İçindekiler / Contents

Increasing Number of Children and Poverty: A Multidimensional Approach
Mehmet ZANBAK Selim ÇAĞATAY *299-317*

Ownership Level in Cross-border M&As of Turkish MNCs: The Role of Ownership Concentration and Institutional Contexts
Ayşe KAYACI, Aylin ATAAY *319-332*

Accounting Conservatism and Intellectual Capital: Evidence From Turkey With Comparison Models and Sectors
Uğur BELLİKLİ, Abdulkerim DAŞTAN *333-355*

Media-Coverage-Related Investor Sentiment During the COVID-19 Pandemic
Esra BULUT, Seval AKBULUT BEKAR, Gülay ÇİZGİCİ AKYÜZ *357-372*

The Role of Business Analytics in Transforming Management Accounting Information into Cost Performance
Metin UYAR *373-389*

Role of Emotional Intelligence and Work-Life Balance in Relationship between Workplace Happiness and Perceived Performance in Academic Setting
Tayfun ARAR, Melahat ÖNEREN *391-406*

Contagion in Turkish Stock Market: Evidences from Developed and Emerging Markets
Elif Hilal NAZLIOĞLU, Dündar KÖK *407-425*

Persistence of Policy Shocks to the Ecological Footprint of MINT Countries
Ali Eren ALPER, Özlem ALPER *427-440*

EGE AKADEMİK BAKIŞ
Cilt 2021 • Sayı 4 • October 2021

EGE ACADEMIC REVIEW
Volume 21 • Number 4 • October 2021

EGE AKADEMİK BAKIŞ

EGE ACADEMIC REVIEW

Ekonomi, İşletme, Uluslararası İlişkiler
ve Siyaset Bilimi Dergisi

Journal of Economics, Business Administration, International Relations and Political Science

Cilt 21 • Sayı 4 • Ekim 2021
Volume 21 • Number 4 • October 2021

ISSN 1303-099X

ISSN – 1303-099X

Ege Akademik Bakış
Ekonomi, İşletme, Uluslararası İlişkiler ve Siyaset Bilimi Dergisi

Ege Academic Review
Journal of Economics, Business Administration, International Relations and Political Science

Cilt 21 • Sayı 4 • Ekim 2021
Volume 21 • Number 4 • October 2021

Yayınlanma Sıklığı / *Frequency:* **Yılda dört kez** / *Four Times in a Year*

Yayınlayan / *Publisher*
Ege Üniversitesi, İktisadi ve İdari Bilimler Fakültesi
Bornova 35100 İZMİR / TÜRKİYE

E-mail: eab@mail.ege.edu.tr

Basım Yeri: Ege Üniversitesi Basımevi Müdürlüğü **Basım Tarihi:** 1 Ekim 2021
T.C. Kültür ve Turizm Bakanlığı Sertifika No:18679

Ege Akademik Bakış

Ege Akademik Bakış Dergisi, iktisat, işletme, uluslararası ilişkiler ve siyaset bilimi alanlarında çalışan akademisyenler, araştırmacılar ve profesyonellerin görüşlerini paylaştıkları bir forum oluşturmak amacıyla, bu alanlarda yapılmış olan uluslararası çalışmaları kapsamaktadır. Ege Üniversitesi İktisadi ve İdari Bilimler Fakültesi tarafından Ocak, Nisan, Temmuz ve Ekim aylarında olmak üzere yılda dört defa yayınlanan hakemli bir dergi olup, Türkçe veya İngilizce olarak kaleme alınmış tüm çalışmalar dergide yayınlanmak üzere gönderilebilir. Ege Akademik Bakış Dergisi aşağıdaki veri tabanlarınca taranmaktadır:

- EconLit (http://www.aeaweb.org/)
- ULAKBİM, Sosyal ve Beşeri Bilimler Veri Tabanı (http://www.ulakbim.gov.tr/)
- Emerging Sources Citation Index (ESCI)
- Director of Open Access Journals(http://www.doaj.org/)
- EBSCO Publishing (http://www.ebscohost.com/)
- PERO(http://knjiznica.irb.hr/pero)
- Scientific Commons(http://en.scientificcommons.org)
- WorldWideScience(http://worldwidescience.org)
- ProQuest(http://www.proquest.com)
- ASOS Index(http://www.asosindex.com)
- RePEc (http://www.repec.org)

Makaledeki görüşler yazarlarına aittir. Dergide yayınlanan makaleler kaynak göstermeden kullanılamaz.

Ege Academic Review includes international papers about economics, business administration, international relations and political science with the aim of providing a forum for academicians, researchers and professionals interested in these fields. This journal is subject to a peer-review process. Ege Academic Review is published by Ege University Faculty of Economics and Administrative Sciences for four times in a year. Papers written in Turkish and English can all be sent in order to be published in the journal. The articles in Ege Academic Review are indexed/abstracted in:

- EconLit (http://www.aeaweb.org/)
- ULAKBİM, Social Sciences and Humanities Database (http://www.ulakbim.gov.tr/)
- Director of Open Access Journals(http://www.doaj.org/)
- EBSCO Publishing (http://www.ebscohost.com/)
- PERO(http://knjiznica.irb.hr/pero)
- Scientific Commons(http://en.scientificcommons.org)
- WorldWideScience(http://worldwidescience.org)
- ProQuest(http://www.proquest.com)
- ASOS Index(http://www.asosindex.com)
- RePEc (http://www.repec.org)

Authors are responsible for the content of their articles. Papers published in the journal can not be quoted without reference.

Volume 21 • Number 4 • October 2021
Cilt 21 • Sayı 4 • Ekim 2021

Contents

Increasing Number of Children and Poverty: A Multidimensional Approach
Mehmet ZANBAK· Selim ÇAĞATAY *299-317*

Ownership Level in Cross-border M&As of Turkish MNCs: The Role of Ownership Concentration and Institutional Contexts
Ayşe KAYACI, Aylin ATAAY *319-332*

Accounting Conservatism and Intellectual Capital: Evidence From Turkey With Comparison Models and Sectors
Uğur BELLİKLİ, Abdulkerim DAŞTAN *333-355*

Media-Coverage-Related Investor Sentiment During the COVID-19 Pandemic
Esra BULUT, Seval AKBULUT BEKAR, Gülay ÇİZGİCİ AKYÜZ *357-372*

The Role of Business Analytics in Transforming Management Accounting Information into Cost Performance
Metin UYAR *373-389*

Role of Emotional Intelligence and Work-Life Balance in Relationship between Workplace Happiness and Perceived Performance in Academic Setting
Tayfun ARAR, Melahat ÖNEREN *391-406*

Contagion in Turkish Stock Market: Evidences from Developed and Emerging Markets
Elif Hilal NAZLIOĞLU, Dündar KÖK *407-425*

Persistence of Policy Shocks to the Ecological Footprint of MINT Countries
Ali Eren ALPER, Özlem ALPER *427-440*

EGE AKADEMİK BAKIŞ / *EGE ACADEMIC REVIEW*

Cilt 21 • Sayı 4 • Ekim 2021
SS. 299-317
Doi: 10.21121/eab.1015821
Başvuru Tarihi: 19.10.2020• Kabul Tarihi: 10.09.2021

Increasing Number of Children and Poverty: A Multidimensional Approach

Mehmet ZANBAK[1], Selim ÇAĞATAY[2]

ABSTRACT

This study aims at looking at the effects of increasing number of children on poverty. Unlike monetary approaches based on income and consumption expenditures, the multidimensional poverty approach, which includes dimensions such as education, health and environmental factors, can conduct a more accurate analysis based on the deprivation of individuals and households. In other words, determining how a differentiation in household size based on the number of children is reflected in the multidimensional poverty of the household is among the main goals of the study. For this purpose, in light of the data of the head of households based on the 2006 and 2017 data of the Turkish Statistical Institute (TurkStat), a multidimensional poverty measurement is carried out for Nomenclature of Territorial Units for Statistics (NUTS) Level-1 regions of Turkey and for the entire country and it is examined whether the increase in the number of children might cause an increase in the household poverty. It can be specified among the findings of the study that the multidimensional poverty is increased with the increased number of children in the households as we move from west to east of Turkey.

Keywords: Number of children, Household size, Multidimensional poverty.

JEL Codes*:* I32, O18, R29.

1. INTRODUCTION

The increase in the average number of children in households has been voiced for nearly two decades and is even supported by some policies. The short-term and long-term effects of the increasing number of children in the household may differ and may have different effects on the welfare level of these households. For example, whether children who reach the age of 15 will be employed or continue their education in the labour market depends on the economic conditions and capabilities of the households. If they are employed, what kind of jobs they are going to get, how much added value will be produced; if they continue education, what quality and what kind of education they will receive are all important questions to be answered and planned in advance. Of course, it is another possibility to enter the labour market but stay unemployed. Data published by TurkStat (2020) indicate that the unemployment rate for 15-24 age group is 26.1%. Besides, the rate of those who are neither in education nor in employment is around 29.3%. When these two rates are evaluated together, it can be said that a significant portion the youth are not in a position to bring income to their households. Therefore, increase in number of children without the improvements to the current economic conditions in Turkey would be negatively reflected on the poverty of households in the coming period. Based on this perspective, this study aims at looking at the relationship between increasing number of children and poverty.

In the literature poverty is often considered as the monetary deprivation. However, in cases where there is sufficient income, there may be different types of deprivations in households regardless of income level. Different deprivations lead to a poor quality of life for individuals and households, and even their freedom can be restricted. In this case, looking at and measuring the phenomenon of poverty only in monetary terms may mean ignoring the various dimensions of the problem. The first studies on the lack of this diagnosis and measurement method entered the literature within the framework of the Sen (1976)'s "capabilities approach".

[1] mehmetzanbak@akdeniz.edu.tr
[2] selimcagatay@akdeniz.edu.tr

Later, Alkire and Foster (2011a; 2011b) introduced the multidimensional poverty method to the literature and in parallel with this, created a measurement method that takes all dimensions into account.

In this study, Alkire et al. (2014)'s multidimensional poverty measurement method –referred as the Alkire-Foster (AF) method in the literature- is used to highlight the forgotten and lost dimensions of poverty and the dimensions, indicators and weights used in calculations are chosen accordingly with Alkire and Foster's suggestions. Special attention is given to health and education indicators of households in calculations as access to education and health opportunities has an important place among the basic capabilities of the individual. While these two basic variables, which are also included in the United Nations Sustainable Development Goals, contribute to the increase in the quality of life of the individual, the deficiencies in these skills stand out as an indicator of underdevelopment. For this reason, in this study, education and health indicators represent 5 of the 12 indicators focused on in the measurement of poverty.

Accordingly, it was deemed appropriate to make an assessment for the whole Turkey and then 12 NUTS Level-1 regions according to the Nomenclature of Units for Territorial Statistics (NUTS) in the first place to the extent permitted by the data set. In the study, the sample group was also separated according to the number of children in order to highlight the effects of the diversity in the number of children on poverty. For this purpose, the data of household heads of households with a mother and father and at least 1 child were used and single-parent households with or without children were not included in the study.

In this study, it is planned to get answers to the following questions; how the multidimensional poverty of the households change when the number of children increases up to 3 and more rather than a single child per household, whether the household poverty differentiates from west to the east of the country as the number of children increases, and lastly, how multidimensional poverty occurred on a national and regional basis between 2006-2017. For this purpose, the second part of the study introduces the multidimensional approach and measurement method, and the empirical literature using this methodology is given in part three. In the fourth part, in light of the data discussed, findings regarding national and regional multidimensional poverty are presented. Last part concludes with a general evaluation.

2. MULTIDIMENSIONAL MEASUREMENT OF POVERTY WITH THE ALKIRE-FOSTER METHOD

The Alkire-Foster Method (Alkire and Foster, 2011a; 2011b) (shortly AF Method) was developed by Sabina Alkire and James Foster. The FGT index (Foster et al., 1984) is a poverty measurement method used by Foster-Greer-Thorbecke and forms the basis of the Alkire-Foster Method together with the "capability approach" of Amartya Sen (1976). The Alkire-Foster Method, which was introduced to the literature in 2011, has since become a measurement method that is frequently used in many of the research on multidimensional poverty. When measuring poverty, the main problem is determining the thresholds of deprivation and poverty of the individual. These thresholds must be correctly analysed in order to identify the individual as poor or not. In the Alkire-Foster method, measurements are made on a counting basis. In this method, the "dual cutoff" approach is used as a method of determining the depth of poverty, even its severity and even intensity within the group by dividing poverty into subgroups, where the thresholds of deprivation and poverty can be determined effectively.

In order to develop a design that accepts the approach based on the Alkire-Foster Method as the fundamental dynamic and which is a "multidimensional poverty index (MPI)" based on observation, it is necessary to determine many and different parameters in a healthy and accurate manner. In the selection of these parameters, which will be used while designing the multidimensional poverty index, the data is passed through some stages. These stages can be listed under five headings as follows (Alkire, 2018; Alkire et al., 2014; Song and Imai, 2018):

Dimensions: The first and most important step is the dimension selection to make an accurate measurement. While selecting the dimensions, it should be made in a way that gives the healthiest results for the sample group. Dimensions should cover everyone in the sample, and no observations made in the sample should be ruled out. (Alkire and Jahan, 2018).

Indicators: Indicators are the elements that clearly demonstrate the situation of the sample group, which are developed to expose the deprivation of individuals or households in social, economic or cultural areas.

Deprivation Cutoffs: Accurate measurement of the index is possible with the correct determination of deprivation cutoffs. Deprivation cutoffs are the determination of a minimum level of capability determined as a result of determining whether an individual or household can be considered deprived for each indicator to be measured.

Weighting: Relative weighting determines how much the dimension and sub-indicators selected will affect the index. Selection of weighting is done entirely by the author. The effect ratios of these dimensions and sub-indicators selected by the author are equal in general. However, there are alternative weighting methods according to the sample group to be observed and inferred (Seth and McGillivray, 2018).

Poverty Cutoffs: The author of the research should have comprehensive information about the sample in order to determine poverty cutoffs correctly. This is because this threshold is generally set in line with the expectations of the researcher (Alkire and Foster, 2011b). Poverty cutoffs are the lowest limit values calculated by weighting from each indicator in order to identify the individual or household as poor according to the study to be conducted.

Following the steps listed above, the dimensions, indicators, deprivation cutoffs, weighting and poverty cutoffs are determined in accordance with the Alkire-Foster approach. In light of all this data, the next step is to create achievement matrices using the data obtained from the household through the survey. Thus, the deprivation matrix indicating which individual in the sample is deprived of in what dimension/indicator is reached. In this process leading to the deprivation matrix, individual deprivations in dimensions/indicators should be determined first. For the data obtained as a result of this determination, it can be said that the AF method measures poverty by using the matrices. Since the Alkire-Foster method is counting-based, first the matrices are defined, then multidimensional poverty and related multidimensional poverty indices are calculated using the censored matrix (Alkire and Foster, 2011b). It is possible to express the steps taken in a mathematical plane;

First, the $Y=[y_{ij}]_{nxd}$ matrix, which is created and called the achievement matrix consisting of *n* observations (individuals) and *d* dimensions/indicators (*nxd*) with raw data, is defined. In this $[y]_{nxd}$ matrix, the columns represent dimensions and sub-indicators of dimensions, if there are any. Each row gives the values that each individual in the sample receives in dimensions/indicators (i=1,…,n and j=1,…,d). For example, the point where the first row and first column intersect (the value expressed as y_{11} in equation 1) shows the value of the first individual in the first dimension/indicator.

$$\begin{array}{c} \text{Dimension} \\ Y = \begin{bmatrix} y_{11} & y_{12} & y_{13} & \cdots & y_{1d} \\ y_{21} & y_{22} & y_{23} & \cdots & y_{2d} \\ y_{31} & y_{32} & a_{33} & \cdots & y_{3d} \\ y_{41} & y_{42} & y_{43} & \cdots & y_{4d} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ y_{n1} & y_{n2} & y_{n3} & \cdots & y_{nd} \end{bmatrix} \text{Individual} \end{array} \quad (1)$$

In the second step, the "deprivation cutoff" vector matrix is defined.

$$Z = [\ Z_{11} \quad Z_{12} \quad Z_{13} \quad \ldots \quad Z_{1d}\ ] \quad (2)$$

It is a *1xd* matrix shown in Equation 2 and the value belonging to each dimension determined by the researcher is compared with the threshold values of the dimension to which it belongs. Individuals below or above these values are considered to be deprived of that dimension depending on the character of the dimension. The mentioned-matrix is important in revealing which individual is deprived of which dimension.

In the third step, the deprivation counts matrix is defined.

$$C = [C_{11} \quad C_{21} \quad C_{31} \quad \ldots \quad C_{n1}]' \quad (3)$$

It is a *nx1* matrix shown in Equation 3 (*transposition of the equation*). The dimensions that each individual is deprived of are counted, these dimensions are added together and the sum is written into this matrix. In this way, the dimensions the n^{th} individual is deprived of are revealed. This is an important indicator in terms of reflecting the depth of an individual's deprivation (Alkire and Foster, 2011a; 2011b).

In the fourth step, the poverty cutoff value is defined. This value, which is expressed as *k*, must be greater than zero and smaller than the total number of dimensions used in the study (0<*k*<d). In the AF method, it is generally taken as 2 (k = 2). If the mentioned *k* value compared with the values in the C matrix in the equation 3, which shows the total deprivation count mentioned in the third step, is found to be smaller than the value in each row of the C matrix, the individual in that row is considered poor. This is a very important value in terms of showing how many people are under the *k* cutoff value and how many poor individuals there are in this observation group; thus, it should be

selected very carefully. Otherwise, if the cutoff value of *k* is taken higher than it should be, the number of poor in the observation group will be lower than expected, or on the contrary, the majority of the observation group will be above the poverty line. In such a case, the measurement will not give accurate results and accurate policies will not be developed. These four steps mentioned are explaining how the definitions should be for a measurement carried out with the AF method. The steps should be followed for the measurement are shown in Figure 1.

Calculation of the multidimensional poverty index (M_0):

Headcount ratio (H): This concept, which is frequently used in poverty measurements, is called by various names such as *the poverty rate, ratio of the number of people*. In other words, while *q* represents the number of poor individuals in the total population, *n* represents the total population, the headcount rate *H* is calculated as shown in equation 4.

$$H = \frac{q}{n} \tag{4}$$

This ratio, calculated using equation 4, takes a value between 0 and 1, which indicates that if the ratio is 0, there is no poor person in the population, and if it takes the value 1, the whole population is poor (Haughton and Khandker, 2009).

Average deprivation ratio (A): This ratio is very important in terms of showing the depth of poverty and showing the deprivation that poor people experience per dimension. *The sum of deprivations;* represents the sum of the total deprivation counts each individual is exposed to, *q* represents the number of poor individuals in the total population mentioned in the headcount rate, *d* represents the total number of dimensions in the achievement matrix in equation 1, while the average

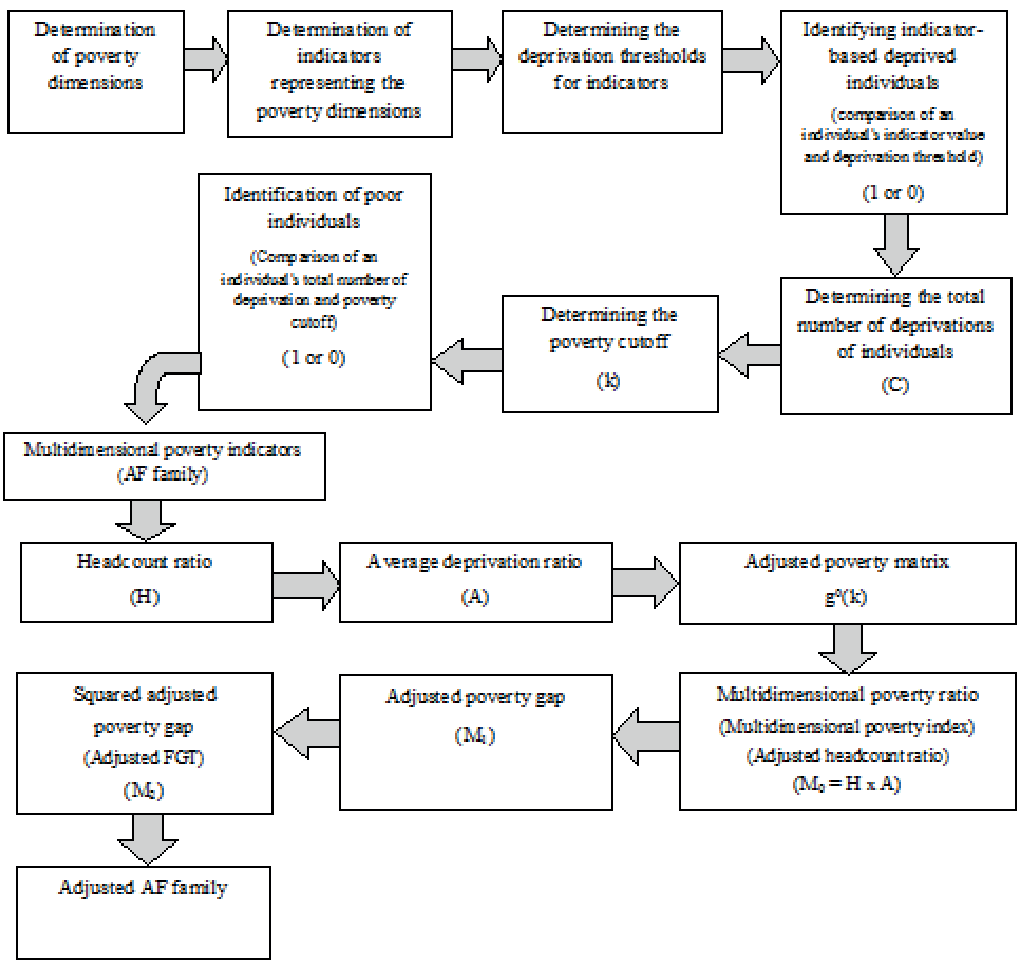


Figure 1: The Stages of Multidimensional Poverty Measurement

Source: Zanbak and Çağatay, 2013.

deprivation ratio is calculated as shown in equation 5 (Zanbak, 2014).

$$A = \frac{Average\ Deprivation}{Number\ of\ Dimensions} = \frac{\frac{Sum\ of\ Deprivations}{Number\ of\ Poor\ Individuals}}{Number\ of\ Dimensions} = \frac{\frac{\sum_1^d C}{q}}{d} \quad (5)$$

Adjusted headcount ratio (multidimensional poverty index) (M_0): The adjusted head count ratio is the most commonly used index in the Alkire-Foster method and it is very important in terms of showing the level of poverty experienced. This importance is due to the fact that it allows the factors such as units, regions, etc. affecting the poverty index to be revealed by dividing the observation group into subgroups and the index can be subdivided into subgroups. M_0 can be calculated in two different ways: In the first way, this ratio is obtained by multiplying the headcount ratio (H) and the average deprivation ratio (A) as given in equation 6. In the second way, it is calculated by taking the arithmetic average (: arithmetic average function) of "g^0(k), censored deprivation matrix" shown in equation 7 (Alkire and Foster, 2011b).

$$M_0 = H\ x\ A \quad (6)$$

$$M_0 = \mu\ [\ g^0\ (k)] \quad (7)$$

3. LITERATURE REVIEW

In this section, the empirical literature will be evaluated from two different angles, and in the first stage, studies conducted using a multidimensional approach, which is a method of addressing poverty, will be included. Some of the research looking at the relationship between household size and poverty based on the number of children will be summarized in the following sections.

In order to overcome the lack of monetary poverty measurements both in the national and international arenas, new ways have been proposed, and poverty has been attempted to be disclosed by evaluating all aspects of life with these approaches. Sen (1976; 1983; 1997; 1999; 2004) and Foster et al. (1984) can be listed among the first researchers to distinguish these approaches from monetary methods. These studies, in contrast to the narrow view of poverty in the discipline of economics, emphasize that poverty is not solely dependent on income, and that everything related to a good life should be taken into account in the measurement of poverty. One of the first and most important studies to introduce a distinct perspective to poverty measurements was conducted by Bourguignon and Chakravarty (2003). A multidimensional computation method is offered in the study as an alternative to monetary approaches, with each dimension having its own poverty line. It is suggested that the poverty dimensions should be defined first, followed by the poverty lines of these dimensions.

Alkire and Foster's (2011a) study includes another measurement method that differs from monetary approaches and takes its place as the "AF Approach" in the literature. While this approach differs from monetary approaches with more than one dimension in the analysis, it also differs from the multidimensional approaches developed in previous years by calculating the average deprivation rate, the average poverty gap, the square of the average poverty gap representing the severity of the gap, and thus obtaining the adjusted headcount ratio, the adjusted poverty gap and the adjusted FGT (squared adjusted poverty gap). In their study of poverty measurement theory, Lugo and Maasoumi (2009) aimed to introduce the poverty rates calculated using monetary indicators and the rates calculated using a multidimensional approach, and analyzed poverty among three ethnic groups in Indonesia in terms of expenditure, health status and education level. One of the most comprehensive worldwide studies of multidimensional poverty measurement is the study of Alkire and Santos (2010), which covered 104 developing countries and used data from 2000 to 2008. A poverty calculation based on income was also made in the study, and it was determined whether they were poor using a multidimensional approach. Alkire and Foster (2011b), who conducted one of the pioneering studies in measuring poverty in a multidimensional way, noted that it is insufficient to reflect poverty only with monetary indicators, and therefore, the missing dimensions of poverty should be included in the calculation. It has also been stated that determining the indicators that would represent these missing dimensions, which also contribute to a better understanding of poverty, and the determination of their deprivation lines is a difficulty. According to the researchers, the most significant contribution of the AF approach to the literature, which determines poor individuals based on the number of deprivations they have experienced, is that the average deprivation experienced by the individual is included in the measurement, and the adjusted headcount ratio is calculated in this way.

The human development index and income-based poverty rates were calculated first in the study of Batana (2013), one of the studies that analyzes poverty multidimensionally in 21 Sub-Saharan African nations, and then the values obtained were compared with multidimensional poverty rates based on the AF approach. Assets, health, education, and empowerment dimensions (11 indicators) were included in the calculation to make the study multidimensional, while the poorest sub-regions and the dimensions with the highest deprivation were also analyzed.

Another study group that will be covered under the title of literature consists of studies that look at how poverty evolves as household numbers differ. Anand's (1977) study uses field research data to evaluate the scope and nature of poverty in Malaysia. The findings reveal that the relationship between household size and poverty in Malaysia is positive up to 7-member households, and the relationship thereafter is uncertain. Furthermore, when the percentage distribution of household size between poor and non-poor households was compared, it was discovered that the impoverished have a larger average household size. In another study within this scope, Anyanwu (2005) used a logistic regression model to assess the profile of rural poverty in Nigeria using the 1996 national consumer survey dataset. According to the findings, there is a positive and substantial relationship between household size and the likelihood of being impoverished in Nigeria's rural areas. Similarly, Anyanwu (2014) looked at the effect of household size and marital status on poverty in Nigeria, using data from the 2009/2010 Harmonized Nigerian Standard of Living Survey. The findings show that household size has a considerable effect on poverty. While poverty was found to be lower in single-person households, it was discovered that the likelihood of being poor increased as the number of children in the household increased.

Geda et al. (2001) conducted another study focusing on the relationship between household size and poverty. The researchers used binomial and multidimensional logit models to examine the possible drivers of Kenya's poverty condition in the light of household-level data gathered in 1994. As a result of the findings, it has been shown that household size has a positive and strong relationship with poverty. Khan et al. (2015), on the other hand, used data from a rural-based household survey to examine the determinants affecting poverty in 600 families in Pakistan's Bahawalpur region, and found that household size considerably increased household poverty as a result of the estimation.

Furthermore, in their study evaluating the poverty patterns of extended families in developing nations, Lanjouw and Ravallion (1995) used the data of a field study conducted with 4,794 households in urban and rural parts of Pakistan in 1991. As a result of the analysis, a positive correlation was found between poverty and household size for Pakistan, indicating that the increase in the number of people in the household also increased poverty. Meyer and Niyimbanira (2016) employed Pearson's chi-square test method to examine the relationship between household size and poverty in low-income communities, using data from 12 communities (about 2900 families) in the Northern Free State region of South Africa. According to the findings, a positive relationship was found between household size and poverty in 11 of 12 communities.

4. THE EFFECT OF THE HOUSEHOLD POPULATION WHICH DIVERSIFIES ACCORDING TO THE NUMBER OF CHILDREN ON MULTIDIMENSIONAL POVERTY

4.1. Sample

In this study, the required data was obtained by extracting the cross-sectional data of the Turkish Statistical Institute Income and Living Conditions Survey in 2006 and 2017. When the raw data are analysed for the sample group of 2006, it is observed that there were 10,920 households in the country and a total of 30,186 people live in these households. Accordingly, it can be said that the average population was about 3 (2.7) per household in 2006. Similarly, when the sample group for 2017 is examined, it is seen that there are 22,869 households and 58,744 individuals living in these households and the average household size is 2.5.

Since the main purpose of this study is to determine how the size of households that differ according to the number of children is reflected in poverty, the relevant sample is also divided according to the number of children. In this respect, in the first stage, the sample was grouped into households with one, two to three and more children with a precondition of including households with married individuals in the analysis. As shown in Table 1, the number of households with one child is 1366, 1652 with two children, and 1398 with three or more children for the year of 2006. On the other hand, the number of households with one child is 2907, 3237 with two children, and 2203 with three or more children for 2017.

Another aim of the study is to determine how the household poverty, which differs with the change in the number of children, is distributed by regions. For this purpose, the data of twelve NUTS Level-1 regions were used. Hence, when the households of both 2006 and 2017 are analysed from a regional perspective, the number of children is increasing from west to east. It can be said that the number of households with three or more children, especially in the regions of Northeast Anatolia, Middle Eastern Anatolia and Southeastern Anatolia, stood out in both 2006 and 2017. On the other hand, it can be emphasized that the number of households with two children is higher than the others for both analysis years towards the west.

Before the multidimensional poverty measurement of the households shown in Table 1, which differed by the number of children and years, comparing the average incomes of the regions with the average income of Turkey, it can be said that some regions have diverged from the overall average in a positive and some in a negative way. While the average income of households with 1 child in the western regions of the country is above the country average, this situation reverses as the number of children increases in the eastern regions. For example, even though the average income of a household with one child for Istanbul Region in 2006 was 1.3 times the average income of Turkey, the average income of the region in 2017 has come to the same level as the national average. This region is one of the most advantageous regions in terms of average income, and this result can be seen as normal considering the potential for the labor market.

As mentioned, the increase in the number of children and the orientation to the eastern regions resulted in a lower household income than the national average, but this situation did not differ significantly between 2006 and 2017. In other words, the ratio of the average income of households with three or more children in regions other than Istanbul and East Marmara regions to the national average is not very different from each other on the basis of both years. In addition, the regions with an average income of households with three children below the average income of Turkey can be listed as Southeastern Anatolia, Middle Eastern Anatolia and Eastern Black. At this point, it can be emphasized that the same regions showed a slight improvement from 2006 to 2017 and converged to the country average at a low rate.

4.2. Dimensions, Indicators, Deprivation Conditions, and Weights Used in the Study

In order to calculate the poverty of households and to determine which indicators stand out as the number of children differs, "Europe 2020; A Strategy for Smart, Sustainable and Inclusive Growth" (European Commission, 2010) was taken as the basis and the dimensions, indicators and weights specified in the study of Alkire et al. (2014) were used[1]. Alkire et al. (2014) created a set of indicators in which Europe 2020, education, health and environmental factors are evaluated together for poverty measurement. The weighting method varying according to the number of dimensions was selected in this formation, which includes a total of four dimensions and twelve indicators representing these dimensions.

Table 1: Regional Distribution of Households Varying by the Number of Children.

TR1		Istanbul	West Marmara	Aegean	Eastern Marmara	Western Anatolia	Mediterranean	Central Anatolia	Western Black Sea	Eastern Black Sea	Northeast Anatolia	Middle Eastern Anatolia	Southeastern Anatolia	Turkey
		TR2	**TR3**	**TR4**	**TR5**	**TR6**	**TR7**	**TR8**	**TR9**	**TRA**	**TRB**	**TRC**	**TR**	
1 child	**2006**	200	131	228	135	121	172	83	77	68	49	45	57	**1366**
	2017	323	225	432	339	300	355	163	245	92	124	115	194	**2907**
2 children	**2006**	208	138	228	142	176	199	104	114	99	75	77	92	**1652**
	2017	331	186	440	333	332	427	254	271	98	155	187	223	**3237**
3 children and above	**2006**	108	35	68	57	94	150	102	74	66	152	163	329	**1398**
	2017	165	44	121	137	166	285	150	98	53	172	264	548	**2203**

At this point, the dimensions and indicators included in the analysis can be introduced. The Europe 2020 dimension, the first of these four dimensions, includes "income", "work intensity" and "extreme material deprivation" sub-indicators. The income deprivation of the individual and therefore the household is determined by comparing whether the equivalent per capita income determined using the OECD scale is below 60% of the median income. In this study, which investigates household poverty rather than individual poverty, the household head data determined by verbal statements were used to include income and other indicators in the study. Another indicator that reflects the income dimension is extreme material deprivation, in which the Eurostat norms are taken as the basis in the determination of deprivation. According to Eurostat, in order to be able to say that an individual is experiencing extreme material deprivation, at least four of the following nine items should be experienced at the same time; inability to afford unexpected expenses; difficulty in paying debts such as rent, bills, mortgage loan etc.; inability to meet the heating needs of the house; not being able to eat meat, chicken or fish every other day; inability to take a one-week vacation with all family members away from home; not being able to own a washing machine, colour television, mobile phone and car. In addition, in determining the work intensity representing the Europe 2020 dimension, the ratio of the total number of months worked by individuals of working age to the number of months they are eligible to work becomes important, and individuals with this ratio below 0.2 are considered deprived. As mentioned, in determining the dimensions and indicators used in the study, the study of Alkire et al. (2014) was taken as the basis and the researchers attached importance to the education dimension in order to obtain the multidimensional poverty index. In fact, this dimension was represented by a single indicator in the form of basic education by taking its potential impact on other dimensions into consideration. In other words, due to the high power of influencing both income and indicators in other dimensions, the weight of the indicator representing education has become relatively prominent. The fact that the individual has not received primary education corresponds to the deprivation in the education dimension.

Another dimension used in the calculation of the multidimensional poverty index is related to health. There are four sub-indicators under this dimension. A determination that is defined as bad or very bad in the health status indicator of the individual leads to the acceptance of the individual as deprived in this indicator. The second sub-indicator in the health dimension focuses on whether the individual has a chronic disease or not, and the presence of the individual's chronic disease indicates deprivation. In the third indicator of the health dimension, which focuses on whether there is a limitation in the activities of the individual (eating, sports, etc.) due to health problems, the person is considered to be deprived if he/she feels physically inadequate. In addition, the final indicator of health points out the capacity of the individual to consult a doctor in case of need. If the person is unable to apply to a doctor or any health institution due to severe health problems, this person is considered deprived in this indicator. Another indicator group considered by Alkire et al. (2014) while calculating the multidimensional poverty index includes environmental factors. In the first environmental factor indicator focusing on the environment in which the individual lives and the physical structure of the house, if the roof of the house where the individual lives is leaking water, the walls are damp and the window profiles are rotten, the person is considered deprived. Another of the four environmental factor indicators focuses on noise pollution. If the household is exposed to disturbing sounds from neighbours or the street, the individuals in this household are included in the analysis as deprived. Furthermore, if there is industrial-based air pollution, traffic density, environmental degradation and pollution in the environment where the individual lives, he/she is considered to be deprived in this indicator. The final indicator points to the possibility of an individual facing criminal incidents, and the fact that the crime is hosted or violent incidents are encountered in the living environment makes the individual deprived.

At this point, the dimensions, indicators and indicator weights used in the calculation of multidimensional poverty can be shown as in Table 2.

Alkire et al. (2014) put different options in the weighting of indicators when measuring, specifying the number of indicators in the health dimension as three, then four, and included the indicator weights of this dimension as 1/12 and 1/16, respectively. In this study, in which the reflection of the household population that differs by the number of children to multidimensional poverty is tested, the health dimension is represented by four indicators, as emphasized above, so the weight of each indicator of the health dimension included in the measurement is 1/16. The weight of the indicators of the Europe 2020 dimension, which includes three indicators, is 1/12, the weight of the indicator for the education dimension, which includes only one indicator, is 1/4, and lastly, the weight of the indicators in the environmental factors dimension where the four indicators are included in the analysis is 1/16.

After determining the dimensions, indicators, deprivation conditions and weights required for measurement, it has become possible to calculate multidimensional poverty on a national and regional scale (Level-1). Therefore, the multidimensional poverty index measurement phase was started after these determinations. Following the creation of the required matrices of the 2006 and 2017 sample groups, which differed according to the number of children, the Headcount Ratio (H) and the Average Deprivation Ratio (A) were calculated in the first place, and then the Multidimensional Poverty Index (M_0) consisting of these two ratios was obtained. In other words, the multidimensional poverty of households with one, two, three or more children aged 15 and under was calculated both nationally and regionally and policy recommendations were presented in the light of the findings.

4.3. Multidimensional Poverty of Households Differentiated by Number of Children in Turkey

Once the necessary matrices were created, the poverty cutoff was set to k=26% in order to calculate the poverty of the sample group, which was also separated according to regions. In other words, if the value of each row of the matrix showing the sum of the deprivation counts (C) is 0.26 and above, it can be said that the households[2] in that row are considered deprived. When the share of deprivations in the regions under the indicators and conditions of poverty is examined throughout Turkey, it is observed that Istanbul stands out with single-child households, while the Southeastern Anatolia Region stands out with households with 3 or more children. In other words, while 15% of the nationwide deprivation in 2006 was experienced in the Istanbul region, this share was realized as 11% in 2017. The shares of deprivation experienced by households with 3 or more children in the same region in 2006 and 2017 were 8% and 7.5%, respectively. However, it can be emphasized that the deprivation in households with one child is concentrated in the western regions, while it is concentrated in households with three or more children in the eastern regions. In particular, the

Table 2: Dimensions, Indicators, and Weights Used in the Multidimensional Poverty Measurement.

Dimensions	Indicators	Deprivation Conditions	Weights
Europe 2020	Income	If the equivalent per capita income is below 60% of the median income	1/12
	Extreme Material Deprivation	If deprived from at least four of the nine items determined by Eurostat	1/12
	Work Intensity	If the ratio of the total number of months worked by individuals of working age to the number of months, they are eligible to work is below 0.2	1/12
Education	Graduated School	If the person didn't receive primary school education	1/4
Health	Health Status	If the individual describes his/her health status as bad or very bad	1/16
	Chronic Health Problem	If the person has a chronic disease	1/16
	Limitation in the Activities	If the individual has difficulty performing daytime activities	1/16
	Being Unable to Apply to the Doctor	If the individual is unable to apply for a medical examination and doctor in case of need	1/16
Environmental Factors	Housing	If the roof of the household where the individual lives is leaking, the wall is damp, the window is rotten	1/16
	Noise Pollution	If the household of the individual is disturbed by the sounds coming from the street or from the neighbours	1/16
	Environmental pollution	If there is a traffic problem, industry-induced air pollution and environmental pollution in the environment where the individual lives	1/16
	Crime	If the individual is intensely faced with crime and violence problems in the environment where he/she lives	1/16

Eastern Anatolia Region contains an important part of the total deprivation experienced in this sample group. In other words, while 13% of households with 3 or more children and experiencing deprivation in at least one of the indicators were located in Southeastern Anatolia in 2006, this ratio reached 20% in 2017. In other words, 1 out of every 5 individuals, who is deprived of at least one indicator in the mentioned sample group, lives in Southeastern Anatolia. Other regions where deprivation proportionately stands out in at least one indicator in both time periods in households with 3 or more children, which can also be defined as crowded households, are the Mediterranean, Central Anatolia and Middle Eastern Anatolia Regions. However, in this sample group, the proportion of those in the same situation in Western Marmara is 2.7% and 2.3%, respectively.

After determining the deprivations at the point reached, the headcount ratio (H), average deprivation ratio (A) and multidimensional poverty index (M_0), obtained by multiplying these two values, were calculated for Turkey and then Level-1 regions (Figure 2 and Figure 3).

First, as shown in Figure 2 and Figure 3, the findings related to multidimensional poverty ratios in 12 regions of Turkey for the years 2006-2017 can be evaluated. However, at this point, it is useful to give preliminary information about how these graphics should be interpreted and what the different colours represent. In both Figure 2 and Figure 3, the blue bar represents the multidimensional poverty ratios of households with 1 child, the red bar with 2 children, and the green bar with 3 or more children, respectively. The relatively long length of a bar with the same colour indicates that poverty in that region is relatively high compared to other regions. Furthermore, more poverty in different coloured bars in one region, which vary depending on the number of children, again corresponds to the long-coloured bar.

For example, in the overall measurement of Turkey; based on the findings shown in Figure 2, it is seen that in a family consisting of mother and father with 1 child, the multidimensional poverty ratio is 6.8% in 2006 and this is represented by a blue bar. In the same year, in case the number of children in the household is 3 or more, the multidimensional poverty ratio reached 8.4% with an increase of more than 1.5 points, and this level was reflected in green. When the same scale was analysed for 2017 shown in Figure 2; it can be determined that households with 1 and 2 children have a poverty ratio of 4.4% (respectively blue and red bars), whereas households with 3 and more children have a poverty rate of 5.9% (green bar). Although the poverty ratio has declined in Turkey from 2006 to 2017, the findings suggest that the increase in the number of children in households in both 2006 and 2017 has negatively affected poverty.

When evaluated regionally, it can be said that the region with the highest poverty ratio among families with one child in 2006 was the Southeastern Anatolia Region with a rate of 11.4%. On the other hand, it is

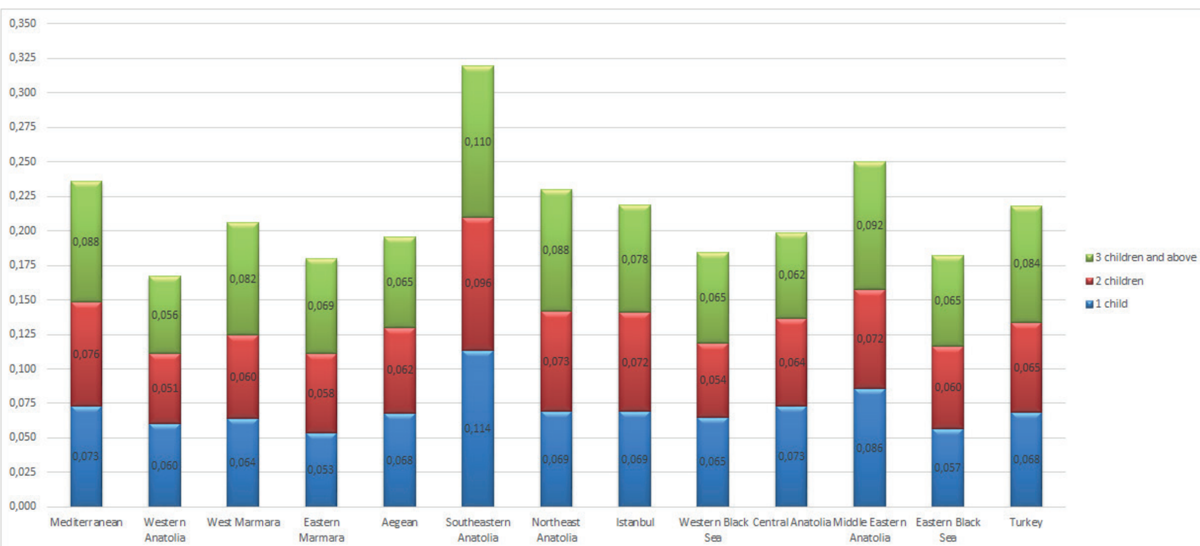


Figure 2: Multidimensional Poverty Ratios (M_0) of Households Differing by Number of Children in Turkey and Level-1 Regions (2006)

observed that households with 1 child in the same year with the lowest poverty ratio are located in East Marmara with a rate of 5.3%. The poverty ratio in East Marmara has declined to 4.3% with the number of children reaching 3 or more, while this rate in Southeastern Anatolia remained at 11%. In addition to the Southeastern Anatolia Region, other regions with relatively high poverty ratios in single-child households for 2006 can be listed as Middle Eastern Anatolia (8.6%), Mediterranean (7.3%) and Central Anatolia (7.3%). The poverty ratio of Middle Eastern Anatolia has increased with the increase in the number of children and reached 9.2% and 8.8%, respectively. On the other hand, the poverty ratio of households with one child has declined to 6.2% from 7.3% in Central Anatolia.

The seven regions, whose poverty ratios increased as the number of children increased to 3 and above from one child, are Northeast Anatolia (+1.9), West Marmara (+1.8), East Marmara (+1.6), Mediterranean (+1.5), Istanbul (+0.9), Eastern Black Sea (+0.8) and Middle Eastern Anatolia (+0.6), respectively. In the Western Black Sea Region, there is no difference between the poverty ratios of households with one child and those with 3 or more children in 2006. The Central Anatolia Region is one of the regions where the poverty rate has decreased the most despite the increase in the number of children (from 7.3% to 6.2%). In addition, it can be said that the increase in the number of children in the Southeastern Anatolia and Aegean Regions, albeit less than 5 per thousand, is positively reflected in household poverty.

When the multidimensional poverty measurements of 2017 are evaluated regionally, it is seen that the Southeastern Anatolia Region stands out again in all samples differing by the number of children (Figure 3). In other words, while the multidimensional poverty ratio of households with 1 child is 6.4% in this region, it is 6.6% in households with 2 children, and 7.3% in households with 3 or more children, respectively. Considering the sample groups of all three levels discussed, it can be said that the Southeastern Anatolia Region is disadvantaged compared to all other regions. The Central Anatolia and Northeast Anatolia Regions are also at the forefront in terms of high poverty ratios in all analysis groups. The regions with the lowest poverty ratio, especially in households with 3 and more children, are the Western Anatolia and Western Black Sea Regions with a rate of 4.2%. In the same analysis, the East and West Marmara and Central Anatolia Regions are among the regions where poverty is relatively low. Based on these results, it can be suggested that poverty increases as we go from west to east, and this finding clarifies one of the questions in the study.

The fact that the number of children is 1, 2, and 3 or more might cause the differentiation of poverty between the regions. In other words, for example, the poverty of households with 1 child and 3 or more children in

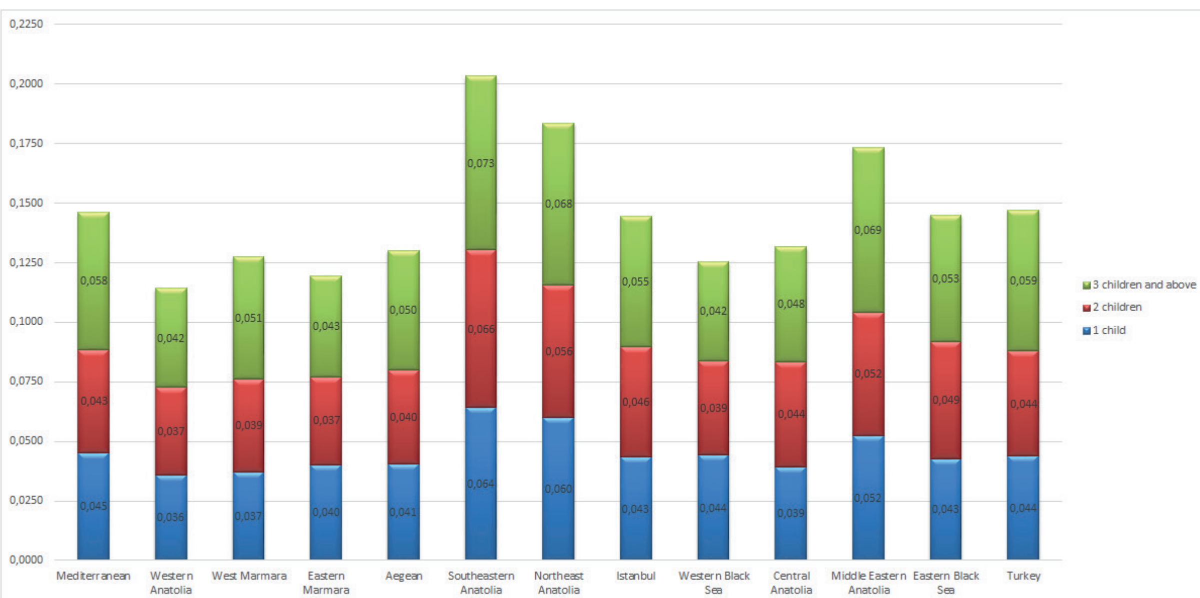


Figure 3: Multidimensional Poverty Ratios (M_0) of Households by the Differences in the Number of Children in Turkey and Level-1 Regions (2017)

the Middle Eastern Anatolia Region is increased by 1.7 points. The other regions where poverty is driven by a rising momentum with the increase in the number of children are West Marmara with an increase of 1.4 points, Mediterranean with 1.3 points and Istanbul with 1.2 points, respectively. Similarly, in 2017, the increase in the number of children in all regions except the Western Black Sea Region negatively affects and increases poverty. A decrease of 0.2 points is observed in the Western Black Sea Region.

As mentioned earlier, the number of households with one child is 1366, 1652 with two children, and 1398 with three or more children for the year of 2006. The number of those who were found to experience poverty in these households is 708, 907, and 551, respectively. In other words, 551 of 1398 households with 3 or more children are poor according to the multidimensional poverty approach. On the other hand, the number of households with one child is 2907, 3237 with two children, and 2203 with three or more children for 2017. The number of poor households are 2218, 2484, and 1365 by the number of children.

Figure 4 and Figure 5 were created to determine how the samples detailed regionally in Table 1 differ from each other according to the number of children identified as poor. These two figures show how the poor are regionally distributed according to the number of children. In this doughnut chart consisting of three layers, the inner layer reflects the share of poor households with 1 child, the middle layer with 2 children, and the outer layer with 3 or more children. In these figures, in which each region is represented by a different colour, it can be observed how the population of households, which increases from inside to outside according to the number of children, affects the share of the poor households in the region. For example, as shown in Figure 4, 16.5% of the poor households with one child across Turkey are located in the Aegean Region and this region takes the first place in this ranking. Similarly, in 2006, 14.97% of the households identified as poor with only one child are in the Istanbul Region, followed by the Mediterranean Region with a ratio of 12.43%. On the other hand, the lowest shares of poor households with 1 child belong to Southeastern Anatolia (1.13%) and Middle Eastern (2.12%) (inner layer of the graph). In the same year, 14.77% of 907 poor households with 2 children in Turkey are also located in the Aegean Region. The Regions of Western Anatolia (13.67%) and Istanbul (11.03%) also have a significant share of poor sample with 2 children (middle layer of the graph). As mentioned earlier, the poverty ratio is increased with the increase in the number of children, and this increase was found to be relatively high in the eastern regions. Out of 1398 households with three or more children, the majority of 551 poor households are located in the Central Anatolia and eastern regions. For example, 72 (13.07%) poor households with 3 or more children are located in Southeastern Anatolia, and 60 (11.25%) poor households are located in Cent-

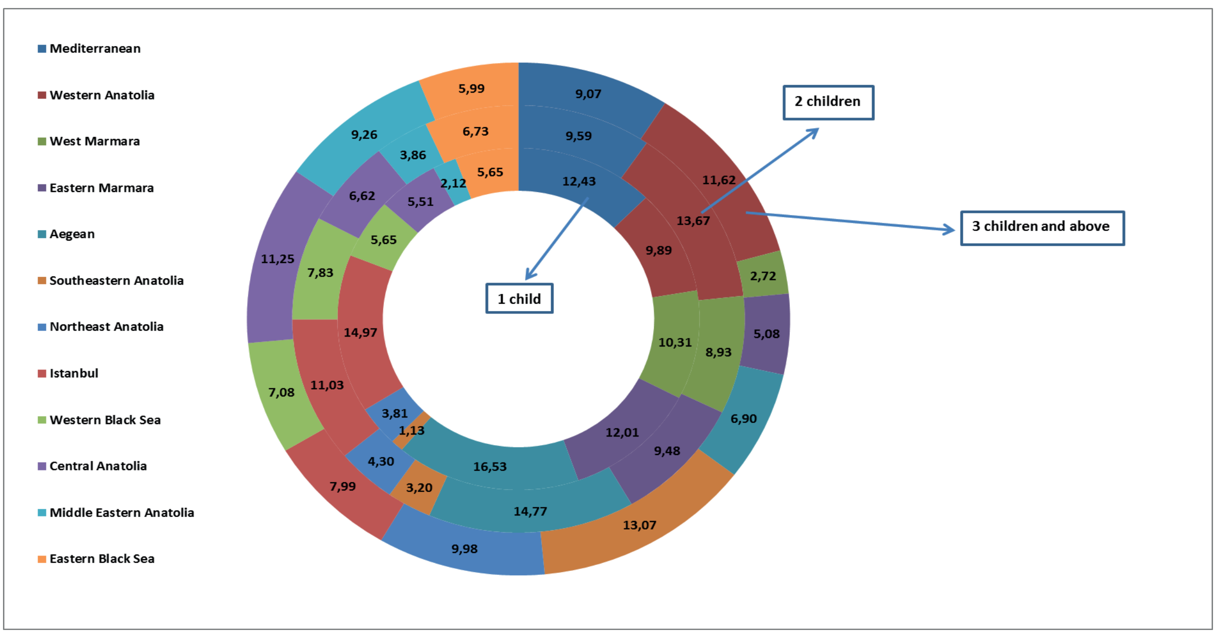


Figure 4: Regional Distribution of Poor Households (2006)

ral Anatolia. In this sample group, which can also be described as a crowded family, only 2.72% of the poor households are located in West Marmara and 5.08% in East Marmara, respectively (the outer layer of the graph). These findings, which reflect the year 2006, support the argument that poverty increases as the number of children increases and as we move from west to east of Turkey.

Similar results on the regional share of poor households are also encountered when the findings of 2017 shown in Figure 5 are considered. A significant portion (15.37%) of the poor households (2218) with one child are in the Aegean Region. In other respects, it can be said that approximately 15 of every 100 households with 1 child in the total sample and identified as poor are located in the Aegean Region. East Marmara (11.99%), Mediterranean (11.81%) and Western Anatolia (11.68%) show the regional distribution of the poor households with one child. Even these results indicate that the West is densely populated with poor households with fewer children (inner layer of the graph). In addition, the Aegean and Mediterranean Regions stand out with a share of 14.41% and 13.53%, respectively, in the classification of poor households with 2 children (middle layer of the graph).

The main focus of this study is the sample group that consists of households with 3 or more children (2203), and as a result of the analysis, it was found that 1365 of these households were poor in 2017. Approximately 20% (275) of these 1365 poor households are located in the Southeastern Anatolia Region. In other words, 1 in every 5 poor households with 3 or more children is located in the Southeastern Anatolia. This ratio can be considered quite high in a sample group including other regions as well. The Mediterranean Region is also at the top of the list with a share of 13.41%. Nevertheless, it can be emphasized that West Marmara (2.34%) and Eastern Black Sea (2.64%) are the regions with the lowest share in the poor households. At first, the share of the Eastern Black Sea Region may seem surprising, but the fact that the number of households with 3 or more children in the 2017 sample of this region is 53 and 36 of these households are poor, actually supports the prediction that poverty will increase as we go to east from west. In the graph given in Figure 5, the limited number of samples can be considered among the reasons why the share of poor households with 3 or more children in the Eastern Black Sea Region is low. In summary, as 2.5% of 2203 households with 3 or more children in 2017 are located in the Eastern Black Sea Region, the low share of this region in the total poor can be considered usual and consistent (outer layer of the graph).

Another analysis of how households' poverty changes according to the diversity of the number of children is aimed at the deviations of regional poverties as reflected in Figure 6 and 7 from the averages in Turkey. While the multidimensional poverty ratio of some

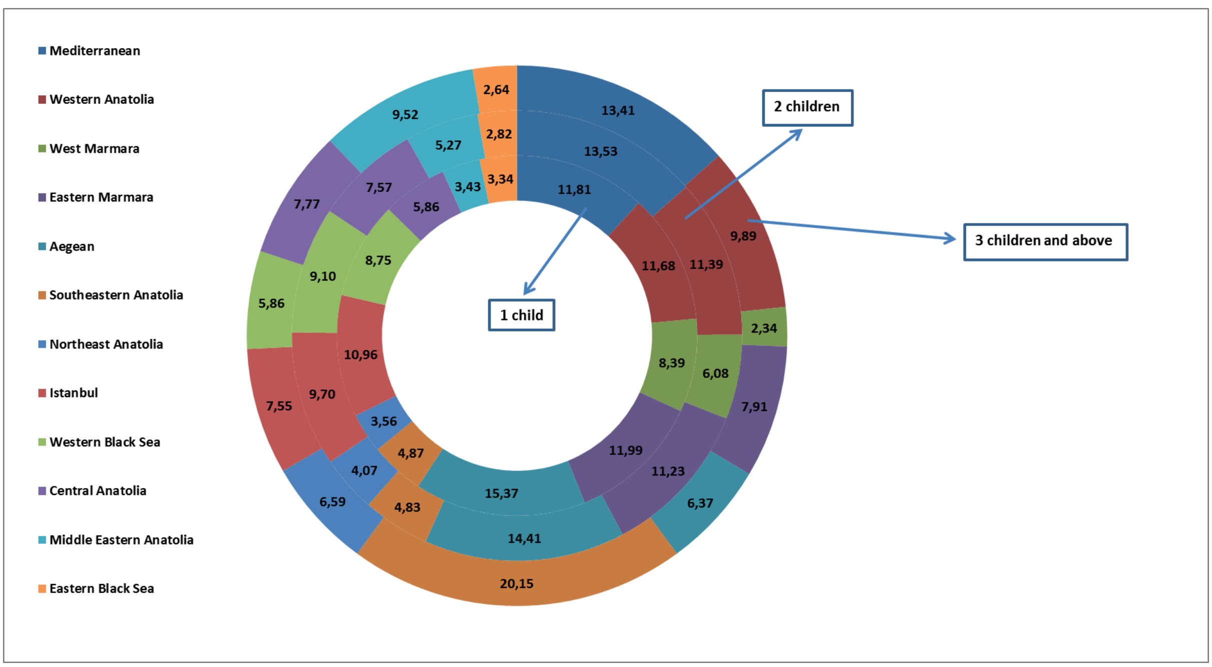


Figure 5: Regional Distribution of Poor Households (2017)

regions based on both the number of children and the year remained behind the poverty rate of Turkey, it is in the opposite direction in some regions. At this point, it can be emphasized that while the area in the graph containing positive values above zero refers to the regions experiencing poverty above the Turkish average, the area containing negative values below zero refers to the regions in a better position than the country's average in terms of poverty.

Considering the data of 2006 (Figure 6), which is taken as the first period of the analysis, it can be said that the poverty rates of the Southeastern Anatolia, Northeast Anatolia, Middle Eastern Anatolia, Mediterranean Regions are above the Turkey's average in terms of child poverty in all sample groups. Especially the Southeastern Anatolia Region differs significantly in a negative way in all groups, the poverty rate of this region is 2.5 to 4.5 points above the average. As the number of children increases in these regions, the poverty of households approaches the averages of Turkey. In Istanbul and Central Anatolia Regions, the situation of being below or above the average differs according to the number of children. On the other hand, the poverty of households in all other regions remained behind the national average in all sample groups differing by the number of children. Considering the multidimensional poverty ratios of households with three or more children, especially in the Western Anatolia region, they are observed to be well behind the average in Turkey. Similar results are observed in the Aegean, Eastern Marmara, Western Black Sea, Central Anatolia and Eastern Black Sea Regions in households with three or more children. When we look at Istanbul for the same sample group, poverty was encountered below the average in Turkey, but the degree of this was relatively low.

Considering the deviation of the poverty values of the regions from the country averages for 2017, the negative course of the Southeastern Anatolia Region in all child groups stands out (Figure 7). The deviation of this region from the average of Turkey, especially in terms of households with two or more children, was found to be above 2%. At this point, it can be emphasized that almost all of the regions with poor households above the average poverty of Turkey are located in the east. From this point of view, it can be said that poverty is experienced above the country averages in the households of all sample groups in the Northeast Anatolia and Middle Eastern Anatolia Regions. It can also be stated that the poverty of households with one child in the Mediterranean and Western Black Sea Regions and with two children in Istanbul and Eastern Black Sea Regions exceeds the country average.

On the other hand, the poverty ratios of households in all groups of children in the Western Anatolia, East Marmara, West Marmara and Aegean Regions are lower

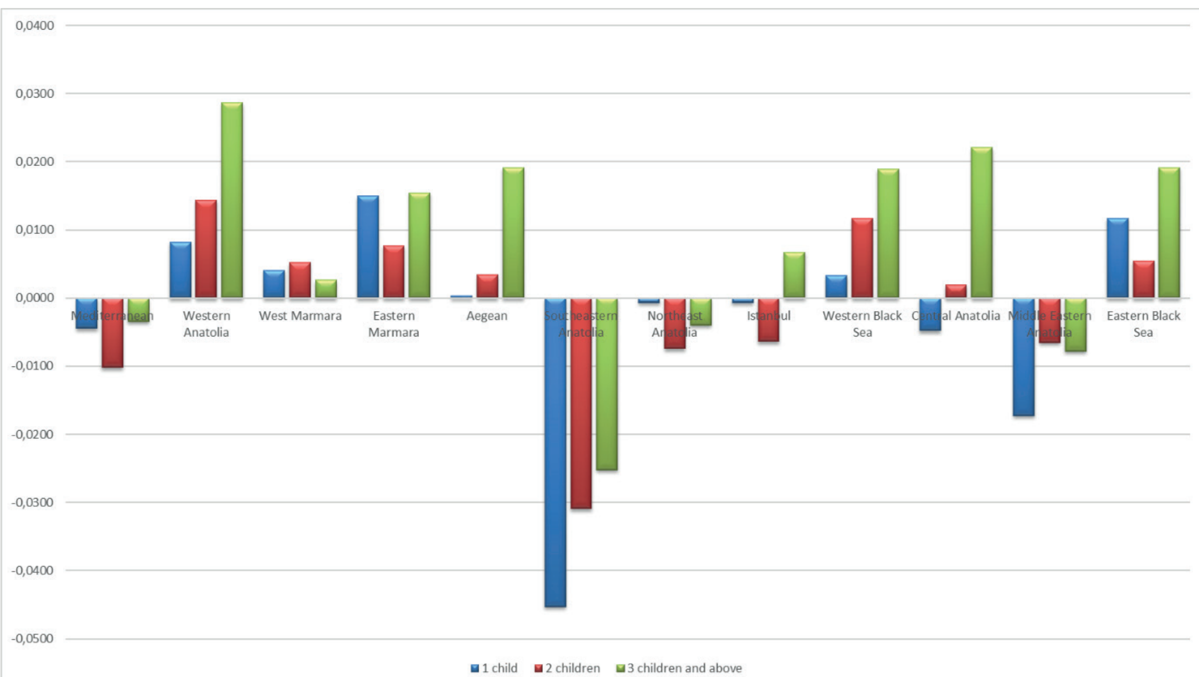


Figure 6: The Deviations of Regions from the Average Poverty Ratio of Turkey (2006)

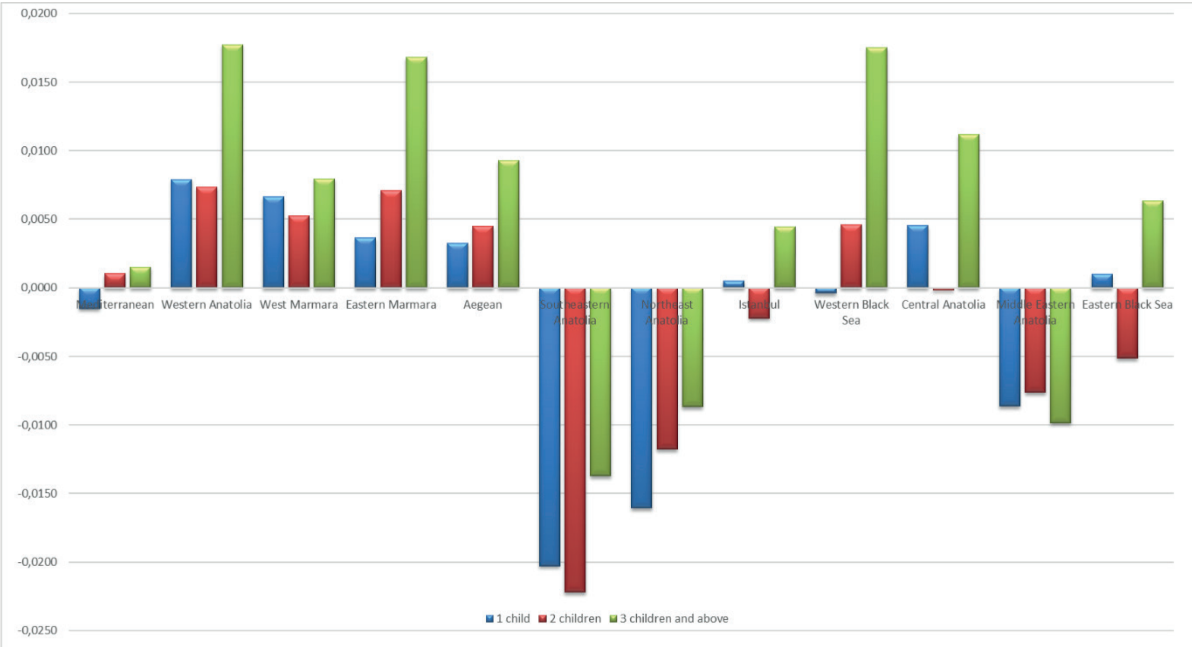


Figure 7: The Deviations of Regions from the Average Poverty Ratio of Turkey (2017)

compared to the averages of Turkey. In addition, the multidimensional poverty of households with 3 or more children in the Mediterranean, Istanbul, Western Black Sea, Central Anatolia and Eastern Black Sea Regions was found to be below the country average. Based on these results, the poverty rates are exceeding the average of Turkey as we go to east from west, and the opposite is encountered as we go to west from east.

Another question that is sought to be answered in this study is about how poverty has changed in all groups of children nationally and regionally from 2006 to 2017. In Figure 8, which was created to reflect

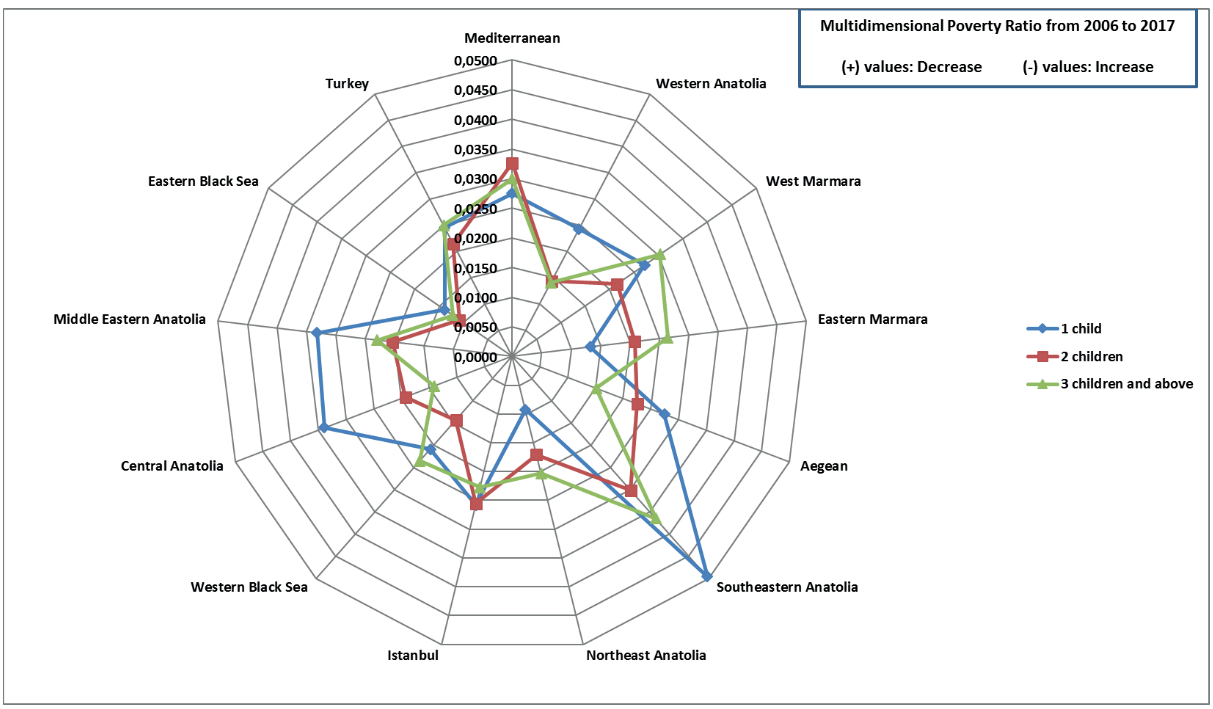


Figure 8: The Change of Multidimensional Poverty from 2006 to 2017 in Turkey and Level-1 Regions

the change in question, positive values indicate that poverty is declined between periods, whereas negative values indicate that poverty in the relevant region is increased.

As shown in Figure 8, the poverty ratio has declined from 2006 to 2017 in Turkey, all regions and household groups differentiated by the number of children. In other words, the ratio of multidimensional poverty has declined in all analysis units, including the country in general, and this rate was declined by over 3% especially in the Southeastern Anatolia region. In addition, the poverty ratio of households with 1 child in the Middle Eastern and Central Anatolia Regions and with 2 children in the Mediterranean Region has also declined over the past eleven years. The poverty rate decrease in other analysis units is in the range of 0.05% - 2.5%.

In other words, both 2006 and 2017 measurements show that the households with the most multidimensional poverty are those with 3 and more children. It can also be said that as we move from western parts of Turkey to the east, poverty has increased with the increase in the number of children. Finally, the multidimensional poverty ratio across Turkey declines slightly from 2006 to 2017 in accordance with the poverty measurements conducted by the TurkStat (2020) and the World Bank (2020) using the monetary indicators.

5. CONCLUSION

The aim of this study is to measure the poverty of households that differ according to the number of children aged 15 and under using the multidimensional measurement method. In determining the dimensions, indicators and weights required to calculate the multidimensional poverty of households, the study of Alkire et al. (2014) was taken as the basis. In their study, Alkire et al. (2014) created four dimensions in which Europe 2020, education, health and environmental factors are evaluated together for poverty measurement. These four dimensions are included in the study with twelve indicators. The Europe 2020 dimension is represented by "income", "work intensity" and "extreme material deprivation" sub-indicators, while the education dimension is represented by "graduated school", the health dimension is represented by "health status", "chronic health problem", "limitation in the activities" and "being unable to apply to the doctor". Finally, the environmental factors dimension is included in the study with sub-indicators of "housing ", "noise pollution", "environmental pollution" and "crime".

The study is conducted with the expectation that the poverty of households with one, two, three or more children will differ according to the number of children and the multidimensional poverty of households will increase with an increase in the number of children. It is also among the pre-analysis predictions that poverty will change in parallel with the increase in the number of children as we move from west to east.

The findings suggest that the increase in the number of children in households in both 2006 and 2017 has negatively affected poverty. Both the 2006 and 2017 findings show that multidimensional poverty is increasing as the number of children increases and as we go to east from west. It is seen that the multidimensional poverty rate was relatively lower in 2017. Another important finding obtained in this study is that the Southeast Anatolia, Northeast Anatolia, Middle Eastern Anatolia Regions experience poverty above the average of Turkey in all sample groups.

Saying these, this study has not directly searched the causality between poverty and increasing number of children. The required panel data for measuring the mentioned causality is not available. In addition, information on the level and quality of the education of the children and on their employment and income conditions is not available. Therefore the positive relationship between poverty and number of children is rather a co-change.

The Southeast Anatolia, Central Anatolia and Northeast Anatolia regions stand out in the deprivations experienced in all the indicators discussed in the measurement of poverty. From this point of view, policies aimed at eliminating excessive financial deprivation particularly in these regions (but in all actually) would have positive impacts on reducing household poverty. The measures taken by the government institutions and policies should not be limited to income but should also include education, health and environmental factors, so that improvements covering a wide perspective from education to health, from the physical structure of the house to the possibility of experiencing crime will strengthen individuals and prevent the poverty to become chronic. Improving the level of access to education and health opportunities in these regions will help reduce poverty in the long run. Average number of children in the above mentioned regions are higher compared to nation's average, therefore people's attention might drawn to the relationship between poverty and househol size as well. Finally, implementations regarding ensuring security and minimizing crime incidents, primarily in these regions, will help reduce regional poverty.

Considering that the children under the age of 15 will be included in the labor market in the future, the socio-economic structure of these households in the near future depends on the education of today's children and their possibility of finding a job in the future. In other words, the question is; with the increasing number of children, will the poverty of the household decrease with these children being included in the labor market and being employed? Or household population increase, results in unemployment and poverty given the economic conditions in Turkey, current level of unemployment and the experienced middle-income trap. Therefore, increase of the number of children in households without the improvements to the current conditions in Turkey to take young people's education and employment of more, it would reflect negatively on the poverty of households in the coming period. 15 years of age constitute 23% of the total population in Turkey. Especially in the eastern region of Turkey average median age (32.4 years) of being behind in the household it is associated with the relatively large number of children and young people. Therefore, the individuals in this group to bring income and contribute to their households in the future, of course, depend on their education level. The fact that 1 out of every 3 young people is neither educated nor employed today indicates the steps to be taken in this direction. Today, nearly half of the unemployed in Turkey for at least 6 months, is looking for work for at least 1 year is one in four. One way to reverse these periods is to improve educational opportunities, and another way is to create new jobs supported by technology. Otherwise, there does not seem to be a way to raise an income level caught in the middle-income trap and hence help households escape poverty.

REFERENCES

Alkire, S. & Santos, M, E., (2010). Acute multidimensional poverty: A new ındex for developing countries, *United Nations Development Programme Human Development Reports Research Paper 2010/11*.

Alkire, S. & Foster, J., (2011a). Counting and multidimensional poverty measurement, *Journal of Public Economics,* 95(7), 476-487.

Alkire, S. & Foster, J., (2011b). Understandings and misunderstandings of multidimensional poverty measurement, The *Journal of Economic Inequality*, 9(2), 289-314.

Alkire, S., Apablaza, M., & Jung, E., (2014). Multidimensional poverty measurement for EU-SILC countries, *Oxford Poverty and Human Development Initiative Working Paper Series*, 36b, 1-49.

Alkire, S. & Jahan, S., (2018). The new global MPI 2018: Aligning with the sustainable development goals, *Oxford Poverty and Human Development Initiative Working Paper Series*, 121, 1-21.

Alkire, S., (2018). The research agenda on multidimensional poverty measurement: Important and as-yet unanswered questions, *Oxford Poverty and Human Development Initiative Working Paper Series,* 119, 1-24.

Anand, S., (1977). Aspects of poverty in Malaysia. *Review of Income and Wealth*, 23(1), 1-16.

Anyanwu, J. C., (2005). Rural poverty in Nigeria: Profile, determinants and exit paths. *African Development Review*, 17(3), 435-460.

Anyanwu, J. C., (2014). Marital status, household size and poverty in Nigeria: Evidence from the 2009/2010 survey data. *African Development Review*, 26(1), 118-137.

Batana, Y. M., (2013). Multidimensional measurement of poverty among women ın Sub-Saharan Africa*, Social Indicators Research,* 111(2), 337-362.

Bourguignon, F. & Chakravarty, S.R., (2003). The Measurement of multidimensional poverty, *Journal of Economic Inequality,* 1(1), 25–49.

Foster, J., Greer, J., & Thorbecke, E., (1984). A class of decomposable poverty measures, *Econometrica,* 52(3), 761-766.

European Commission, (2010). A Strategy for smart, sustainable and inclusive growth. https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf, (20.06.2019).

Geda, A., De Jong, N., Mwabu, G. & Kimenyi, M., (2001). Determinants of poverty in Kenya: A household level analysis. *ISS Working Paper Series/General Series*, 347, 1-20.

Haughton, J. & Khandker, S.R., (2009). *Handbook on Poverty and Inequality,* The World Bank, Washington.

Khan, R. E. A., Rehman, H. & Abrar ul Haq, M., (2015). Determinants of rural household poverty: the role of household socioeconomic empowerment. *American-Eurasian J. Agric. & Environ. Sci*, 15(1), 93-98.

Lanjouw, P. & Ravallion, M., (1995). Poverty and household size. *The Economic Journal*, 105(433), 1415-1434.

Lugo, A.M. & Maasoumi, E., (2009). Multidimensional Poverty Measures from an Information Theory Perspective, *Oxford Poverty and Human Development Initiative Working Paper Series,* 10, Oxford.

Meyer, D. F. & Nishimwe-Niyimbanira, R., (2016). The impact of household size on poverty: An analysis of various low-income townships in the Northern Free State region, *South Africa. African population studies*, 30(2).

Sen, A., (1976). Poverty: An ordinal approach to measurement, *Econometrica*, 44(2), 219-231.

Sen, A., (1983). Poor, Relatively Speaking, *Oxford Economic Papers*, 35(2), 153-169.

Sen, A., (1997). *On Ethics in Economics*, Basil Blackwell, Oxford.

Sen, A., (1999). Development As Freedom, *NY: Knopf Publishers*, New York.

Sen, A., (2004). Capabilities, Lists, and Public Reason: Continuning the Conversation, *Feminst Economics,* 10(3), 77-80.

Seth, S. & McGillivay, M., (2018). Composite indices, alternative weights and comparison robustness, *Social Choice and Welfare*, 51, 657-679.

Song, S. & Imai, K., (2018). Does the hunger safety net programme reduce multidimensional poverty? Evidence from Kenya, *Oxford Poverty and Human Development Initiative Working Paper Series*, 124, 1-26.

TurkStat, (2017). *Türkiye İstatistik Kurumu Gelir ve Yaşam Koşulları Araştırması*, Ankara.

TurkStat, (2020). *Temel İstatistikler, Gelir, Yaşam, Tüketim ve Yoksulluk*, http://www.tuik.gov.tr/UstMenu.do?metod=temelist, (04.08.2020).

World Bank, (2020). *World Bank Data, Poverty Data*, https://data.worldbank.org/topic/poverty, (04.08.2020).

Zanbak, M., (2014). *Yetenekler Yaklaşımı Perspektifi İle Yoksulluğun Ölçülmesi: Yoksulluğun Kayıp Boyutları Üzerine Ampirik Bir Uygulama*, Akdeniz Üniversitesi Sosyal Bilimler Enstitüsü, Yayınlanmamış Doktora Tezi, Antalya.

Zanbak, M. & Çağatay, S., (2013). Yetenek yaklaşımı temelinde yoksulluğun ölçülmesi: Mersin ve Erzurum illerinde yoksulluğun kayıp boyutları. *İktisat İşletme ve Finans*, 28(327), 67-104.

Endnotes

[1] In this study, the dimensions and indicators that Alkire and Foster (2011a, 2011b) and Alkire and Jahan (2018) addressed in their studies were not used, but the dimensions, indicators, deprivation conditions and weights, which are shown in Table 2, presented in the study of Alkire et al. (2014) were used.

[2] At this point, it can be emphasized again that the households were represented by the data of the "household head" based on their verbal statements.

EGE AKADEMİK BAKIŞ / *EGE ACADEMIC REVIEW*

Cilt 21 • Sayı 4 • Ekim 2021
SS. 319-332
Doi: 10.21121/eab.1018108
Başvuru Tarihi: 12.12.2020 • Kabul Tarihi: 27.07.2021

Ownership Level in Cross-border M&As of Turkish MNCs: The Role of Ownership Concentration and Institutional Contexts*

Ayşe KAYACI[1], Aylin ATAAY[2]

ABSTRACT

This study investigates how ownership concentration effects the ownership level and institutional environment moderates this relationship in Cross-border Merger & Acquisitions of a sample of Turkish Multinational Corporations. Proposed relationships based on institutional theory and socio-emotional wealth approach have been analyzed in a sample of 71 completed Cross-border Merger & Acquisition deals of Turkish firms between 1998-2017. Tobit regression model has been operationalized to test research hypotheses. While the findings have provided support for the positive relationship between concentrated ownership of acquiring firm and ownership level of target firm in Cross-border Merger & Acquisitions, the contextual effects of formal and informal institutions could not provide evidence for moderating impacts. These findings have implied the importance of using different theoretical approaches for distinct Emerging Market contexts like Turkey and how governance issues should be considered differently for Emerging Market firms to understand their Foreign Direct Investment decisions properly.

Keywords: Cross-border merger and acquisitions, Emerging multinationals, Ownership Concentration, Ownership level, Turkey

1. Introduction

In recent years, the route of foreign direct investment (FDI) and home countries of multinational corporations (MNCs) in global markets have been diversified due to neoliberal economic policies and the progresses in information technologies in emerging markets (EMs) (Child & Rodrigues, 2005; Satta, Parola, & Persico, 2014) In 2017, outward FDI by EMs have reached 383 billion US dollars (UNCTAD, 2018). Accordingly, Turkey as other EMs, has also achieved significant amount of OFDI in recent decades via accelerated cross border Merger and Acquisitions (CBMAs) of Turkish MNCs. For the year of 2016, Turkey's the value of net sales for CBMAs has increased to 1856 million of US dollars (UNCTAD, 2017, p. 231).

Although, recent literature on the internationalization of EM firms have attracted considerable amount of attention from scholars (Buckley, 2017; Cuervo-Cazurra, 2012; Cuervo-Cazurra & Genc, 2008; Ramamurti, 2009), the determinants of the ownership level preferences of emerging multinationals (EMNCs) in CBMAs still need to be investigated for different EM contexts. This paper adopts a multi-level perspective to incorporate a wider range of explanations for the extent of equity share of acquiring firm in target company in CBMAs of EMNCs. The goal of this study is to determine institutional and firm level constraints that shape the preferences of the Turkish MNCs regarding their ownership level in their CBMAs.

*This study is related to Management field with a narrow focus in international business and strategic management issues. It gives results that are provided by empirical analyses about firm-level strategic behavior and corresponds with main aims and scope of Ege Academic Review.

[1] Assistant Professor, Dicle University, Faculty of Economics and Administrative Sciences/ Department of Management, Diyarbakır, Turkey, ayse.kayaci@dicle.edu.tr
[2] Professor, Galatasaray University, Faculty of Economics and Administrative Sciences/Department of Business Administration, İstanbul, Turkey, aataay@gsu.edu.tr

This study intents to contribute existing knowledge in two main domains: First, by using a multi-level approach, it will be possible to better understand how country- specific (CSAs) and firm-specific advantages (FSAs) play crucial roles in the EMNCs' internationalization process (Rugman & Verbeke, 2003) and in their cross border investments. Second, the determinants of ownership level in CBMA activities of Turkish firms will be examined. Studies conducted in EMs suggest that differences in research findings compared to developed countries can be associated to the idiosyncratic circumstances presented by these economies. Turkey is classified as a late-industrializing country with its increased integration into the world capital system via liberalization policies that are put into action during 1980s. For this reason, Turkey would be an interesting research setting for the study. Even if Turkey's economy has become more liberal, the dominant actors are still state-created, family-controlled and highly diversified business groups (BGs) which are strategic responses to strategic factor market imperfections and institutional voids emerged due to information asymmetries, poor contract enforcement, and imperfect regulatory structures (Buğra, 1995; Colpan, 2010; Yamak & Üsdiken, 2006; Yıldırım-Öktem & Üsdiken, 2010). Moreover, Turkey is classified as a mid-range EM with its better infrastructural development and inadequate institutional development among various EMs (Hoskisson, Wright, Filatotchev, & Peng, 2013) which makes it interesting to analyze the effects of constraints from different levels in firm internationalization. Based on the view of institutional theory and socio-emotional wealth approach, the contribution of ownership concentration and formal and informal institutional contexts to the CBMA activity of EMNCs have been analyzed in the study.

This paper has been organized as follows: Firstly, conceptual background about the variables of the study and hypotheses have been provided. Second, the data gathering process and measurements of variables have been explained. Lastly, results and implications of the study have been presented.

Conceptual Background and Hypotheses Development

EMNCs have been the dominant contributors of OFDI from EMs for two decades and they have succeeded this through cross-border investments that helped them to access new markets and to explore strategic assets. EMNCs have accelerated their internationalization especially with CBMAs which involve high level of risk to enter foreign markets (Luo & Tung, 2007; Mathews, 2006). Through these risky entry modes, EMNCs have aimed to strengthen their global brands and technological capabilities in order to compete with advanced MNCs in both domestic and international markets. Besides EMNCs would overcome "liability of emergingness" in global markets via accelerated internationalization (Bonaglia, Goldstein, & Mathews, 2007; Lebedev, Peng, Xie, & Stevens, 2015; Madhok & Keyhani, 2012). Additionally, EMNCs have got many advantages such as economies of scale, exploiting foreign markets and accessing rare resources by CBMAs (Chakrabarti, Gupta-Mukherjee, & Jayaraman, 2009, p. 216). While expanding by CBMAs, firms have to decide about the ownership level in target firms (Chari & Chang, 2009; Chen, 2008). Like advanced MNCs, EMNCs have to consider significant factors caused by internal and external environment for ownership level choice in CBMAs.

Since EMNCs have been in a less favorable position due to operating in institutionally less developed environments than advanced MNCs, they have used CBMAs to escape imperfect home markets and to enter institutionally distant and generally advanced countries (Cuervo-Cazurra, 2012; Cuervo-Cazurra & Genc, 2008; Khanna & Palepu, 1997; Madhok & Keyhani, 2012). However, managing differences in institutional environment can also be a significant burden when deciding about CBMAs because of constraints of formal and informal institutions that manifest strategic decisions of firms (Peng, Sun, Pinkham, & Chen, 2009). As institutional theory suggests, institutions determine "rules of the game" for organizational interactions and firm behavior as cognitive, rule-based and regulatory constructs (North, 1990; Scott, 1995). Besides, institutions provide a more stable environment for firms via reducing uncertainty and transaction costs (Hoskisson, Lau, Eden, & Wright, 2000). For instance, MNCs have avoided high transaction costs that arise due to high political constraints and cultural distance when entering EMs like Turkey by choosing joint ventures (JVs) rather than wholly owned subsidiaries (WOS) (Demirbag, Glaister, & Tatoglu, 2007). Accordingly, considering the institutional environments of both home and host countries have been significant for EMNCs in internationalization.

Ownership Choice and Acquirer Ownership Concentration

Firms from EMs have shown concentrated ownership structure (e.g. BGs, family firms and state owned enterprises) more than advanced economy counterparts in general (Filatotchev, Strange, Piesse, & Lien, 2007;

Khanna & Yafeh, 2007; La Porta, Lopez-De-Silanes, & Shleifer, 1999; Lebedev et al., 2015; Yaprak & Karademir, 2010). While internalizing markets, shared resource base and escaping institutional voids are positive attributions, tunneling, transparency issues and principal-principal (PP) conflicts are negative attributions of EM firms in practice due to concentrated ownership structure of these firms (Chen & Young, 2010; Guillen, 2000; Khanna & Yafeh, 2010; Morck & Yeung, 2003; Pattnaik, Chang, & Shin, 2013). Previous studies about the relationship between M&A outcomes and concentrated ownership have proposed a negative direction since investors perceive concentrated ownership structure as unfavorable (Bhaumik & Selarka, 2012; Chen & Young, 2010). For example, Filatotchev et al. (2007) have proposed that family ownership decreases the level of equity participation of EM firms in their foreign subsidiaries because of owner families' risk averse attitude for long term strategies. As a consequence, ownership concentration and high level of family control in EM firms have been evaluated as detrimental factors in CBMAs despite their benefits in imperfect market settings of EMs (Bhaumik, Driffield, & Pal, 2010; Khanna & Palepu, 1999). Moreover, PP conflicts between minority and majority shareholders is not only about profit sharing but also about strategic decisions that involve high amount of risk and return (Peng, Wang, & Jiang, 2008; Young, Peng, Ahlstrom, Bruton, & Jiang, 2008). When minority shareholders are not protected strong enough, majority shareholders would dominate EMNCs strategy in the long term (Filatotchev & Wright, 2010). Correspondingly, ownership concentration which manifests itself as family ownership or BG affiliation in EMs for most of the time has affected internationalization decision and level of firms negatively (Bhaumik et al., 2010; Singla, George, & Veliyath, 2017).

On the other hand, for some cases, owner family's concern about its survival and firm reputation to transfer family wealth to next generations may have a positive effect on firm performance and majority shareholders in the long run (Anderson & Reeb, 2003). Socio-emotional wealth (SEW) approach could be a significant theoretical base since it provides evidence that owner families may consider risky strategic decisions like international expansion as profitable and preferable for wealth generation (Chung, 2014; Gómez-Mejía, Haynes, Núñez-Nickel, Jacobson, & Moyano-Fuentes, 2007). For instance, previous studies have provided evidence that family involvement increases the probability of international expansion of firms affiliated to BGs and endorse growth of affiliate firms via international investments since owner families desire higher returns in the long term (Chung, 2014; Gómez-Mejía et al., 2007; Singh & Delios, 2017; Zahra, 2003). Another finding suggests that BG affiliates are first movers and entrants in CBMAs made by Indian firms (Fuad & Sinha, 2018). This indicates how ownership concentration may be beneficial for investment decisions with higher returns as a timesaver. As other EM firms, majority of firms in Turkey possess high level of ownership concentration which shows itself as forms of pyramidal family BGs (Yurtoglu, 2000). Family BGs in Turkey are known for their reputable owner families whom dominate executive boards of affiliates via concentrated shareholdings. Turkish family BGs prefer long run growth strategies such as unrelated diversification and internationalization via their internal capital markets in general (Colpan, 2010; Yurtoglu, 2000). Previous findings have suggested that ownership concentration and equity participation level of Turkish firms in foreign subsidiaries does not have any significant relationship (Demirbag, Tatoglu, & Glaister, 2010; Ilhan-Nas, Okan, Tatoglu, Demirbag, & Glaister, 2018). However, context specific conditions and rent seeking attitude of owner families whom hold majority shareholdings may cause greater level of ownership stake in CBMAs of Turkish firms to get high returns of international growth. Therefore, we propose the following hypothesis:

H1: A greater ownership concentration of acquirer firm will lead Turkish MNCs to choose higher ownership level in target firms for CBMAs.

Ownership Choice and Institutional Environment

Companies decide about the ownership level in CBMAs according to the nature of their assets and uncertainty in firm environment. Consequently, the costs and benefits of the transactions that are results of these environments and information asymmetry have shaped the optimum ownership level in international investments (Anderson & Gatignon, 1986; Chari & Chang, 2009; Chen & Hennart, 2004). Earlier research about ownership level decisions in CBMAs have been generated contradictory results regarding the effects of institutional and industrial environments. While some studies have proposed that institutional distance decreases the level of ownership in CBMAs, others have found opposite results (Chari & Chang, 2009; Liou, Chao, & Ellstrand, 2017; Liou, Chao, & Yang, 2016; Malhotra, Lin, & Farrell, 2016; Yang, 2015). Consequently, it is important to evaluate the findings regarding the relationships between the institutional environment and the ownership choice or level of foreign investments for different EM contexts.

EMNCs should consider the rules of the game while investing abroad and decide in accord with the host country's market potential, natural resource base, economic freedom and business friendly environment (Pablo, 2009; Yang & Deng, 2017). Government support is another significant determinant of the increasing number of CBMAs from EMs like China's "Go Global" policy (Holtbrügge & Kreppel, 2012; Peng, 2012). However, EMs have high level of institutional voids like high protectionism and corruption which inhibit firms to operate and expand effectively in home countries and these voids may motivate EMNCs for escapist OFDI (Stoian & Mohr, 2016). As a consequence, EMNCs may prefer high level of ownership in CBMAs despite its high risk to manage the acquisitions of strategic intangible assets more effectively (Deng, 2009; Khanna & Palepu, 2000). Whether CBMAs of EM firms are motivated by push or pull factors, it is apparent that the differences between host and home country institutional environments would determine entry mode or equity participation level decisions.

Institutional and cultural context constraints have been considered as basic determinants of entry mode decisions in early studies since they affect the flexibility of the firms as well as their legitimacy in the targeted countries (Anderson & Gatignon, 1986; Brouthers, 2002; Brouthers & Brouthers, 2000; Kostova & Zaheer, 1999). Therefore, choosing higher level of ownership levels are seen as more risky while investing in distant institutional environments (Brouthers & Brouthers, 2000; Chari & Chang, 2009). For example, Zhang, Zhou, & Ebbers (2011) have found that institutional quality in target countries affect positively cross border deal completion in Chinese investments. This result is not surprising since the perceived risk and uncertainty related to the differences between the institutional environments may work as reverse conditions for EMNCs. Similarly, Yang (2015) and Pinto, Ferreira, Falaster, Fleury, & Fleury (2017) have highlighted the divergence of the results of the studies conducted on EMNCs compared to advanced MNCs and concluded that greater institutional distance between countries may cause a higher level of ownership in CBMAs by EMNCs. Some studies that distinguish formal and informal institutional distance have claimed contradictory findings. According to these studies, while formal institutional distance increases ownership level of EMNCs in CBMAs, informal or cultural distance mitigates it (Contractor, Lahiri, Elango, & Kundu, 2014; Liou et al., 2017; Yang, 2015). Significantly, previous research ensures when MNCs enter in foreign countries with dissimilar cultures, they have to deal with distinct social behavior, management style, decision making processes and implicit assumptions between parties (Chakrabarti et al., 2009; Hofstede, 2001). Moreover, entry mode decisions of MNCs are affected by cultural factors which can cause additional transaction costs for firms. As cultural distance between host and home countries increases, MNCs would prefer lower level of equity participation (Kogut & Singh, 1988). Therefore, considering the effect of cultural distance for CBMAs of different EM firms would provide new evidence in IB studies.

EMNCs should also consider governance quality in the host country as a motivator for minimizing risks in CBMAs like advanced MNCs (Lahiri, 2017). However, concentrated ownership structure of EM firms can be destructive for investments in institutionally distant environments. Beside the destructive effects of concentrated ownership in strategic decision processes, the role of wealth maximization and reputation attitude of majority shareholders should be considered while evaluating the relationship between institutional distance and ownership level in CBMAs of EMNCs (Bhaumik et al., 2010; Filatotchev et al., 2007). Although previous studies have evaluated differences in institutional environment as intermediate factors for the relationship between ownership concentration and ownership level and found that they play a mitigating role in this reverse relationship (Filatotchev et al., 2007; Ilhan-Nas et al., 2018), this relationship may show different features for different EM firms and institutional forces. Despite the findings of earlier research about Turkish MNCs which have proposed insignificant relations between institutional distance and ownership level (Demirbag, McGuinness, & Altay, 2010; Ilhan-Nas et al., 2018), this constraint can play a different role for firms with different governance structures from Turkey. Turkish MNCs with high level of ownership concentration may prefer high level of ownership in CBMAs if the host country institutions can provide similar governance rules and laws. Turkish MNCs' ability to coopt with and operate in imperfect markets and their risk-taking attitude during venturing abroad to build value added activities may influence differently the choice of their entry mode as well as their extent of equity ownership in CBMAs (Yaprak, Yosun, & Cetindamar, 2018). While formal institutional differences may hinder the effect of ownership concentration on ownership level in CBMAs, the difference between informal institutional factors like values, norms and beliefs can increase the motivation of majority shareholders to fully control their foreign subsidiaries. Majority shareholders may find it difficult to rely on foreigners or foreign partners in a different cultural context for post-acquisition process and prefer to acquire most of the shares of foreign subsidiary. As a result, we propose that:

H2a: Formal institutional distance will negatively moderate the relationship between acquirer ownership concentration and ownership level of Turkish MNCs in target firms for CBMAs.

H2b: Cultural distance will positively moderate the relationship between acquirer ownership concentration and ownership level of Turkish MNCs in target firms of CBMAs.

The proposed research model is presented in Figure 1.

Methodology

Quantitative research methods is used to test our hypotheses. Quantitative research methods ensure to get a broader level of study and to generalize the findings of the study. Besides, we can get more objective and accurate results which can be compared with similar studies in the previous literature (Babbie, 2010).

Sample

The sample of this study includes CBMAs by Turkish firms that are completed between years 1998-2017. M&A data are sought through Zephyr and Thomson Reuters Eikon databases to expand sample and control deal information by cross checking. These databases have been widely used in previous studies related to CBMAs (Aybar & Ficici, 2009; Gubbi, 2015). Both databases provide firm level M&A data which is updated hourly and have been used by more than 3000 institutions in the world that include investment banks, education institutions, corporations and so on. Also, we cross-validated our data by using two M&A databases at the same time. 470 completed deals are collected at first. Due to missing data of firm level variables, we have eliminated deals from companies which are not listed Istanbul Stock Exchange (ISE). After removing non-listed companies and deals with misinformation, our final sample includes 71 CBMAs that are completed by Turkish firms within years 1998-2017. This final sample has included independent firms, BG affiliates and state-owned enterprises.

Variables

The dependent variable of this study is *ownership level* of Turkish firms as acquirers of CBMAs. This variable is measured as the percentage level of equity that acquiring firm obtains during cross border M&A deal and ranges from 0.1 % to 100%. This measure is available in Zephyr and Eikon databases for every completed deal. It is very common to use purchased stake in M&As literature so far since its continuous nature (Liou et al., 2017; Liou et al., 2016; Malhotra, Sivakumar, & Zhu, 2011; Yang, 2015). This measure is more accurate

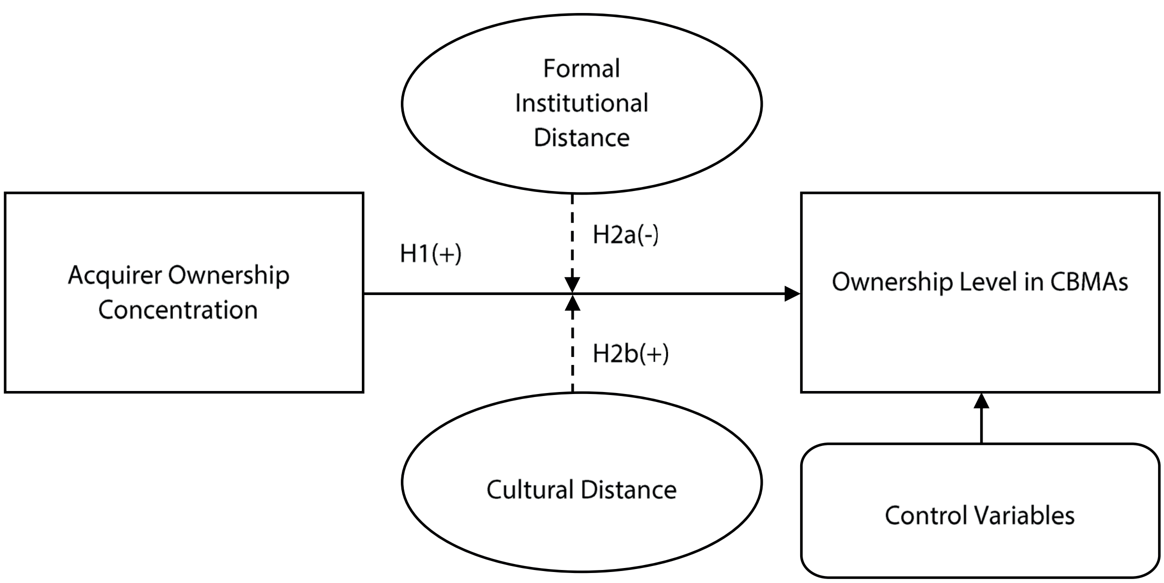


Figure 1: Proposed Research Model

than classifying ownership levels as minority, majority and full ownership since it can easily differentiate the real effect of changes between 50% and 75% equity participation in CBMA deals than evaluating them in the same ownership level (Chen & Hennart, 2004; Yang, 2015). By this way, the statistical power of hypotheses testing can be guaranteed (Fitzsimons, 2008).

The independent variable is *acquirer ownership concentration* and measured as the percentage of shares that are controlled by the largest shareholder who is the owner family or BG affiliates in the acquiring firm (Chirinko, van Ees, Garretsen, & Sterken, 2004; Ilhan-Nas et al., 2018; Singla et al., 2017). The data of this variable is collected from annual and audit reports of the firms which are reported to Public Disclosure Platform (KAP) since 2009 and ISE archieves between years 1998 and 2009.

The first moderator variable is *formal institutional distance* between the countries of acquiring and target firms. To measure this variable we have used World Bank's governance indicators (WGI) that is developed by Kaufmann, Kraay, & Mastruzzi, (2011). WGI has six indicators about institutional quality of an economy and has been documented since 1996. These indicators are accountability, political stability, government effectiveness, regulatory quality, rule of law and corruption control. All indicators have value between -2.5 to + 2.5 and higher values mean better institutional quality in the related country. Formal institutional distance has been calculated through the formula as stated below:

$$ID_{at} = \sqrt{\sum_{i=1}^{6}(I_{ia} - I_{it})^2}$$

In this formula, ID_{at} represents the formal institutional distance between host country and Turkey, I_{ia} represents Turkey's score for a particular governance indicator and I_{it} shows the host country's score for the related governance indicator. This measurement has been used quite widely in previous research (Contractor et al., 2014; Yang, 2015). We have utilized the formula of Kogut and Singh (1988) to measure cultural distance between Turkey and host country. The formula produces an absolute score value of difference between home and host countries according to Hofstede's four cultural dimensions (*power distance, uncertainty avoidance, individualism and masculinity*). The scores of cultural dimensions have been obtained from Geert Hofstede's website[i]. The formulation of cultural distance is below:

$$CD = \sum_{j=1}^{4}\frac{(H_{A,j} - H_{T,j})^2}{4xV_j}$$

in which, $H_{A,j}$ represents the score of host country for the related cultural dimension, $H_{T,j}$ represents the score of Turkey on that cultural dimension and V_j is the variance of the particular dimension.

We have also operationalized some firm, industry, country and deal level control variables as in previous studies for understanding how factors related to M&As influence EM firms' ownership level. For firm level factors, we have controlled acquirer firm performance, firm size and CBMA experience. Firm performance is measured as previous year's return on assets (ROA) of acquiring firm to clearly understand how firm resources and financial strength affect its ownership level in cross border deals (Yang, 2015). Also, firm size is measured as natural logarithm of net sales (ROS) prior to year of cross border deal announcement (Chari, 2013) and CBMA experience as log transformation of the number of CBMAs that are done by the acquiring firm before the related deal's announcement date. We have measured industry relatedness as a dummy variable that takes value of 1 if the acquiring and target firm have the same three-digit SIC code and takes value of 0 otherwise (Contractor et al., 2014; Deng & Yang, 2015; Lahiri, 2017; Malhotra et al., 2011). For the country level control variable, we have employed market size of host country and measured it as natural logarithm of GDP of the host country for the given year. At last, we have measured deal value for finding the effect of deal specific factors on ownership level choice in cross-border deals.

Statistical Analysis Method

Our dependent variable which represents ownership level of Turkish MNCs in CBMAs is ranged between 0.1 % and 100 %. Most of the values of our dependent variable are both left and right censored which led us to use Tobit regression analysis to test our proposed hypotheses. Tobit regression analysis is more suitable when the dependent variable has limited values like 0.1 % to 100 %. Since a firm cannot own an equity stake at 0 % or more than 100 % in an acquisition deal, Tobit regression analysis would give better results with dependent variables that distributed continuously over positive values (Chari & Chang, 2009; Wooldridge, 2012, p. 596). Descriptive statistics, VIF values and correlation results of all variables are presented in Table 1. The highest correlation is between cultural distance and formal institutional distance (0.762). Correlations between

Log Host GDP and ownership concentration (0.524) and cultural distance (0.509) have caused to suspicions about multicollinearity among variables. All variables in the statistical models have Variance Inflation Factor (VIF) values less than 10 so multicollinearity is not a concern for this study (Greene, 2012; Hair, Black, Babin, & Anderson, 2014). In general, it seems that Turkish firms generally have concentrated ownership with a mean value of 65%. Besides, Turkish MNCs have preferred a moderate level of ownership in their CBMAs with 55% mean value in our sample.

Results

Table 2 presents results of Tobit regression analysis of six different models. All control variables and dependent variable are tested through Model 1. All control variables are also included to other models that analyze effects of independent and moderator variables. Missing values in cultural distance variable has caused variation in the number of observations. As shown in Model 1 acquiring firm's performance (β=2.265, $p<0.05$) is positively and significantly related to ownership level in acquired firm. Contrary to previous literature, industry relatedness has shown negative and significant relationship with the dependent variable in Model 2 (β=-0.231, $p<0.1$) and Model 3 (β=-0.269, $p<0.05$). Deal value has shown positive and significant relationship with ownership level in Model 3 (β=0.000, $p<0.1$) and Model 4 (β=0.000, $p<0.1$).

Model 2 shows the main effect of independent variable on ownership level of Turkish MNCs. H1 predicts a positive relationship between ownership concentration in acquiring firm and the level of ownership in target firm. As seen in Model 2, acquirer ownership concentration is positively and significantly associated (β=0.595, $p<0.1$) with ownership level which has provided support for H1. H2a has predicted that formal institutional distance between target country and Turkey will decrease the power of the positive relationship between acquirer ownership concentration and ownership level in target firm. However, Model 3 results have not provided support for H2a since the coefficient of the interaction variable (β=0.093, $p>0.1$) is insignificant. Furthermore, H2b has proposed that the positive relationship between acquirer ownership concentration and ownership level in target firm is strengthened if cultural distance between target country and Turkey increases. Results of Model 4 have not supported H2b since the interaction effect of cultural distance and acquirer ownership concentration is also insignificant (β=-0.296, $p>0.1$).

Table 1: Descriptive Statistics and Correlations

	VIF	Mean	SD	1	2	3	4	5	6	7	8	9	10
1.Ownership Level	-	0.55	0.38	1									
2.Acquirer Ownership Concentration	1.46	0.65	0.20	0.20	1								
3.Formal Institutional Distance	2.94	2.72	1.25	-0.13	0.20	1							
4.Cultural Distance	3.34	1.40	1.07	-0.12	0.24	0.76***	1						
5.Industry Relatedness	1.36	0.53	0.50	-0.08	-0.10	-0.34**	-0.20	1					
6.Log Host GDP	1.97	26.49	1.97	0.10	0.52***	0.47***	0.50***	-0.26*	1				
7.Log CBMA Experience	1.53	1.01	0.69	-0.18	-0.30*	-0.20	-0.46***	0.18	-0.32*	1			
8.Firm Performance	1.22	0.04	0.06	0.24	-0.03	-0.09	-0.05	0.21	-0.15	-0.04	1		
9.Firm Size	1.21	5.96	0.87	-0.16	-0.13	-0.15	-0.21	0.24	-0.16	0.24	-0.19	1	
10.Deal Value	1.14	74536.13	211049.5	0.21	-0.00	-0.02	0.01	0.15	0.12	0.01	0.23	-0.04	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: Results of Tobit Regression Analyses

VARIABLES	Model 1	Model 2	Model 3	Model 4
Constant	0.236	0.559	0.249	1.083
	(1.034)	(1.025)	(1.059)	(1.705)
Industry Relatedness	-0.211	-0.231*	-0.269**	-0.177
	(0.135)	(0.132)	(0.127)	(0.138)
Log Host GDP	0.035	0.008	0.038	0.009
	(0.033)	(0.035)	(0.036)	(0.062)
Log CBMA Experience	-0.091	-0.026	-0.041	-0.104
	(0.089)	(0.093)	(0.091)	(0.113)
Firm Performance	2.265**	2.317**	2.282**	2.089*
	(0.989)	(0.963)	(0.926)	(1.093)
Firm Size	-0.076	-0.085	-0.079	-0.151
	(0.095)	(0.093)	(0.089)	(0.121)
Deal Value	0.000	0.000	0.000*	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
Acquirer Ownership Concentration (AOC)		0.595*	0.291	0.706
		(0.338)	(0.708)	(0.592)
Formal Institutional Distance (FID)			-0.174	
			(0.165)	
FID*AOC			0.093	
			(0.236)	
Cultural Distance (CD)				0.065
				(0.267)
CD*AOC				-0.296
				(0.357)
Constant	0.236	0.559	0.249	1.083
	(1.034)	(1.025)	(1.059)	(1.705)
Log-likelihood	-50.418	-48.895	-46.353	-39.332
Chi-square	17.76***	20.80***	25.89***	18.94**
Pseudo R-square	0.149	0.175	0.218	0.194
Observations	71	71	71	58

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Discussion

Due to increasing presence of cross-border investments of EMNCs in the last decade (UNCTAD, 2017), it is still important to find out how different EM firms determine their strategic choices according to their EM institutional contexts and firm characteristics. This study has tried to figure out the determinants of degree of ownership in CBMAs of Turkish firms at firm and institutional level. By this way, we have tried to contribute both EMNCs and CBMAs literature. The antecedents of CBMAs of Turkish firms have been shaped by institutional theory and SEW approach.

The findings have indicated that ownership concentration in acquiring firms have also increase the level of ownership in target firms for Turkish MNCs CBMAs. This result has diverged from previous findings which were asserted that ownership concentration will mitigate the level of ownership in foreign subsidiaries for EM firms (Bhaumik et al., 2010; Filatotchev et al., 2007). In the case of Turkish MNCs, majority shareholders seem to have less concern about the detrimental effects of full control in foreign acquisitions than other EM firms. Strategy literature in EMs have generally been shaped by institution, resource and transaction cost based views (Hoskisson et al., 2000). This finding can lead up to consider different theoretical approaches for EM firm strategies contrary to previous studies. Thus, using SEW approach in CBMA studies is also a significant contribution of this study. FDI by EMNCs should be considered with different theoretical combinations to get a broader view about them. Moreover, both formal and informal institutions have not affected ownership level of Turkish MNCs related to firm level characteristics. This finding contrasts with previous findings about the significant effect of institutional factors on the equity stake of CBMAs made by EMNCs (Liou et al., 2017; Yang, 2015). When these findings are evaluated together, home country's institutional environment may not have significant impact on strategic choices of Turkish firms. Consequently, it can be assumed that not all EM firms are motivated by escaping weak institutional environments when they choose outward FDI. These findings can be evaluated with findings of Yaprak et al. (2018) which ensure market seeking internationalization of Turkish firms more than asset seeking internationalization. Market seeking FDI motivation is more related with profit than the institutional context of host country. Therefore, majority shareholders disregard both home country and host country institutional environments when expanding in foreign markets. These findings have also provided support for the idea that majority shareholders and their high control on strategic decisions can dominate firm decisions in weak institutional environments like Turkey. However, majority shareholders and owners of EMNCs should consider the legitimacy threats and adaptation problems in regulated environments for FDI decisions. Concentrated ownership as a domestic feature of Turkish firms (Yurtoglu, 2000) would cause governance problems in both domestic and foreign markets for future investments. Another confusing result of this study is that Turkish firms prefer higher level of ownership in CBMAs when the target company is from an unrelated industry. This outcome is coherent with characteristics of Turkish firms whom are organized as highly diversified BGs and have gained high profits for years in the national market (Colpan, 2010; Yaprak, Karademir, & Osborn, 2006). Turkish firms seem to expand their operations with unrelated diversification both in domestic and foreign markets. This can be an outcome of rent seeking and risk diversifying attitude of Turkish firms whom show resistance to change their habitual strategies.

Limitations and future research

Although this study has contributed to EMNCs literature by focusing on a single EM and have demonstrated different results contrary to studies with different EMs, it still has some limitations. Firstly, our study only focused on CBMAs as FDI entry mode choice. Therefore, future studies should analyze diverse FDI entry modes such as greenfield investments or strategic alliances by regarding governance characteristics of Turkish firms and the impact of institutional differences on these choices. Furthermore, as mentioned above, the insignificant effect of institutional and cultural distances may be related to market seeking motivations of Turkish MNCs. The motivations which are not the research questions of this study can be studied in the future to combine the findings of current study. By this way, we can get more accurate connections between antecedents of CBMAs of Turkish firms.

Since we can gather governance measures from only listed companies, our study is limited for sample selection. Future studies may expand the sample by applying different governance measurements like business group affiliation or family firm. Family ownership and business group affiliation are common governance characteristics in EM firms which can cause principal-principal conflicts like ownership concentration (Aguilera, De Castro, Lee, & You, 2012). The role of family control can also be studied with different approaches despite the common usage of agency theory and institutional theory. Moreover, other context specific factors about Turkey's institutional setting and their relations with target countries should be investigated for future studies.

ACKNOWLEDGEMENT

Authors would like to thank Galatasaray University Research Fund (BAP) for supporting this study under the grant no: 18.102.004.

References

Aguilera, R. V., De Castro, L. R. K., Lee, J. H., & You, J. (2012). Corporate Governance in Emerging Markets. In G. Morgan & R. Whitley (Eds.), *Capitalisms and Capitalism in the Twenty-First Century* (pp. 319–344). https://doi.org/10.1093/acprof:oso/9780199694761.003.0014

Anderson, E., & Gatignon, H. (1986). Modes of Foreign Entry: A Transaction Cost Analysis and Propositions. *Journal of International Business Studies*, *17*(17), 1–26.

Anderson, R. C., & Reeb, D. M. (2003). Founding-Family Ownership and Firm Performance: Evidence from the S&P 500. *The Journal of Finance*, *58*(3), 1301–1328. https://doi.org/10.1111/1540-6261.00567

Aybar, B., & Ficici, A. (2009). Cross-border acquisitions and firm value: An analysis of emerging-market multinationals. *Journal of International Business Studies*, *40*(8), 1317–1338. https://doi.org/10.1057/jibs.2009.15

Babbie, E. R. (2010). *The Practice of Social Research* (12th ed.). Belmont, CA: Wadsworth Cengage.

Bhaumik, S. K., Driffield, N., & Pal, S. (2010). Does ownership structure of emerging-market firms affect their outward FDI the case of the Indian automotive and pharmaceutical sectors. *Journal of International Business Studies*, *41*(3), 437–450. https://doi.org/10.1057/jibs.2009.52

Bhaumik, S. K., & Selarka, E. (2012). Does ownership concentration improve M&A outcomes in emerging markets?: Evidence from India. *Journal of Corporate Finance*, *18*(4), 717–726. https://doi.org/10.1016/J.JCORPFIN.2012.04.001

Bonaglia, F., Goldstein, A., & Mathews, J. A. (2007). Accelerated internationalization by emerging markets' multinationals: The case of the white goods sector. *Journal of World Business*, *42*(4), 369–383. https://doi.org/10.1016/j.jwb.2007.06.001

Brouthers, K. D. (2002). Institutional, cultural and transaction cost influeces on entry mode choice and performance. *Journal of International Business Studies*, *2*(1), 203–221. https://doi.org/10.1057/jibs.2012.23

Brouthers, K. D., & Brouthers, L. E. (2000). Acquisition or greenfield start-up? Institutional, cultural and transaction cost influences. *Strategic Management Journal*, *21*(1), 89–97. https://doi.org/10.1002/(SICI)1097-0266(200001)21:1<89::AID-SMJ85>3.0.CO;2-8

Buckley, P. J. (2017). Internalisation Theory and Outward Direct Investment by Emerging Market Multinationals. *Management International Review*, 1–30. https://doi.org/10.1007/s11575-017-0320-4

Buğra, A. (1995). *Devlet ve Işadamları: State and Business in Modern Turkey; a Comparative Study*. İletişim Yayınları.

Chakrabarti, R., Gupta-Mukherjee, S., & Jayaraman, N. (2009). Mars-Venus marriages: Culture and cross-border M & A. *Journal of International Business Studies*, *40*(2), 216–236. https://doi.org/10.1057/jibs.2008.58

Chari, M. D., & Chang, K. (2009). Determinants of the share of equity sought in cross-border acquisitions. *Journal of International Business Studies*, *40*(8), 1277–1297. https://doi.org/10.1057/jibs.2008.103

Chari, M. D. R. (2013). Business groups and foreign direct investments by developing country firms: An empirical test in India. *Journal of World Business*, *48*(3), 349–359. https://doi.org/10.1016/j.jwb.2012.07.019

Chen, S.-F. S. (2008). The motives for international acquisitions: capability procurements, strategic considerations, and the role of ownership structures. *Journal of International Business Studies*, *39*(3), 454–471. https://doi.org/10.1057/palgrave.jibs.8400357

Chen, S.-F. S., & Hennart, J.-F. (2004). A hostage theory of joint ventures: why do Japanese investors choose partial over full acquisitions to enter the United States? *Journal of Business Research*, *57*(10), 1126–1134. https://doi.org/10.1016/S0148-2963(03)00041-9

Chen, Y. Y., & Young, M. N. (2010). Cross-border mergers and acquisitions by Chinese listed companies: A principal-principal perspective. *Asia Pacific Journal of Management*, *27*(3), 523–539. https://doi.org/10.1007/s10490-009-9150-7

Child, J., & Rodrigues, S. B. (2005). The Internationalization of Chinese Firms: A Case for Theoretical Extension? *Management and Organization Review*, *1*(3), 381–410. https://doi.org/10.1111/j.1740-8784.2005.0020a.x

Chirinko, R., van Ees, H., Garretsen, H., & Sterken, E. (2004). Investor Protections and Concentrated Ownership: Assessing Corporate Control Mechanisms in the Netherlands. *German Economic Review*, *5*(2), 119–138. https://doi.org/10.1111/j.1465-6485.2004.00098.x

Chung, H. M. (2014). The role of family management and ownership on semi-globalization pattern of globalization: The case of family business groups. *International Business Review*, *23*(1), 260–271. https://doi.org/10.1016/j.ibusrev.2013.04.005

Colpan, A. M. (2010). Business Groups in Turkey. In A. M. Colpan, T. Hikino, & J. R. Lincoln (Eds.), *The Oxford Handbook of Business Groups* (pp. 486–525). Oxford University Press.

Contractor, F. J., Lahiri, S., Elango, B., & Kundu, S. K. (2014). Institutional, cultural and industry related determinants of ownership choices in emerging market FDI acquisitions. *International Business Review*, *23*(5), 931–941. https://doi.org/10.1016/j.ibusrev.2014.02.005

Cuervo-Cazurra, A. (2012). Extending theory by analyzing developing country multinational companies: Solving the Goldilocks debate. *Global Strategy Journal*, *2*(3), 153–167. https://doi.org/10.1111/j.2042-5805.2012.01039.x

Cuervo-Cazurra, A., & Genc, M. (2008). Transforming disadvantages into advantages: Developing-country MNEs in the least developed countries. *Journal of International Business Studies*, *39*(6), 957–979. https://doi.org/10.1057/palgrave.jibs.8400390

Demirbag, M., Glaister, K. W., & Tatoglu, E. (2007). Institutional and transaction cost influences on MNEs' ownership strategies of their affiliates: Evidence from an emerging market. *Journal of World Business*, *42*(4), 418–434. https://doi.org/10.1016/j.jwb.2007.06.004

Demirbag, M., McGuinness, M., & Altay, H. (2010). Perceptions of institutional environment and entry mode. *Management International Review*, *50*(2), 207–240. https://doi.org/10.1007/s11575-010-0028-1

Demirbag, M., Tatoglu, E., & Glaister, K. W. (2010). Institutional and transaction cost determinants of Turkish MNEs' location choice. *International Marketing Review*, *27*(3), 272–294. https://doi.org/10.1108/02651331011047989

Deng, P. (2009). Why do Chinese firms tend to acquire strategic assets in international expansion? *Journal of World Business*, *44*(1), 74–84. https://doi.org/10.1016/j.jwb.2008.03.014

Deng, P., & Yang, M. (2015). Cross-border mergers and acquisitions by emerging market firms: A comparative investigation. *International Business Review*, *24*(1), 157–172. https://doi.org/10.1016/j.ibusrev.2014.07.005

Filatotchev, I., Strange, R., Piesse, J., & Lien, Y. C. (2007). FDI by firms from newly industrialised economies in emerging markets: Corporate governance, entry mode and location. *Journal of International Business Studies*, *38*(4), 556–572. https://doi.org/10.1057/palgrave.jibs.8400279

Filatotchev, I., & Wright, M. (2010). Agency Perspectives on Corporate Governance of Multinational Enterprises. *Journal of Management Studies*, *48*(2), 471–486. https://doi.org/10.1111/j.1467-6486.2010.00921.x

Fitzsimons, G. J. (2008). Death to Dichotomizing. *Journal of Consumer Research*, *35*(1), 5–8. https://doi.org/10.1086/589561

Fuad, M., & Sinha, A. K. (2018). Entry-timing, business groups and early-mover advantage within industry merger waves in emerging markets: A study of Indian firms. *Asia Pacific Journal of Management*, *35*(4), 919–942. https://doi.org/10.1007/s10490-017-9531-2

Gómez-Mejía, L., Haynes, K., Núñez-Nickel, M., Jacobson, K., & Moyano-Fuentes, J. (2007). Socioemotional Wealth and Business Risks in Family- Controlled Firms: Evidence from Spanish Olive Oil Mills. *Administrative Science Quarterly*, *52*(1), 106–137. https://doi.org/10.2189/asqu.52.1.106

Greene, W. H. (2012). *Econometric Analysis*. London: Pearson Education Limited.

Gubbi, S. R. (2015). Dominate or Ally? Bargaining Power and Control in Cross-Border Acquisitions by Indian Firms. *Long Range Planning*, *48*(5), 301–316. https://doi.org/10.1016/j.lrp.2015.07.004

Guillen, M. F. (2000). Business Groups in Emerging Economies: a Resource-Based View. *Academy of Management Journal*, *43*(3), 362–380. https://doi.org/10.2307/1556400

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate Data Analysis*. USA: Pearson Education Limited.

Hofstede, G. (2001). Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations Across Nations. In *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations Across Nations* (2nd ed.). Retrieved from https://digitalcommons.usu.edu/unf_research/53

Holtbrügge, D., & Kreppel, H. (2012). Determinants of outward foreign direct investment from BRIC countries: an explorative study. *International Journal of Emerging Markets*, *7*(1), 4–30. https://doi.org/10.1108/17468801211197897

Hoskisson, R. E., Lau, C.-M., Eden, L., & Wright, M. (2000). Strategy in Emerging Economies. *The Academy of Management Journal*, *43*(3), 249–267. https://doi.org/10.2307/1556394

Hoskisson, R. E., Wright, M., Filatotchev, I., & Peng, M. W. (2013). Emerging Multinationals from Mid-Range Economies: The Influence of Institutions and Factor Markets. *Journal of Management Studies*, *50*(7), 1295–1321. https://doi.org/10.1111/j.1467-6486.2012.01085.x

Ilhan-Nas, T., Okan, T., Tatoglu, E., Demirbag, M., & Glaister, K. W. (2018). The effects of ownership concentration and institutional distance on the foreign entry ownership strategy of Turkish MNEs. *Journal of Business Research*, *93*, 173–183. https://doi.org/10.1016/j.jbusres.2018.02.006

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2011). The Worldwide Governance Indicators: Methodology and Analytical Issues. *Hague Journal on the Rule of Law*, *3*(02), 220–246. https://doi.org/10.1017/S1876404511200046

Khanna, T., & Palepu, K. (2000). Is Group Affiliation Profitable in Emerging Markets? An Analysis of Diversified Indian Business Groups. *The Journal of Finance*, *55*(2), 867–891.

Khanna, T., & Palepu, K. G. (1997). Why Focused Strategies May Be Wrong for Emerging Markets. *Harvard Business Review*, (July-August).

Khanna, T., & Palepu, K. G. (1999). The Right Way to Restructure Conglomerates in Emerging Markets. *Harvard Business Review*, (July-August). https://doi.org/10.12968/eyed.2016.17.9.14

Khanna, T., & Yafeh, Y. (2007). Business Groups in Emerging Markets : Paragons or Parasites ? Business Groups in Emerging Markets : Paragons or Parasites ? *Journal of Economic Literature*, *45*(3), 331–372. https://doi.org/10.1257/jel.45.2.331

Khanna, T., & Yafeh, Y. (2010). Business Groups in Emerging Markets: Paragons or Parasites? *The Oxford Handbook of Business Groups*, *45*(2), 331–372. https://doi.org/10.1093/oxfordhb/9780199552863.003.0020

Kogut, B., & Singh, H. (1988). The Effect of National Culture on the Choice of Entry Mode. *Journal of International Business Studies*, *19*(3), 411–432.

Kostova, T., & Zaheer, S. (1999). Organizational Legitimacy under Conditions of Complexity : The Case of the Multinational Enterprise. *The Academy of Management Review*, *24*(1), 64–81.

La Porta, R., Lopez-De-Silanes, F., & Shleifer, A. (1999). Corporate Ownership Around the World. *The Journal of Finance*, *54*(2), 471–517. https://doi.org/10.1111/0022-1082.00115

Lahiri, S. (2017). The moderating influence of market potential and prior experience on the governance quality-equity participation relationship: Evidence from acquisitions in BRIC. *Management Decision*, *55*(1), 203–217. https://doi.org/10.1108/MD-06-2016-0408

Lebedev, S., Peng, M. W., Xie, E., & Stevens, C. E. (2015). Mergers and acquisitions in and out of emerging economies. *Journal of World Business*, *50*(4), 651–662. https://doi.org/10.1016/j.jwb.2014.09.003

Liou, R.-S., Chao, M. C., & Ellstrand, A. (2017). Unpacking Institutional Distance: Addressing Human Capital Development and Emerging-Market Firms' Ownership Strategy in an Advanced Economy. *Thunderbird International Business Review*, *59*(3), 281–295. https://doi.org/10.1002/tie.21839

Liou, R. S., Chao, M. C. H., & Yang, M. (2016). Emerging economies and institutional quality: Assessing the differential effects of institutional distances on ownership strategy. *Journal of World Business*, *51*(4), 600–611. https://doi.org/10.1016/j.jwb.2016.03.001

Luo, Y., & Tung, R. L. (2007). International expansion of emerging market enterprises: A springboard perspective. *Journal of International Business Studies*, *38*(4), 481–498. https://doi.org/10.1057/palgrave.jibs.8400275

Madhok, A., & Keyhani, M. (2012). Acquisitions as Entrepreneurship: Asymmetries, Opportunities, and the Internationalization of Multinationals from Emerging Economies. *Global Strategy Journal*, *2*(1), 26–40. https://doi.org/10.1111/j.2042-5805.2011.01023.x

Malhotra, S., Lin, X., & Farrell, C. (2016). Cross-national uncertainty and level of control in cross-border acquisitions: A comparison of Latin American and U.S. multinationals. *Journal of Business Research*, *69*(6), 1993–2004. https://doi.org/10.1016/J.JBUSRES.2015.10.145

Malhotra, S., Sivakumar, K., & Zhu, P. C. (2011). Curvilinear relationship between cultural distance and equity participation: An empirical analysis of cross-border acquisitions. *Journal of International Management*, *17*(4), 316–332. https://doi.org/10.1016/j.intman.2011.06.001

Mathews, J. A. (2006). Dragon multinationals: New players in 21st century globalization. *Asia Pacific Journal of Management*, *23*(1), 5–27. https://doi.org/10.1007/s10490-006-6113-0

Morck, R., & Yeung, B. (2003). Agency Problems in Large Family Business Groups. *Entrepreneurship Theory and Practice*, *27*(4), 367–382.

North, D. (1990). Institutions, institutional change, and economic performance. *Economic Perspective*, *5*(1), 97–112.

Pablo, E. (2009). Determinants of cross-border M&As in Latin America. *Journal of Business Research*, *62*(9), 861–867. https://doi.org/10.1016/J.JBUSRES.2008.10.004

Pattnaik, C., Chang, J. J., & Shin, H. H. (2013). Business groups and corporate transparency in emerging markets: Empirical evidence from India. *Asia Pacific Journal of Management*, *30*(4), 987–1004. https://doi.org/10.1007/s10490-011-9273-5

Peng, M. W., Sun, S. L., Pinkham, B., & Chen, H. (2009). The Institution-Based View as a Third Leg for a Strategy Tripod. *Academy of Management Perspectives*, *23*(3), 63–81. https://doi.org/10.5465/AMP.2009.43479264

Peng, Mike W., Wang, D. Y. L., & Jiang, Y. (2008). An institution-based view of international business strategy: A focus on emerging economies. *Journal of International Business Studies*, *39*(5), 920–936. https://doi.org/10.1057/palgrave.jibs.8400377

Peng, Mike W. (2012). The global strategy of emerging multinationals from China. *Global Strategy Journal*, *107*, 97–107. https://doi.org/10.1111/j.2042-5805.2012.01030.x

Pinto, C. F., Ferreira, M. P., Falaster, C., Fleury, M. T. L., & Fleury, A. (2017). Ownership in cross-border acquisitions and the role of government support. *Journal of World Business*, *52*(4), 533–545. https://doi.org/10.1016/j.jwb.2016.08.004

Ramamurti, R. (2009). Why study emerging-market multinationals? In R. Ramamurti & J. V. Singh (Eds.), *Emerging Multinationals in Emerging Markets* (pp. 3–22). https://doi.org/10.1017/CBO9780511576485.001

Rugman, A. M., & Verbeke, A. (2003). Extending the theory of the multinational enterprise: Internalization and strategic management perspectives. *Journal of International Business Studies*, *34*(2), 125–137. https://doi.org/10.1057/palgrave.jibs.8400012

Satta, G., Parola, F., & Persico, L. (2014). Temporal and Spatial Constructs in Service Firms' Internationalization Patterns: The Determinants of the Accelerated Growth of Emerging MNEs. *Journal of International Management*, *20*(4), 421–435. https://doi.org/10.1016/j.intman.2014.05.001

Scott, W. R. (1995). Institutions and organizations. In *Sage Publications*. Retrieved from http://books.google.com/books?id=7Y-0bDCw_aEC

Singh, D., & Delios, A. (2017). Corporate governance, board networks and growth in domestic and international markets: Evidence from India. *Journal of World Business*, *52*(5), 615–627. https://doi.org/10.1016/j.jwb.2017.02.002

Singla, C., George, R., & Veliyath, R. (2017). Ownership structure and internationalization of Indian firms. *Journal of Business Research*, *81*(December 2016), 130–143. https://doi.org/10.1016/j.jbusres.2017.08.016

Stoian, C., & Mohr, A. (2016). Outward foreign direct investment from emerging economies: escaping home country regulative voids. *International Business Review*, *25*(5), 1124–1135. https://doi.org/10.1016/j.ibusrev.2016.02.004

UNCTAD. (2017). *World Investment Report 2017: Investment and Digital Economy*.

UNCTAD. (2018). *World Investment Report:Investment and New Industrial Policies*.

Wooldridge, J. M. (2012). *Introductory Econometrics: A Modern Approach* (5th ed.). Mason:USA: Cengage Learning Publishing.

Yamak, S., & Üsdiken, B. (2006). Economic liberalization and the antecedents of top management teams: Evidence from turkish "big" business. *British Journal of Management*, *17*(3), 177–194. https://doi.org/10.1111/j.1467-8551.2006.00491.x

Yang, M. (2015). Ownership participation of cross-border mergers and acquisitions by emerging market firms. *Management Decision*, *53*(1), 221–246. https://doi.org/10.1108/MD-05-2014-0260

Yang, M., & Deng, P. (2017). Cross-Border M&As by Chinese Companies in Advanced Countries: Antecedents and Implications. *Thunderbird International Business Review*, *59*(3), 263–280. https://doi.org/10.1002/tie.21767

Yaprak, A., & Karademir, B. (2010). The internationalization of emerging market business groups: an integrated literature review. *International Marketing Review*, *27*(2), 245–262. https://doi.org/10.1108/02651331011037548

Yaprak, A., Karademir, B., & Osborn, R. N. (2006). How do Business Groups Function and Evolve in Emerging Markets? The Case of Turkish Business Groups. *Advances in International Marketing*, *17*(06), 275–294. https://doi.org/10.1016/S1474-7979(06)17010-6

Yaprak, A., Yosun, T., & Cetindamar, D. (2018). The influence of firm-specific and country-specific advantages in the internationalization of emerging market firms: Evidence from Turkey. *International Business Review*, *27*(1), 198–207. https://doi.org/10.1016/j.ibusrev.2017.07.001

Yildirim-Öktem, Ö., & Üsdiken, B. (2010). Contingencies versus external pressure: Professionalization in boards of firms affiliated to family business groups in late-industrializing countries. *British Journal of Management*, *21*(1), 115–130. https://doi.org/10.1111/j.1467-8551.2009.00663.x

Young, M. N., Peng, M. W., Ahlstrom, D., Bruton, G. D., & Jiang, Y. (2008). Corporate governance in emerging economies: A review of the principal-principal perspective: Review paper. *Journal of Management Studies*, *45*(1), 196–220. https://doi.org/10.1111/j.1467-6486.2007.00752.x

Yurtoglu, B. (2000). Ownership, control and performance of Turkish listed firms. *Empirica*, *27*, 193–222. Retrieved from http://link.springer.com/article/10.1023/A:1026557203261

Zahra, S. A. (2003). International expansion of U.S. manufacturing family businesses: the effect of ownership and involvement. *Journal of Business Venturing*, *18*(4), 495–512. https://doi.org/10.1016/S0883-9026(03)00057-0

Zhang, J., Zhou, C., & Ebbers, H. (2011). Completion of Chinese overseas acquisitions: Institutional perspectives and evidence. *International Business Review*, *20*(2), 226–238. https://doi.org/10.1016/j.ibusrev.2010.07.003

Endnotes

[i] https://www.hofstede-insights.com/product/compare-countries/

EGE AKADEMİK BAKIŞ / *EGE ACADEMIC REVIEW*

Cilt 21 • Sayı 4 • Ekim 2021
SS. 333-355
Doi: 10.21121/eab.1017873
Başvuru Tarihi: 28.12.2020 • Kabul Tarihi: 31.07.2021

Accounting Conservatism and Intellectual Capital: Evidence From Turkey With Comparison Models and Sectors

Uğur BELLİKLİ[1], Abdulkerim DAŞTAN[2]

ABSTRACT

The aim of this study is to investigate the relevance between accounting conservatism and intellectual capital in the context of the contribution of accounting conservatism to intellectual capital. Four different measurement methods [the asymmetric timeliness of the earnings, market-to-book ratio, asymmetry of the accruals and cash flows and negative accruals] were employed in the study to measure both accounting conservatism and intellectual capital. In this study, research data based on listed companies in manufacturing industry and financial institutions of Borsa Istanbul (BIST) 100 Index in Turkey. The method of the study was the panel data analysis in which the effect of accounting conservatism on intellectual capital was examined based on the data of the predetermined this companies for 2006-2017 period. As a result of the findings, it was determined that the companies care about intellectual capital, and although there is a difference according to the measurement methods, accounting conservatism has an effect on intellectual capital, which is observed both positively that more prominent in financial institutions and negatively, and companies that have conservative accounting policies.

Keywords: Accounting conservatism; beneficial financial information; intellectual capital; Companies in listed BIST 100 Index.

INTRODUCTION

Consider an example of an enterprise that has a strong intellectual capital structure at the level we can measure and assume that the measured level of the conservative accounting of this enterprise is high. Right at this point, would it be possible to find an answer to the following question? "Does the high conservatism level of a company cause that it has a strong intellectual capital structure, or does the strong intellectual capital structure bring with it the conservative attitude of the company?"This study seeks the answer to this question and evaluates the issue in the light of the findings of analyzes in terms of the effect or contribution of conservative accounting policies on the intellectual capital structure.

The fact that there are limited number of studies that directly deal with the relationship between accounting conservatism and intellectual capital in the literature and that only a limited number of studies deal with the subject in general was the starting point of the present study.

In these limited number of studies, it is stated that they argued that conservative accounting practices suppressed intellectual capital, and emphasized the negative aspects of the relevance between accounting conservatism and intellectual capital (Amir and Lev, 1996; Brennan, 2001; Lev, 2001; Holland, 2003; Sofian et al., 2011). However, the fact that the subjects with which accounting conservatism was investigated (corporate social responsibility, auditing and auditor quality, management of earnings, etc.) have common aspects with intellectual capital, accounting conservatism aims to protect the interests of the parties of the enterprise. Besides, intellectual capital is also a part of this aim for taking the business further may provide a more positive approach to the relationship between accounting conservatism and intellectual capital. In addition, it is possible to argue that every enterprise

[1] Dr. Öğr. Üyesi, Giresun Üniversitesi, Alucra Turan Bulutcu Meslek Yükseokulu, Yönetim ve Organizasyon Bölümü, ugur.bellikli@giresun.edu.tr
[2] Prof. Dr., Karadeniz Teknik Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İşletme Bölümü,akdastan@ktu.edu.tr

that sustains its existence in a proper way contributes to the accumulation of the intellectual capital. In brief, it is possible to bring alternative and more positive perspectives to the opinion claiming that conservative reporting prevents intellectual capital from becoming prominent in the literature (Bellikli, 2019).

It is possible to name the structure and understanding of the management, relations with customers, the level of knowledge and quality of employees, technological opportunities, and the ability to use them as "the factors that may affect the intellectual capital structure at the enterprise level" (Martensson 2000:210). In addition to these factors, to what extent can the conservative accounting policies that are applied in enterprises have an impact on the intellectual capital? In one sense, the purpose of this study, which aimed to question this effect, was to investigate the relationship between accounting conservatism and intellectual capital in terms of the contribution of accounting conservatism to intellectual capital based on the data of manufacturing industry and financial institutions of Borsa Istanbul (BIST) 100 Index in Turkey. The method of the study was the panel data analysis in which the effect of accounting conservatism on intellectual capital was examined based on the data of the predetermined this companies for 2006-2017 period. In addition to directly dealing with the effect of accounting conservatism on intellectual capital, the use of four different measurement methods to measure both accounting conservatism and intellectual capital and the possibility of comparing the methods and sectors may be stated as the originality of the study in the literature.

DEFINITION OF ACCOUNTING CONSERVATISM AND INTELLECTUAL CAPITAL

Accounting conservatism, which affects the accounting theory and applications, particularly the presentation and the quality of financial statements are defined as "proper reporting of the assets, liabilities, incomes and expenses based on a cautious approach to uncertainties and risks that might have impacts on the presentation of financial information, ignoring possible profits; however, always considering the possible losses, to prefer the least optimistic situation for the owners of the company" (Basu, 1997; Wang et al., 2008:2; Givoly & Hayn, 2000:291).

Based on this definition, it is also ambiguous what high conservatism means. There are at least two interpretations, the following:

- High degree of proper reporting – as in the level of details provided in the reporting.
- High degree of caution being placed on uncertainties and risks.

It can be stated that the second interpretation is more logical. Because the essence of accounting conservatism based on caution being placed on uncertainties and risks. Therefore, the measurement methods are mentioned in this study, which express a high or low level of conservatism is only based on statistical figures (Wang 2009:19).

In the broad range of the stakeholders, from business executives to business leaders, from those that purchase goods and services, from the business to its staff, all of these parties may demand that their interests are considered superior. Stakeholders may act according to their interests from time to time in or out company. In such a situation, conflicts of interests are inevitable. However, such conflicts may be avoided with the contracts that will be made in line with the accounting conservatism. Meanwhile, reasonable requests of the parties can also be provided (Watts & Zimmerman, 2003; Leone et al., 2006; Mashayekhi et al., 2009; Pae et al., 2005; Chandra et al., 2004).

One of the significant aspects of the studies that are conducted on accounting conservatism is that there is a great diversity among these methods measuring the accounting conservatism, and that there is no significant consistency among them. The measurement methods of accounting conservatism were used in applied studies to test the theories and hypotheses about conservatism, and the differences of these measurement methods were revealed in some applied studies that employed multiple measurement methods (Wang 2009:26). For this reason, there may be uncertainties about the validity of the results that are obtained with a certain measurement method and about the significance levels of the measurement methods. When the literature on accounting conservatism studies is reviewed, it is seen that the following five measurement methods come to the forefront (Basu, 1997; Beaver & Ryan, 2000; Ball & Shivakumar, 2005; Penman & Zhang, 2002; Givoly & Hayn, 2000). These are;

- The method of measuring the asymmetric timeliness of the earnings,
- The method of measuring the market-to-book ratio (MTB),
- The method of asymmetry of the accruals and cash flows,

- The hidden reserves measurement method,
- The negative accruals measurement method.

The first and third of this measurement method are based on the similar basic idea of asymmetric timeliness and are estimated from models with a similar structure. Substantially, both models regress an earnings variable on a proxy for economic 'news'. Both models use dummy variables to distinguish between 'good-news' and 'bad-news'. The fundamental distinction between these two methods comes from their different choices of the proxies for economic 'news' and the response variable. The first method uses stock return as the proxy for news, whereas the third method measure uses operating cash-flow as the proxy for news (Wang, 2009:45). Other measurement methods don't use dummy variables and consider 'good-news' and 'bad-news. Its use coefficient for the measurement of accounting conservatism.

On the other hand, it is possible to define the intellectual capital, which cannot be handled easily and expressed like an ordinary intangible asset in the companies as based on the information, the process of firstly activating human resources in an enterprise to get competitive advantage and create value, and in this way, revealing intellectual assets with higher added values by emphasizing non-physical assets is used (Stewart, 1997:20; Bontis, 1998:64; Samiloglu, 2002:69; Brooking, 1997:364).

Intellectual capital, which consists of generally accepted components like human capital, structural capital, and customer capital, in one sense, needs the adoption of the business practices that are required by the industrial revolution (robot technology, cyber security, etc.). However, these business practices are extremely important, they are not adequate alone. So, enterprises need human capital for their professional workforce, structural capital for strategically important assets, and customer capital for customers, who are the reason for the existence of businesses. In this context, these business practices, and intellectual capital elements must be considered equally (Brooking, 1997; Stewart, 1997; Edvinsson & Malone, 1997; Bontis, 1998; McElroy, 2002; Cıkrıkcı & Dastan, 2002).

It was also emphasized in the literature that the measurement methods must have certain characteristics (being useful and meaningful, comprehensibility, etc.) to overcome the reasons that make it difficult to measure intellectual capital and to facilitate it (Erkus 2004:313). In addition, it is necessary that the measurement methods are evaluated in the context of the interests and needs of the enterprise. When all these opinions are considered, it may be argue that the methods were developed in the literature to measure intellectual capital as a whole at enterprise level and at the level of elements (Hand & Lev, 2003:4; Carroll & Tansey, 2000:302-303; Erkus, 2004:313).

The methods measuring intellectual capital as a whole at enterprise level make measurements in a holistic manner without focusing on the elements of intellectual capital (Stewart, 1997; Rodov & Leliaert, 2002; Bontis, 1998; Chung & Pruitt, 1994; Celik & Percin, 2000). These are;

- Intellectual capital performance method (also known as the market-to-book ratio - MTB),
- Tobin's Q Rate Method,
- Calculated intangible value method.

Two approaches are adopted in methods measuring the intellectual capital at the level of elements in general (Pulic, 1998; Pulic, 2004; Ercan et al., 2003; Kim, 2004). In these methods, either an approach is adopted that go towards the whole by measuring the elements of intellectual capital one by one, or it is sufficed to measure one or more elements of intellectual capital, and the whole is not considered. These methods are;

- Value added intellectual coefficient method (VAIC),
- Economic value-added method (EVA),
- Market value added method (MVA).

Among the other measurement methods measuring the intellectual capital at the elements level, those that come to the forefront in the literature are listed below (Van den Berg, 2002; Edvinsson, 1997; Bontis, 2001; Kaplan and Norton, 1999). These are;

- Intellectual capital index measurement method,
- Skandia Guide measurement method,
- Technology broker measurement method,
- Balanced score table measurement method,
- Intangible assets list measurement method.

LITERATURE REVIEW

Despite the limited number of studies that deal with the relationship between accounting conservatism and intellectual capital directly in the literature, it is possible to argue that there are many applied studies conducted on accounting conservatism and intellectual capital issues separately and in relationship to other subjects.

The studies conducted as of 2005 (new regulations in the field of accounting based on international accounting standards) directly or indirectly on the subject, which are considered to contribute to the analysis of this study are given in chronological order in the table below.

The aspects that make this study different from the studies in the literature;

- In this study, it is possible to state that the effect of accounting conservatism on intellectual capital was investigated to contribute the literature,
- Four different measurement methods were employed to measure both accounting conservatism and intellectual capital,
- The opportunity of making comparisons between the methods and sectors was provided,

Accounting conservatism literature is given as a summary in Table 1 as authors, years, subjects and scopes, measurement methods, and findings.

Table 1: Summary of accounting conservatism literature

Author(s)	Year	Subject and Scope	Measurement Method(s)	Finding(s)
Pae et al.	2005	The relationship between accounting conservatism and market-to-book ratio. USA Enterprises. 1970-2001.	Basu (1997), Beaver-Ryan (2000)	It was reported that there is a negative relationship between accounting conservatism and market-to-book ratio.
Cheng	2005	The relationship between accounting conservatism and return on equity (ROE). The enterprises between 6000 and 6999 in Standard Industry Encoding. 1976-1997.	Penman-Zhang (2002)	It was shared as a finding that the return on equity was higher in businesses, which applied conservative accounting policies predominantly.
Ahmed and Duelman	2007	The relationship between corporate management and accounting conservatism. S&P 1500 Enterprises. 1999-2001.	Basu (1997), Beaver-Ryan (2000), Givoly Hayn (2000)	It was determined that accounting conservatism was related negatively with the internal management of an enterprise, and was positively related with the external stakeholders.
Krishnan	2007	The relationship between auditing and auditor quality and accounting conservatism. The enterprises in the USA. 2001-2002.	Basu (1997)	Following the collapse of the audit firm that was named Arthur Andersen, it was found that this company considered conservative accounting policies to be more important to decrease the court costs of its former clients.
Qiang	2007	The relationship between accounting conservatism and some variables (contracts, court expenses, taxes, and political factors). The enterprises in the USA. 1982-2002.	Beaver-Ryan (2000), Givoly-Hayn (2000)	It was shared as a finding that several variables encouraged businesses to conditional and non-conditional conservatism, and there was a negative relationship between accounting conservatism and market-to-book ratio.
LaFond and Watts	2008	The relationship between information asymmetry and accounting conservatism. The enterprises in the USA stock market. 1983-2001.	Basu (1997)	It was determined that accounting conservatism increased information asymmetry.
Lara et al.	2009	The relationship between corporate management and accounting conservatism. The companies in the USA. 1992-2003.	Basu (1997), Ball-Shivakumar (2005), Givoly-Hayn (2000)	It was determined that there is a positive relationship between accounting conservatism and corporate management.
Sofian et al.	2011	The relationship between the intellectual capital on conservatism and value relevance of earnings.	Literature review	It was shared as a finding that generally accepted accounting principles, accounting standards, and accounting conservatism prevented intellectual capital to come to the forefront.

Table 1: Continue

Author(s)	Year	Subject and Scope	Measurement Method(s)	Finding(s)
Gokmen	2012	The relationship between the value relevance of earnings and accounting conservatism. 106 manufacturing companies. 2006-2010.	Basu (1997)	It was reported that accounting conservatism has a negative effect on the value relevance of earnings.
Francis et al.	2013	The relationship between the financial crises and accounting conservatism. S&P 1500 companies. 2007-2009.	Basu (1997), Penman-Zhang (2002)	It was shared as a finding that the enterprises with higher conservatism levels before financial crises lost less value in crises compared to the enterprises with lower conservatism levels.
Crawley	2015	The effect of accounting conservatism on macroeconomic indicators. S&P 500 companies. 1955-2007.	Other	It was shared as a finding that accounting conservatism might affect the basic macroeconomic indicators like Gross National Product (GNP) and Consumer Price Index (CPI).
Ettredge et al.	2016	The relationship between commercial cases against companies and accounting conservatism. The companies in the USA. 1996-2011.	Basu (1997)	It was reported that as the accounting conservatism levels of the enterprises increased, the commercial cases against the enterprise ended in favor of the enterprise.
Sana'a NM	2016	The effect of accounting conservatism on financial performance indicators. Insurance companies in Jordan 2007-2014.	Givoly-Hayn (2000)	It was reported that accounting conservatism has a positive effect on financial performance indicators.
Polat	2016	The relationship between corporate management and accounting conservatism. The companies in Borsa Istanbul (BIST) 100 Index 2006-2013.	Ball-Shivakumar (2005)	It was reported that there is a positive relationship between corporate management and accounting conservatism.
Ge et al.	2018	The relationship between investor sentiment and accounting conservatism. The companies in the USA. 1987-2008.	Re-edited, Ball-Shivakumar (2005)	Investors had higher sensitivity for making investments as a result of their earlier consideration of economic losses due to conservatism.
Li and Xu	2018	The relationship between asset specificity and accounting conservatism. The companies in the USA. 1988-2011.	Basu (1997)	It was reported that asset specificity affected the current value, risk of bankruptcy, cash flows directly; however, there was a negative relationship between accounting conservatism and asset specificity.
Chen	2019	The relationship between the success of family enterprises and accounting conservatism. The companies in Japan. 2011-2016.	Basu (1997)	It was reported that the success of family enterprises will improve accounting conservatism.

Similarly, the summary of the intellectual capital literature is given in Table 2 in the form of the authors, years, subjects, measurement methods and findings.

Table 2: Summary of intellectual capital literature

Author(s)	Year	Subject and Scope	Measurement Method(s)	Finding(s)
Chen et al.	2005	The relationship between intellectual capital and market values of the enterprises and financial performances. The companies in Taiwan stock exchange. 1975-1991.	Value added intellectual coefficient (VAIC)	It was shared as a finding that intellectual capitals of enterprises had positive effect on financial performances, and that intellectual capital might be a sign for the future financial performance of the enterprise.
Yalama	2005	The relationship between intellectual capital and profitability. The companies in banking sector. 1995-2004.	Value added intellectual coefficient (VAIC)	It was shared as a finding that the ability of businesses that can make profits from intellectual assets was at medium level.
Akmese	2006	The relationship between Intellectual capital and company value. 35 companies in Borsa Istanbul (BIST) from various sectors.	Intellectual capital performance (market-to-book ratio)	It was shared as a finding that the structural capital element of the intellectual capital was influential on market-to-book ratio of enterprises.
Kamath	2008	The relationship between intellectual capital and profitability. The drug companies in India. 1996-2006.	Value added intellectual coefficient (VAIC)	It was reported that the effect with the biggest impact on the profitability and productivity of the enterprise among the intellectual capital elements was the human capital.
Unal	2010	Intellectual capital and accounting standards.	Literature review	It was determined that intangible fixed assets were quite inadequate in expressing intellectual capital.
Zor and Cengiz	2013	The relationship between intellectual capital and company value. The companies of Energy Sector in Borsa Istanbul (BIST) 2009-2011.	Intellectual capital performance (market-to-book ratio)	It was determined that enterprises do not care about intellectual capital, and only tangible fixed assets were influential on the value of the enterprise.
Bayraktaroglu et al.	2014	The relationship between intellectual capital usage efficacy and market performance. The companies in Chemistry, Petroleum, and Plastic Sector in Borsa Istanbul (BIST).2006-2012.	Value added intellectual coefficient (VAIC)	It was determined that a significant difference was not detected between intellectual capital use efficacy and market performance.
Kendirli and Diker	2016	The effect of intellectual capital on financial performance indicators. Seven companies in paper and wrapping industry. 2011-2013	Intellectual capital performance (market-to-book ratio), Economic value added (EVA), Calculated intangible value	It was reported that intellectual capital affect financial performance.
Hussunki et al.	2017	The relationship between intellectual capital and information management applications and business performance. The companies in Finland.	Intellectual capital and information management practices	It was reported that the enterprises that had different intellectual capital levels did not have any differences in terms of information management use.
Ozkan et al.	2017	The relationship between intellectual capital and financial performance. The 44 banking companies in Turkey. 2005-2014.	Value added intellectual coefficient (VAIC)	It was shared as a finding that the usage efficacy of intellectual capital and human capital affect financial performance in a positive way.

Table 2: Continue

Author(s)	Year	Subject and Scope	Measurement Method(s)	Finding(s)
Cenciarelli et al.	2018	The relationship between intellectual capital and bankruptcy risk. The companies in the USA. 1985-2015.	Value added intellectual coefficient (VAIC)	It was shared as a finding that intellectual capital was better in estimating the bankruptcy risk when compared to the other estimation methods.
Bayraktaroglu et al.	2019	The relationship between intellectual capital and firm performance. Turkish manufacturing firms. 2003-2013	Extended Value-added intellectual coefficient (VAIC)	It has been detected that innovation capital effectiveness has a direct impact on firms' productivity. But intellectual capital effectiveness elements have a moderating role on the relationship between capital employed efficiency and profitability.

If a general assessment is to be made about the literature in Table 1 and 2, it is noteworthy that there is only one study that addresses the relationship between accounting conservatism and intellectual capital directly (Sofian et al., 2011), and this study was not conducted at empirical level. It is also possible to share as a finding that there are only a limited number of indirect studies among the 30 studies that were examined in the accounting conservatism literature. Only 5 studies employed more than two measurement methods, and only one study used more than one measurement method among the 18 studies in the intellectual capital literature, and that only the literature review was used to make conclusions in some studies. Furthermore, no cross-sector comparisons were made in the studies.

METHODOLOGY

The Purpose, Method and Scope of the Study

The aim of the study is to investigate the impact of accounting conservatism on intellectual capital. The method that was used to achieve this purpose was as follows:

- Determining how the accounting conservatism and intellectual capital data were calculated for each of the 38 manufacturing industry and 31 financial institutions companies in Borsa Istanbul (BIST) 100 Index in Turkey between 2006 and 2017,
- Creating eight panel datasets for four different measurement methods (the asymmetric timeliness of the earnings, market-to-book ratio, asymmetry of the accruals and cash flows, hidden reserves and negative accruals) and two sectors with the help of the data calculated in this respect,
- Determining the conservatism levels of the companies in general with the help of the panel datasets created, and then, investigating the possible effect of accounting conservatism on intellectual capital.

The scope of the study consists of the companies of 38 manufacturing industry and 31 financial institutions in BIST 100 Index, which constitute the basic companies in Borsa Istanbul (BIST) in Turkey. In this context, it was planned to include all the companies in the index in the scope of the study. However, it was not possible to include all these companies in the index to create balanced panels for the purpose of obtaining more accurate results in the panel data analysis for the period between 2006 and 2017, which was included in the analysis. In this respect, the companies of 36 manufacturing industry and 26 financial institutions whose data were accessed in a continuous way in three measurement methods of accounting conservatism were included in the analyses, and 432 (manufacturing industry) – 312 (financial institutions) observations were obtained. However, in "the asymmetric timeliness of earnings method", the companies of 33 manufacturing industry and 23 financial institutions whose data were accessed in a continuous way were analysed, and in this way, 396 (manufacturing industry) – 276 (financial institutions) observations were obtained. While the data of these companies were obtained, the panel datasets were created by accessing the financial statements, footnotes of their financial statements, and the share data of these companies in various financial sites (like Bloomberg ht, invest.com).

The Hypotheses and Model of the Study

Eight different hypotheses were developmented in the scope of this study in Table 3.

The study models and the regression equations of these models are shown in Table 4. Models and the regression equations are valid for both sectors.

In these study models;

- α_{it} : Refers to the constant coefficients of the models,
- α_i: Refers to the inclination component (bias) of the model (constant effects coefficient),
- β_0, β_1, β_2 and β_j : Refers to the coefficients in the models,
- μ_{it} : Refers to the error term components in the models according to unit or time,
- ε_{it} : Refers to the error terms of the models.

Table 3: Research hypotheses

	Hypotheses
H_1	Accounting conservatism, which is measured according to the Asymmetric Timeliness of Earnings Measurement Method, has an effect on intellectual capital in manufacturing industry.
H_2	Accounting conservatism, which is measured according to the Asymmetric Timeliness of Earnings Measurement Method, has an effect on intellectual capital in financial institutions.
H_3	Accounting conservatism, which is measured according to the Asymmetry of Accruals and Cash Flows, has an effect on intellectual capital in manufacturing industry.
H_4	Accounting conservatism, which is measured according to the Asymmetry of Accruals and Cash Flows, has an effect on intellectual capital in financial institutions.
H_5	Accounting conservatism, which is measured with the market-to-book ratio Measurement Method has an effect on intellectual capital in manufacturing industry.
H_6	Accounting conservatism, which is measured with the market-to-book ratio Measurement Method has an effect on intellectual capital in financial institutions.
H_7	Accounting conservatism, which is measured according to the Negative Accruals Measurement Method, has an effect on the intellectual capital in manufacturing industry.
H_8	Accounting conservatism, which is measured according to the Negative Accruals Measurement Method, has an effect on the intellectual capital in financial institutions.

Table 4: Study models

Basu (1997) Model	$EPS_{it}/SP_{it} = \alpha_{it}+\beta_0 SMR_{it}+\beta_1 DV_{it}+\beta_2 SMR_{it}\times DV_{it}+\mu_{it}+\varepsilon_{it}$
	$MTB_{it} = \alpha_{it}+\beta_0 SMR_{it}+\beta_1 DV_{it}+\beta_2 SMR_{it}\times DV_{it}+\mu_{it}+\varepsilon_{it}$
	$VAIC_{it} = \alpha_{it}+\beta_0 SMR_{it}+\beta_1 DV_{it}+\beta_2 SMR_{it}\times DV_{it}+\mu_{it}+\varepsilon_{it}$
	$Q_{it} = \alpha_{it}+\beta_0 SMR_{it}+\beta_1 DV_{it}+\beta_2 SMR_{it}\times DV_{it}+\mu_{it}+\varepsilon_{it}$
	$MVA_{it} = \alpha_{it}+\beta_0 SMR_{it}+\beta_1 DV_{it}+\beta_2 SMR_{it}\times DV_{it}+\mu_{it}+\varepsilon_{it}$
Ball and Shivakumar (2005) Model	$ACC_{it} = \alpha_{it}+\beta_0 DV_{it}+\beta_1 CFO_{it}+\beta_2 DV_{it}\times CFO_{it}+\mu_{it}+\varepsilon_{it}$
	$MTB_{it} = \alpha_{it}+\beta_0 DV_{it}+\beta_1 CFO_{it}+\beta_2 DV_{it}\times CFO_{it}+\mu_{it}+\varepsilon_{it}$
	$VAIC_{it} = \alpha_{it}+\beta_0 DV_{it}+\beta_1 CFO_{it}+\beta_2 DV_{it}\times CFO_{it}+\mu_{it}+\varepsilon_{it}$
	$Q_{it} = \alpha_{it}+\beta_0 DV_{it}+\beta_1 CFO_{it}+\beta_2 DV_{it}\times CFO_{it}+\mu_{it}+\varepsilon_{it}$
	$MVA_{it} = \alpha_{it}+\beta_0 DV_{it}+\beta_1 CFO_{it}+\beta_2 DV_{it}\times CFO_{it}+\mu_{it}+\varepsilon_{it}$
Beaver and Ryan (2000) Model	$MTB_{it} = \alpha_{it}+\alpha_i+\sum_{j=0}^{6}\boldsymbol{\beta}_j ROE_{t-j,i}+\varepsilon_{it}$
	$MTB_{it} = \alpha_{it}+\alpha_i+\sum_{j=0}^{6}\boldsymbol{\beta}_j ROE_{t-j,i}+\varepsilon_{it}$
	$VAIC_{it} = \alpha_{it}+\alpha_i+\sum_{j=0}^{6}\boldsymbol{\beta}_j ROE_{t-j,i}+\varepsilon_{it}$
	$Q_{it} = \alpha_{it}+\alpha_i+\sum_{j=0}^{6}\boldsymbol{\beta}_j ROE_{t-j,i}+\varepsilon_{it}$
	$MVA_{it} = \alpha_{it}+\alpha_i+\sum_{j=0}^{6}\boldsymbol{\beta}_j ROE_{t-j,i}+\varepsilon_{it}$
Givoly and Hayn (2000) Model	$MTB_{it} = \alpha_{it}+\beta_0 NA_{it}+\mu_{it}+\varepsilon_{it}$
	$VAIC_{it} = \alpha_{it}+\beta_0 NA_{it}+\mu_{it}+\varepsilon_{it}$
	$Q_{it} = \alpha_{it}+\beta_0 NA_{it}+\mu_{it}+\varepsilon_{it}$
	$MVA_{it} = \alpha_{it}+\beta_0 NA_{it}+\mu_{it}+\varepsilon_{it}$

Table 5: Variables in Study Models

Abbreviation for Variable	Explanation of the variable	Source of the Variable
EPS	Earnings Per Share	Financial Statement and Income Statement
SP	Stock Price	Various finacial websites (bloomberg ht, invest.com etc.)
SMR	Stock Market Return	Finacial Statement Footnotes, various financial websites
DV	Dummy Variable	It is determined according to the stock market return.
ACC	Activity Accruals	Financial Statement and footnotes, Income Statement
CFO	Cash Flow Operations	Cash Flow Statement
DV	Dummy Variable	It is determined according to the CFO
MTB	Market to Book Ratio	Financial Statement Footnotes, various financial websites
ROE	Return on Equity	Financial Statement and Income Statement
NA	Negative Accruals	Financial Statement and footnotes, Income Statement
VAIC	Value Added Intellectual Capital	Financial Statement and footnotes, Income Statement
Q	Approximate Tobin Q Ratio	Financial Statement, Income Statement, financial websites
MVA	Market Value Added	Financial Statement and Income Statement

Study Findings and Evaluation of This Findings

The descriptive statistics of the variables that were included in the study and the information on their interpretations are given in Table 6. Particularly, when the results related to the dependent variables and the variables that represent the intellectual capital are examined in the descriptive statistics, EPS/SP variable is between -2,8996 and 5,6790, and its mean was 0,1727 in manufacturing industry. EPS/SP variable is between -1,7079 and 8,2976, and its mean was 0,1578 in financial institutions. On the other hand, The ACC variable is between -3644,9420 and 3407,4500 and its mean was -101,7934 in manufacturing industry. Unlike the manufacturing industry, ACC variable is mean 34,5526 in the financial institutions. During the observation period, the NA variable, which represents the accounting conservatism degree, had a minimum value of -331,4145 and -302,8678 in both sectors. When the MTB, VAIC, Q and MVA variables, which represent intellectual capital values, firstly they are 5,4135; 19,7559; 19,0570; 211,7976 in manufacturing industry, secondly, they are 1,2447; 20,4068; 0,6171; 124,1824 in financial institutions. The results are same in other methods for the intellectual capital values. When the fact that these values are positive and high is considered, it can be argued that the companies have intellectual assets and intellectual capital.

Table 6: Descriptive statistics

Variables	Number of Observations	Mean	Standard Deviation	Minimum Value	Maximum Value
EPS/SP	396 (M)	0,1727	0,6487	-2,8996	5,6790
SMR	396 (M)	0,3492	0,8214	-0,7857	5,1390
DV	396 (M)	0,3485	0,4771	0	1
SMR×DV	396 (M)	-0,1011	0,1851	0,7857	0
MTB	396 (M)	5,4135	21,5449	-23,1786	173,1202
VAIC	396 (M)	19,7559	39,3417	-56,7568	356,2007
Q	396 (M)	19,0570	98,8751	-0,6031	847,1846
MVA	396 (M)	211,7976	549,8369	-1538,6200	3732,1550
EPS/SP	276 (F)	0,1578	0,6234	-1,7097	8,2976
SMR	276 (F)	0,2954	0,6466	-0,7438	3,8482
DV	276 (F)	0,3623	0,4815	0	1
SMR×DV	276 (F)	-0,0915	0,1651	-0,7438	0
MTB	276 (F)	1,2447	1,9475	-3,2556	26,6815
VAIC	276 (F)	20,4068	32,8430	-3,8713	233,2028
Q	276 (F)	0,6171	0,8564	-0,1890	10,8252
MVA	276 (F)	124,1824	383,7392	-2805,2840	2129,0620
ACC	432 (M)	-101,7934	695,6485	-3644,9420	3407,4500
DV	432 (M)	0,2222	0,4162	0	1
CFO	432 (M)	45,0128	149,6570	-556,6716	1099,9990
DV×CFO	432 (M)	-8,5373	49,4637	-556,6716	0
MTB	432 (M)	5,1708	20,6759	-23,1786	173,1202
VAIC	432 (M)	25,9286	70,1472	-56,7568	1056,5730
Q	432 (M)	23,0172	101,4606	-0,6031	847,1846
MVA	432 (M)	218,5785	544,9767	-1538,6200	3732,1550

Variables	Number of Observations	Mean	Standard Deviation	Minimum Value	Maximum Value
ACC	312 (F)	34,5526	428,8567	-615,9528	2858,8410
DV	312 (F)	0,2532	0,4355	0	1
CFO	312 (F)	37,3771	210,1822	-1156,4180	2070,8160
DV×CFO	312 (F)	-18,3126	100,9104	-1156,4180	0
MTB	312 (F)	1,2557	1,8505	-3,2556	26,6815
VAIC	312 (F)	19,3653	31,1677	-3,8713	233,2028
Q	312 (F)	0,5961	0,8179	-0,1890	10,8252
MVA	312 (F)	157,0399	410,2539	-2805,2840	2129,0620
ROE	432 (M)	0,1494	0,4795	-4,4584	7,5724
MTB	432 (M)	5,1708	20,6759	-23,1786	173,1202
VAIC	432 (M)	25,9286	70,1472	-56,7568	1056,5730
Q	432 (M)	23,0172	101,4606	-0,6031	847,1846
MVA	432 (M)	218,5785	544,9767	-1538,6200	3732,1550
ROE	312 (F)	0,0774	1,0608	-17,9678	3,4048
MTB	312 (F)	1,2557	1,8505	-3,2556	26,6815
VAIC	312 (F)	19,3653	31,1677	-3,8713	233,2028
Q	312 (F)	0,5961	0,8179	-0,1890	10,8252
MVA	312 (F)	157,0399	410,2539	-2805,2840	2129,0620

M: Manufacturing Industry, F: Financial Institutions

The Effect of Asymmetric Timeliness of Earnings Measurement Method on Intellectual Capital

When the estimation process is performed based on the Basu model (1997) in the manufacturing industry, it is understood from the cross-sectional and time F values in Table 7 and the Hausman tests that when the dependent variable is EPS/SP (the Rate of Earning Per Share to Stock Price), *the unit and time-effective fixed effects model* is valid; when the dependent variable is VAIC (Value Added Intellectual Coefficient), *the unit and time-effective random effects model* is valid; and when dependent variables are market-to-book ratio, Q (Approximate Tobin Q Rate) and MVA (Market Value Added), *the unit-effective random effects model* is valid.

According to Basu (1997)'s measurement method, it is possible to argue that the greater the asymmetric earning, the higher the accounting conservatism. For companies that have positive Stock Market Return (SMR), when the Dummy Variable (DV) is taken as "0", the effect of SMR on the dependent variable EPS/SP (0.2419-0=0.2419) is positive. When the DV is taken "1" for enterprises that have negative SMR, the effect of SMR on the dependent variable (0.2419-0.0395=0.2024) is positive again. In other words, there is no asymmetry if the news is good and bad. According to the method of asymmetric timeliness measurement of the earnings, it may be argued that the companies have slight conservative accounting policies (due to the partial differences between the coefficients) according to the coefficient of the interaction component (SMR×DV) variable (0,0395) expressing the accounting conservatism.

In addition, in case the dependent variable is selected as MVA, it can be understood in Table 7 that the SMR×DV interaction component representing accounting conservatism has a positive effect on intellectual capital. In other words, as the level of conservatism of enterprises increases, the intellectual capitals of them will also increase. For this reason, it can be argued that accounting conservatism that is measured according to the method of asymmetric timeliness of the earning has a positive effect on intellectual capital according to a dependent variable (MVA). In this context, the *H_1 hypothesis will be accepted* for this variable. In some of the studies in the literature, we may have the opportunity of making a comparison between accounting conservatism and Intellectual Capital Performance (ICP) (also known as the market-to-book ratio), since they are investigated in relationship to each other. This is also valid for the other hypotheses discussed in the study. For this reason, the results obtained in the studies conducted by Sana'a NM (2016), Chen et al. (2005) and Akmeşe (2006)

Table 7: The analysis results of the Basu (1997) Model in the manufacturing industry

Variables	EPS/SP	MTB(ICP)	VAIC	Q	MVA
CONSTANT	0,0493 (0,0444)	5,5852 (4,0165)	16,3211[a] (2,5493)	24,3405 (20,4054)	284,7898[a] (101,4972)
DV	0,1231[b] (0,0514)	-0,3348 (1,0027)	6,3152 (6,1456)	-2,0718 (1,9564)	-81,8934 (57,4082)
SMR	0,2419[a] (0,0635)	0,2611 (0,5086)	4,7411 (5,1870)	-2,7966 (2,7377)	-48,4596[c] (28,3692)
SMR×DV	0,0395[a] (0,1428)	1,4456 (2,1307)	4,1657 (9,3618)	35,4468 (30,4142)	272,2382[a] (102,8854)
R^2	0,0914	0,0673	0,0102	0,0208	0,0343
F	10,28[a]	4,00	1,58	2,67	11,98[a]
Cross-Sectional F	3,63 (0,00)	786,35 (0,00)	97,35 (0,00)	524,57 (0,00)	244,07 (0,00)
Time F	1,83 (0,05)	0,00 (1,00)	6,70 (0,00)	0,00 (1,00)	1,19 (0,14)
Hausman	20,92 (0,00)	0,27 (0,97)	0,91 (0,82)	1,67 (0,64)	0,91 (0,82)
Wald Test	2,1e+05 (0,00)	15,61 (0,00)	15,62 (0,00)	37,05 (0,00)	15,61 (0,00)
Bharvaga Durbin Watson	1,8874	1,4619	0,3799	0,5886	0,5435
Baltagi Wu LBI	1,9874	1,7165	0,6324	0,7563	1,0042
Pesaran CD	8,3310 (0,00)	11,5060 (0,00)	13,3800 (0,00)	19,6480 (0,00)	9,2230 (0,00)

The values in brackets show the resistant predictors standard errors.
a=prob<0,01; b=prob<0,05; c=prob<0,10

overlap with each other partially when compared with the results of the present study. However, unlike these results, Pae et al. (2005), Qiang (2007) and Sofian et al. (2011) reported negative relations between accounting conservatism and the market-to-book ratio (since ICP was calculated in this way).

When the estimation process is performed based on the Basu model (1997) in the financial institutions, it is understood from the cross-sectional and time F values in Table 8 and the Hausman tests that when the dependent variable is EPS/SP *the unit and time-effective fixed effects model* is valid; when the dependent variable is Q *the unit and time-effective random effects model* is valid; when dependent variables are market-to-book ratio (MTB), VAIC and MVA *the unit-effective random effects model* is valid.

For companies that have positive Stock Market Return (SMR), when the Dummy Variable (DV) is taken as "0", the effect of SMR on the dependent variable EPS/SP (0.4145-0=0.4145) is positive. When the DV is taken "1" for enterprises that have negative SMR, the effect of SMR on the dependent variable (0.4145-0.3598=0.0547) is positive again. There is no asymmetry if the news is good and bad in the same way. It may be argued that the financial institutions have slight conservative accounting policies.

In case the dependent variable is selected as MTB and MVA it can be understood in Table 8 that the SMR×DV interaction component representing accounting conservatism has a positive effect on intellectual capital. But, in case the dependent variable is selected as VAIC that the SMR×DV interaction component representing accounting conservatism has a negative effect on intellectual capital. In this context, the H_2 *hypothesis will be accepted* for these variables.

In case the basic econometric hypotheses are covered in panel data analysis, it may be argued that the results are accurate. These hypotheses are that the variance does not change according to units, the units are not autocorrelated among themselves, and that there is no inter-unit correlation. The test results of the hypotheses are shown in Table 7 and 8. It was concluded for all models in Table 7 and 8 that the variance varied according to the units as a result of the Changed Wald Test. The Local Best Invariance Test, which was suggested by Durbin Watson and Baltagi-Wu, was carried out to determine whether or not there was autocorrelation. It is concluded that autocorrelation is important if these

Table 8: The analysis results of the Basu (1997) Model in the financial institutions

Variables	EPS/SP	MTB(ICP)	VAIC	Q	MVA
CONSTANT	-0,0347 (0,0778)	1,6318[a] (0,3707)	14,0292[a] (4,4230)	0,6911[a] (0,1110)	162,2841[b] (80,0965)
DV	0,1024 (0,1362)	-0,6625 (0,4592)	6,2993 (9,0283)	0,1216 (0,2687)	4,1326 (48,0408)
SMR	0,4145[c] (0,2152)	-0,2023 (0,2479)	9,9153 (6,5162)	-0,0187 (0,1201)	-27,6252 (46,7722)
SMR×DV	-0,3598 (0,2960)	0,9534[b] (0,4712)	-12,7396[a] (4,4986)	1,2300 (0,7606)	343,4877[c] (199,0182)
R^2	0,1408	0,0421	0,0297	0,0467	0,0207
F	2,50	39,31[a]	8,38[b]	33,15[a]	7,62[c]
Cross-Sectional F	3,08 (0,00)	21,72 (0,00)	44,96 (0,00)	36,86 (0,00)	57,15 (0,00)
Time F	3,07 (0,00)	2.3e-13 (1,00)	0,28 (0,30)	9,49 (0,00)	0,00 (1,00)
Hausman	77,90 (0,00)	0,59 (0,90)	0,28 (0,96)	1,19 (0,75)	0,82 (0,84)
Wald Test	32802,41 (0,00)	4,62 (0,00)	4,62 (0,00)	4,62 (0,00)	4,62 (0,00)
Bharvaga Durbin Watson	1,3551	1,5822	1,1373	1,4261	0,5635
Baltagi Wu LBI	1,4681	1,6340	1,3076	1,5055	0,9962
Pesaran CD	10,4070 (0,00)	9,2730 (0,00)	6,8800 (0,00)	14,8690 (0,00)	6,3790 (0,00)

The values in brackets show the resistant predictors standard errors.
a=prob<0,01; b=prob<0,05; c=prob<0,10

test results are less than the critical value, i.e. "2". As it can be seen in Table 7 and 8, it is understood that the result value is less than 2 for all models. For the purpose of testing the presence of inter-unit correlation, the Pesaran Test was applied, it was determined as a result of this test that there was inter-unit correlation.

If the dependent variable is selected as EPS/SP to eliminate these econometric problems following the testing of the hypotheses, the "Driscoll Kraay" resistant estimator was employed, and if the dependent variable was selected as MTB(ICP), VAIC, Q and MVA, the "Arellano, Froot and Rogers" resistant estimators were employed. The errors that resulted according to the resistant estimators are shown in brackets in Table 7 and 8.

The Effect of the Asymmetry of Accruals and Cash Flows Measurement Method on Intellectual Capital

When the model estimation process is carried out according to Ball and Shivakumar (2005) model in the manufacturing industry, it is understood from the cross-sectional and time F values and Hausman test results given in Table 8 that *the unit-effective fixed effects model* is valid if the dependent variable is Operating Accruals (ACC), if the dependent variable is MTB(ICP), VAIC and Q, *the unit-effective random effects model* is valid and if the dependent variable is MVA *the unit and time-effective fixed effects model* is valid.

When the analysis results are evaluated, the effect of CFO on dependent variable ACC is negative (-1,1184+0= -1,1184) when the Dummy Variable (DV) is taken as "0" for the companies that have positive CFO values. However, if the Dummy Variable (DV) is taken as "1" for companies that have negative CFO values, the effect of CFO on the dependent variable is positive (-1,1184+1,7479=0,6295). In other words, there is an asymmetry if the news is good and bad. It is seen that the interaction coefficient component (CFO×DV) which is accepted as an indicator of accounting conservatism is 1,7479 according to the accruals and asymmetry of cash flows measurement method. According to this result, it is possible to argue that companies have conservative accounting policies. It is also understood in Table 8 that if the cash flows obtained from operating activities (CFO) are increased by one unit, the activity

Table 9: The analysis results of the Ball and Shivakumar (2005) Model in the manufacturing industry

Variables	ACC	MTB(ICP)	VAIC	Q	MVA
CONSTANT	-34,0361 (24,5451)	4,9623 (3,0174)	26,7227[a] (7,0696)	23,4930 (15,3559)	213,1397[a] (55,8540)
DV	-11,2082 (23,9032)	0,7322 (1,7289)	-3,5316 (5,6434)	-8,7662 (6,9355)	-51,9255 (29,9685)
CFO	-1,1184[a] (0,3666)	0,0012 (0,0009)	0,0012 (0,0164)	0,0220 (0,0276)	0,1541 (0,3547)
CFO×DV	1,7479[a] (0,5121)	0,0009 (0,0039)	0,0077 (0,0258)	-0,0562 (0,0611)	-1,1760 (1,3758)
R^2	0,1640	0,0021	0,0006	0,0074	0,0138
F	6,43[a]	2,33	3,69	1,84	2,36
Cross-Sectional F	73,06 (0,00)	858,75 (0,00)	115,63 (0,00)	529,55 (0,00)	10,52 (0,00)
Time F	0,33 (0,98)	0,00 (1,00)	1,53 (0,11)	0,00 (1,00)	2,44 (0,00)
Hausman	188,21 (0,00)	0,24 (0,97)	0,75 (0,86)	0,17 (0,98)	38,36 (0,00)
Wald Test	1.1e+09 (0,00)	15,08 (0,00)	15,07 (0,00)	15,08 (0,00)	9.3e+06 (0,00)
Bharvaga Durbin Watson	0,9020	1,4783	1,3074	0,7262	0,5517
Baltagi Wu LBI	1,2699	1,7369	1,4413	0,8776	0,9690
Pesaran CD	-1,1090 (0,27)	15,0780 (0,00)	6,0840 (0,00)	0,9500 (0,00)	14,9350 (0,00)

The values in brackets show the resistant predictors standard errors.
a=prob<0,01; b=prob<0,05; c=prob<0,10

accruals (ACC) will decrease by 1,1184 units. However, it is understood in Table 9 that the interaction component (CFO×DV), which is the indicator of accounting conservatism according to this measurement method, does not have a significant effect on the dependent variables (MTB or ICP, VAIC, Q, MVA) that express the intellectual capital. As a result of these findings, the H_3 hypothesis will be rejected for all the dependent variables that express the intellectual capital. In the literature review, no studies were found that had consistent results with the present study. However, unlike the results that were found, Pae et al. (2005), Qiang (2007) and Sofian et al. (2011) reported negative relationship between accounting conservatism and the ratio of market value to book value; and Chen et al. (2005) and Akmeşe (2006), Sana'a NM (2016) reported positive relationship.

When the model estimation process is carried out according to Ball and Shivakumar (2005) model in the financial institutions, it is understood from the cross-sectional and time F values and Hausman test results given in Table 10 that *the unit-effective fixed effects model* is valid, if the dependent variable is MVA, if the dependent variable is Q *the unit and time-effective random effects model* is valid and if the dependent variable is ACC, MTB(ICP) and VAIC *the unit-effective random effects model* is valid.

The effect of CFO on dependent variable ACC is positive (0,2708+0=0,2708) when the Dummy Variable (DV) is taken as "0" for the companies that have positive CFO values. But, if the Dummy Variable (DV) is taken as "1" for companies that have negative CFO values, the effect of CFO on the dependent variable is negative (0,2708-0,4537= -0,1829). So, there is an asymmetry if the news is good and bad. According to this result, it is possible to argue that companies have conservative accounting policies. Unlike the manufacturing industry, in Table 9 that the interaction component (CFO×DV), which is the indicator of accounting conservatism according to this measurement method, does have a positive effect on two dependent variables (MTB and VAIC). As a result of these findings, the *H_4 hypothesis will be accepted* for these dependent variables that express the intellectual capital.

When the explanations that were made for the basic econometric assumptions in Basu (1997) Model are considered, it is understood in Table 9 and 10 that there is a heteroscedasticity, autocorrelation, and inter-unit correlation problems for all dependent variables in this model. For the purpose of eliminating the econometric

Table 10: The analysis results of the Ball and Shivakumar (2005) Model in the financial institutions

Variables	ACC	MTB(ICP)	VAIC	Q	MVA
CONSTANT	5,3104 (56,4087)	1,3790[a] (0,2083)	22,0848[a] (4,1368)	0,5911[a] (0,0806)	132,1117[a] (32,0505)
DV	42,707 (41,5264)	-0,3230 (0,2589)	-8,2591[b] (4,0698)	0,0466 (0,1531)	101,9007[b] (32,4765)
CFO	0,2708 (0,2696)	-0,0006[c] (0,0003)	-0,0107[b] (0,0044)	-0,0008 (0,0009)	0,0121 (0,2201)
CFO×DV	-0,4537 (0,5569)	0,0009[c] (0,0005)	0,0125[b] (0,0055)	0,0001 (0,0001)	0,0723 (0,4326)
R^2	0,0247	0,0060	0,0122	0,0002	0,0150
F	21,07	5,12	14,87[a]	3,92	5,94[b]
Cross-Sectional F	298,56 (0,00)	23,45 (0,00)	48,03 (0,00)	43,19 (0,00)	8,90 (0,00)
Time F	0,00 (1,00)	0,30 (0,29)	0,91 (0,17)	15,77 (0,00)	1,16 (0,32)
Hausman	1,89 (0,60)	2,21 (0,53)	2,68 (0,44)	1,77 (0,62)	72,59 (0,00)
Wald Test	21,58 (0,00)	21,57 (0,00)	21,58 (0,00)	21,58 (0,00)	1.4e+06 (0,00)
Bharvaga Durbin Watson	1,1682	1,5683	1,1476	1,4044	0,6739
Baltagi Wu LBI	1,2478	1,6291	1,3215	1,4830	1,0945
Pesaran CD	1,9800 (0,05)	15,0320 (0,00)	4,1330 (0,00)	23,1530 (0,00)	9,7330 (0,00)

The values in brackets show the resistant predictors standard errors.
a=prob<0,01; b=prob<0,05; c=prob<0,10

problems mentioned above, appropriate resistant estimators were used, the resistant standard errors that were obtained according to the analysis results made with resistant estimators are given in brackets in Table 9 and 10.

The Effect of the Market-to-Book Ratio Measurement Method on Intellectual Capital

It was considered useful that an issue was clarified before the evaluation of the estimation process of Beaver and Ryan (2000) Model and the analysis results. In this model, the market-to-book ratio variable, which is the dependent variable in the panel data regression equation that was employed in the measurement of accounting conservatism, was also the formula used in the calculation of intellectual capital performance or market-to-book ratio in this study. For this reason, the analysis results of this model overlap with both dependent variables in a one-to-one fashion. For this reason, no need was felt to provide the results for the intellectual capital performance (ICP) dependent variable.

In the Beaver and Ryan (2000) Model, the inclination component (bias) α_i, which is the indicator of accounting conservatism, was calculated for the companies of manufacturing industry and financial institutions that were included in the analysis separately. In addition, this calculation was repeated for each dependent variable in both sectors. However, instead of creating tables for the inclination components (α_i) of the companies, it was considered to be more proper to draw graphics for the study. These graphics are given in the appendix. When the MVA dependent variable which express the intellectual capital are selected, it can be seen in the graphics that there are companies of manufacturing industry and financial institutions that had high inclination component that expresses the accounting conservatism (α_i).

Table 11: The analysis results of the Beaver and Ryan (2005) Model in the manufacturing industry

	MTB	VAIC	Q	MVA
CONSTANT	11,9232[a] (0,6498)	19,7120[a] (2,2502)	27,8934[a] (4,0011)	391,8977[a] (47,7989)
ROE	-9,3343[a] (0,8131)	-2,6787 (2,7045)	-0,1499 (4,8558)	-14,0912 (63,4987)
ROE (-1)	-5,7492[a] (1,0220)	-3,2276 (3,3108)	2,8415 (5,9854)	25,9428 (81,8682)
ROE (-2)	-8,0790[a] (1,2451)	-0,7528 (3,9266)	-0,8603 (7,1401)	-36,9646 (104,1406)
ROE (-3)	-7,3539[a] (1,3527)	-2,8267 (4,1123)	2,0541 (7,5528)	-7,6104 (117,2245)
ROE (-4)	-8,9316[a] (1,3552)	-1,3719 (4,0431)	-0,1292 (7,4525)	-36,2846 (121,8865)
ROE (-5)	-0,0886 (1,8797)	-6,6499 (6,5591)	6,5638 (11,6336)	77,6294 (139,6450)
ROE (-6)	0,0145 (1,8101)	-1,1140 (6,2413)	-2,7420 (11,1204)	-35,3448 (133,3186)
R^2	0,5231	0,0231	0,0037	0,0055
F	21,46[a]	0,46	0,07	0,11
Cross-Sectional F	84,53 (0,00)	22,76 (0,00)	183,13 (0,00)	23,27 (0,00)
Time F	0,88 (0,56)	1,38 (0,18)	0,29 (0,99)	1,75 (0,06)
Hausman	The main study was taken as the basis.			
Wald Test	0,00 (1,00)	0,00 (1,00)	0,00 (1,00)	0,00 (1,00)
Bhargava Durbin Watson	1,2875	1,4363	1,3660	0,9990
Baltagi Wu LBI	1,2875	1,4363	1,3660	0,9990
Pesaran CD	-0,4930 (0,62)	0,3950 (0,69)	0,8960 (0,37)	9,8960 (0,00)
The values in brackets show the resistant estimators standard errors. **a=prob<0,01; b=prob<0,05; c=prob<0,10**				

According to Beaver and Ryan (2000) Model, it is seen in Table 11 and 12 that there is a unit effect for all dependent variables; however, there is no time effect. However, since it was understood that the direct constant effects model was taken as the basis in the study conducted by Beaver and Ryan (2000) without giving the Hausman Test results, the methodology of the authors was followed and it was accepted that the unit effect constant effects model was valid for all dependent variables.

When the results of the analysis are evaluated, it is seen in all models that the constant terms are significant at 0.01 level. In addition, it is seen in Table 10 that in case the dependent variable is selected as market-to-book raito, the Return on Equity (ROE) and the delay components of Return on Equity (ROE) have a significant effect on MTB. However, in case the Approximately Tobin Q (Q) ratio, VAIC and the Market Value Added (MVA) are selected as dependent variables, it is seen that the Return on Equity (ROE) and delay components do not have a significant effect on these dependent variables.

When the results of the analysis are evaluated, it is seen in all models that the constant terms are significant at 0.01 level. However, in Table 12, it is seen that any dependent variable has no significant effect on the delay components of Return on Equity (ROE) and Return on Equity (ROE).

According to these results, the MVA is selected as the dependent variable, it is understood that the enterprises that have high inclination component (α_i), which express the accounting conservatism, in the attached graphic (appendix) are active in the manufacturing industry and financial institutions. In this case, *the H_5 and H_6 hypothesis are accepted* for the MVA dependent variable.

When the test results of the basic econometric hypotheses are examined, it is understood from the

Table 12: The analysis results of the Beaver and Ryan (2005) Model in the financial institutions

	MTB	VAIC	Q	MVA
CONSTANT	1,6996[a] (0,0690)	14,4469[a] (1,3758)	0,6619[a] (0,0739)	136,0576[a] (19,4092)
ROE	-0,4091[b] (0,1869)	-1,0116 (4,0541)	0,0155 (0,0311)	5,1695 (55,3091)
ROE (-1)	-0,0988 (0,2523)	-0,1749 (6,0271)	-0,5282[a] (0,0314)	-81,2048 (92,5712)
ROE (-2)	-0,2597 (0,2729)	-0,3311 (6,9617)	-0,0696[b] (0,0298)	-10,7378 (118,0070)
ROE (-3)	-0,1062 (0,2801)	-0,4070 (7,4274)	0,0130 (0,0326)	-5,2709 (135,7585)
ROE (-4)	-0,1424 (0,2842)	-0,3575 (7,7097)	-0,0463 (0,0385)	-12,9989 (149,1991)
ROE (-5)	-0,3436 (0,2832)	-2,1689 (7,2184)	0,7621[b] (0,3524)	-34,5988 (137,3217)
ROE (-6)	-0,5826 (0,4291)	-4,8410 (9,3433)	0,7376[c] (0,3975)	-54,8427 (136,1874)
R^2	0,6147	0,0230	0,5985	0,4624
F	22,11[a]	0,33	596,16[a]	11,92[a]
Cross-Sectional F	22,79 (0,00)	6,22 (0,00)	19,02 (0,00)	9,31 (0,00)
Time F	3,40 (0,00)	1,50 (0,13)	3,17 (0,00)	0,82 (0,62)
Hausman	The main study was taken as the basis.			
Wald Test	0,00 (1,00)	0,00 (1,00)	0,00 (1,00)	0,00 (1,00)
Bhargava Durbin Watson	1,2666	0,9579	1,8307	0,5685
Baltagi Wu LBI	1,6141	1,3757	2,1185	1,3333
Pesaran CD	1,6210 (0,11)	3,6800 (0,00)	2,9420 (0,00)	0,9620 (0,34)

The values in brackets show the resistant estimators standard errors.
a=prob<0,01; b=prob<0,05; c=prob<0,10

test results given in Table 11 and 12 that there is only autocorrelation problem for all the involved models. The standard errors are given in brackets in Table 11 and 12 by using the proper resistance estimator.

When compared with the studies in the literature, the results reported by Chen et al. (2005), Akmese (2006), Sana'a NM (2016) and Bayraktoroglu, at al. (2019) partly overlap with this study. However, Pae et al. (2005), Qiang (2007) and Sofian et al. (2011) reported a negative relationship between accounting conservatism and the ratio of the market value to the book value. Cheng (2005), on the other hand, reported that the Return on Equity of the companies applying conservative accounting policies was high, which is partly related to the study. However, when the results given in Table 11 and 12 are analysed, it is seen that the Return on Equity and its delay component coefficients are negative.

The Effect of Negative Accruals Measurement Method on Intellectual Capital

Before evaluating the Givoly and Hayn (2000) Model and the Analysis Results, a figure was created to see how negative accruals (non-activity accruals) as indicators of accounting conservatism followed a course through the observed years. The trend of negative accruals during the observation period is given in Figure 1.

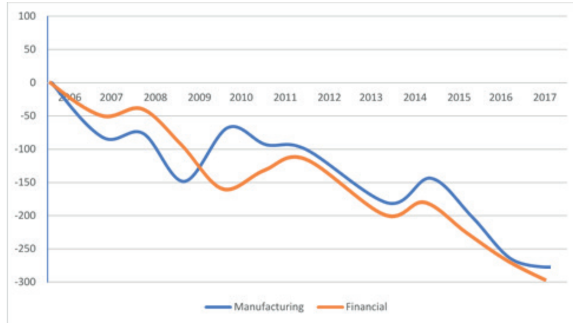


Figure 1: The trend of negative accruals of the companies of manufacturing industry and financial institutions in BIST 100 Index in Turkey

When Figure 1 was created, the companies of manufacturing industry and financial institutions that were included in the scope of the analyses were taken as a single company, and the above-mentioned accruals of these enterprises were evaluated as a whole. When the figure is examined, it is seen that non-operating accruals had a negative progression between 2006 and 2017 in both sectors, which is the observation period in the present study, except for small increases in several years, and were always negative. It is possible to argue that the bigger the accruals, the greater the accounting conservatism levels. As it can be seen in Figure 1, it is possible to argue that the accounting conservatism level of these companies that were included in the analysis in the BIST 100 Index is very large.

Table 13: The analysis results on Givoly and Hayn (2000) Model in the manufacturing industry

	MTB(ICP)	VAIC	Q	MVA
CONSTANT	5,8743[a] (0,3276)	26,4555[a] (7,7446)	22,9584 (15,1941)	221,2848[a] (63,8663)
NA	0,0590[a] (0,0092)	0,0442[a] (0,0163)	-0,0049 (0,0219)	0,2269 (1,0207)
R^2	0,0559	0,0001	0,0001	0,0003
F	41,52[a]	7,37[a]	0,05	0,05[a]
Cross-Sectional F	109,66 (0,00)	114,85 (0,00)	528,03 (0,00)	13,06 (0,00)
Time F	0,38 (0,96)	1,57 (0,11)	0,00 (1,00)	2,16 (0,01)
Hausman	19,01 (0,00)	0,58 (0,45)	0,08 (0,78)	21,83 (0,00)
Wald Test	1.1e+09 (0,00)	12,94 (0,00)	12,93 (0,00)	5.0e+09 (0,00)
Bhargava Durbin Watson	1,5012	1,3069	0,7214	0,5103
Baltagi Wu LBI	1,7670	1,4411	0,8762	0,9437
Pesaran CD	19,0410 (0,00)	6,9420 (0,00)	16,2810 (0,00)	25,8140 (0,00)

The values in brackets show the resistant estimators standard errors.
a=prob<0,01; b=prob<0,05; c=prob<0,10

It is seen based on the results given in Table 13 (cross-sectional and time F, Hausman) that according to the estimation process for the Givoly and Hayn (2000) Model in the manufacturing industry, when the dependent variables are selected MTB, *the unit-effective fixed effects model* is valid; if the MVA selected, *the unit and time-effective fixed effects model* is valid and if the VAIC and Q selected, *the unit-effective random effects model* is valid.

When the results of the analysis are considered, it is possible to argue that a one-unit increase in the negative accrual (NA) amount will increase the Intellectual Capital Performance (ICP) at a rate of 0.0590 units, the Value-Added Intellectual Coefficient (VAIC) at a rate of 0.0442 units. In addition, it is seen in Table 12 that -except for Approximately Tobin Q (Q)- the constant terms are statistically significant. According to these results, it is seen that accounting conservatism that was measured according to Negative Accruals Measurement Method had positive effects on intellectual capital. For this reason, *the H_7 hypothesis is accepted* for the above-mentioned dependent variables.

It is seen based on the results given in Table 14 (cross-sectional and time F, Hausman) that according to the estimation process for the Givoly and Hayn (2000) Model in the financial institutions, when the dependent variables are selected MTB and VAIC, *the unit-effective random effects model* is valid; if the Q selected *the unit and time-effective random effects model* is valid and if the MVA selected *the unit-effective fixed effects model* is valid.

When the results of the analysis are considered, it is possible to argue that a one-unit increase in the negative accrual (NA) amount will increase the VAIC at a rate of 0.0278 units, the Q at a rate of 0.0012 units. It is seen in Table 13 that the constant terms are statistically significant. According to these results, it is seen that accounting conservatism that was measured according to Negative Accruals Measurement Method had positive effects on intellectual capital. For this reason, *the H_8 hypothesis is accepted* for the above-mentioned dependent variables.

When the test results of the hypotheses are examined, it is seen that there is a heteroscedasticity problem as a result of the Changed Wald Test. When the results of the Durbin Watson and Baltagi-Wu tests are examined, it is seen that the results are lower than 2, which is the critical value. In this situation, it is understood that there is autocorrelation problem. According to the Pesaran Test results, on the other hand, it is understood in Table 13 and 14 that there is a correlation problem between the units. For the purpose of solving these problems, proper resistant estimator was used; and the resistant standard errors that were obtained as a result of this estimations are given in brackets in Table 13 and 14.

Like these results, Francis et al. (2013) and Sana'a NM (2016) determined that accounting conservatism had

Table 14: The analysis results on Givoly and Hayn (2000) Model in the financial Institutions

	MTB(ICP)	VAIC	Q	MVA
CONSTANT	1,2752[a] (0,1887)	19,6443[a] (3,6001)	0,6081[a] (0,0896)	157,2078[a] (40,6636)
NA	0,0019 (0,0012)	0,0278[c] (0,0147)	0,0012[a] (0,0003)	0,0167 (1,1101)
R^2	0,0031	0,0001	0,0002	0,0001
F	2,60	3,56[c]	10,13[a]	0,00
Cross-Sectional F	25,18 (0,00)	49,96 (0,00)	40,94 (0,00)	6,34 (0,00)
Time F	0,31 (0,29)	1,03 (0,15)	16,80 (0,00)	1,38 (0,18)
Hausman	0,38 (0,54)	0,74 (0,39)	1,59 (0,21)	24,01 (0,00)
Wald Test	5,02 (0,00)	5,01 (0,00)	5,02 (0,00)	1.4e+07 (0,00)
Bhargava Durbin Watson	1,5621	1,1349	1,4014	0,6728
Baltagi Wu LBI	1,6229	1,3122	1,4800	1,0967
Pesaran CD	16,2990 (0,00)	7,7550 (0,00)	26,2790 (0,00)	15,3010 (0,00)

The values in brackets show the resistant estimators standard errors.
a=prob<0,01; b=prob<0,05; c=prob<0,10

a positive effect on financial performance indicators. When the fact that Intellectual capital can be considered as a financial performance indicator, making a comparison would not be an incorrect evaluation. However, unlike this study, Pae et al. (2005), Qiang (2007), and Sofian et al. (2011) determined a negative relationship between accounting conservatism and the ratio of the market value to the book value.

RESULTS AND DISCUSSION

The evaluations of the findings, the effect of accounting conservatism on intellectual capital and the level of accounting conservatism are given in Table 15 and 16.

- Accepted (for MVA dependent variable) – Sector M in Basu Model
- Accepted (for MTB/ICP, VAIC and MVA dependent variables) – Sector F in Basu Model
- Accepted (for MVA dependent variable) – Sector M in Beaver and Ryan Model
- Accepted (for MVA dependent variable) – Sector F in Beaver and Ryan Model
- Accepted (for MTB/ICP and VAIC dependent variables) – Sector F in Ball and Shivakumar Model
- Accepted (for MTB/ICP and VAIC dependent variables) – Sector M in Givoly and Hayn Model
- Accepted (for VAIC and Approximately Tobin Q dependent variables) – Sector F in Givoly and Hayn Model

Table 15: The effect of Accounting Conservatism on Intellectual Capital

	Sectors	MTB or ICP (The common model in the Literature)	VAIC (Public, 1998)	Approximately Tobin Q (Chung and Pruitt, 1994)	MVA (Stern Stewart Counselling Business	Hypothesis
Basu (1998)	M	×	×	×	+	Accepted
	F	+	-	×	+	Accepted
Beaver and Ryan (2000)	M	×	×	×	+	Accepted
	F	×	×	×	+	Accepted
Ball and Shivakumar (2005)	M	×	×	×	×	Rejected
	F	+	+	×	×	Accepted
Givoly and Hayn (2000)	M	+	+	×	×	Accepted
	F	×	+	+	×	Accepted

NB: (+Positive effect), (-Negative effect), (×No effect) – M: Manufacturing Industry F: Financial Ins

Table 16: The Level of Accounting Conservatism

	Sectors	Asymmetry	Coefficients	The Level of AC
Basu (1998)	M	*No*	*0,0395*	*Low*
	F	*No*	*-0,3598*	*Low*
Beaver and Ryan (2000)	M	*See the graphics in appendix*	*Bias component is high when MVA is selected.*	*High*
	F	*See the graphics in appendix*	*Bias component is high when MVA is selected.*	*High*
Ball and Shivakumar (2005)	M	*Yes*	*1,7479*	*High*
	F	*Yes*	*-0,4537*	*High*
Givoly and Hayn (2000)	M	*See the figure 1*	*The graph-line is negative directional.*	*High*
	F	*See the figure 1*	*The graph-line is negative directional.*	*High*

As given in Table 15 and 16 as a brief summary, it was determined as a result of the analyses that;

- Accounting conservatism has a positive effect on intellectual capital. This is more prominent on financial institutions,
- Accounting conservatism, which was measured only (for the VAIC dependent variable) according to Asymmetric Timing of Earnings (i.e. the Basu Model) has a negative effect on intellectual capital,
- All of the research hypotheses have been accepted (Except for H3: Accounting conservatism, which is measured according to the asymmetry of accruals and cash flows, has an effect on intellectual capital in manufacturing industry),
- The highest number of positive effects is seen on intellectual capital measured by MVA method, the least number of positive effects is seen on intellectual capital measured by approximately Tobin Q,
- The companies of manufacturing industry and financial institutions have high levels of conservatism (except for Basu Model),

CONCLUSION

Since accounting conservatism ensures that;

- the benefit of business stakeholders is increased,
- the business is protected against risky situations,
- the financial statements of the enterprises are adjusted to real values,
- the number of commercial cases involving the enterprise is reduced, and
- the audit costs are minimized,

it is cared about by relevant parties, and the opinions in favor of it become widespread in the literature (Watts, 2002; Ahmed and Duellman, 2007; Ettredge et al., 2016). However, there are also some counterarguments -although a few- claiming that accounting conservatism causes manipulation of financial information, and causes that misunderstandings appear about the assets, foreign sources and revenues and expenses of the enterprise (Xie, 2015; Feltham and Ohlson, 1995; Zhang, 2000).

The enterprise can convert its raw data into human capital and customer capital, and increase the market value of the enterprise by including the increase and management of the intellectual capital in this process, and by managing information. Although some authors in the literature (Brooking, 1997; Bontis, 1998) consider intellectual capital as an equivalent concept to the unearned increments concept in accounting at a descriptive level, the important elements host by intellectual capital (i.e. knowledge, education, technology, etc.), and the fact that it cannot be calculated as easily as unearned increments makes it quite different from unearned increments.

In this respect, it is noteworthy that several studies in the literature argue that conservative accounting applications suppress intellectual capital (Sofian et al., 2011), and although not directly related, emphasize the negative aspects of the relationship between accounting conservatism and intellectual capital (Amir and Lev, 1996; Brennan, 2001; Lev, 2001; Holland, 2003). However, the fact that the subjects with which accounting conservatism was investigated (corporate social responsibility, auditing and auditor quality, management of earnings, etc.) have common aspects with intellectual capital, accounting conservatism aims to protect the interests of the parties of the enterprise. Besides, intellectual capital is also a part of this aim for taking the business further may provide a more positive approach to the relationship between accounting conservatism and intellectual capital. In addition, it is also possible to argue that every enterprise maintaining its existence contributes to the accumulation of intellectual capital. In summary, it is possible to bring alternative and more positive viewpoints about the opinions that conservative reporting prevents intellectual capital from becoming prominent in the literature (Bellikli, 2019).

In the light of the theoretical explanations on accounting conservatism and intellectual capital given above, the relationship between accounting conservatism and intellectual capital was dealt with in this study. For the purpose of revealing this relationship, accounting conservatism and intellectual capital were measured separately by considering the measurement methods in the literature and on two different sectors, and the effect of accounting conservatism on intellectual capital was investigated with the help of panel data analysis.

When the findings that were obtained as a result of the analyses are evaluated briefly, the following conclusions may be made;

- The conservatism levels of the companies that were included in the analyses were low in one measurement method (Basu, 1997), which was determined collectively with a general coefficient, and were high in two measurement methods (Givoly and Hayn, 2000; Ball and Shivakumar, 2005);

- The companies that were included in the analyses have conservative accounting policies in the measurement method that was determined with separate coefficients (Beaver and Ryan, 2000),
- Three of the measurement methods have yielded consistent results in terms of levels of conservatism,
- Considering that the intellectual capitals of the companies that were included in the analysis had positive values in average according to the measurement methods, intellectual capital is cared by the companies,
- Accounting conservatism has a positive effect on intellectual capital. This is more prominent on financial institutions, accounting conservatism, which was measured only (for the VAIC dependent variable) according to Asymmetric Timing of Earnings (i.e. the Basu Model) has a negative effect on intellectual capital.
- It may be concluded and hypothesized that only one of the accounting conservatism measurement methods (Ball and Shivakumar, 2005) that was applied in the study had no effects on intellectual capital in manufacturing industry.

On the other hand, three of the measurement methods have yielded consistent results in terms of levels of conservatism in this study. Measurement methods based on the same principles (Basu-Ball and Shivakumar) have yielded consistent results for both sectors. But its have yielded different results for levels of conservatism. It may be recommended for future studies that authors can use measurement methods that give consistent results or measurement methods based on the same principles (Basu-Ball and Shivakumar) in this study. However, the effect of accounting conservatism on intellectual capital is re-examined with different business data, and studies are conducted with the companies that are not listed in the Stock Exchange and/or with comparative country examples.

Acknowledgements

This study was derived from the doctoral dissertation with the title “The Effect of Accounting Conservatism on Intellectual Capital: A Survey on Listed Borsa Istanbul (BIST) 100 Index”, written by Ugur BELLIKLI under the supervision of Prof. Dr. Abdulkerim DAŞTAN in Karadeniz Technical University, Social Sciences Institute, Business Administration Department. We would like to thank Assoc. Prof. Dr. Zehra ABDIOĞLU, Prof. Dr. Yusuf SÜRMEN, Prof. Dr. Ahmet Hayri DURMUS and Prof. Dr. Dursun ARIKBOGA for their precious contributions to enable the completion of the present study.

REFERENCES

Ahmed, A. S. & Duellman, S. (2007). Accounting conservatism and board of director characteristics: An empirical analysis, *Journal of Accounting and Economics,* 43(2-3), 411-437.

Akmeşe, H. (2006). *Entellektüel sermayenin firma piyasa değeri üzerine etkisi ve IMKB'de işlem gören şirketler üzerinde bir araştırma,* Master Thesis, Selçuk University–Institute of Social Sciences.

Amir, E. & Lev, B. (1996). Value-relevance of nonfinancial information: The wireless communications industry, *Journal of Accounting and Economics,* 22(1-3), 3-30.

Ball, R. & Shivakumar, L. (2006). The role of accruals in asymmetrically timely gain and loss recognition, *Journal of Accounting Research,* 44, 207-242.

Basu, S. (1997). The conservatism principle and the asymmetric timeliness of earnings. *Journal of Accounting and Economics,* 24(1), 3-37.

Bayraktaroglu, A. E., Calisir, F., Baskak, M. (2014). Kimya, petrol, plastik sektöründeki firmalarda 1. ve 2. ulusal pazar açısından entelektüel sermaye kullanım etkinliği ve pazar performansı ilişkisi, *Eskişehir Osmangazi University, Journal of Economics and Administrative Sciences,* 9(3), 25-47.

Bayraktaroglu, A. E., Calisir, F., Baskak, M. (2019). Intellectual capital and firm performance: an extended VAIC model, *Journal of Intellectual Capital,* 20 (3), 406-425.

Beaver, W. H. & Ryan, S. G. (2000). Biases and lags in book value and their effects on the ability of the book-to-market ratio to predict book return on equity, *Journal of Accounting Research,* 38(1), 127-148.

Bellikli, U. (2019). *Muhasebe muhafazakarlığının entelektüel sermaye üzerindeki etkisi: Borsa Istanbul (BIST) 100 Endeksi'ndeki işletmelerde bir araştırma,* Doctoral Dissertation, Karadeniz Technical University–Institute of Social Sciences.

Bontis, N. (1998). Intellectual capital: An exploratory study that develops measures and models, *Management Decision,* 36(2), 63-76.

Bontis, N. (2001). Assessing knowledge assets: A review of the models used to measure intellectual capital, *Journal of Management Reviews,* 3(1), 41-60.

Brennan, N. (2001). Reporting intellectual capital in annual reports: Evidence from Ireland, *Accounting, Auditing & Accountability Journal,* 14(4), 423-436.

Brooking, A. (1997). The management of intellectual capital, *Long Range Planning,* 30(3), 364-365.

Carroll, R. F. & Tansey, R. R. (2000). Intellectual capital in the new internet economy – Its meaning, measurement, and management for enhancing quality, *Journal of Intellectual Capital,* 1(4), 296-312.

Celik, A. E. & Percin, S. (2000). Entelektüel sermayenin işletme bazında ölçülmesi ve değerlendirilmesi, *Accounting and Auditing Review,* 2, 111-118.

Cenciarelli, V. G., Greco, G., Allegrini, M. (2018). Does intellectual capital help predict bankruptcy? *Journal of Intellectual Capital,* 19(2), 321-337.

Chandra, U., Wasley, C. E., Waymire, G. B. (2004). Income conservatism in the U.S. technology sector, *Simon School Working Paper,* No. FR 04-01, 2-61.

Chen, M. C., Cheng, S. J., Hwang, Y. (2005). An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance, *Journal of Intellectual Capital,* 6(2), 159-176.

Chen, Y. (2019). Succession of family firms and accounting conservatism, *Modern Economy,* 10, 298-310.

Cheng, Q. (2005). What determines residual income?, *The Accounting Review,* 80(1), 85-112.

Chung, K. H. & Pruitt, S. W. (1994). A simple approximation of Tobin's q, *Financial Management,* 23(3), 70-74.

Cıkrıkcı, M. & Dastan, A. (2002). Entelektüel sermayenin temel finansal tablolar aracılığı ile sunulması, *Bankacılar,* 43, 18-32.

Crawley, M. J. (2015), Macroeconomic consequences of accounting: The effect of accounting conservatism on macroeconomic ındicators and the money supply, *The Accounting Review,* 90(3), 987-1011.

Edvinsson, L. & Malone, M. (1997) *Intellectual capital.* Harper Business, New York.

Edvinsson, L. (1997). Developing intellectual capital at skandia, *Long Range Planning,* 30(3), 366-373.

Ercan, M. K., Öztürk, M. B., Demirgüneş, K. (2003). *Değere dayalı yönetim ve entelektüel sermaye,* Gazi Kitabevi, Ankara.

Erkus, H. (2004). Geleneksel raporlama yöntemlerinin yeni ekonomi karşısındaki durumunun irdelenmesi ve entelektüel sermayenin raporlanması, *Süleyman Demirel University Journal of Economics and Administrative Sciences,* 9(2), 303-324.

Ettredge, M. L., Huang, Y., Weining, Z. (2016). Conservative reporting and securities class action lawsuits, *Accounting Horizons,* 30(1), 93-118.

Feltham, G. A. & Ohlson, J. A. (1995). Valuation and clean surplus accounting for operating and financial activities, *Contemporary Accounting Research,* 11(2), 689-731.

Francis, B., Hasan, I., Wu, Q. (2013). The benefits of conservative accounting to shareholders: Evidence from the financial crisis, *Accounting Horizons,* 27(2), 319-346.

Ge, R., Seybert N., Zhang, F. F. (2018). Investor sentiment and accounting conservatism, *Accounting Horizons,* 33(1), 83-102.

Givoly, D. & Hayn, C. (2000). The changing time-series properties of earnings, cash flows and accruals: Has financial reporting become more conservative?, *Journal of Accounting and Economics,* 29(3), 287-320.

Gokmen, M. K. (2012). Koşula bağlı ihtiyatlılık ve karın getiriye yansıması üzerine ampirik bir araştırma, *19 Mayıs University Journal of Economics and Administrative Sciences,* 6, 1667-1720.

Hand, J. & Lev, B. (2003). *Intangible assets, values, measures and risk,* Oxford University Press, New York Inc.

Holland, J. (2003). Intellectual capital and the capital market-organisation and competence, *Accounting, Auditing & Accountability Journal,* 16(1), 39-48.

Kamath, G. B. (2008). Intellectual capital and corporate performance in Indian pharmaceutical ındustry, *Journal of Intellectual Capital,* 9(4), 684-704.

Kaplan, R. S. & Norton, D. P. (1999). *Balanced scorecard: Şirket stratejisini eyleme dönüştürmek,* (Transl. Serra Egeli), Sistem Yayıncılık, İstanbul.

Kendirli, S. & Diker, F. (2016). Kâgıt ve ambalaj sanayi işletmelerinde entelektüel sermayenin finansal performansa etkisi, *Journal of Accounting and Tax Practices,* 9(1), 45-58.

Kim, K. S. (2004). Strategic planning for value-based management, *Management Decision,* 42(8), 938-948.

Krishnan, G. V. (2007). Did earnings conservatism ıncrease for former andersen clients?, *Journal of Accounting, Auditing & Finance,* 22(2), 141-163.

LaFond, R. & Watts, R. L. (2008). The information role of conservatism, *The Accounting Review,* 82(2), 447-478.

Lara, J. M. G., Osma, B. G., Penalva, F. (2009). Accounting conservatism and corporate governance, *Review of Accounting Studies,* 14(1), 161-201.

Leone, A. J., Wu, J. S., Zimmerman, J. L. (2006). Asymmetric sensitivity of ceo cash compensation to stock returns, *Journal of Accounting and Economics,* 42(1-2), 167-192.

Lev, B. (2001). *Intangibles: management, measurement, and reporting,* Washington, DC: The Brooking Institution.

Li, Q. & Xu, L. (2018). Asset specificity and conditional accounting conservatism, *Journal of Business Financial Accounting,* 45, 839-870.

Martensson, M. (2000). A critical review of knowledge management as a management tool, *Journal of Knowledge Management,* 4(3), 204-216.

Mashayekhi, B., Abadi, M. M., Hesarzadeh, R. (2009). Accounting conservatism, earnings persistance and earnings distribution, *Journal of the Accounting and Auditing Review,* 56, 107-214.

McElroy, M. W. (2002). Social innovation capital, *Journal of Intellectual Capital,* 3(1), 30-39.

Ozkan, N., Cakan, S., Kayacan, M. (2017). Intellectual capital and financial performance: A study of the Turkish banking sector, *Borsa Istanbul Review,* 17(3), 190-198.

Pae, J., Thornton, D. B., Welker, M. (2005). *The link between earnings conservatism and balance sheet conservatism,* Queen's Univesity Working Paper.

Penman, S. H. & Zhang, X. (2002). Accounting conservatism the quality of earnings, and stock returns, *The Accounting Review,* 77(2), 237-264.

Polat, Z. G. (2016). *Muhasebede ihtiyatlılık ve kurumsal yönetim: Borsa Istanbul üzerine ampirik bir uygulama,* Master Thesis, Dumlupınar University–Institute of Social Sciences.

Pulic, A. (1998). MVA and VAIC analysis of randomly selected companies from FTSE 250, *Austrian Intellectual Capital Research Center,* Graz-London, 1-41.

Pulic, A. (2004). Intellectual capital – Does it create or destroy value?, *Measuring Business Excellence,* 8(1), 62-68.

Qiang, X. (2007). The effects of contracting, litigation, regulation, and tax costs on conditional and unconditional conservatism: Cross-sectional evidence at the firm level, *The Accounting Review,* 82(3), 325-370.

Rodov, I. & Leliaert, P. (2002). FIMIAM: Financial method of ıntangible assets measurement, Journal of Intellectual Capital, 3(3), 323-336.

Samiloglu, Famil (2002). *Entelektüel sermaye,* Gazi Kitabevi, Ankara.

Sofian, S., Rasid, S. Z. A., Mehri, M. (2011). Conservatism of intellectual capital and relevance of earnings, *International Journal of Business and Social Science,* 2(10), 26-30.

Stewart, T. A. (1997). *Entelektüel sermaye kuruluşların yeni zenginliği,* (Transl. Nurettin Elhüseyni), Kontent Kitap, BZD Yayıncılık.

Unal, O. (2010). Entelektüel sermayenin raporlanması ve UMS 38 maddi olmayan duran varlıklar standardı kapsamında değerlendirilmesi, *Journal of Trade and Tourism Education Faculty,* 2, 20-39.

Van den Berg, H. A. (2002). Models of intellectual capital valuation: A comparative evaluation, *Knowledge Summit Doctoral Consortium,* 1-33.

Wang, R. Z. (2009). *Accounting conservatism,* Doctoral Dissertation, Victoria University, Wellington.

Wang, R. Z., Hogartaigh, C. O., Zijl, T. V. (2008). Measures of accounting conservatism: A construct validity perspective, *Journal of Accounting Literature,* 28, 1-60.

Watts, R. L. & Zimmerman, J. L. (2003). Conservatism in accounting, *Accounting Horizons,* 17(4) 287-301.

Watts, R. L. (2002). Conservatism in accounting, *Simon School of Business Working Paper,* Working Paper Nr.: FR 02-21, The Bradley Policy Research Center.

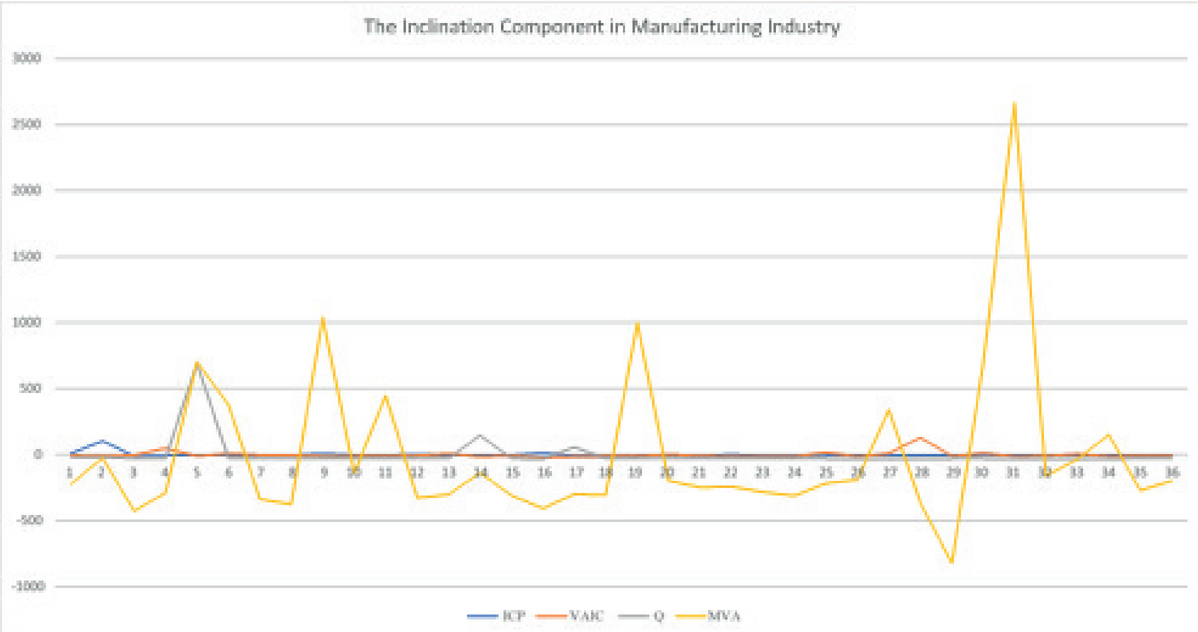
Xie, Y.(2015). Confusion over accounting conservatism: A critical review, *Australian Accounting Review Nr. 73,* 25(2), 204-216.

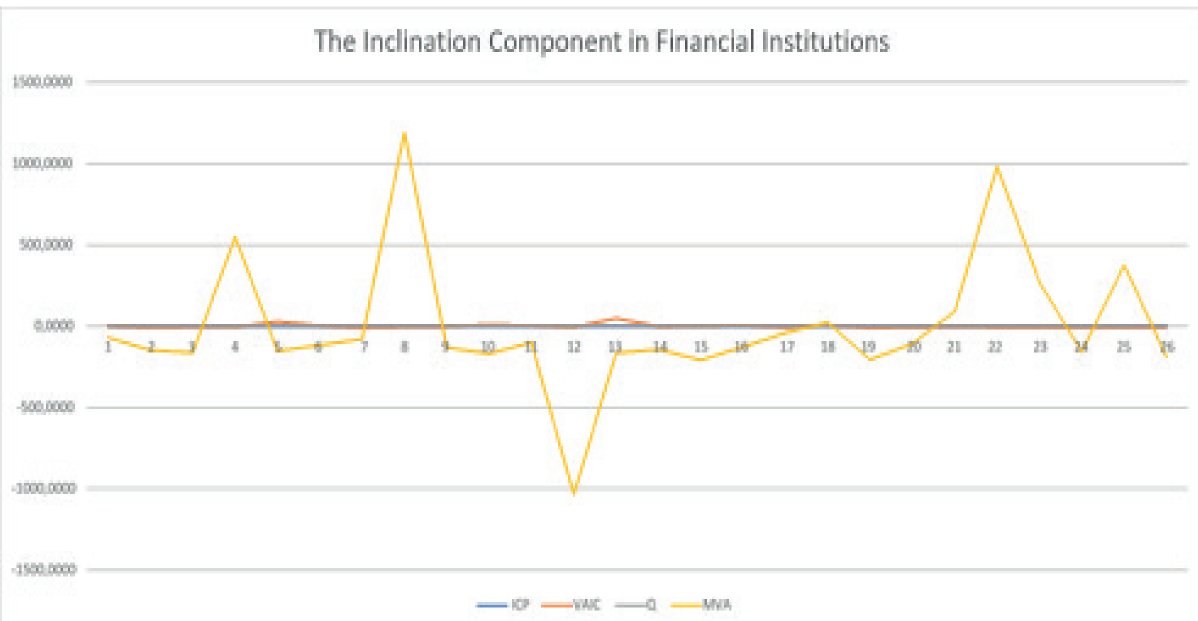
Yalama, A. (2005). *Entelektüel sermayenin entelektüel katma değer katsayısı (VAIC) ile ölçülmesi ve veri zarflama analizi (DEA) yöntemi kullanılarak karlılığa etkisinin sınanması: İMKB'ye kote bankalarda uygulaması,* Master Thesis, Anadolu University–Institute of Social Sciences.

Zhang, X. J. (2000). Conservative accounting and equity valuation, *Journal of Accounting and Economics,* 29(1), 125-149.

Zor, I. & Cengiz, S. (2013). Entelektüel sermaye ile firma değeri arasındaki ilişki: Borsa İstanbul'da bir araştırma, *Çankırı Karatekin University Journal of Economics and Administrative Sciences,* 3(1), 37-56.

Appendix - The Graphics of Inclination Component (Bias)





EGE AKADEMİK BAKIŞ / *EGE ACADEMIC REVIEW*

Cilt 21 • Sayı 4 • Ekim 2021
SS. 357-372
Doi: 10.21121/eab.1015661
Başvuru Tarihi: 11.11.2020 • Kabul Tarihi: 14.09.2021

Media-Coverage-Related Investor Sentiment during the COVID-19 Pandemic

Esra BULUT[1], Seval AKBULUT BEKAR[2], Gülay ÇİZGİCİ AKYÜZ[3]

ABSTRACT

This study tests the relationship between investor sentiment generated by COVID-19-related media coverage and BIST100 Index returns. In this context, the study is based on the ground laid by Tetlock's (2007) study, which stated that media content and stock market activity are correlated. The effect of investor sentiment on the BIST 100 Index is examined in this study for the period 11 March 2020 – 19 August 2020 through the news on the COVID-19 pandemic. In this context, panic, fear, media coverage and vaccine indices are used in the study as investor sentiment proxies based on media coverage of COVID-19. The Dolado-Lütkepohl causality test and the ARDL method were used to investigate the effects of indices on the BIST100 Index return and subsequently, the cross-correlation relationship has been examined to check the robustness of the results. It is found that media-coverage-based investor sentiment indices are related to BIST100 Index returns. However, our evidence does not support investor sentiment theory.

Keywords: investor sentiment, behavioural finance, BIST100, media coverage, COVID-19

Classification codes: G10, G40, G14

1. INTRODUCTION

In recent years, the potential linkages between investors and returns from a behavioural finance perspective have become an important research area. Investor sentiment, which is an overlooked phenomenon in traditional finance theories, is a very hot topic for behavioural finance researchers. De Long et al. (1990) provide a theoretical framework that describes the significance of investor sentiment in determining stock prices. Shleifer and Summers (1990) suggest a different approach to the efficient-markets approach which is based on investor sentiment and limited arbitrage. They show that investors who base their trading on 'noise' are not fully rational. The demands of these investors with regard to risky assets are influenced by thoughts and beliefs that cannot be properly justified by fundamental values. Investor sentiment is commonly defined as a belief about future earnings and investment risks that cannot be confirmed by the facts investors have (Baker and Wurgler, 2007: 129). Overall, studies indicate that unpredictable changes in investor sentiment may affect stock prices (Shleifer and Summers, 1990; De Long et al., 1990; Baker and Wurgler, 2007; Kaplanski and Levy, 2010). In this context, when sensitivity is high, investors cannot make correct evaluations about the size and risk of future cash flows, and this can lead to an overvaluation of stocks. The exact opposite situation is valid in periods when sensitivity is low (Mian and Sankaraguruswamy, 2012: 1358).

Certain events generating positive or negative sentiment may influence investment decisions and stock prices (Donadelli et al., 2017: 84). Negative sentiment, as well as fear and panic, leads to negative returns (French, 2018; Shu, 2010; Donadelli et al., 2017). There are many studies examining pandemics and their effects on financial markets (Chen et al., 2007; Ali et al., 2010; Chen et al., 2018; Schell et al., 2020). The effects of the COVID-19 on financial markets appear to be similar to those identified in the literature (Albulescu, 2020; Al-Awadhi et al., 2020; Baig et al., 2020; Ashraf, 2020; Cepoi, 2020; Haroon and Rizvi, 2020; Engelhardt et al., 2020; Baker et al., 2020; Salisu and Vo, 2020; He et al., 2020; Liu et al., 2020; Schell et al., 2020). Schell et al. (2020) point out that the COVID-19 pandemic is one

[1] Dr. Öğr. Üyesi, Trabzon Üniversitesi, Turizm ve Otelcilik MYO, Seyahat-Turizm ve Eğlence Hizmetleri Bölümü, ebulut@trabzon.edu.tr
[2] Dr. Öğr. Üyesi, Trabzon Üniversitesi, Vakfıkebir MYO, Yönetim ve Organizasyon Bölümü, sevalakbulut@trabzon.edu.tr
[3] Dr. Öğr. Üyesi, Trabzon Üniversitesi, Vakfıkebir MYO, Finans-Bankacılık ve Sigortacılık Bölümü, gulayakyuz@trabzon.edu.tr

of the costliest epidemics in economic terms. Similarly, Baker et al. (2020) evidence that the USA stock market has responded much more influentially to COVID-19 than it has to other pandemics.

During the pandemic period, government restrictions to avoid the spread of the disease have induced unexpected supply-and-demand shocks in some sectors. In response to this, offices and factories have made decisions to reduce costs and ultimately have had to cut back their activities, affecting productivity and profitability (Liu et al., 2020: 16–17). According to early estimates by the ILO, significant increases in unemployment and underemployment which is about from 5.3 million to 24.7 million are expected after the pandemic. It is clear to understand the destructiveness of the economic effects of the pandemic when comparing this expectation with the increase in the unemployment figure by 22 million experienced in the 2008 financial crisis (ILO, 2020). From the losses among airline companies, it can be seen how difficult the sustainability of enterprises is. Air France-KLM's income fell by 15.5% in the first quarter of 2020 (Reuters, 2020), while the International Airlines Group reported a loss of 2.2 billion euros in the second quarter (Caswell, 2020). During this period, Norwegian Air cancelled 97 Boeing aircraft not yet supplied in fulfilment of the order it had placed with Boeing in 2012 and claimed compensation from the plane-maker (CNBC, 2020). At the same time, the financing problems of credit-dependent companies, degression in investments, and a decrease in innovation and entrepreneurship are important negative outcomes of the pandemic (World Bank, 2020). The decrease in economic activities globally due to the pandemic explains the panic in the financial markets. As is well known, stock prices stand in for earning potential in the future. In this context, the decrease in economic activities affects the earnings expectations of investors, and investors are concerned about future cash flows (Liu et al., 2020: 16–17). In parallel with the increase in the number of COVID-19 cases, the FTSE, Nikkei and Dow Jones Industrial Average have seen large decreases: in fact, Dow and FTSE have seen their biggest decline since the first quarter of 1987 (Jones et al., 2020).

The rapid spread of the COVID-19 pandemic has increased the sensitivity of many people to news, including investors. It can be said that COVID-19 has led to a news flood all over the world, especially due to its human and economic effects. Media coverage of panic and fear related to the pandemic and of the search for a vaccine affects investor sentiment and increases investors' concerns about their future cash flows (Lee, 2020: 1; Baig et al., 2020). A high degree of pessimism in the news predicts downward pressure on market prices (Tetlock, 2007: 1139). On the other hand, there are findings that positive emotions increase the willingness of investors to take risks (Donadelli et al., 2017). Baker and Wurgler (2007) have obtained findings that investor sentiment has significant effects on the stock market. Similarly, Engelhardt et al. (2020) have established that the decrease in stock markets is related to news attention, rather than to rational expectation. Haroon and Rizvi (2020) revealed that panic created by COVID-19-related media coverage has effects on financial markets.

This study is motivated by the need to investigate how negative events may affect the sensitivity of investors. It aims to test the effect of COVID-19-related news-based investor sentiment on BIST100 Index returns. It demonstrates originality by using COVID-19-related news-based investor sentiment proxies and examining the capital market in terms of behavioural finance for the period of the pandemic. In this context, this study followed Tetlock's (2007) study, which found that media content and stock market activity are correlated. In particular, the study investigates the effect of investor sentiment induced by a specific event of the COVID-19 pandemic. In this framework, after the introduction, the theoretical background on investor sentiment and stock markets is introduced. Then, a literature review on COVID-19-related investor sentiment and its relationship to stock returns are presented. The fourth section discusses the measurement of investor sentiment, while the data and methodology are explained in the fifth section. The sixth section introduces the research findings, which are then evaluated in the last section.

2. MOTIVATION AND BACKGROUND

An efficient market assumes that participants receive all available information in the market (Fama, 1995: 76). In this context, it is assumed that investors act rationally. However, it has been observed that investors do not act rationally (Baker and Wurgler, 2007: 129). De Long et al. (1990) confirm that irrational noise traders affect prices and claim that the unpredictable beliefs of noise traders and the effect on the market of their expectations increase the risk in the market. In this case, prices may deviate from the fundamental values even when there is no fundamental risk. Shleifer and

Summers (1990) state that investor sentiment affects their demands, and that arbitrage is risky and limited. The researchers established that limited arbitrage is more reasonable than perfect arbitrage by revealing that investor sentiment is an important determinant of prices. Similarly, Shleifer and Vishny (1997) confirmed the assumption of behavioural finance that arbitrage is limited. Shu (2010) evaluates the mood of investors as a very important factor for equilibrium asset prices and returns. Bathia and Bredin (2013) found that with respect to high investor sentiment, future returns are low. Conversely, low investor sentiment is related to high future returns. According to Shu (2010), the mental or psychological conditions of investors can influence their choices, risk assessments and attendant investment decisions. Therefore, financial decisions can be expected to vary according to the mood of investors (Shu, 2010: 267).

It is possible to say that certain events can create a particularly positive or negative emotion affecting the relevant stock market prices – that is, they can affect investor sentiment (Donadelli et al., 2017: 84). As Kahneman and Tversky' (1979) prospect theory which forms the basis of behavioural finance, losses outweigh gains for investors. De Bondt and Thaler (1985) associate the overreaction of investors with psychological findings and attribute price anomalies to the overreaction of investors to unexpected and dramatic events. In such cases, particularly adverse events can be expected to have a large effect on investor sentiment, and in particular, negative events have a higher impact than positive events on investor sentiment (Baker and Wurgler, 2007: 129–130). Baker and Wurgler (2007) state that investor sentiment and emotional waves have significant effects on stock market. Investor sentiment theory assumes that short-run returns will reverse in the long run. However, information theory assumes that short-term returns will not change in the long run (Tetlock, 2007: 1143). Unlike previous studies, Verma et al. (2008) obtained findings that individual and institutional investor sentiment can be both fundamental-driven (rational) and irrational.

3. LITERATURE REVIEW: COVID-19-RELATED INVESTOR SENTIMENT AND ITS RELATIONSHIP TO STOCK RETURNS

COVID-19 appeared first in China, spread rapidly all over the world and became a pandemic. Due to the measures taken in response to this rapid spread, the pandemic has had very unfavourable effects on the economies and financial markets. During this stage, the ever-increasing cases and death rates have triggered an increase in fear and panic among the people. The reflection of this panic and uncertainty on financial markets in different countries have been an important research topic. Albulescu (2020) investigated the relationship between COVID-19 cases and death rates and the financial market volatility index, and found that mortality rates positively affect the volatility index, especially in countries other than China. In addition, he points out that volatility increases as the number of countries is affected by COVID-19 increases. Similarly, Al-Awadhi et al. (2020) have determined that the daily increase in total cases and total deaths in China had significant negative effects on the stock returns of all companies.

Investigating the COVID-19 outbreak and the microstructure of US stock market relationships, Baig et al. (2020) found that an increase in liquidity and volatility dynamics is associated with an increase in confirmed cases and deaths due to COVID-19. According to Baig et al. (2020), government restrictions, lockdowns and a declining level of sentiment worsen the stability and liquidity of the markets. Similarly, Ashraf (2020) has determined that stock markets have reacted negatively to the increase in confirmed COVID-19 cases. According to Ashraf (2020), stock markets have responded rapidly to the COVID-19 pandemic, and this response has changed over time depending on the stage of the pandemic reached.

Disaster-related news and media coverage are also factors that trigger fear and panic. This fear and panic affects the expectations of investors. As is known from the finance literature, investor sentiment effects stock returns significantly (De Long et al., 1990; Baker and Wurgler, 2006, 2007; Shleifer and Vishny, 1997; Shu, 2010: 267; Donadelli et al., 2017). Tetlock (2007) states that high pessimism in the media indicate a change in the stock price due to downward pressure. He also finds that uncommonly high or low pessimism in the media predict high market volatility. According to Tetlock's (2007) findings, movements in market prices and trading volume can be predicted by the content of the news in the media.

Cepoi (2020) analysed the effect of COVID-19-related news on stock market returns in the USA, the UK, France, Germany, Italy and Spain for the period 3 February 2020 – 17 April 2020. According to Cepoi (2020), the findings show that it is important to use proper communication channels to reduce the confusion caused by the COVID-19 pandemic in financial markets.

Similarly, Haroon and Rizvi (2020) examined the relationship between the sentiment caused by the news on COVID-19 and the volatility of stock markets for the period 1 January 2020 – 30 April 2020. The researchers used the benchmark indices for the world and the USA, and 23 sectoral indices for the USA from Dow Jones. They found that news-induced panic and increasing volatility in stock markets are related. In addition, they observe that panic related news caused more volatility in the stocks of the sectors that are thought to be most affected by the pandemic.

Lee (2020) analysed the first effect of COVID-19 sentiment on the US stock market. Lee (2020) analysed investor sentiment through Google Trends data on coronavirus-related searches and the Daily News Sentiment Index (DNSI) and found that the effects of COVID-19 sentiment vary between 11 industry indices for the period 21 January 2020 – 20 May 2020. Engelhardt et al. (2020) analysed whether the decrease in stock market performance during to COVID-19 was due to news interest or to the rational expectations of investors, coupled with the economic impact of the pandemic. The researchers used data from 64 countries comprising 94% of world GDP for the period between 22 January 2020 and 9 April 2020. They found that the decrease in stock markets is related less to rational expectation and more to news attention. According to Engelhardt et al. (2020), the economic effect of media hype will be excessive for the USA and the rest of the G8 countries.

Baker et al. (2020) analysed the effects of pandemics on the stock market using text-based methods, through both automated and human readings of newspaper articles. The researchers found that the stock market has responded to the COVID-19 pandemic much more strongly than to previous pandemics. According to Baker et al. (2020), the measures taken by the government are important reasons for the dramatic effects on the stock markets. Similarly, Schell et al. (2020) studied the response of 26 stock market indices to disease-related news announcements made by the World Health Organization on H1N1 (swine influenza) in 2009, the poliovirus and Ebola outbreaks in West Africa in 2014, the Zika virus in 2016, the Ebola outbreak in 2019, and COVID-19 in 2020. They conclude that diseases other than COVID-19 had a relatively low economic impact on a global scale. Schell et al. (2020) also found that only COVID-19 affected stock markets negatively for at least 30 days. Salisu and Vo (2020) analysed the relationship between health news trends obtained through Google Trends for 20 countries during the COVID-19 pandemic and the predictability of stock returns for the period 1 January 2020 – 30 March 2020. They determined that health news searches predict stock returns well since the emergence of the pandemic.

He et al. (2020) examined the market performance and response trends of Chinese industries in relation to COVID-19. They considered 2895 companies registered on Shanghai and Shenzhen stock exchanges using the case study approach for the period 3 June 2019 – 13 March 2020. They found that the pandemic has positively affected the stock prices in the Shenzhen Stock Exchange, but that it has had a negative impact on the stock prices in the Shanghai Stock Exchange. Similarly, Liu et al. (2020) analysed the short-term effects of the coronavirus epidemic on 21 leading stock market indices in the major countries over two periods – a pre-event period from 21 February 2019 to 19 January 2020 and a post-event period from 20 January 2020 to 18 March 2020. Their findings show that stock markets fell rapidly after the pandemic in the major countries and regions.

4. MEASUREMENT OF INVESTOR SENTIMENT

As is known from the finance literature, market-based metrics, confidence and sentiment surveys, internet search queries and news are used as proxies for investor sentiment. Baker and Wurgler (2006, 2007) combine six distinct proxies to create an index. Their sentiment index based on trading volume is measured by the closed-end fund discount, NYSE turnover, the number of and first-day returns on IPOs, the dividend premium, and the equity share in new issues. Similarly, Smales (2017) uses the composite index created by Baker and Wurgler (2006) as an investor sentiment proxy, in addition to other sentiment proxies. Baker and Stein (2004) and Tas and Sen (2019) use trading volume as a proxy for investor sentiment, while Kandır et al. (2013) use a consumer confidence index and the closed-end fund discount.

According to Da et al. (2015), market-based investor sentiment measures provide the convenience of obtaining data at a relatively high frequency. However, these measures have the disadvantage of carrying the effects of many economic factors in addition to investor sentiment. Hence, Da et al. (2015) created the Financial and Economic Attitudes Revealed by Search (FEARS) index by using internet search queries. According to Da et al. (2015), investor sentiment can be measured through the internet search behaviour of households. Similarly, Salisu and Vo (2020) and Oliveira-Brochado (2019) use a Google search-based sentiment index. On the other hand, Bollen et al. (2011) measure sentiment utilizing Twitter feeds, while Kaplanski and Levy (2014) analyse football results as a sentiment proxy. According to Lee (2020), sentiment analysis, which uses big data drawn from social media, is a good source of information during times when the stock markets face a sudden and unpredictable event like the COVID-19 pandemic. Lee (2020) states that these analyses can provide forecasts to investors that determine investment strategies. On the other hand, investors find it difficult to properly evaluate the economic significance and effect of such information when they have extensive access to news and information (Haroon and Rizvi, 2020: 1). According to Li (2018), while positive news improves stock market performance and the trading of individual stocks, negative news impedes it. Besides, media coverage of disasters increases anxiety and fear and causes sensitivity among investors (Kaplanski and Levy, 2010). Donadelli et al. (2020) examine the fear index as a sentiment proxy, consistent with the common view that disease-related news can cause panic, fear and anxiety among investors. Haroon and Rizvi (2020) examine the panic index, sentiment index and media coverage index which are created from COVID-19 pandemic-related news, and they have analysed the sentiment arising from the media. Similarly, Cepoi (2020) examines the panic index, the media hype index, the fake news index, the country sentiment index, the contagion index and the media coverage index. Tetlock (2007) establishes in his findings that media content metrics act as a proxy for investor sentiment. Similarly, the present study examines media-coverage-based measures as an investor sentiment proxy.

5. DATA AND METHODOLOGY

The effect of investor sentiment on the Borsa Istanbul 100 Index is examined in this study for the period 11 March 2020 – 19 August 2020 through the news on the COVID-19 pandemic. Following Cepoi (2020) and Haroon and Rizvi (2020), the news index values for Turkey which are obtained through the coronavirus news monitor launched by RavenPack and given in Table 1 are used.

ADF (Augmented Dickey Fuller) and Fourier ADF unit root tests (Dickey and Fuller, 1981) were used to establish the stationarity levels of the variables. The Dolado-Lütkepohl (1996) (DL) causality test and the ARDL (autoregressive distributed lag) method developed by Pesaran (Pesaran et al., 2001) were used to investigate the effects of panic, fear, media coverage and discussion of a vaccine – indices for which were created by taking into account the news on the COVID-19 pandemic – on the BIST100 Index return. The cross-correlation method was used for graphical analysis.

Trigonometric terms are used in the equations, unlike the ADF test in the Fourier ADF unit root test developed by Christopoulos and León-Ledesma (2010). Fourier series are defined in the Fourier ADF test as the

Table 1: The Data

Variables	Description and source	Source
Stock Market Return (BIST100)	Daily rate of change, the Borsa İstanbul 100 return	Borsa Istanbul Data Platform
Panic Index (PI)	This measures the proportion of media coverage referring to panic or hysteria and the coronavirus. Index values range from 0 to 100: a higher value indicates a greater number of references to panic and COVID-19.	RavenPack https://coronavirus.ravenpack.com
Fear (F)	This measures how frequently the theme of fear appears alongside mentions of the coronavirus, expressed as a percentage of all news stories about the virus.	
Media Coverage Index (MCI)	This measures how frequently the topic of the novel coronavirus is covered among all news sources. Index values range from 0 to 100, so e.g. a value of 60.00 means that currently 60% of all stories among sampled news providers relate to COVID-19.	
Vaccine (V)	This measures how frequently the subject of a vaccine appears alongside mentions of the coronavirus, expressed as a percentage of all news stories about the virus.	

Note: Variables are used in the analysis by taking their logarithms.

sum of cosines and sines (trigonometric values) of the periodic y_t function, as shown in Equation (1).

$$y_t = \delta_0 + \delta_1 \sin\left(\frac{2\pi kt}{T}\right) + \delta_2 \cos\left(\frac{2\pi kt}{T}\right) + v_t \quad (1)$$

In Equation (1), t refers to trend, T refers to sample size, π= 3.1416 and k refers to the frequency value, taking an integer value between 1 and 5, which minimizes the sum of residual squares. The optimal frequency number of k is specified by estimating Equation (1), and the residues are obtained as in Equation (2).

$$v_t = y_t - \left[\delta_0 + \delta_1 \sin\left(\frac{2\pi kt}{T}\right) + \delta_2 \cos\left(\frac{2\pi kt}{T}\right)\right] \quad (2)$$

In order to apply the standard ADF unit root test to the residues that are calculated with the help of Equation (2), Equation (3) is estimated.

$$\Delta v_t = \alpha_1 v_{t-1} + \sum_{i=1}^{p} \beta_j \Delta v_{t-j} + \varepsilon_t \quad (3)$$

In Equation (3), the null hypothesis shows the unit root process as ($H0 = a1 = 0$), while the alternative hypothesis shows the stationarity as ($H1 = a1 < 0$) in linear form for the Fourier ADF test (Destek and Okumuş, 2016: 78). The calculated test statistic is compared with the critical values created according to the number of k frequencies determined by the Fourier ADF test in Christopoulos and León-Ledesma's work (2010: 1083), and a decision is made about the stationarity.

If the variables are stationary, the significance of the trigonometric terms (calculated F (k) test) in Equation (1) will be compared with the critical values in the study of Becker et al. (2006: 389). It is recommended to use the Fourier ADF test if the trigonometric terms are significant and the standard ADF test if the trigonometric terms are insignificant (Enders and Lee, 2012: 196–197).

5.1. Dolado-Lütkepohl (DL) Causality Method

The optimal lag length k is determined in the first place using the Dolado-Lütkepohl causality method with the help of the VAR (vector autoregression) model according to the criteria LR, FPE, AIC, SIC and HQ. By adding $a + 1$ lag to the determined optimal lag length, the VAR ($k + 1$) model is estimated. To determine whether the estimated VAR model is smooth and stable, tests such as AR unit root, autocorrelation, heteroscedasticity and normality tests (diagnostic tests) are performed. In the next phase, the Wald test is applied to the k lag coefficient matrix of the independent variables in Equations (4) and (5) for the VAR ($k + 1$) model that is created to test the causality relationship between two variables such as X and Y.

With the help of the DL causality test, in the analysis of the causality relationship between two variables, such as X and Y, Equations (4) and (5) are formed.

$$X_t = \varphi_0 + \sum_{i=1}^{k+1} \delta_i X_{t-i} + \sum_{j=1}^{k+1} \alpha_j Y_{t-j} + u_{1t} \quad (4)$$

$$Y_t = \gamma_0 + \sum_{i=1}^{k+1} \pi_i Y_{t-i} + \sum_{j=1}^{k+1} \beta_j X_{t-j} + u_{2t} \quad (5)$$

As a result of the Wald test applied to the lag coefficient matrix k in the VAR ($k + 1$) model, it is concluded that there is a one-way causality relationship from Y to X if $\alpha j \neq 0$ in Equation (4); and from X to Y if $\beta j \neq 0$ in Equation (5). If $\alpha j \neq 0$ and $\beta j \neq 0$ together, it is assumed that there is a two-way causality relationship between variables.

5.2. ARDL Method

A boundary test is made to determine the cointegration relationship between two variables such as X and Y using the ARDL method. The unrestricted error correction model in the estimation of the F statistic that will be used for the boundary test is defined as in Equation (6).

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{m} \beta_i \Delta Y_{t-i} + \sum_{i=0}^{n} \delta_i \Delta X_{t-i} + \mu_i Y_{t-1} + \sigma_i X_{t-1} + u_t \quad (6)$$

In Equation (6), m and n refer to optimal lag lengths and Δ refers to first-degree differences. It is stated that if zero and alternative hypotheses are H_0: $\mu_i = \sigma_i = 0$ in Equation (6), which is estimated for the F statistic to be used in the ARDL boundary test, there is no cointegration relationship between the series; and if H_1: $\mu_i \neq \sigma_i \neq 0$, there is a cointegration relationship between the series.

As a result of the boundary test, the long- and short-term relationships between the variables for which a cointegration relationship is determined are examined. The long-term ARDL (m, n) model is estimated as in Equation (7), after the lag lengths of the dependent (Y) and the independent (X) variables are determined according to the AIC.

$$Y_t = \beta_0 + \sum_{i=1}^{m} \beta_{2i} Y_{t-i} + \sum_{i=0}^{n} \beta_{3i} X_{t-i} + u_t \quad (7)$$

The error correction model of the ARDL (m, n) model is formed in order to determine the short-term relationship between variables, as in Equation (8).

$$\Delta LY_t = \alpha_0 + \sum_{i=1}^{m} \omega_i \Delta LY_{t-i} + \sum_{i=1}^{n} \varphi_i \Delta LX_{t-i} + \tau ECT_{t-1} + u_t \quad (8)$$

The coefficients in Equation (8) show the short-term coefficients of the model. ECT_{t-1} is the error correction term. It is expected that the coefficient of $\boldsymbol{\tau}$ for the error correction term will be negative and significant. If the $\boldsymbol{\tau}$ coefficient is between 0 and −1, this indicates that it stabilizes in the long term. Besides, Narayan and Smyth (2006: 339) argue that if this coefficient is greater than −1 ($\boldsymbol{\tau} > -1$) it will fluctuate and stabilize in the long term.

5.3. Cross-correlation Function

In the cross-correlation function, correlation coefficients are calculated, and analysis is performed by obtaining information about the direction of the relationship between these coefficients and the variables. The measurement of a linear relationship or association between variables is identified as a positive value, while the measurement of an opposite relationship or association is a negative value. If there is no association between the two variables, they are statistically independent (Sevüktekin and Nargeleçekenler, 2010: 243).

The correlation coefficient is the measure of the association between a standard deviation change in X (independent variable) and a standard deviation change in Y (dependent variable). Hence, the correlation coefficient is equal to the division of the products of the standard deviations of X and Y to Cov (X, Y). In short, it is formulated as in Equation (9) (Sevüktekin and Nargeleçekenler, 2010:246).

$$\tilde{n}(X,Y)=\frac{\mathrm{Cov}(X,Y)}{\sqrt{\mathrm{Var}(X)}\sqrt{\mathrm{Var}(Y)}}=\frac{\mathrm{Cov}(X,Y)}{\acute{o}_X \acute{o}_Y} \tag{9}$$

The covariance between two variables such as X and Y in this definition is calculated as in Equation (10) (Sevüktekin and Nargeleçekenler, 2010: 246).

$$\mathrm{Cov}\ (X,Y)=\sum_{i=1}^{N}(X_i\text{-}\overline{X})(Y_i-\overline{Y}) \tag{10}$$

σ_x and σ_y are the standard deviations of X and Y respectively:

$$\acute{o}X=\sqrt{\frac{\sum\left(X_i-\overline{X}\right)^2}{N-1}} \tag{11}$$

and

$$\acute{o}Y=\sqrt{\frac{\sum\left(Y_i-\overline{Y}\right)^2}{N-1}} \tag{12}$$

are calculated as above. Equations (10), (11) and (12) can be reformed as in Equation (13) below by replacing the correlation coefficient in Equation (9) (Sevüktekin and Nargeleçekenler, 2010: 247):

$$\rho_{XY}=\frac{\sum_{i=1}^{N}(X_i\text{-}\overline{X})(Y_i-\overline{Y})}{\sqrt{\sum_{i=1}^{N}(X_i\text{-}\overline{X})^2(Y_i-\overline{Y})^2}} \tag{13}$$

Cross-correlation coefficients between variables for the past and future periods are also calculated using Equation (13). Therefore, in order to analyse the relationship in the cross-correlation function that is used to find out the dynamic relationship between variables, cross-correlation coefficients must be calculated. Accordingly, when the cross-correlation coefficients between X (independent variable) and Y (dependent variable) are reformed according to Equation (14), ($\rho X, Y\ (k)$) will be calculated as in Equation (14).

$$\rho_{X,Y}(k)=\frac{\Sigma[(X_{t+k}-\overline{X})(Y_t-\overline{Y})]}{\sqrt{\Sigma(X_{t+k}-\overline{X})^2\,\Sigma(Y_t-\overline{Y})^2}} \tag{14}$$

In Equation (14), X_{t+k} represents current, future and past t-period values of the dependent variable; and $Y_t$represents the t-period value of the dependent variable. $\overline{X}$ and $\overline{Y}$ represent the means of independent and dependent variables. k represents the lag and lead length.

In the aforementioned equation, the instant correlation between X and Y is obtained when $k = 0$; and cross-correlation between $X_{t\pm1}$ and Y_t is obtained when $k = \pm1$. Future periods where k is positive give the cross-correlation that shows leading effects, while past periods where k is negative give the cross-correlation that shows lagged effects. Thus, instant correlations between independent and dependent variables, as well as cross-correlations that reveal lagged and leading effects, can be calculated with this method. A unique ρ value is calculated in the analysis for each k value. The cross-correlation function graph between $X_{t\pm k}$ and Y_t is obtained with the graph drawn through the cross-correlation function with ρ values (cross-correlation coefficients) on the vertical axis and k values (current, lead and lag length values) on the horizontal axis.

With the graphs obtained, the effects of current, lead and lag values of the panic, vaccine, fake news, fear, media hype, media coverage and contagion indices on the BIST100 return will be analysed visually and the robustness of the findings will be evaluated.

6. RESEARCH FINDINGS

The results of the BIST100 index value and the ADF and Fourier ADF unit root tests of the variables PI, F, MCI and V are given respectively in Tables 2 and 3.

If the absolute values of t statistics that are calculated with the help of the ADF test are greater than (less than) the critical absolute values of the table, it is decided that the series is stationary (not stationary). When we look at the results in Table 2, the BIST100 variable is stationary at the 1st difference, according to the ADF unit root test, while other variables are stationary at the level.

Table 2: ADF Unit Root Test

Variables	At level		At 1st difference	
	Constant	Constant + trend	Constant	Constant + trend
BIST100	−2.37(0.15)	−3.07(0.11)	***−8.84(0.00)*** [a]	***−8.97(0.00)*** [a]
PI	***−4.00(0.00)*** [a]	***−10.92(0.00)*** [a]	**−5.69 (0.00)**	**−5.66(0.00)**
F	***−7.38(0.00)*** [a]	***−8.26(0.00)*** [a]	**−7.49(0.00)**	**−7.45(0.00)**
MCI	−1.38(0.58)	**−6.41(0.00)** [a]	***−8.13(0.00)*** [a]	***−8.12(0.00)*** [a]
V	***−9.87(0.00)*** [a]	***−9.83(0.00)*** [a]	**−7.38(0.00)**	**−7.34(0.00)**

Note: Values in ( ) represent the p value of t statistics. Table critical values in the constant model are 1%: −3.50, 5%: −2.89, 10%: −2.58; in the constant and trend model, 1%: −4.05, 5%: −3.45, 10%: −3.15. a: significant at the 1% level, b: significant at the 5% level.

Table 3: Fourier ADF Unit Root Test Results

Variables	Min. KKT	*k*	FADF	F(*k*)
BIST100	2.049	1	−2.576	3.029
PI	5.744	1	***−10.871*** [a]	***10.142*** [a]
F	3.96	2	***−8.233*** [a]	***6.886*** [a]
MCI	0.214	1	***−7.361*** [a]	***17.191*** [a]
V	3.054	4	−10.379 [a]	10.684 [a]

Note: k represents the frequency number. Table critical values for k = 1 are 1%: −4.43, 5%: −3.85, 10%: −3.52; table critical values for k = 2 are 1%: −3.95, 5%: −3.28, 10%: −2.91; table critical values for k = 4 are 1%: −3.60, 5%: −2.93, 10%: −2.59. Table critical values for the significance of trigonometric terms are 1%: 6.73, 5%: 4.92, 10%: 4.13. a: significant at the 1% level; b: significant at the 5% level, c: significant at the 10% level. Δ represents difference operator.

According to the result of the Fourier ADF test as seen in Table 3, other variables – except the BIST100 variable – are stationary at the level under structural change. Since the F (*k*) statistic of the BIST100 variable is insignificant, it is decided that the finding obtained from the ADF test is appropriate to decide on the stationarity of this variable (Enders and Lee, 2012: 196–197).

As a result of unit root tests, while the BIST100 variable is stationary at the 1st difference I(1), other variables are stationary at the level I(0). The Dolado-Lütkepohl causality and ARDL methods have been chosen in the analysis of the relationship between BIST100 (dependent variable), which has different levels of stability, and the variables of PI, F, MCI, and V (independent variable).

The results of DL causality analysis are given in Table 4.

Table 4: DL Causality Test Results

VAR Model	**k + 1**	**Wald ist. (P value)**	**Causality**	**LM (P value)**	**White (P value)**	**Inverse roots of the AR characteristic polynomial (maximum value)**	**Findings summary**
BIST100 = f(PI) **PI = f(BIST100)**	1 + 1	**31.35(0.00)** [a] 1.02(0.31)	**PI→BIST100(−0.68)** No causality	5.03 (0.28)	63.84 (0.34)	0.66	One-way negative causality
BIST100 = f(F) **F = f(BIST100)**	1 + 1	**27.67(0.00)** [a] 0.18 (0.66)	**F→BIST100(−0.72)** No causality	0.29 (0.99)	35.22 (0.91)	0.66	One-way negative causality
BIST100 = f(MCI) **MCI = f(BIST100)**	5 + 1	**10.24(0.06)** [b] 9.12(0.11)	**MCI→BIST100(−0.29)** No causality	6.39 (0.17)	53.11 (0.95)	0.22	One-way negative causality
BIST100 = f(V) **V = f(BIST100)**	1 + 1	**23.95(0.00)** [a] 1.64(0.19)	**V→BIST100(+0.38)** No causality	3.73 (0.43)	63.18 (0.36)	0.65	One-way positive causality

Note: k represents the optimal lag length. a: significant at the 1% level, b: significant at the 5% level.

According to the results of the analysis in Table 4, a one-way negative and statistically significant causality relationship has been found between the BIST100 variable and the PI, F and MCI variables. Table 4 also shows that there is a one-way positive and statistically significant causality relationship between the vaccine index and the BIST100 return. It is concluded that the panic, fear and media coverage indices affect the BIST100 return negatively, and the vaccine index affects the BIST100 return positively. It has been established that there is no problem in the diagnostic tests of VAR models (the probability values of White variance, LM autocorrelation and JB normal distribution tests are greater than 0.10), and the inverse roots of the AR characteristic polynomial that belong to the models are less than 1. In Table 4, it can be seen that the estimated models are reliable, problem-free and stable.

Findings obtained from DL causality analysis prove that media content is an indicator of stock markets, as stated in the determinations of Tetlock (2007). In addition, investor sentiment cannot be observed directly and its effects on the markets are analysed using proper proxies, as emphasized by Smales (2017). Within this framework, the fact that news indices, which are considered proxies for investor sentiment, have an effect on returns indicates that returns have been affected by investor sentiment during the COVID-19 pandemic. To verify this indicator, the short- and long-term relationship needs to be analysed. As Tetlock's (2007) findings confirm, a high level of media pessimism is connected with low investor sentiment, and this predicts a downward pressure on returns. The opposite of this relationship is expected in the long term. In this context, the short- and long-term relationship of investor sentiment to the BIST100 Index value has been analysed using the ARDL boundary test approach, and subsequently, the cross-correlation relationship has been examined to check the robustness of the results.

The results of F statistics calculated to decide whether there is a cointegration relationship between variables using the ARDL method are shown in Table 5.

Table 5: ARDL Bound Test Results

Model	k	F statistics	
BIST100 = f(PI)	1	50.96[a]	
BIST100 = f(F)	1	26.56[a]	
BIST100 = f(MCI)	1	47.60[a]	
BIST100 = f(V)	1	11.87[a]	
Table critical values		Lower bound I(0)	Upper bound I(1)
10%		3.02	3.51
5%		3.62	4.16
1%		4.94	5.58

Note: a: significant at the 1% level; k refers to the number of independent variables.

It is concluded in Table 5 that the calculated F statistics values of the models are greater than the table critical values and there is a cointegration relationship between variables. The optimal ARDL models determined to analyse the short- and long-term relationships

Table 6: Long-Term Coefficient

BIST100 = f(PI)		**BIST100 = f(MCI)**		**BIST100 = f(F)**		**BIST100 = f(V)**	
ARDL(1,2)		ARDL1,4)		ARDL(4,3)		ARDL(2,2)	
PI	−0.03 (−0.55) [0.57]	***MCI***	**−0.28**[b] **(−2.26)** **[0.02**]	***F***	−0.06 (−0.92) [0.35]	***V***	**0.16**[b] **(1.98)** **[0.04]**
C	1.02[a] (20.41) [0.00]	***C***	1.55[a] (6.83) [0.00]	***C***	1.12[a] (11.96) [0.00]	***C***	1.97[a] (15.35) [0.00]
Diagnostic tests							
Diagnostic tests	**BIST100 = f(PI)**	**BIST100 = f(MCI)**		**BIST100 = f(F)**		**BIST100 = f(V)**	
LM	1.14[0.32]	0.99(0.32]		2.16(0.15]		1.39(0.25]	
BPG	0.38[0.82]	1.20[0.30]		0.80[0.60]		1.88[0.12]	
Ramsey reset test	0.11[0.73]	0.36[0.54]		0.24[0.62]		0.08[0.77]	

Note: The values in ( ) represent the statistical values of t tests; the values in [ ] represent probability (p) values, a: significant at the 1% level, b: significant at the 5% level; k represents the number of independent variables. LM refers to Breusch-Godfrey LM autocorrelation and BPG to Breusch-Pagan-Godfrey heteroscedasticity tests.

according to the AIC were estimated after the cointegration relationship was established. The long-term coefficients of the ARDL models are stated in Table 6.

It is found in Table 6 that the BIST100 variable has not been affected by the PI and F variables in the long term, while the MCI variable has a negative and statistically significant effect on the BIST100 variable in the long term. It has been established that a 1% increase in the MCI variable decreases the BIST100 variable by 0.28%. Besides, it is concluded in the analysis that the effect of the V variable on the BIST100 variable is positive and statistically significant in the long term. It is established that a 1% increase in the V variable increases the BIST100 variable by 0.16%. It can be seen in Table 6 that the estimated ARDL models are problem-free – in other words, there are no autocorrelation, no variance problems and the models are set in the correct form (because the probability values of Breusch-Godfrey LM, Breusch-Pagan-Godfrey and Ramsey Reset test statistics are greater than 0.10).

The Short-term coefficients of error correction models estimated in the ARDL method are shown in Table 7.

When the short-term coefficients are examined in Table 7, it is concluded that the coefficients of the PI, F and MCI variables are negative and the coefficients of the V variable are positive. It is determined that a 1% increase in the V variable in the short term increases the BIST100 variable by 0.38%, while a 1% increase in the PI, F and MCI variables in the short term decreases the BIST100 variable by 0.07%, 0.08% and 0.61%, respectively. While the PI (t-period values) variable affects BIST100 negatively, it can be seen that the lag value of the variable (PI(−1)) does not have an effect. It can be seen that all coefficients of the MCI and F variables are negative and statistically significant, and the lag values of the MCI and F variables (MCI(−1), MCI(−2), MCI(−3), F(−1), F(−2)) have a negative effect. In other words, it is concluded that the increase in the lag values of the MCI and F variables affects the t-period value of the BIST100 variable negatively.

It is concluded that the ECT(−1) coefficient in the ARDL error correction models that is estimated as BIST100 = f(PI), BIST100 = f(F), BIST100 = f(MCI) and BIST100 = f(V) is −1.07, −0.87, −1.11 and −0.69 respectively. The fact that the ECT(−1) coefficient is negative and statistically significant is construed as showing that the short-term deviations will be eliminated in the following periods. The fact that the coefficient of the error correction term in the BIST100 = f(PI) and BIST100 = f(MCI) models is greater than −1 shows that the deviations in the short term will fluctuate and will be balanced in the longer term.

In addition, with the use of CUSUM and CUSUM-SQ graphics, it has been determined that the coefficients

Table 7: Short-Term Coefficients (Error Correction Model)

BIST100 = f(PI)		**BIST100 = f(F)**		**BIST100 = f(MCI)**		**BIST100 = f(V)**	
ARDL(1,2)		ARDL(4,3)		ARDL(1,4)		ARDL(2,2)	
PI	**−0.07^{b}** **(−1.96)** **[0.05]**	***F***	**−0.08^{b}** **(−2.26)** **[0.02]**	***MCI***	**−0.61^{a}** **(−3.53)** **[0.00]**	***V***	**0.38^{a}** **(4.98)** **[0.00]**
PI(−1)	−0.005 (−0.12) [0.90]	***F(−1)***	**−0.10^{a}** **(−2.60)** **[0.01]**	***MCI(−1)***	**−0.77^{a}** **(−3.79)** **[0.00]**	***V(−1)***	−0.02^{a} (−0.97) [0.33]
				MCI(−2)	**−0.57^{a}** **(−2.93)** **[0.00]**		
		F(−2)	**−0.06^{c}** **(−1.77)** **[0.08]**	***MCI(−3)***	**−0.35^{b}** **(−1.92)** **[0.05]**		
ECT(−1)	**−1.07^{a}** **(−12.49)** **[0.00]**	***ECT(−1)***	**−0.87^{a}** **(−9.02)** **[0.00]**	***ECT(−1)***	**−1.11^{a}** **(−16.37)** **[0.00]**	***ECT(−1)***	**−0.69^{a}** **(−6.02)** **[0.00]**

Note: a, b and c represent the significance levels: 1%, 5% and 10% respectively; the values in ( ) represent the statistical values of t test, the values in [ ] represent the probability (p) values, and ECT(−1) represents the error correction coefficient. The coefficients of the independent variables in the model are given in the table.

of the DL and ARDL models are stable and there is no structural break. CUSUM and CUSUM-SQ graphics of DL and ARDL models are given in the appendix.

With the help of the cross-correlation function, cross-correlation coefficients between the variables PI, F, MCI, V and BIST100 are calculated up to k = ±12 lag. Figure 1 shows k taking values between –12 and +12 on the horizontal axis and calculated cross-correlation coefficients on the vertical axis. The effects on the BIST100 variable of the current, lead and lag values of the variables PI, F, MCI and V can be seen visually in the graphs obtained.

As can be seen in Figure 1, the current, past and future values of the cross-correlation coefficients calculated between the PI-BIST100, F-BIST100 and MCI-BIST100 variables are negative, and the current, past and future values of the coefficients calculated between the V-BIST100 variables are positive. In other words, it can be said that the effects of current, past and future values of the variables PI, F and MCI on the BIST100 variable are negative, while the effects of current, past and future values of the variable V on the BIST100 variable are positive.

It seems that the findings obtained from the DL causality test, ARDL and cross-correlation methods support each other. It can be seen that the panic, fear and media coverage indices affect the BIST100 return negatively, when the findings obtained from the analysis are evaluated together.

7. DISCUSSION AND CONCLUSION

As is known from the finance literature, the effect of investor sentiment on the financial markets in the framework of a behavioural finance approach is a very hot topic (Baker and Wurgler, 2007; De Long et al., 1990; Shleifer and Vishny, 1997; Shleifer and Summers, 1990). Studies on investor sentiment are important in revealing the biases of investors in stock market forecasts and providing an opportunity to earn returns on these biases (Fisher and Statman, 2000: 16). In this context, investor sentiment is defined as the belief regarding future cash flows and investment risk, and it is claimed that this is difficult to confirm using the existing data (Baker and Wurgler, 2007). On the other hand, it is stated that certain events can create positive or negative investor sentiment and affect stock returns (Donadelli

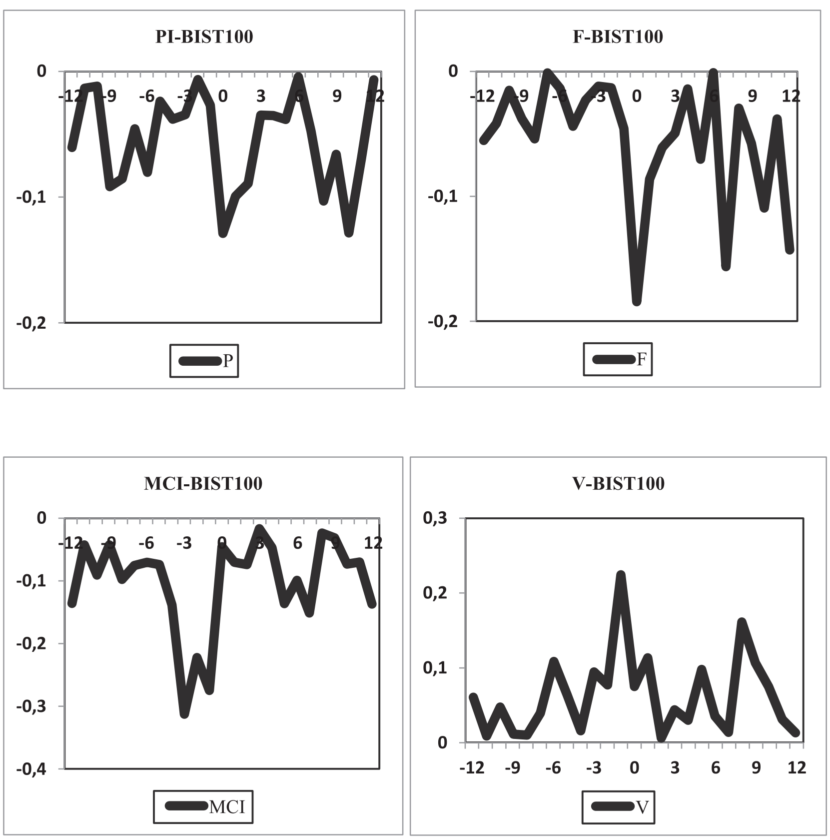


Figure 1: Cross-Correlation Coefficients (Cross-Correlation Coefficients Between P, F, MCI, V and BIST100)

et al., 2017). Support this statement, the effect of investor sentiment is striking when looking at the effects of the emergence of the COVID-19 pandemic on markets such as the FTSE, the Dow Jones Industrial Average and the Nikkei.

The present study analyses the relationship between investor sentiment caused by COVID-19-related media coverage and the BIST100 Index return. Since it is difficult to observe investor sentiment, different variables are used as sentiment proxies in the related studies. Among these studies, Tetlock (2007) determines that high levels of media pessimism relate to low investor sentiment. In this context, panic, fear, media coverage and vaccine indices are used in the present study as investor sentiment proxies based on media coverage of COVID-19, consistent with Cepoi's (2020) and Haroon and Rizvi's (2020) studies. In the first stage of the analysis of this study, the Dolado-Lütkepohl causality analysis method is used to test the relationship between media-coverage-related investor sentiment proxies and BIST100 returns, and it is found that media-coverage-based investor sentiment indices are related to returns, consistent with the findings of Tetlock (2007) and Haroon and Rizvi (2020).

In the framework of theoretical assumptions regarding investor sentiment, it is expected that there will be a positive relationship between investor sentiment and contemporaneous returns, and that this relationship will be reversed in the long run (Smales, 2017; Tetlock, 2007). Within this scope, ARDL analysis was performed in the second stage of analyses in the present study to test the short- and long-run relationship between investor sentiment and returns. In addition, cross-correlation analysis was performed as a robustness check. We found evidence that the short- and long-run relationship between investor sentiment and returns are the same, indicating that this relationship does not change in the long run, as investor sentiment theory suggests it will. The findings obtained point to the prediction of information theory that short-run returns will persist indefinitely. Lastly, it seems difficult to make an absolute judgement on the prediction of 'investor sentiment theory' regarding news, as the COVID-19 pandemic continues. In addition, Verma et al. (2008) state that rational investor sentiment also may affect stock market returns. In accordance with this view, the long-run results obtained in this study may point to rational investor sentiment that needs to be investigated in more detail after the COVID-19 pandemic.

REFERENCES

Al-Awadhi, A.M., Alsaifi, K., Al-Awadhi, A. and Alhammadi, S. (2020). Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns, *Journal of Behavioral and Experimental Finance,* 27, 100326.

Albulescu, C. (2020). Coronavirus and financial volatility: 40 days of fasting and fear, 2020, *SSRN Electronic Journal*. http://dx.doi.org/10.2139/ssrn.3550630

Ali, N., Nassir, A., Hassan, T. and Abidin, S. (2010). Short run stock overreaction: Evidence from Bursa Malaysia, *International Journal of Economics and Management,* 4(2), 319–333.

Ashraf, B.N. (2020). Stock markets' reaction to Covid-19: Cases or fatalities? *Research in International Business and Finance*, 54, 101249. http://dx.doi.org/10.2139/ssrn.3585789

Baig, A.S., Butt, H.A., Haroon, O. and Rizvi, S. (2020). Deaths, panic, lockdowns and US equity markets: The case of COVID-19 pandemic, *Finance Research Letters,* 101701. https://doi.org/10.1016/j.frl.2020.101701

Baker, M. and Stein, J.C. (2004). Market liquidity as a sentiment indicator, *Journal of Financial Markets*, 7(3), 271–299.

Baker, M. and Wurgler, J. (2006). Investor sentiment and the cross-section of stock returns. Journal of Finance, *American Finance Association*, 61(4), 1645–1680.

Baker, M. and Wurgler, J. (2007). Investor sentiment in the stock market, *Journal of Economic Perspectives,* 21 (2), 129–152. DOI: 10.1257/jep.21.2.129

Baker, S.R., Bloom, N., Davis, S.J., Kost, K.J., Sammon, M.C. and Tasaneeya, V. (2020). *The unprecedented stock market impact of COVID-19*. NBER Working Papers 26945. Cambridge, MA: National Bureau of Economic Research.

Bathia, D. and Bredin, D. (2013). An examination of investor sentiment effect on G7 stock market returns, *The European Journal of Finance*, 19(9), 909–937. DOI: 10.1080/1351847X.2011.636834

Becker, R., Endes, W. and Lee, J. (2006). A stationarity test in the presence of an unknown number of smooth breaks, *Journal of Time Series Analysis*, 3(5), 381–409.

Bollen, J., Mao, H. and Zeng, X. (2011). Twitter mood predicts the stock market, *Journal of Computational Science,* 2(1), 1–8.

Caswell, M. (2020). IAG reports €2.2 billion second quarter loss. Business Traveller, 31 July. www.businesstraveller.com/business-travel/2020/07/31/iag-reports-e2-2-billion-second-quarter-loss, (Accessed 31 July 2020).

Cepoi C.O. (2020). Asymmetric dependence between stock market returns and news during COVID-19 financial turmoil, *Finance Research Letters*, 36, 101658. https://doi.org/10.1016/j.frl.2020.101658

Chen, M.H., Jang, S.S. and Kim, W.G. (2007). The impact of the SARS outbreak on Taiwanese hotel stock performance: An event-study approach, *International Journal of Hospitality Management*, 26(1), 200–212. https://doi.org/10.1016/j.ijhm.2005.11.004

Chen, M.-P., Lee, C.-C., Lin, Y.-H. and Chen, W.-Y. (2018). Did the S.A.R.S. epidemic weaken the integration of Asian stock markets? Evidence from smooth time varying cointegration analysis, *Economic Research-Ekonomska Istraživanja*, 31(1), 908–926. DOI: 10.1080/1331677X.2018.1456354

Christopoulos, D.K. and León-Ledesma, M.A. (2010). Smooth breaks and non-linear mean reversion: Post-Bretton Woods real exchange rates, *Journal of International Money and Finance*, 29(6), 1076–1093. DOI: 10.1016/j.jimonfin.2010.02.003.

CNBC (2020). Norwegian Air cancels 97 Boeing planes, claims compensation. 29 June. https://www.cnbc.com/2020/06/29/norwegian-air-cancels-97-boeing-planes-claims-compensation.html, (Accessed 29 June 2020).

Da, Z., Engelberg, J. and Gao, P. (2015). The sum of all fears investor sentiment and asset prices, *The Review of Financial Studies*, 28(1), 1–32.

De Bondt, Werner F.M. and Thaler, R. (1985). Does the stock market overreact? *The Journal of Finance,* 40(3), 793–805. DOI: 10.2307/2327804

De Long, J., Shleifer, A., Summers, L.and Waldmann, R. (1990). Noise trader risk in financial markets, *Journal of Political Economy*, 98(4), 703–738.

Destek, M.A. and Okumuş, İ. (2016). Satın Alma Gücü Paritesi Hipotezi Geçerliliğinin Fourier Birim Kök Testleri ile İncelenmesi: OECD Ülkeleri Örneği, *Gaziantep University Journal of Social Sciences,* 15(1), 73–87.

Dickey, D.A. and Fuller, W.A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root, *Econometrica,* 49(4), 1057–1072.

Dolado, J.J. and Lütkepohl, H. (1996). Making wald tests work for cointegrated VAR systems, *Econometric Theory*, 15(4), 369–386.

Donadelli, M., Kizys, R. and Riedel, M. (2017). Dangerous infectious diseases: Bad news for Main Street, good news for Wall Street? *Journal of Financial Markets,* 35(C), 84–103.

Enders, W. and Lee, J. (2012). The flexible Fourier form and the Dickey-Fuller type unit root tests, *Economics Letters,* 117, 196–199.

Engelhardt, N., Krause, M., Neukirchen, D. and Posch, P. (2020). What drives stocks during the corona-crash? News attention vs. rational expectation, *Sustainability,* MDPI 12(12), 1–12.

Fama, E.F. (1995). Random walks in stock market prices, *Financial Analysts Journal,* 51(1), 75–80. DOI: 10.2469/faj.v51.n1.1861

Fisher, K.L. and Statman, M. (2000). Investor sentiment and stock returns, *Financial Analysts Journal*, 56(2), 16–23. www.jstor.org/stable/4480229

French, J. (2018). Market moods: An investor sentiment event study, *Foresight*, 20(5), 488–506.

Haroon, O. and Rizvi, S. (2020). COVID-19: Media coverage and financial markets behavior – a sectoral inquiry, *Journal of Behavioral and Experimental Finance,* 27, 100343. https://doi.org/10.1016/j.jbef.2020.100343

He, P., Sun,Y., Zhang, Y. and Li, T. (2020). COVID–19's impact on stock prices across different sectors: An event study based on the Chinese stock market, *Emerging Markets Finance and Trade*, 56(10), 2198–2212.

Hon, M.T., Strauss, J. and Yong, S.-K. (2004). Contagion in financial markets after September 11: Myth or reality? *Journal of Financial Research*, 27(1), 95–114. DOI: 10.1111/j.1475-6803.2004.00079.x

ILO (2020). *COVID-19 and the world of work: Impact and policy responses.* ilo.org/global/topics/coronavirus (Accessed 1 May 2020).

Jones, L., Palumbo, D. and Brown, D. (2020). Coronavirus: A visual guide to the economic impact, www.bbc.com/news/business-51706225 (Accessed 30 June 2020).

Kahneman, D. and Tversky, A. (1979). Prospect theory: An analysis of decision under risk. Champaign: University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship. https://ssrn.com/abstract=1505880

Kandır, S.Y., Cerci, G. and Uzkaralar, O. (2013). Investor sentiment proxies: An example of closed end fund discount and consumer confidence index, *Journal of BRSA Banking and Financial Markets,* 7(2), 55–75.

Kaplanski, G. and Levy, H. (2010). Sentiment and stock prices: The case of aviation disasters, *Journal of Financial Economics,* 95(2), 174–201. https://ssrn.com/abstract=1084533

Kaplanski, G. and Levy, H. (2014). Sentiment, irrationality and market efficiency: The case of the 2010 FIFA World Cup, *Journal of Behavioral and Experimental Economics*, 49(C), 35–43.

Lee, H.S. (2020). Exploring the initial impact of COVID-19 sentiment on US stock market using big data, *Sustainability,* 12(16), 1–16.

Li, K. (2018). Do high-frequency fleeting orders exacerbate market illiquidity*? Electronic Commerce Research*, 18, 241–255.

Liu, H., Manzoor, A., Wang, C., Zhang, L. and Manzoor, Z. (2020). The COVID-19 outbreak and affected countries stock markets response, *International Journal of Environmental Research and Public Health*, 17(8), 2800.

Mian, G.M. and Sankaraguruswamy, S. (2012). Investor sentiment and stock market response to earnings news, *The Accounting Review,* 87(4), 1357–1384.

Narayan, P.K. and Smyth, R. (2006). What determines migration flows from low-income to high-income countries? An empirical investigation of Fiji–U.S. migration 1972–2001, *Contemporary Economic Policy,* 24(2), 332–342.

Oliveira-Brochado, A. (2019). Google search-based sentiment indexes, *IIMB Management Review*, in press. https://doi.org/10.1016/j.iimb.2019.10.015

Pesaran, M.H., Shın, Y. and Smıth, R.J. (2001). Bounds testing approaches to the analysis of level relationships, *Journal of Applied Econometrics,* 16, 289–326.

Reuters (2020). Air France-KLM loss gives first taste of coronavirus impact. 7 May. www.reuters.com/article/us-air-france-klm-results/air-france-klm-loss-gives-first-taste-of-coronavirus-impact-idUSKBN22J0IZ, (Accessed 7 May 2020).

Salisu, A.A. and Vo, X.V. (2020). Predicting stock returns in the presence of COVID-19 pandemic: The role of health news, *International Review of Financial Analysis*, 71, 101546. https://doi.org/10.1016/j.irfa.2020.101546

Schell, D., Mei, W. and Toan Luu Duc, H. (2020). This time is indeed different: A study on global market reactions to public health crisis. 16 April. https://ssrn.com/abstract=3577418

Sevüktekin, M. and Nargeleçekenler, M. (2010). *Ekonometrik Zaman Serileri Analizi Eviews Uygulamalı*. Nobel Yayın Dağıtım 3. baskı, Ankara.

Shleifer, A. and Summers, L.H. (1990). The noise trader approach to finance, *Journal of Economic Perspectives,* 4 (2), 19–33.

Shleifer, A. and Vishny, R.W. (1997). The limits of arbitrage, *Journal of Finance,* 52(1). https://ssrn.com/abstract=8043

Shu, H.-C. (2010). Investor mood and financial markets, *Journal of Economic Behavior & Organization*, 76(2), 267–282.

Smales, L.A. (2017). The importance of fear: investor sentiment and stock market returns. *Applied Economics,* 49(34), 3395–3421.

Tas, O. and Sen, M.C. (2019). The comparative analysis of investor sentiment effect on two major earthquakes and tsunami incidents, *PressAcademia Procedia,* 10, 12–16.

Tetlock, P.C. (2007). Giving content to investor sentiment: The role of media in the stock market, *Journal of Finance* 62(3), 1139–1168.

Verma, R., Baklaci, H. and Gokce S. (2008). The impact of rational and irrational sentiments of individual and institutional investors on DJIA and S&P500 index returns, *Applied Financial Economics,* 18(16), 1303–1317.

World Bank, 2020. Assessing the impact and policy responses in support of private-sector firms in the context of the COVID-19 pandemic. Equitable Growth, Finance and Institutions, COVID-19 Notes, Finance Series. Washington DC, World Bank. http://pubdocs.worldbank.org/en/879461586478617078/COVID-19-Outbreak-Support-to-Firms.pdf, (Accessed 26 March 2020).

Appendix

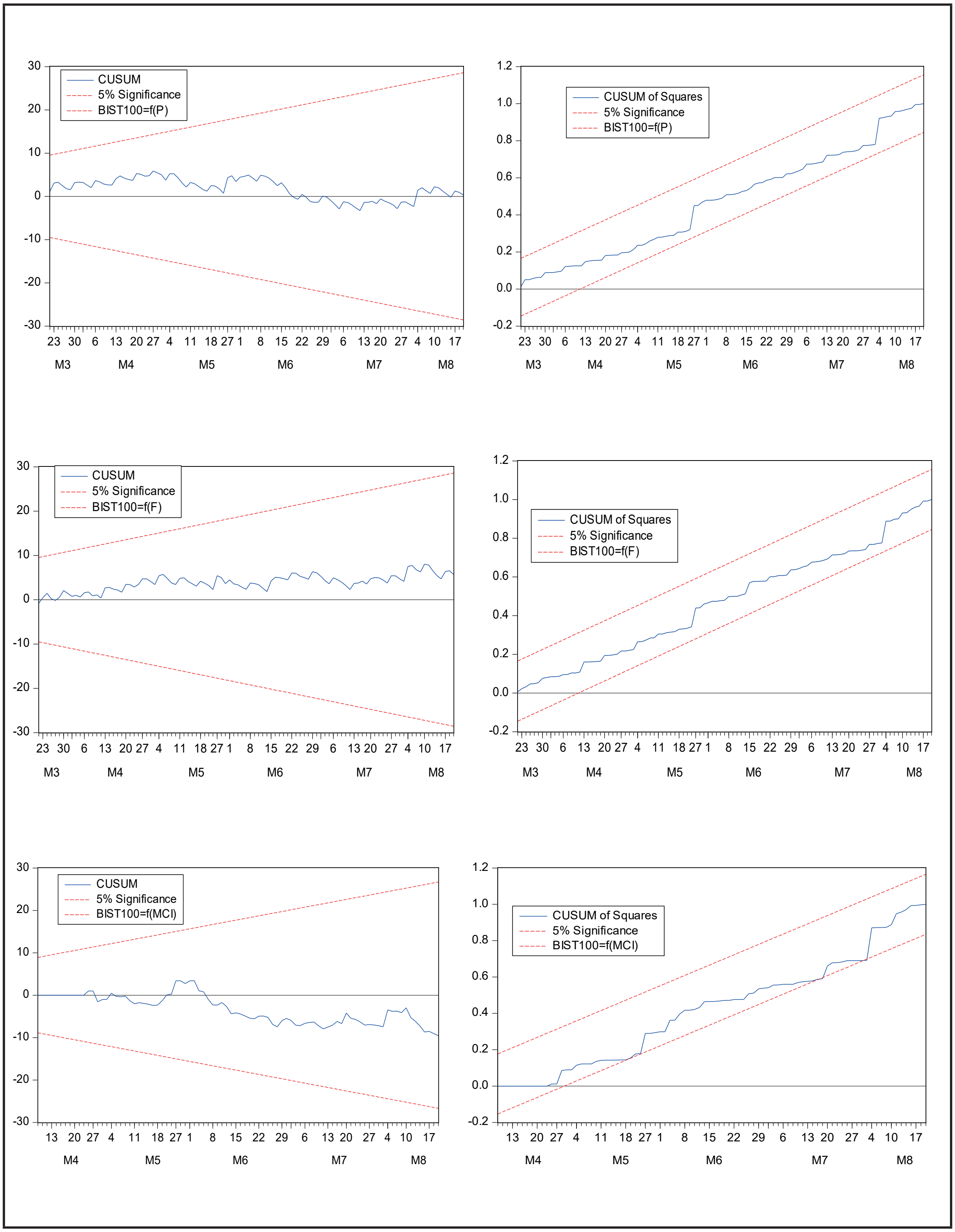


Figure 1: CUSUM and CUSUM-SQ Charts of DL Models

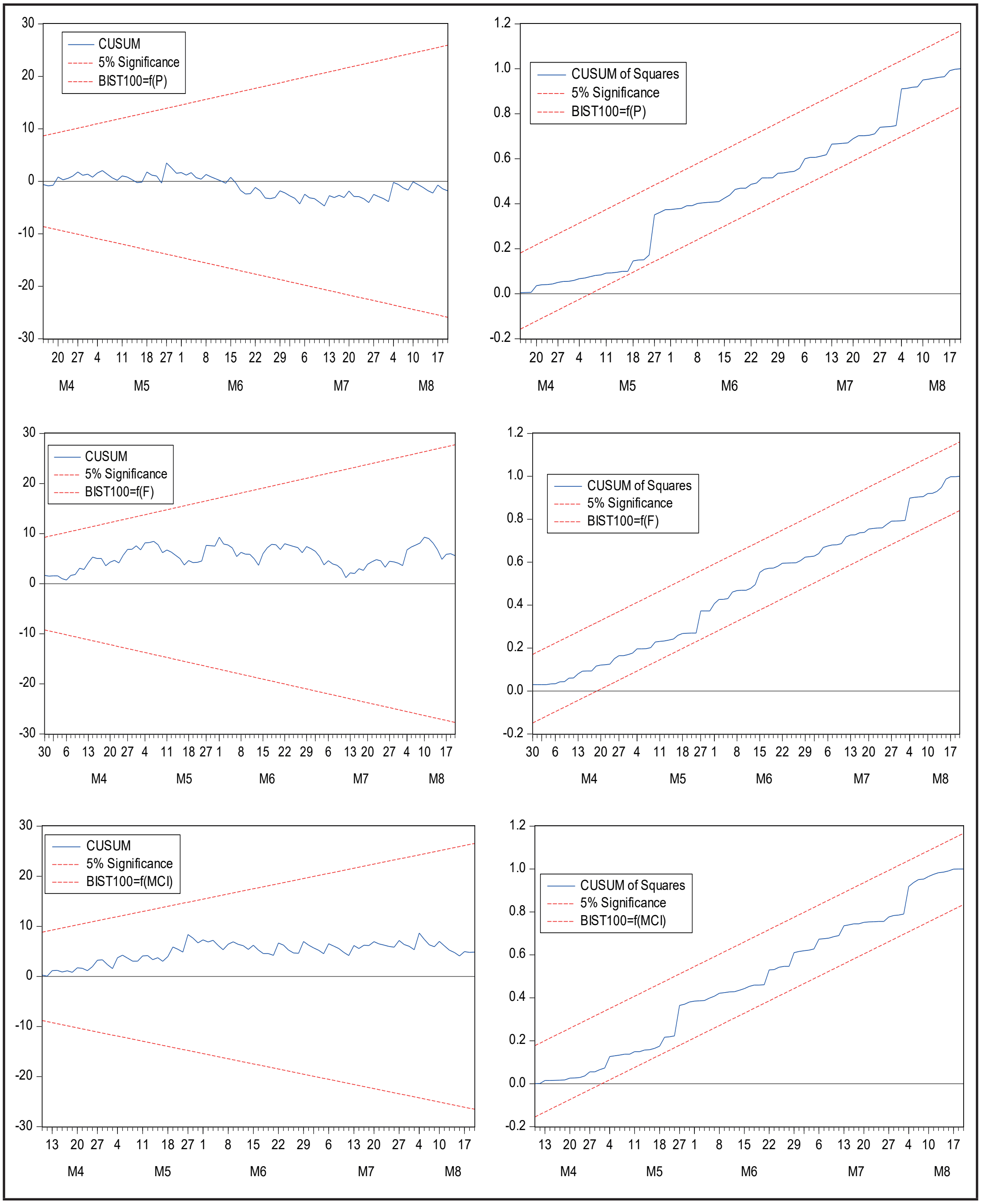


Figure 2: CUSUM and CUSUM-SQ Charts of ARDL Model

EGE AKADEMİK BAKIŞ / EGE ACADEMIC REVIEW

Cilt 21 • Sayı 4 • Ekim 2021
SS. 373-389
Doi: 10.21121/eab.1015665
Başvuru Tarihi: 14.12.2020 • Kabul Tarihi: 27.08.2021

The Role of Business Analytics in Transforming Management Accounting Information into Cost Performance

Metin UYAR[1]

ABSTRACT

The effects of e-commerce and big data on accounting and cost management should be evaluated comprehensively from various aspects. Increasing internet-based applications deeply affect both accounting and cost management. The effect of three basic variables is emphasized in the study. First, the relationship between business analytics and management accounting, and cost performance was evaluated. Business analytics can play an important role in the effectiveness of management accounting. The findings of the study show that descriptive and predictive analytics have positive effects on the planning, control, and cost management. The productivity increase seen in the planning and control functions of management accounting improves the cost performance in favor of the company. Managerial and practical evaluations have been made in the context of the inferences obtained from the research.

Keywords: Business analytics, management accounting, big data, cost performance, performance management, information technology.

JEL CODES: M41

1. Introduction

The fact that the information becomes increasingly digitized to enable the combination of conventional company data with digital data, and expansion of the data ecosystem. The changing data structure from the traditional toward digitized provides radical developments in business analytics and makes it a key to the management accounting as well as the organization performance. Big data utilization and technology contribute to a competitive advantage (Granlund, 2011; Haas and Pentland, 2014). Business analytics paves the way for management accounting applications to take advantage of both internal and external resources by expanding the data ecosystem. Analytics also allows businesses to access more data and details. Increased quality of information supports both quantitative and qualitative performance to reach the targeted level. Analytics becomes a component of organizational processes as important optimization techniques and tools used to solve problems (Zikopoulos et al., 2012; Vidgen et al., 2017). Cost performance, which is an indicator of organizational performance, can be positively affected by the interaction between the management accounting system and business analytics.

Business analytics methods to be integrated into the management accounting system improve cost performance by strengthening various aspects of information. On the other hand, studies show that this change is not adequately reflected in management accounting (Scapens and Jazayeri, 2003). Business analytics methods and tools, including descriptive, predictive, and prescriptive features, have a positive impact on management accounting knowledge and cost performance. Technological facilities and sophisticated tools should be used more to obtain information more closely related to managerial processes (Appelbaum et al., 2017. Using business analytics allows businesses to make predictive, descriptive, and prescriptive inferences by obtaining data from various sources.

[1] Assoc. Prof. (Ph.D.), Business Administration, Faculty of Economics Administrative and Social Sciences, İstanbul Gelisim University, İstanbul-Turkey, meuyar@gelisim.edu.tr

Prior studies have examined association between accounting system and business analytics (Nielsen, 2015; Silvi et al., 2010). Few studies studied the associations between the accounting system, cost performance, and business analytics. The potential contributions are as follows: It is pioneering research that examines associations between accounting, cost performance, and business analytics in a holistic view by answering the questions such as "can organizations having similar management accounting systems gain more advantage using business analytics techniques?, May cost performance be developed by business analytics improving the effectiveness of managerial accounting?", "How does business analytics affect the functions of management accounting?". Secondly, an accounting-oriented multidimensional scale was developed to assess business analytics through the concepts of descriptive, predictive, and descriptive business analytics. Third, the study reveals whether management accounting plays a mediator role between cost performance and business analytics. In the second part of the study, the conceptual framework is explained. This section also includes hypotheses and the research model. The third part shows the methodology and research findings. In the last part, evaluations, discussions, and suggestions are given in line with the findings.

2. Literature Review and Hypotheses Development

2.1. The Business Analytics and New Data Ecosystem

Organizations need more sophisticated data due to uncertainty and fluctuations in business life. Virtual world and real-life provide more data called "big data" for businesses. Conventional data replaces with digitized data. This transformation expands the data ecosystem like never, bringing both advantages and challenges (Shmueli and Koppius, 2011). Consequently, business analytics are gradually increasing their impact. Business analytics refers to techniques, approaches, applications, and orientations that include data, information-communication technologies, visualization tools, statistical analysis, mathematical and quantitative models in business life to make evaluations and make rational decisions.

Business analytics helps test and understand causal phenomena in business life using mathematical and statistical methods (Davenport and Harris, 2007; Klatt et al., 2011). Research confirms that business analytics is becoming increasingly important both for present and future organizational activities (Gartner, 2012; Troilo et al., 2016; Aydıner et al., 2019). Business analytics may enhance the effective use of organizational resources.

Holsapple et al. (2014) state that business analytics applications consist of three orientations that are descriptive, predictive, and prescriptive. Orientation describes the function and content of analytics. Descriptive analytics provides an analytical summary of business activities and events and, includes basic and advanced statistical analyses, qualitative and quantitative ratios, dashboards and visual tools, and are frequently used in business (IBM, 2013; Dilla et al., 2010). Descriptive analytics describes the financial and non-financial results of the business following its interaction with the environment through statistical and other tools. It includes all kinds of data sources in the analysis rather than financial statement data. In this way, business analytics changes the traditional data-oriented view of management accounting. Predictive analytics is the next step in obtaining information from descriptive analytics. It provides forecasting about what might be (IBM, 2013). Predictive analytics is performed with probability and forecasting models, statistical advanced analyses and scoring tools. Forecasting and probability models use historical data collected over time to understand possible future events. Descriptive analytics is strongly related to the use of predictive analytics. Prescriptive analytics focuses on the question of what should be done based on data provided by the descriptive and predictive outcomes (Holsapple et al., 2014). With this feature, prescriptive analytics can be considered as an optimization technique. Prescriptive analytics take into the data of descriptive and predictive analytics to the next level by revealing possible solutions. Organizations may achieve their objectives owing to prescriptive analytics that generates solutions by processing qualitative and quantitative data obtained from various information sources (Basu, 2013).

2.2. The Business Analytics and Management Accounting

Management accounting has three basic roles: control and planning, performance measurement, and cost management (Cokins, 2013). Business analytics can contribute to each function of management accounting. Accountants can use the data provided by business analytics at every stage of their business. The budget to be prepared using the data obtained from social media can be given as an example. In this way, risk analysis can be done to prevent the allocation of resources to wrong market segments. In addition, social media and industry reports can help managements redesign their business processes.

Analytics tools positively affect the performance evaluation, as they include sophisticated tools such as text mining, machine learning, and data mining (Nielsen, 2015; Warren et al., 2015). Accounting data quality enhances owing to business analytics. High-data quality is one of the prerequisites of business management (Chae et al., 2014; Redman, 2013). Business analytics helps to provide quality data for data users to make valuable analyzes and predictions. In this context, business analytics utilization improves the performance of the accounting system. The management accounting system performs basic functions such as strategic cost management, operational control, and performance measurement, budgeting, and reporting (Brands, 2015). Information produced through reporting should be predictive rather than historical based (Cokins, 2013). Therefore, the need for predictive accounting information and financial statements is increasing rather than historical accounting information and financial statements. It will be useful to integrate business analytics methods into accounting and corporate resource planning systems to realize this change and transformation by enterprises.

Descriptive analytics improves the cost management function of accounting as it helps to summarize and explain an entity's cost structure. Sivarajah et al. (2017) addressed those analytics are applied in conjunction with dashboards, scorecards, data visualization to monitor operational processes. Predictive and descriptive analytics such as machine learning, statistical analysis, mathematical modeling, trend analysis, a regression equation can be used in performance measurement and evaluation studies. Prescriptive analytics can improve the efficiency of both cost management and planning by contributing to the determination of optimal solutions. The planning and control function can be performed more efficiently through scenarios provided by risk analytics and prescriptive analytics.

Due to predictive, prescriptive, and descriptive analytics, management accounting can provide more optimal solutions in solving business problems. In this way, instead of relying on internal data, management accounting can perform more comprehensive analyses that consider external data. Relatively difficult processes, such as cost reduction, supplier selection, measurement of company reputation, quality, and pricing in material management, can be made by management accounting easier and more feasible owing to business analytics tools. Increased effectiveness of management accounting allows the firm to focus more on cost performance. In this context, business analytics positively affects management accounting and cost performance.

Prescriptive analytics utilization not only reduces costs, but also increases the effectiveness of accounting in understanding new markets, developing new products, and determining customer preferences. Data from social media facilitates changes in consumer preferences and understanding of trends by the business. Thus, management accounting can perform more realistic analyzes both in planning activities and in cost management.

Business analytics improves the planning and control effectiveness of management accounting by providing the data needed to help businesses get to know their customers better. For example, indicators such as customer satisfaction, the return rate of products, customer complaints can be easily monitored through analytics. The analytics also enable the accounting unit to compile customer ratings from various websites or forums. The effect of this change is seen in the creation of a social media analysis team for many companies. Analytical techniques, such as text mining, enable the accountant to perform budgeting and control more effectively by identifying the frequency of company brands taking part in customer conversations (such as Facebook, Instagram, Pinterest). Analysis on Facebook, Twitter, Instagram statistics can be reflected in the management accounting studies through business analytics tools. Business analytics contribute to management accounting for evaluating the internal processes of the business.

The use of descriptive analytics enables internal processes to be summarized for managers. Summarizing and aggregating data increases the success of planning and control functions (Jans et al., 2013; Sun et al., 2017). The evaluation of internal performance and development of forecasting models can be easier with predictive analytics utilization. Management accounting controls the success levels of internal processes and objectives using transaction mining. Descriptive analytics contribute to the quality of control by providing descriptors such as mean, median and standard deviation for managerial processes. Prescriptive and predictive methods support management in developing employee skills, improving product quality. An example is when the accountant chooses a raw material supplier using an optimization model that increases revenue by reducing costs in the production process (Taleizadeh et al., 2015). Business analytics has a vital position in creating value and using resources effectively (Hindle and Vidgen, 2018). In this context, it is important to analyze the relationship between the accounting system and the use of business analytics. The hypotheses developed according to the evaluations are as follows:

H1a: The more intensive use of descriptive business analytics by the enterprise positively affects the cost management dimension of management accounting.

H1b: The more intensive use of predictive business analytics by the enterprise positively affects cost management function.

H1c: The more intensive use of prescriptive business analytics by the enterprise is positively associated with cost management.

H1d: Descriptive business analytics positively affects the planning and control function of management accounting in the enterprises.

H1e: Predictive business analytics positively affects the planning and control activities in the enterprises.

H1f: Prescriptive business analytics positively affects the planning and control activities in the enterprises.

H1g: Descriptive business analytics positively affects performance measurement and evaluation in enterprises.

H1h: The predictive business analytics is positively associated with the performance measurement and evaluation in the enterprises.

H1i: The prescriptive business analytics affects the performance measurement and evaluation activities in the enterprises in the positive direction

2.3. Cost Performance, Business Analytics, and Management Accounting

In response to competition, businesses gradually increase competition in each component of products and services (Stenzel and Stenzel, 2004). Cost and quality are important factors that enable businesses to survive the competition. Business analytics utilization helps improve product quality and business processes. Understanding business analytics and big data are important because of their impact on efficient use of resources and performance improvement (Pape, 2016).

Big data and business analytics can be used in decision-making and strategy development processes (Davenport, 2006). The analytics utilization makes it possible to compile, process, and analyze data provided by various informational sources. Descriptive, predictive, and prescriptive analytics make it easier to define cost behavior in businesses as direct-indirect, fixed or variable. Descriptive and predictive analytics enhance the firm's ability to analyze each cost component. Wong et al., (2011) state that the analytics utilization has a significant impact on cost reduction.

Business analytics are also used in performance management. Analytics make a positive contribution to reducing costs. The use of business analytics increases efficiency and helps to make decisions that will reduce costs (Hedgebeth, 2007). Previous research displays that business analytics can make a significant contribution to product development and management (Cooper and Slagmulder, 2004). Analytics may enhance the efficiency of supply chain and operational costs (Maiga et al., 2015; Anderson and Dekker, 2009). Business analytics also improve organizational performance (Maiga and Jacobs, 2003; Krishnamoorthi and Mathew, 2018).

The use of business analytics supports knowledge sharing and creativity in businesses (Larson and Chang, 2016). In this respect, business analytics support evidence-based problem-solving techniques. Therefore, cost performance is positively affected by the evidence-based problem-solving approach of business analytics. Management accounting, which is an information system, has a positive effect on the production capability of the enterprise by affecting the sharing of information (Esfahbodi et al., 2016). Data analysis has an important role in decision-making in terms of costing processes (Cadez and Guilding, 2008). However, the cost management dimension of management accounting makes it possible to evaluate the weak and strong aspects of cost performance. Through management accounting applications such as performance measurement and planning, it is possible for the business to both evaluate and make its cost success sustainable. Hypotheses are as follows:

H2a: The descriptive business analytics positively affects the cost performance.

H2b: Predictive business analytics positively affects cost performance.

H2c: The prescriptive business analytics is positively associated with the cost performance.

H3a: The cost management dimension of the management accounting positively affects the cost performance in the enterprises.

H3b: The planning and control dimension of management accounting positively affects the cost performance in the enterprises.

H3c: The performance measurement and evaluation practices in management accounting positively affect the cost performance of the enterprises.

H4: The business analytics and management accounting affect the cost performance of enterprises positively.

H5: There is a significant indirect relationship between business analytics to cost performance using management accounting system.

3. Research Method

3.1. Sampling and Data Collection Process

The study is based on a questionnaire that was administered to managers and employees of the accounting department of companies which operating in Turkey. As a prerequisite, large-scale enterprises with more than 250 employees were accepted as the population. According to the official data published by the Turkish Statistical Institute, as of the end of 2019, the number of micros, small and medium-sized enterprises is 3,221,000, which is 99.8% of the enterprises operating in Turkey. The share of large-scale enterprises is 0.2% (https://data.tuik.gov.tr/Bulten/Index?p=Kucuk-ve-Orta-Buyuklukteki-Girisim-Istatistikleri-2019-37548). In this context, the number of large-scale enterprises that constitute the population of the research is 6,455. The contact and corporate information of the respondents in the sample were obtained from the publicly available data in the member lists of the chambers of industry and commerce. Firms were selected using the random sampling method. Random sampling is a method in which all the units in the population have an equal and independent chance of being selected for sampling. Because of this feature, the results obtained from the random sampling can be generalized to the population (Baştürk and Taştepe, 2013). The sample was selected from manufacturing, service and retail enterprises to allow cross-sector comparison. However, no distinction has been made between sub-sectors or business codes. 50 of the questionnaires were delivered to the participants through workplace visits (face-to-face). An E-mail that includes a hyperlink to the internet site where respondents could complete the questionnaire anonymously was sent to 2750 companies (online). The responses of 185 participants were determined to be proper for data analysis. We examined the adequacy of the sample size, since the sample size was 185, although the questionnaire form was delivered online and face-to-face to a total of 2800 respondents. We followed Daniel & Cross (2018), and Wonnacott & Wonnacott (1990) to determine the adequacy of sample size. We determined the sample size is adequate with a confidence level of 95% and a margin of error of 7.2%. The sample size and the margin of error were determined as follows,

$$n = \frac{z^2 \rho q}{e^2} \tag{1}$$

$$e = z\sqrt{\frac{p(1-P)}{n}} \tag{2}$$

Where,

n is the estimated sample size.

z is the value to chosen alpha level for .05 this is 1.96

p is the estimated proportion of the population. This is 0.5 generally

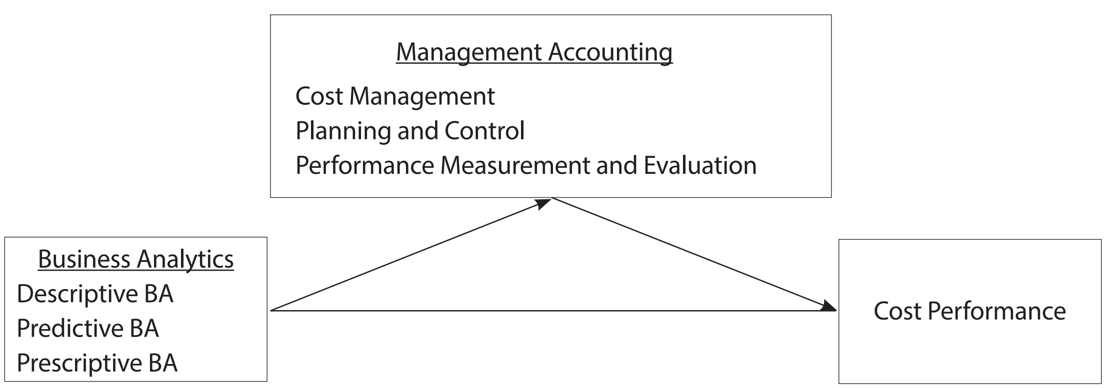


Figure 1: Research Model

q is 1-p

e is the margin of error.

Table 1 shows the sample characteristics.

Table 1: Sample Demographics

Category	Frequency (N=37)	Percentage
Gender		
Female	85	45.9
Male	100	54.1
Age		
Under 28	57	30.8
Between 28-40	93	50.2
Over 40	35	19.0
Experience		
1-5 Years	50	27.0
6-10 Years	90	48.6
11 Years and Above	45	24.4
Job Title		
Manager	42	22.7
Senior Accountant	143	77.3
Industry		
Retail	75	40.5
Manufacturing	60	32.4
Service	50	27.1
Organization Size (Number of		
Employees)	130	70.3
250-1000	43	23.2
1001-3000	12	6.5
3001 and Above		

About 40% of the firms are retail, 32% are manufacturing, and 27% are from the service sector. In terms of the size of the firms, it is understood that 70% of them have 250-1000 employees. The proportion of female and male participants shows closeness.

3.2. Pre-Testing and Measurement Design

At this stage, the questionnaire form was delivered to 24 participants working in 20 firms by face-to-face interview method. The criteria of the face and content validity of the questionnaire were determined. Items difficult to understand are eliminated at this stage. In addition, the recommendations of the participants for the development of the questionnaire were also taken into consideration. In the design of measuring instruments, a field-specific structure was preferred considering previous research (Hindle & Vidgen, 2018). Questions on business analytics, cost performance, and management accounting are in 5-point Likert form.

3.2.1 The Accounting Focused Business Analytics Orientation

It was assumed that the responders had knowledge about prescriptive, predictive, and descriptive analytics. The measurement tool was developed based on previous studies that have high reliability and validity scores. The scale includes the sub-scales relevant to business analytics. The descriptive business analytics scale includes 4 items in the total. The predictive analytics scale consists of 5 items. The prescriptive business analytics scale involves 4 items. The questions are used to the business analytics usefulness scale as follows,

Q1: In our company, ratio analysis, clustering models, process mining, Spearman rank correlations are used effectively. (Descriptive)

Q2: We frequently use descriptive statistics such as arithmetic mean, standard deviation, median about our accounting activities. (Descriptive)

Q3: Statistical descriptors and ratio analysis are used in the control activities of our business. (Descriptive)

Q4: Decision-making process in our enterprise is conducted comparing the data obtained from internal sources with the data obtained from the external sources. (Descriptive)

Q5: Artificial Neural networks, probability theory models, operations research, support vector machines are used frequently by our company. (Predictive)

Q6: Expert systems and decision tree methods are included in business processes by our company. (Predictive)

Q7: In planning activities, analytical hierarchy processes method is used effectively. (Predictive)

Q8: Predictive analysis and techniques are important for the management of our processing. (Predictive)

Q9: Predictive analysis and techniques provide benefits for cost control and effectiveness. (Predictive)

Q10: Monte Carlo and simulation methods are effective in determining business strategies. (Prescriptive)

Q11: Regression and trend analysis is important in determining business objectives. (Prescriptive)

Q12: Prescriptive techniques and analysis are used in the management of business processes. (Prescriptive)

Q13: Prescriptive optimization models contribute to the cost performance and control of the enterprise. (Prescriptive)

3.2.2 The Management Accounting

To measure management accounting variables, the literature on management accounting practices was reviewed (Atkinson et al. 2011; Anderson and Lanen, 1999).

3.2.3 The Cost Performance

It is a 6-item scale specially prepared for this research. The questions in the measurement tool are,

CP1. The cost structure of our business provides the advantage to compete with our competitors.

CP2. Our costs contribute to the profitability of our business.

CP3. Costs achieved are consistent with targeted costs..

CP4. Cost planning of our company is done successfully.

CP5. The expense behavior of our business shows a tendency to help us achieve our goals.

CP6. The efficiency of both direct and indirect costs is high.

3.3. Analysis and Results

First, we performed reliability and factor analysis. Secondly, hypothesis tests, intermediate variable analysis, and additional tests are performed. To determine the appropriateness of the sample to the normal distribution, the data set was evaluated for kurtosis and skewness values. Table 2 displays normality and descriptive results

Table 2: Normality, and Descriptive Statistics

	Kurtosis	Skewness	Mean	Standard Deviation
Cost performance	1.22	0.81	3.77	0.39
Management Accounting				
P. Control	1.51	0.73	3.48	0.25
C. Management	1.68	0.44	3.54	0.30
P. M. Evaluation	1.13	0.18	3.11	0.49
Business Analytics				
Descriptive BA	-0.32	-0.18	1.93	0.48
Predictive BA	-0.49	-0.23	1.84	0.61
Prescriptive BA	-0.40	-0.57	1.75	0.38

The mean of cost performance variable was determined as (μ=3.77). Cost management stands out as the most important dimension of management accounting (μ=3.68). Other variables were determined as (μ=3.48 and μ=3.11) respectively. Highest mean value belongs to the descriptive dimension in business analytics (μ=1.93). The lowest values belong to prescriptive analytics. (μ=1.75). We performed the cluster analysis to test differentiation by sector type. Table 3 displays the cluster analysis findings.

We performed ANOVA and Cohen's d factor analysis test the increase of representation power in determining the difference between means. Manufacturing has the highest values for Cost performance in the context

Table 3: Cluster Analysis by Industry

	Cluster 1 Retail Mean	Cluster 2 Manufacturing Mean	Cluster 3 Service Mean	p value	Cohen's d factor 1-2	1-3	2-3
Cost performance	3.59	3.91	3.74	0.042**	Med	Sml	Med
Management Accounting							
CM.	3.66	3.73	3.58	0.172	Ns	Ns	Ns
PC	3.64	3.70	3.50	0.088***	Ns	Ns	Sml
PME	3.02	3.17	3.09	0.069***	Ns	Med	Med
Business Analytics							
Descriptive BA	1.77	1.99	1.80	0.181	Ns	Ns	Ns
Predictive BA	1.68	1.93	1.74	0.092***	Med	Ns	Med
Prescriptive BA	1.57	1.86	1.61	0.095***	Med	Ns	Med
For Cohen's d. the standardized difference between two means is: small (Sml) (d =0.2). medium (Med) (d= 0.5). and large (Lrg) (d =0.8). Ns: Not significant The p-values are associated with the F-statistics are derived from one-way ANOVA.							

*p < 0.01; **p < 0.05; ***p < 0.10.

of industry averages (μ=3.91). Cost-effectiveness levels of service and retail businesses are close to each other (Cohen's d factor=Sml). The difference between production companies and other groups was found to be "Medium" (p=0.042). Highest value for cost management is seen in manufacturing companies (μ=3.73). Both F-test and Cohen's d factor analysis showed that there was no significant difference between clusters (p=0.0172). There is a significant difference between the means of clusters for performance measurement and evaluation (p=0.069). However, according to Cohen's analysis, the difference is between manufacturing and service. There is no significant difference between retail and manufacturing enterprises. Retail is at a moderate level (μ=3.52). According to Cohen's analysis, there is no significant difference between retail and service. However, the difference between retail, service, and manufacturing is at the "medium" level.

Descriptive analytics mean is highest in manufacturing enterprises (μ=1.99). There was no significant difference between sectors according to both F-test and Cohen's d factor analysis (p=0.181). For Predictive, the difference between clusters is significant (p=0.092). Cohen's analysis confirms the findings for comparisons (1-2) and (2-3). F-test results show that there is a significant difference in prescriptive context (p=0.095). Similar results are found in Cohen's analysis. The difference between Retail and Manufacturing is "medium". Figure 2 reflects the statistical values of the sector means in terms of cost performance variable.

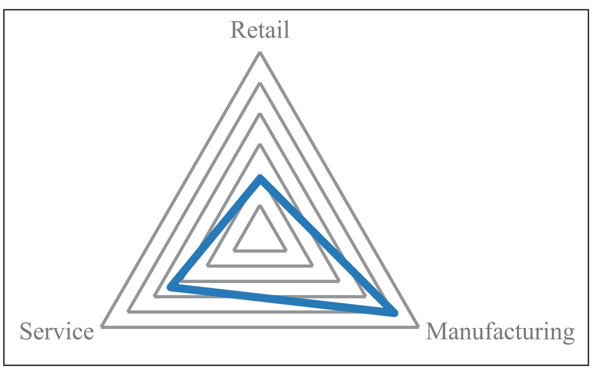


Figure 2: Cost performance Tendency by Industry

In terms of business analytics, sectoral orientations are described in Figure 3.

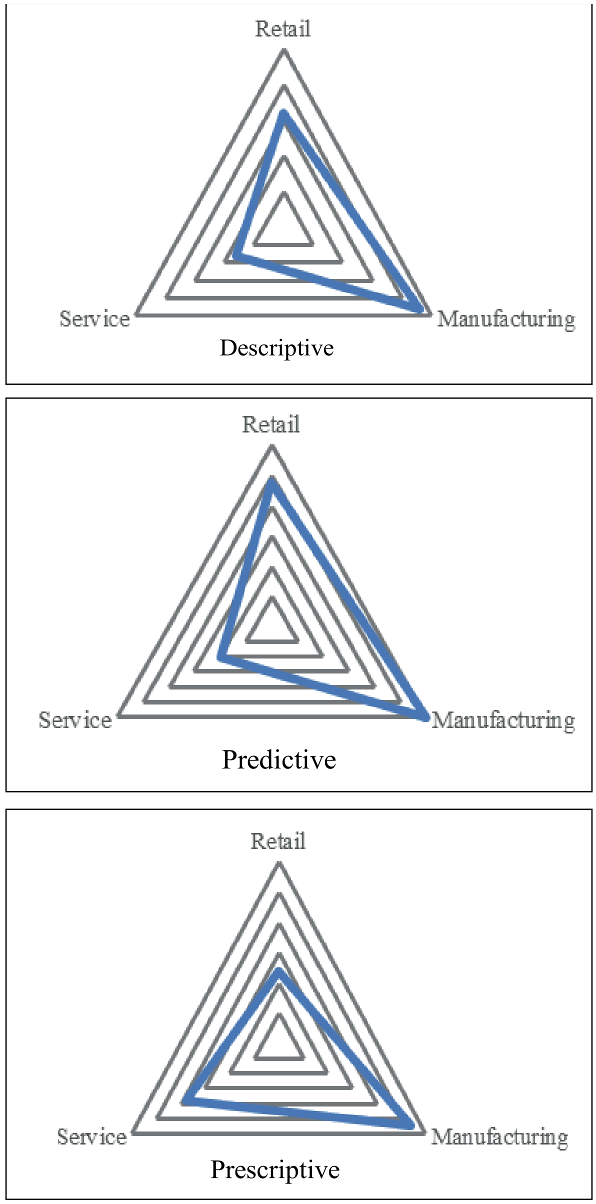


Figure 3: The tendency of Industry by Sub-Dimensions of Business Analytics

Table 4 displays the reliability, KMO, and factor analysis results of the research variables.

KMO results show that there is significant factor structure for business analytics (KMO=0.821; KMO=0.835; KMO=0.812). The results of factor analysis confirm that business analytics consists of three sub-dimensions as descriptive, predictive, and prescriptive as stated in the theoretical framework. The reliability values of the scales confirm that the questions are reliable for measurement. Factor analysis and reliability analysis were performed for cost performance and management accounting. Table 5 shows the findings.

Table 4: Factor Analysis and Reliability for Business Analytics

Descriptive BA (Cronbach's Alpha: 0.821 and KMO: 0.830)	Factor Loads
Q1: In our company, ratio analysis, clustering models, process mining, Spearman rank correlations are used effectively.	0.794
Q2: We frequently use descriptive statistics such as arithmetic mean, standard deviation, median about our activities.	0.787
Q3: Statistical descriptors and ratio analysis are used in the control activities of our business.	0.792
Q4: Decision-making process in our enterprise is conducted comparing the data obtained from internal sources with the data obtained from the external sources.	0.780
Predictive BA (Cronbach's Alpha: 0.835 and KMO: 0.838)	
Q5: Artificial neural networks, probability theory models, operations research, support vector machines are used frequently by our company.	0.814
Q6: Expert systems and decision tree methods are included in business processes by our company.	0.799
Q7: In planning activities, analytical hierarchy processes method is used effectively.	0.801
Q8: Predictive analysis and techniques are important for the management of our processing.	0.795
Q9: Predictive analysis and techniques provide benefits for cost control and effectiveness.	0.806
Prescriptive BA (Cronbach's Alpha: 0.812 and KMO:0. 817)	
Q10: Monte Carlo and simulation methods are effective in determining business strategies.	0.789
Q11: Regression and trend analysis is important in determining business objectives.	0.783
Q12: Prescriptive techniques and analyzes are used in the management of business processes.	0.780
Q13: Prescriptive optimization models contribute to the cost performance and control of the enterprise.	0.782

Table 5: Factor and Reliability Analyses for Cost-Performance and Management Accounting

	Factor Loads
Cost performance (Cronbach's Alpha: 0.847 and KMO: 0.853)	
The cost structure of our business provides the advantage to compete with our competitors.	0.812
Our costs contribute to the profitability of our business.	0.819
Costs achieved are consistent with targeted costs.	0.830
Cost planning of our company is done successfully.	0.827
The expense behavior of our business shows a tendency to help us achieve our goals.	0.838
The efficiency of both direct and indirect costs is high.	0.792
Managerial Accounting	
Planning and Control (Cronbach's Alpha: 0.836 and KMO:0.844)	
Flexible Budgeting	0.822
Zero Based Budgeting	0.804
Cash Budgeting	0.791
Increased Budgeting	0.794
Activity-Based Budgeting	0.800
Balanced Score Card	0.788
Cost Management (Cronbach's Alpha: 0.841 and KMO:0.850)	
Target Costing	0.843
Product Life-cycle Costing	0.840
Activity Based Costing	0.832
Value Chain Analysis	0.859
Traditional Cost Techniques	0.825
Performance Measurement and Evaluation (Cronbach's Alpha: 0.804 and KMO:0.823)	
Customer Profit Analysis	0.790
Data Envelopment Analysis	0.777
Department Productivity Analysis	0.782
Ratio Analysis	0.829
Product Profitability Analysis	0.801
Profitability Analysis	0.772
Operations Analysis	0.757
Shareholder Value Analysis	0.820
Sales Analysis	0.703
Breakeven Point Analysis	0.818

Reliability and KMO values confirm the suitability of the findings for further analysis. The question items of the cost performance variable were found to be reliable. (α=0.847). KMO value is significant(0.844). Table 6 shows the correlations and the validity values of construct variables.

It is understood from the parameters in Table 6 that the variables have significant values in terms of validity. Validity is significant for descriptive analytics (√AVE=0.826). The validity parameters of the predictive and prescriptive factors also indicate a very high level (√AVE=0.819 and √AVE=0.805). The findings confirm that the structures constituting the business analytics factor are valid. The validity score of the cost management factor indicates a significant level (√AVE=0.836). Performance measurement and evaluation have construct validity (√AVE=0.802). Cost performance has been validated as a construct (√AVE=0.894). Correlation values between variables reveal the presence of medium and low-level positive linear relations.

We tested the hypotheses after validity and correlation analysis. Hypotheses were tested using regression analysis. We performed multi-linear regression to measure the joint effect.The research model has been tested in two stages. First, the relationship between business analytics and management accounting was analyzed. Second, the impact of business analytics and management accounting on cost performance was tested. Estimation value (Q^2) and effect size (f^2) values were also included in the analysis.

Table 6: Correlation coefficient matrix and discriminant validity

	√AVE	DES BA	PRE BA	PRS BA	COSM	PLAC	PEMA
DES BA	0.826						
PRE BA	0.819	*0.367***					
PRS BA	0.805	*0.354***	*0.416**				
COSM	0.836	0.188***	0.195***	0.228***			
PLAC	0.845	*0.103*	*0.178****	*0.204****	*0.250****		
PEMA	0.802	*0.056*	*0.063*	*0.089*	*0.202****	*0.165****	
COPR	0.894	*0.314***	*0.269****	*0.232****	*0.366***	*0.339***	*0.274****

DES BA: Descriptive Business Analytics; PRE BA: Predictive Business Analytics; PRS BA: Prescriptive Business Analytics; COSM: Cost Management; PLAC: Planning and Control; PEMA: Performance Measurement and Evaluation; COPR: Cost Performance; AVE: Average Variance Extracted.
Italic Values refer to Correlation Coefficients.

*p < 0.01; **p < 0.05; ***p < 0.10.

Table 7: Association Between Business Analytics and Management Accounting

	Cost Management					
Construct	β	ε	R^2	Q^2	f^2	Decision
Descriptive BA	0.17***	0.053	0.128	0.179	0.144	H1a: Supported
Predictive BA	0.21**	0.039	0.204	0.180	0.173	H1b: Supported
Prescriptive BA	0.26**	0.028	0.229	0.185	0.179	H1c: Supported
	Planning and Control					
	β	ε	R^2	Q^2	f^2	Decision
Descriptive BA	0.04	0.142	0.033	0.080	0.088	H1d: Not Supported
Predictive BA	0.16***	0.075	0.119	0.172	0.145	H1e: Supported
Prescriptive BA	0.22**	0.037	0.207	0.180	0.178	H1f: Supported
	Performance Measurement and Evaluation					
	β	ε	R^2	Q^2	f^2	Decision
Descriptive BA	0.02	0.153	0.016	0.054	0.053	H1g: Not Supported
Predictive BA	0.11	0.099	0.057	0.072	0.069	H1h: Not Supported
Prescriptive BA	0.15***	0.081	0.104	0.160	0.143	H1i: Supported

*p < 0.01; **p < 0.05; ***p < 0.10.

Descriptive business analytics applications have a significant and positive effect on cost management (β=0.17 and R^2=0.128). The use of descriptive methods and approaches contributes to the business focusing more on cost-effectiveness. Based on the findings, "H1a: The more intensive use of descriptive business analytics by the enterprise positively affects the cost management dimension of management accounting" was confirmed. Descriptive data strengthens the company's control over cost components and cost-effectiveness. The spread of descriptive statistical methods and tools facilitates the decision-making of the enterprise. Estimation of the relevant hypothesis shows that it is significant (Q^2=0.179). The effect size for descriptive business analytics is moderate (f^2=0.144). In other words, descriptive analytics show a moderate impact on cost management. The effect of predictive business analytics variable on cost management was significant and positive (β=0.21 and R^2=0.204). Predictive analytics is a factor that improves both cost and non-cost performance of firms. "H1b: The more intensive use of predictive business analytics by the enterprise positively affects cost management function" was supported. Predictive analysis techniques contribute to better risk management. The estimation power of the hypothesis was determined to be significant and significant (Q^2=0.180). Predictive business analytics have a high impact on cost management (f^2=0.173). Cost management is highly influenced by the predictive business analytics variable.

The relationship between the prescriptive dimension of business analytics and cost management is evaluated in the hypothesis "H1c: The more intensive use of business analytics by the enterprise is positively associated with the cost management". Prescriptive business analytics has a significant impact on the cost management (β=0.26 and R^2=0.229). More intensive use of prescriptive techniques and approaches improves cost management positively. Prescriptive business analytics improves the quantitative aspect of firm performance, particularly by providing risk control. It contributes by developing suggestions for a prescriptive analytics solution to ensure the compliance of cost structure with business objectives. Value of hypothesis estimation is significant (Q^2=0.185). The size of the effect is statistically significant (f^2=0.179).

When the relations between business analytics components and planning and control are examined, the findings are as follows. The relationship between descriptive business analytics and planning and control is not significant. The coefficient of the related regression equation is not significant (β=0.04 and R^2=0.033). The degree of relevance of the hypothesis is not significant (Q^2=0.080). Impact size is low (f^2=0.088). Predictive business analytics have a positive impact on planning and control (β=0.16 and R^2=0.119). "H1e: The predictive business analytics positively affects the planning and control activities in the enterprises" was supported. The effect size of the hypothesis is relatively low but significant (f^2=0.172). The estimation power between variables was determined as appropriate (Q^2=0.145). Prescriptive business analytics have a significant impact on planning and control (β=0.22 and R^2=0.209). "H1f: The prescriptive business analytics positively affects the planning and control activities in the enterprises" was accepted the degree of the effect size of the hypothesis was found to be moderate. (f^2=0.178). The estimated value of the hypothesis is also moderate (Q^2=0.180).

Descriptive business analytics do not have a significant impact on performance measurement and evaluation (β=0.02 and R^2=0.016). "H1g: The descriptive business analytics positively affects the performance measurement and evaluation in the enterprises" was not supported. Predictive business analytics do not significantly affect performance measurement and

Table 8: Direct and Joint Effects on Cost performance

	β	ε	R^2	Q^2	f^2	Decision
Descriptive BA	0.22**	0.043	0.200	0.166	0.185	H2a: Supported
Predictive BA	0.17***	0.059	0.154	0.150	0.181	H2b: Supported
Prescriptive BA	0.15***	0.068	0.139	0.148	0.178	H2c: Supported
Cost Management	0.30*	0.020	0.236	0.203	0.210	H3a: Supported
Planning and Control	0.27**	0.026	0.213	0.194	0.198	H3b: Supported
Performance Measurement and Evaluation	0.19**	0.049	0.161	0.152	0.145	H3c: Supported
Business analytics X Management Accounting	0.48*	0.014	0.603	0.230	0.249	H4: Supported

*p<0.01; **p<0.05; ***p<0.10

evaluation (β=0.11 and R^2=0.057). "H1h: The predictive business analytics is positively associated with the performance measurement and evaluation in the enterprises" was not supported. The relevant indicators confirm that predictive analytics does not have a significant and powerful effect on measurement and evaluation (Q^2=0.072 and f^2=0.069). Prescriptive analytics affects performance measurement and evaluation (β=0.15 and R^2=0.104). "H1i: The prescriptive business analytics affects the performance measurement and evaluation activities in the enterprises in the positive direction" was supported. The impact size is medium according to the finding (f^2=0.143 and Q^2=0.160). Table 8 shows the independent and joint impact of both business analytics and management accounting on cost performance. We performed multi-linear regression to measure the joint effect.

Descriptive business analytics has a significant effect on cost performance (β=0.22 and R^2=0.200). The use of descriptive methods and approaches contributes to a greater focus on cost performance. Based on the findings, "H2a: The descriptive business analytics positively

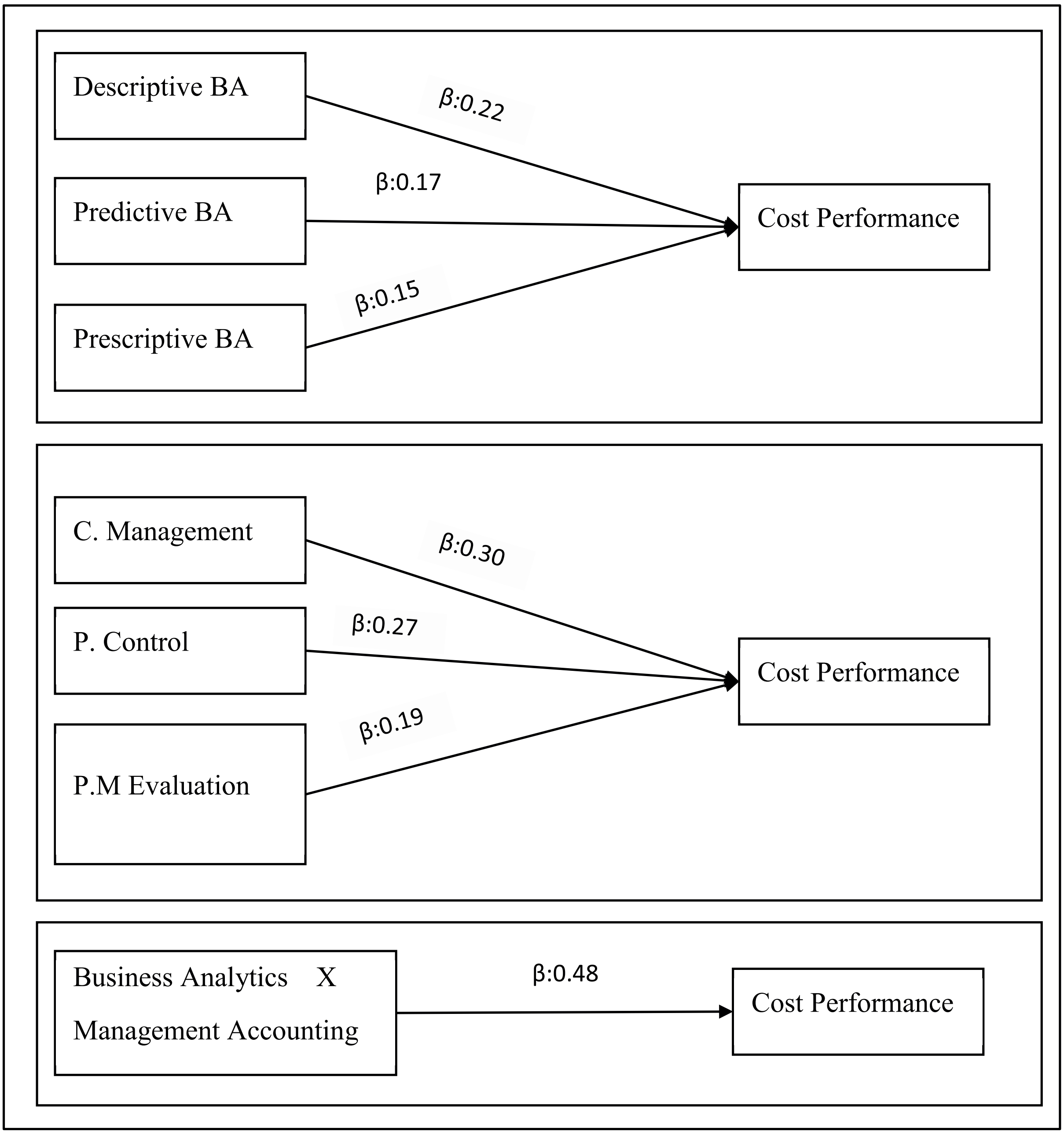


Figure 4: Direct and Joint Effects on Cost Performance

affects the cost performance" was accepted. Descriptive analytics strengthens the company's control over cost components and cost success. Cost-related risk analytics give positive results in the firm's control efforts. The widespread use of descriptive statistical methods and tools paves the way for rapid decision-making on cost performance. Decisions resulting from descriptive analytics improve cost performance. The estimation ability of the hypothesis shows that it is significant (Q^2=0.166). The effect size for descriptive business analytics is moderate (f^2=0.185). Predictive analytics effect on cost performance is significant (β=0.17 and R^2=0.154). Predictive analytics is a factor that improves both cost and non-cost performance of firms. In this context, "H2b: The predictive business analytics positively affects cost performance" was accepted. Estimation-based analysis techniques contribute to better cost determination of firms. The predictability of the hypothesis was determined to be significant (Q^2=0.150). Predictive business analytics have a high-level impact on cost performance (f^2=0.181).

The relationship between prescriptive analytics and cost performance is tested in the hypothesis "H2c: The prescriptive business analytics is positively associated with the cost performance". Results show that the prescriptive analytics has a significant impact on cost performance (β=0.15 and R^2=0.139). The more intensive use of prescriptive techniques and approaches brings into the better the cost performance. Prescriptive analytics develops quantitative-qualitative aspects of organizational performance. Degree of hypothesis estimation is significant (Q^2=0.148). The size of the effect is statistically significant (f^2=0.178).

The association between cost management and cost performance is positive and significant. The coefficient of the related regression equation is high (β=0.30 and R^2=0.226). "H3a: The cost management dimension of the management accounting positively affects the cost performance in the enterprises" was accepted. The effect size and prediction power of the relationship are significant (f^2=0.197 and Q^2=0.203). Planning and control have a positive impact on cost performance (β=0.27 and R^2=0.213). The effect size of the relationship in the hypothesis is relatively high and significant (f^2=0.194 and Q^2=0.198). The findings support H3c (β=0.19 and R^2=0.161). The effect and adequacy level of the hypothesis was found to be moderate (f^2=0.145 and Q^2=0.152). The joint impact of business analytics and management accounting on cost performance is positive and significant (β=0.48 and R^2=0.603). "H4: The business analytics and management accounting affect the cost performance of enterprises positively" was confirmed. Both estimation ability and effect size of the relationship is at high-level (Q^2=0.230 and f^2=0.249). In this context, management accounting and business analytics significantly affect the cost performance of enterprises. Figure 4 shows the direct and indirect effects of independent variables on cost performance.

The distribution of regression coefficients by sectors is important for understanding the details of the research model. Table 9 shows the joint impact of business analytics and management accounting variables on cost performance by sector.

The interaction cost between business analytics and management accounting affects performance in most manufacturing companies (β=0.55). Business analytics and management accounting cost can have a high impact on performance, as intensive cost analysis and evaluation is carried out in manufacturing enterprises. The regression coefficient for retail was significant and high (β=0.43). Management accounting applications and business analytics techniques affect the decision-making processes and cost management of retail companies. The regression coefficient of service companies is lower than in other industries (β=0.40). The interaction between business analytics, management accounting and, organization size has been found to have a high impact on cost performance for manufacturing firms (β=0.59). The interaction effect of independent variables is also very high in the retail industry (β=0.50 and R^2=0.574). The impact is signifi-

Table 9: Joint Effects on Cost performance by Industry

	Retail		Manufacturing		Service	
Construct	β	R^2	β	$^{R}2$	β	R^2
Business analytics X Managerial Accounting	0.43*	0.474	0.55*	0.628	0.40*	0.419
Business analytics X Managerial Accounting X Organization Size (Control Variable)	0.50*	0.574	0.59*	0.637	0.44*	0.480

*p<0.01; **p<0.05; ***p<0.10

cant and positive for service companies (β=0.44 and R^2=0.480).

Determining indirect effects is an important contribution to the study. For this purpose, mediation analysis was performed to determine the role of management accounting in the relationship between business analytics and cost performance. MacKinnon (1994) states that four conditions must be met for mediation analysis: (i) There should be a significant relationship between independent variables and dependent variables. (ii) Independent variable (Business analytics) should be significantly related to the hypothesized mediator (management accounting). (iii) The mediator variable should have more effect on the dependent variable than the independent variable. (iv). The mediating effect should be statistically significant. In this study, a single mediator model approach was adopted and "H5: There is a significant indirect relationship between business analytics and cost performance through the use of management accounting system" was tested. Table 10 reflects the mediator role of management accounting in the relationship between business analytics and cost performance.

Table 10: Sobel Test for The Mediator Role of Management Accounting

	Z	*Standard Error*	*p*
Sobel Test	2.402	0.029	0.037**

*p<0.01; **p<0.05; ***p<0.10

According to the results of mediation analysis, the indirect effect of business analytics factor on cost performance was significant. According to Sobel test results, management accounting is a mediator variable that increases or decreases the degree of impact of business analytics factor on cost performance (Z=2.402 and p=0.037). In this context, the more adapted companies in management accounting, the higher the effectiveness of business analytics. "H5: There is a significant indirect relationship between business analytics to cost performance through the use of management accounting system" was supported.

Table 11 shows a multivariate analysis of variance (MANOVA) explaining the extent to which factors varied among the participants. Demographic characteristics [gender, age, experience, job title] and factors [business analytics, management accounting system] were evaluated in [4x2] dimension.

Table 11: Results of MANOVA for Demographics of Participants.

	Business Analytics	Management Accounting System
	Multivariate F Value	*Multivariate F Value*
Gender	7.78**	3.44***
Age	2.07	1.39
Experience	3.20***	0.90
Job Title	1.11	0.72

Multivariate analysis results displays business analytics value differ significantly in terms of gender (F=7.78). Evaluations of the management accounting system factor vary according to the gender variable (F=3.44). Evaluations for business analytics and management accounting do not differ significantly in terms of age category (F=2.07 and F=1.39). Participants respond for business analytics vary in experience category (F=3.20). However, the experience is not a distinguishing factor for management accounting (F=0.90). There is no significant difference in terms of the job title for business analytics and management accounting system (F=1.11 and F=0.72).

4. Conclusion

Advancement in science and technology is changing the classic data ecosystem of management accounting from inside of the organization to outside. Internet-centric change provides more ability to access, store and use more data and data types for management accounting. For the change in the amount and structure of the data to be positive, the management accounting system must understand and use the business analytics correctly. The increase in the efficiency of the management accounting system will positively affect organizational cost performance. Activities such as cost reduction, analysis of cost structure, supplier selection, determination of cost behavior, determination of cost components that do not add value can be performed more efficiently through business analytics. The results of the research performed to test the structural relationships between business analytics, management accounting, and cost performance are as follows,

Descriptive business analytics provides the statistical and visual data required for cost management effectively. In addition, the raw data required for performing descriptive statistics and regression analysis is produced by descriptive analytics, making it easier for accounting to perform its planning and control functions. Descriptive analytics reduce the firm's dependence on financial statements, sales reports, and internal documentation in measuring past performance. In this way, the performance measurement and evaluation effectiveness of accounting are improved.

Predictive business analytics includes analytical and multidimensional analysis such as regression, mathematical modeling, decision tree and scenario, game theory, probability modeling instead of traditional and financial weighted applications such as ratio analysis, comparative table analysis, percentage analysis, profitability analysis. Thus, accounting management can evaluate many qualitative and quantitative variables and indicators besides financial analysis. Determining customer expectations and behaviors becomes easier for the enterprise owing to predictive models. Thus, the phenomenon of change on the internet and real life is reflected in the firm's forecasts. Predictive analysis also enables greater involvement of the political, economic, and social environment in the firm's plans. It may be possible to develop targets and develop strategies by comparing the findings of the performance measurement performed by management accounting and the findings provided by predictive analytics by using both together.

Prescriptive analytics prevents the firm from seeing accounting as a necessity. By using analytics, the accounting influences strategy development, decision making and sustainability of the organization through prescriptive techniques. In addition, cost management, planning, and performance measurement can be performed more efficiently owing to prescriptive analytics. The findings displayed those analytical applications improve the cost performance of the firm. In this context, enterprises need to use analytics more in cost control and reduction. Management accounting has a mediator effect between business analytics and cost performance. In this context, business analytics must be integrated into accounting information system to affect performance.

Based on these implementation, it can be stated that businesses should move from a traditional accounting structure to a more comprehensive accounting system that has integrated analytics. The implementation and integration of analytics bring a challenging process for businesses and individuals. The staff needs to adapt to analytics and allocate more resources to the process management of enterprises for their implementation. As can be understood from the research findings, business analytics does not have the same effect in every sector. In this context, integration should be realized in the enterprises considering the sectoral differences. In this study, the effects of analytics on accounting and cost performance were evaluated in a limited sample. In future research, the relationship between risk analytics, business intelligence, and accounting analytics should be evaluated. In addition, the integration of analytics in institutional architecture should be explored.

REFERENCES

Aydıner, A.S., Tatoğlu, E., Bayraktar, E., Zaim,S., &Delen, D. (2019). Business analytics and firm performance: The mediating role of business process performance. *Journal of Business Research*, 96, 228-237.

Anderson, S.W. & Lanen, W.N. (1999). Economic transition strategy and the evolution of management accounting practices: The case of India. *Accounting, Organizations and Society*, 24 (5-6), 379-412.

Anderson, S.W., & Dekker, H.C. (2009). Strategic Cost Management in Supply Chains, Part 2: Executional Cost Management. *Accounting Horizons*, 29(3), 293-305.

Anderson, S.W., & Lanen.,W.N. (2002). Using electronic data interchange (EDI) to improve the efficiency of accounting transactions. *Accounting Review*, 77(4),703-729.

Appelbaum, D., Kogan,A., Vasarhelyi, M., & Yan, Z. (2017). Impact of business analytics and enterprise systems on managerial accounting. *International Journal of Accounting Information Systems*, 25,29-44

Atkinson, A. A., Kaplan, R.S., Matsumura, E.M. & Young, S.M. (2011). Management Accounting: Information for Decision Making and Strategy Execution. 6 Pearson Education.

Basu, A. (2013). Five pillars of prescriptive analytics success. *Analytics Magazine*, 8-12.

Baştürk, S. & Taştepe, M. (2013). Evren ve ömeklem. S. Baştürk (Ed.), *Bilimsel Araştırma Yöntemleri* (129- 159). Ankara: Vize Yayıncılık.

Brands, K. (2015). Business Analytics: Transforming the Role of Management Accountants. *Management Accounting Quarterly*, 16(3), 1-12.

Cadez,S.&, Guilding, C. (2008). An exploratory investigation of an integrated contingency model of strategic management accounting. *Accounting, Organizations and Society*, 33(7-8), 836-863.

Chae, B.K., Yang, C., Olson, D., & Sheu, C. (2014). The impact of advanced analytics and data accuracy on operational performance: a contingent resource based theory (RBT) perspective. *Decision Support Systems*, 59, 119-126.

Chen, I.J., & Paulraj, A. (2004). Towards a theory of supply chain management: the constructs and measurements. *Journal of Operations Management*, 22, 119-150.

Cokins, G. (2013). Top 7 trends in management accounting. *Strategic Finance*. 95(6), 21-30.

Cooper, R., & Slagmulder, R. (2004). Interorganizational cost management and relational context. *Accounting, Organizations and Society*, 29(1), 1-26.

Daniel, W.W., & Cross, C.L. (2018). *Biostatistics: A Foundation for Analysis in the Health Sciences,* 11th Ed., Wiley.

Davenport, T. & Harris, J.G. (2007). *Competing on Analytics: The New Science of Winning*. Harvard Business School Press, Boston, MA.

Davenport, T. (2006). Competing on analytics, *Harvard Business Review*, 84(5), 150-151.

Dilla, W., Janvrin, D.J., & Raschke, R. (2010). Interactive data visualization: new directions for accounting information systems research. *Journal of Information Systems*, 24(2), 1-37.

Esfahbodi,A., Zhang, Y., & Watson, G. (2016). Sustainable supply chain management in emerging economies: Trade-offs between environmental and cost performance. *International Journal of Production Economics*, 181, 350-366.

George, G. , Haas, M. , & Pentland, A. (2014). Big data and management. *Academy of Management Journal*, 57(2), 321-326.

Granlund M. (2011). Extending AIS research to management accounting and control issues: A research note. *International Journal of Accounting Information Systems*, 12(1), 3-19.

Hedgebeth, D. (2007). Data-driven decision making for the enterprise: an overview of business intelligence applications, *VINE*, 37(4), 414-420.

Hindle, G. A., & Vidgen, R. (2018). Developing a business analytics methodology: A case study in the foodbank sector. *European Journal of Operational Research*, 268(3), 836-851.

Holsapple, C., Lee-Post, A., & Pakath, R. (2014). A unified foundation for business analytics. *Decision Support Systems*, 64, 130-141.

https://data.tuik.gov.tr/Bulten/Index?p=Kucuk-ve-Orta-Buyuklukteki-Girisim-Istatistikleri-2019-37548 (access date: 5 May, 2020).

IBM. (2013). Descriptive, predictive, prescriptive: transforming asset and facilities management with analytics. In: Thought Leadership White Paper.

Jans, M., Alles, M., & Vasarhelyi, M. (2013). The case for process mining in auditing: Sources of value added and areas of application. *International Journal of Accounting Information Systems* ,14, 1-20.

Klatt, T., Schlaefke,M., & Moeller, K. (2011). Integrating business analytics into strategic planning for better performance. *Journal of Business Strategy*, 32(6), 30-39.

Krishnamoorthi, S.,& Mathew, S.K. (2018). Business analytics and business value: A comparative case study. *Information & Management*, 55, 643-666.

Larson, D., & Chang, V. (2016). A review and future direction of agile, business intelligence, analytics and data science. *International Journal of Information Management*, 36(5), 700-710.

MacKinnon, D.P. (1994). Analysis of mediating variables in prevention and intervention research, in Cazares, A. and Beatty, L.A. (Eds), *Scientific Methods in Prevention Research*, NIDA Research Monograph, Vol. 139, Government Printing Office, Washington, DC, pp. 127-153.

Maiga, A., & Jacobs, F.A. (2003). Balanced Scorecard, Activity-based Costing and Company Performance: An Empirical Analysis. *Journal of Managerial Issues*, 15(3), 283-301.

Maiga, A.S., Nilsson, A., & Ax, C. (2015). Relationships between internal and external information systems integration, cost and quality performance, and firm profitability. *International Journal of Production Economics*, 169, 422-434.

Nielsen, S. (2015). The Impact of Business Analytics on Management Accounting. (Available at SSRN 2616363).

Pape, T. (2016). Prioritising data items for business analytics: Framework and ap- plication to human resources. *European Journal of Operational Research*, 252 , 687-698 .

Redman, T.C. (2013). *Data Driven: Profiting From Your Most Important Business Asset*. Harvard Business Press.

Scapens, R.W., & Jazayeri, M. (2003). ERP systems and management accounting change: opportunities or impacts? A research note. *European Accounting Review*, 12(1), 201-233.

Shmueli, G., & Koppius, O. R. (2011). Predictive Analytics in Information Systems Research. *MIS Quarterly*, 35(3), 553-572.

Silvi, R., Moeller, K., & Schlaefke, M. (2010). Performance management analytics – the next extension in managerial accounting. available at: SSRN eLibrary, SSRN, doi: 10.2139/ssrn.1656486

Sivarajah, U., Kamal, M. M., Irani, Z., & Weerakkody, V. (2017). Critical analysis of big data challenges and analytical methods. *Journal of Business Research*, 70, 263-286.

Stenzel,J., &Stenzel.,C. (2004). Performance measurement and management in the reinsurance industry. *Cost Management*, 18(3), 28-35.

Sun, Z., Strang, K., & Firmin, S. (2017). Business analytics-based enterprise information systems. *The Journal of Computer Information Systems*, 57(2), 169-178

Taleizadeh, A.A., Noori-daryan, M., & Cárdenas-Barrón, L.E., (2015). Joint optimization of price, replenishment frequency, replenishment cycle and production rate in vendor managed inventory system with deteriorating items. *International Journal of Production Economics*, 159, 285-295.

Troilo, M., Bouchet, A., Urban, T. L., & Sutton, W. A. (2016). Perception, reality, and the adoption of business analytics: Evidence from North American professional sport organizations. *Omega*, 59, 72-83.

Vidgen, R., Shaw, S., & Grant, D.B. (2017). Management challenges in creating value from business analytics, *European Journal of Operational Research*, 261, 626-639.

Warren Jr., J.D., Moffitt, K.C., & Byrnes, P. (2015). How big data will change accounting. *Accounting Horizons*, 29(2), 397-407.

Wong,C.Y., Boon-itt,S.,& Wong.,C.W.Y. (2011). The contingency effects of environmental uncertainty on the relationship between supply chain integration and operational performance. *Journal of Operation Management*, 29, 604-615.

Wonnacott, T.H. & Wonnacott, R.J. (1990). *Introductory Statistics*, 5th Ed. Wiley.

Zikopoulos, P. , Eaton, C. , DeRoos, D. , Deutsch, T. , & Lapis, G. (2012). *Understanding big data: Analytics for enterprise class hadoop and streaming data* . Maidenhead, UK: McGraw-Hill.

EGE AKADEMİK BAKIŞ / *EGE ACADEMIC REVIEW*

Cilt 21 • Sayı 4 • Ekim 2021
SS. 391-406
Doi: 10.21121/eab.1015653
Başvuru Tarihi: 31.05.2021 • Kabul Tarihi: 13.09.2021

Role of Emotional Intelligence and Work-Life Balance in Relationship between Workplace Happiness and Perceived Performance in Academic Setting*

Tayfun ARAR[1], Melahat ÖNEREN[2]

ABSTRACT

This study was conducted to confirm the thesis of "happy employee=productive employee" in an academic setting in which the working hours and workplace is not as clear as in other workplace settings that the aforementioned thesis was handled in. Thus, the pioneer aim was to investigate the relationship between workplace happiness and perceived academic performance. Based on the possible relationship, it was to analyze the moderator effect of emotional intelligence and mediator effect of work-life balance with sub-dimensions respectively. The study was conducted in 42 universities locating in Central Anatolia Region of Turkey with 1136 academicians. In analyzing data, hierarchical regression analysis was conducted. The results showed that workplace happiness positively affected perceived academic performance directly. Moreover, this effect became stronger with emotional intelligence and its three sub-dimensions. Besides, three sub-dimensions of work-life balance partially mediated this relationship. This research make theoretical contributions to literature by validating the thesis also in academic setting and the mediating role of work-life balance, opposite to that of the literature. It also has some practical contributions to universities by showing how to improve performance.

Keywords: Workplace Happiness, Perceived Academic Performance, Emotional Intelligence, Work-Life Balance

JEL Codes: I23, M10, M12

1. Introduction

Knowledge has been the most crucial value to societies so far. We consider societies as developed if they proactively produce, access, and practically use knowledge. In this context, universities are prominent organizations in which knowledge is produced and transferred via research and teaching processes (Houston, Meyer and Paewai, 2006). Universities play substantial roles in shaping societies' future by raising competent generations and doing scientific researches through academicians (Rowley, 1996) who mostly use their intelligence by curiosity. By working with high performance, they take responsibility for raising the human resources necessary for the changes and developments in the society (Gür, 2017). This performance includes scientific research and publication, education activities, and administrative services in order of importance (Houston et al., 2006). Turkey has made progress in academic performance (AP) recently, but principally it is still not in a position qualitatively desirable. The reasons lie behind this problem could be classified into three periods. The first period, which had lasted until 1989, constituted left wing-right wing conflicts, political instability, and difficulty of conducting scientific research in a country with relatively poor socio-economic conditions. Second period began in 1993 with one of the well-established universities' rector assistant's speech which claimed that universities were notably converted into education institutes for mass instead, they were expected of serving elitist education (Ak and Gülmez, 2006). Since this speech, it was understood that most universities in Turkey had grown away from scientific research and focused on educating an incre-

*This study is based on the PhD dissertation titled as "Akademide İşyeri Mutluluğu İle Performans Arasındaki İlişkide İş Yaşam Dengesi Ve Duygusal Zekânın Rolü" written by Tayfun Arar and supervised by Melahat Öneren in Kırıkkale University Institute of Social Sciences.

[1] Arş. Gör. Dr., Kırıkkale Üniversitesi, İşletme Bölümü, İktisadi ve İdari Bilimler Fakültesi, Kırıkkale/Türkiye, tayfunarar@kku.edu.tr
[2] Doç. Dr., Kırıkkale Üniversitesi, İşletme Bölümü, İktisadi ve İdari Bilimler Fakültesi, Kırıkkale/Türkiye, melahatonerenn@gmail.com

asing number of students and social problems. In third phase, with government intervenes, the number and scales of universities increased in 10 years exceedingly as a counter policy to other G20 countries (Uyar, 2018). Apart from these, the established research culture, foreign language problem, heavy course loads, and insufficient funds reserved for scientific research lead to this problem.

In terms of quantitative statistics, we see that there is a rising trend in the numbers of Turkey-based publications indexed in both SCOPUS and WoS recently (Bibliometric Analysis, 2020). However, according to the same database, the number of publications per million-people decreases. According to Ertekin (2014), 40% of those publications are not cited. Besides, there are only 11 universities in "The World" index, 1 in "ARWU" index, and 10 in "QS World" and "URAP" indexes (Olcay and Bulu, 2016) on a study conducted when there were 193 universities, which reveals the insufficiency of AP. According to Göksu and Bolat (2017), Turkey is still far from its ideal academic position, and the universities would not compete with their rivals in U.S. and Europe. This situation motivated researchers to investigate how to improve AP. Talent, energy, creativity, motivation, ambition, self-discipline level (Wood, 1990), scientific skills, predisposition to technology, language skills, self-efficacy, gender (Gür, 2017), age (Kyvik and Olsen, 2008), academic optimism, emotional intelligence (EI) (Bozkurt and Ercan, 2017), career capital and self-consciousness (Aytekin, Erdil, Erdoğmuş and Akgün, 2016) have been analyzed as individual, while fund, equipment and tenure provided (Wood, 1990), perceived empowerment (Çöl, 2008), information sharing in-house (Ghabban, Selamat and Ibrahim, 2018), competition level in-house (Saydan, 2008), administrative work-loads (Gür, 2017) have been studied as organizational factors. Incentive policies and applications (Masron, Ahmad and Rahim, 2012), salary and additional charges (Argon, 2010) as environmental and job-related factors have been analyzed so far. Despite those factors, there is another term, which is workplace happiness (WPH) that has been popular in the last two decades, haven't been studied in regards of its impact on AP yet. It is defined as the workplace situation in which the employees work happily, efficiently, and reach both individual and organizational purposes easily (Januwarsono, 2015). In the literature, there has been a thesis of "happy employee = productive employee" since Hawthorne studies (Wright and Cropanzano, 1997), which is still popular as "Holy Grail" in the management field (Quick and Quick, 2004) claiming that if the employees are happy, they are more productive (Fisher, 2010). The logic behind is that happiness extends employees' interest, cognition and actions, forms their physical, intellectual and social capitals while reducing their stress levels and encouraging them for social affairs (Rego and Cunha, 2008). Happiness enables employees to perceive their jobs more meaningfully (Rego, Ribeiro and Cunha, 2010). For Bakker and Oerlamans (2011), happy employees are more energetic, sympathetic, open and more determined when facing a difficult situation. These employees receive more support from their colleagues and supervisors due to their positive mood and their help in advance (Rego and Cunha, 2008). As the studies, which examined this thesis, are analyzed, we see that they either addressed the issue theoretically (Lyubomirsky, King and Diener, 2005; Boehm and Lyubomirsky, 2008) or the work-fields dealt are framed by concrete office-hours taking place at only workplace such as schools (Tadic, Bakker and Oerlemans, 2013) and private companies (Rego and Cunha, 2008; Januwarsono, 2015). But in academia, office hours are relatively flexible. Moreover, an academician works not only during office hours at workplace but anywhere available (Fontinha, Easton and Laar, 2019). Furthermore, this thesis works accurately in jobs that require creativity. For jobs those are composed of routine tasks and strict rules to follow, WPH distracts the employees and results in hesitation which leads decreasing in performance. In Turkey, especially research assistants and other lecturers who are charged with administrative duties are spending their office hours with administrative tasks which are mostly routine and require strict rules instead of academic issues (Wood, 1990). In this regards, it is not clear if WPH has a positive effect on AP. For these reasons, this study revisits this thesis to validate in academic setting. But in this research, instead of objective performance measurements, the perceived academic performance (PAP) was taken into consideration. We supposed that it would not make any difference since perceptional and objective assessment would be equal because an academician is expected to be physically and mentally healthy and rationale. In this possible positive effect, EI, which is a must for an academician, was to be examined if it moderates the relationship. Academia requires technical information in terms of cognitive intelligence (CI) as well as requiring EI due to its social nature. In communicating with students, supervisors and colleagues in terms of education, administrative duties and collaborated scientific research respectively, academicians should control and manage their emotions (Mustafayeva and Ustun, 2018). In this research, moderator effect of EI was discussed in two ways, one of which is also divided into two segments. First is academicians who perform mostly administrative duties during office hours because these kind of duties are generally routine and the effect of WPH on PAP may be negative, so that they should control their emotions in order not to reflect the level of happiness negatively on PAP. Second one is about the facts that because universities are socio-technical sites and have academicians of different characters, who desire or reach the highest point in Maslow's hierarchy of needs, the competitive environment, emotional fatigue, fragility, and sadness may cause various negative emotions. It is important to control and direct these emotions in order not to affect the PAP in conducting research and teaching activities. The second way would be the situations when the academicians are happy at work in activities that require creativity, the effect of this situation on their performances would increase exponentially via EI.

Apart from the direct effect, the indirect effect of WPH on PAP via work-life balance (WLB) was also examined. Based on the model developed by Greenhaus, Collins and Shaw (2003) claiming that all sources should be divided into work and life equally, and on the idea that if academicians are happy at work, they will spend more time at work which leads to higher performance, at least by perception of it, by decreasing WLB. Although in literature, when provided WLB is said to lead to higher performance, in this study, the reverse logic was to be analyzed, along with supporting the original idea. That means WLB may contribute to higher performance; nevertheless, in this WPH and PAP relationship, WLB was expected to play a partial mediating role in the reverse sense.

Contextual Framework

Workplace Happiness

WPH is defined as experiencing positive emotions towards work frequently and negative ones rarely (Singh and Aggarwal, 2018). Happiness dates back to Aristoteles, 2000 years ago, and was first addressed by philosophers who approach it in two ways as eudemonism and hedonism (Fisher, 2010). Because of it's referring to self-development, virtue, and being useful for others (Ryan and Deci, 2001), eudemonism would be more valid for academicians. Psychology which has dealt with problematic issues for years (Diener and Seligman, 2002), such that according to Diener, Suh, Lucas and Smith (1999), the ratio of negative topics studied to positive ones was found as 17:1, took over happiness from philosophers with Seligman (2000) who initialized the term "positive psychology" and emphasized that positive topics should be studied more. The ratio motivated Luthans in 2002 to do a similar research to emphasize the need for positive organizational behavior (POS). So of such a ratio, 375:1, even he put forward POS (Wright, 2003) including happiness, WPH has been started to be studied especially in early 2000s by researchers such as Lyubomirsky et al. (2005) and Fisher (2010). Throughout this process, researchers used other terms instead of WPH such as job satisfaction, flow, and organization commitment which have narrower coverage compared to WPH (Fisher, 2010).

Perceived Academic Performance

AP is defined as the value of the academician by examining various criteria together (Gür, 2017) such as scientific research quality and frequency, teaching activities and administrative duties. PAP is determined by the perception of an academician on one's self performance. They are expected to be parallel from such a rational and mental healthy person. AP is primarily performed in universities which are indispensable for developed societies because of their position and are digested by their institutional environment because of the complexity (Houston et al., 2006) and technical uncertainties in their organizational structures and the difficulties in performance measurement (Ünal, 2017). The reason for this is that it is not precisely certain which activities they should focus on more. In this context there are two different viewpoints in academia in Turkey. First one, called as "scientific logic" refers to aiming at producing knowledge under universal principles and scientific methods, while the second one, called as "local logic" that refers to serving of knowledge, which is already obtained, for the development purpose by adapting it in the country (Ünal, 2017). Unfortunately, instead of integrating the two logics, preferring only one because of the various degrees of importance within the scope, the development of academia becomes difficult.

Emotional Intelligence

As controlling one's self and others' emotions, distinguishing between them and using the information obtained throughout the process in others' thoughts and actions (Salovey and Mayer, 1990), EI has changed humanity and the world's perspective, with the realization that feelings, which were seen as insignificant in the years when classical management was dominant and even prevent people from their goals (Alici and

Yılmaz, 2017). It provided many professional and personal benefits, as they were developed and used with excellent education later. The roots of EI based on Thorndike's Social Intelligence theory in 1920 (Tischler, Biberman and McKeage, 2002), but the term was first brought in literature by Mayer and Salovey in 1990 and in Goleman's book in 1995 drew the business world's attention by relating it to job performance (Baba, 2017). Because of the nature of the profession, academicians need technical knowledge and human relations. They use CI mostly in the technical part and EI in the social context. The importance attributed to CI for years has been replaced recently by EI (Goleman, 2007) because it can be improved and it plays a greater role in success (Slaski and Cartwright, 2003).

Work-Life Balance

Two essential models lead to different understanding of WLB. Guest (2002) defends the opinion that WLB is the perceived balance between private life and work-life, which means sources should be divided optimally as far as satisfying all needs while Greenhaus et al. (2003) claim that the sources (time, commitment, and satisfaction) of oneself should be divided into private life and work-life equally. WLB was first used in practical life in the 1930s by Kellog Company in shifting (Korkmaz and Erdoğan, 2014) and then in literature 30 years later in 1965 with Rapoport and Rapoport (Nizam and Kam, 2018). Increasing demands in both family and work-lives (Oyewobi, Oyekunle, Adeneye and Jimoh (2019) and increasing competition made the sources (energy and time) of humans insufficient (Foy, Dwyer, Nafarrete, Hammoud and Rockett, 2018). Along with this, women's increasing education level and participation in business life escalated the number of double-careers couples (Karkoulian, Srour and Sinan, 2016) which changed family structures. Despite the bad course of the global economy, human desires of consumption and for the better have put the decline in births and the families in danger. As women gained their economic freedom, divorces increased and the general demographic structure started to deteriorate (Doğrul and Tekel, 2010). Today, maintaining WLB, which academicians have difficulty with (Fontinha et al., 2019), is important for both individuals, families, companies and governments because of these developments.

Literature Review and Hypotheses Developing

WPH and PAP

Since Hawthorne studies, the thesis of "happy employee = productive employee" has been tested in various studies based on different sectors in the literature, and mostly a positive relationship was found between the two variables. Supporting this, Yılmaz (2013) states WPH as one of the items while listing the common features of high performance organizations. According to Ardıç and Erbaşaran (2019), while turnover rates of happy employees are lower; job satisfaction, motivation, and performance levels are higher. Wright and Cropanzano (2007) explain the relationship between WPH and performance in a logical framework, regarding how the performance of unhappy employees will be negatively affected. According to the study, unhappy employees are more sensitive in the face of negative events, perceive uncertainties threatening, see negative reviews more destructive, and benefit less from positive feedback. These have devastating consequences for their performance. This situation happens more often in professions that require human interactions, such as academics. Unhappy people are more careful in social situations, introverted and prone to shyness. This causes them to adopt a hostile attitude and use tactics for discussion, and this condition can anger their colleagues and superiors. This situation complies with the complaint of unhappy employees that there is little support from their colleagues and supervisors. Apart from this, one of the most significant factors in increasing the performance of employees is their motivation. According to Herzberg's theory, the factors that increase motivation are divided into two groups as internal and external (motivator-hygiene factors). In the workplace, the physiological and sociological factors that make the employees happy are included in the external factors. In other words, WPH as an environmental and social factor counted as a hygiene factor affects motivation. Therefore, it increases the performance. Relevantly, Argon (2010) stated that working environment and qualifications affect the performance of employees. Similarly, Bozkurt and Ercan (2017) emphasize the physiological and psychological factors in the work environment affect AP. In Wood's (1990) study, he stated that the characteristics of the work environment and attitude and behaviors of colleagues affect AP. This study conceptually explains WPH can affect AP, yet any empirical study in the literature does not exist to support this claim. In addition, while Turkey is in 41st position among 45 countries in the world ranking in terms of happiness index; it is ranked 20th of 32 countries in terms of reference publications, self-citations, citations per publication and academic performance context (Ortaş, 2018). In this respect, the first two hypotheses to be examined within the scope of the research are:

H_1: Positive relationship exists between WPH and PAP.

H_2: WPH positively affects PAP.

WPH, EI and PAP

According to Tarhan (2014), there are two basic steps for a person to attain happiness. First is that the being aware of oneself, recognizing, directing and acting with the help of one's emotions, while the second is communicating with other people and being able to recognize other party's emotions. According to the same study, he defined the emotional qualities required for happiness and success as EI. In addition, we should not forget that emotions play a substantial role in human beings of modern life, and general intelligence increases as EI develops (Balanescu, 2018), and ultimately, intelligence affects performance positively. According to the study of İnce, Gül and Gözükara (2015), EI makes it easier to deal with work pressure and stress and provides a better work life to the person. Similarly, for Bozkurt and Ercan (2017), the level of EI is among the factors affecting the employee performance, as well as other physiological and psychological factors. According to the same study, while these physiological and psychological factors that cause stress affect individual performance negatively, people with EI are expected to transform their positive thoughts into high performance or to control emotions and thoughts that negatively affect people and increase their performance by cleansing them from such negativities. Ngah Jusoff and Rahman (2009) argue that job satisfaction can be proxy for the welfare of the employee in the workplace, and that job satisfaction is positively related to EI. Andrew (2011) also states that the person with high EI is happier in the workplace and their performance may be higher in this context. According to Yusoff, Khan and Azam (2013), academicians will increase their performance when they work in a business environment where they can manage their emotional competencies and cooperate with other academicians and the administrative department. Thus third hypotheses related with EI and its sub-dimensions are:

H_3: EI has a moderator role in the relationship between WPH and PAP.

H_{31}: Self-emotional appraisal has a moderator role in the relationship between WPH and PAP.

H_{32}: Others' emotional appraisal has a moderator role in the relationship between WPH and PAP.

H_{33}: Regulation of emotions has a moderator role in the relationship between WPH and PAP.

H_{34}: Use of emotions has a moderator role in the relationship between WPH and PAP.

WPH, WLB and PAP

Analyzing the role of WLB as mediator role in the relationship of WPH and PAP has two phases. The first phase embodies the relationship between WPH and WLB. In this context, Korkmaz and Erdoğan (2014) found a negative relationship between job satisfaction, which is the narrower scope of WPH and WLB. That means the more satisfied employees are, the more time they can spare time for work resulting in disruption of WLB. On the other hand, Talukder, Vickers and Khan (2017) found that happy employees are more successful at maintaining WLB. Thus it is uncertain that how WPH affects WLB in the literature. In the second phase related to WLB and PAP relation, Achour, Grine and Nor (2014) made analyses with 43-45 aged female academicians. Results show that participants who suffer from work-life conflict have decreased performance. Similarly, Genç, Genç and Gümüş (2016) emphasized that performance levels of employees who cannot achieve WLB are expected to be lower. In contrast, the results of Soomro, Breitenecker and Shah' study (2017) conducted with young academicians prevails that participants who cannot maintain WLB and experience work-life conflict have higher performance. Comparing these studies, the major difference, as Soomro et al. (2017) also stated that, arises from the age. They stated that especially young employees who are at the beginning of their careers can work longer hours, thinking that they will reach their goals faster when they spend more time in the workplace. Similarly, in Fonthinha's study with British academicians (2019), there is a U-shaped relation between WLB and performance. Academicians who work up to 10 hours weekly additionally get satisfied and perform better than who work within office hours only and who work for over 10 hours additionally. According to some researches (Machlowitz, 1978 and Peiperl and Jones, 2001; cited by İplik, 2019), being workaholic, which affects WLB negatively, contributes to performance as it affects employees' satisfaction level and creativity. Thus fourth hypotheses related with WLB and its sub-dimensions are:

H_4: There is a partial mediator role of WLB in the relationship between WPH and PAP.

H_{41}: There is a partial mediator role of neglecting life in the relationship between WPH and PAP.

H_{42}: There is a partial mediator role of work-life fit in the relationship between WPH and PAP.

H_{43}: There is a partial mediator role of life's comprising work in the relationship between WPH and PAP.

H_{44}: There is a partial mediator role of devoting time to oneself in the relationship between WPH and PAP.

In the light of this information, the research model of the study is:

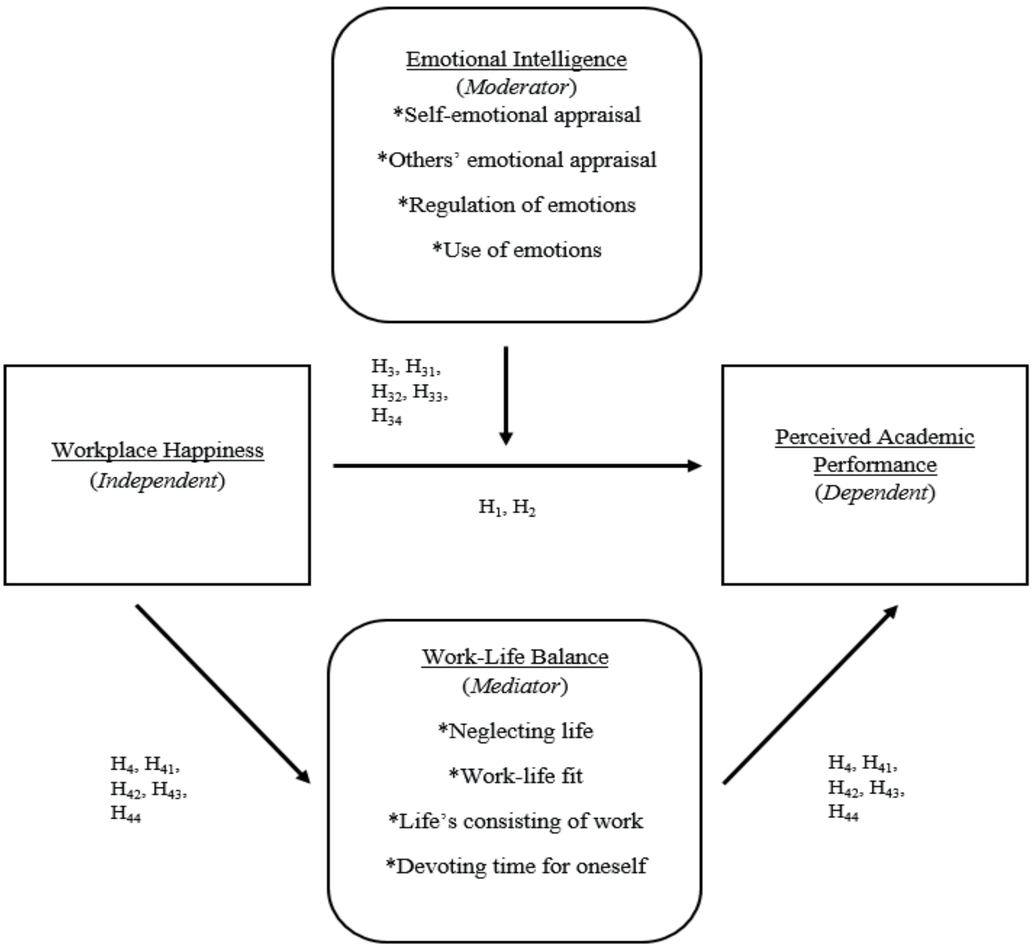


Figure 1: Research Model

2. Method

Sample

Academicians who work in faculties of private and public universities in Central Anatolia Region of Turkey composed the target population of the study. The reason for choosing academicians as a sample arises from the nature of their work. Because of their profession, academicians do not have a single workplace or specific hours to perform. Thus "happy employee=productive employee" stands as a question in this regard. The reason for choosing this region underlies the fact that it had the highest score of Turkey in the academic context in 2016 (Göksu and Bolat, 2017: 445) which was the first year of the implementation of academic incentive program that was put forward by government to motivate academicians. There are 42 universities in the aforementioned region. We excluded medical and dentistry faculties due to work density. By excluding them, in these universities there are 4167 professors, 2652 associate professors, 5708 assistant professors, 3434 lecturers and 6270 research assistants; 22231 working at total (HEI, 2019). Because of some technical problems such as non-existence of mail addresses or web pages, we sent surveys online to approximately 15000 academicians at all. We used proportional sampling technique, and the sample comprised 1184 academicians. As we detected 48 participants as outliers, we extracted them from the study and we continued the research with 1136 people. 54.9% of the sample is female (n=624), while 45.1% is male (n=512); mostly aged 26-40 as 59.6% (n=677), married as 66.3% (n=753) and works as a research assistant with 39% (n=443) followed by assistant professors (n=263). Majority work for a public university as 84.6% (n=961) and working time is mostly 6-15 years (n=438).

Measurements

All the scales used in this study were chosen either because they were developed for academicians or because they gave ideal results when implemented on aforementioned participants. PAP, EI, and WLB scales were developed in Turkey for academicians, thus may not make any cultural differences, and the WPH scale was developed by a global institution and it was handled within academicians during the adaptation phase to Turkish. Besides, for obtaining normality of distribution, we conducted a seven-point Likert scale.

WPH

Psychiatric Researches Unit, WHO Collaborating Center for Mental Health, Frederiksborg General Hospital developed WPH scale in 1998. The scale is composed of 5 items which involves 4 positive items such as "I feel cheerful at work" and a negative item as "I feel nervous at work" in one factor. The scale was adapted into academic workplace context and translated into Turkish by Alparslan (2016).

PAP

Scale, which was developed by Gür (2017), has five components such as effective lecturing, self-efficacy of foreign language, scientific research, technology and environmental factors that analyze the perception of academic performance. Scale is composed of 19 positive items such as "I can do data analysis of my research without help" and 7 negative items as "When faced with difficulties, I stop my research".

EI

We used Wong and Law's scale (2002) to measure EI. This scale has been derived from Mayer and Salovey's (1997) four factor-scale. The scale is composed of 16 positive items such as "I can control my emotions well" and includes four dimensions as mentioned in hypotheses development. The scale was translated into Turkish and used for academicians by Ilgın (2010) with serial approach method.

WLB

The scale used in this study was developed to measure academicians' levels of WLB. It was developed by Apaydın (2011) and composed of four dimensions as mentioned in hypotheses development. There are 12 positive items such as "I think I have allocated my time appropriately both in my business and private life" and 18 negative items as "I cannot keep up with the intensity of my work".

Procedure

Before starting, ethical approval form was obtained from Kırıkkale University Ethical Approval Committee. We preferred online-survey method in order to reach more people and due to time and cost constraints. The survey form was prepared and sent online to mail addresses of academicians, which they stated on their institutional pages. The form comprised demographic questions besides scales. In the beginning of the form, there was an informed consent. We replied to each participant who experienced difficulties in understanding the items. Most participants gave feedback about the survey and the items. Thus it took nearly four months to collect data.

All data are collected by self-report for some reasons. First, happiness is a subjective judgment and no one can claim about another one's happiness level (Januwarsono, 2015), so it requires self-report evaluation. Second, we measured the perceived performance instead of what objective criteria reveal. Because academic performance is relatively more difficult than other job performances due to universities' organizational structures (Ünal, 2017) and the uncertainty as to which of the academic performance components is more important, or whether they should be considered as equally important. Third, we wanted to see how balanced the academicians feel their work and private lives. Last, we thought that in such a competitive work-setting like academia, it would be more objective evaluation of EI levels of participants in terms of self-reports. Another reason is that the time and money constraints that prevented us from doing such professional EI tests.

Reliability and Validity of Scales

The scales' reliabilities are found as Cronbach's α = .849, .897, .904 and .896 for WPH, PAP, EI and WLB respectively, which are considerably high. For validation of the scales, first EFA was conducted. WPH was explained with five items in one factor which adheres to its original form with a variance of 64.173% and KMO value as .849. PAP was explained with four factors including 10, five, three and two items respectively with a variance of 57.511% at total. Three items (2nd, 10th and 26th) were extracted from the scale due to overlapping. Apart from this, the remaining items were united in factors as its original form except for the items of self-efficacy of technology and effective lecturing originally. They were re-checked and gathered in one factor called as effective lecturing and self-efficacy of technology because of their common coverages. KMO value was found as .905. EI scale was explained with four factors involving four items per each concretely based on the original form with a variance of 77.168% and KMO value was .883. WLB was explained with four factors including eight, five, five, and three items respectively with a variance of 55.561% at total. Six items (2nd, 14th, 16th, 18th, 20th and 21st) which were excluded from the original scale too, were extracted due to overlapping. Three more items (4th, 15thi and 26th) were extracted due to the same reason. Because remaining items united in each factor adhere to original form, they were renamed same. KMO value was found as .910. After then for psychometric validity of each scale, CFA was conducted. The fit indices are x^2=7.76, df= 4, CFI=.999, GFI=.997, TLI=.997, RMSEA=.029 for WPH after one modification; x^2= 739.232, df= 152, CFI=.946, GFI=.937, TLI=.932, RMSEA=.058 for PAP after six modifications, x^2= 474.137, df= 97, CFI=.972, GFI=.950, TLI=.966, RMSEA=.059 for EI after one modification and x^2= 876,392, df= 180, CFI=.952, GFI=.929, TLI=.909, RMSEA=.059 for WLB after three modifications.

3. Results

In this study, data were analyzed via SPSS 21.0. For determining the moderating and mediating effects of EI and WLB respectively, we conducted hierarchical regression by Process Macro for SPSS v3.4 developed by Andrew F. Hayes, 2018 rather than SEM. This is because we wanted to see the direct effect of WPH on PAP exclusively. SEM would be more appropriate in order to make comparisons of direct and indirect effects of independent variable on a dependent one (Stock, 2016).

Table 1: Correlation Table of Variables

	M	s.d.	1	2	3	4	5	6	7	8	9	10
1.Gender	1.45	.50	1									
2.Age	247	.72	.19**	1								
3.Marital Status	1.34	.47	-.18**	-.25**	1							
4.Title	3.61	1.53	.21**	.72**	-.30**	1						
5.Working Time	2.35	1.15	.15**	.83**	-.30**	.75**	1					
6.University Type	1.17	.44	.06*	.16**	-.09**	.00	-.07*	1				
7.WPH	5.13	1.10	.06*	.16**	-.09**	.16**	.13**	.02	1			
8.PAP	5.18	.79	.06*	.08*	-.06*	.19**	.10**	.07*	**.24****	1		
9.EI	5.66	.69	-.03	.24**	-.10**	.22**	.24**	-.04	.34**	.36**	1	
10.WLB	4.69	.76	.03	.20**	-.15**	.20**	.19**	.05	.39**	.25**	.35**	1

*** Significant at the 0.01 level* *Significant at the 0.05 level

From the data above, we see that there is a weak but positive relationship (r=.241) between WPH and PAP which means H_1 is supported.

Table 2: Hierarchical Regression Analysis-Moderator Effect of EI

	Model 1	*Model 2*	*Model 3*
WPH	.173	.105	.118
EI		.249	.259
WPH*EI			.075
R^2	**.058**	.146	**.157**
ΔR^2	.058	.088	.011
F	70.122***	97.002***	70.276***
N	1136	1136	1136

Durbin-Watson = 1.966 Tolerance = .952 VIF=1.050
****p<0.001*

In Model 1, it is seen that WPH explains approximately 6% of PAP's variance and affects it positively (β=.173, p<0.01). Thus, H_2 is accepted.

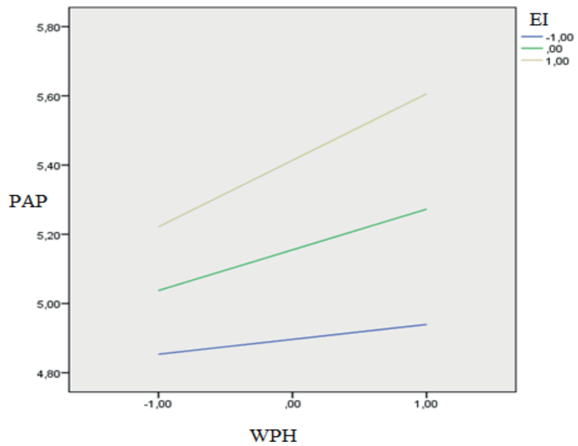


Figure 2: Moderating Effect of EI

Table 2 also prevails that the effect of WPH on PAP increases with EI which has a moderating role (β=.157; p<0.01) in the relationship. In Figure 2, by taking the values of one standard deviation (s.d) below and above the means of EI, it was proved that the effect of WPH on PAP increases when the EI level of academicians is high. Thus, H_3 is also accepted.

Table 3: Hierarchical Regression Analysis-Moderator Effect of Self-Emotional Appraisal

	Model 1	*Model 2*	*Model 3*
WPH	.173	.157	.162
Self-Emotional Appraisal (EISD1)		.143	-.101
WPH*EISD1			.055
R^2	.058	.089	**.096**
ΔR^2	.058	.031	.007
F	70.122***	55.514***	39.947***
N	1136	1136	1136

Durbin-Watson = 1.959 *Tolerance = .948* *VIF=1.055*
****p<0.001*

The effect of WPH on PAP increases with self-emotional appraisal (β=.096; p<0.01) which is the first sub-dimension of EI, as presented in Table 3. In Figure 3, by taking the values of s.d. below and above the means of this dimension, it was proved that the effect of WPH on PAP increases when academicians appraise their own emotions, which leads to H_{31} acceptance.

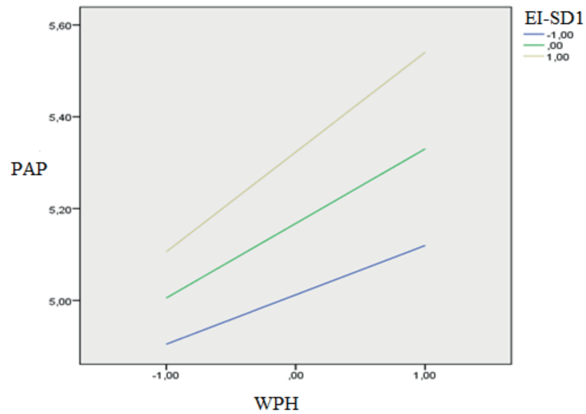


Figure 3: Moderating Effect of Self-Emotional Appraisal

Table 4: Hierarchical Regression Analysis-Moderator Effect of Others' Emotional Appraisal

	Model 1	*Model 2*	*Model 3*
WPH	.173	.179	.179
Others' Emotional Appraisal (EISD2)		.023	.111
WPH*EISD2			.036
R^2	.058	.077	.080
ΔR^2	.058	.019	.003
F	70.122***	47.275***	32.620***
N	1136	1136	1136

Durbin-Watson = 1.969 *Tolerance = .998* *VIF=1.002*
****p<0.001*

Because interaction term (WPH*EISD2) is not significant in the model (p>0.05), we cannot prove that this sub-dimension has a moderating effect in the relation. Thus H_{32} is rejected.

Table 5: Hierarchical Regression Analysis-Moderator Effect of Use of Emotions

	Model 1	*Model 2*	*Model 3*
WPH	.173	.087	.093
Use of Emotions (EISD3)		.312	.033
WPH*EISD3			.06
R^2	.058	.198	.204
ΔR^2	.058	.140	.006
F	70.122***	139.552***	96.829***
N	1136	1136	1136

Durbin-Watson = 1.997 *Tolerance = .938* *VIF=1.066*
****p<0.001*

Table 5 shows that the effect of WPH on PAP increases with use of emotions (β=.06; p<0.01) which is the third sub-dimension of EI. In Figure 4, by taking the values of s.d. below and above the means of this dimension, it was proved that the effect of WPH on PAP increases when academicians use their emotions, which leads to H_{33} acceptance.

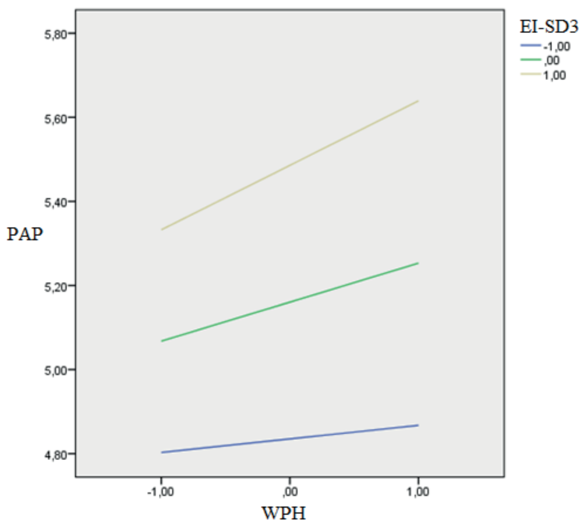


Figure 4: Moderating Effect of Use of Emotions

Table 6: Hierarchical Regression Analysis-Moderator Effect of Regulation of Emotions

	Model 1	*Model 2*	*Model 3*
WPH	.173	.148	.162
Regulation of Emotions (EISD4)		.140	.162
WPH*EISD4			.083
R^2	.058	.087	.102
ΔR^2	.058	.029	.005
F	70.122***	53.887***	43.062***
N	1136	1136	1136

Durbin-Watson = 1.983 Tolerance = .916 VIF=1.092
****p<0.001*

Table 6 reveals that the effect of WPH on PAP increases with regulation of emotions (β=.102; p<0.01) which is the fourth sub-dimension of EI. In Figure 6, by taking the values of s.d. below and above the means of this dimension, it was proved that the effect of WPH on PAP increases when academicians regulate their emotions. Hence, H_{34} is accepted.

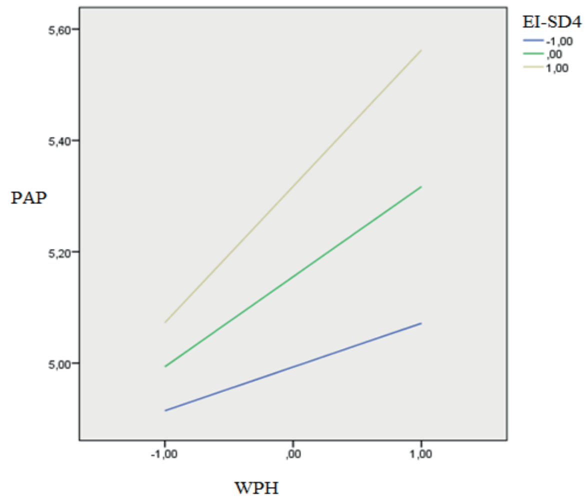


Figure 5: Moderating Effect of Regulation of Emotions

In the last phase, we investigated the mediating effect of WLB and its sub-dimensions in the relationship according to Baron and Kenny steps (1986).

Table 7: Mediator Effects of WLB and Its Sub-Dimensions

	Model 1 (DV: WLB)	*Model 2 (DV: PAP)*	*Model 3 (DV:PAP)*
WPH	.272	**.173**	**.123**
WLB			.183
R^2	.153	.058	.085
ΔR^2			.033
F	204.252***	70.1218***	55.535***
N	1136	1136	1136
Durbin-Watson = 1.950	*Tolerance = .847*	*VIF=1.180 ***p<0.001*	*Sobel p value>0.05*
	Model 1 (DV: WLBSD1)	*Model 2 (DV: PAP)*	*Model 3 (DV:PAP)*
WPH	.024	**.173**	.115
Neglecting Life			.172
R^2	.148	.058	.096
ΔR^2			0.038
F	196.800***	70.1218***	60.325***
N	1136	1136	1136
Durbin-Watson = 1.934	*Tolerance = .852*	*VIF=1.174 ***p<0.001*	*Sobel p value<0.05*
	Model 1 (DV: WLBSD2)	*Model 2 (DV: PAP)*	*Model 3 (DV:PAP)*
WPH	.174	**.173**	**.162**
Work-Life Fit			.064
R^2	.0534	.058	.063
ΔR^2			.005
F	64.003***	70.1218***	37.8035***
N	1136	1136	1136
Durbin-Watson = 1.972	*Tolerance = .947*	*VIF=1.056 ***p<0.001*	*Sobel p value<0.05*
	Model 1 (DV: WLBSD3)	*Model 2 (DV: PAP)*	*Model 3 (DV:PAP)*
WPH	.439	**.173**	**.078**
Life's Consisting of Work			.217
R^2	.187	.058	.135
ΔR^2			.077
F	261.295***	70.1218***	88.0034***
N	1136	1136	1136
Durbin-Watson = 1.960	*Tolerance = .813*	*VIF=1.23 ***p<0.001*	*Sobel p value<0.05*
	Model 1 (DV: WLBSD4)	*Model 2 (DV: PAP)*	*Model 3 (DV:PAP)*
WPH	.174	**.173**	**.162**
Devoting Time to Oneself			.064
R^2	.0534	.058	.063
ΔR^2			.005
F	64.003***	70.1218***	37.8035***
N	1136	1136	1136
Durbin-Watson = 1.979	*Tolerance = .988*	*VIF=1.012 ***p<0.001*	

In Table 7, neglecting life, life's comprising work and work-life fit sub-dimensions are providing partially mediator roles in the relationship. WPH positively affects neglecting life (β=.174; p<0.01) and neglecting life positively affects PAP (β=.172; p<0.01). When neglecting life was introduced to model, the effect of WPH on PAP decreases (b1=.173=>b2=.123), but not becomes insignificant. Similarly, WPH positively affects life's comprising work positively (β=.439; p<0.01) which affects PAP in the same direction (β=.217; p<0.01). When this dimension was introduced to model, the effect of WPH on PAP decreases (b1=.173=>b2=.078), but not becomes insignificant. Last, WPH positively affects work-life fit (β=.174; p<0.01) which affects PAP in the same way (β=.064; p<0.01). When it was added to model, the effect of WPH on PAP decreases (b1=.173=>b2=.162), but not becomes insignificant. Sobel Tests proved these sub-dimensions' mediating roles as significant (p<0.01). Thus, H_{41}, H_{42}, and H_{43} were supported. Despite all criteria for mediating effect has been met, since Sobel Test did not approve (p>0.05), WLB was not found as mediator. Thus H_4 was rejected. Last, because of insignificance of devoting time to oneself sub-dimension in the model (p>0.05), it was not found as mediator either. For this reason, H_{44} was also rejected.

4. Conclusion and Discussion

This study fills the gap in the literature by validating the thesis of "happy employee=productive employee" in an academic setting. Despite of positive relationship and effect, the power of both correlation (r=.241) and regression (R^2=.058) were found relatively low. There are probable reasons for this result. First, AP is measured in a perceptional context. Because all scales were made by self-assessment in order to ensure the consistency of the study results. Instead, if objective criteria were preferred, it would be likely that there will be changes in the explanatory effect of WPH on PAP. Second and maybe the most important, academicians do not perform only at workplace or during office hours. They keep working at least mentally by sparing time in their private lives, especially for academic publications. Thus, it is so rational that the effect of a positive emotional situation at their workplace on their performance may be that low. Moreover, they are mostly busy with administrative tasks, which lowers the impact of WPH on performance, even affects negatively, when they are at work. Third, there are many individual, organizational and job-related factors that explain AP's variance. In this context, 6% explaining power of WPH among those many factors may be counted as expected.

Second goal was to analyze the EI and its sub-dimensions in moderating role in the thesis. Results showed EI has moderated the relationship. The situation that WPH's effect on PAP is at the highest point when EI is highest, is consistent with the literature (Ngah et al., 2009; Andrew, 2011; Balanescu, 2018). Moreover three of its sub-dimensions also played the moderating role. Happy academicians at work show performance at maximum level when they can appraise, use and regulate their own emotions. The only sub-dimension found statistically insignificant is appraising of others' emotion. Considering all sub-dimensions, significant ones are related with self, but the insignificant one is related with other. This situation proves that in a relationship between WPH, which is a subjective term and PAP that is also subjective assessment, factors to play moderator roles would be expected as self-assessed EI and its self-related sub-dimensions.

The third goal was to analyze WLB and its sub-dimensions in partially mediating role in this thesis in reverse logic. The rationale here is when academicians feels happy at workplace, their PAP will rise because they will spend more time at work. Focal point of PAP means, the more time spent at work might not lead to higher performance but at least a rise in perception of it. Fontinha et al.'s study (2019) also supported this claim. The result of their study with British academicians' show that up to additional 10 hours to weekly office hours makes them feel more satisfied, controlled over their jobs and highly performed. Second point is the disruption of WLB should happen at workplace, which can be called as work-life conflict. In Soomro et al.'s study with Pakistani academicians (2017), it is obtained that work-family conflict affects performance positively with the idea that academicians feel like they outperform than usual when they spend more time at office. Thus, just like in Border theory (Clark, 2000), workplace has its own borders to work and an academician should spend his working time at this place, not in his private life by sparing time of it for work. In the study, though WPH affected WLB positively and did WLB so PAP, WLB did not mediate the relationship. But its two sub-dimensions served for our aforementioned claim. Results showed WPH affected neglecting life and life's comprising work sub-dimensions positively and they affected PAP in the same way, and they also mediated the relationship. Apart from this, work-life fit also partially mediated this relationship in opposition to this claim, but complying with the literature. Difference arises from two opponent views of model mentioned in WLB part. Fourth sub-dimension, devoting time to oneself, did not mediate the relationship. The reason underlies the fact that disruption of WLB does not happen at workplace, which can be explained by Clark's Border theory in which natural areas where one can spare time for himself are considered as areas outside of the workplace. It is a rational situation that the sub-dimension of devoting time to himself does not undertake the mediating role in the effect of WPH on PAP, if the environment in which the person should spare time for himself or his family is not a workplace.

All the variables in the study gained scores above average. EI and PAP were expected to be rather high because of subjective judgements. This is due to Personal Identity theory which claims that people strive for positive self-definitions (Dutton et al., 2010). While the score of WPH is most welcome, WLB comes as a surprise in contrary to the literature (Fontinha et al., 2019). It can be explained by Miller's (2008) sense of imbalance thesis which claims that if a job is not perceived as meaningful by the person performing the job, the feeling of imbalance may prevail. Scholarship includes duties such as benefiting society at the most basic level, producing and sharing information and engaging in managerial activities makes the profession meaningful. Apart from this, flexibility and autonomy provided for them may also lead to this result.

With this study, we made contributions to literature. First, we filled the gap by validating the thesis of "happy employee=productive employee" in an academic setting by showing that performance of an occupation whose employees' productivity is not limited to office hours and workplace borders can be improved by WPH directly. This direct relationship can be strengthened via employees' EI levels. On the other hand, the relationship can be partially mediated indirectly with WLB. We proved WLB can affect performance positively when it is not ensured.

Limitations and Suggestions

This study has some limitations inevitably. First, the data were obtained from the same type of source which could lead to common-method bias or variance. To reduce this risk, as aforementioned, we responded participants to assure their confidentiality. Because the participants are academicians, we expected from them filling the questions not for social desirability, instead in reality. Regarding the bias, this study is cross-sectional. Literature suggests that in mediation analyses, longitudinal studies are more appropriate (Maxwell and Cole, 2007), unless the authors present a reason for the temporal order of factors (Fairchild and McDaniel, 2017). Furthermore, in a study where cross-sectional and longitudinal mediation results are compared, if the purpose is to draw conclusions processes which unfold over time, the authors discourages that using the mediation analysis with cross-sectional data (O'Laughlin, Martin and Ferrer, 2018). In this research, we collected the data of all variables at the same time, instead of a longitudinal process. The rationale here is that the perception part of academic performance is short term and simultaneously happening as well as happiness and the perception of WLB in temporal and involvement contexts. Happy academicians would think they are more productive because they are spending more time at workplace at that time. Moreover, we do not claim that happiness increases academic performance in general, just the perception of it. Its effect on AP is another issue. Besides, the data used in this research is proper to meet the mediation requirements discussed by Baron and Kenny (1986). Second, we used PAP scale. Objective criteria may be used to assess the AP and make comparisons. Third, we used general WPH scale. Instead, by considering the nature of academia, a specific scale could be developed and test the hypotheses again. Fourth, this study was conducted in Turkey. An international study with different research cultures can be applied to make comparisons. Fifth, medicine and dentistry faculties were omitted because of their dense workloads. Analyzes in these two types of faculties, which are in constant communication and interaction with different people in the workplace, may yield different results.

Considering the status of AP in Turkey, to improve it, academicians in administrative positions should provide an environment with happiness, qualified social relations, regarding scientific knowledge and autonomy. Superior ones should motivate and guide the beginners. In this study, we found that the more happiness and the more time spent at workplace result in higher performance perception. Nevertheless, this study was conducted in north semi-sphere like Fontinha et al.'s study (2019), which managers in south should take into consideration. The study also shows that the effect of WPH on PAP gets stronger with EI, which can be improved with education. Thus, training seminars may be provided for beginners.

References

Achour, Meguellati, Grine, Fadila, & Nor, Mohd R. M. N. (2014). Work-family conflict and coping strategies: qualitative study of Muslim female academicians in Malaysia. *Mental Health, Religion & Culture*, 17 (10), 1002-1014. https://doi.org/10.1080/13674676.2014.994201.

Ak, Mehmet, & Gülmez, Ahmet (2006). Türkiye'nin uluslararası yayın performansının analizi. *Akademik İncelemeler Dergisi*, 1(1), 22-49.

Alici, İsmail, & Yılmaz, Hüseyin (2017). Duygusal zeka ve alt boyutlarının ilişki yönetimi üzerine etkisi: ampirik bir uygulama. Örgütsel Davranış Araştırmaları Dergisi, 2 (1), 70-89. ISSN: 2528-9705.

Alparslan, Ali, M., Kahraman, Mehmet, & Cantürk, Nihal (2016, May). Araştırma Görevlilerinin İşyerinde Mutluluk ve Mutsuzluk Nedenleri: Bir Alan Araştırması. 15. Ulusal İşletmecilik Kongresi, İstanbul Üniversitesi, İstanbul.

Andrew, Sharon, S., (2011). S.M.I.L.E.S.: The differentiating quotient for happiness at work. *Social Sciences and Medicine*, 1-13.

Apaydın, Çiğdem (2011). Öğretim üyelerinin işe bağımlılık düzeyi ile iş-yaşam dengesi ve iş-aile yaşam dengesi arasındaki ilişki. Doctoral Dissertation, Ankara University, Eğitim Bilimleri Enstitüsü.

Ardıç, Kadir, & Erbaşaran, Zeynel (2019). İşkoliklik ve iş tatmini arasındaki ilişkinin incelenmesi. *Avrasya Sosyal ve Ekonomi Araştırmaları Dergisi*, 6 (4), 334-346. ISSN: 2148-9963.

Argon, Türkan (2010). A qualitative study of academicians' views on performance evaluation, motivation and organizational justice. *International Online Journal of Educational Sciences*, 2(1), 133-180. ISSN: 1309-2707.

Aytekin, İhsan, Erdil, Oya, Erdoğmuş, Nihat, & Akgün, Ali, E. (2016). Academicians' career capital and career satisfaction: the mediation effect of research productivity, *Kuram ve Uygulamada Eğitim Bilimleri*, 16(6), 1921-1945. DOI: 10.12738/estp.2016.6.0412.

Baba, Mubashir, M. (2017). Emotional intelligence, organizational commitment, and job satisfaction: a study of higher learning institutions. *Amity Global Business Review*, 51-60. DOI: 10.1016/j.sbspro.2011.11.447.

Bakker, Arnold, B., Oerlemans, Wido, G., M. (2010). In Spreitzer, G. M., & Cameron, K. S. (Eds.), Subjective well-being in organizations. *Handbook of positive organizational scholarship* (pp. 1-31), Oxford University Press. DOI: 10.1093/oxfordhb/9780199734610.013.0014.

Balanescu, Ramona, C. (2018, April). Emotional intelligence – a possible predictor of performance or success at organizational and individual level?!. *The 14th International Scientific Conference eLearning and Software for Education*, Bucharest. ISSN: 2066-8821.

Baron, Reuben, M., & Kenny, David, A. (1986). The moderator-mediator variable distinction in social psychological research: conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology,* 51 (6), 1173-1182. DOI: 10.1037//0022-3514.51.6.1173.

Bibliometric Analyses - SCOPUS (2019). Retrieved from cabim.ulakbim.gov.tr/bibliyometrik-analiz/scopus-turkiye-adresli-veriler/. Accessed February 8, 2021.

Bibliometric Analyses - WoS (2019). Retrieved from cabim.ulakbim.gov.tr/bibliyometrik-analiz/wos-turkiye-adresli-veriler/. Accessed February 8, 2021.

Boehm, Julia, K., & Lyubomirsky, Sonja (2008). Does happiness promote career success?. *Journal of Career Assessment,* 16 (1), 101-116. https://doi.org/10.1177/1069072707308140.

Bozkurt, Öznur & Ercan, Armağan (2017). Akademik iyimserlik ile performans arasındaki ilişkinin akademisyenler açısından değerlendirilmesi. *Uluslararası Yönetim İktisat ve İşletme Dergisi*, ICMEB17 Special Issue, 251-254.

Clark, Sue, C. (2000). Work-family border theory: a new theory of work-family balance. *Human Relations*, 53 (6), 747-770. https://doi.org/10.1177/0018726700536001.

Çöl, Güner (2008). Algılanan güçlendirmenin işgören performansı üzerine etkileri. *Doğuş Üniversitesi Dergisi,* 9(1), 35-46. ISSN: 1308-6979

Diener, Ed, & Seligman, Martin E. P. (2002). Very happy people. *Psychological Science*, 13 (1), 81-84. https://doi.org/10.1111/1467-9280.00415.

Diener, Ed, Suh, Eunkook M., Lucas, Richard. E., & Smith, Heidi L. (1999). Subjective well-being: three decades of progress. *Psychological Bulletin*, 125 (2), 276-302. DOI: 10.1037/0033-2909.125.2.276.

Doğrul, Burcu Ş., & Tekeli, Seda (2010). İş-yaşam dengesinin sağlanmasında esnek çalışma. *Sosyal ve Beşeri Bilimler Dergisi*, 2 (2), 11-18. ISSN: 1309 -8012.

Dutton, J. E., L. M. Roberts, and J. Bednar. 2010. Pathways for positive identity construction at work: Four types of positive identity and the building of social resources. Academy of Management Review 35 (2):265–93.

Ertekin, Cumhur (2014). Bilimsel araştırma ve bilimsel performans ölçümü. *TJN*, 20(2), 32-36. DOI: 10.4274/tnd.80269.

Fairchild, Amanda J., McDaniel, Heather L. (2017). Best (but oft-forgotten) practices: mediation analysis. *Am J Clin Nutr.*, 105(6), 1259-1271. DOI: 10.3945/ajcn.117.152546.

Fisher, Cynthia D. (2010). Happiness at work. *International Journal of Management Reviews*, 12, 384-412. DOI: 10.1111/j.1468-2370.2009.00270.x.

Fontinha, Rita, Easton, Simon, & Laar, Darren, V. (2019). Overtime and quality of working life in academics and non-academics: the role of perceived work-life balance. *International Journal of Stress Management,* 26 (2), 173-183. DOI: 10.1037/str0000067.

Foy, Tommy, Dwyer, Rocky J., Nafarrete, Roy, Hammoud, Mohammad S. S., & Rockett, Pat (2019). Managing job performance, social support and work-life conflict to reduce workplace stress. *International Journal of Productivity and Performance Management*, 68 (6), 1018-1041. https://doi.org/10.1108/IJPPM-03-2017-0061.

Genç, Seray, G., Genç, Volkan, Gümüş, Murat (2016). Otel işletmelerinde duygusal zekanın iş stresi ve iş yaşam dengesi üzerindeki etkisi. *Batman Üniversitesi Yaşam Bilimleri Dergisi*, 6 (2/1), 97-112.

Ghabban, Fahad, Selamat, Ali, & Ibrahim, Roliana (2018). New model for encouraging academic staff in Saudi universities to use IT for knowledge sharing to improve scholarly publication performance. *Technology in Society*, 55, 92-99. https://doi.org/10.1016/j.techsoc.2018.07.001.

Goleman, Daniel (2007). İşbaşında Duygusal Zeka. Handan Balkara, (Eds.) Varlık Publications, İstanbul.

Göksu, İdris & Bolat, Yusuf İ. (2017). Akademik teşvik uygulamasının ilk sonuçlarına ait değerlendirmeler. *Yükseköğretim ve Bilim Dergisi*, 7(3), 441-452. DOI: 10.5961/jhes.2017.221.

Greenhaus, Jeffrey H., Collins, Karen M., & Shaw, Jason D. (2003). The relation between work–family balance and quality of life. *Journal of Vocational Behavior*, 63, 510-531. https://doi.org/10.1016/S0001-8791(02)00042-8.

Guest, David E. (2002). Perspectives on the study of work-life balance. *Social Sciences Information*, 41 (2), 255-279. DOI: 10.1177/0539018402041002005.

Gür, Recep. (2017). Development of the academic performance perception scale. *Eurasian Journal of Educational Research*, 69, 177-197. DOI: http://dx.doi.org/10.14689/ejer.2017.69.10.

Houston, Don, Meyer, Luanna, H., & Paewai, Shelley. (2006). Academic staff workloads and job satisfaction: expectations and values in academe. *Journal of Higher Education and Policy Management*, 28(1), 17-30. https://doi.org/10.1080/13600800500283734.

Ilgın, Burcu (2010). Örgütsel vatandaşlık davranışlarının oluşumunda ve sosyal kaytarma ile ilişkisinde, duygusal zeka ve lider üye etkileşiminin rolü, Doctoral Dissertation, Hacettepe University, Ankara, Turkey.

İnce, Mehmet, Gül, Hasan, & Gözükara, M. Yavuz (2015). Duygusal zeka ile işgören performansı arasındaki ilişkiler üzerine ampirik bir araştırma. *Gümüşhane Üniversitesi Sosyal Bilimler Elektronik Dergisi,* 12, 226-245.

Iplik, Esengül (2019). İşkolikliğin çalışan tutum ve davranışları üzerine etkisinde iş-yaşam dengesinin rolü. *Business and Economics Research Journal,* 10 (4), 929-943. doi: 10.20409/berj.2019.211.

Januwarsono, Santoso (2015). Analytical of factors determinants of happiness at work case study on PT. PLN (persero) region Suluttenggo, Sulawesi, Indonesia. *European Journal of Business and Management*, 7 (8), 9-17.

Karkoulian, Silva, Srour, Jordan, Sinan, Tala (2016). A gender perspective on work-life balance, perceived stress and locus of control. *Journal of Business Research*, 69, 4918-4923.

Korkmaz, Oya, & Erdoğan, Evrim (2014). İş yaşam dengesinin örgütsel bağlılık ve çalışan memnuniyetine etkisi. *Ege Academic Review*, 14 (4), 541-557. DOI: 10.21121/eab.2014418011.

Kyvik, Svein, & Olsen, Terje B. (2008). Does the aging of tenured academic staff affect the research performance of universities?. *Scientometrics*, 76(3), 439-455. DOI: 10.1007/s11192-007-1767-z.

Lyubomirsky, Sonja, King, Laura, Diener, Ed (2005). The benefits of frequent positive affect: does happiness lead to success?. *Psychological Bulletin*, 131 (6), 803-855. DOI: 10.1037/0033-2909.131.6.803.

Masron, Tajul, A., Ahmad, Zamri & Rahim, Norizan B. (2012). Key performance indicators vs key intangible performance among academic staff: A case study of a public university in Malaysia. *Procedia-Social and Behavioral Sciences*, 56, 494-503. DOI: 10.1016/j.sbspro.2012.09.681.

Maxwell, Scott E. & Cole, David A. (2007). Bias in cross-sectional analyses of longitudinal mediation. *Psychological Methods*, 12(1), 23-44. DOI: 10.1037/1082-989X.12.1.23.

Miller, Cindy S. (2008). Meaningful work over the life course (Unpublished doctoral thesis). Fielding Graduate University, USA.

Mustafayeva, Sabin, & Üstün, Ferda (2018). Çalışanların duygusal zeka becerilerinin iş yaşam kalitesi algıları üzerine etkisi: Türkiye ve Azerbaycan örneği. *Business and Economics Research Journal*, 9 (3), 665-680. DOI: 10.20409/berj.2018.130.

Ngah, Rohana, Jusoff, Kamaruzaman, & Rahman, Zanariah A. (2009). Emotional intelligence of Malaysian academia towards work performance. *International Education Studies*, 2 (2), 103-112. DOI: 10.5539/ies.v2n2p103.

Nizam, İsmail & Kam, Chrystinne (2018). The determinants of work life balance in the event ındustry of Malaysia. *International Journal of Management, Accounting and Economics*, 5 (3), 141-168.

Numbers of Lecturers (2019).Retrieved from https://istatistik.yok.gov.tr/ Accessed February 5, 2020.

Olcay, Gökçen, & Bulu, Melih. (2016). Uluslararası üniversite sıralama endekslerinde Türk üniversitelerinin yeri. *Yükseköğretim Dergisi*, 6(2), 95-103. doi:10.2399/yod.16.003.

Ortaş, İbrahim (2018). Bilimsel yayınlar yönünden Türkiye'nin dünyadaki yeri nedir?. Retrieved from https://indigodergisi.com/2018/07/bilimsel-yayinlar-turkiye-yeri/. Accessed December 15, 2019.

O'Laughlin, Kristine D., Martin, Monica & J., Ferrer, Emilio (2018). Cross-sectional analysis of longitudinal mediation processes. *Multivariate Behavioral Research*, 53(3), 375-402. DOI: 10.1080/00273171.2018.1454822.

Oyewobi, Luqman, O., Oke, Ayodeji E., Adeneye, Toyin D. & Jimoh, Richard A. (2019). Influence of organizational commitment on work-life balance and organizational performance of female construction professionals. *Engineering, Construction and Architectural Management*, 26 (10), 2243-2263. DOI 10.1108/ECAM-07-2018-0277.

Quick, James C., & Quick, Jonathan D. (2004). Healthy, happy, productive work: A leadership challenge. *Organizational Dynamics*, 33 (4), 329-337. https://doi.org/10.1016/j.orgdyn.2004.09.001.

Rego, Armenio & Cunha, Miguel P. (2008). Authentizotic climates and employee happiness: pathways to individual performance? *Journal of Business Research*, 61, 739-752. https://doi.org/10.1016/j.jbusres.2007.08.003.

Rego, Armenio, Ribeiro, Neuza, & Cunha, Miguel P. (2010). Perceptions of organizational virtuousness and happiness as predictors of organizational citizenship behaviors. *Journal of Business Ethics*, 93, 215-235. DOI 10.1007/s10551-009-0197-7.

Rowley, Jennifer (1996). Motivation and academic staff in higher education. *Quality Assurance in Education*, 4(3). 11-16. https://doi.org/10.1108/09684889610125814.

Ryan, Richard M., Deci, Edward L. (2001). On happiness and human potentials: A review of research on hedonic and eudemonic well-being. *Annual Review Psychology*, 52, 141-166. DOI: 10.1146/annurev.psych.52.1.141.

Salovey, Peter, & Mayer, John D. (1990). Emotional intelligence. *Imagination, Cognition and Personality*, 9, 185-211. https://doi.org/10.2190/DUGG-P24E-52WK-6CDG.

Saydan, Reha (2008). Üniversite öğrencilerinin öğretim elemanlarından kalite beklentileri: yüzüncü yıl üniversitesi İİBF örneği. *Gazi Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergis*i, 10(1), 63-79.

Seligman, Martin E. P., & Csikszentmihalyi, Mihaly (2000). Positive psychology: An Introduction. *American Psychologist*, 55 (1), 5-14. DOI: 10.1037/0003-066X.55.1.5.

Singh, Sanjay, & Aggarwal, Yogita. (2018). Happiness at work scale: Construction and psychometric validation of a measure using mixed method approach. *Journal of Happiness Studies*, 19, 1439-1463. https://doi.org/10.1007/s10902-017-9882-x.

Slaski, Mark, Cartright, Susan (2003). Emotional intelligence training and its implications for stress, health and performance. *Stress and Health*, 19, 233-239. https://doi.org/10.1002/smi.979.

Soomro, Aqeel A., Breitenecker, Robert J., & Shah, Syed. A. M. (2018). Relation of work-life balance, work-family conflict and family-work conflict with the employee performance-moderating role of job satisfaction. *South Asian Journal of Business Studies*, 7 (1), 129-146. DOI 10.1108/SAJBS-02-2017-0018.

Stock, R. M. (2016). Understanding the Relationship between Frontline Employee Bore-out and Customer Orientation. *Journal of Business Research.* 69, 4269-4268.

Tadic, Maja, Bakker, Arnold B. & Oerlemans, Wido G. M. (2013). Work happiness among teachers: a day reconstruction study on the role of self-concordance. *Journal of School Psychology*, 51, 735-750. https://doi.org/10.1016/j.jsp.2013.07.002.

Talukder, A.K.M., Vickers, Margaret, & Khan, Aila. (2018). Supervisor support and work-life balance impacts on job performance in the Australian financial sector. *Personnel Review*, 47 (3), 727-744. DOI 10.1108/PR-12-2016-0314.

Tarhan, Nevzat (2014). *Duyguların Psikolojisi*. Ministry of Culture Publishing, İstanbul. ISBN: 9786050823691.

Tischler, Len, Biberman, Jerry, & McKeage, Robert. (2002). Linking emotional intelligence, spirituality and workplace performance. *Journal of Managerial Psychology,* 17 (3), 203-218. DOI 10.1108/02683940210423114.

Uyar, Başar (2018). Ranking chemical engineering departments in Turkey based on academic performance. *Yükseköğretim Dergisi*, 8(2), 125-132. doi:10.2399/yod.17.019.

Ünal, Ali F. (2017). Türkiye yükseköğretim alanında rakip kurumsal mantıklar: akademik performans kriterlerinde çeşitlilik ve yayın üretkenliği üzerine etkisi. *Amme İdaresi Dergisi,* 50(4), 83-114. ISSN: 1300-1795.

Wong, Chi-Sum & Law, Kenneth S. (2002). The effects of leader and follower emotional intelligence on performance and attitude: An exploratory study. *The Leadership Quarterly*, 13, 243–274. https://doi.org/10.1016/S1048-9843(02)00099-1.

Wood, Fiona (1990). Factors influencing research performance of university academic staff. *Higher Education*, 19, 81-100.

Wright, Thomas. A. (2003). Positive organizational behavior: An idea whose time has truly come. *Journal of Organizational Behavior*, 24, 437-442. DOI: 10.1002/job.19.

Wright, Thomas. A. & Cropanzano, Rusell (1997). Well-being, satisfaction and job performance: another look at the happy / productive worker thesis. *Academy of Management Proceedings*. https://doi.org/10.5465/ambpp.1997.4988986.

Wright, Thomas A. & Cropanzano, Russell (2007). The happy / productive worker thesis revisited. *Research in Personnel and Human Resources Management*, 26, 269-307. DOI: 10.1016/S0742-7301(07)26006-2.

Yılmaz, Hüseyin (2013). *Yüksek Performans Organizasyonu Liderlik Kültür ve Tasarım.* Beta Publishing, İstanbul.

Yusoff, R., Khan, Anwar & Azam, Kamran (2013). Job stress, performance and emotional intelligence in academia. *Journal of Basic and Applied Scientific Research*, 3(6), 1-8.

EGE AKADEMİK BAKIŞ / EGE ACADEMIC REVIEW

Cilt 21 • Sayı 4 • Ekim 2021
SS. 407-425
Doi: 10.21121/eab.1015640
Başvuru Tarihi: 23.11.2020• Kabul Tarihi: 10.09.2021

Contagion in Turkish Stock Market: Evidences from Developed and Emerging Markets

Elif Hilal NAZLIOĞLU[1], Dündar KÖK[2]

ABSTRACT

The aim of this paper is to empirically investigate financial contagion between developed and emerging markets and Turkish stock market. With this purpose, daily closing values of Turkish (BIST100), US (SPX), German (DAX), Brazilian (IBOV), Russian (RTSI), Indian (NIFTY), Chinese (SHCOMP) market indexes for the period 04.01.2000-12.11.2019 have been used in cointegration and causality analyses, where the latter takes into account structural breaks endogenously. While findings of co-integration analysis demonstrate tendency of Turkish stock market to move together with developed markets SPX and DAX, and with NIFTY from among emerging ones, allowing for structural breaks has been found significant in terms of methodological perspective. Findings from causality analysis, on the other hand, indicate presence of various causality relations among markets, including unilateral relations from SPX and DAX to BIST100, bilateral relations of BIST100 with IBOV and NIFTY, and unilateral ones of RTSI and SHCOMP with BIST100 index. Our analyses in general point out contagion to Turkish market from both developed markets and Russia and China from among emerging markets, moreover mutual interdependence between Turkey and the emerging markets of Brazil and India.

Keywords: contagion, financial crisis, co-integration with structural breaks, emerging stock markets

Jel Codes: F36, G15, G01, C22

1. Introduction

The spreading nature of the adverse effects of crisis-induced shocks to other countries during post-crisis period, which are influential on investor behaviours, financial and macroeconomic stability in relation to increased capital flows fostered by financial liberalization and globalization, has led to expansion in research towards financial contagion, particularly after 2008 Financial Crisis. Indeed, there is broad opinion in literature which suggests that besides 2008 Financial Crisis, the common feature of crises which broke out in 1990s, i.e. North European crisis of 1992, Mexican crisis in 1994, 1997 crisis in Asia, followed by the one in Russia in 1998, is contagion.

Factors such as concentration and level of economic relations between countries, affiliations through unions and similar bodies and geographical proximity are likely to affect levels of exposure to crises and portfolio outcomes through diversification in different dimensions, though in comparable scales. Brazil, Russia, India, and China (collectively BRIC), which are among emerging economies, are similar countries in terms of rapid growth, booming domestic demand, attracting foreign investments and low per capita income. Shocks arising from geopolitical concerns and economic uncertainties could cause changes in directions of foreign capital flows, and comparable structural breaks in the economies of these countries.

Analysis of contagion for Turkey, which is one of the emerging market economies and possesses similar financial and economic structure as BRIC countries, also turns out to be important for pinpointing both pre-emptive indicators concerning financial deepening and macroeconomic stability, and diversification opportunities available to individual investors. In this regard, this paper aims at investigating existence of contagion within the interactions of Turkish stock market with international financial markets. Taking US SPX and German DAX indexes as proxies for developed markets, and Brazilian (IBOV), Russian (RTSI), Indian

[1] enazlioglu@pau.edu.tr
[2] dkok@pau.edu.tr

(NIFTY) and Chinese (SHCOMP) stock market indexes, i.e. leading indexes of BRIC countries, for emerging countries as sample set, we implement correlation, co-integration and causality analyses for pre-crisis (04.01.2000-21.02.2007) and post-crisis (22.02.2007-12.11.2019) periods, and also the extended versions of the latter two analyses, which take structural breaks into account, on the whole period. This study hence aims to investigate the contagion phenomenon in Turkish stock markets by conducting a comprehensive analysis. We first employ the conventional co-integration tests which does not account for structural breaks. We then proceed with the co-integration testing with structural breaks since ignoring breaks may results in a false conclusion in favour of co-integration. We next consider causal linkages between the stock markets by using the Toda and Yamamoto approach to causality and a recent extension of considering smooth shift in causality framework. The previous works on Turkey do not consider the issue of structural breaks in a systematic framework based on a multiple testing strategy.

The correlation analysis on price series points out high increases in correlation coefficients in post-crisis period with respect to their pre-crisis levels. While the co-integration analysis which ignores structural breaks provides evidences for co-integration relations between Turkey and Brazil, India and Germany in the pre-crisis period, and also those between Turkey with Germany, and Turkey with India after crisis, the co-integration analysis allowing for structural breaks which is performed for the whole period exhibits that co-integration relationship between Turkey and developed economies, i.e. US and Germany, unfolds in case regime and trend changes are accounted for. These findings are consistent with those of Celik (2012), Islam et al. (2013), Bekiros (2014), Ayaydin (2014), Kocabas (2016), Kirac & Cicek (2017) and Gulzar et al. (2019) in literature. On the other hand, we determine through causality analysis, which disregards structural breaks, that US and German indexes provide forecast information for Turkish index, and there is feedback relation between Turkey and BRIC markets except Russian market. This end is in conformity with studies of Var (2015) and Atakan et al. (2010).

For investigating causal linkages, we first benefit from the Toda and Yamamoto (1995) approach to Granger causality. Incorporating structural breaks in causality analysis may be crucial due to the well-known fact that financial markets, particularly in emerging markets, are subject to structural changes. From the point of statistical inference, the null of non-causality can be rejected even though there is no causality when data generating process has structural shifts (see, Ventosa-Santaularia and Vera-Valdés, 2008). Monte Carlo simulations by Enders and Jones (2016) indicate that ignoring structural breaks in a VAR model leads Granger causality test to be biased towards a false rejection of the true null hypothesis. The simulation evidence further reveals that unless breaks are properly modelled, Granger causality tests also tend to have an over-rejection of the null hypothesis. These findings not only indicate the importance of accounting for any structural shifts but also necessitate a careful treatment of how breaks are captured (Nazlioglu et al., 2016). In order to control for structural breaks, we employ the causality analysis which takes structural shifts into account suggested by Nazlioglu et al. (2016) which employ a Fourier approximation in the Toda and Yamamoto approach to account for gradual breaks in Granger causality analysis. The causality analysis which incorporates possible structural breaks puts forth contagion effects to Turkey both from developed countries (i.e. US and Germany) and from Russia and China among emerging ones; additionally feedback relations between Turkey with Brazil and China for the total period covered. We report importance of structural breaks in analysis of financial contagion since we find that these affect the direction of causality to a great extent for Chinese and Russian cases.

2. Literature Review

Literature concerning financial contagion can basically be explored though three main lenses. Whereas fundamental view focuses on real markets, financial and coordination views oversee financial markets and macroeconomic policy implications respectively (Rigobon, 2016). Based on financial contagion conceptualization and its empirical setup, this paper traces signs of contagion in developed and emerging markets by focusing on the financial view among the three lenses. Forbes & Rigobon (2002) assert that existence of contagion can be verified in terms of significant increase in interaction with markets of other countries following a financial shock. In addition, some finer distinctions within the theoretical definition of contagion evolve, on the basis of determining channels of international shock transmissions, through increased probability of crisis in one country depending on one that occurs in another; spread of volatility of asset prices to other countries from the country where crisis has taken place; significant increases in co-movements of prices and volumes between markets and finally change in concentration in transmission channel further to a shock Pericoli & Sbracia (2003).

Empirical literature related with contagion has been expanding, and we summarize some research papers in Table A.1. In studies on 2008 Economic Crisis and its effects, the general finding concerning financial contagion suggests consequences on different economies at varying degrees. The findings of Samarakoon (2011)'s research on dependency and contagion between US and foreign markets with a broad sample of 22 emerging and 40 frontier markets covering 2000-2009 indicate that dependency is due to financial shocks in US markets while contagion effects are originated from those observed in emerging markets. Findings concerning dependency supports Forbes & Rigobon (2002)'s view in that strong linkages in crisis do not result in contagion provided that they remain at high levels prior to crisis and such linkages which do not scale up compared to stable (normal) period can neither be accounted for contagion, hence these circumstances can be explained by interdependence. Moreover, the paper suggests interdependence is valid for frontier markets, and that shocks in US has contagion effects towards them. In a similar research on interdependence, Dimitriou et al. (2013) have investigated contagion effects due to global financial crisis for BRICS and US stock markets in 1997-2012. Findings show that there is no contagion effect for most BRICS countries in early stages of crisis and that relations have been recoupled after collapse of Lehman Brothers. Furthermore, starting from 2009, increased correlations between BRICS and US markets have been reported, in consequence compared to bear markets, higher interdependence is inferred in bull markets. These findings also suggest lack of clear contagion pattern for all BRICS countries. The authors have explained this end by the existence of mutual trade and financial structures among countries involved. In another study, Chancharoenchai & Dibooglu (2006) have examined contagion and spill-over effects of 1997 Asian crisis on six major stock markets, i.e. Thailand, Philippines, Indonesia, Malaysia, Korea, and Taiwan. Their analysis through GARCH-M Model justifies some dependence scheme in terms of volatility between developed (US and Japan) and emerging markets prior to pre-crisis period (03.01.1994-31.12.1996) and after the extended period (03.01.1994-31.12.1999). Additionally, they have found out that feedbacks between East Asian stock markets were strong before the Asian crisis and remained influential thereafter. On the other hand, in a group of studies concerning transmission mechanism in literature, findings supporting financial spill-over outweighs those for financial contagion. In a sense, this group can also be considered within interdependence framework.

Islam et al. (2013) have analysed financial contagion and volatility spill-overs between 15 select countries from Asia-Pacific and Europe with a dataset of weekly periodicity covering 1997-2013. Their findings evidence volatility spill-over for the largest eight economies (India, Japan, China, South Korea, Taiwan, Malaysia, Singapore and Australia) in Asia-Pacific, and financial contagion for European markets (Austria, France, Germany, Greece, Holland, Italy and UK) due to overwhelming cross-volatility transmissions. In a similar study, Polat (2018) reports highest financial risk transmission between US and UK, and those at high levels between Germany, France, and Italy. While these countries' membership in EU is highlighted, Turkey is identified with the lowest financial risk transmission. It is apparent that volatility, which is the subject matter of both studies, is affected significantly from level of interdependence between major economies. On the other hand, Roy & Sinha Roy (2017) have studied multi-directional volatility transmission in asset markets in order to measure the extent of financial contagion specifically in Indian markets. Their analysis is based on daily returns of commodity derivative indexes and other assets for the period 2006-2016. The authors determine that the highest and lowest degree of contagion for commodity derivatives are with the stock market and gold market respectively and that commodity and stock markets are volatility transmitters whereas bond, FX and gold markets are volatility receivers in net terms, hence volatility is transmitted to commodity markets via stock markets only. As a matter of time-varying feature of such volatility transmission, higher values are detected for Global Financial Crisis and great Rupi depreciation of 2013-2014.

Var (2015) has studied financial contagion specifically for Turkey taking data for US, Brazilian, Indian, Hong Kong, UK, Japanese, Mexican, and Russian stock markets covering 2009-2014. According to results, volatilities on all these markets influence Turkish market's volatility, moreover asymmetries in transmission towards Turkish market have been reported from all except Indian and Japanese markets. Results of Granger causality analysis show that Indian, Brazilian, and Russian stock market returns are Granger cause of Turkish stock market returns. Those for variance decomposition indicate Turkish market returns are affected by their own lagged values to a great extent and by US market most among the foreign markets. Impulse-response functions, on the other hand, show that Turkish market reacts to shocks in US and UK markets most, and additionally shocks in Brazilian, Russian, and Indian stock markets are reported to impact Turkish market returns.

There are also studies centred on financial contagion rather than financial transmission in explaining interactions among markets in the literature we focus on. Bekiros (2014) has analysed contagion and spill-over effects of US financial crisis on BRIC countries during periods of Global Financial Crisis and Debt Crisis of Euro area. The empirical findings over American, German, Brazilian, Russian, Indian, and Chinese stock market indexes for 1999-2011 indicate increased integration of BRIC markets to international markets, hence presence of contagion effects. Similarly, Gulzar et al. (2019) have examined transmitted effects of Global Financial Crisis on emerging Asian financial markets (India, China, Pakistan, Malaysia, Russia and Korea) for the period 2005-2015, by distinguishing three subperiods, i.e. pre-crisis, crisis, post-crisis periods. The authors have found that detected long-term co-integration relationship of emerging markets has continued with an increase further to crisis and a shock in US financial markets has only short-term effects on returns in emerging markets. Celik (2012), in a similar set up have reported results confirming financial contagion effects between various emerging market economies and FX markets of developed countries during American High-risk Loan Crisis (2005-2009) after having found supporting evidence for most countries in the sample, i.e. Australia, Brazil, Canada, China, Denmark, India, Japan, Malaysia, Mexico, New Zealand, Norway, Singapore, South Africa, South Korea, Sweden, Switzerland, Taiwan, Thailand, Turkey and US. This paper also stresses that contagion has more effects on emerging markets. Baur (2012)'s research, on the other hand distinctively focuses on financial contagion effects on various sectors. Tracing the transition of Global Financial Crisis of 2007-2009 into real economies through 10 sectors in 25 leading developed and emerging markets for the period 1979-2009, the paper reports findings evidencing strong contagious linkages between Global Financial Crisis and financial sector stocks and stock markets in general.

As for the research papers centred on Turkey, Alper & Yilmaz (2004) is among the earliest studies supporting presence of financial contagion. They report contagious effects to volatility on real returns of Turkish stock market from both developed markets, i.e. finance centres like US, UK and Hong Kong and emerging markets like Brazil, South Korea, and Russia. Similarly, Atakan et al. (2010), Ayaydin (2014), Kocabas (2016), Kirac & Cicek (2017), Altan & Yildirim (2019) and Akcali et al. (2019) have affirmed contagion for Turkey for different periods, channels, and cases. As pointed out recently by Buberkoku & Kizildere (2018), the contagion channel of 2007-2008 Global Financial Crisis to Turkish financial markets is the stock market rather than FX and interest markets.

3. Econometric Methodology

3.1. Testing for Co-integration

For analyzing the long-run relationship between Turkish and the selected stock markets, we conduct the co-integration analysis. A co-integration regression model can be written as

$$y_t = \alpha + \beta X_t + \epsilon_t \tag{1a}$$

or

$$y_t = \alpha + bt + \beta X_t + \epsilon_t \tag{1b}$$

where $t = 1, \dots, T$, y_t represents the Turkish stock market, x_t denotes each of the selected foreign stock markets, α is the intercept term, b is the trend coefficient, β is the co-integration parameter, and ϵ_t is the error term. Engle & Granger (1987) propose a simple co-integration test based on conducting augmented Dickey-Fuller (ADF) unit root test of Dickey & Fuller (1979) on the residuals $\widehat{\epsilon_t}$. Phillips & Ouliaris (1990) use the same idea by conducting the Z_α and Z_t unit root tests of Phillips & Perron (1988) on the residuals. If the residuals are stationary, there is co-integration relationship between x_t and y_t.

As outlined earlier, we conduct the co-integration analysis for the total and the pre-crisis and post-crisis periods in order to investigate whether a possible co-integration relation differs across the periods. To this end, we divide the data into the pre-crisis and the post-crisis periods by considering the Global Financial Crisis as a major breakpoint. Nonetheless, determining the break date a priori to split data into the sub-periods is difficult in practice and hence is a challenge for practitioners. Gregory & Hansen (1996a,b) determine a structural break endogenously in a co-integration relation and therefore allow us to test for the existence of co-integration with a structural break. Authors extend the co-integration regressions in Equations (1a) and (1b) with a structural break. They define the level shift model, the regime shift model and the regime and trend shift model. The level shift model is given as

$$y_t = \alpha_1 + \alpha_2 D_t + \beta X_t + \epsilon_t \tag{2a}$$

and the regime shift model is given as

$$y_t = \alpha_1 + \alpha_2 D_t + \beta_1 X_t + \beta_2 (X_t D_t) + \epsilon_t \tag{2b}$$

and finally, the regime and trend shift model is given

$$y_t = \alpha_1 + \alpha_2 D_t + b_1 t + b_2 (t D_t) + \beta_1 X_t + \beta_2 (X_t D_t) + \epsilon_t \tag{2c}$$

where $D_t = \text{if } t > T_b$ and $D_t = 0$ otherwise, that T_b is the break time. We estimate the model for each regime shift $T_b \in T$, and apply then unit root test to the residuals. Gregory & Hansen (1996a) hence propose the extensions of the Engle & Granger (1987) ADF, the Phillips & Ouliaris (1990) Z_α and Z_t tests for co-integration by allowing structural break(s). The co-integration tests with a structural break denoted as ADF^*, Z_α^*, and Z_t^* are the smallest value of ADF, Z_α and Z_t tests corresponds to all possible break points.

3.2. Testing for Causality

Granger (1969) causality analysis is based on VAR(p) model, defined as

$$y_t = \gamma + \Phi_1 y_{t-1} + \cdots + \Phi_p y_{t-p} + u_t \tag{3}$$

where y_t consists of m endogenous variables, γ is the constant terms, $\Phi = (\Phi_1, \ldots, \Phi_p)'$ are autoregressive parameters and u_t are the residuals with a white-noise process. Here, y_t includes Turkish and a foreign stock market prices, and VAR(p) is a bivariate model. Since the distribution of Wald test asymptotical depends on unit root and co-integration properties of the variables, Toda and Yamamoto (1995) suggest estimating the lag-augmented VAR model by using the level variables. In Toda & Yamamoto (TY) approach a VAR(p+d) model is defined, given by

$$y_t = \gamma + \Phi_1 y_{t-1} + \cdots + \Phi_{p+d} y_{t-(p+d)} + u_t \tag{4}$$

where d is the maximum unit root degree of variables. The null hypothesis of Granger non-causality is defined as $H_o: \Phi_1 = \cdots = \Phi_p = 0$ for m^{th} element of y_t and Wald statistic has an chi-square distribution with p degrees of freedom. In some recent studies, it is shown that the bootstrap distribution leads to more powerful test statistic in small samples and is not affected from unit root and co-integration (among other, Balcilar et al., 2010). We therefore also use the bootstrap distribution of Wald statistic[3].

As in the co-integration analysis, we conduct the causality analysis for the total and the pre-crisis and post-crisis periods in order to investigate whether a possible co-integration relation differs across the periods. Besides, we also employ the causality analysis which takes structural shifts into account suggested by Nazlioglu et al. (2016) which employ a Fourier approximation in the TY approach to account for gradual breaks in Granger causality analysis. Their approach is known as the Fourier TY test that is defined as

$$y_t = \gamma(t) + \Phi_1 y_{t-1} + \cdots + \Phi_{p+d} y_{t-(p+d)} + u_t \tag{5}$$

where the constant $\gamma(t)$ depends on time and has hence structural shifts in y_t. Fourier approximation models gradual structural shifts, defined as

$$\gamma(t) = \gamma_0 + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) \tag{6}$$

where k is the Fourier frequency. Substituting Eqn. (6) into Eqn. (2) yields

$$y_t = \gamma_0 + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) + \Phi_1 y_{t-1} + \cdots + \Phi_{p+d} y_{t-(p+d)} + u_t \tag{7}$$

Eqn. (7) necessitates to determine the Fourier frequency k and lag length p. Following Nazlioglu et al. (2016), we determine optimal frequency and lags by Schwarz information criterion.

4. Data

We take SPX and DAX indexes to represent the developed markets since US and Germany are the most important trade partners of Turkey. IBOV, RTSI, NIFTY and SHCOMP stock indexes of BRIC (Brazil, Russia, India, and China) countries make up the sample set for the emerging markets. These indicative indexes are all chosen since we believe they portray best the strength of economies and deepness of financial markets they are related. Moreover, overall level of exposure to crisis can be deduced from their trends. The dataset includes 5181 daily closing prices of listed indexes obtained from

[3] To save space, we do not provide details of the bootstrapping method here and refer to Balcilar et al. (2010).

Bloomberg database and covers the period 04.01.2000-12.11.2019.

In order to assess the effects of crisis better, the whole period is split into subperiods in empirical papers. Following this practice, we conduct our analysis for the whole period (04.01.2000-12.11.2019), and additionally for the two subperiods, i.e. pre-crisis period (04.01.2000-21.02.2007) and post-crisis period (22.02.2007-12.11.2019). In determining sub-periods, we adopt Bekiros (2014)'s view, which takes 22.07.2007 as a break point of crisis. The largest loss ever reported in regard to sub-prime loans, amounting to 10.5 million USD by HSBC, was declared on this day (Bekiros, 2014).

5. Empirical Findings

Figures 1 and 2 show the dynamics of price and return series respectively. Downward trend on all indexes after the outbreak of 2008 Financial Crisis is remarkable. Moreover, indexes are observed to rise after crisis becomes ineffective. The important point suggested by the dynamics of return series (Figure 2) is that 2008 Economic Crisis have resulted in increased volatility and overall mean in return series.

Descriptive statistics for price and return series are presented in Table 1. In general, increase in standard deviations compared to pre-crisis period implies increased volatility after crisis. Moreover, sudden drops in means are observed for post-crisis period. Skewness and kurtosis values indicate overall departure from normality. We notice that means and standard deviations of price series, except for Russia, are higher in post-crisis period compared to their pre-crisis values. This end can be interpreted as an indicator for increased price volatilities after the crisis.

The correlation matrix reported in Table 2 indicates positive correlations between markets in general. Significant increases in these after crisis when compared to those in pre-crisis period are also noticeable. Correlation coefficients have at least doubled in post-crisis period, indicating contagion among markets. Dimitriou et al. (2013) argue that there was no contagion effects for BRICS countries in the early stages of crisis, yet relations were recoupled further to failure of Lehman Brothers, and conclude that correlations between BRICS countries and US have increased since 2009. Their findings do not suggest contagion for all BRICS countries, and this end is justified by joint trade and financial setup of countries.

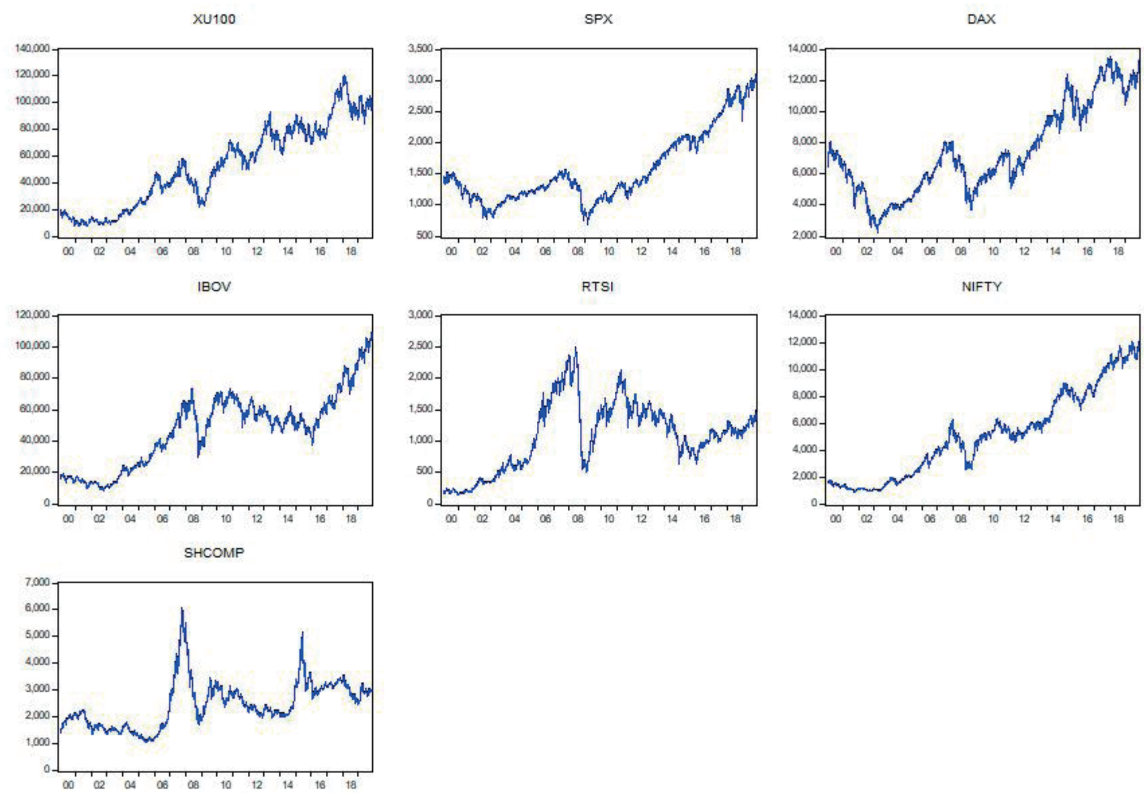


Figure 1: Price Series

Chinese market shows mostly lower correlations, hence no connectedness with other markets. Having the least relation with other markets, China has negative relations with US and Germany before crisis, yet these turned out to be positive in post-crisis period. The change of correlations between developed countries and China in the positive direction before and after the crisis can be explained by common trade and financial frames of China with US and Germany rather than contagion effects as argued by Dimitriou et al. (2013). The high positive correlations of SPX with both DAX and IBOV before crisis are observed to hold up with some increases in the post-crisis period. Correlations of BIST100 with SPX, DAX, NIFTY and SHCOMP in post-crisis period have indeed climbed to approximately 3.5, 2.5, 2.5 and 6 times of their pre-crisis values, respectively. While this finding can be evaluated on the notion which implies positive high correlation increases the probability of systematic risk exposure, it can be interpreted as argued by Forbes & Rigobon (2002) as well. According to this view, the persistence and even increases in positive correlations of pre-crisis period in the post-crisis period can be explained by *interdependence*.

The first step of co-integration analysis is to examine the unit root properties of the variables, because the co-integration tests outlined earlier are assumes that that and are integrated at order one. This means that one can proceed with testing for the existence of the long-run co-integration relationship, if the series are not stationary in the levels and are stationary in the first differences. Furthermore, the TY method also requires to determine maximum unit root degree (d) of the series. The visual examination, descriptive statistics and correlation analysis of the data are likely to signal that the stock market prices experienced structural shift(s), particularly during the 2008 Financial Turmoil. We therefore concentrate on the unit root tests that take such changes into account. In that respect, we conduct Dickey & Fuller (1979) augmented Dickey & Fuller (ADF) test, Zivot & Andrews (1992) test with a break (ZA-ADF), and Enders & Lee (2012) test with a Fourier approximation (F-ADF)[4]. The results from the unit root tests are reported in Table 3. For the level

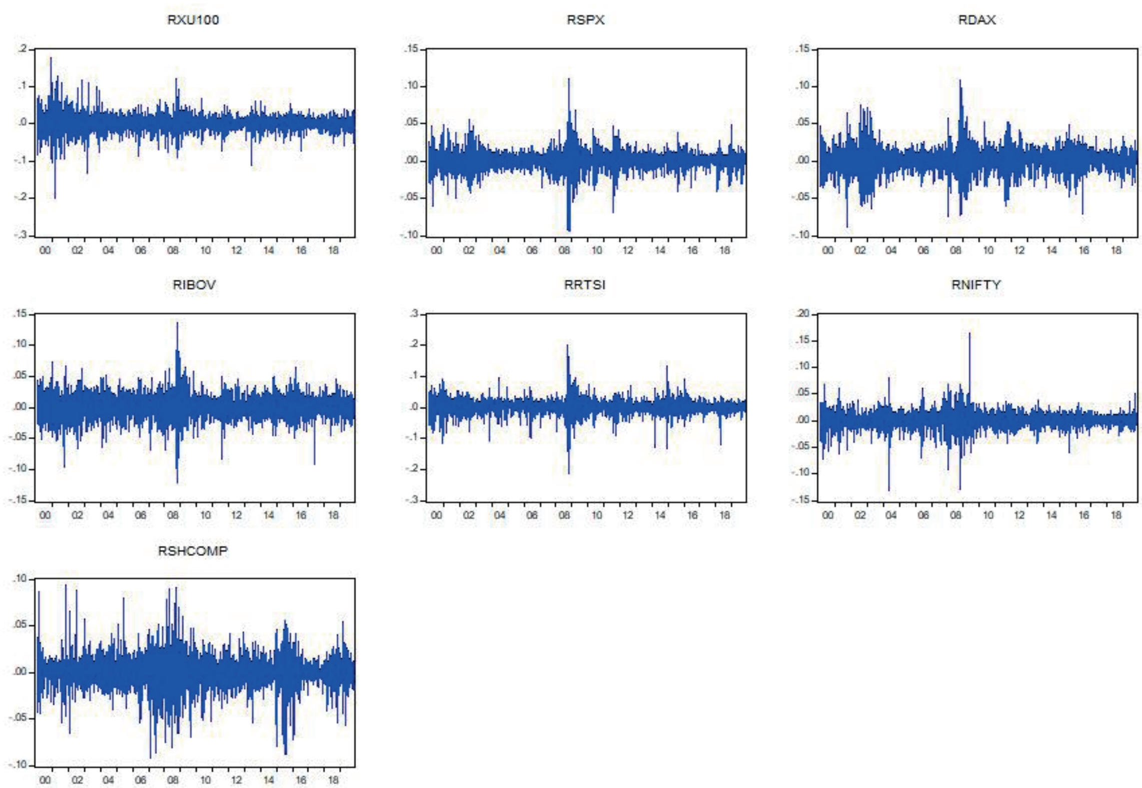


Figure 2*:* Return Series

[4] For the details of these test, we refer to the cited articles. We use GAUSS tspdlib of Nazlioglu (2019) to conduct Zivot and Andrews (1992) and Enders and Lee (2012) unit root tests.

log-prices, all the tests cannot reject the null hypothesis of unit root irrespective of whether the model includes constant or constant and trend. For the first differenced prices (i.e. returns), all the unit root tests reject the null of unit root at 1 percent level of significance hence strongly support the evidence on stationarity for the stock markets returns. The estimated break dates from the Zivot and Andrews procedure indicate that the time of structural breaks do not seem to be same for each stock market. This result in fact is expected due to the fact that a response of one market can be different from another market because of investor behaviours.

Given the existence of a unit root in the level log-prices, we proceed with the co-integration analysis. To this end, we first conduct Engle & Granger (1987) and Phillips & Ouliaris (1990) co-integration tests for the total, the pre-crisis and the post-crisis periods. The results for the total period in the Panel A of Table 4 indicate that even though the co-integration tests for the mode with constant provides an evidence on the existence of the long-run co-integration relationship only between Turkish and Indian stock markets, the test for the model with constant and trend support a strong co-integration nexus between Turkish and both the developed and emerging economies stock markets.

As Perron (1989) points out, ignoring the possible effects of structural breaks can lead to a false rejection of the null hypothesis. At first glance, the co-integration relationship between the Turkish and the selected stock markets are slightly different from those for the total period. The results for the pre-crisis period in the Panel B show that there is a co-integration relationship for Turkey with Brazil, India, and Germany at least 10 percent level for the model with constant. In the post crisis-period, we find evidence on the co-integration relationship between Turkey and Germany and between Turkey and India. However, the inclusion of a deterministic trend in a co-integration relation leads to changes in the results for both the pre- and post-crisis periods. Even though an eye look at the Turkish stock market prices in Figure 1 might signal an existence of deterministic trend in the pre-crisis period, there is not any such clear evidence in the pre-crisis period.

As discussed in Gregory & Hansen (1996a), the breaks may cause a level or regime shift in a co-integration relation and splitting the data into sub-samples may not able to capture such dynamics. Furthermore, it is difficult to know the break date *a priori* to split data in practice. We hence further employ the co-integration tests with a break proposed by Gregory & Hansen (1996a,b) that determine a structural break endogenously in a co-integration relation. The results in Table 5 indicate an evidence on the prevalence of the co-integration relationship between Turkey and India. The results also shed light on the evidence of a co-integration relationship between Turkey and the developed economies (USA and Germany) stock market prices when we consider a regime and trend shift in the co-integration relation.

As it is discussed earlier, the contagion phenomenon implies co-movement between stock markets. Our co-integration analysis first indicates that taking the structural breaks into account in the co-integration relations between Turkey and the developed and the BRICS countries play an important role to detect the existence of the long-run co-movements. It second supports an evidence of the contagion from the developed stock markets as well as from India. These relations hence imply that international investors can make a portfolio diversification between Turkey and BRICS countries except India.

Results from Toda & Yamamoto causality test are presented in Table 6. According to these, we obtain one-way causality relationships to Turkish stock market from US and Germany, and two-way causality relationships between Turkey, Brazil and India when structural breaks are not considered. Briefly, two types of causality relations are present, a unidirectional one from developed countries to Turkey, and a bidirectional one between BRIC countries, excluding Russia, and Turkey. Whereas one-way causality relations from developed countries to Turkey bring contagion outcomes into mind, the feedback relations Turkey has with Brazil, India and China can be justified by interdependence, which is substantiated within the context of mutual trade and financial infrastructures. As a matter of fact, Brazil, Russia, India, and China, which are among emerging economies, are similar countries in terms of their rapid growth potential, booming domestic demand, attractive foreign investment environment, and additionally low per capita income. Shocks triggered by countries' geopolitical positions and conditions marked by economic uncertainties can result in sudden changes in the direction of foreign capital flows to these countries and similar structural breaks in their economies. From this point of view, such an interdependence relationship for Turkey, which is among the emerging economies with compatible financial and economic structure as BRIC countries, comes out to be significant for both determining leading indicators related to financial deepening and macroeconomic stability, and portfolio diversification facilities for individual investors.

We reach neutrality finding between Turkey and Russia, which implies lack of impact in between. Considering Turkish and Russian stock markets can mutually be considered safe heaven with one another, this finding can be regarded as a portfolio diversification opportunity for investors.

The summary of Toda & Yamamoto causality test with a Fourier Approximation is reported in Table 2. The motivation behind selecting this methodology is its incorporation of structural breaks in the analysis and providing information on breaks in a flexible way, with no dependence on prior forecasts for number and time of possible break points. The result of the test indicates validity of one-way causality relation from US and German markets to Turkish stock market and two-way causality relation between Turkish, Brazilian and Indian markets. These findings of the analysis are in line with causality analysis which does not account for structural breaks. However, allowing for structural breaks has led to changes in findings of the causality tests of Turkey with Russian and Chinese markets. While Toda & Yamamoto causality analysis which has no reference to breaks does not indicate any causality relation between Turkish and Russian markets, we observe one-way causality relation from Turkey to Russia through this analysis which considers such possible breaks. Similarly, one-way causality relation from Turkey to China is detected when breaks are allowed, whereas the former test attests causality relations in both ways. In consequence, we obtain one-way causality relations from developed countries to Turkey, and one-way causality relations between the emerging economies of Russia and China with Turkey, additionally two-way causality relations between Turkey, Brazil, and India.

In this respect, one-way causality relations from developed and emerging countries to Turkey, and feedback relations between Turkey and emerging markets can be explained by contagion and interdependence, respectively. Moreover, we stress the finding which indicates that the direction of causality, in case of China and Russia, is affected by breaks.

6. Conclusion and Discussion

The preliminary findings through descriptive statistics of this paper, which examines financial contagion phenomenon between Turkish stock market and developed markets of US and Germany, and also emerging markets of Brazil, Russia, India, China (BRIC) using co-integration analysis allowing for structural breaks (Engle & Granger, 1987; Phillips & Ouliaris, 1990; Gregory & Hansen, 1996a) and causality analysis (Toda & Yamamoto, 1995; Nazlioglu et al., 2019) along with correlation analysis, remark that the means and standard deviations of price series are higher in post-crisis period than before crisis for all economies apart from Russia. This outlook can be interpreted as an indication for increased price volatilities in post-crisis era. Hence, initial findings for noticeable rise in volatilities can be regarded as primary evidence for contagion in terms of the definition suggested by Forbes & Rigobon (2002).

On the other hand, change in correlation in between developed countries in the positive direction before and after the crisis can be attributed to joint trade and financial settings of countries rather than contagion (Dimitriou et al., 2013). The correlations of SHCOMP with SPX and DAX analysed in this paper can be regarded in this vein. A similar connection which refers to the persistence of high positive correlation of SPX with DAX and IBOV before the crisis with some increase in post-crisis period has also been observed in BIST100 index with developed and other emerging economies, but with a lesser extent. Besides implying increased exposure to systematic risk jointly, high positive correlation between financial markets of countries brings *interdependence* phenomenon forward as highlighted by Forbes & Rigobon (2002) and Dimitriou et al. (2013). In fact, similar characteristics of Brazil, Russia, India and China from among emerging economies with the Turkish economy, e.g. rapid growth potential, roaring domestic demand and attractiveness for foreign investors, could set ground for sudden changes in the direction of foreign capital flows in these countries and occurrence of comparable structural breaks, especially via shocks triggered by economic uncertainties. This dependence relation, as brought about here specifically for Turkey, may accommodate potential for both creating portfolio diversification for individual investors and being an economic indicator concerning financial deepening and macroeconomic stability.

With no prior practice within contagion framework and the Turkish stock market, co-integration analysis allowing for structural breaks implemented here has manifested co-integration relation between BIST100 and NIFTY for all break specifications, and those for Turkish market with the developed indexes, SPX and DAX in case of regime and trend shifts. This end can also be considered as other indications for contagion between Turkey and developed markets, and interdependence between Turkey and emerging markets. Our findings for contagion and interdependence through correlation and co-integration analyses are in parallel with those in literature (Kirac & Cicek, 2017; Ayaydin, 2014; Islam et al., 2013; Bekiros, 2014; Gulzar et al., 2019; Celik, 2012; Kocabas, 2016) as well.

Furthermore, the causality analysis accounting for structural breaks substantiates one-way causality relations from developed market samples, SPX, and DAX, to BIST100; two-way causality relations of BIST100 with IBOV and NIFTY; and finally, one-way causality relations between RTSI and SHCOMP with BIST100 index. The common findings of correlation, co-integration and causality analyses, where the latter two take structural breaks into account, can be viewed to correspond to contagion phenomenon in terms of one-way causality relations from developed countries, US and Germany, and from emerging economies of Russia and China to Turkey; and to interdependence phenomenon in terms of two-way causality (feedback) relations of emerging economies of Brazil and India with Turkey. In this respect, we conclude that possible shocks arising both from US and Germany, which are developed markets, and from Chinese and Russian emerging stock markets have high probability of contagion to Turkish stock markets.

Studies in this domain can be extended with causality approach considering volatility transmissions, and co-integration and causality approaches focusing on quartiles of distribution in the future. Moreover, empirical work is also possible to explain reasons of contagion by integrating risk factors due to geopolitical positions of countries.

References

Akcali Yasar, B., Mollaahmetoglu, E. & Altay, E. (2019). Contagion analysis of interest rates, inflation and exchange rate shocks in Turkey by implementing arma-egarch model, *Istanbul Gelisim Universitesi Sosyal Bilimler Dergisi*, Gelisim-UWE 2019 Özel sayi, 29-43.

Alper, E. C. ve K., Yilmaz. (2004). Volatility and contagion: evidence from the İstanbul stock exchange. *Economic Systems*. 28, 353–367.

Altan, I.M. & Yildirim, M. (2019). Uluslararasi finansal piyasalarda bulasma etkisi, *II. International Conference on Empirical and Social Sciences (ICEESS' 19),* June 20-21-22, 2019. Bandirma, 452-459.

Atakan, T., Gumrah, U. & Gokbulut Ilker, R. (2010). Contagion effects of the credit crisis in financial markets of the United States to emerging countries: an evidence from Turkey, *Trakya Universitesi Sosyal Bilimler Dergisi,* 12(1),388-414.

Ayaydin, H. (2014). A study on the relationship between international diversification, financial contagion, and the global financial crisis. *Ataturk University Journal of Economics & Administrative Sciences*, 28 (3), 43-67.

Balcilar, M., Ozdemir, Z.A., Arslanturk, Y. (2010). Economic growth and energy consumption causal nexus viewed through a bootstrap rolling window. *Energy Economics*, 32, 1398-1410.

Baur, D.G., (2012). Financial contagion and the real economy. *Journal Of Banking & Finance*, 36, 2680-2692.

Bekiros, D.S. (2014). Contagion, decoupling and the spillover effects of the US financial crisis: evidence from the bric markets. *International Review Of Financial Analysis,* 33, 58-69.

Buberkoku, Ö & Kizildere, C. (2018). Has the turkish economy experienced a contagion effect from the global financial crisis?. *Journal of Business Research-Turk* 10(4) 1272-1297.

Celik, S. (2012). The more contagion effect on emerging markets: the evidence of dcc-garch model. *Economic Modelling,* 29, 1946-1959.

Chancharoenchai, K. & Dibooglu, S. (2006). Volatility spillovers and contagion during the asian crisis: evidence from six southeast asian stock markets. *Emerging Markets Finance and Trade,* 42, 4-17. doi: 10.2753/REE1540-496X420201.

Dickey, D.A., Fuller, W.A., (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Society*, 75, 427–431.

Dimitriou, D., Kenourgios, D., Simos,T., (2013). Global financial crisis and emerging stock market contagion: a multivariate fıaparch-dcc approach. *International Review of Financial Analysis*, 30, 46-56.

Enders, W., Lee, J., (2012). The flexible fourier form and dickey-fuller type unit root tests. *Economics Letters*, 117, 196-199.

Enders, W., & Jones, P. (2016). Grain prices, oil prices, and multiple smooth breaks in a VAR. *Studies in Nonlinear Dynamics & Econometrics*, 20(4), 399-419.

Engle, R. F., and Granger, C. W. J. (1987). Co-integration and error correction: representation, estimation and testing. *Econometrica*, 55, 251-276.

Forbes, K. J., Rigobon, R. (2002). No contagion, only interdependence: measuring stock market comovements. *Journal of Finance*, 57(5): 2223-2261.

Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of The Econometric Society*, 424-438.

Gregory, A.W., Hansen, B., (1996a). Residual-based tests for cointegration ın models with regime shifts. *Journal of Econometrics*, 70, 99-126.

Gregory, A. W., & Hansen, B. E. (1996b). Practitioners corner: tests for cointegration in models with regime and trend shifts. *Oxford Bulletin of Economics and Statistics*, *58*(3), 555-560.

Gulzar, S., Mujtaba Kayani, G., Xiaofeng, H., Ayub, U., & Rafique, A. (2019). Financial cointegration and spillover effect of global financial crisis: a study of emerging asian financial markets. *Economic Research-Ekonomska Istraživanja*, *32*(1), 187-218.

Islam, Raisul, M. Talhatul Islam and A. Hannan Chowdhury; (2013). Testing for global volatility spillover, financial contagion and structural break in fifteen economies from two regions: a diagonal vech matrix and egarch (1,1) approach. *International Journal of Economics and Finance*, 5(5), 159-170.

Kirac, F. & Cicek, M. (2017). Mortgage krizinin uluslararası hisse senetleri piyasası üzerine bulaşma etkisi. *Sosyal Bilimler Dergisi/Journal of Social Sciences*, 1, Nisan, 75-97.

Kocabaş, C. (2016). 2008 krizinin bulaşma etkisi: bir finansal kriz göstergesi olarak hisse senedi fiyat endeksi üzerine bir analiz. *Sosyal Arastirmalar ve Davranis Bilimleri Dergisi- Journal of Social Research and Behavioral Sciences,* 2, Özel sayı, 1-23.

Nazlioglu, S., Gormus, N. A., & Soytas, U. (2016). Oil prices and real estate investment trusts (reıts): gradual-shift causality and volatility transmission analysis. *Energy* Economics, 60, 168-175.

Nazlioglu, S. (2019). GAUSS Time series and panel data tests package (tspdlib), https://github.com/aptech/tspdlib.

Pericoli, M. & Sbracia, M. (2003). "A primer on financial contagion. *Journal of Economic Surveys*, 17(4), 571-608.

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

Phillips, P. C., & Ouliaris, S. (1990). Asymptotic properties of residual based tests for cointegration. *Econometrica: Journal of the Econometric Society*, 165-193.

Phillips, P. C. B., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, 75, 335–346. doi:10.2307/2336182

Polat, O. (2018). Hisse senedi piyasalarında finansal bağlantılılık analizi. *Politik Ekonomik Kuram,* Cilt:2, Sayi:1, ss.73-86.

Rigobon, R. (2016). Staff Working Paper No. 607 Contagion, spillover and interdependence.

Roy, R. P., & Roy, S. S. (2017). Financial contagion and volatility spillover: an exploration into indian commodity derivative market. *Economic Modelling*, *67*, 368-380.

Samarakoon, L.P. (2011). Stock market interdependence, contagion, and the U.S. financial crisis: the case of emerging and frontier markets. *Journal Of International Financial Markets, Institutions&Money,* 21, 724-742.

Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics*, 66(1-2), 225-250.

Var, U. (2015). Türkiye ile Bazı Gelişmiş ve Gelişmekte Olan Ülkelerin Hisse Senedi Piyasaları Arasındaki Getiri ve Volatilite Yayılma İlişkisi ile Entegrasyonun Analizi (2009-2014). (Yayımlanmamış Yüksek Lisans Tezi). İstanbul Teknik Üniversitesi Fen Bilimleri Enstitüsü İşletme Mühendisliği Anabilim Dalı, İstanbul.

Ventosa-Santaulària, D., & Vera-Valdés, J. E. (2008). Granger-causality in the presence of structural breaks. *Economics Bulletin*, 3(61).

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

Appendix

Table A1: Summary of Literature

Reference	Countries	Method(s)	Finding
Gulzar et al. (2019)	India, China, Pakistan, Malaysia, Russia, Korea	Johansen and GARCH-BEKK	Co-integration between US and emerging markets is reported.
Altan & Yildirim (2019)	US, Turkey	ARDL Boundary Test	Negative/Positive relationship in the long/short terms between markets.
Akcali et al. (2019)	Turkey	ARMA-EGARCH	Contagion effects are valid between variables of interest.
Polat (2018)	G-7, Norway, Turkey	VAR based on historical volatility	Highest financial risk transmission is reported for US, followed by UK, and lowest for Turkey.
Buberkoku & Kizildere (2018)	America, Turkey	AR(p)-DBEKK-GARCH, AR(p)-SBEKK-GARCH	2008 Crisis has impacted Turkey the most.
Roy & Sinha Roy (2017)	India	DCC-MGARCH	Financial contagion is highest with stock market and lowest with gold market for commodity derivatives.
Kirac & Cicek (2017)	11 countries	DCC-GARCH	Contagion effects are higher especially in crisis period for high-income countries.
Kocabas (2016)	25 countries	ARCH-GARCH MA (1)-GARCH (1,1)-M	Countries which are highly integrated with US financial markets are more sensitive to crisis. Evidence for contagion is reported.
Bekiros (2014)	BRICS, US, Germany	VAR and multiple GARCH	There are contagion effects in BRICS markets following the American financial crisis.
Ayaydin (2014)	24 developed and 21 emerging markets	Correlation analysis	Financial contagion between developed and emerging markets is reported
Dimitriou et al. (2013)	BRICS and America	ARCH (FIAPARCH), (DCC)	Correlations have increased since the beginning of 2009.
Islam et al. (2013)	15 countries	GARCH Diagonal VECH, EGARCH	Volatility spillover between Asia-Pacific countries is more dominant than international contagion.
Celik (2012)	21 countries	DCC-GARCH	Contagion is valid for most countries. Higher contagion effects are found for emerging markets.
Baur (2012)	25 developed and developing countries, 10 sectors.	Asymmetric GJR-GARCH	Health, telecommunications and some sub-sectors in Tech. have been affected the least from crisis.
Samarakoon (2011)	62 countries	Regression Estimation	Source of contagion is shocks in emerging markets.

Table A1: continued. Summary of Literature

Reference	Countries	Method(s)	Finding
Atakan et al. (2010)	US, Turkey	Granger Causality, IRF, Variance Decomposition	While impact of IMKB-100 on USD increases, domestic interest rates become less influential in crisis period.
Chancharoenchai & Dibooglu (2006)	US, Japan, Thailand, Philippines, Indonesia, Malaysia, S. Korea, Taiwan	GARCH-M	Crisis has been spread to other countries. This supports "Asian contagion" idea.
Alper & Yilmaz (2004)	US, UK, H.Kong, Brazil, S. Korea, Russia, Turkey	Rolling regression analysis, GARCH	There is evidence for contagion towards Turkey.

Table 1: Descriptive Statistics

Panel A: Price	XU100	SPX	DAX	IBOV	RTSI	NIFTY	SHCOMP
			Total Period				
Mean	52406.880	1563.960	7401.662	47261.34	1075.656	5092.581	2451.928
Std. Dev.	30641.720	572.866	2851.090	23538.13	547.460	3175.956	886.380
Skewness	0.143	0.978	0.448	0.104	0.078	0.414	0.881
Kurtosis	1.849	2.899	2.127	2.380	2.266	2.107	4.186
J-B	303.618	828.079	337.539	92.443	121.446	319.851	974.243
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Pre-Crisis				
Mean	20002.07	1180.521	4986.300	21080.58	620.045	1790.860	1613.908
Std. Dev.	11008.74	169.434	1353.512	9586.659	476.341	854.365	345.022
Skewness	0.910	-0.137	0.174	0.874	1.251	1.186	0.951
Kurtosis	2.504	2.432	2.0529	2.668	3.492	3.380	4.551
J-B	276.087	30.787	79.027	245.838	504.461	447.985	467.182
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Post-Crisis				
Mean	70586.38	1779.074	8756.710	61949.07	1331.260	6944.887	2922.068
Std. Dev.	21862.47	606.172	2559.734	14593.48	398.494	2405.835	737.971
Skewness	-0.059	0.406	0.129	1.045	0.518	0.430	1.398
Kurtosis	2.421	2.054	1.756	4.056	2.873	2.096	5.683
J-B	48.216	214.798	223.008	759.270	150.839	215.484	2077.775
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Panel B: Return			Total Period				
Mean	0.0003	0.0002	0.0001	0.0004	0.0004	0.0004	0.0001
Std. Dev.	0.020	0.012	0.014	0.017	0.021	0.014	0.015
Skewness	-0.061	-0.225	-0.057	-0.108	-0.442	-0.295	-0.359
Kurtosis	11.501	12.036	7.856	7.283	12.502	12.923	8.490
J-B	15600.38	17667.49	5091.47	3969.76	19654.07	21325.56	6617.02
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Pre-Crisis				
Mean	0.0005	0.0000	0.0000	0.0006	0.0013	0.0005	0.0004
Std. Dev.	0.026	0.011	0.016	0.018	0.021	0.015	0.013
Skewness	0.017	0.122	-0.087	-0.198	-0.551	-0.779	0.570
Kurtosis	9.432	5.910	6.011	4.107	6.294	8.998	8.585
J-B	3207.52	661.11	705.18	107.23	935.72	2977.78	2519.20
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Post-Crisis				
Mean	0.0003	0.0002	0.0002	0.0003	-0.0001	0.0003	0.0000
Std. Dev.	0.016	0.012	0.014	0.017	0.021	0.013	0.016
Skewness	-0.270	-0.371	-0.022	-0.049	-0.381	0.070	-0.649
Kurtosis	7.439	14.214	9.419	9.537	16.099	15.999	8.150
J-B	2765.58	17466.53	5698.02	5910.48	23807.27	23373.22	3900.75
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Total period is from 04.01.2000 to 12.11.2019 (5181 observations), pre-crisis period is from 04.01.2000 to 21.02.2007 (1862 observations), and post-crisis period is from 22.02.2007 to 12.11.2019 (3319 observations).

Table 2: Correlation coefficients

Total Period	RXU100	RSPX	RDAX	RIBOV	RRTSI	RNIFTY
RXU100	-					
RSPX	0.2197	-				
RDAX	0.3295	0.5933	-			
RIBOV	0.2637	0.5742	0.4437	-		
RRTSI	0.3695	0.2891	0.4180	0.3251	-	
RNIFTY	0.2382	0.2054	0.3016	0.2279	0.3163	-
RSHCOMP	0.0825	0.0618	0.1017	0.1145	0.1346	0.1812
Pre-crisis						
RXU100	-					
RSPX	0.0962	-				
RDAX	0.1972	0.5747	-			
RIBOV	0.1925	0.4782	0.3730	-		
RRTSI	0.2946	0.1763	0.2774	0.1968	-	
RNIFTY	0.1366	0.0703	0.1565	0.1277	0.2227	-
RSHCOMP	0.0271	-0.0062	-0.0087	0.0293	0.0014	0.0478
Post-crisis						
RXU100	-					
RSPX	0.3430	-				
RDAX	0.4854	0.6121	-			
RIBOV	0.3476	0.6290	0.4944	-		
RRTSI	0.4629	0.3479	0.5139	0.4021	-	
RNIFTY	0.3531	0.2827	0.4076	0.2940	0.3751	-
RSHCOMP	0.1342	0.0908	0.1646	0.1579	0.1975	0.2525

Table 3: Results from unit root tests

	Level (log-prices)					First- Difference (Return)				
Constant	ADF	ZA-ADF	TB	F-ADF	f	ADF	ZA-ADF	TB	F-ADF	f
XU100	-0.893	-4.661*	09/05/2003	-1.211	3	-71.679***	-71.789***	06/24/2002	-71.711***	3
SPX	-0.01	-3.692	10/30/2007	-0.425	3	-55.531***	-55.724***	03/05/2009	-55.597***	3
DAX	-0.768	-3.54	03/18/2002	-1.046	3	-73.215***	-52.389***	03/10/2003	-73.261***	3
IBOV	-0.878	-3.609	08/05/2003	-1.525	2	-72.242***	-72.295***	10/14/2002	-72.262***	3
RTSI	-2.218	-2.962	04/03/2003	-2.616	3	-66.005***	-66.108***	05/15/2008	-66.046***	1
NIFTY	-0.456	-4.272	06/22/2004	-0.698	2	-68.058***	-68.094***	04/23/2003	-68.095***	2
SHCOMP	-1.749	-3.428	03/09/2006	-2.505	2	-29.392***	-33.892***	10/12/2007	-29.478***	3
Constant & trend										
XU100	-2.652*	-4.602*	07/29/2003	-3.844**	1	-71.672***	-71.815***	02/23/2003	-71.705***	3
SPX	-2.173	-4.514	06/04/2008	-2.328	3	-55.563***	-55.719***	03/05/2009	-55.608***	3
DAX	-2.738*	-4.369	03/11/2003	-3.05	3	-73.223***	-52.476***	03/10/2003	-73.259***	3
IBOV	-1.896	-3.754	02/25/2003	-3.176	1	-72.235***	-72.311***	10/14/2002	-72.281***	1
RTSI	-1.895	-4.023	06/18/2008	-3.309	1	-66.018***	-66.103***	05/15/2008	-66.041***	1
NIFTY	-2.488	-4.307	05/09/2003	-3.474	1	-68.053***	-68.134***	04/23/2003	-68.088***	2
SHCOMP	-1.892	-3.879	03/09/2006	-2.12	3	-29.392***	-33.940***	10/12/2007	-29.476***	3

Notes: Schwarz criterion was used to select the optimal lag from maximum 12 lags. The Fourier frequency was determined by minimizing residuals sum of squares. The critical values are -3.433 (1%), -2.862 (5%), -2.567 (10%) for ADF; -5.34 (1%), -4.80 (5%), -4.58 (10%) for ZA-ADF; and -4.31 (1%), -3.75 (5%), -3.45 (10%) for F-ADF. * (10%), ** (5%), and *** (1%).

Table 4: Results from cointegration tests without structural breaks

	SPX		DAX		IBOV		RTSI		NIFTY		SHCOMP	
Constant	*Panel A: Total Period*											
ADF	-2.185		-2.919		-2.137		-0.652		-3.977	***	-1.280	
Z_t	-2.078		-2.804		-1.903		-0.662		-3.655	**	-1.239	
Z_α	-7.669		-13.619		-7.891		-1.521		-27.686	**	-4.036	
Constant and trend												
ADF	-3.941	**	-4.134	**	-3.926	**	-3.990	**	-4.187	**	-4.061	**
Z_t	-3.896	**	-4.136	**	-3.844	**	-4.008	**	-4.000	**	-4.054	**
Z_α	-29.855	**	-33.933	**	-27.777	**	-29.388	**	-32.117	**	-30.545	**
Constant	*Panel B: Pre-crisis*											
ADF	-0.792		-0.103		-3.414	**	-2.315		-3.072	*	1.272	
Z_t	-0.634		-0.03		-3.278	*	-2.167		-2.984		1.311	
Z_α	-1.272		-0.05		-22.035	**	-8.508		-19.043	*	2.430	
Constant and trend												
ADF	-3.603		-4.093	**	-3.517		-2.372		-3.229		-2.591	
Z_t	-3.501		-3.914	**	-3.440		-2.230		-3.143		-2.591	
Z_α	-21.981		-25.293	*	-23.094		-8.685		-20.448		-8.422	
Constant	*Panel C: Post-crisis*											
ADF	-2.932		-3.298	*	-1.701		-1.353		-3.329	*	-1.193	
Z_t	-2.919		-3.245	*	-1.585		-1.413		-3.082	*	-1.184	
Z_α	-15.935		-20.009	*	-4.794		-4.873		19.271	*	-3.169	
Constant and trend												
ADF	-3.227		-3.361		-3.158		-3.361		-3.377		-3.421	
Z_t	-3.167		-3.374		-3.092		-3.402		-3.236		-3.397	
Z_α	-20.192		-22.759		-19.083		-23.473	*	-21.104		-22.629	

Notes: We use Schwarz information criterion for ADF^* test with maximum 12 lag; and Bartlett with 4(T/100)^(2/9) for Z_t^* and Z_α^* tests. The critical values for *ADF* and Z_t tests are -3.962 (1%), -3.365 (5%), -3.066 (10%) for the constant model and -4.363 (1%), -3.800 (5%), -3.518 (10%) for the constant and trend model. The critical values for Z_α test are -28.322 (1%), -20.494 (5%), -17.039 (10%) for the constant model and -35.419 (1%), -27.087 (5%), -23.192 (10%) for the constant and trend model. * (10%), ** (5%), and *** (1%).

Table 5: Results from cointegration tests with structural breaks

Level shift	SPX		DAX		IBOV		RTSI		NIFTY		SHCOMP
ADF^*	-3.659		-4.236		-4.250		-3.547		-4.717	**	-2.998
Z_t^*	-3.505		-4.114		-4.127		-3.577		-4.473	*	-2.936
Z_α^*	-24.199		-33.859		-35.986		-25.726		-40.291	*	-18.628
Regime shift											
ADF^*	-4.057		-4.029		-4.679		-3.582		-5.308	**	-3.079
Z_t^*	-3.827		-3.934		-4.609		-3.590		-5.009	**	-2.996
Z_α^*	-28.122		-30.831		-42.604	*	-28.722		-49.892	**	-19.348
Regime and trend shift											
ADF^*	-5.283	*	-5.345	*	-5.039		-4.966		-5.299	*	-4.727
Z_t^*	-5.291	*	-5.264	*	-4.682		-4.868		-5.007		-4.600
Z_α^*	-28.122		-30.831		-42.604		-28.722		-49.892		-19.348

Notes: ADF^*, Z_t^*, and Z_α^* are Gregory and Hansen (1996a, 1996b) co-integration tests with a break. We use Schwarz information criterion for ADF^* test with maximum 12 lag; and Bartlett kernel with the bandwidth 4(T/100)^(2/9) for Z_t^* and Z_α^* tests. The critical values for ADF^* and Z_t^* tests are -5.130 (1%), -4.610 (5%), -4.340 (10%) for the level shift model; -5.470 (1%), -4.950 (5%), -4.680 (10%) for the regime shift model; and -6.020 (1%), -5.500 (5%), -5.240 (10%) for the regime and trend shift model. The critical values for Z_α^* test are -50.070 (1%), -40.480 (5%), -36.190 (10%) for the level shift model; -57.170 (1%), -47.040 (5%), -41.850 (10%) for the regime shift model; and -69.370 (1%), -58.580 (5%), -53.310 (10%) for the regime and trend shift model. * (10%), ** (5%), and *** (1%).

Table 6: Results from Toda & Yamamoto causality test

Panel A: Total Period	Lag(p)	Wald		p-value[a]	p-value[b]
SPX ≠>XU100	2	172.444	***	0.000	0.000
DAX ≠>XU100	1	22.362	***	0.000	0.000
IBOV ≠>XU100	2	151.087	***	0.000	0.000
RTSI ≠>XU100	2	3.955		0.138	0.141
NIFTY ≠>XU100	1	9.682	***	0.002	0.001
SHCOMP ≠>XU100	1	2.646	*	0.104	0.095
XU100 ≠>SPX	2	0.169		0.919	0.923
XU100 ≠>DAX	1	0.129		0.719	0.721
XU100 ≠>IBOV	2	5.364	*	0.068	0.070
XU100 ≠>RTSI	2	4.328		0.115	0.117
XU100 ≠>NIFTY	1	11.636	***	0.001	0.000
XU100 ≠>SHCOMP	1	30.064	***	0.000	0.000
Panel B: Pre-crisis					
SPX ≠>XU100	2	66.968	***	0.000	0.000
DAX ≠>XU100	1	9.288	***	0.002	0.001
IBOV ≠>XU100	2	60.868	***	0.000	0.000
RTSI ≠>XU100	1	0.744		0.388	0.399
NIFTY ≠>XU100	1	2.165		0.141	0.14
SHCOMP ≠>XU100	1	1.494		0.222	0.185
XU100 ≠>SPX	2	0.473		0.789	0.796
XU100 ≠>DAX	1	0.015		0.901	0.893
XU100 ≠>IBOV	2	2.610		0.271	0.286
XU100 ≠>RTSI	1	0.714		0.398	0.394
XU100 ≠>NIFTY	1	0.882		0.348	0.347
XU100 ≠>SHCOMP	1	3.951	**	0.047	0.051
Panel C: Post-crisis					
SPX ≠>XU100	2	129.862	***	0.000	0.000
DAX ≠>XU100	1	11.939	***	0.001	0.000
IBOV ≠>XU100	2	99.145	***	0.000	0.000
RTSI ≠>XU100	2	3.672		0.159	0.166
NIFTY ≠>XU100	2	14.463	***	0.001	0.000
SHCOMP ≠>XU100	2	1.856		0.395	0.360
XU100 ≠>SPX	2	0.255		0.880	0.890
XU100 ≠>DAX	1	1.199		0.273	0.258
XU100 ≠>IBOV	2	2.525		0.283	0.283
XU100 ≠>RTSI	2	3.327		0.190	0.185
XU100 ≠>NIFTY	2	35.808	***	0.000	0.000
XU100 ≠>SHCOMP	2	40.983	***	0.000	0.000

Notes: ≠> represents Granger non-causality hypothesis. p-val[a]: Asymptotic p-value. p-val[b] : Bootstrap p-value from 1,000 re-sampling. In VAR(p+d), *p* was selected by Schwarz criterion with maximum 12 lags and d is equal to 1. VAR models consists of Turkey's XU100 and a foreign index. . * (10%), ** (5%), and *** (1%).

Table 7: Results from Toda & Yamamoto causality test with smooth structural shifts

	Lag(p)	Freq. (k)	Wald		p-value[a]	p-value[b]
SPX ≠>XU100	2	3	174.621	***	0.000	0.000
DAX ≠>XU100	1	3	22.009	***	0.000	0.000
IBOV ≠>XU100	2	3	155.311	***	0.000	0.000
RTSI ≠>XU100	2	3	4.386		0.112	0.105
NIFTY ≠>XU100	1	3	10.898	***	0.001	0.000
SHCOMP ≠>XU100	2	3	3.092		0.213	0.182
XU100 ≠>SPX	2	3	0.006		0.997	0.999
XU100 ≠>DAX	1	3	0.074		0.785	0.796
XU100 ≠>IBOV	2	3	5.498	*	0.064	0.072
XU100 ≠>RTSI	2	3	4.907	*	0.086	0.092
XU100 ≠>NIFTY	1	3	12.350	***	0.000	0.001
XU100 ≠>SHCOMP	2	3	32.536	***	0.000	0.000

Notes: ≠> represents Granger non-causality hypothesis. p-val[a]: Asymptotic p-value. p-val[b] : Bootstrap p-value from 1,000 re-sampling. In VAR(p+d), *p* and *k* were selected by Schwarz criterion with maximum 12 lags and 3 frequency and d is equal to 1. VAR models consists of Turkey's XU100 and a foreign index. * (10%), ** (5%), and *** (1%).

EGE AKADEMİK BAKIŞ / EGE ACADEMIC REVIEW

Cilt 21 • Sayı 4 • Ekim 2021
SS. 427-440
Doi: 10.21121/eab.1015635
Başvuru Tarihi: 09.04.2020 • Kabul Tarihi: 27.07.2021

Persistence of Policy Shocks to the Ecological Footprint of MINT Countries

Ali Eren ALPER[1], F. Özlem ALPER[2]

ABSTRACT

The main purpose of this study is to test the stability of the ecological footprint and its sub-components in Mexico, Indonesia, Nigeria, and Turkey (MINT) by performing the Fourier unit root test, which yields reliable results in the presence of an unknown number and form of breaks, on the data obtained over the period 1961–2016. Unit root tests provide information regarding future behaviors based on the previous data of the series. In this respect, suggestions for policymakers can be made by determining that shocks have either permanent or temporary impacts on the series. As a result of the analysis, since the cropland footprint for Mexico; the total ecological footprint and construction area footprint subcomponent for Indonesia; cropland and grazing land footprint subcomponents for Nigeria; and the fishery and forestry subcomponents for Turkey are detected as stationary, it is concluded that policies to reduce the level of pollution are ineffective for these components. Moreover, it was detected that the carbon footprint subcomponent is not stationary in all the MINT countries, and policies to reduce carbon emissions would have permanent impacts.

Keywords: Ecological footprint, Fourier unit root, MINT countries, Stationarity, Global warming

JEL Codes: C22, Q57, Q58

1. Introduction

The full circumstance of the environment, as one of the basic elements determining people's quality of life, has now become one of the leading domains of interest on a global scale. As of today, environmental pollution poses an enormous threat for both developed and developing countries. Previously, the measurement of quality of life had been determined merely in terms of physical output growth until the dawn of the 21st century. However, there is an overall consensus that the degradation in environmental quality renders the sustainability of economic growth impossible and poses a major obstacle to the prevention of poverty (Munasinghe, 1992).

The decline in the size and quality of natural resource capacity restricts the livelihood of the existing population as well as that of future generations. Humanity transforms natural resources to boost the production of goods and services and to ensure the sustainability of its supply. Production of goods and services requires not only natural resources but also labor force. Nonetheless, the labor force cannot subsist without natural resources. Therefore, natural resources are required for the continuity of both the labor force and the production of goods and services (Tisdell, 2010).

In environmental economics literature, CO_2 is used as an environmental pollution criterion due to the availability of a large dataset and its contribution to creating greenhouse gases. A few studies also used other ecological indexes such as a sulfur dioxide and hanging particulate matter instead of CO_2 emissions (Ozturk et al., 2016). However, it is not rational to consider merely a single indicator (or type of contamination) for examining environmental pollution. Thus, Rees (1992) and Wackernagel (1994) designed a measurement named ecological footprint (EF). This measurement method takes various standards of degradation such as soil, forests, and mines into account (Ulucak & Lin, 2017). EF consists of six components, namely, croplands,

[1]alierenalper@gmail.com
[2]oalper@ohu.edu.tr

grazing lands, forest lands, fishing grounds, built-up lands, and carbon footprint. Since EF concentrates on many resource reserves, policy implications based on this measurement are also more efficient than those made in accordance with a single pollution indicator.

Upon calculating the EF, the global footprint network keeps track of the extent to which people need biologically efficient areas to fulfill their competing demands. These demands include areas for food production, the absorption of the CO_2 emissions stemming from fossil fuel burning, and the construction of the necessary infrastructures. The ecological consumption of a country is determined by adding imports to its national production and subtracting exports. Biologically productive lands and seas are required in order to produce all goods and to accommodate the waste stemming from their production. Therefore, international trade can actually be perceived as the flow of embedded EF, which uses primary yields from croplands, forests, grazing lands, and fisheries to calculate the amount of whatever is required to support a particular activity. Biological capacity is measured by calculating the amount of biologically efficient land and sea areas available to provide resources consumed by a population and absorb generated wastes, given current technology and management practices. To ensure that biological capacity is comparable over time, areas are adjusted in proportion to their biological productivity. These adjusted areas are referred to as global hectares (gha) ("Global Footprint Network," 2018).

$$EF_C = EF_P + (EF_I + EF_E) \quad (1)$$

Equation 1 is used for calculating the EF. Accordingly, EF_C denotes the EF of consumption, which indicates the consumption of bio capacity by a country's residents. EF_P denotes the footprint of production and indicates the consumption of bio capacity stemming from production processes within a given geographic area, such as a country or society. The variables EF_I and EF_E denote the EFs of imports and exports, respectively. The net EF of international trade is determined by subtracting the EF of exports from the EF of imports. If the country's embedded EF in exports is higher than that of imports, the country is a net exporter of renewable resources and ecological services. The ecological impacts of countries are determined at the end of this calculation. Countries have ecological reserves when the footprint of the country exceeds its biological capacity ("Global Footprint Network," 2018).

MINT countries consisting of Mexico, Indonesia, Nigeria, and Turkey were selected for the analysis in this study within the range of the 1961–2016 period. Several important reasons validate the selection of these countries, the time range, and the dataset. The first one involves, as also stated in Solarin and Bello (2018), the convenience of categorizing the countries in accordance with their economic properties rather than their geographic locations while examining the unit root features of EF. Developing economies are, in general, middle-income countries with the same economic features. Many developing countries are industrial economies. In other words, the transformation of their economies to the service economy is not yet complete. The second reason involves, as stated in Stern (2004), the fact that the amount of polluter per output lessens depending on the technological improvements and environmental regulations in both industrialized and emerging countries, although the amount of per capita waste and the level of pollution increase. For this reason, it is appropriate to use EF as the environmental degradation proxy variable in order to determine the unit root characteristics of the countries' overall pollution levels. Third, the reliability of the data in both developed and developing countries is higher since the reliability of the institutions that collect information in such countries is higher than of the less developed countries.

This study contributes to the literature in terms of two aspects. The first aspect involves the fact that the KPSS unit root test developed by Kwiatkowski et al. (1992) and extended by the Fourier function (FKPSS) is used in the study. The FKPSS test would be able to detect both smooth and sharp breaks in the EF series. The second important contribution of the study to the literature involves the fact that only a few studies directly examined the unit root properties of EF in emerging economies. Thus, common policy implications can also be made for these countries with identical economic features.

The main objective of this study is to test the unit root properties of EF and its components for the MINT countries over the period 1961–2016 via the FKPSS unit root test, which allows both smooth and sharp structural breaks. The remaining sections of the study are as follows: The second section presents the empirical literature. The third section presents the data and the methodology used in this study, while the fourth section reports the empirical findings obtained from the study. The fifth section considers some policy implications and conclusions.

2. Empirical Literature

To our knowledge, only a few studies in the literature directly tested the unit root properties of EF. Ulucak and Lin (2017) aimed at identifying the stochastic behaviors of EF in the USA during the period 1961–2013 and determining its reactions to policy shocks. In the analysis performed with the Fourier unit root test, it was determined that EF had a non-stationary structure. Solarin and Bello (2018) examined the unit root characteristics of EF by courtesy of the nonlinear unit root test developed by Kruse (2011) and the linear unit root test developed by Narayan and Popp (2010) in a sample group of 128 countries. The study found that the series were non-stationary and contained unit roots in 96 countries (81% of the sample); hence, they did not have mean-reverting tendency. Ozcan et al. (2019) investigated whether or not environmental policies were effective for various income groups in countries classified by World Bank income groups during the period 1961–2013 using the panel unit root test developed by Kapetanios et al. (2003). The EF of all high-income group countries and half of the low- and middle-income countries were detected to be stationary. Solarin et al. (2019) tested the stationarity of the carbon footprint, which was considered as a criterion for environmental degradation in 92 countries during the period 1961–2014 using the frictional unit root test. The analysis results determined that the series in 25 countries had mean-reverting tendency.

Several studies in the literature conducted stationarity analysis. The most commonly used environmental degradation criterion is the level of carbon emissions. There are a few important motivations for conducting a unit root analysis of carbon emissions in the literature. The initial reason is that if the unit root is detected in the carbon emission series, a policy shock applied to these ecological indicators would have a permanent impact. Second, the non-stationary carbon emission series would have important implications for the environmental Kuznets curve (EKC) hypothesis in the long-term. Third, examining the stationarity properties of carbon emissions would enable people to obtain information about the effectiveness of the convergence concept (Solarin & Bello, 2018). Aldy (2006) examined the convergence of per capita CO_2 emissions for the Organisation for Economic Cooperation and Development (OECD) countries throughout the period of 1960–2000. Convergence was detected in 23 OECD member countries, whereas divergence was detected in 88 countries worldwide. Camarero et al. (2013) analyzed the stationarity of emission intensity during the period 1960–2008 by courtesy of Phillips and Sul's (2007) methodology. The analysis results revealed that the emission intensities converged. Christidou et al. (2013) investigated the stationarity of CO_2 emissions in 36 countries during the period 1870–2006 by panel unit root test. According to the analysis results, it was determined that the series were stationary; hence, they converged. Li and Lin (2013) analyzed the stationarity of per capita CO_2 emissions in a sample group of 110 countries during the period 1971–2008 and detected very few findings for convergence, whereas they detected convergence of sub-samples according to income groups. Li et al. (2014) analyzed the stationarity of CO_2 emissions in 50 states of the USA using the sequential panel selection method during the period 1990–2010. It was determined that CO_2 emissions converged in 12 out of 50 states, whereas they diverged in the other 38 states. Barros et al. (2016) analyzed the stationarity characteristics of global CO_2 emissions, their components, and per capita CO_2 emissions. In the analysis using the frictional unit root test, the order of integration of all series was determined as above one. Ahmed et al. (2017) analyzed the convergence of per capita CO_2 emissions in 162 OECD and non-OECD countries with high and low-income levels, using the data obtained during the period 1960–2010 via wavelet-based unit root test. The analysis results suggest that convergence occurred in 18 high-income OECD, 2 high-income non-OECD, 13 middle-income, and 5 low-income countries, whereas divergence occurred in the remaining 124 countries. Presno et al. (2018) examined the convergence of per capita CO_2 emissions in 28 OECD member countries during the period 1901–2009. The study was conducted at two aggregation levels: the first for all countries and the second for both developing and developed countries. Stochastic convergence was detected in the first-level analysis, whereas certain dispersions in terms of β-convergence were detected in the second-level analysis, especially for developed countries. Shahbaz et al. (2019) analyzed the unit root properties of per capita CO_2 emissions in 98 countries between 1975–2014. In the study using the nonlinear unit root test developed by Kruse (2011), it was determined that the series were non-stationary in most of the countries included in the analysis, whereas in only nine countries the series were stationary.

The second field of examination in the empirical literature involves testing the EKC hypothesis. Zambrano-Monserrate et al. (2018) tested the EKC hypothesis using per capita CO_2 emission data obtained during the period 1980–2011 in Peru. In the study using the ARDL method, the EKC hypothesis was found to be invalid for Peru. Destek and Sarkodie (2019) examined the EKC hypothesis in 11 new industrialized countries using the EF variable during the period 1977–2013 via the panel data analysis method. Analysis results detected the existence of an inverted U-shaped relationship between EF and economic growth. Hove and Tursoy (2019) examined the EKC hypothesis using the panel generalized method of moments within the data range of 2000–2017 in 24 developing countries. The analysis results suggested that per capita CO_2 emission decreases as the gross domestic product increases; however, the nitrogen oxide (NO_x) emission increases. Chen and Taylor (2020) examined the EKC hypothesis using the emissions of heavy metals as a proxy of environmental quality for Singapore within the data range of 1900–2017 and found it to be valid in Singapore. Bekhet et al. (2020) analyzed the EKC hypothesis for Malaysia within the data range of 1971–2013, using CO_2 emissions. Analysis results indicated that the hypothesis was valid.

The third and last application area in the environmental economics literature is the pollution haven hypothesis (PHH). Sun et al. (2017) analyzed PHH using the annual data obtained from China during the period 1980–2012 using the ARDL method. Analysis results indicated that PHH was valid in China. Solarin et al. (2017) examined the validity of PHH during the period 1980–2012 for Ghana using the ARDL method. Analysis results indicated that PHH was valid in Ghana. By courtesy of multinational input-output tables, Cai et al. (2018) investigated whether or not developing countries were pollution havens for developed economies. The results indicated that China was the pollution haven for 22 developed countries, whereas 19 developing countries were pollution havens for China. López et al. (2018) tested the validity of PHH within the data range of 1995–2009 for 6 countries and the rest of the world via multinational input-output analysis. Analysis results asserted that the existence of international trade caused the overall CO_2 emissions in the global economy to decrease in comparison to the hypothetical situation without international trade. Another result of the study revealed that only China could not reduce CO_2 emissions due to international trade and it was a pollution haven. Shao et al. (2019) examined the validity of PHH within the 1982–2014 data range in Brazil, Russia, India, China, and South Africa and MINT countries and found that PHH was not valid in both country groups.

3. Data and Methodology

In this part, the dataset utilized for the analysis is introduced. Furthermore, the methodology of the FKPSS unit root test developed by Becker et al. (2006) which allows sharp and smooth breaks is explained.

3.1. Data

This study aims to test the impacts of economic or political shocks to be applied to EF and its subcomponents in MINT countries within the data range of the 1961-2016 period are permanent or temporary. All data used for the analysis are obtained in per capita gha from the Global Footprint Network. Descriptive statistics for the dataset are shown in Table 1.

Figure 1 depicts the EF and its subcomponents in per capita gha for the selected countries over the period of 1961-2016. According to Figure 1, the largest share in the ecological footprints of all countries except Nigeria belongs to the carbon footprint.

3.2. Methodology

For the purpose of testing the stationarity of EF and its subcomponents, the FKPSS unit root test developed by Becker et al. (2006) is used in the study. The most important advantage of the Fourier KPSS test is that the locations, number and form of breaks in the series do not need to be predetermined. The main reason for Becker et al. (2006) extending the KPSS unit root test using the Fourier function is that the test can detect the movements of unknown functions. The FKPSS test can determine not only sharp changes but also smooth changes, and the location, number and shape of the structural changes do not influence the strength of the test.

Table 1: Descriptive Statistics

Country		Mean	Median	St. Dev.	Country		Mean	Median	St. Dev.
Mexico	EF (Total)	2.50	2.490	0.427	Indonesia	EF (Total)	1.294	1.275	0.167
	Built-up land	0.039	0.040	0.006		Built-up land	0.044	0.050	0.014
	Carbon	1.209	1.205	0.447		Carbon	0.306	0.225	0.202
	Cropland	0.518	0.515	0.082		Cropland	0.354	0.365	0.074
	Fishing grounds	0.056	0.065	0.022		Fishing grounds	0.110	0.090	0.061
	Forest product	0.268	0.260	0.022		Forest product	0.459	0.415	0.249
	Grazing land	0.404	0.370	0.116		Grazing land	0.017	0.020	0.008
Nigeria	EF (Total)	1.097	1.080	0.116	Turkey	EF (Total)	2.443	2.340	0.542
	Built-up land	0.032	0.030	0.011		Built-up land	0.027	0.030	0.007
	Carbon	0.164	0.165	0.078		Carbon	1.066	1	0.520
	Cropland	0.482	0.485	0.096		Cropland	0.899	0.890	0.070
	Fishing grounds	0.056	0.050	0.016		Fishing grounds	0.045	0.040	0.016
	Forest product	0.271	0.275	0.046		Forest product	0.241	0.240	0.048
	Grazing land	0.089	0.090	0.026		Grazing land	0.163	0.160	0.041

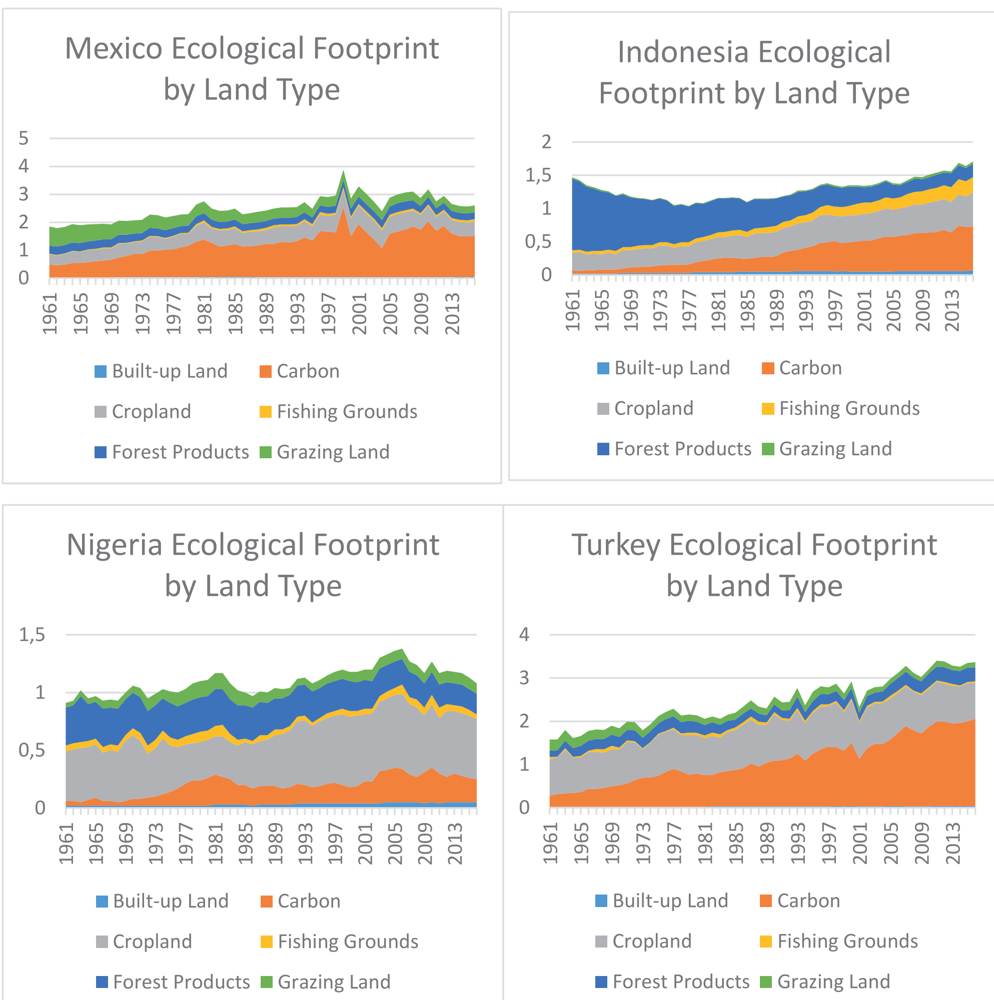


Figure 1: MINT countries' ecological footprints by land types

Becker et al. (2006) considered the data creating process specified in Equations 2 and 3.

$$y_t = X_t'\beta + Z_t'\gamma + r_t + \varepsilon_t \quad (2)$$

$$r_t = r_{t-1} + u_t \quad (3)$$

Here, ε_t denotes the stationary error term, and u_t denotes the error term that is independent and identically distributed with variance σ_u^2. $Z_t = [\sin\left(\frac{2\pi kt}{T}\right), \cos\left(\frac{2\pi kt}{T}\right)]'$. denotes the vector containing trigonometric terms such as, where represents the trend term, T is the number of observations, and k is the frequency value.

In order to calculate the test statistic required to test the stationarity null hypothesis $(H_0\colon \sigma_u^2 = 0)$, one of the Equations 4 or 5 is estimated and residues are obtained in the first stage.

$$y_t = \alpha_0 + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) + e_t \quad (4)$$

$$y_t = \alpha_0 + \beta_t + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) + e_t \quad (5)$$

Level stationarity null hypothesis is tested with Equation 4, while trend stationarity null hypothesis is tested with Equation 5. The test statistic is calculated with the help of Equation 6.

$$\tau_\mu(k) or\ \tau_\tau(k) = \frac{1}{T^2}\frac{\sum_{t=1}^{T}\widetilde{S_t(k)}^2}{\widetilde{\sigma}^2} \quad (6)$$

To determine the optimal frequency value, the value that gives the least sum of squares of residuals (SSR) is selected. If the data generation process does not contain a nonlinear trend, the standard KPSS stationarity test is stronger than the FKPSS stationarity test. Therefore, Becker et al. (2006) suggested testing the null hypothesis $(H_0\colon \gamma_1 = \gamma_2 = 0)$ indicating the absence of nonlinear trend with the F test statistic specified in Equation 7.

$$F_i(k) = \frac{(SSR_0 - SSR_1(k))/2}{SSR_1(k)/(T-q)} \quad (7)$$

SSR_1 (k) denotes the SSR obtained from Equation 4 or Equation 5, SSR_0 denotes the SSR obtained from the regression in which the null hypothesis is valid, and q is the number of independent variables. Critical values required for F statistics take place in Becker et al. (2006).

4. Empirical Results

The FKPSS unit root test results are shown in Table 2. The "frequency value" column in the table indicates the number of frequencies selected according to the minimum SSR value; significance of trigonometric terms are calculated by the "F(k)" value, which indicates the F-test statistic value; whereas "FKPSS" indicates the test statistic value.

The null hypothesis of the FKPSS unit root test claims that the series is stationary, and the alternative hypothesis claims that the series contain unit root. If the FKPSS test statistic value is higher than the critical values determined by the number of frequencies, the null hypothesis will be rejected and the series will be determined to contain unit root.

According to the analysis results, cropland footprint in Mexico; cropland and grazing land footprint subcomponents in Nigeria; and fishing grounds and forest product footprint subcomponents in Turkey are detected as stationary at a 5% significance level. The F-test statistic should be checked in order to test the significance of the trigonometric terms of the variables which are detected as stationary at level. If the F-test statistic of stationary series is higher than the critical value, it will be determined that trigonometric terms are significant, otherwise, trigonometric terms are insignificant, therefore, the KPSS unit root test should be performed instead of the FKPSS unit root test. All the trigonometric terms of the variables (which are stationary) are detected to be significant at a 5% significance level.

According to the results of the analysis, the variables that were detected as stationary have mean-reverting tendency following a shock. As stated by Ozcan et al. (2019), technological evolutions that would reduce disruption can balance the impact of ecologic degradation. Moreover, policies aiming at reducing the level of pollution would be ineffective because of the temporary nature of policy shocks as well as the mean-reverting tendency of the series for cropland footprint in Mexico; cropland and grazing land footprint subcomponents in Nigeria; and fishing grounds and forest product footprint subcomponents in Turkey, which are detected as stationary as a result of the analysis. Moreover, since these variables are stationary, their future actions can be predicted by policymakers based on their past behaviors. Therefore, appropriate environmental policies can be designed for these stationary variables.

However, besides these variables, policymakers will not face any resistance if the size of other variables (such as built-up land footprint, carbon footprint, fishing ground footprint, forest product footprint, grazing land footprint subcomponents and total EF variables in Mexico; built-up land footprint, carbon footprint, cropland footprint, fishing ground footprint, forest product footprint, grazing land footprint subcomponents, and total EF in Indonesia; built-up land footprint, carbon footprint, fishing ground footprint, forest product footprint subcomponents, and total EF variable in Nigeria; and built-up land footprint, carbon footprint, cropland footprint, grazing land footprint subcomponents, and the total EF component in Turkey) are chosen to be changed since those variables are non-stationary at 5% significance level since the policy shocks will have permanent impacts on these variables in the long-run.

Consequently, the changes in EF and its subcomponents in each country over time are depicted in Figures A1–A4 in the Appendix. The blue lines in the figures illustrate the original timeline and the red lines illustrate the anticipated values. These lines indicate that both the sharp and smooth breaks from the figures are largely seized by the anticipated values within the timeline.

5. Conclusion and Policy Implications

The ecological footprint has been the main environmental indicator that is frequently examined in the relevant environmental economics literature, since it is not dependent on a single pollutant variable and is a composite indicator with many subcomponents. By not focusing on a single variable, it has allowed us to observe the effects of economic activities on the environment in a much more comprehensive way. The aim of this study is to examine the stationary properties of the ecological footprint and its subcomponents and to determine whether the effects of policies that will reduce the ecological footprint and increase environmental quality are permanent or temporary.

The findings obtained from the results of the stationarity analysis conducted on EF and its subcomponents in MINT countries via the FKPSS unit root test provide policymakers with valuable information. As a result of the study, it is determined that the vast majority of EF and its subcomponents are non-stationary at level and that the variables do not have mean-reverting tendency. Therefore, the impact of policy shocks is permanent.

Quite crucial is that the carbon footprint, which has the largest share in the total EF, is not stationary and that the policies implemented to reduce such a variable would have permanent impacts in all countries included in the analysis. Thus, technologies that would mitigate carbon emissions such as hybrid or electric vehicles and encouraging the use and improvement of these technologies would be effective in aggravating environmental quality. Furthermore, it has been determined that environmental taxes or environmental protection laws would be effective in reducing the carbon emissions of production units.

Table 2: FKPSS Test Results

Country		Frequency Value	F(k)	FKPSS[3]	Country		Frequency Value	F(k)	FKPSS
Mexico	EF (Total)	1	39.337	0.249	Indonesia	EF (Total)	1	103.692	0.202
	Built-up land	1	9.848	0.422		Built-up land	1	37.439	0.412
	Carbon	1	32.539	0.326		Carbon	1	55.042	0.448
	Cropland	1	46.622	0.160		Cropland	1	45.809	0.428
	Fishing grounds	1	65.272	0.455		Fishing grounds	1	52.815	0.452
	Forest product	1	14.209	0.216		Forest product	1	33.153	0.434
	Grazing land	1	18.446	0.439		Grazing land	1	69.675	0.294
Nigeria	EF (Total)	1	30.612	0.193	Turkey	EF (Total)	1	31.976	0.431
	Built-up land	1	68.683	0.429		Built-up land	1	28.506	0.443
	Carbon	2	35.052	0.807		Carbon	1	31.973	0.434
	Cropland	1	78.876	0.069		Cropland	1	11.423	0.214
	Fishing grounds	2	25.968	0.482		Fishing grounds	3	5.686	0.151
	Forest product	1	24.675	0.430		Forest product	2	8.051	0.358
	Grazing land	2	41.879	0.205		Grazing land	2	30.173	0.930

[3] Critical values for frequency values 1, 2 and 3 at 5% significance level are 0.1720, 0.4152, and 0.4480, respectively. F test statistic is 4.929 at 5% significance level.

Furthermore, fishing grounds and forest product subcomponents in countries except Turkey have been detected to be non-stationary at level. In these countries, water-polluting factors such as traditional agricultural activities, industrialization, and a high population growth rate can be reduced by focusing on green industries and supporting smart city systems. Moreover, rapid urbanization and unplanned construction in these countries have resulted in the rapid destruction of forest areas. Measures need to be taken by determining city planning and prevention of illegal constructions in all countries except Turkey, which would also have permanent impact on forest product subcomponents.

References

Ahmed, M., Khan, A. M., Bibi, S., & Zakaria, M. (2017). Convergence of per capita CO2 emissions across the globe: Insights via wavelet analysis. *Renewable and Sustainable Energy Reviews, 75*, 86-97. doi:10.1016/j.rser.2016.10.053

Aldy, J. E. (2006). Per Capita Carbon Dioxide Emissions: Convergence or Divergence? *Environmental & Resource Economics, 33*(4), 533-555. doi:10.1007/s10640-005-6160-x

Barros, C. P., Gil-Alana, L. A., & Perez de Gracia, F. (2016). Stationarity and Long Range Dependence of Carbon Dioxide Emissions: Evidence for Disaggregated Data. *Environmental and Resource Economics, 63*(1), 45-56. doi:10.1007/s10640-014-9835-3

Becker, R., Enders, W., & Lee, J. (2006). A Stationarity Test in the Presence of an Unknown Number of Smooth Breaks. *Journal of Time Series Analysis, 27*(3), 381-409. doi:10.1111/j.1467-9892.2006.00478.x

Bekhet, H. A., Othman, N. S., & Yasmin, T. (2020). Interaction between Environmental Kuznet Curve and Urban Environment Transition Hypotheses in Malaysia. *International Journal of Energy Economics and Policy, 10*(1), 384-402. doi:10.32479/ijeep.8389

Cai, X., Che, X., Zhu, B., Zhao, J., & Xie, R. (2018). Will developing countries become pollution havens for developed countries? An empirical investigation in the Belt and Road. *Journal of Cleaner Production, 198*, 624-632. doi:10.1016/j.jclepro.2018.06.291

Camarero, M., Picazo-Tadeo, A. J., & Tamarit, C. (2013). Are the determinants of CO2 emissions converging among OECD countries? *Economics Letters, 118*(1), 159-162. doi:10.1016/j.econlet.2012.10.009

Chen, Q., & Taylor, D. (2020). Economic development and pollution emissions in Singapore: Evidence in support of the Environmental Kuznets Curve hypothesis and its implications for regional sustainability. *Journal of Cleaner Production, 243*. doi:10.1016/j.jclepro.2019.118637

Christidou, M., Panagiotidis, T., & Sharma, A. (2013). On the stationarity of per capita carbon dioxide emissions over a century. *Economic Modelling, 33*, 918-925. doi:10.1016/j.econmod.2013.05.024

Destek, M. A., & Sarkodie, S. A. (2019). Investigation of environmental Kuznets curve for ecological footprint: The role of energy and financial development. *Sci Total Environ, 650*(Pt 2), 2483-2489. doi:10.1016/j.scitotenv.2018.10.017

Global Footprint Network. (2018). *Global Footprint Network*. Retrieved from https://www.footprintnetwork.org/resources/data/

Hove, S., & Tursoy, T. (2019). An investigation of the environmental Kuznets curve in emerging economies. *Journal of Cleaner Production, 236*. doi:10.1016/j.jclepro.2019.117628

Kapetanios, G., Shin, Y., & Snell, A. (2003). Testing for a unit root in the nonlinear STAR framework *Journal of Econometrics, 112*.

Kruse, R. (2011). A new unit root test against ESTAR based on a class of modified statistics. *Statistical Papers, 52*(1), 71-85. doi:10.1007/s00362-009-0204-1

Kwiatkowski, D., Phillips, P. C., Schmidt, P., & Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root. *Journal of econometrics, 54*(1-3), 159-178.

Li, X.-L., Tang, D. P., & Chang, T. (2014). CO2 emissions converge in the 50 U.S. states — Sequential panel selection method. *Economic Modelling, 40*, 320-333. doi:10.1016/j.econmod.2014.04.003

Li, X., & Lin, B. (2013). Global convergence in per capita CO2 emissions. *Renewable and Sustainable Energy Reviews, 24*, 357-363. doi:10.1016/j.rser.2013.03.048

López, L. A., Arce, G., Kronenberg, T., & Rodrigues, J. F. D. (2018). Trade from resource-rich countries avoids the existence of a global pollution haven hypothesis. *Journal of Cleaner Production, 175*, 599-611. doi:10.1016/j.jclepro.2017.12.056

Munasinghe, M. (1992). *Environmental Economics and Sustainable Development*. Paper presented at the United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, Brazil.

Narayan, P. K., & Popp, S. (2010). A new unit root test with two structural breaks in level and slope at unknown time. *Journal of Applied Statistics, 37*(9), 1425-1438. doi:10.1080/02664760903039883

Ozcan, B., Ulucak, R., & Dogan, E. (2019). Analyzing long-lasting effects of environmental policies: Evidence from low, middle and high-income economies. *Sustainable Cities and Society, 44*, 130-143.

Ozturk, I., Al-Mulali, U., & Saboori, B. (2016). Investigating the environmental Kuznets curve hypothesis: the role of tourism and ecological footprint. *Environ Sci Pollut Res Int, 23*(2), 1916-1928. doi:10.1007/s11356-015-5447-x

Phillips, P. C., & Sul, D. (2007). Transition modeling and econometric convergence tests. *Econometrica, 75*(6), 1771-1855.

Presno, M. J., Landajo, M., & Fernández González, P. (2018). Stochastic convergence in per capita CO 2 emissions. An approach from nonlinear stationarity analysis. *Energy Economics, 70*, 563-581. doi:10.1016/j.eneco.2015.10.001

Rees, W. E. (1992). Ecological footprints and appropriated carrying capacity: what urban economics leaves out. *Environment and Urbanization, 4*(2), 121-130.

Shahbaz, M., Khraief, N., & Hammoudeh, S. (2019). How Do Carbon Emissions Respond to Economic Shocks? Evidence from Low-Middle- and High-Income Countries. *MPRA Paper, 93976*.

Shao, Q., Wang, X., Zhou, Q., & Balogh, L. (2019). Pollution haven hypothesis revisited: A comparison of the BRICS and MINT countries based on the VECM approach. *Journal of Cleaner Production, 227*, 724-738. doi:10.1016/j.jclepro.2019.04.206

Solarin, S. A., Al-Mulali, U., Musah, I., & Ozturk, I. (2017). Investigating the pollution haven hypothesis in Ghana: An empirical investigation. *Energy, 124*, 706-719. doi:10.1016/j.energy.2017.02.089

Solarin, S. A., & Bello, M. O. (2018). Persistence of policy shocks to an environmental degradation index: the case of ecological footprint in 128 developed and developing countries. *Ecological Indicators, 89*, 35-44.

Solarin, S. A., Gil-Alana, L. A., & Lafuente, C. (2019). Persistence in carbon footprint emissions: an overview of 92 countries. *Carbon Management, 10*(4), 405-415. doi:10.1080/17583004.2019.1620038

Stern, D. I. (2004). The Rise and Fall of the Environmental Kuznets Curve. *World Development, 32*(8), 1419-1439. doi:10.1016/j.worlddev.2004.03.004

Sun, C., Zhang, F., & Xu, M. (2017). Investigation of pollution haven hypothesis for China: An ARDL approach with breakpoint unit root tests. *Journal of Cleaner Production, 161*, 153-164. doi:10.1016/j.jclepro.2017.05.119

Tisdell, C. A. (2010). Resource and environmental economics: modern issues and applications (Vol. 7). World Scientific Publishing Company.

Ulucak, R., & Lin, D. (2017). Persistence of policy shocks to Ecological Footprint of the USA. *Ecological Indicators, 80*, 337-343. doi:10.1016/j.ecolind.2017.05.020

Wackernagel, M. (1994). *Ecological Footprint and Appropriated Carrying Capacity: A Tool for Planning Toward Sustainability.* (PhD Thesis). The University of British Columbia,

Zambrano-Monserrate, M. A., Silva-Zambrano, C. A., Davalos-Penafiel, J. L., Zambrano-Monserrate, A., & Ruano, M. A. (2018). Testing environmental Kuznets curve hypothesis in Peru: The role of renewable electricity, petroleum and dry natural gas. *Renewable and Sustainable Energy Reviews, 82*, 4170-4178. doi:10.1016/j.rser.2017.11.005

Appendix

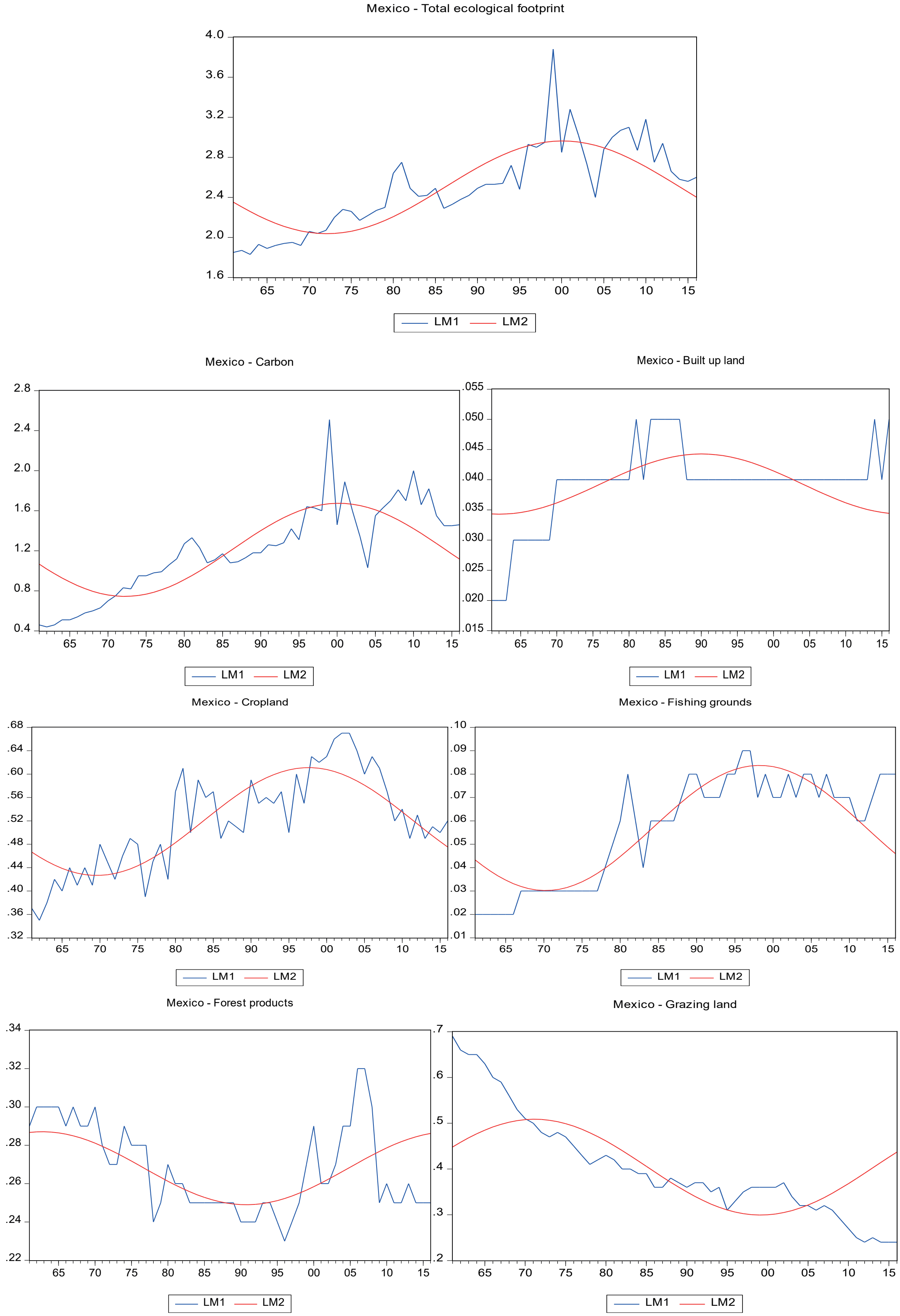


Fig. A. 1: Plots of ecological footprints and subcomponents in Mexico.

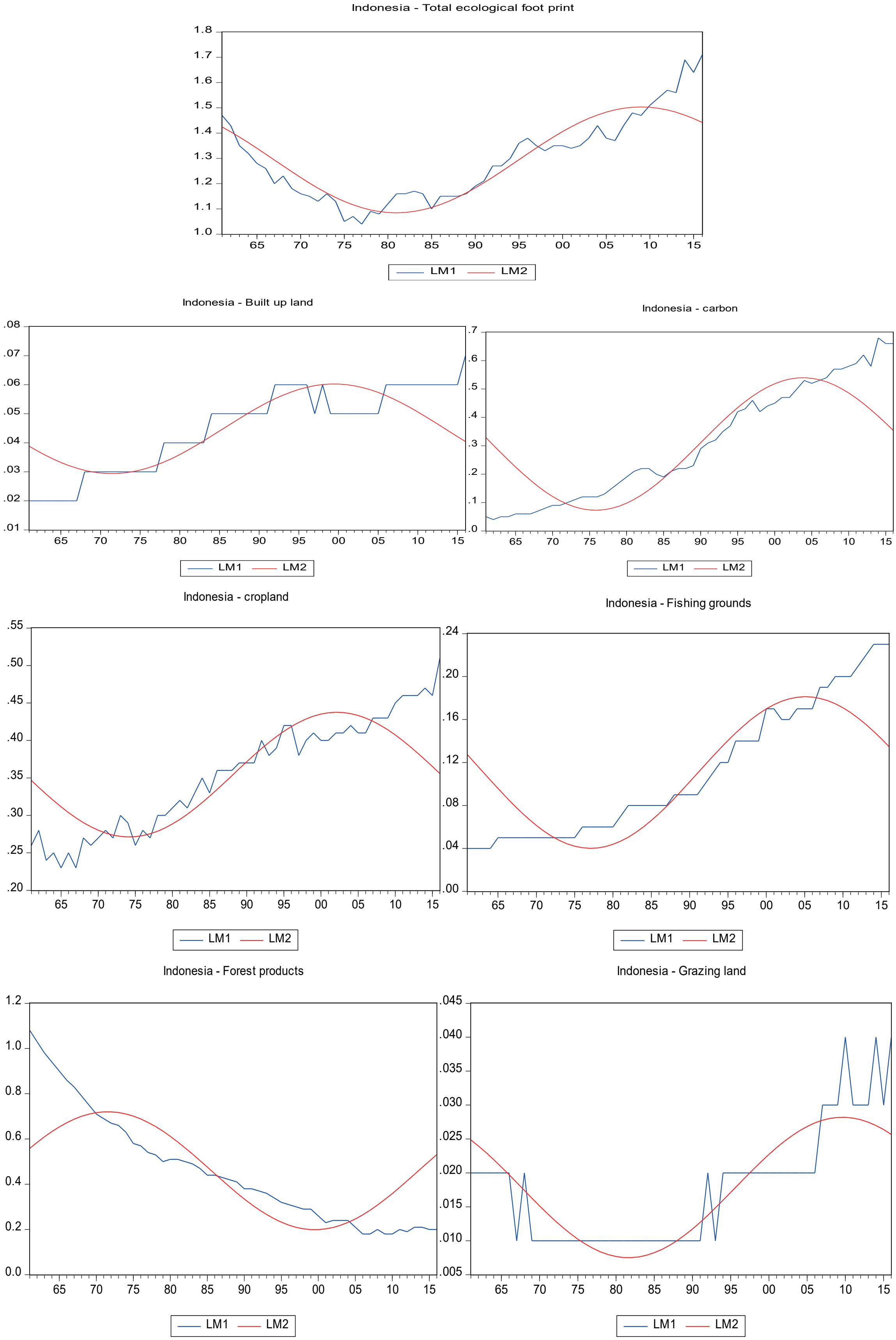


Fig. A. 2: Plots of ecological footprints and subcomponents in Indonesia.

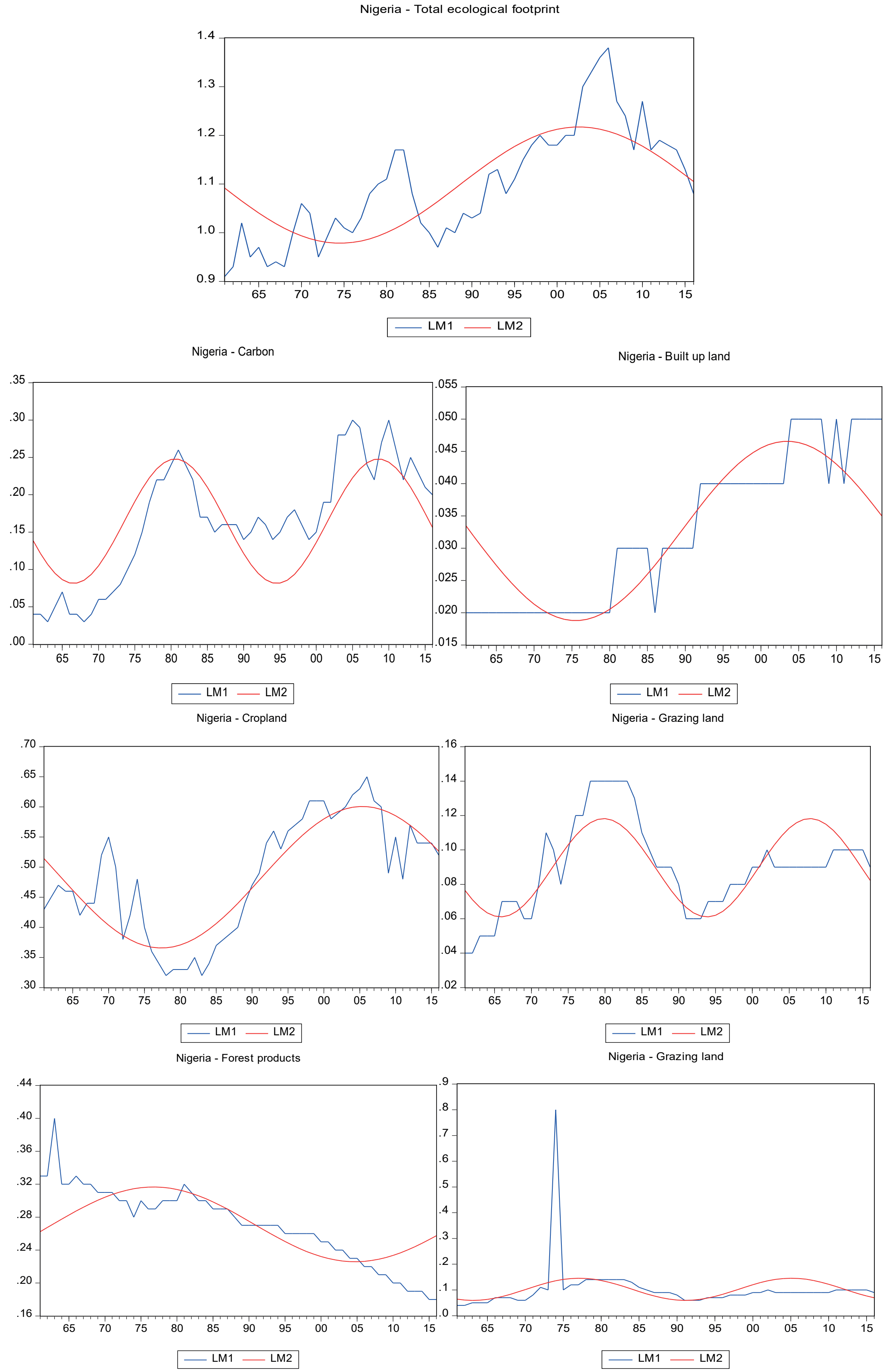


Fig. A. 3: Plots of ecological footprints and subcomponents in Nigeria.

Fig. A. 4: Plots of ecological footprints and subcomponents in Turkey.

Author Guidelines

Peer Review and Publication Policy

The editorial board reserves the right to reject manuscripts if they do not meet scholarly originality, or conform to journal aims and scope or follow submission guidelines. All submitted works undergo scholarly peer-review process. Articles are initially screened for relevance, originality and contribution by the editors. Only manuscripts of sufficient quality that meet the aims and scope of EAR will be sent out to at least two referees for double-blind reviewing. The editors may return manuscripts for revisions or to organize them in the house journal style. While the views of external reviewers are of primary influence on editorial decisions, the editorial board remains responsible for final decisions (not) to publish submitted manuscripts.

Publication Ethics and Conflicting Interests

Authors will be held responsible for academic integrity and publication ethics. We encourage authors to refer to EAR's "ethical principles and publication policy" and to include a declaration of any conflicting interests in the cover letter.

Online Manuscript Submission

EAR is hosted on Dergipark, a web based online submission and peer review system. Visit http://dergipark.gov.tr/eab to login and submit your article online. If you don't have an account, please create a new one.

Any correspondence, queries or additional requests for information on the manuscript submission process should be sent to the EAR editorial office as follows:

Fatma Demircan Keskin
Ege University, Faculty of Economics and Administrative Science, Bornova, 35100 İzmir, Turkey
E-mail: eab@mail.ege.edu.tr

Gül Huyugüzel Kışla
Ege University, Faculty of Economics and Administrative Science, Bornova, 35100 İzmir, Turkey
E-mail: eab@mail.ege.edu.tr

All editorial correspondence should be addressed to:

Editor-in-Chief,
Assoc. Prof. A. Nazif Çatık
Ege University, Faculty of Economics and Administrative Sciences.
E-mail: eab@mail.ege.edu.tr

1. Starting Submission:

Before submitting your manuscript to EAR, please ensure you have read the journal's aims and scope. Authors should first determine their manuscripts' scholarly area or contribution (business, economics or international relations). They also need to submit a cover letter explaining concisely how their submission fits in journal's aims and scope and contributes to scholarly literature. Authors may also use the dialog box to contact the editor.

2. Submission Information:

Authors should fill their names and addresses, the title and abstract of their manuscripts in related fields. Keywords and JEL codes need to be submitted. Scientific databases and search engines use this information for indexing and abstracting.

3. Manuscript Uploading:

Authors should follow the instructions to upload their manuscripts. THE MANUSCRIPT MUST NOT CONTAIN ANY CLUE REGARDING AUTHOR(S)' IDENTITY OR AFFILIATION.

4. Submission Confirmation:

Submission is completed after running a final check of the uploaded files.

Uploaded files should include:

- **Manuscript** (with no information about the authors)
- **Abstract**
- **Cover Letter** (including author(s) name, surname, institution, e-posta, address, ORCID no)
- **Copyright Agreement Form** (can be downloaded during submission)
- **Similarity Report** (iThenticate/Turnitin can be used. Manuscripts with more than 20% overall similarity scores (including references and quotations) cannot be accepted for consideration.)

5. Submission Fee:

If the manuscript is accepted for scholarly review after a preliminary assessment by the Editorial board, authors should pay $60/300 TL to journal's bank account to cover processing costs. Review process will commence only after submission fee is paid. Submission fee is non-refundable.

The Journal Writing Style

1. Font - Times New Roman 12-point font style is to be used throughout the text

2. Page Format - On an A4 size paper:
Top, bottom, left and right margins: 2,5 cm (0,98 inches)
Paragraphs should be justified
No hyphenation
Paragraphs should have an indent of 0,5 cm.

3. Paragraph Format - In the indent and spacing section of paragraph tab:
Left and right section should be 6 pt (0,6 line)
Line spacing should be 1,5.

4. Word Limits - Articles submitted should not exceed 10,000 words, including all notes and references.

5. Headings - Main section headings should be centered and bold.

6. Author Names - Author names should not appear anywhere in the manuscript. Manuscripts including author names are not processed and returned.

7. Abstract - Abstracts should have number of words between 150-200 and should not include citations. There is no need to submit abstract, keywords in Turkish during the submission process.

8. Key Words - Between 5-8 words.

9. Main Text - The manuscript should include an introduction, a conclusion and other relevant sections.

10. References - EAR adheres to the APA reference style. View the Publication Manual of American Psychological Association (6 edition) to get your manuscript conform to journal style of referencing.

ENDNOTES

Please use endnotes instead of footnotes. Endnotes should be marked by consecutive superscript numbers in the related part of the text, and listed at the end of the article.