

-RESEARCH ARTICLE-

**CONVERGENCE IN TERMS OF NON-PERFORMING LOANS IN THE
BANKING SECTOR: EUROPEAN UNION COUNTRIES**

Hasan KAZAK¹

Abstract

Banks perform an important function in transferring funds to parties in need of capital and the stability of the banking system is vital for economic growth and development. With the developing financial markets and the integration of the world banking system, the stability of the banking system has become a concern for all economies of the world rather than being a national or regional target and/or problem. In this framework, analyzing the stability of the banking system in the European Union countries can provide important data. In this framework, the aim of this study is to reveal the convergence among the member countries of the European Union (member and candidate) based on the non-performing loan ratios of banks operating in the member countries within the framework of the economic integration process. For this purpose, analyses were conducted with the Result of Updated Panic LM Test (Dummy Breaks, Factor) procedure developed by Payne et al. (2022) using the non-performing loan ratios for the period 1997-2022 in the European Union countries. As a result of the analyses, convergence at various levels of significance was found between Belgium, Denmark, Estonia, France, Germany, Italy, Latvia, the Netherlands, North Macedonia, Poland, Spain and Türkiye. Moreover, when the break periods are evaluated, it is observed that the regulations in the banking sector affect the convergence relations. The study is expected to make important contributions to decision makers, national policy makers and the banking sector in terms of banking sector standards. It also contributes to the literature as it is the first study that deals with convergence based on non-performing loans (NPLs).

Keywords: *European Union, Convergence, Non-performing Loans, Basel Accord*

JEL Codes: *G21, G32, P34, P52*

Başvuru: *11.03.2024*

Kabul: *12.07.2024*

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BANKACILIK SEKTÖRÜNDE TAKİPTEKİ KREDİLER AÇISINDAN YAKINSAMA: AVRUPA BİRLİĞİ ÜLKELERİ

Öz

Bankalar sermaye ihtiyacı olan taraflara fon transferi sağlamada önemli bir fonksiyon icra etmekte olup bankacılık sisteminin istikrarı ekonomik büyüme ve kalkınma açısından hayati öneme sahiptir. Gelişen finansal piyasalar ve dünya bankacılık sisteminin entegrasyonu birlikte bankacılık sisteminin istikrarı, bölgesel ve bölgesel bir hedef ve/veya sorun olmaktan öte tüm dünya ekonomilerini ilgilendirir hale gelmiştir. Tüm bu çerçevede Avrupa Birliği ülkelerindeki bankacılık sisteminin istikrarının ele alınması oldukça önemli veriler sunabilecektir. Bu çerçevede bu çalışmanın amacı Avrupa Birliği ülkelerinde (üye ve aday) ekonomik entegrasyon süreci çerçevesinde birlik üyesi ülkelerde faaliyet gösteren bankaların takipteki kredi oranı oranları baz alınarak birlik üyesi ülkeler arasındaki yakınsamanın ortaya konulmasıdır. Bunun için Avrupa Birliği ülkelerinde 1997-2022 dönemi takipteki kredi oranları kullanılarak Payne et al. (2022) tarafından geliştirilen Result of Updated Panic LM Test (Dummy Breaks, Factor) prosedürü ile analizler yapılmıştır. Yapılan analizler sonucunda Belçika, Danimarka, Estonya, Fransa, Almanya, İtalya, Letonya, Hollanda, Kuzey Makedonya, Polonya, İspanya, Türkiye arasında çeşitli önem seviyelerinde yakınsama tespit edilmiştir. Ayrıca kırılma dönemleri değerlendirildiğinde bankacılık sektöründe yapılan düzenlemelerin yakınsama ilişkilerini etkilediği gözlenmiştir. Çalışmanın bankacılık sektörü standartları konusunda karar alıcılara, ülke politika yapıcılara ve bankacılık sektörüne önemli katkıları olacağı düşünülmektedir. Ayrıca takipteki krediler (TGA) baz alınarak yakınsamayı ele alan bildiğimiz kadarıyla ilk çalışma olması hasebiyle literatüre de önemli katkılar sunmaktadır.

Anahtar Kelimeler: *Avrupa Birliği, Yakınsama, Takipteki Krediler, Basel uzlaşısı*

JEL Kodları: *G21, G32, P34, P52*

“Bu çalışma Araştırma ve Yayın Etiğine uygun olarak hazırlanmıştır.”

1. INTRODUCTION

The European Union (EU) is an international organization based on treaties ratified voluntarily and democratically by member states (EU, 2024). It is an important organizational structure in which unity is ensured in line with common goals in diversity by preserving the unique elements of the member states with the slogan “United in diversity” (EU, 2000). An important element of this structure is economics, which serve common economic objectives by preserving the diversity of economic performance among member states. Significant efforts are being made to ensure that the diversity of economic performance among member states does not hinder economic integration and convergence efforts, but rather serves as a supportive element. The fact that the member states of the European Union have succeeded in

integration is evident from its development from a limited form of industrial cooperation (“the early days of the European Coal and Steel Community shortly after the Second World War”) to its current status as a major economic and monetary union (Begg, 2021). If we define integration as “the creation of the most desirable structure of the international economy, the removal of artificial obstacles to its optimal functioning, and the deliberate introduction of all desirable means of coordination or unification” (Tinbergen, 1965), it is essential that one of the most important elements is the removal of obstacles to optimal functioning and the planning and management process necessary to create the desired structure. The European Union is a static structure, but through new accession negotiations, treaty amendments, successive enlargements, and major policy initiatives, the EU is becoming both 'broader' and 'deeper' (Faber & Wessels, 2006). This widening and deepening, which affects the process of economic integration and convergence among EU countries, is also crucial for the banking sector. Among many other considerations, it is crucial to assess the non-performing loan (NPL) situation in the banking sector and, if necessary, to adjust course in the process of removing artificial barriers to efficient operations. Right now, policymakers can benefit greatly from understanding the convergence of NPLs across Member States.

This study uses the term “bank non-performing loans” or “NPLs” to refer to loans that are non-performing. NPLs are a crucial indicator of the financial health of the banking system as they can indicate future weaknesses and stability threats. Non-performing loans are loans for which borrowers have defaulted on their payments for a predetermined amount of time, usually 90 days or more (Berger & DeYoung, 1997; Choudhary & Jain, 2021). Non-performing loans (NPLs) are an indicator of problems within the banking industry, credit risk management, macroeconomic conditions, and regulatory effectiveness. NPLs tend to increase in volume and amount, especially during financial crises. In severe crises, they can even reach unprecedented levels (Konstantakis et al., 2016; Ari et al., 2021; Kazak, 2022).

Given this importance, the purpose of this study is to determine the degree of convergence in the non-performing loan ratios of banks in the European Union across Member States. In this context, convergence refers to the degree to which countries are affected by the same processes, the tendency of countries to close the gap in NPL ratios over the period under consideration and a process of harmonization of banking sector performance across the EU. The European Union is particularly interested in the phenomenon of NPL convergence because of its potential implications for financial stability, economic growth, and the effectiveness of monetary policy. In order to support financial stability and sustainable economic development throughout the EU, policymakers, regulators, and market participants can greatly benefit from an understanding of the dynamics and drivers of NPL convergence.

To achieve these objectives, this study employs state-of-the-art econometric analysis methods to analyze NPLs convergence across EU member states. After this stage, the paper consists of the following sections: Literature Review, Data Set and Basic Statistics, Methodology, and Empirical Results.

2. LITERATURE REVIEW

The issue of convergence of countries in terms of non-performing loans has hardly been addressed in the literature. The studies in the literature have mostly examined in detail the state of the banking sector in terms of non-performing loans, their effects on bank efficiency and their changes especially during crisis periods (Partovi & Matousek, 2019; Kazak, 2022; Phung et al., 2022; Kryzanowski et al., 2023; Takahashi & Vasconcelos, 2024). Banking convergence has been evaluated from different perspectives in the literature in the context of various bank groups and country groups. Some examples from the literature on this subject are briefly presented below.

Matthews and Zhang (2010) examine the convergence and divergence in the efficiency of various bank groups operating in China.

The impact of the global financial crisis on bank convergence in the banking sectors of Central and Eastern Europe has been studied by Efthyvoulou and Yildirim (2014). When banks are compared on the basis of their ownership characteristics rather than their market strength, it is found that there are differences among them.

Convergence in bank efficiency during the process of bank integration in the European Union is examined by Matousek et al. (2015). The results generally show signs of club development with mild convergence, but little evidence of group convergence after the financial crisis.

Karadima and Louri (2020) looked for evidence of fragmentation or convergence in the structure of euro area banks in terms of competition and credit risk. The study revealed the persistence of fragmentation, as well as fragmentation within and/or between the center and the periphery, especially during the crisis period.

Lamers et al. (2022) examined the gap during the crisis and the convergence of profitability for banks in the Euro area between 2009 and 2020. The study found that bank profitability in the euro region converged in the aftermath of the sovereign debt crisis. Notably, banks with worse performance showed a significant convergence with higher performing banks.

Apergis (2022) analyzed the convergence of bank profits in the US banking industry before and during the COVID-19 epidemic using empirical data from 86 major banks. The empirical findings suggest that bank earnings exhibited increased convergence during the pandemic crisis. Additionally, the study found that non-performing loans had a favorable effect on convergence dynamics during the pandemic.

Kazak (2024) analyzed the convergence of European Union member and candidate countries in terms of the ratio of bank capital to assets. The empirical analysis revealed that eight out of twenty-eight countries converged in terms of the related indicator.

Liu (2024) examines the effects of digitalization on bank convergence in detail. The empirical analysis reveals that the adoption of digital technology plays a decisive role in the convergence process. The analysis showed that digitalization acts as a catalyst that contributes to less efficient banks adapting significantly faster than their more efficient competitors.

Considering the impact and importance of the banking sector on the financial integration process, this study deals with the convergence of the banking sector in European Union countries in terms of the non-performing loans problem. Considering that there are not enough studies on this issue in the literature, the study makes important contributions to the literature. The study also uses the most up-to-date methods in convergence analysis and presents qualified findings.

3. DATA SET AND BASIC STATISTICS

The article analyzes the convergence of the banking sector in the European Union countries in terms of non-performing loans. For this purpose, data for the period 1997-2022 for the current and candidate countries of the European Union are used. Among these countries, countries with complete data are included in the analysis and countries with missing data are not included in the analysis. The countries evaluated in the study are as follows: Austria (AUT), Belgium (BEL), Bulgaria (BGR), Croatia (HRV), Czechia (CZE), Denmark (DNK), Estonia (EST), Finland (FIN), France (FRA), Georgia (GEO), Germany (DEU), Greece (GRC), Hungary (HUN), Ireland (IRL), Italy (ITA), Latvia (LVA), Lithuania (LTU), Luxembourg (LUX), Malta (MLT), Moldova (MDA), Netherlands (NLD), North Macedonia (MKD), Poland (POL), Portugal (PRT), Romania (ROU), Slovak Republic (SVK), Slovenia (SVN), Spain (ESP), Türkiye (TUR), Ukraine (UKR). The data used in the analysis were obtained from “<https://databank.worldbank.org/>” and “<https://data.ecb.europa.eu>” addresses.

A summary of the descriptive statistics of the variable used in the study is given in Table 1.

Table 1. Descriptive Statistics

	AUT	BEL	BGR	CZE	DEU
Mean	0.336924	0.365282	1.341346	0.88261	0.42086
Median	0.331354	0.401041	1.348029	0.619791	0.383418
Maximum	0.600351	0.525463	2.285522	3.19426	0.93252
Minimum	0.14552	0.155401	0.267061	0.279233	0.172908
Std. Dev	0.097212	0.095385	0.521858	0.664785	0.22299
Skewness	0.590541	-0.59201	-0.4713	1.951321	1.031521
Kurtosis	3.877346	2.398896	2.714046	6.689415	3.191276
Jargue-Bera	2.345082	1.910144	1.051119	31.24594	4.650457
Probability	0.309579	0.384784	0.591225	0	0.097761
Sum	8.760012	9.497321	34.87501	22.94785	10.94237
Sum Sq. Dev	0.236256	0.227459	6.808391	11.04847	1.243118
Observations	26	26	26	26	26

Table 1. Descriptive Statistics (continued)

	DNK	ESP	EST	FIN	FRA
Mean	0.235912	0.454824	0.246097	0.114738	0.541279
Median	0.246938	0.525579	0.185678	0.083216	0.510272
Maximum	0.456508	1.072579	0.763246	0.384992	0.889427
Minimum	0.05136	0.085119	0.024278	0.036417	0.371853
Std. Dev	0.127148	0.291216	0.199818	0.094257	0.129753
Skewness	-0.0842	0.17724	1.286327	1.856483	1.055882
Kurtosis	1.804812	1.786076	3.838228	5.285537	3.638555
Jargue-Bera	1.578237	1.73254	7.931278	20.59394	5.272911
Probability	0.454245	0.420517	0.018956	0.000034	0.071615
Sum	6.133721	11.82542	6.39852	2.983177	14.07325
Sum Sq. Dev	0.404168	2.12017	0.998179	0.222111	0.420894
Observations	26	26	26	26	26
	GEO	GRC	HRV	HUN	IRL
Mean	0.550896	2.823601	1.32014	0.810406	0.84185
Median	0.409351	1.535672	1.430463	0.527825	0.62274
Maximum	1.351456	9.507134	2.018211	1.812691	2.410285
Minimum	0.097827	0.553651	0.648528	0.248933	0.06491
Std. Dev	0.334065	2.418615	0.385303	0.521809	0.830021
Skewness	0.944056	1.199793	-0.04242	0.785581	0.700348
Kurtosis	3.072955	3.515201	2.012815	2.233692	2.024132
Jargue-Bera	3.867814	6.525404	1.063542	3.310426	3.157124
Probability	0.144582	0.038285	0.587563	0.191051	0.206271
Sum	14.32329	73.41362	34.32363	21.07055	21.88809
Sum Sq. Dev	2.789993	146.2424	3.711468	6.807106	17.22338
Observations	26	26	26	26	26
	ITA	LTU	LUX	LVA	MDA
Mean	1.243443	0.95582	0.090145	0.756087	1.417864
Median	1.111458	0.717091	0.054682	0.550628	1.337104
Maximum	2.007032	3.24819	0.422894	2.974026	2.40443
Minimum	0.756955	0.121391	0.016398	0.072835	0.534122
Std. Dev	0.427534	0.856853	0.093956	0.732693	0.459661
Skewness	0.650641	1.151809	2.431616	2.12977	0.263479
Kurtosis	2.005614	3.551509	8.401167	6.873311	2.815634
Jargue-Bera	2.905648	6.078391	57.22559	35.90841	0.337648
Probability	0.233909	0.047873	0	0	0.844658
Sum	32.32953	24.85133	2.343772	19.65827	36.86447
Sum Sq. Dev	4.569638	18.35494	0.220695	13.42096	5.282216
Observations	26	26	26	26	26
	MKD	MLT	NLD	POL	PRT
Mean	1.825497	1.001463	0.308853	1.115528	1.145148
Median	1.257901	0.927893	0.314961	0.766817	0.925566
Maximum	3.926214	2.248959	0.530421	3.676649	5.56016
Minimum	0.619957	0	0.121391	0.452438	0.20544
Std. Dev	1.141515	0.479131	0.096515	0.878062	1.269924
Skewness	0.673182	0.786363	0.253293	1.700097	2.499317
Kurtosis	1.870082	4.187081	2.827476	4.803813	8.649977

Table 1. Descriptive Statistics (continued)

Jargue-Bera	3.346863	4.206184	0.310261	16.04965	61.65096
Probability	0.187602	0.122078	0.856303	0.000327	0
Sum	47.46292	26.03803	8.030171	29.00372	29.77385
Sum Sq. Dev	32.57643	5.739158	0.232877	19.27483	40.31769
Observations	26	26	26	26	26
	ROU	SVK	SVN	TUR	UKR
Mean	1.589286	0.899196	0.827125	0.813928	4.7314
Median	1.143024	0.625991	0.762157	0.579548	3.535361
Maximum	6.111304	2.693406	1.709761	3.413592	10.10859
Minimum	0.319297	0.431779	0.303478	0.189239	1.225216
Std. Dev	1.480906	0.609568	0.394884	0.73651	2.750813
Skewness	2.014152	1.656278	0.560191	2.24611	0.476772
Kurtosis	6.062775	4.750298	2.294127	7.746769	1.717752
Jargue-Bera	27.74182	15.20628	1.89964	46.27117	2.76619
Probability	0.000001	0.000499	0.386811	0	0.250801
Sum	41.32145	23.37909	21.50526	21.16214	123.0164
Sum Sq. Dev	54.82709	9.289318	3.898332	13.56119	189.1743
Observations	26	26	26	26	26

Table 1 presents the descriptive statistical values of the data compiled for testing the convergence hypothesis. Looking at these values, it is seen that the country with the highest values of the analyzed variable is the UKR with 10.10859. Likewise, with an average score of 4.7314, the UKR is the country with the highest average of the variable in question.

4. METHODOLOGY

In order to determine and apply the most appropriate test in the process of conducting panel data analysis, horizontal cross-section dependence tests should be performed first. The Lagrangian multiplier test in equation (1) developed by Breusch and Pagan (1980) is used to test for horizontal cross-section dependence.

$$LM = T \sum_{i=1}^{N-1} \sum_{j=i+1}^N (\hat{p}_{ij}^2) X^2_{\frac{N(N-1)}{2}} \quad (1)$$

The Breusch-Pagan LM test in equation (2) was developed by Pesaran (2004) for cases where both (N) and (T) are large and transformed into the CD_{LM} test in equation (2). In addition, equation (2) developed by Pesaran (2004) is also used to detect horizontal cross-section dependence.

$$CD_{LM} = \left(\frac{1}{N(N-1)} \right)^{\frac{1}{2}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N (T \hat{p}_{ij}^2 - 1) \quad (2)$$

Equation 3, on the other hand, is an adaptation of the previous approaches and was brought to the literature by Pesaran et al. (2008) to indicate the bias-adjusted LM test statistic.

$$LM_{adj} = \sqrt{\frac{2}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \frac{(T-k) \hat{p}_{ij}^2 - \hat{\mu}_{\tau_{ij}}}{VT_{ij}} \quad (3)$$

In the next stage, the stochastic convergence of bank non-performing loans in the EU countries is analyzed. For this purpose, the data to be analyzed are organized with the help of the following equation.

$$\hat{\omega}_{it} = A_{it} / (\bar{A}_t), \quad A = \text{NPLs Ratio} \quad (4)$$

In order to test for stochastic convergence in terms of the non-performing loans ratio in the European Union countries (member and candidate) considered in the study, the unit root test with breaks and factor structure developed by Payne et al. (2022). The test, which basically incorporates the two structural breaks of Lee and Strazicich (2003), is one of the most popular approaches (e.g. it has 3,400 citations on Google Scholar as of 24/02/2024). However, this study has a limitation because it does not allow for cross-correlations. Recognizing this problem, Payne et al. (2022) extended the aforementioned test of Lee and Strazicich (2003) and strengthened the PANIC (Panel Analysis of Non-Stationarity in Sentiment and Common Components) procedure of Bai and Ng (2004).

Payne et al. (2022) propose a panel model with alternative DGP as follows since the test procedures discussed earlier allow for a factor structure.

$$\begin{aligned} y_{it} &= \delta_i Z_{it} + \pi_i F_t + e_{it} \\ &\text{and} \\ e_{it} &= \beta_i e_{i,t-1} + e_{it} \\ i &= 1, \dots, N; t = 1, \dots, T \end{aligned} \quad (5)$$

“Where F_t is an $r \times 1$ vector of unobservable common factors and π_i is the factor loadings that capture the responses of each cross-sectional unit to the common factors. Again, i includes i cross-sectional units and Z_{it} includes one or two structural breaks. The difficulty in estimating the above model is that there is no convenient way to estimate the factor terms together with other parameters in a linear model framework” (Payne et al., 2022).

The LM procedure introduced by Lee and Strazicich (2003) uses a two-stage procedure. Here, however, we follow the spirit of the PANIC procedure described by Payne et al. (2022). Accordingly, in the first step of the LM test procedure, we try to estimate factor terms based on first differenced variables. To start, we fix the number of breaks (R) as given.

The estimation of break points and factor terms is the first step in the LM test technique. Equation 6 provides the first difference regression for this.

$$\Delta y_{it} = \delta_i' \Delta Z_{it} + \pi_i' \Delta F_t + \Delta e_{it} \tag{6}$$

In fact, estimating factor terms using first differences is a key feature of the Bai and Ng (2004) PANIC procedure. However, the main problem with this equation (Equation 6) is that the ΔZ_{it} coefficients have to be estimated together with unknown factors (ΔF_t) and factor loadings (π_i). To address this problem, Payne et al. (2022) adopt an iterative approach, following Bai and Carrion-I-Silvestre (2009) together with Nazlioglu et al. (2022). To do so, the following equation (Equation 7) is first estimated for each i 'th horizontal cross-section unit.

$$\Delta y_{it} = \delta_i' \Delta Z_{it} + w_{it}^* \tag{7}$$

In the next step, Equation 8 is estimated by defining ΔZ_{it} using the optimal break locations.

$$q_{it} = \Delta y_{it} - \delta_i' \Delta Z_{it} \tag{8}$$

Here (Equation 8); it is clear that q_{it} has zero mean and has a pure factor structure defined as follows.

$$q_{it} = n_i' f_t + n_{it} \tag{9}$$

The principal components approach can be used to estimate n_i and $f_t (= \Delta f_t)$ in this case. Again, the values of the information criteria for can be used to determine the number of factors (Bai & Ng, 2002).

$$\xi_{it} = \Delta y_{it} - \hat{\pi}_i' \hat{f}_t \tag{10}$$

Although the above term is factor-free, it will contain deterministic terms, including intermediate words. Next, we use “ ξ ” to re-estimate equation (7):

$$\xi_{it} = \delta_i' \Delta Z_{it} + w_{it}^* \tag{11}$$

It is at this point that we mix the factors and the deterministic terms in order to calculate the residuals using the factor terms and the estimated parameters.

$$\hat{z}_{it} = \Delta y_{it} - \delta_i' \Delta Z_{it} - \hat{\pi}_i' \hat{f}_t \tag{12}$$

In this step of the test procedure, we define the diverted variable as $\tilde{S}_{it} = \sum_{s=2}^t \hat{z}_{is}$. Here \hat{z}_{is} represents the residual obtained from Equation (12).

In the next step of the regression test, the test statistic can be obtained from the regression for each horizontal cross-section unit:

$$\Delta y_{it} = \tilde{y}_i + \beta_i \tilde{S}_{i,t-1}^* + \delta_i' \Delta Z_{it} + \hat{\pi}_i' \hat{f}_t + \sum_{s=1}^{k_i} C_{is} \Delta \tilde{S}_{i,t-s} + v_{it} \quad (13)$$

Where $\tilde{S}_{i,t-1}^*$ is the series transformed according to the estimated break locations. To correct for autocorrelations, the lagged value of $\tilde{S}_{i,t}$ is included together with the estimated frequencies, the factors \hat{f}_t and the augmented terms of $\Delta \tilde{S}_{i,t}$. Thus, in the above procedure, all break locations, the number of factors and the number of augmented terms can be estimated together. Here, the null hypothesis of unit root of the i -th horizontal cross-section is given as $\beta_i = 0$ and the t -statistic obtained for $\beta_i = 0$ is denoted as \tilde{T}_i and the corresponding p -value of the test statistic as p_i .

$$\tilde{T}_i = t - \text{statistic for } \beta_i = 0 \text{ in (13)} \quad (14)$$

One important reason for adopting and preferring the PANIC procedure is that this recommended test statistic follows the same asymptotic distribution of the LM statistic with breaks. Given this fundamental property, we can easily use the same response surface estimates of Nazlioglu and Lee (2020) for critical values and corresponding p -values.

5. RESULTS

The analysis first examines the horizontal cross-section dependence for the European Union countries. This is important for determining the appropriate generation test. In this context, the horizontal cross-section dependence test introduced by Breusch and Pagan (1980), Pesaran (2004), Pesaran et al. (2008).

Table 2. Cross-Sectional Dependence Tests

Test	Statistics	Probability Value
LM	1,669.33***	0.000
CDLM	41.85***	0.000
LMadj	23.19***	0.000

In all of the 3 different test results applied to analyze the horizontal cross-section dependence of the variable, the probability value was found to be less than 0.05 and the H_1 hypothesis was accepted, and it was concluded that there is horizontal cross-section dependence.

After the horizontal cross-section dependence analysis, convergence analysis was performed. The results of the statistical analysis of Payne et al. (2022) updated PANIC LM test for level and trend models are presented in Table 3.

Table 3. Result Of Updated Panic LM Test (Dummy Breaks, Factor)

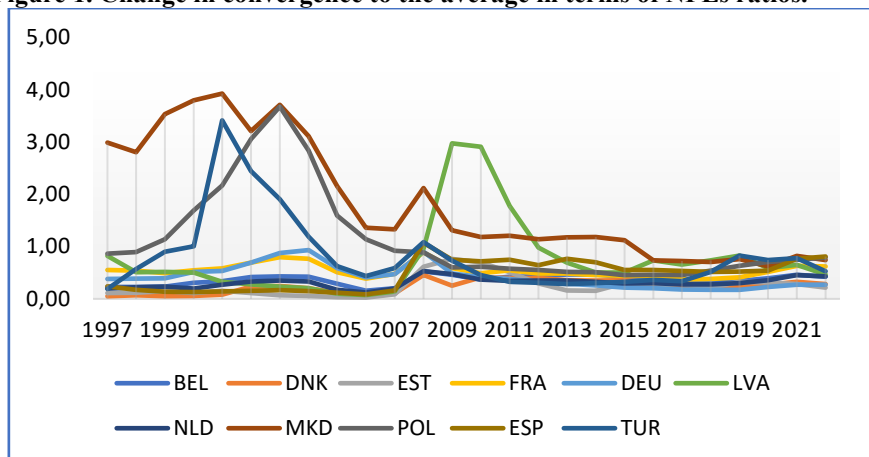
Country Code	Two level breaks				Two trend breaks					
	LM		p-val	brk1	brk2	LM	p-val	brk1	brk2	
AUT	-0.20		0.95	2004	2008	-0.74	0.84	2004	2008	
BEL	-5.41	***	0.00	2005	2007	-1.67	0.67	2004	2007	
BGR	0.16		0.98	2004	2009	-4.05	0.21	2004	2009	
HRV	-2.38		0.23	2005	2007	-1.63	0.68	2004	2007	
CZE	-2.13		0.23	2005	2007	-2.8	0.41	2004	2007	
DNK	-2.71	*	0.08	2007	2009	-0.64	0.97	2004	2007	
EST	-4.41	***	0.00	2007	2011	-2.61	0.45	2007	2014	
FIN	-0.79		1.00	2004	2007	-1.36	0.97	2007	2012	
FRA	-3.17	**	0.04	2004	2007	-6.61	**	0.02	2007	2010
GEO	-2.17		0.21	2004	2007	-2.29	0.53	2007	2012	
DEU	-4.59	***	0.00	2004	2008	-1.34	0.89	2004	2007	
GRC	-1.57		0.70	2005	2007	-3.28	0.44	2004	2007	
HUN	-1.96		0.42	2007	2010	-3.29	0.46	2007	2014	
IRL	-1.95		0.37	2008	2011	-3.28	0.31	2007	2012	
ITA	-1.79		0.56	2005	2007	-4.91	*	0.08	2007	2010
LVA	-3.11	**	0.05	2008	2010	-2.89	0.39	2008	2012	
LTU	2.07		1.00	2007	2011	-4.35	0.15	2006	2009	
LUX	-0.34		1.00	2006	2009	-3.95	0.24	2009	2014	
MLT	-1.71		0.44	2005	2008	-0.24	0.9	2005	2008	
MDA	-0.56		0.90	2007	2009	-0.33	0.89	2006	2009	
NLD	-9.24	***	0.00	2004	2007	-3.25	0.32	2004	2007	
MKD	-3.25	**	0.03	2004	2007	-4.68	0.1	2004	2007	
POL	-4.16	***	0.01	2004	2008	-0.4	0.89	2004	2009	
PRT	-0.09		0.98	2004	2006	-2.08	0.58	2004	2007	
ROU	0.40		1.00	2007	2013	0.5	0.97	2006	2013	
SVK	1.68		1.00	2005	2007	0.55	0.97	2005	2011	
SVN	0.74		0.99	2007	2010	-4.28	0.15	2007	2010	
ESP	-4.40	***	0.00	2007	2012	0.08	0.94	2007	2010	
TUR	-3.67	***	0.01	2004	2011	-4.84	*	0.09	2004	2007
UKR	-0.36		0.93	2004	2007	-2.02	0.59	2004	2007	

*, ** and *** indicate that the null hypothesis of unit root is rejected at 1%, 5% and 10% significance levels, respectively.

When the results of Table 3 are evaluated, the following results have been reached in the analyzes. In the first model, “Two level breaks” model, Belgium, Estonia, Germany, Netherlands, Poland, Spain and Türkiye converge at 1% significance level; France, Latvia and North Macedonia converge at 5% significance level; and finally, Denmark converges at 10% significance level. In the second model, the “Two trend breaks” model, convergence is observed in fewer countries. Accordingly, France converges at the 5% significance level; Italy and Türkiye converge at the 10% significance level.

The distribution of convergence to the average for the countries with convergence in terms of NPLs ratios by years is given in Figure 2 and the break periods are given in Table 4.

Figure 1. Change in convergence to the average in terms of NPLs ratios.



The break periods of the countries with convergence are given in Table 4.

Table 4. Break periods of countries with convergence detected.

Country Code	Two level breaks				Two trend breaks					
	LM	p-val	brk1	brk2	LM	p-val	brk1	brk2		
BEL	-5.41	***	0.00	2005	2007	-1.67	0.67	2004	2007	
DNK	-2.71	*	0.08	2007	2009	-0.64	0.97	2004	2007	
EST	-4.41	***	0.00	2007	2011	-2.61	0.45	2007	2014	
FRA	-3.17	**	0.04	2004	2007	-6.61	**	0.02	2007	2010
DEU	-4.59	***	0.00	2004	2008	-1.34	0.89	2004	2007	
ITA	-1.79		0.56	2005	2007	-4.91	*	0.08	2007	2010
LVA	-3.11	**	0.05	2008	2010	-2.89	0.39	2008	2012	
NLD	-9.24	***	0.00	2004	2007	-3.25	0.32	2004	2007	
MKD	-3.25	**	0.03	2004	2007	-4.68	0.1	2004	2007	
POL	-4.16	***	0.01	2004	2008	-0.4	0.89	2004	2009	
ESP	-4.40	***	0.00	2007	2012	0.08	0.94	2007	2010	
TUR	-3.67	***	0.01	2004	2011	-4.84	*	0.09	2004	2007

*, ** and *** indicate that the null hypothesis of unit root is rejected at 1%, 5% and 10% significance levels, respectively.

Figure 2 and Table 4 show that the weighted first breaks are predominantly in the 2004 and 2007 periods - only Latvia is different in 2008 - while the second breaks are

predominantly in the 2007 and 2008-2011 periods (rarely, some countries also have breaks in the 2012 and 2014 periods). Among these periods, 2004 and 2007 are particularly noteworthy. The most important feature of these periods is the regulations made in the banking sector based on the lessons learned from the crisis periods. The Basel-II Accord in 2004, the Basel II Accord in 2009, the Basel III Accord in 2010 and the Basel IV Accord in 2017 are the most important developments affecting this process. When Figure 2 is analyzed, it is observed that the convergence between countries is quite clear, especially after the 2009 consensus. These results clearly show the impact of Basel regulations on countries. It is clear that convergent countries are affected by banking sector regulations. In other words, there are breaks in terms of the convergence of countries at the time of the Basel Accords. This is an important finding and is noteworthy in terms of revealing the importance of banking regulations for policymakers.

4. DISCUSSION AND CONCLUSION

This study aims to assess the level of convergence in non-performing loans (NPLs) across European Union (EU) countries, which represents the process of harmonization of banking sector performance across the EU and the tendency of countries to narrow the gap in non-performing loan ratios over time. Convergence is a term used to refer to the convergence of the economies of the countries under consideration in terms of one or more measures. The first uses of convergence in the literature refer to initially poor economies catching up with initially rich economies (Quah, 1996). The economic convergence hypothesis was first analyzed in terms of physical capital accumulation (Solarin et al., 2023). The phenomenon of NPL convergence is important for financial stability, economic growth and monetary policy effectiveness within the EU. Analyzing the drivers and dynamics of NPL convergence provides valuable insights for policymakers, regulators and market participants aiming to promote financial resilience and sustainable economic development across the EU. The results of the study reveal convergence at various levels of significance between Belgium, Denmark, Estonia, France, Germany, Italy, Latvia, Netherlands, North Macedonia, Poland, Spain, Türkiye and Denmark. When the break periods are evaluated together with the convergence relationship, very important findings are obtained. It is found that the breaks are consistent with the regulations in the banking sector, especially the Basel II consensus periods have a direct impact on these breaks. These results are important in terms of clearly demonstrating the importance of Basel II regulations for the European Union countries. The fact that convergence countries have experienced a significant decline in non-performing loan (NPL) ratios, especially in the last five years, is important in terms of revealing the positive impact of these regulations on countries. The study is expected to make significant contributions to decision makers, national policy makers and the banking sector in terms of banking sector standards. It also contributes to the literature as it is the first study that deals with convergence based on non-performing loans (NPLs).

BANKACILIK SEKTÖRÜNDE TAKİPTEKİ KREDİLER AÇISINDAN YAKINSAMA: AVRUPA BİRLİĞİ ÜLKELERİ

1. GİRİŞ

Dünyadaki hiçbir bölge ve topluluk ekonomilerini entegre etme konusunda Avrupa Birliği ülkeleri kadar çaba harcamamıştır. Avrupa Birliği (AB) üye ülkeleri tarafından gönüllü ve demokratik olarak onaylanan anlaşmalara dayanan uluslararası bir örgüt (EU, 2024) olup “United in diversity” (EU, 2000) sloganı ile üye ülkelerin kendine özgü unsurlarını muhafaza ederek çeşitlilik içerisinde ortak amaçlar doğrultusunda birlikteliğin sağlandığı önemli bir örgütsel yapıdır. Bu yapının önemli bir unsuru ekonomik unsurlar olup üye ülkeler arasındaki ekonomik performans çeşitliliği koruyarak ortak ekonomik amaçlara hizmet etmektedir. Üye ülkeler arasındaki ekonomik performans çeşitliliğinin ekonomik entegrasyon ve yakınlaşma çabalarına engel olmayıp tam tersine destekleyici bir unsur olarak görev yapmasını sağlamak için önemli çabalar harcanmaktadır. Ülkelerin kendi özlerini muhafaza ederek bu entegrasyon sürecini yürütmeleri hiç de kolay bir süreç değildir. Kurulduğu günden beri birlik, bu amacı yerine getirmeye çalışmaktadır. AB ülkeleri arasında ekonomik entegrasyon ve yakınlaşma sürecini etkileyen bu genişleme ve derinleşme bankacılık sektörü açısından da oldukça önemlidir. Optimal işleyişin önündeki yapay engellerin kaldırılması sürecinde bankacılık sektörünün birçok unsurun yanında özellikle de takipteki kredilerle (NPLs) ilgili olarak durumunun tespit edilmesi ve buna uygun pozisyonların alınması oldukça önemlidir. İşte bu noktada üye ülkeler arasında “NPLs” açısından yakınsamanın bilinmesi özellikle önem arz etmektedir ve karar alıcılar açısından önemli açılımlar sağlayabilir.

Sorunlu krediler veya takipteki krediler olarak tanımlanan bankaların kullandırmış oldukları kredilerin geri dönüş sorunlarını anlatan ve bu çalışmada “Bank nonperforming loans” ve kısaltması “NPLs” şeklinde ifade edilen oran, bankacılık sisteminde finansal sağlığın önemli bir ölçütünü temsil eder ve istikrara yönelik potansiyel kırılmalara ve risklere işaret etmektedir. Borçluların belirli bir süre boyunca (genellikle 90 gün veya daha fazla) planlanan ödemeleri yerine getiremediği krediler (Berger & DeYoung, 1997; Choudhary & Jain, 2021) olarak tanımlanan “NPLs”, bankacılık sektörünün performansı, kredi riski yönetimi, makroekonomik koşullar ve düzenleyici etkinlikteki zorlukları yansıtır.

Bu çalışma, bahsedilen bu önemine binaen AB ülkeleri arasında bankaların takipteki kredilerine ilişkin yakınsama derecesini araştırmayı amaçlamaktadır. Bu bağlamda yakınsama, AB genelinde bankacılık sektörü performansında bir uyumlaştırma sürecini yansıtan, ülkelerin incelenen zaman periyodu içerisinde takipteki krediler oranlarındaki farkı daraltma eğilimini ve ülkelerin aynı süreçlerden etkilenme durumunu ortaya koymaktadır. “NPLs” açısından yakınsama olgusu, Avrupa Birliği'nde finansal istikrar, ekonomik büyüme ve para politikası etkinliği üzerindeki etkileri nedeniyle özellikle ilgi çekicidir. “NPLs” yakınsamasının itici güçlerini ve dinamiklerini anlamak, AB genelinde finansal dayanıklılığı ve sürdürülebilir ekonomik kalkınmayı teşvik etmek isteyen politika yapımcılar, düzenleyiciler ve piyasa katılımcıları için değerli bilgiler sağlayabilir.

2. YÖNTEM

Makale AB ülkelerinde bankacılık sektörünün takipteki krediler açısından yakınsamasını analiz etmektedir. Bu amaçla AB üye ülkeleri ve aday ülkelerinin 1997-2022 dönemine ait veriler kullanılmıştır. Bu ülkeler içerisinde tüm verileri eksiksiz olarak bulunabilen ülkeler analize dahil edilmiş eksik verileri olan ülkeler analize dahil edilmemiştir. Analizde kullanılan veriler “<https://databank.worldbank.org/>” ve “<https://data.ecb.europa.eu>” adreslerinden elde edilmiştir.

Çalışmada ele alınan AB ülkelerindeki (üye ve aday) takipteki krediler oranı açısından stokastik yakınsamayı test etmek amacıyla Payne vd. (2022) tarafından geliştirilen kırılmalı birim kök testi ve faktör yapısı kullanılmıştır. Temel olarak Lee ve Strazicich'in (2003) iki yapısal kopuşunu birleştiren test, en popüler yaklaşımlardan biridir. Ancak bu çalışmanın çapraz korelasyonlara izin vermemesi nedeniyle önemli bir sınırlılığı bulunmaktadır. Bu sorunun farkında olan Payne vd. (2022); Lee ve Strazicich'in (2003) önemli testini genişletmiş ve Bai ve Ng'in (2004) PANIC (Duygu ve Ortak Bileşenlerde Durağan Olmamanın Panel Analizi) prosedürünü güçlendirmiştir. Payne vd. (2022) tarafından geliştirilen test güncel bir yöntem olup eski testlere göre önemli avantajları bulunmaktadır.

3. BULGULAR

Payne vd. (2022) tarafından geliştirilen test sonuçlarına göre AB ülkelerinde bankacılık sektörünün takipteki kredilerinin oranı açısından önemli yakınsama ve buradan yola çıkılarak önemli bulgulara ulaşılmıştır. İlk model olan “seviyede iki kırılmalı” modelinde Belçika, Estonya, Almanya, Hollanda, Polonya, İspanya ve Türkiye %1 önem seviyesinde; Fransa, Letonya ve Kuzey Makedonya %5 önem seviyesinde; son olarak Danimarka %10 önem seviyesinde yakınsamaktadır. İkinci model olan “trend iki kırılmalı” modelinde ise daha az ülkede yakınsama görülmektedir. Buna göre Fransa %5 önem seviyesinde; İtalya ve Türkiye ise %10 önem seviyesinde yakınsamaktadır.

Çalışmada ortaya konulan diğer önemli bulgu birinci kırılmaların 2004,2007 dönemlerinde -sadece Letonya için kırılma dönemi 2008-, ikinci kırılmaların ise ağırlıklı olarak özellikle 2007 ve 2008-2011 dönemlerinde olduğunun tespit edilmesidir. Bu dönemler içerisinde özellikle 2004 ve 2007 dikkat çekicidir. Bu dönemlerin en önemli özelliği kriz dönemlerinden alınan derslerden yola çıkılarak bankacılık sektöründe yapılan düzenlemelerdir. 2004 yılında Basel-II Uzlaşısı, 2009 yılında Basel II uzlaşısı, 2010 yılında Basel III Uzlaşısı ve 2017 yılındaki Basel IV Uzlaşısı bu süreci etkileyen en önemli gelişmelerdir. Bu sonuçlar Basel düzenlemelerinin ülkeler üzerindeki etkisini açıkça göstermektedir. Yakınsama yaşanan ülkelerin bankacılık sektörü düzenlemelerinden etkilendikleri açıktır.

4. TARTIŞMA VE SONUÇ

Avrupa ülkeleri arasındaki mali ve ekonomik entegrasyon sürecinde bankacılık sektörü önemli bir yer tutmaktadır. Önemine binaen bu çalışma, AB ülkeleri açısından

AB genelinde bankacılık sektörü performansının uyumlaştırılması sürecini ve ülkelerin zaman içinde takipteki krediler oranlarındaki farkı daraltma eğilimini temsil eden takipteki kredilere ilişkin yakınsama düzeyini değerlendirmeyi amaçlamaktadır. “NPLs” yakınsaması olgusu, AB içinde finansal istikrar, ekonomik büyüme ve para politikası etkinliği açısından önem taşımaktadır. “NPLs” yakınsamasının itici güçlerinin ve dinamiklerinin incelenmesi, AB genelinde finansal dayanıklılığı ve sürdürülebilir ekonomik kalkınmayı desteklemeyi amaçlayan politika yapıcılar, düzenleyiciler ve piyasa katılımcıları için değerli bilgiler sunmaktadır. Çalışmanın sonuçları değerlendirildiğinde Belçika, Danimarka, Estonya, Fransa, Almanya, İtalya, Letonya, Hollanda, Kuzey Makedonya, Polonya, İspanya, Türkiye arasında çeşitli önem seviyelerinde yakınsama tespit edilmiştir. Yakınsama ilişkisiyle birlikte kırılma dönemleri değerlendirildiğinde oldukça önemli bulgulara ulaşılmıştır. Kırılmaların bankacılık sektöründe yapılan düzenlemelerle uyumlu olduğu Basel düzenlemelerinin ve özellikle Basel II uzlaşma dönemlerinin bu kırılmalar üzerinde doğrudan etkisi olduğu tespit edilmiştir. Bu sonuçlar Avrupa birliği ülkeleri açısından Basel II düzenlemelerinin önemini açıkça ortaya koymasından önemlidir. Yakınsama yaşanan ülkelerin özellikle son beş yılda “NPLs” açısından önemli bir düşüş trendine girmesi, bu düzenlemelerin ülkeler üzerindeki pozitif etkisini ortaya çıkarması açısından önemlidir. Çalışmanın bankacılık sektörü standartları konusunda karar alıcılara, ülke politika yapıcılara ve bankacılık sektörüne önemli katkıları olacağı düşünülmektedir. Ayrıca takipteki krediler baz alınarak yakınsamayı ele alan bildiğimiz kadarıyla ilk çalışma olması hasebiyle literatüre de önemli katkılar sunmaktadır.

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