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Long-Term Relationship Between G-7 Country's Stock Markets and Bist100:Fourier Approach[1]

G-7 Ülkelerinin Borsaları ve Bist-100 Arasındaki Uzun Dönem İlişkisi: Fourier Yaklaşımı

Hasan AYAYDIN[2], Abdulkadir BARUT[3], Fahrettin PALA[4]

Abstract

The purpose of this study is to examine the long-term relationship between the developed capital markets and BIST-100 for the period of 2000: M1-2018: M1. For this purpose Banarje et al. (2017) Fourier ADL cointegration analysis and Toda and Yamamoto (1995) causality analyzes were used. According to Fourier ADL results; BİST100 and the S&P /TSX, BIST100 and DOW JONES, BIST100 and NASDAQ, BIST100 and the S&P500, BIST100 and while there is a cointegration relationship between the DAX index, BIST100 with nikeı225, BIST100 and the FTSE100, BISST100 and CAC4010, and BIST100 and a long-term between FTSEMIB index of no relationship was found. According to Toda and Toda and Yamamoto (1995) causality results; BİST100 (Turkey) and Dow Jones (USA), CAC40 (France), DAX (Germany), the FTSE100 (England), bi-directional causality between indices, BİST100 (Turkey), FTSEMIB (Italy) between one BİST100 directional causality from the ftsemıb relationship has been determined. BIST 100 (Turkey) 225 Nike (Japan), the S & P500 (USA), the S&P/TSX (Canada), NASDAQ (USA) causal relationship was found between indexes.

Keywords: *Fourier Cointegration, BIST 100, G-7 Countries*

Jel Codes: *C50, F30 G15*

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[2] Prof. Dr., University of Gumushane**,** Faculty of Economic and Administrative Sciences**,** Management Department, Gümüşhane, Türkiye. **E-mail**: hayaydin61@gumushane.edu.tr. **Orcid no:** 0000-0002-5395-14-11

[3]**Corresponding Author/Sorumlu Yazar:** Asist. Prof., University of Harran, Siverek Vocational School, Department of Accounting and Tax, Şanlurfa, Türkiye. **E-mail:** kadirbarut@harran.edu.tr. **Orcid no:** 000-000I8315-9727.

[4]Lecturer, University of Gumushane**,** Kelkit Aydın Doğan Vocational School**,** Department of Accounting and Tax, Gümüşhane, Türkiye. **E-mail:** fahrettinpala@gumushane.edu.tr. **Orcid no:** 000-0001-9565-8638

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Öz

Bu çalışmanın amacı, 2000: M1-2018: M1 dönemi için gelişmiş sermaye piyasaları ile BIST-100 arasındaki uzun vadeli ilişkiyi incelemektir. Bu amaçlal Banarje vd. (2017) Fourier ADL eşbütünleşme analizi ve Toda ve Yamamoto (1995) nedensellik analizleri kullanılmıştır. Fourier ADL sonuçlarına göre; BİST100 ve S&P/TSX, BIST100 ve DOW JONES, BIST100 ve NASDAQ, BIST100 ve S&P500, BIST100 ve DAX endeksleri arasında bir eşbütünleşme ilişkisi varken, BIST100 ile NiKEI225, BIST100 ve FTSE100, BISST100 ve CAC4010, ve BIST100 ve FTSEMIB endekleri arasında uzun süreli bir ilişki bulunamamıştır. Toda'ya ve Toda ve Yamamoto (1995) nedensellik sonuçlarına gore; BİST100 (Türkiye) ve Dow Jones (ABD), CAC40 (Fransa), DAX (Almanya), FTSE100 (İngiltere), endeksler arasındaki çift yönlü nedensellik, BİST100 (Türkiye), FTSEMIB (İtalya) arasında ise FTSEMIB'den BİST100'e tek yönlü nedensellik ilişkisi tespit edilmiştir. BIST 100 (Türkiye), 225 Nike (Japonya), S&P500 (ABD), S&P/TSX (Kanada), NASDAQ (ABD) arasında nedensellik ilişkisi bulunamamıştır**.**

Anahtar Kelimeler: *Fourier eş-bütünleşme, BİST 100, G-7 Ülkeleri*

Jel Kodu: *C50, F30 G15*

INTRODUCTION

Knowing which country's stock markets will move or knowing which country stocks are associated or forecasting offers clues about portfolio diversification for both national and international investors (KeskinBenli, 2014:19). Because the direction of the relationship between the stock exchanges of countries is important to what stock market and when and how much investment can be made.In this context, it is a known fact that the national portfolio diversification is risky from the international portfolio diversification that the national portfolio diversification and the international portfolio diversification will not be the same.However, this risk can vary according to the country's risk factors such as the invested securities, exchange rate risk, and political risk (Korkmazet. al. 2009:42).

Portfolio theory is a theory based on the diversification of investment instruments.According to this theory, when all eggs are not put to a single basket but putting agges to more than one baskets when diversified, and risk will be reduced if they are distributed at risk and distributed risk to baskets.In financial terms, this is defined as the fact that not all assets are invested in an asset (Seyidoğlu, 2003:384). Rather than diversifying portfolios of national or international investors with only national investment instruments, diversification with international securities would provide a better risk-return union. In other words, it provides more returns at the same level of risk as international diversification, or the expected return is achieved with a lower risk. One important aspect to note when diversification is done is the relationship between the stock exchanges of diversified investment instruments.If there is a long-lasting relationship between stock exchanges, the diversification will not benefit much.Because the risks inherent in these two stock markets are similar, the risk in one stock market will be valid in the other stock market.This is similar to putting a different basket of eggs to a big basket.Although the baskets are different, the risk will not be distributed because the main basket is the same.Therefore, attention should be paid to the lack of long-term relationships between stock exchanges when diversifying. In this context, the aim of this study the relationship between various indices of Turkey and the G-7 countries Fourier ADL is analyzed by cointegration analysis which is up-to-date and was contributed to literature by Banerjee et.al.(2017).

1. LİTERATURE

This section summarizes national and international studies on the relationship between stock market indices of countries.

In studies of Bozoklu and Saydam (2010); capital markets of China, India, Russia, Brazil, and

Turkey have analyzed to what extent they are integrated with each other and Have analyzed by parametric and nonparametric cointegration methods developed by Johansen (1988, 1991 and 1994) and Bierens (1997 and 2004). At the end of his studies; they came to the conclusion that the capital markets of the mentioned countries were integrated with each other but that there was no profitable profit in the long run. In the studies of Samirkaş and Düzakın (2013); Stock market of Eurasia countries of Istanbul Stock Exchange (ISE); They tested Johansen's cointegration analysis method for the existence of long-term coexistence relations between Egypt, Bulgaria, Kazakhstan, Bahrain, Pakistan, Romania, Jordan, Croatia and the United Arab Emirates (BAE).At the end of his studies; there is a significant relationship between stock market of Turkey and the stock market of Egypt in the long term, however, there is no significant relationship between the stock markets of Turkey and UAE, Croatia, Bahrain, Bulgaria, Pakistan, Kazakhstan and Jordan and Romania stock markets. In the studies of Çelik and Boztosun (2010); the long-term relationship between the stock market of Turkey (ISE 100) and stock markets of Eurasian countries from January 1998 to December 2009, China (SHANGHAI Composite), Australia (OLL ORDINARIES index), India (BSE 30), Hong Kong (Hang Seng), Malaysia (KLSE Composite), Indonesia (Jakarta Composite), Korea (Seoul Composite), Japan (Nikkei 225) (Straits Times) and Taiwan (Taiwan Weighted) was tested with the Johesen-JuseliusCointegration analysis. At the end of his studies; there is a significant relationship for long-term between with stock market of Turkey, Taiwan, Singapore, Korea, and Malaysia for the 1998-2009 period, but there is no significant relationship between stock market of Turkey with stock markets of Hong Kong, China, Japan, Australia, India, Indonesian.In the work of Akel (2015); they have analyzed the stock market indices of the fragile five countries with Johansen Cointegration test by using the weekly closing data from November 2000 to December 2013.At the end of the study; it is concluded that these countries have a long and short term coexistence and causality relation between their capital markets. In the studies of ZerenveZeren (2015); Maki (2012) cointegration and Carrion-i-Silvestre (2009) have analyzed the unit root tests between the relationship of the integration stock by using monthly data for the period of 1990-2013 Turkey and some other OECD countries (the Netherlands, Austria, Mexico, Belgium and Switzerland).At the end of his studies; investors have come to the conclusion that they can only invest in the Dutch stock market together with BIST (Borsa Istanbul). In the study of Korkmaz, ZamanveÇevik (2009); they have tested whether there is a relationship. The monthly index of the long-term value of the stock market in Turkey with the advanced and emerging countries stock markets have tested by using the

data of the period of between January 1995 and December 2007. Johansen, Gregory-Hansen Cointegration tests, and Zivot-Andrews structural fracture tests were used as an analysis method. At the end of their studies; they have reached that as a conclusion stock market of Turkey is co-integrated with the stock markets of 21 developing countries and 16 developed countries.Turkey securities market was tested with the method of analysis developed by Johansen cointegration whether there is any relationship between the 22 developing countries and 12 developed countries and their securities markets. At the of their studies; they have reached that as a conclusion stock exchange of Turkey is co-integrated with the stock exchanges of 5 developing countries 5 and 7 developed countries. In studies of Çıtak and Gözebaşı (2007); They have analyzed that whether the Istanbul Stock Exchange (ISE) had a long-term cointegration relationship between developed stocks exchanges such as Japanese, UK, US, German and developing stock exchanges such as Malaysian and Indian by using data of period between January 1986 and 2006 July. Besides the basic indices of the countries; financial, industry and service indices for the period January 2000 - July 2006, and also examined whether cointegration differs on the basis of the main sector indices.At the end of their studies; they arrived that as conclusion It is seen that the Istanbul Stock Exchange (ISE) and the main indices of Germany, UK, USA and Indian stocks are cointegrating, however, in the sub-periods tested, they concluded that there was no cointegration relationship between the Istanbul Stock Exchange (ISE) and the main indices of the countries included in the analysis. In the studies of Boztosun and Çelik (2011); The long-term relationship between the stock market of Turkey (ISE 100) with stock markets of European Countries (Germany's DAX, France: CAC40, Austria: ATX, Belgium: BEL-20, Spain: Madrid General, Norway: OS All Share, Netherlands: AEX General, Swiss: Swiss Market, Sweden: Stockholm General and UK: FTSE 100) is tested with Johansen-Jeseliuswithcointegration analysis. In the study of Yılancı and Öztürk (2010); they have analyzed the relationship between the stock markets of Turkey with the stock markets of five largest trading partners by using the data for the periods of January 1995 - December 2009. At the end of their studies; they concluded that there was a long-term relationship between the Istanbul Stock Exchange (ISE 100) and the AEX, SP 500 and FTSE 100 exchanges.

In the study of Sun (2014); different stock exchanges of China with the integration level of America, Europe, Asia and other developed big stock markets were tested by using Johansen and Juselius (1990) cointegration and Granger causality analysis methods. At the end of the study; it is concluded that the different stock markets in China have various degrees of integration with the mentioned markets.In the studies of Kofman and Martens (1997) they

analyzed the impact of the movements and volatility between the London and New York stock exchanges during coincident trading hours.At the end of their studies; although the impact of the United States on England is even stronger, they have come to the conclusion that both markets influence each other. In the studies of Chang, Ranjbar, and Jooste (2017); they analyzed the interaction between the BRICS stock exchanges and the United States by the help of the Granger causality test. At the end of their studies; they concluded that there was a two-way causality relationship between the US stock market and the BRICS markets, and the negative and positive shocks on the US stock market were the most influential on the BRICS markets.In the study of Ye (2014); to be able to demonstrate the interaction between the US and Chinese stock exchanges, the S & P500 and DJIA daily inventories have examined the ability of SSEC and SZCI, two benchmark indices in the Chinese securities market, to predict the opening direction and vice versa. At the end of the study; The US stock market daily yield has been an important ability to predict Chinese stock market openings since 2006, but the Chinese stock market daily returns did not show the ability to predict US stock market openings. In the studies of Canarella, Miller and Pollard (2008); they analyzed the interactions of NAFTA stocks (ie Canada, Mexico, and the USA), first of all, the long-run relationship between the three markets with cointegration techniques, the dynamic relationship between the three markets using impulse response analysis, and finally the volatility transmission process between the three markets by using various multivariate GARCH models they have. At the end of their studies; NAFTA has a significant volatility transmission between its second moments, again the magnitude and tendency of conditional correlations have come to the conclusion that in the last few years the Mexican stock market has tended to integrate more with the US market.

2. DATA SET AND IMPLEMENTATİON

The correlation between the stock markets of Turkey and the G-7 countries in the period of 2000: m1-2018: m1 is examined. BIST 100 index for Turkey, the NASDAQ for the US, Dow Jones, S&P500 index, the FTSE100 index for England, the DAX index for Germany, Canada, S&P/TSX index for Canada, FTSEMIB index for Italy and the Nike 225 index for Japan is used is in this study.

3. RESULTS

First of all stabilty of the series was examined in the study. The stability of the series has been tested with the ADF unit root test and reported in table 1.

Table 1: ADF Unit Root Test

	I(0)	I(1)
LNBIST100	-1.0529	-16.967***
LNCAC40	-2.7511	-13.242***
LNDAX	-1.0453	-3.6345***
LNDOWJONES	0.4379	-13.572***
LNFTSE100	-1.6377	-3.2172**
LNFTSEMIB	-2.0866	-7.3686***
LNNIKEI225	-1.4110	-12.613***
LNS&p/TSX	-1.6088	-3.9488***
LNSP500	-0.2279	-7.2939***
LNNASDAQ	-0.210	-13.380***

Not: ***,**,* the order of the variables %1, %5 ve %10 it represents that they are stable at the level of importance.

All series are unit roots at I (0) level, I(1) all series become unit rootless, means becomes stable. The cointegration analysis can be performed because all series have static levels I (1).

It has been examined whether there is a cointegration relationship between the stock exchanges by using the Fourier ADL cointegration test given to literature by Banerjee and up-to-date(2017). Test statistics obtained as a result of analysis in Banarje et al. (2017), is larger than the critical ones, then there is a categorization relationship between the series, otherwise it is said that there is no cointegration relation between the series.

Table 2: Fourier ADL Cointegration Test Results

Co-Integration	**Statistic of Test**	**Frequency (k)**
BİST100-S&P/TSX	-4.864***	2
BİST100-NİKEİ225	-3.696	1
BİST100- DOW JONES	-4.346**	1
BİST100-DAX	-4.353**	1
BİS100-CAC40	-2.837	2
BİST100- FTSEMIB	-0.611	5
BİS100-S&P500	-4.140**	1
BİST100-FTSE100	-1.950	2
BİST100- NASDAQ	-4.156**	1

Note: Critical Values Banerje et al. (2017,s.2 Table 1a) %1, %5 ve %10 Critical values in importance level **k:1** −4.66 −4.03 −3.70**, k:2** −4.85 −4.26 −3.95, **k:5** −4.27 −3.64 −3.30

According to the results of Table 2; BİST100 (Turkey), the S&P / TSX(Canada), BİST100 (Turkey), Dow Jones (USA), BİST100 (Turkey), NASDAQ (USA), BİST100 (Turkey), the S & P500 (USA), BİST100 (Turkey), DAX (Germany) indexes have been identified as cointegration relation meaning, when a long-lasting relationship is detected, BİST100 (Turkey), nikei225 (Japan), BİST100 (Turkey), the FTSE100 (England), BİST100 (Turkey), CAC40 (France), BİST100 (Turkey), FTSEMIB (Italy) there is no long-term relationship between the indexes in the end of the research.

In the analyst of Toda and Yamamoto (1995), stability levels of variables in causality analysis and stability levels and stability of variables are not important also this analysis was chosen to be able to perform this analysis irrespective of whether there is a cointegration relationship between the series.

Table 3: Toda and Yamamoto Causality Analysis

	Statistic of Test	**H_0**
BİST100DOW JONES not the Granger cause	60.748***	Rejection
DOW JONES BİST 100 not the Granger cause	123.744***	Rejection
BİST100CAC40 not the Granger cause	82.454***	Rejection
CAC40 BİST100 not the Granger cause	108.881***	Rejection
BİST 100 DAXnot the Granger cause	72.856***	Rejection
DAX BİST 100 not the Granger cause	74.732***	Rejection
BİST 100 NİKEİ225not the Granger cause	14.540	Aggreed
NİKEİ225 BİST 100 not the Granger cause	18.493	Aggreed
BİST100 S&P 500 not the Granger cause	22.526	Aggreed
S&P 500 BİST100 not the Granger cause	28.725	Aggreed
BİST 100 FTSEMIB not the Granger cause	22.956	Aggreed
FTSEMIB BİST100 not the Granger cause	88.013***	Rejection
BIST100 S&P/TSX not the Granger cause	26.503	Aggreed
S&P/TSX BİST 100 not the Granger cause	30.423	Aggreed
BİST100 FTSE100not the Granger cause	27.125*	Rejection
FTSE100 BİST 100 not the Granger cause	98.922***	Rejection
BİST 100 NASDAQ not the Granger cause	24.369	Aggreed
NASDAQ BİST 100 not the Granger cause	18.292	Aggreed

Not::***,**,* the order of the variables %1, %5 ve %10 it represents that they are stable at the level of importance.

According to results of causality anaylsis of Toda and Yamamoto (1995) ; with BİS100 (Turkey) and Dow Jones (USA), CAC40 (France), DAX (Germany), the FTSE100 (England) bi-directional causality between indexes, BİST100 (Turkey), FTSEMIB (Italy) one-way causality relationship from FTSEMIB to BİST100. BIST 100 (Turkey) with 225 Nike (Japan), the S & P500 (USA), the S&P / TSX (Canada), NASDAQ (USA) no causality relation was found between the indexes.

CONCLUSION

Turkey and the G-7 countries (USA, Canada, Japan, Germany, Italy, UK) the long-run relationship between various stock market indices have been examined in this study. Theory Banarje et al. (2017), the Fourier ADL cointegration test was used. First, the series were tested with stability levels of the ADF unit root test. Fourier ADL cointegration test was applied to the series which were found to be integrated at the same time, and then causality relation between the series and Toda and Yamamoto (1995) causality analysis was determined.

According to the results of analysis; BİST100 (Turkey), the S&P/TSX (Canada), BİST100

(Turkey), Dow Jones (USA), BİST100 (Turkey), NASDAQ (USA), BİST100 (Turkey), the S&P500 (USA), BİST100 (Turkey), DAX (Germany) indexes have been identified as cointegration relation meaning, when a long-lasting relationship is detected, BİST100 (Turkey), nikei225 (Japan), BİST100 (Turkey), the FTSE100 (England), BİST100 (Turkey), CAC40 (France), BİST100 (Turkey), FTSEMIB (Italy) there is no long-term relationship between the indexes in the end of the research.

According to results of causality anaylsis of Toda and Yamamoto (1995) ; with BİS100 (Turkey) and Dow Jones (USA), CAC40 (France), DAX (Germany), the FTSE100 (England) bi-directional causality between indexes, BİST100 (Turkey), FTSEMIB (Italy) one-way causality relationship from FTSEMIB to BİST100. BIST 100 (Turkey) with 225 Nike (Japan), the S&P500 (USA), the S&P/TSX (Canada), NASDAQ (USA) no causality relation was found between the indexes.

According to the findings obtained as a result of the applications, despite the rapid increase in integration between the stock markets International portfolio managers in Turkey will reduce both portfolio risk and portfolio return by diversifying the portfolio among market where there is no integration with Turkey. In other words, the lack of integration between the stock markets or the absence of integration offers diversification of the various risks (financial risk, operational risk, etc.) that companies may be able to take into consideration and thus offers the opportunity to obtain higher returns.

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