Necmettin Erbakan Üniversitesi Siyasal Bilgiler Fakültesi Dergisi
(NEUSBF Dergisi)
Journal of the Faculty of Political Science (NEUSBF)
DOI: 10.51124/jneusbf.2024.93

Cilt: 6 Sayı: 2 Yıl: 2024 | Araştırma Makalesi / Research Article | E-ISSN: 2687-5063

Analysis of Financial Convergence with Structural Breaks Unit Root Tests[1]

Bengü AÇDOYURAN[2] Ahmet ŞAHBAZ[3]

[2] Assist. Prof. Dr., Agri Ibrahim Cecen University, Department of Economics Ağrı, Türkiye, bcetin@agri.edu.tr, *(Corresponding Author)*

[3] Prof. Dr., Necmettin Erbakan University, Department of Public Finance, Konya, Türkiye, asahbaz@erbakan.edu.tr

Article Info

Article History

Received: 28/08/2024
Accepted: 17/12/2024
Published: 31/12/2024
Keywords: Financial Development, Convergence, Emerging Markets

Jel Codes: E44, O16, G20

ABSTRACT

The process of financial liberalization in emerging markets over the past two decades has both fostered financial development and reduced the information gap between developed and developing countries. This situation has made it more important for developing countries to achieve economic growth, to provide the necessary funds for investments and to reach the living standards of developed countries. Therefore, financial systems in developing countries are considered to have reached a level quite close to that of developed countries. The aim of this study is to investigate whether countries defined as emerging market economies have converged to the financial systems of developed countries with advanced financial systems. in this study, the convergence of financial development in 12 selected emerging market economies to the reference 5 developed countries is analyzed by structural breaks panel unit root tests. In the analysis covering the period 1996-2016, the financial development index calculated using financial development indicators was obtained. KPSS and Fourier KPSS panel unit root tests with structural breaks are then applied to the series obtained. According to the findings of the analysis, financial developments in selected emerging market economies converge to the financial systems of advanced economies.

Finansal Yakınsamanın Yapısal Kırılmalı Birim Kök Testleri ile Analizi

Makale Bilgileri

Makale Geçmişi

Geliş: 28/08/2024
Kabul: 17/12/2024
Yayın: 31/12/2024

Anahtar Kelimeler: Finansal Yakınsama, Gelişme, Yükselen Piyasalar.

JEL Kodları: E44, O16, G20

ÖZ

Son yirmi yılda gelişmekte olan piyasalarda yaşanan finansal serbestleşme süreci hem finansal gelişmeyi desteklemiş hem de gelişmiş ülkeler ile aralarındaki bilgi açığını azaltmıştır. Bu durum, gelişmekte olan ülkelerin ekonomik büyümeyi gerçekleştirmelerini, yatırımlar için gerekli fonları sağlamalarını ve gelişmiş ülkelerin yaşam standartlarına ulaşmalarını daha da önemli hale getirmiştir. Dolayısıyla gelişmekte olan ülkelerdeki finansal sistemlerin gelişmiş ülkelerdekine oldukça yakın bir düzeye ulaştığı düşünülmektedir. Bu çalışmanın amacı, yükselen piyasa ekonomisi olarak tanımlanan ülkelerin, gelişmiş finansal sistemlere sahip ülkelerin finansal sistemlerine yakınsayıp yakınsamadıklarını araştırmaktır. Bu çalışmada, seçilmiş 12 gelişmekte olan piyasa ekonomisindeki finansal gelişmenin referans alınan 5 gelişmiş ülkeye yakınsaması yapısal kırılmalı panel birim kök testleri ile analiz edilmektedir. 1996-2016 dönemini kapsayan analizde, finansal gelişme göstergeleri kullanılarak hesaplanan finansal gelişme endeksi elde edilmiştir. Elde edilen serilere daha sonra yapısal kırılmalı KPSS ve Fourier KPSS panel birim kök testleri uygulanmıştır. Analiz bulgularına göre, seçilmiş yükselen piyasa ekonomilerindeki finansal gelişmeler, gelişmiş ekonomilerin finansal sistemlerine yakınsama göstermektedir.

Atıf/Citation: Açdoyuran, B. ve Şahbaz, A. (2024). Analysis of Financial Convergence with Structural Breaks Unit Root Tests, *Necmettin Erbakan Üniversitesi Siyasal Bilgiler Fakültesi Dergisi*, 6(2): 373-385.

[1] This study is derived from the thesis titled ''Financial Convergence: An Empirical Analysis of Emerging Market Economies'', 2020

INTRODUCTION

As many countries adopted liberal policies, financial markets began to change and integrate. Liberalization policies rapidly implemented in various sectors have enabled the opening of the application area in financial services (Rysin, et al.,2021:66). This has changed the global economic arena and increased the role of financial instruments. The participation rate in the financial services market has increased and the role of the financial sector in the economy has strengthened. Especially the increasing trends in international trade have necessitated an increase in financial flows. At the same time, the increase in the growth rates of countries globally has also increased the demand for financial services. This has had a positive impact on financial development (Karataş and Ergül, 2023: 225). Thus, the increasing use of financial instruments has led to increased competition and intensity across financial sectors (Fung, 2009: 57-59).

The impact of financial support mechanisms on economic activities has reached an important point, especially in developing countries (Özdoğan and Kayhan, 2023: 167). In recent years, research on the relative merits and efficiency of market- and bank-based financial systems has been the subject of considerable academic and policy debate around the world. In this context, bank- and market-based systems have been found to give rise to different economic and institutional dynamics. At the same time, the global economy and the vastly improved financial sector, financial liberalization and rapid technological advances have transformed financial systems around the world (Herrmann and Winkler, 2009:8). Hence, the view has emerged that financial systems today tend to become more uniform. The efforts of countries around the world to adapt to these conditions have led to convergence in the financial sector. The idea that one way to achieve financial convergence is through a link to financial integration has helped developing countries to accelerate their reform efforts in this area and has led to increased financial interactions with countries around the world (Yaseen, 2012:155). This process has helped countries that started with less developed financial markets to expand the size of their national financial systems.

Over the past two decades, significant progress has been made in laying the foundations for modern economies and financial systems, particularly in emerging market economies. It has been debated whether these common developments have led to convergence between countries' financial systems, as is commonly assumed (Antzoulatos, 2011: 2). This, in turn, has raised questions about the position of the national financial systems of emerging market economies relative to those of advanced economies. These events have made the study of the differences and similarities between national financial systems more important than ever before and have produced a large body of literature comparing financial systems. While the effects of financial development are well established, to date there is little systematic evidence on whether financial development in developing countries has reached the levels achieved by developed countries. Similar to the literature on economic growth, the concept of convergence in terms of financial development differs from the determination of income growth in terms of whether access to financial services has increased over time and whether the increase in developing countries has outpaced that in leading countries. In this context, the ratio of private sector credit to GDP, one of the most important determinants of financial development in the global economy, has doubled over the last three decades. Although this growth in the banking sector has been faster in some countries and slower in others, it has generally been on an upward trend. This is considered as an indication that financial liberalization has spread knowledge in the financial sector to emerging market economies and financial institutions have become more specialized. It also shows that this worldwide market mobility provides opportunities for capital investment in financial services (Bahadır and Valev, 2015: 2-6; Aghion, et al., 2005: 177). The development of the financial system is seen as a key to the success of national economies and is believed to increase productivity in these countries. As a result, they are expected to experience a kind of convergence that shapes contemporary policy. There are arguments against this view. In this case, two different views emerge (Stolbov and Veysov, 2011: 2). While some views emphasize the convergence of financial systems due to globalization, economic integration and efforts to harmonize financial institutionalization, others argue that national markets remain heterogeneous despite integration and globalization (Bruno, et al., 2011; Bruno and De Bonis, 2009; Asteriou, 2011; Antzoulatos, et al., 2011; Nitoi and Pochea, 2016). These developments have made it

more important than ever to examine the differences and similarities between national financial systems, leading to a large body of literature comparing financial systems (Yaseen, 2002; Bahadır and Valev, 2015; Fung, 2009).

The aim of this study is to examine whether the developments in the financial systems of emerging market economies following the financial liberalization process have converged to those of advanced economies. Therefore, this study examines the extent of financial development in emerging market economies both from the perspective of advanced economies and by evaluating the developments over time. As a result, we seek to answer the questions of how the financial markets of emerging market economies compare to those of advanced economies and whether there is a convergence to the financial markets of advanced economies. These questions, which form the basis of the research, are answered with an original methodology and a large database.

The rest of the paper is organized as follows. Section 2 reviews the empirical literature. The dataset and methodology used in the analysis are presented in Section 3. Section 4 presents the results from the econometric analysis of the convergence process in emerging market economies. In the last section, the conclusions are discussed.

1. LITERATURE

Convergence theory is generally concerned with the functioning of countries' regulation and supervision of financial markets in a single order. in this context, the phenomenon of financial convergence has been included in the analyses due to the integration process in the European region and the reflection of this process in the financial markets. Therefore, the role of the financial harmonization process in financial markets has become important. In the last two decades, the literature has started to include financial development as a potential factor for both determining economic development and explaining income convergence (Stolbov and Veysov, 2011:4). The study of financial convergence is an empirical issue that has been studied using different methods and indicators. Initially, financial systems were categorized as bank-based and market-based and included in the analysis. Financial assets and transactions in household portfolios were classified as market-based, while assets such as money and deposits were classified as bank-based. However, some authors have argued that the classical distinction between “bank-based” and “market-based” systems is no longer valid (Allen and Gale, 2000; Rajan and Zingales, 2003; Herrmann and Winkler, 2009).

Although there is a consensus on the contribution of financial development to a country's economy, there is little systematic evidence on whether financial development in developing countries has reached the level achieved by developed countries (Bahadır and Valev, 2015: 2; Yaseen, 2012: 155). It is possible to evaluate these studies in chronological order as shown in Table 1.

Table 1. *Financial Convergence Analyses Among Countries*

Authors	Period	Method	Results
Herrmann and Winkler (2009)	Emerging Europe and Emerging Asia	FGLS	They concluded that emerging markets can develop further by integrating with the financial markets of developed countries and by providing external debt.
Fung (2009)	57Selected Countries 1967-2001	Conditional Convergence	For middle- and high-income countries, conditional convergence applies not only to economic growth but also to financial development. At the same time, low-income countries with relatively better financial development are likely to catch up with middle- and high-income countries, but poorer countries that lack financial development are much less likely to catch up.
Stolbov and Veysov (2011)	102 Countries 1980-2009	β and σ Convergence	It is concluded that financial depth exhibits β convergence faster in middle-income countries.

Bruno, et al. (2011)	OECD Countries 1980-2005	β and σ Convergence	Both datasets provide evidence of the increasing importance of capital market development in the developing world and the β convergence of equity and insurance products.
Antzoulatos, et al. (2011)	38 Developing Countries 1990-2005	Panel Unit Root and Cointegration HAC	There is no convergence in the financial systems of these countries. Country-specific factors affect the financial system more than global factors.
Apergis, et al. (2010)	50 Countries 1980-2003	Panel OLS Club Convergence	The results do not support the hypothesis that all countries are converging towards a single equilibrium state of financial development. However, there is strong evidence of club convergence.
Yaseen (2012)	GCC 2002-2007	GMM	It is concluded that the key aspects of the intermediation roles of the financial institutions of the GCC economies are converging, i.e. there is a convergence in the banking system of the member countries of this council.
Dekle and Pundit (2015)	23 Asia Countries 2004-2011	Panel (random effect)	Asian countries with weaker financial systems converge to five countries with stronger financial systems.
Bahadır and Valev (2015)	45 Countries 1965-2009	GMM, fixed effect, β Convergence	Less financially developed countries are catching up with more financially developed countries. There is convergence.
Nitoi and Pochea (2016)	(CEE) 2007-2014	A non-linear single factor model	convergence in the financial markets of these countries is not homogenous. Moreover, after the global financial crisis and sovereign debt crises, the differences between these markets have tended to increase
Özcan (2017)	Transition economies 1995-2013	Panel Unit Root	There is convergence.

In the empirical growth literature, most studies define convergence as the tendency for the output gap between countries to narrow. In this context, Bernard and Durlauf (1995, 1996), who provided the first statistical definition of cross-country convergence, argued that convergence can be said to exist if the long-run forecasts of two countries are the same. In other words, they argued that cointegration or unit root tests are appropriate for testing the convergence of countries. In many empirical studies on financial convergence, different econometric techniques have been applied (Apergis, et al., 2010: 1015; Durlauf, 2003: 2).

In the literature, studies that have investigated the existence of financial convergence in the banking dimension stand out. These studies, which generally include variables related to bank credit, intermediation services and financial credits, have used the panel data method (Yaseen (2012); Bahadır and Valev, 2015; Özcan, 2017). A number of studies have analyzed financial convergence for many groups of countries using absolute and conditional (β and σ) convergence techniques. They typically use broad money, banking and stock market data and find evidence of β convergence (Fung (2009); Bruno, et al. (2011); Veysov and Stolbov (2011)). In addition to these studies, there are some studies that investigate the existence of club convergence for identical country groups using a different methodology. In their study, Apergis, et al. (2010) analyze financial convergence from both a country and a club perspective. As a result of the analysis, they find evidence that there is no financial convergence on a country basis, but there is evidence for the existence of club convergence. In addition, Dekle and Pundit (2015) analyzed whether the financial structure of emerging Asian economies has converged to that of developed Asian economies. In the study, a financial development index was

calculated using financial development indicators data. For this calculation, data covering the period 2004-2011, which shows the access of individuals and firms to financial services, the efficiency of financial institutions and markets in the financial market, and the depth of financial institutions and markets, were used. The analysis reveals that Asian countries with weaker financial systems converge to five countries with stronger financial systems.

When the literature is analyzed, most of the studies have dealt with the indicators related to financial development either in terms of banking or capital markets. Our study differs from other studies in that it deals with the financial development measures commonly used in the literature in their entirety. In other words, whether there is convergence across countries is evaluated in terms of the financial sector as a whole. Therefore, the contribution of this study to the literature is to determine whether the financial development measures commonly used in the literature show convergence or divergence across countries over time. In other words, it is not the magnitude of financial development differences between countries, but the determination of the changes in these differences over time.

2. DATA SET AND METHODOLOGY

The sample group used in the study covers selected emerging market economies. The IMF (International Monetary Fund) has selected 12 countries with available data from 29 countries that are categorized as emerging markets based on various characteristics (IMF, 2014: 64). Data availability was effective in the selection of the countries subject to the analysis. In addition, in terms of the efficiency of the analysis, the selected countries were determined among two groups as low middle income and high-income countries according to the World Bank's income group classification. In this context, Argentina, Saudi Arabia, Hungary, Poland and Chile are included in the high-income country group, while Indonesia, Morocco, the Philippines, India, Nigeria, Egypt and Pakistan are included in the low middle-income country group. In the study, 5 developed countries (USA, Australia, Switzerland, Japan and Norway) were selected for the econometric method to be applied to determine whether emerging market economies converge to the financial systems of developed countries. This country group consists of countries that are among the top 10 countries in the country ranking made by the IMF within the financial development index calculated annually by the IMF in terms of data availability.

In the analysis, a financial development index is calculated using 10 variables, each of which is shown as a determinant of financial development (Worldbank "Financial Development and Structure Dataset 2018" Beck, et al. (2018)). In order to create a comprehensive data network in the analysis, 10 data belonging to financial markets were determined. The date range of these data was limited to 2016 due to the high number of countries included in the analysis and for accessibility. The variables are Broadly Defined Money Supply to GDP (M2/gdp), Private Sector credit to GDP (prcdgdp), Private Sector credit Used by Other Banks and Financial Institutions to GDP (prcdbogdp), Bank Deposits to GDP (bdgdp), Financial System Deposits to GDP (fdgdp), Deposit Banks' Assets to GDP (dbagdp), Net Interest Margin (netintmargin), Stock Market Turnover (stturnover), Stock Market Capitalization to GDP (stmktcap), Total Stock Market Value to GDP (stvaltraded). This study aims to create a single measure of financial development by combining different dimensions of financial development. For this purpose, 10 financial development indicators, including banking, capital markets and various quantitative indicators, covering the period 1996-2016 for the countries in the sample group were used to obtain a financial development index using the principal components analysis method. The most commonly used method for calculating financial development indices is principal component analysis (see Kar, et al., 2008; Beck and Patrick, 2008; Yalçınkaya, 2017; Dekle and Pundit, 2015). In principal component analysis, data can be used with their original values or standardized. As this method is sensitive to the unit of measurement of the data, the use of standardized variables is more reliable in terms of results when the variables are measured in different units (Kar, et al., 2008: 31). Therefore, in calculating the Financial Development Index, the data were standardized and included in the analysis. With the development of econometric methods, different applications are made to analyze the convergence hypothesis. In this hypothesis, which basically reflects income convergence, it is evaluated whether the shocks between per capita income differences are permanent or not. In this application, which is expressed as the stochastic definition of convergence, the necessity of a stationary process between income differences is argued. In the literature, transitory and permanent shocks are crucial for

the impact of policy outcomes with different perspectives. (Carlino and Mills, 1993: 336-337; Savacı and Karşıyakalı, 2016: 224; Tütüncü and Beşer, 2021: 684). For this purpose, unit root tests are performed on the income differentials and results indicating that they are stationary are expected.

The basic model of the study is as follows (Stolboy and Veysov 2011; Özcan, 2017):

- $\frac{1}{T}\left(fge_{yp,it} - fge_{g,it}\right) = \beta_0 + \beta_1 \ln\left(fge_{yp,it}\right) + u_{it}.$ (1)
- $fge_{yp,it}$, financial development index for emerging market economies
- $fge_{g,it}$, financial development index calculated for the reference country group
- u_{it}, error term

In the analysis, first the homogeneity test was performed (Peseran and Yamagata, 2008), then the cross-sectional dependence of the series was examined and second-generation unit root tests were applied accordingly.

There are many models to test for horizontal cross-section dependence in panel data models. Breusch and Pagan (1980) "CD_{LM}" test, Pesaran (2004) "CD_{LM2}" test and Pesaran et al. (2008) "bias-corrected 'LM test' (LM_{adj}) are applied in this study. Since there is horizontal cross-section dependence in the study, KPSS unit root test with structural breaks (Carrion-i-Silvestre, et al., 2005) and Fourier KPSS (Nazlıoğlu and Karul, 2017) unit root tests are applied to the data of country groups.

The panel KPSS unit root test with structural breaks, which is developed by including structural breaks in the trends and averages of the panel cross sections, allows for different dates and numbers of structural breaks for each cross section. In this test, which is an extension of the Hadri (2000) stationarity test, the null hypothesis is that the series are stationary. The stationarity of the series is determined by comparing the test statistic values calculated for the panel as a whole or for each cross-section with the critical values calculated by iteration (boostrap). Nazlıoğlu and Karul (2017) develop the Fourier KPSS unit root test, which takes into account the dependence of horizontal cross sections in the panel and allows for heterogeneity in horizontal cross sections. This test is a combination of the time series stationarity test developed by Becker, et al. (2006), where structural breaks are modelled using the Fourier approach, and the panel stationarity test proposed by Hadri and Kruzomi (2011, 2012), where horizontal cross-section dependence is included. The distribution of the individual statistic depends only on the Fourier frequency, and the panel statistic has a standard normal distribution.

3. EMPIRICAL FINDINGS

The models of the second-generation unit root tests for high income and low middle income groups are explained in detail above. The cross-section dependence and homogeneity test results required for the determination of these tests are given in the tables below.

Table 2. *Cross-Section Dependency Test Results for Variables (High Income (HI) and Low Middle-Income Group (LMI)*

	CD_{LM}		CD_{LM2}		LM_{adj}	
	statistics	p-value	statistics	p-value	statistics	p-value
$\left(fge_{yp,it} - fge_{g,it}\right)$ **HI**	20.386	0.026**	2.322	0.010**	3.204	0.001*
$\left(fge_{yp,it} - fge_{g,it}\right)$ **LMI**	46.208	0.001*	3.890	0.000*	4.335	0.000*

Note: The related statistics are obtained with 'Gauss 10' programme. (,**,***) indicate that the null hypothesis H_0 is rejected at 1%, 5% and 10% significance levels, respectively.*

Table 2 shows the results of the cross-section dependence test for the countries in the high and low middle income group. In this context, the results of CD_{LM}, CD_{LM2} test statistics show that the hypothesis H_0 is rejected at 5% significance level for high middle income countries and at 1% significance level for low middle income countries, while the results of LM_{adj}test statistics show that the hypothesis H_0 is rejected at 1% significance level for all country groups. According to the findings, the test statistics of the variable $(\text{fge}_{\text{yp,it}} - \text{fge}_{\text{g,it}})$ indicate the presence of cross section dependence. Therefore, second generation panel unit root analyses were preferred in unit root tests for all country groups.

Table 3. *Homogeneity Test Results for Country Groups*

		Test Statistics		
Country Groups	Δ	p- value	Δ_{Adj}	p- value
High Income	9.151	0.000*	9.885	0.000*
Low Middle Income	3.908	0.000*	4.222	0.000*

Note: The related statistics are obtained with 'Gauss 10' programme. (,**,***) indicate that the null hypothesis H_0 is rejected at 1%, 5% and 10% significance levels, respectively.*

Table 3 shows the homogeneity test statistics for the country groups. According to the results (Δ) test and Δ_{Adj} homogeneity tests in the table, the hypothesis H_0 is rejected at 1% significance level for high income group and low middle income group countries. In this context, it is concluded that the panel parameters are heterogeneous in the high-income group and low middle income group. In line with the results obtained, the unit root tests to be performed in the next stages were determined.

Table 4. *KPSS Unit Root Test Results with Structural Breaks (High Income Group Countries)*

Panel KPSS Test Statistics (Constant)						
Country	*KPSS Test*	*Critical Values*			*KS*	*Break Dates*
		1%	5%	10%		
Argentina	1.333*	1.929	1.019	0.737	1	2013
Chili	0.712*	2.016	0.921	0.628	1	2006
S.Arabia	0.078*	2.493	1.116	0.729	1	2007
Hungary	0.351*	2.038	1.147	0.838	3	1998-1999
Poland	2.171*	2.374	1.173	0.660	1	2008
PANEL RESULT						
Boostrap Value	19.151*	27.06	15.545	11.918		
P-Value	0.000*					
Panel KPSS Test Statistics (Constant and Trend)						
Country	*KPSS Test*	*Critical Values*			*KS*	*Break Dates*
		1%	5%	10%		
Argentina	0.299*	2.753	0.843	0.534	1	2013
Chili	0.194*	1.960	0.841	0.505	1	2009
S.Arabia	0.305*	9.577	3.96	2.817	3	1999-2004-2007
Hungary	0.863*	4.224	1.913	1.174	3	1998-2008
Poland	0.506*	1.609	0.677	0.405	1	2006
PANEL RESULT						
Boostrap Value	37.671*	250.985	112.587	84.689		
P-Value	0.000*					

Note: Related Test Statistics are obtained with Gauss 10 software. The signs (, **, ***) related to the Panel KPSS test statistics in the table indicate that the series for the countries in the panel and the entire panel are stationary at 1%, 5% and 10% significance levels, respectively. The KS column in the same table indicates the number of structural breaks in the cross-sections in the relevant period. Critical values of panel KPSS test statistics are obtained by using Bootstrap with 1000 iterations.*

Table 4 shows the KPSS unit root test statistics for the variable $(fge_{yp,it} - fge_{g,it})$ with structural breaks for high income group countries. In the analysis, stationarity is mentioned if the KPSS test statistic values calculated for both panel and cross-sections (countries) are smaller than the critical table values. In this study, KPSS test statistics are calculated with both constant and constant and trended models. According to the constant model results obtained for the cross-sections, the null hypothesis H_0, which states that the series are stationary with structural breaks, is accepted at the 1% significance level for all countries. The results obtained for the overall panel show that the series are stationary at 1% significance level. The results of the Panel KPSS test statistics obtained in the constant and trended form are similar to the results obtained in the constant form. According to the KPSS test statistics, the null hypothesis H_0, which states that the series are stationary by including structural breaks in both the overall panel and in each of the countries in the panel, is accepted at 1% significance level. On the other hand, the break dates estimated for countries in both constant and constant and trended models are similar to each other and give accurate estimates of the break dates. The structural breaks in the group of countries included in the analysis generally draw attention to the crises (such as the Asian crisis, the Russian and Argentine crisis) due to the financial liberalization in the early 1990s and the effects of the financial crisis in 2008.

Table 5. *Fourier KPSS Unit Root Test Results (High Income Group Countries)*

Fourier KPSS Test Statistics						
Country	*Constant*			*Constant and Trend*		
	k=1	k=2	k=3	k=1	k=2	k=3
Argentina	0.340	0.166*	0.146*	0.083	0.160*	0.146*
Chili	0.091*	0.410*	0.171*	0.083	0.143*	0.117*
S.Arabia	0.120*	0.330*	0.192*	0.094	0.224	0.192*
Hungary	0.115*	0.215*	0.148*	0.059*	0.179*	0.142*
Poland	0.089*	0.139*	0.123*	0.076	0.092*	0.091*
PANEL RESULT						
FZ(k)	3.546*	1.872*	0.014*	8.519	6.193*	4.221*

Note: Related Test Statistics are obtained with Gauss 10 software. The signs (, **, ***) for the Panel KPSS test statistics in the table indicate that the series for the countries in the panel and the entire panel are stationary at 1%, 5% and 10% significance levels, respectively. Critical values for the optimal frequencies are obtained from the paper by Becker, et al. (2006, 389). Critical values obtained from the table for both models are shown below. Critical values for k=1 are 0.2699 for 1%, 0.1720 for 5%, 0.1318 for 10%, critical values for k=2 are 0.6671 for 1%, 0.4152 for 5%, 0.3150 for 10%, critical values for k=3 are 0.7182 for 1%, 0.4480 for 5%, 0.3393 for 10%. 3393 In the Model with Constant and Trend; critical values for k=1 are 0.0716 for 1%, 0.0546 for 5%, 0.0471 for 10%, critical values for k=2 are 0.2022 for 1%, 0.1321 for 5%, 0.1034 for 10%, critical values for k=3 are 0.2103 for 1%, 0.1423 for 5%, 0.1141 for 10%.*

In order to ensure that the results obtained in the KPSS panel unit root test with structural breaks are reliable, the Fourier KPSS unit root test is included in the analysis. Table 5 shows the results of the Fourier KPSS panel unit root test for the variable $(fge_{yp,it} - fge_{g,it})$ applied to high income group countries. In the analysis, if the Fourier KPSS test statistic values calculated for both panel and cross-sections (countries) are smaller than the critical table values of the optimal frequencies (k=1, k=2, k=3), the null hypothesis H_0, which states that the series are stationary, is accepted. According to the results of the Fourier KPSS test statistics, in the constant model, the countries forming the panel are stationary

at 1% significance level except Argentina when the optimal frequency is k=1, and all countries forming the panel are stationary at 1% significance level when the optimal frequencies are k=2 and k=3. In the model of the same test with constant and trend, only Hungary is stationary at 1% significance level when the optimal frequency is k=1, all countries except S. Arabia are stationary at 1% significance level when the optimal frequency is k=2, and all countries are stationary at 1% significance level when the optimal frequency is k=3. According to the test statistics for the overall panel, stationarity is found at 1% significance level at all frequencies in both the model with constant and the model with constant and trend. The KPSS unit root test with structural breaks reveals similar results.

Table 6. *KPSS Unit Root Test Results with Structural Breaks (Low Middle Income Group Countries)*

Panel KPSS Test Statistics (Constant)						
Country	*KPSS Test*	*Critical Values*			*KS*	*Break Dates*
		1%	5%	10%		
Egypt	0.692*	1.162	0.553	0.439	1	2013
India	0.054*	2.906	2.357	2.063	1	2011
Indonesia	0.165*	0.842	0.558	0.438	3	1999
Morocco	3.691	3.611	2.180	1.889	1	2012
Nigeria	0.499*	0.520	0.409	0.359	2	2006-2009
Pakistan	0.216*	2.495	1.296	0.865	0	
Philippines	0.115*	2.328	1.386	0.902	0	
PANEL RESULT						
Boostrap Value	17.061*	23.719	18.435	16.406		
P-Value	0.000*					
Panel KPSS Test Statistics (Constant and Trend)						
Country	*KPSS Test*	*Critical Values*			*KS*	*Break Dates*
		1%	5%	10%		
Egypt	0.965*	3.542	1.633	1.000	0	
India	0.160*	2.798	1.155	0.760	2	2001-2002
Indonesia	0.240*	5.053	2.107	1.335	3	1999-2008-2010
Morocco	0.124*	2.273	0.679	0.455	1	2007
Nigeria	0.106*	3.336	1.690	1.363	3	1998-2006
Pakistan	0.074*	3.453	1.683	1.087	2	2009-2012
Philippines	0.219*	4.853	2.031	1.158	2	2004
PANEL RESULT						
Boostrap Value	26.892*	182.052	110.966	89.744		
P-Value	0.000*					

Note: Related Test Statistics are obtained with Gauss 10 software. The signs (, **, ***) related to the Panel KPSS test statistics in the table indicate that the series for the countries in the panel and the entire panel are stationary at 1%, 5% and 10% significance levels, respectively. The KS column in the same table indicates the number of structural breaks in the cross-sections in the relevant period. Critical values of panel KPSS test statistics are obtained by using Bootstrap with 1000 iterations.*

Table 6 shows the KPSS unit root test statistics for the variable $(\text{fge}_{\text{yp,it}} - \text{fge}_{\text{g,it}})$ with structural breaks for low middle income countries. In the study, KPSS test statistics are calculated with both constant and constant and trended models. According to the results obtained for the cross-sections in the model with constant, the null hypothesis H_0, which states that the series are stationary with structural breaks, is accepted at 1% significance level for all countries except Morocco. The results obtained for the overall panel show that the series are stationary at 1% significance level. The results of Panel KPSS

test statistics with constant and trend are similar to the results obtained in constant form. According to the KPSS test statistics, the null hypothesis H_0, which states that the series are stationary by including structural breaks in both the overall panel and in each of the countries in the panel, is accepted at 1% significance level. On the other hand, the estimated break dates for countries in both constant and constant and trended models are similar for some countries, while for some countries there is no break in the constant model, but there is a break in the constant and trended model. However, the results obtained give accurate estimates of the break dates. The structural breaks in the group of countries included in the analysis generally draw attention to the crises due to the financial liberalization in the early 1990s and the effects of the financial crisis in 2008.

Table 7. *Fourier KPSS Unit Root Test Results (Low Middle Income Group Countries)*

Fourier KPSS Test Statistics						
Country	*Constant*			*Constant and Trend*		
	k=1	k=2	k=3	k=1	k=2	k=3
Egypt	0.098*	0.119*	0.191*	0.343	0.187*	0.123*
India	0.784*	0.334*	1.011	1.546	0.092*	0.079*
Indonesia	0.370	0.166*	0.268*	0.171	0.058*	0.089*
Morocco	0.503	0.827	0.998	0.085	0.230	0.137*
Nigeria	0.407	0.455*	0.329*	0.125	0.146*	0.070*
Pakistan	0.088*	0.473*	0.343*	0.069*	0.534	0.065*
Philippines	0.231*	0.165*	0.163*	0.167	0.157*	0.153*
PANEL RESULT						
FZ(k)	14.188	4.424**	5.899*	66.669	10.133	2.718*

Note: Related Test Statistics are obtained with Gauss 10 software. The signs (, **, ***) for the Panel KPSS test statistics in the table indicate that the series for the countries in the panel and the entire panel are stationary at 1%, 5% and 10% significance levels, respectively. Critical values for the optimal frequencies are obtained from the paper by Becker, et al. (2006, 389). Critical values obtained from the table for both models are shown below. Critical values for k=1 are 0.2699 for 1%, 0.1720 for 5%, 0.1318 for 10%, critical values for k=2 are 0.6671 for 1%, 0.4152 for 5%, 0.3150 for 10%, critical values for k=3 are 0.7182 for 1%, 0.4480 for 5%, 0.3393 for 10%. 3393 In the Model with Constant and Trend; critical values for k=1 are 0.0716 for 1%, 0.0546 for 5%, 0.0471 for 10%, critical values for k=2 are 0.2022 for 1%, 0.1321 for 5%, 0.1034 for 10%, critical values for k=3 are 0.2103 for 1%, 0.1423 for 5%, 0.1141 for 10%.*

In order to ensure that the results obtained in the KPSS panel unit root test with structural breaks are reliable, the Fourier KPSS unit root test is included in the analysis. Table 7 shows the results of the Fourier KPSS panel unit root test for the variable $(fge_{yp,it} - fge_{g,it})$ applied to low middle income group countries. In the analysis, if the Fourier KPSS test statistic values calculated for both panel and cross-sections (countries) are smaller than the critical table values of the optimal frequencies (k=1, k=2, k=3), the null hypothesis H_0 stating that the series are stationary is accepted. According to the results of Fourier KPSS test statistics, Egypt, India, Pakistan and Philippines are stationary at 1% significance level when the optimal frequency k=1, all countries except Morocco are stationary at 1% significance level when the optimal frequency k=2, and all countries except Morocco and India are stationary at 1% significance level when the optimal frequency k=3. According to the test statistics in the fixed and trended model of the same test, when the optimal frequency k=1, Pakistan is stationary at 1% significance level, when the optimal frequency k=2, all countries except Morocco and Pakistan are stationary at 1% significance level, and when the optimal frequency k=3, all countries in the panel are stationary at 1% significance level. According to the test statistics for the overall panel, the model with constant is stationary at 5% significance level for k=2 and 1% significance level for k=3, while the model with constant and trend is stationary at 1% significance level for k=3. According to the convergence hypothesis, stationarity of the series indicates the existence of convergence. In this case, according to the test results, the convergence hypothesis is valid for these countries.

CONCLUSION

In this study, the financial development index is calculated using financial development data of selected country groups from emerging market economies. Then, the existence of financial convergence in these countries was analyzed with unit root tests with structural breaks (KPSS with structural break and Fourier KPSS). According to the results of the unit root tests for the two country groups, the tests taking into account the vulnerabilities reveal that financial development in the selected emerging market economies converges to the developed countries. The homogeneity test revealed that the series have a heterogeneous structure. This made it possible to evaluate the results of the stationarity test both on country group and country basis.

The results indicate that there is financial convergence in countries in the high-income group. The countries in this income group are Argentina, Hungary, Saudi Arabia, Poland and Chile. Among these countries, Hungary and Poland are among the countries that have experienced a transition from a planned economy to a market economy. Although they have a short history, their financial sectors have undergone major institutional, regulatory and technical developments. Thus, they have become able to meet the requirements of European markets. All these countries in the high-income group are among the emerging market economies that easily adapt to the economic and financial liberalization process. Therefore, the findings obtained in the analysis applied in this study prove the existence of convergence. The other countries where financial convergence is analyzed are in the low middle income group. The countries in this group are Egypt, India, Indonesia, Morocco, Nigeria, Pakistan and the Philippines. Since 1990, these countries, which have been involved in the financial liberalization process, have attached great importance to financial diversification in order to adapt to the modern financial structure in the world. Like every other country going through the liberalization process, low middle income countries have also been affected by some financial shocks. This process has enabled countries to build more robust financial system foundations. Thus, the diversity and depth of financial markets in these countries started to increase. Therefore, the results obtained for this group of countries support the convergence of financial markets of developed countries.

The results of the study show that the quality of a country's financial intermediation system (how efficient it is in allocating funds) and its size are key drivers of financial convergence or divergence. This general conclusion is captured by the use of financial intermediation-related activity measures as the most characteristic variables of the efficiency of the financial system. At the same time, the fact that financial liberalization facilitates financial development and convergence is shown in the results and in detailed country-specific explanations. The evidence that the world has become more financially homogenous demonstrates the applicability of the traditional financial system dichotomy. In particular, the integration of emerging market economies with developed countries has created a very special environment for the financial sector quality of these developing countries. Moreover, the entry of foreign banks has also provided a means of improving the quality of domestic banking sectors in a region by reducing the weaknesses of domestic banks in terms of lending techniques and governance. Based on the results obtained in the study, it is clearly seen that financial liberalization policies implemented in emerging market countries have caused financial crises in these countries. However, these shocks also contributed to the transition process required for the financial markets of emerging market economies to reach the level of international competition. Moreover, the crises due to financial liberalization have revealed that in a globalized world, in addition to an effective supervision mechanism, it is necessary to establish institutions with similar qualities and functions to developed financial markets on the international platform and to strengthen the existing ones. These developments led to increased diversity and capital inflows in the financial markets of emerging market economies and formed the basis of financial development. Therefore, the integration of emerging market economies with developed countries plays an important role in improving the quality of the financial systems of these countries. Moreover, the increase in the quality of financial markets enables these countries to obtain the funds they need more easily. In order for emerging market economies to allocate the necessary funding resources more easily, these countries need to become more advantageous. The size of financial intermediation activities also helps to increase the efficiency of the financial system.

Consequently, emerging market economies need to continue financial regulation and supervision and implement necessary practices to improve financial quality. At the same time, considering the diversity in the world financial market, new developments should be closely monitored by emerging market countries. Determining whether there is convergence in the financial systems of countries can also allow inferences to be made about the effects of financial development on the economy and development of the country and enable macroeconomic policies to be developed in the light of this information. At the same time, the existence of financial convergence can provide evidence on whether developing countries have caught up with the developments in the world.

REFERENCE

Aghion, P., Peter, H. & David, M. F. (2005). The Effect of Financial Development on Convergence: Theory and Evidence. *Quarterly Journal of Economics*,120 (1):173-222.

Allen, F. & Gale, D. (2000). *Comparing Financial Systems*. Cambridge University Press.

Antzoulatos, A. A., Panopoulou, E. & Tsoumas, C. (2011). Do Financial Systems Converge?. *Review of International Economics*.

Apergis, N., Christina, C. & Miller, S. M. (2010). *Convergence Patterns in Financial Development: Evidence from Club Convergence*. University of Connecticut Department of Economics Working Paper Series.

Asteriou, D., Karagianni, S. & Siriopoulos, C. (2011). Testing the Convergence Hypothesis Using Time Series Techniques: The Case of Greece. *Journal of Applied Business Research*,18(2): 125-130.

Bahadır, B. & Valev, N. (2015). Financial Development Convergence. *Journal of Banking Finance*, No: 56.

Beck, T. & Patrick, H. (2008). *Finance for all?: Policies and Pitfalls in Expanding Access.* Vol. 41792, World Bank Publications.

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.

Bernard A. & Durlauf, S. (1995). Convergence in İnternational Output. *Journal of Applied Econometrics*, 10: 97–108.

Breusch, T. S. & Pagan, A. R. (1980). The Lagrange Multiplier Test and Its Applications to Model Specification in Econometrics. *Review of Economic Studies*, 47: 239-253.

Bruno, G., De Bonis, R. & Silvestrini, A. (2011). Do financial Systems Converge? New Evidence from Financial Assets in OECD Countries. *Journal of Comparative Economics*, Elsevier.

Bruno, G. & De Bonis, R. (2009). *Do Financial Systems Converge? New Evidence from Household Financial Assets in Selected OECD Countries*. OECD Statistics Working Papers.

Carrion-İ-Silvestre, J. L., Barrio-Castro, T. D. & Lopez-Bazo, E. (2005). Breaking the Panels: An Application to the GDP Per Capita. *Econometrics Journal*, 8: 159-175.

Carlino, Gerald A. & Mills Leonard O. (1993). Are U.S. Regional Incomes Converging?. *Journal of Monetary Economics*, 32(2): 335-346.

Dekle, R. & Pundit, M. (2015). *The Recent Convergence of Financial Development in Asia*. ADB Economics Working Paper Series, No: 440.

Durlauf, S. N. (2003). *The Convergence Hypothesis After 10 Years.* University of Wisconsin at Madison.

Fung, M. K. (2009). Financial Development and Economic Growth: Convergence or Divergence. *Journal of International Money and Finance*, 28(1): 56-67.

Herrmann, S. & Winkler, A. (2009). Real Convergence, Financial Markets, and the Current Account – Emerging Europe Versus Emerging Asia. *The North American Journal of Economics and Finance*, 20(2): 100-123.

IMF (2014). *Public Expenditure Reform.* Fiscal Monitor, World Economic and Financial Surveys.

Kar, M., Peker, O. & Kaplan, M. (2008). Trade liberalization Financial Development and Economic Growth in the Long Run: The Case of Turkey. *The South East European Journal of Economics and Business*, 3(2): 25-38.

Karataş, A. R. & Ergül, M. (2023). Türkiye'de Ekonomik Büyüme, Finansal Gelişme ve Ticari Açıklık: Genişletilmiş ARDL ile Kanıtlar. *Necmettin Erbakan Üniversitesi Siyasal Bilgiler Fakültesi Dergisi*, 5(Özel Sayı): 222-236.

Nazlıoğlu, S. & Karul, C. (2017). A Panel Stationarity Test with Gradual Structural Shifts: Re-Investigate the International Commodity Price Shocks. *Economic Modelling*, 61: 181-192.

Niţoi, M., & Pochea, M. M. (2016). Testing Financial Markets Convergence in Central and Eastern Europe: A Non-Linear Single Factor Model. *Economic Systems,* 40(2): 323–334.

Özcan, G. (2017). Financial Convergence in Transition Economies. Ed. Tayfur Bayat. in *Political Economy in Transition Economies*, Aurel Vlaicu University of Arad: Romania.

Özdoğan, M. A. & Kayhan, S. (2023). Kredi Garanti Fonunun Makroekonomik Etkileri: Türkiye Örneği. *Necmettin Erbakan Üniversitesi Siyasal Bilgiler Fakültesi Dergisi,* 5 (Özel Sayı): 165-183.

Pesaran, M. H. (2004). *General Diagnostic Tests for Cross Section Dependence in Panels*. Cambridge Working Papers in Economics No.435: Cambridge.

Pesaran, M. H., Ullah, A. & Yamagata, T. (2008). A Bias- Adjusted LM Test of Error Cross-Section Independence. *Econometrics Journal*, 11: 105-127.

Pesaran, M. H. & Yamagata, T. (2008). Testing Slope Homogeneity in Large Panels. *Journal of Econometrics*, 142(1): 50-93.

Rajan, R. & Zingales, L. (2003). *Banks and Markets: The Changing Character of European Finance.* NBER, Working paper, no: 9595.

Rysin, V., Galenko, O., Duchynska, N., Kara, N., Voitenko, O. & Shalapak, A. (2021). Financial Convergence as a Mechanism for Modifying Sectors of the Global Financial Services Market. *Universal Journal of Accounting and Finance,* 9(1): 65-73.

Savacı, S. & Karşıyakalı, B. (2016). Ülkeler Arası Gelir Yakınsaması Analizi: AB Ülkeleri ve Türkiye. *Akdeniz İ.İ.B.F. Dergisi*, (33): 237-257.

Stolbov, M. & Veysov, A. (2011). *Do Financial Systems Converge? A Comprehensive Panel Data Approach and New Evidence From A Dataset For 102 Countries.* MPRA. No:36103.

Tütüncü, A. & Beşer, N. Ö. (2021). Türkiye'de Kişi Başına Enerji Kullanımı Durağan mıdır?. *Journal of Yaşar University,* 16(62): 683-697.

Yalçınkaya, Ö. (2017). Ticari Dışa Açıklığın ve Finansal Gelişmişliğin Ekonomik Büyüme Üzerindeki Etkileri: G-20 Ülkeleri İçin Yeni Nesil Panel Veri Analizi (1994-2015). *International Journal of Academic Value Studies*, 3(15): 458-477.

Yaseen, H. (2012). The Convergence of Financial Institutions in GCC Countries. *The Journal of Global Business Management*, JGBM 1(8): 153-159.