İstanbul İktisat Dergisi - Istanbul Journal of Economics
74, 2024/1, s. 59-98
E-ISSN: 2602-3954

RESEARCH ARTICLE

Empirical Analysis of Turkish Banking Sector Institutional and Macroeconomic Determinants of Risks*

Hikmet AKYOL[1], Selim BAŞAR[2]

ABSTRACT
This research examines the macroeconomic and institutional sources of individual, systemic, and systematic risks in the Turkish banking sector. The period between 2008:Q3 and 2019:Q3 of the nine deposit banks selected for this purpose were estimated using panel data analysis estimators. The results indicate that selected macroeconomic and institutional variables affect banking risks. These findings are important for revealing the institutional and macroeconomic sources of risks in the Turkish banking sector. Therefore, the results contain significant propositions for researchers, market participants, and politicians. Market participants and researchers can anticipate defaults and financial instability using selected macroeconomic and institutional variables. The estimation results reveal Turkish banks' institutional soundness and financial performance strength. In addition, the extent to which banks are effective intermediaries in the sector was analysed. This research documented a strong link between global market indicators and banking risks.

Keywords: Individual risk, Systematic risk, Systemic risk, Macro-Finance
JEL Classification: E44, G20, G21

DOI: 10.26650/ISTJECON2023-1288872

* This study is derived from the doctoral thesis titled "Determinants of Risks in the Turkish Banking Sector and the Impact of These Risks on Investor Behavior" published in Atatürk University, Institute of Social Sciences, Department of Economics, Department of Economic Policy, under the supervision of Prof. Dr. Selim BAŞAR.

[1]Asst. Prof. Dr., Gümüşhane University, Şiran Mustafa Beyaz Vocational School, Gümüşhane, Türkiye

[2]Prof. Dr., Eskişehir Anadolu University, Faculty of Economics, Eskişehir, Türkiye

ORCID: H.A. 0000-0001-9119-7416; S.B. 0000-0002-7055-8240

Corresponding author:
Hikmet AKYOL,
Gümüşhane University, Şiran Mustafa Beyaz Vocational School, Gümüşhane, Türkiye
E-mail: hikmetakyol76@gmail.com

Submitted: 24.04.2023
Revision Requested: 22.02.2024
Last Revision Received: 29.04.2024
Accepted: 30.04.2024

Citation: Akyol, H., & Başar, S. (2024). Empirical analysis of Turkish banking sector ınstitutional and macroeconomic determinants of risks. *İstanbul İktisat Dergisi - Istanbul Journal of Economics 74*(1), 59-98. https://doi.org/10.26650/ISTJECON2023-1288872

1. Introduction

The Global Financial Crisis, which began with the collapse of the financial giant Lehman Brothers in 2008, spread from the United States to the entire world and affected the macroeconomic and financial systems of both developed and developing countries. The crisis has demonstrated how devastating systemic risks can be for the banking and financial sector. The complex nature of systemic risks makes it difficult to understand them in advance and develop effective policy instruments. Because of its strong organic link to the financial sector and macroeconomic structure, it can quickly spread to the entire sector and economy. Systemic risk-taking can lead to higher growth, but in the long run, it can exacerbate financial distortion and cause economic crisis (Ranciere and Tornell, 2004; Ranciere et al., 2010). However, increased banking performance and credit growth may lead to overheating of the economy and increased credit risk (Festic, Kavkler and Repina , 2011). Moreover, systemic risk may increase during periods of rising inflation (Stolbov, 2017). In addition to basic macroeconomic variables, institutional factors such as capital requirements, financial leverage, and bank size have a strong relationship with systemic risks (Pais and Stork, 2013; Anginer and Kunt, 2014; Bhagat, Bolton and Lu, 2015; Kuzubaş, Saltoğlu and Sever, 2016; Grill, Lang and Smith, 2016; Dreyer, Schmid and Zugrav, 2018). High leverage makes financial institutions more sensitive to systemic risks (Acharya and Thakor, 2016, p.5). However, larger banks may have more systemic risk (Pais and Stork, 2013). Therefore, academic interest in these risks increased after the 2008 crisis. (Anginer and Kunt, 2014; Laeven, Ratnovski and Tong, 2014; Smaga, 2014; Kuzubaş et al., 2016; Wibowo, 2017; Dreyer et al., 2018; Varotto and Zhao, 2018). There is no accepted definition of systemic risk (ECB, 2009, p.134, Smaga, 2014, p.2). One of the main reasons for this is that this phenomenon has a complex structure (Allen and Carlatti, 2013, p.29). Borri et al. (2014) defined systemic risks as risks typically triggered by the default of one or more interconnected financial institutions and that may lead to the collapse of the entire financial system. For this reason, the major source of these risks is the banks themselves, and emerging through various channels. The trigger for a systemic risk event may be an exogenous shock from outside the financial system, or the event may occur endogenously within the financial system or the economy (ECB, 2009, p.134). Systemic risks are therefore of critical importance to the banking sector. Another key risk factor in the banking sector is systematic risk. Systematic risks arise from economic and political factors and affect securities prices. Therefore, banks cannot overcome these risks through portfolio diversification. In this regard, systematic risks have the power to affect the entire financial system and the economy, similar to systemic risks. Moreover, these risks force banks to take various measures, undermining the efficiency of their intermediation activities. Because systematic risks are a risk that banks must bear, the length of market conditions, economic factors, and other factors that cause these risks to increase threaten financial stability by distorting banking ratios. The third critical risk indicator for the banking sector is individual risk. We can consider these risks under the headings of credit, operational, liquidity, etc. risks. However, there are also studies that use stock returns to assess individual risk levels among banking institutions (Laeven et al., 2014, 2016; Dreyer et al., 2018). Equity markets are central to financial markets. For example, rising stocks may demonstrate that banks' financial position is stable or is increasing in value. In contrast, stocks in a constant state of decline may reflect instability or depreciation. In this respect, stock returns allow financial performance, corporate structure, and the probability of default to be measured quickly, effectively, and simply. This research focuses on the sources of systemic, systematic, and individual risks in the banking sector in Turkey. In this study, we empirically examine the macroeconomic and institutional determinants of banking risk. In this context, we estimated regression using a large panel dataset. The objectives to be achieved within the research framework are as follows:

- By revealing the strength of the interaction between institutional and macroeconomic variables and risk indicators, this study aimed to determine the level of vulnerability of the Turkish banking sector through different risk indicators.
- This study attempts to show the effects of macro-prudential and monetary policies on banking risks.
- The extent of the effects of the variables on banking risks was analysed. Thus, institutional and macroeconomic sources of banking risks are comparatively examined.

- It attempts to demonstrate how sensitive Turkish banking risks are to global developments.

The research is divided into six sections. The first part is the introduction, and the second part is the conceptual framework. In the third section, some empirical studies are provided. In the fourth section, the dataset and econometric method used are explained. The fifth section provides estimation results. The sixth chapter includes a discussion and conclusion.

2. Conceptual Framework

Traditional financial theories, which have a major place in macrofinance, clearly reveal the limits of the relationship between financial risks and macroeconomic variables. *The Arbitrage Pricing* Hypothesis (APT) assumes that macroeconomic factors, such as interest rates, money supply, and economic growth, affect stock returns (Hussain and Shah, 2018, p.222). According to this hypothesis, new information about macroeconomic variables and expected or unexpected developments in policy decisions will further increase stock returns by changing stock prices, future cash flows, and changes in expected dividends (Fahmi, Geetha and Mohidin, 2017, p.62). Similarly, *The Efficient Markets* Hypothesis (EMH) argues that an economically efficient market helps to allocate economic resources, emphasising that asset price fluctuations and volatilities also reflect the underlying economic factors as well (Macau and Ambrose, 2018, p.1137). *The Capital Asset Pricing* (CAPM) Hypothesis suggests that risks to stock returns arise solely because of macroeconomic variables. According to CAPM, stock returns are a function of a firm's systematic risk, which determines the expected return that a potential investor demands from his/her investments in a firm's stock (Fahmi et al., 2017, p.62). This model also associates firms with two types of risk: systematic and non-systematic (Iqbal and Shah, 2012, p.48). By diversifying their portfolio against unsystematic risks, banks can eliminate them or reduce their negative impact. However, portfolio diversification is not sufficient to avoid systematic risks. Therefore, these risks, represented by market betas, are the risks that banks must bear. Market betas are higher under poor economic conditions and lower under good economic conditions (Drobetz, Menzel and Schröder, 2016, p.130). Therefore, a predictable economy with low inflation, stable exchange rates, and sustainable economic growth can lower market risk. However, studies on the effects of financial ratios on market risks date back to the 1960s. Hamada (1972) showed a positive correlation between financial leverage ratios and beta. Bowman (1980) concluded that financial leverage has a significant impact on equity risk. Mandelker and Rhee (1984) found that operational and financial leverage explain beta variations. The theoretical dimension of the relationship between capital requirements and systematic risks can be based on Modiglani and Miller (1958). Toader (2015) stated that this model is because higher amounts of loss-reducing capital increase bank stability and financial capacity, so investors expect lower returns on equity as the amount of risk will be lower, and the higher cost of the increased amount of equity will be offset by a decrease in the return on bank capital. Researchers have debated the relationship between size and systematic risks for decades (Sullivan, 1978; 1980; Banz, 1981; Lakonishok and Sahpiro, 1984; Daves et al., 2000; Stever, 2007; Dreyer et al., 2018). Sullivan (1978) demonstrated a negative correlation between beta and firm size and interpreted this result as evidence that market power decreases beta. Banz (1981) found that small firms have higher risk-adjusted returns than large firms. Stever (2007) found that the equity betas of large banks are two to five times greater than those of small banks. Profitability plays an important role in the financial conduct of company's activities (Sirivige, 2017, p.3). Besides profitability, another corporate factor associated with systematic risks is liquidity ratios. Logically, since there is an inverse relationship between a firm's liquidity level and risk, firms having a high liquidity level should show that they have a low risk (Puspitaningtyas, 2017, p.49). However, the empirical literature has yielded complex findings on the relationship between profitability, liquidity ratios, and market risks (Lee and Jang, 2007; Iqbal and Shah, 2012; Nimalathasan and Pratheepkanth, 2012; Karakuş, 2017; Puspitaningtyas, 2017).

Another important banking risk is systemic risk. There are many empirical studies in the literature that address the definition and various aspects of this concept, from the risk contributions of large and complex financial institutions to the effects of contagion and spillover between counterparties and market segments, and even macro-financial linkages (Kubinschi and Barnea, 2016, p.81). Systemic risks arise as declines in economic growth and prosperity disrupt the functions of the financial system after a certain point and become widespread (ECB, 2009, p.134). However, an above-average growth rate is also probably associated with systemic risk. According to Ranciere and Tornell (2004), average economic growth rates in countries that have experienced financial crises for decades have been recorded more rapidly than in countries with financial stability, and so systemic risk-taking triggers higher growth, although it produces financial vulnerabilities that lead to crises as a by-product. According to this theoretical mechanism, taking systemic risks reduces financial bottlenecks and increases growth in countries with weak financial institutions (Ranciere, Tornell and Westermann 2008, p.359). In another study, Ranciere et al. (2010) argued that money discord exposes economies to systemic risk and is a key driver of economic growth. Systemic risks may also spread to the entire economy through monetary transmission mechanisms. According to the ECB, the low-interest rate environment, which is appropriate for monetary policy objectives, can adversely affect financial stability by causing financial institutions to take risks in money and capital markets (Kabundi and De Simone, 2019, p.1). In periods when low interest rate policies are applied, banks' risk-taking behaviours may increase (Dell'ariccia, Laeven and Suarez, 2017; Abbate and Thaler, 2019). A low risk-free interest rate may encourage banks to substitute safer assets with riskier ones, increasing their portfolio risk (Colletaz, Levieuge and Popescu, 2018, p.167). In addition, expansionary monetary policies may contribute to systemic risk trends (Ha and Quyen, 2018). In addition, exchange rates constitute one of the main transmission mechanisms of monetary policies (Lopotenco, 2017, p.168). Exchange rate fluctuations affect firms' production costs (raw materials, energy and other inputs) and their ability to pay their foreign currency debts to banks. Rising exchange rates during periods of increased country credit risk or inflation may increase banks' borrowing costs or cause debt payment problems.

There is extensive literature on the relationship between systemic risk and financial ratios. Many researchers have argued that high financial leverage encourages banks to engage in illiquid, risky loans and securities activities that commonly result in the failure of these institutions (Acharya and Thakor, 2016, p.5). Grill et al. (2016) provided evidence that leverage requirements encourage banks to take risks. Increased leverage increases the systemic risk or collective vulnerability of financial institutions, such as banks (Acharya and Thakor, 2016, p.5). Financial leverage weakens measures to reduce systemic risk. Kuzubaş et al. (2016) showed that leverage differences sharply distort systemic risk measures. The Global Financial Crisis of 2007-2008 showed that regulatory capital obligations did not prevent a system-wide banking crisis (Anginer and Kunt, 2014, p.19). Some studies advocating a positive relationship between capital liabilities and banks' risk-taking behaviours have referred to *the regulatory hypothesis* by arguing that regulators and policy practitioners encourage banks to increase their capital in proportion to the amount of risk they take (Lee and Hsieh, 2013, p.252). One of the most important purposes of tight capital obligations is to prevent banks from incurring significant and unexpected losses in their assets while fulfilling deposit transactions and other obligations (Anginer and Kunt, 2014, p.3). Traditional bank regulation approaches have highlighted the positive effects of capital adequacy requirements (Bouheni, 2014, p.246, Bouheni and Rachdi., 2015, p.232). On the contrary, some argue that increases in capital requirements encourage banks to take risks and lead to the emergence of systemic risks. Some studies arguing for a negative relationship between capital requirements and risk-taking behaviour have referred to *the moral hazard hypothesis*, arguing that banks are encouraged to abuse existing deposit insurance schemes (Lee and Hsieh, 2013, p.252). Some studies show that the relationship between bank size and systemic risks existed during the pre-crisis period. Bhagat et al. (2015) showed that a positive relationship between bank size and risk was present in the pre-crisis period (2002-2006) and the crisis period (2007-2009), but it disappeared in the post-crisis period (2010-2012). Pais and Stork (2013) stated that one of the key components of systemic risks is the moral hazard posed by the idea of *too big to fail*. Varotto and Zhao (2018) find that there is a close relationship between size and systemic risks, which is a major concern for *too big to fail* institutions. Pais and Stork (2013), Leaeven et al. (2014), and Dreyer et al. (2018) showed that larger banks carry higher systemic risk.

3. Literature Review

Maysami, Howe and Hamzah (2004) documented that short- and long-term interest rates have a positive and negative relationship with stock returns, respectively. Adami et al. (2010) demonstrated a negative relationship between leverage ratios and stock returns. Boztosun (2010) documented a negative relationship between deposit interest rates, portfolio investments, and the banking index. In contrast, he documented a positive relationship between other explanatory variables and stock returns. Kasman, Vardar and Tunç (2011) showed that interest rates negatively affect contingent stock returns. Iqbal and Shah (2012) found that profitability and systematic risks are positively related. Pais and Stork (2013) showed that bank size has a limited effect on banks' univariate risk (VaR), whereas large banks have significantly higher systemic risk. Nimalathasan and Pratheepkanth (2012) showed that there is a positive relationship between profitability and systematic risks. Al-Qudah and Laham (2013) documented that leverage ratios and betas negatively affect stock returns. In his research examining 17 European countries, Yeşin (2013) concluded that systemic risks are significant outside the eurozone but relatively low in the Eurozone. Anginer and Kunt (2014) demonstrated that regulatory capital is effective in reducing systemic risk and that regulatory risk weights are associated with high future asset volatility; however, they observed that this relationship is weaker for larger banks. Bouheni (2014) showed that restrictions on bank operations, auditor power, and capital adequacy reduce risk-taking and increase bank stability through regulation and audits. Laeven et al. (2014) documented that large banks create more individual and systemic risk, especially when they are not capitalised and have unstable funds. Mazviona and Nyangara (2014) found that firm size has a positive but insignificant effect on stock returns. Narayan, Narayan and Singh (2014) revealed that interest rates negatively affect stock prices. Şentürk and Dücan (2014) found a negative relationship between interest rates and stock returns. Adhikari (2015) documented a positive relationship between profitability and systemic risks. Bhagat et al. (2015) showed that size and risk-taking behaviours are positively related. Öztürk and Yılmaz (2015) found that firms with lower leverage ratios outperform firms with higher leverage ratios. Amtiran et al. (2016) showed that exchange rates affect systematic risks. Grill et al.

(2016) showed that a leverage ratio requirement may encourage banks to increase risk-taking behaviour, even if the requirement is low. Kuzubaş et al. (2016) analysed 25 banks and documented that leverage differences disrupt systemic risk measures. Langfield and Pagano (2016) showed that increases in private bonds and yields in the banking sector in developed economies are associated with high systemic risk and low economic growth. This trend is most prevalent during housing market crises. Chung, Ariff and M. (2017) found that changes in money supply lead to positive liquidity. In addition, banking liquidity positively affects stock market prices. Dedunu (2017) documented a positive relationship between systematic risks and profitability and liquidity ratios. Rutkowska-Ziarko and Pyke (2017) have shown that there is a positive relationship between ROA and ROE and market beta. Akyol and Baltacı (2018) showed that CDS spreads negatively affect stock returns. Dreyer et al. (2018) showed that capital adequacy positively affects stock returns and bank size positively affects systemic risks. Ha and Quyen (2018) documented that lax monetary policies increase risk-taking behaviour. Xu, Hu and Udaibir (2019) found that profitability was negatively correlated with banks' contributions to systemic and idiosyncratic risk.

4. Data and Methods

This section introduces the data, methods, and models used in the predictions.

4.1. Data

This research addresses the institutional and macroeconomic drivers of financial risks for nine deposit banks operating in the Turkish banking sector. The research sample consisted of Akbank, Finansbank, Halkbank, Vakıfbank, Garanti Bank, Yapı Kredi, Şekerbank, İş Bank, and Denizbank. The selection of risk indicators for the banking sector is based on the studies of Laeven et al. (2014, 2016) and Dreyer et al. (2018). Four different proxy indicators representing banking risks were used in this study. There are several indicators of systemic risk. Huang et al. (2009) DIP, Adrian and Brunnermeier (2011) CoVaR[1], Acharya et al. (2010) SES, Brownlees and Engle (2012, 2017). The SRISK and MES indices are the most commonly used. In this study, the SRISK and LRMES index proposed by Brownlees and Engle (2017) were used to represent the systemic risks of nine deposit banks. SRISK is a firm's expected capital shortfall in the event of a crisis, with firms with a high rate of capital loss during a crisis not only the most damaged in the crisis but also the largest contributors to the crisis (NYU-Stern, 2020. Retrieved from https://vlab.stern.nyu.edu/docs/srisk/MES. In this respect, bankruptcies that occur in firms with high SRISK likely dominate the entire sector or the market. SRISK is calculated as follows (NYU-Stern, 2020. Retrieved from https://vlab.stern.nyu.edu/docs/srisk/MES):

$$SRISK=k.\ DEBT-(1-k).\ EQUITY.\ (1-LRMES) \tag{1}$$

where k is the capital requirement.

LRMES denotes the long-run marginal expected shortfall.
EQUITY is the current market capitalisation of this firm

DEBT is the book value of debt, calculated as the book value of assets divided by the book value of equity.

LRMES, which is one of the leading indicators of systemic risk, is an important financial risk indicator instrument because it is used to predict the expected equity losses of companies in the event of a crisis. LRMES is calculated as 1-exp (log (1-d) * beta); where "d" is the six-month crisis threshold for market index declines, and the default value is 40%. Beta is the beta coefficient of the firm. (Retrieved from https://vlab.stern.nyu.edu/docs/srisk/MES). In the predicted models, market betas are used to represent banks' systematic risks. According to the CAPM, the market beta is calculated as follows (Mehrara et al., 2014, p. 28-29):

$$Rj - Rf = \alpha j + \beta j\ (Rm - Rf) + \varepsilon j \tag{2}$$

[1] DIP (Distress Insurance Premium), CoVaR (Conditional Value at Risk), SES (Systemic Expected Shortfall), SRISK (Systemic Risk Index), MES (Marginal Expected Shortfall) and LRMES (Long-Run Marginal Expected Shortfall). VaR is the value at risk.

If time effects are included in the model;

$$Rit - Rft = \alpha + \beta j(Rmt\text{-}Rft) + \varepsilon it;\ t = 1,\ldots T \tag{3}$$

If the assumption of the model is correct, αi does not differ significantly from zero;

$$H0: \alpha i = 0,\ i = 1, \ldots, N \tag{4}$$

where N: is the number of securities.

$$Rit - Rft = \beta j\ (Rmt - Rft) + \varepsilon it\ ;\ t = 1, \ldots , T \tag{5}$$

Rit = i expected return for the stock.
Rft = risk free interest rate.
βj = beta.
Rmt = market return.

When estimating regression models, we took quarterly average monthly data from the NYU Stern V-lab database. In this study, the stock returns of the banks were used to represent the individual risks of the banks[2]. In this study, stock returns were calculated using the following formula using the closing prices of the stocks of the banks obtained from the official website of Borsa Istanbul:

$$SR = (PD_t\text{-}PDt_{-1})\ /PD_{t-1} \tag{6}$$

SR is the return on stock.
PD_t, is the Bank's stock price in the current period.
PDt_{-1} is the previous-period stock price.

Table 2 provides information about macroeconomic variables that affect Turkish banking sector risks. Table 3 provides selected banks' institutional

2 See Laeven et al. (2014, 2016) and Dreyer et al. (2018).

variables. While selecting institutional variables affecting banking risks, we examined previous empirical literature (Bowman, 1980; Mandelker and Rhee, 1984; Stever, 2007; Iqbal and Shah, 2012; Nimalathasan and Pratheepkanth, 2012; Lee and Hsieh, 2013; Pais and Stork, 2013; Anginer and Kunt, 2014; Bhagat et al., 2015; Bouheni and Rachdi., 2015; Acharya and Thakor, 2016; Grill et al., 2016; Kuzubaş et al., 2016; Puspitaningtyas, 2017; Dreyer et al., 2018). We obtained the financial ratios used in this study from the official website of the Banks Association of Turkey (TBB). When selecting ratios, we considered data limitations. Similarly, a larger empirical literature has been used to select macroeconomic drivers (Maysami et al., 2004; Ranciere and Tornell, 2004; Yeşin, 2013; Amtiran et al., 2016; Drobetz et al., 2016; Chung et al., 2017; Lopotenco, 2017; Akyol and Baltacı, 2018; Colletaz et al., 2018; Ha and Quyen, 2018; Hussain and Shah, 2018). Globalisation has strongly integrated the financial systems of countries into each other. For this reason, any uncertainty or pessimism in the world markets can adversely affect the financial sector of all countries. The VIX index was used to determine the effect of global uncertainties on banking sector risks (Bianconi et al, 2015; Kownatzki, 2016).

Table 1: Dependent Variables Used in Research (2008Q3-2019Q3)

Variable	Description	Type	Source
SR	This is the bank stock returns.	The quarterly average monthly stock returns were taken.	Denizbank data is taken from Investing.com, and other bank data were obtained from https://www.borsaistanbul.com/veriler/verileralt/gunluk-bulten.
BETA	The indicator of market risk (systematic risk).	The quarterly average of the monthly data was obtained.	https://vlab.stern.nyu.edu/
SRISK	The SRISK index was used as a systemic risk indicator (the US Dollar).	The quarterly average of the monthly data was obtained.	https://vlab.stern.nyu.edu/
LRMES	Long-Run Marginal Expected Shortfall	The quarterly average of the monthly data was obtained.	https://vlab.stern.nyu.edu/

Table 2: Macroeconomic Variables of the Research (2008Q3-2019Q3)

Variable	Description	Type	Source
GSYH	Gross Domestic Product Ratio	The annual percentage change rate was calculated.	TCMB
LN (CDS)	Turkey's 5-year CDS spreads	Quarterly averages were calculated by taking month-end data, and a natural logarithm was calculated.	Longstaff et al. (2007,2011) for the period 2007-2010, Mcgraw Hill Financial -S&P Capital IQ Reports for the period 2011-2014, and Paragaranti.com for the period 2015-2019.
LN (VIX)	VIX uncertainty index	The natural logarithm of is taken.	Yahoo Finance
M2	M2 money supply rate	The rate of annual percentage change is taken. The exchange rate effect has been adjusted.	CBRT
REFK	Real effective exchange rate	The CPI-based effective exchange rate is the annual percentage rate of change.	CBRT
TÜFE	Consumer price ındex	Annual percentage change rates are calculated.	CBRT
MFAIZ	Deposit Interest rates	The percentage change rate of deposit interest rates in TL was taken.	CBRT
LN (MSCI-E)	MCSI-Europe index	The natural logarithm of is taken.	https://www.msci.com/
CID	Current Balance	The ratio is taken to GDP.	CBRT

Table 3: Institutional Variables of Research (2008Q3-2019Q3)

Variable	Description	Type	Source
	Capital Adequacy Ratios		
SER1	Capital adequacy ratios	Equity/ (CRET+PRET+ORET) *100	TBB
SER2	Capital adequacy ratios	Equity/Total Assets	TBB
	Profitability Ratios		
ROA	Profitability	Net period Profit (Loss)/Total Assets	TBB
ROE	Profitability	Net period Profit (Loss)/ Equity	TBB
	Asset Ratios		
AKTIF2	Asset Quality	Total Loans/Total Assets	TBB
AKTIF4	Asset Quality	Fixed Assets/Total Assets	TBB
	Liquidity Ratios		
LIKIT1	Liquidity Ratio	Liquid Assets and Total Assets	TBB
LIKIT2	Liquidity Ratio	Liquid Assets/(Deposit + Non-Deposit Resources)	TBB

Table 3: Continued

	Income-Expense Ratios		
GGIDER1	Income-expenditure ratios	Interest Incomes/Interest Expenses	TBB
GGIDER2	Income-expenditure ratios	Other operating expenses/total assets	TBB
	Other Financial Ratios		
LN (BOYUT)	Bank Size	The natural logarithm of total assets is taken.	TBB
KAL	Financial Leverage	The quarterly average of monthly data was obtained.	https://vlab.stern.nyu.edu/

4.2. Methods and Models

In this study, the period from 2008Q3 to 2019Q3 was estimated using panel data analysis. Linear models showing the long-term relationship between banking risks and selected macroeconomic and institutional variables are given below:

$$Y_{it}=\beta_0 + \beta_1 KAL_{it} + \beta_2\, LN\,(BOYUT)_{it} + \beta_3\, LN\,(VIX)_{it} + \beta_4\, GSYH_{it} + \beta_5\, ROA_{it} + \beta_6\, AKTIF4_{it} + \beta_7\, GGIDER2_{it}\, \mu i_t \quad (7)$$

$$Y_{it}=\beta_0 + \beta_1 KAL_{it} + \beta_2\, GSYH_{it} + \beta_3\, LN\,(VIX)_{it} + \beta_4\, ROE_{it} + \beta_5\, M2_{it} + \beta_6\, AKTIF4_{it} + \beta_7\, TUFE_{it} + \beta_8\, EFKUR_{it} + \mu i_t \quad (8)$$

$$Y_{it}=\beta_0 + \beta_1 SER2_{it} + \beta_2\, LIKIT1_{it} + \beta_3\, LN\,(VIX)_{it} + \beta_4\, MFAIZ_{it} + \beta_5\, TUFE_{it} + \beta_6\, GGIDER1_{it} + \mu i_t \quad (9)$$

$$Y_{it}=\beta_0 + \beta_1 SER1_{it} + \beta_2 LN(CDS)_{it} + \beta_3\, LN\,(BOYUT)_{it} + \beta_4\, TUFE_{it} + \beta_5\, LIKIT2_{it} + \beta_6\, LN\,(VIX)_{it} + \beta_7\, GGIDER2_{it} + \beta_8\, MFAIZ_{it} + \beta_9\, AKTIF2_{it} + \mu i_t \quad (10)$$

The dependent variable here, "Y_{it}", represents the banks' individual, systemic, and systematic risks (SR, BETA, LRMES, and SRISK).

5. Empirical Analysis

5.1. First Generation Panel Unit Root Test

In this study, the stability of selected macroeconomic variables is examined using first-generation panel unit root tests. These tests were conducted by LLC, Hadri (2000), Breitung (2000), Im, Pesaran and Shin (2003), Maddala and Wu (1999), and Choi (2001). Table 4 shows that all series are stationary at level values.

Table 4: First Generation Panel Unit Root Test Results

Variables	LLC	Hadri (2000)	Breitung (2000)	IPS (2003)	Maddala- Wu (1999)	Choi (2001)
GSYH	-3.473***	13.593	-6.916***	-3.195***	36.343***	41.529***
GSYH	-19.823***	-2.331**	-8.281***	-19.000***	269.817***	271.457***
LN (CDS)	-7.364***	10.554	-5.556***	-6.698***	79.213***	32.344***
LN (CDS)	-9.684***	-1.298**	-4.343***	-14.195***	193.294***	193.294***
LN (VIX)	-6.196***	43.873	-4.309***	-4.151***	46.340***	46.340***
LN (VIX)	-14.468***	-2.644**	-5.570***	-19.111***	275.111***	399.979***
M2	-7.175***	24.678	-2.516***	-7.545***	90.770***	53.868***
M2	-5.382***	-0.289**	-4.466***	-6.933***	80.811***	79.389***
EFKUR	-3.343***	1.615	-6.647***	-4.247***	47.093***	63.579***
EFKUR	-9.530***	-0.930**	-3.598***	-11.866***	166.825***	165.786***
TUFE	-3.962***	32.535	-4.397***	-3.399***	38.916***	20.604***
TUFE	-9.056***	-0.903**	-10.451***	-14.363***	202.945***	101.636***
MFAIZ	-1.405*	23.946	-2.074***	-2.137***	8.984	15.076
MFAIZ	-9.983***	7.000	-10.269***	-11.462***	148.713***	154.527***
LN (MSCI-E)	-8.798***	37.876	-5.592***	-7.638***	30.555***	35.134***
LN (MSCI-E)	-15.339***	-1.966**	-1.583**	-20.551***	250.933***	280.6014***
CID	-0.982	8.130	-10.064***	-1.884**	96.248***	104.274***
CID	-36.980***	-2.656**	-16.152***	-34.548***	404.101***	404.013***

Note: ***, **, and * represent significance at p≤0.01, p≤0.05 and p≤0.10, respectively.

5.2 Cross-sectional Dependence Test

In this study,whether the institutional series contained cross-sectional problems was examined by using Breusch-Pagan LM, Baltaci , Feng and Kao (2012) Bias Corrected-Scaled LM and Pesaran (2015) CD tests. Table 5 presents the test results of the cross-sectional dependence on the institutional variables of the selected banks. According to the results of all three test statistics, all series include the cross-sectional-dependence problem.

Table 5: Cross-sectional Dependence Test Results

Variables	Breusch-Pagan LM		Bias-corrected-scaled LM:		Pesaran (2015), CD	
	Statistics	Prob.	Statistics	Prob.	Statistics	Prob.
SR	525.079	0.000	57.638	0.000	19.322	0.000
BETA	711.397	0.000	79.494	0.000	39.588	0.000
SRISK	868.311	0.000	97.986	0.000	19.921	0.000
LRMES	732.991	0.000	82.038	0.000	39.924	0.000
SER1	385.635	0.000	41.102	0.000	39.991	0.000
SER2	669.079	0.000	74.506	0.000	39.996	0.000
ROA	1194.143	0.000	136.386	0.000	38.016	0.000
ROE	1135.998	0.000	129.533	0.000	37.498	0.000
AKTIF2	849.705	0.000	95.793	0.000	40.161	0.000
AKTIF4	363.923	0.000	38.543	0.000	37.913	0.000
LIKIT1	1209.527	0.000	138.199	0.000	39.743	0.000
LIKIT2	1227.461	0.000	140.312	0.000	39.778	0.000
GGIDER1	834.879	0.000	94.046	0.000	40.049	0.000
GGIDER2	1523.511	0.000	175.202	0.000	39.962	0.000
LN (BOYUT)	1352.479	0.000	155.046	0.000	40.234	0.000
KAL	945.734	0.000	107.111	0.000	37.199	0.000

5.3. Second Generation Panel Unit Root Test

In the presence of cross-sectional dependence, first-generation panel unit root tests lose their reliability. In this respect, the stationary of institutional variables in the study was examined using Pesaran (2007) CADF, Taylor and Sarno (1998), MADF, Bai and Ng (2004, 2010), PANIC and Hadri (2000), Breitung (2000), and IPS (2003) panel unit root tests, which were updated to consider cross-sectional dependence. Bai and Ng (2004, 2010) reported the PANIC panel unit root test results in Table 7. The MQ_c and MQ_f tests show the stability of common factors, whereas the P_a, P_b, and PMSB tests test the stationary levels of residues. According to the test results, some of the series became stationary in common factors (MQ_c and MQ_f or at least one), some became stationary in residues, and some became stationary in both common factors and residues. According to all test results in Table 6, the LN (BOYUT) variable, which is stationary in the first differences, is stationary in common factors according to the PANIC panel unit root test results, whereas the residues contain unit roots. In this respect, when panel unit root tests were considered as a whole, the institutional series was found to be static according to at least one test result.

Table 6: Second Generation Panel Unit Root Test Results

Variables	Breitung (2000)		IPS (2003)		CADF		MADF	
	I [0]	I [1]	I [0]	I [1]	I [0]	I [1]	I [0]	I [1]
SR	-6.165***	-8.806***	-20.525***	-22.092***	-5.254***	-6.190***	562.851**	1372.287**
BETA	-3.497***	-10.052***	12.071***	-23.543***	-3.780***	-6.040***	270.384**	895.477**
SRISK	-2.585***	-9.056***	-2.691***	-15.550***	-1.606	-5.056***	38.410**	438.117**
LRMES	-3.623***	-10.710***	-11.019***	-23.490***	-3.880***	-5.954***	249.288**	927.908**
SER1	-3.520***	-6.833***	-5.615***	-19.743***	-2.339**	-5.513***	68.534**	660.765**
SER2	-1.072	-7.118***	0.140	-17.237***	-1.631	-4.657***	40.557**	447.242**
ROA	-5.232***	-13.843***	-6.263***	15.966***	-2.737***	-5.411***	119.664**	643.518**
ROE	-3.092***	-11.421***	-4.687***	-14.971***	-2.290**	-5.013***	114.504**	542.339**
AKTIF2	-1.861**	-11.195***	-1.989**	-20.335***	-2.581***	-5.222***	59.032**	586.931**
AKTIF4	-1.367*	-11.006***	-3.826***	-18.777***	-1.533	-4.850***	38.085**	558.730**
LIKIT1	0.284	-11.448***	-2.465***	-20.621***	-2.732***	-5.200***	45.887**	540.872**
LIKIT2	0.028	-11.223***	-1.955**	-19.408***	-2.631***	-5.127***	47.432**	559.396**
GGIDER1	-2.498***	-12.426***	-0.300	-15.637***	-1.556	-4.524***	31.625**	340.893**
GGIDER2	-6.332***	-10.439***	-17.535***	-21.744***	-3.369***	-6.022***	179.090**	797.319**
LN (BOYUT)	3.627	-12.097***	1.815	-16.432***	-1.520	-4.175***	18.390	463.846**
KAL	0.132	-5.868***	-0.129	-16.683***	-1.843	-4.466***	60.423**	500.386**

Note: ***, **, and * represent significance at $p \leq 0.01$, $p \leq 0.05$ and $p \leq 0.10$, respectively.

Table 7: PANIC Panel Unit Root Test

	k	MQ_c	H0 Reject	k	MQ_f	H0 Reject	P_a	P_b	PMSB
SR	2	-39.159	1	2	-7.746	0	-9.123***	-2.846***	-1.452*
	1	-39.815	1						
	0	0	0						
BETA	2	-42.261	1	2	-8.248	0	-2.407***	-1.758**	-.993
	1	-37.178	1						
	0	0	0						
SRISK	2	-7.453	0	2	-3.663	0	-3.122***	-1.753**	-1.518*
LRMES	2	-41.957	1	2	-9.459	0	-3.212***	-2.105***	-1.193
	1	-36.663	1						
	0	0	0						
SER1	2	-44.46	1	2	-5.286	0	-3.963***	-2.438***	-1.398*
	1	-8.647	0						
SER2	2	-9.848	0	2	-5.505	0	-.202	-.165	-.564
ROA	2	-42.223	1	2	-13.508	0	-30.772***	-7.879***	-2.141***
	1	-6.112	0						
ROE	2	-43.697	1	2	-11.608	0	-14.104***	-5.043***	-1.954**
	1	-3.133	0						
AKTIF2	2	-19.514	0	2	-4.093	0	.365	.445	1.268
AKTIF4	2	-24.029	1	2	-8.041	0	-1.149	-1.117	-.08
	1	1.66	0						
LIKIT1	2	-29.505	1	2	-6.544	0	-.571	-.511	-.368
	1	.138	0						
LIKIT2	2	-25.476	1	2	-4.224	0	-.991	-.816	-.62
	1	-.024	0						
GGIDER1	2	-14.242	0	2	-5.504	0	-2.271***	-1.596**	-1.142
GGIDER2	2	-35.235	1	2	-6.143	0	-2.278***	-1.797**	-.824
	1	-8.709	0						
LN (BOYUT)	2	-8.555	0	2	-4.309	0	1.784	2.409	1.905
KAL	2	-11.136	0	2	-3.534	0	-5.716***	-2.708***	-1.583**

Note: ***, **, and * represent significance at $p \leq 0.01$, $p \leq 0.05$ and $p \leq 0.10$, respectively.

5.4. Determining Institutional and Macroeconomics Determinants of Risks in the Banking Sector

Table 8 shows the effect of selected institutional and macroeconomic variables on SRISK and the results of the regression estimation. The relationship between SRISK and explanatory variables was estimated using the Driscoll-Kraay (1998) standard error estimator. The estimation results indicate that the effects of the SER1 and SER variables on SRISK were negative for the third and fourth models. Similarly, the effects of ROA, AKTIF4, LIKIT1, and LIKIT2 on SRISK were negative in the first, third, and fourth models. The KAL, LN (BOYUT), and GGIDER2 variables were positively correlated with SRISK. The effects of AKTIF2, GGIDER1, and ROE on SRISK were insignificant. When the effect of macroeconomic variables on SRISK was examined, it was revealed that the effect of GSYH, EFKUR, TUFE, and LN (VIX) variables was negative, whereas the effect of MFAIZ and LN (CDS) is positive. However, the effect of the M2 broad money supply on SRISK is meaningless.

Table 9 provides estimation results for the regression relationship between LRMES, another systemic indicator used in this study, and the explanatory variables. The effects of KAL, ROE, GGIDER1, GGIDER2, and LIKIT1 variables on LRMES were positive. LN (BOYUT), AKTIF2, and AKTIF4 were found to have negative effects on LRMES. The effects of SER1, SER2, ROA, and LIKIT2 on the dependent variable are insignificant. It has been demonstrated that GSYH, LN (VIX), and EFKUR have a negative relationship with LRMES. The effects of MFAIZ, M2, and LN (CDS) on LRMES were positive. The effect of TUFE on LRMES was insignificant.

Table 10 provides robust estimation results for institutional and macroeconomic variables affecting BETA. The effect of LN (BOYUT) on BETA was negative in the first and fourth models. Similarly, the effect of AKTIF2 on BETA was negative. It has been shown that the effects of KAL, ROE, GGIDER1, GGIDER2, and LIKIT1 on BETA are positive. It was observed that the effects of SER1, SER2, ROA, AKTIF4, and LIKIT2 on the dependent variable were insignificant. When the effects of macroeconomic variables on BETA are examined in the table given, it is shown that the effects of TUFE, MFAIZ, M2, and LN (CDS) are positive, while the effects of LN (VIX), GSYH, and EFKUR are negative.

Table 11 presents the estimation results showing the regression relationship between SR and explanatory variables. The estimation results indicate that KAL and GGIDER2 variables have a negative relationship with SR. The effects of SER2, ROA, AKTIF2, AKTIF4, LIKIT1, and LIKIT2 on SR were positive. The effects of the LN (SIZE), ROE, and GGIDER1 variables on SR were meaningless. The estimation results demonstrate that selected macroeconomic variables exert a powerful effect on SR. It was found that GSYH, LN (VIX), and LN (CDS) had negative effects on the dependent variable, whereas MFAIZ and EFKUR had positive effects on SR. The effects of TUFE on SR were mixed. The effect of TUFE on SR was positive in the second model and negative in the fourth model.

Table 8: Estimation of Institutional and Macroeconomic Variables Affecting SRISK

	I	II	III	IV
	DK FE	DK FE	DK FE	DK FE
SER1				-234.811*** (68.117)
SER2			-486.068*** (116.277)	
KAL	124.611*** (13.026)	119.974*** (22.484)		
LN (BOYUT)	710.883*** (199.927)			-331.630 (303.611)
LN (VIX)	-596.454** (286.214)	-1501.662*** (376.687)	-1033.596* (483.950)	-2435.993*** (376.294)
TUFE		42.793 (47.955)	-179.202** (75.550)	-106.154** (48.285)
MFAIZ			229.049*** (72.509)	-3.378 (80.185)
GSYH	-50.737*** (13.448)	-74.016** (25.681)		
M2		-29.145 (36.859)		
EFKUR		-45.683*** (14.244)		
ROA	-84650.92*** (20980.56)			

Table 8: Continued

ROE		-1016.655 (2440.894)		
AKTIF2				-60.061 (44.158)
AKTIF4	-252.233** (116.296)	-242.273 (149.888)		
GGIDER1			9.521 (5.538)	
GGIDER2	443.436*** (127.807)			209.770 (116.476)
LIKIT1			-75.590*** (17.670)	
LIKIT2				-93.501** (33.428)
LN (CDS)				3568.452*** (444.912)
C	-7390.274*** (2833.359)	3651.74* (1676.776)	6831.722*** (2230.019)	2085.086 (7892.762)
Obs.	405	405	405	405
Bank	9	9	9	9
Wald (F-statistic)	30.99 (0.000) ***	10.45 (0.000) ***	13.66 (0.000) ***	34.95 (0.000) ***
R2	0.487	0.518	0.463	0.586
Diagnostic Tests				
F Test	9.633 (0.000)	13.20 (0.000)	14.57 (0.000)	20.84 (0.000)
VIF	1.85	1.51	3.55	3.85
Hausman Test	18.20 (0.002)	14.84 (0.000)	14.36 (0.002)	29.35 (0.000)
Wald Test	913.89 (0.000)	223.73 (0.000)	278.25 (0.000)	691.42 (0.000)
Baltagi-Wu (1999)	.540	.611	.637	.716
DW	.454	.532	.541	.600
LM	447.328 (0.000)	458.796 (0.000)	469.288 (0.000)	411.271 (0.000)
Pesaran (2004), CD	8.429 (0.000)	11.212 (0.000)	12.970 (0.000)	11.780 (0.000)
Friedman (1937)	110.418 (0.000)	146.448 (0.000)	151.348 (0.000)	131.923 (0.000)
Frees (1995, 2004)	1.952 (0.000)	2.268 (0.000)	2.271 (0.000)	1.716 (0.000)

Note***, **, and * represent significance at $p \leq 0.01$, $p \leq 0.05$ and $p \leq 0.10$, respectively.

Table 9: Estimation of Institutional and Macroeconomic Variables Affecting LRMES

	I	II	III	IV
	DK FE	**AFR RE**	**DK FE**	**DK FE**
SER1				-.149 (.206)
SER2			-.637 (.695)	
KAL	.208** (.083)	-.013 (.047)		
LN (BOYUT)	-5.392*** (.794)			-7.307*** (1.283)
LN (VIX)	-12.303*** (2.654)	-10.583*** (1.169)	-8.962*** (1.939)	-19.394*** (2.793)
TUFE		.146 (.121)	-.177 (.285)	.130 (.241)
MFAIZ			.668** (.300)	
GSYH	-.031 (.106)	-.265*** (.053)		
M2		.455*** (.080)		
EFKUR		-.159*** (.026)		
ROA	182.285 (115.672)			
ROE		19.307*** (3.378)		
AKTIF2				-.514** (.202)
AKTIF4	.468 (.564)	.537* (.323)		
GGIDER1			.092*** (.025)	
GGIDER2	-.351 (.636)			.988** (.419)
LIKIT1			.209*** (.062)	
LIKIT2				-.171 (.107)
LN (CDS)				10.266** (3.814)
C	139.523*** (15.277)	69.095*** (4.956)	47.849*** (5.944)	170.949*** (18.506)
Obs.	405	405	405	405
Banka	9	9	9	9
Wald (F-statistic)	9.31	10315.13 (0.000) ***	4.97 (0.020) **	10.98 (0.003) ***

Table 9: Continued

R^2	0.233	0.234	0.189	0.348
	Diagnostic Tests			
F Test	51.47 (0.000)	55.19 (0.000)	49.40 (0.000)	60.10 (0.000)
VIF	1.85	1.51	3.55	3.85
Hausman Test	37.48 (0.000)	55.19 (0.000)	26.88 (0.000)	42.43 (0.000)
Wald Test	10.19 (0.3352)	4.48 (0.214)	13.95 (0.124)	11.45 (0.246)
LBI	1.555	1.619	1.595	1.553
DW Test	1.509	1.573	1.541	1.506
LM	553.561 (0.000)		539.982 (0.000)	498.714 (0.000)
Pesaran (2004), CD	21.217 (0.000)		20.641 (0.000)	19.761 (0.000)
Friedman (1937)	220.218 (0.000)		209.440 (0.000)	214.242 (0.000)
Frees (1995, 2004)	2.535 (0.000)		2.355 (0.000)	2.507 (0.000)
LBS Prob.		W0:0.598 W50:0.734 W10:0.615		

Note: ***, **, and * represent significance at p≤0.01, p≤0.05 and p≤0.10, respectively.

Table 10: Estimation of Institutional and Macroeconomic Variables Affecting BETA

	I	**II**	**III**	**IV**
	DK FE	**ARF RE**	**DK FE**	**DK FE**
SER1				-.006 (.008)
SER2			-.029 (.028)	
KAL	.008* (.004)	-.0007 (.002)		
LN (BOYUT)	-.201*** (.036)			-.289*** (.052)
LN (VIX)	-.451*** (.104)	-.400*** (.053)	-.324*** (.076)	-.756*** (.119)
TUFE		.008* (.004)	-.002 (.012)	.009 (.010)
MFAIZ			.023* (.012)	-.017 (.020)
GSYH		-.009*** (.001)		
M2		.017*** (.003)		
EFKUR		-.007*** (.001)		

Table 10: Continued

ROA	8.695 (5.443)			
ROE		.786*** (.154)		
AKTIF2				-.022** (.008)
AKTIF4	.016 (.022)	.016 (.012)		
GGIDER1			.003*** (.001)	
GGIDER2	-.024 (.028)			.038* (.017)
LIKIT1			.007*** (.002)	
LIKIT2				-.008 (.005)
LN (CDS)				.450** (.164)
C	4.691*** (.619)	2.077*** (.194)	1.271*** (.224)	6.126*** (.848)
Gözlem	405	405	405	405
Banka	9	9	9	9
Wald (F-İstatistik)	7.55 (0.005) ***	21129.12 (0.000) ***	3.72 (0.045) **	8.74 (0.002) ***
R2	0.201	0.227	0.172	0.338
	Diagnostic Tests			
F Testi	36.82 (0.000)	41.14 (0.000)	37.30 (0.000)	47.29 (0.000)
VIF	1.85	1.51	3.55	3.85
Hausman Testi	33.57 (0.000)	4.34 (0.226)	26.02 (0.000)	40.38 (0.000)
Wald Testi	59.07 (0.000)		57.92 (0.000)	35.14 (0.000)
Baltagi-Wu (1999)	1.615	1.686	1.673	1.651
DW Testi	1.563	1.636	1.616	1.592
LM	536.039 (0.000)		532.924 (0.000)	482.045 (0.000)
Pesaran (2004), CD	20.592 (0.000)		20. 305 (0.000)	19.124 (0.000)
Friedman (1937)	212.794 (0.000)		203.976 (0.000)	212.072 (0.000)
Frees (1995, 2004)	2.370 (0.000)		2.234 (0.000)	2.503 (0.000)
LBS Prob Değeri		W0:0.975 W50:0.968 W10:0.968		

Note:***, **, and * represent significance at p≤0.01, p≤0.05 and p≤0.10, respectively.

Table 11: Estimation of Institutional and Macroeconomic Variables Affecting SR

	I	II	III	IV
	DK FE	**POLS**	**DK FE**	**POLS**
SER1				.003 (.002)
SER2			.0194*** (.004)	
KAL	-.002*** (.000)	-.002*** (.000)		
LN (BOYUT)	.021 (.020)			-.004 (.005)
LN (VIX)	-.019 (.032)	-.027** (.014)	-.062*** (.021)	-.011 (.019)
TUFE		.005*** (.001)	-.004 (.003)	-.004* (.002)
MFAIZ			.011*** (.003)	.014*** (.002)
GSYH	-.004*** (.001)	-.004*** (.000)		
M2		-.0004 (.001)		
EFKUR		.0008** (.0004)		
ROA	3.093* (1.588)			
ROE		.036 (.078)		
AKTIF2				.003*** (.001)
AKTIF4	.013** (.004)	-.0009 (.003)		
GGIDER1			-.00006 (.000)	
GGIDER2	-.017* (.008)			-.006 (.004)
LIKIT1			.002** (.000)	
LIKIT2				.003*** (.000)
LN (CDS)				-.078*** (.021)
C	-.130 (.309)	.134*** (.046)	-.141 (.079)	.021 (.188)
Gözlem	405	405	405	405
Banka	9	9	9	9
Wald (F-İstatistik)	6.46 (0.008) ***	7.41 (0.000) ***	7.41 (0.006) ***	4.75 (0.000) ***
R^2	0.113	0.130	0.111	0.077

Table 11: Continued

	Diagnostic Tests			
F Testi	2.59 (0.009)	1.38 (0.202)	3.89 (0.000)	1.42 (0.187)
LR Testi		0.05 (0.409)		0.02 (0.444)
VIF	1.85	1.51	3.55	3.85
Hausman Testi	17.42 (0.003)		27.21 (0.000)	
Green (2000). Wald Testi	228.22 (0.000)		190.64 (0.000)	
Baltagi-Wu (1999)	2.397		2.313	
DW Testi	2.195		2.159	
Breusch-Pagan LM	384.266 (0.000)		354.722 (0.000)	
Pesaran (2004), CD	15.535 (0.000)		14.085 (0.000)	
Friedman (1937)	177.393 (0.000)		157.554 (0.000)	
Frees (1995, 2004)	1.952 (0.000)		1.715 (0.000)	
White (1980)		101.084 (2.2e)		139.657 (1.6e)
Wooldridge (2002)		0.022 (0.885)		0.156 (0.703)

Note:***, **, and * represent significance at $p \leq 0.01$, $p \leq 0.05$ and $p \leq 0.10$, respectively.

6. Discussion

In Table 12, the findings obtained from analyses made to estimate the relationship between the risks in the Turkish banking sector and selected institutional variables are given. Applied analyses have shown that capital adequacy ratios positively affect banks' individual risks. These findings are contrary to Modigliani and Miller (1958) irrelevance proposition that corporate finance decisions will not affect firm value under certain circumstances. Empirically, the Dreyer (2018) study was supported. Although the effects of capital adequacy ratios on market betas and LRMES are meaningless, their impact on SRISK is negative. These findings confirm traditional hypotheses that capital adequacy ratios act as buffers against capital losses and failure, limiting banks' tendency to engage in high-risk activities. Empirically supported by Anginer and Kunt (2014), Bouheni (2014), and Rahman et al. (2018). In this study, we demonstrated that profitability rates positively affect stock returns and market betas. It has been shown that there is a positive relationship between profitability rates and bank betas. Theoretically, the relationship between profit rates and systematic risks is negative. On the contrary, when empirical studies are examined, increased profitability rates are often accompanied by high betas[3]. The findings support the studies of Iqbal and Shah (2012), Nimalathasan and Pratheepkanth (2012), Dedunu (2017), and Rutkowska-Ziarko and Pyke (2017). The impact of profitability rates on SRISK is negative, while the impact on LRMES is positive. Given the relationship between profitability ratios and stock returns and systematic risks, increasing profitability is expected to reduce systemic risk trends. In addition, increased profit rates can encourage banks to make riskier investments. These findings support the studies of Xu et al. (2019) and Adhikari (2015). Asset ratios have been shown to positively affect stock returns and negatively affect systemic and systematic risks. The results show that liquidity ratios have a positive effect on stock returns and systematic risks. These results support the work of Borde (1998), Chung et al. (2017), Dedunu (2017), and Marozva (2019). In this study, it was determined that an inverse relationship between liquidity ratios with SRISK and an upward relationship with LRMES. It has been shown that income-expense ratios affect stock returns negatively and systemic and systematic risks affect them positively. The results of the research showed that the relationship between bank size and stock returns is meaningless. These findings support the work of Mazviona and Nyangara (2014). Bank size has been shown to negatively affect systematic risks. Empirically, Dreyer et al. (2018) supported these studies. Although the effect of bank size on SRISK is positive, its relationship with LRMES is inverse. These findings support the work of Pais and Stork (2013), Leaeven et al. (2014), Bhagat et al. (2015), and Dreyer et al. (2018). The research showed that leverage ratios reduce stock returns and increase systemic and systematic risks. The Modigliani and Miller (1958) model argued that an increase in financial leverage would directly increase cash flow risk to shareholders (Giacomini, Ling and Naranjo, 2015, p.126). However, Mirza, Rahat and Reddy (2016) stated that the main purpose of a firm's use of financial leverage is to generate more income and fulfil its obligations compared to debt financing. If the firm cannot meet its obligations, its receivables may force the firm to enter bankruptcy. In such cases, financial leverage may become a major source of credit risk for the firm. Therefore, an increase in financial leverage ratios can adversely affect stock returns. The

[3] See Kim (2007) and Rowe and Kim (2010).

results of this research support the studies of Muradoglu and Sivaprasad (2008), Adami et al. (2010), Al-Qudah and Laham (2013), Öztürk and Yılmaz (2015). Theoretically, there is a positive relationship between leverage ratios and systematic risks. According to Hamada (1969,1972) and Rubinstein (1973), when a firm issues debt, its beta should increase because it assumes financial and commercial risks (Aharon and Yagil, 2019, p.3). The research results support the work of Hamada (1969,1972) and Rubinstein (1973). Empirically, Alaghi (2011) and Rahim et al. (2016) were supported. According to many researchers, high financial leverage encourages banks to engage in illiquid, risky loans and securities activities that result in the failure of these institutions (Acharya and Thakor, 2016, p.5). These findings support the work of Grill et al. (2016) and Kuzubaş et al. (2016).

Table 12: Institutional Determinants of Risk in Turkish Banking Sector

	SR		BETA		SRISK		LRMES	
	Expected	Result	Expected	Result	Expected	Result	Expected	Result
SER1	(+)	meaningless	(-)	meaningless	(-)	(-)	(-)	meaningless
SER2	(+)	(+)	(-)	meaningless	(-)	(-)	(-)	meaningless
ROA	(+)	(+)	(-)	meaningless	(-)	(-)	(-)	meaningless
ROE	(+)	meaningless	(-)	(+)	(-)	meaningless	(-)	(+)
AKTIF2	(+)	(+)	(-)	(-)	(-)	meaningless	(-)	(-)
AKTIF4	(+)	(+)	(-)	meaningless	(-)	(-)	(-)	(+)
LIKIT1	(+)	(+)	(+)	(+)	(-)	(-)	(-)	(+)
LIKIT2	(+)	(+)	(+)	meaningless	(-)	(-)	(-)	meaningless
GGIDER1	(-)	meaningless	(+)	(+)	(+)	meaningless	(+)	(+)
GGIDER2	(-)	(-)	(+)	(+)	(+)	(+)	(+)	(+)
LN (BOYUT)	(-)	meaningless	(-)	(-)	(+)	(+)	(+)	(-)
KAL	(+)	(-)	(+)	(+)	(+)	(+)	(+)	(+)

Table 13 presents the expected direction of the relationship between banking risks and macroeconomic variables and the results obtained. According to Patrick (1966), there must be a positive relationship between two variables. Levine (1997) emphasised the functions of the financial system, such as facilitating commercial life, allocating resources, and mobilising savings, implying a positive relationship between equity markets and economic growth. The findings show that by contrast, there is an inverse relationship between the two variables. According to Drobetz et al. (2016), market betas are higher under poor but lower under good economic conditions. The research findings supported the study of Karakuş (2017). As emphasised by the European Central Bank (2009), significant economic growth and prosperity disrupt the functions of the financial system after a certain point, causing systemic risks to increase. Steady growth plays a significant role in reducing the current risks to the banking sector. The findings support Langfield and Pagano (2016). CDS spreads have been shown to negatively affect stock returns and positively affect systemic and systematic risks. The results show an inverse relationship between CDS spreads and stock returns. The findings theoretically support the Merton (1973) model. Empirically, Akyol and Baltacı's (2018) study is supported. Kim (2019) showed that the likelihood of market default on average significantly affects credit risk premiums. In this regard, increased CDS premiums may also indicate increased systemic and systematic risks. According to this research, the VIX index negatively impacts banking risksA change in the VIX index, which is an indicator of increasing uncertainty and pessimism in the global investment environment, inevitably affects the returns of the Turkish banking sector. These findings support the work of Fu, Sandri and Shackleton (2016) and Sarwar and Khan (2017). Bianconi, Hua and Tan (2015) showed that VIX is a major determinant of systemic risk and can dominate consumer pessimism. These findings support the findings of Bianconi et al. (2015). According to research, money supply does not affect stock returns but positively affects systemic and systematic risks. These results support the work of Lee (1997) and Alper and Kara (2017) in that they show that there is no relationship between stock returns and money supply. Ha and Quyen (2018) provided evidence of a positive relationship between money supply and systemic risks. The results of this research reveal that there is a positive relationship between real effective exchange rates and stock returns and an inverse relationship between systemic and systematic risks. The finding that there is a positive relationship between stock returns and effective exchange rates demonstrates that the stock market-oriented model hypothesis is valid for the banking sector. The findings support Berke (2012), Belen and Karamelikli (2015), and Daelemans, Daniels and Nourzad

(2018). Exchange rate increases may lead to serious systemic and systematic risk problems for the Turkish banking sector. The results support Yeşin's studies (2013), Amtiran et al. (2016), and Andrieş and Nistor (2018). In this research, it was shown that there is a positive relationship between interest rates and banking sector returns. The findings support the studies of Maysami et al. (2004), Ahmad, Ur Rehman and Raoof (2010), Boztosun (2010), Kasman et al. (2011), Narayan et al. (2014), Şentürk and Dücan (2014), Akyol and Baltacı (2018). Interest rate risk is a significant component of systematic risk. There is a direct relationship between interest rates and systematic risks, according to the study. In this context, Booth, Officer and Henderson (1985), McCurdy and Morgan (1991), and Hussain and Shah (2018) were supported. According to traditional portfolio allocation models, a negative relationship between real interest rates and banks' risk-taking (Colletaz et al., 2018, p.167). An increase in interest rates increased systemic risks, according to the study. It has been shown that inflation raises systematic risks and reduces systemic risks. Regarding the effect of inflation rates on stock returns, complex findings were reached.

Table 13: Macroeconomic Determinants of Risks in Turkish Banking Sector

	SR		BETA		SRISK		LRMES	
	Expected	Result	Expected	Result	Expected	Result	Expected	Result
GSYH	(+)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
LN (CDS)	(-)	(-)	(+)	(+)	(+)	(+)	(+)	(+)
LN (VIX)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
M2	(+)	meaningless	(+)	(+)	(+)	meaningless	(+)	(+)
REFK	(+)	(+)	(-)	(-)	(-)	(-)	(-)	(-)
TÜFE	(+)	(-)/(+)	(+)	(+)	(+)	(-)	(+)	meaningless
MFAIZ	(-)	(+)	(+)	(+)	(-)	(+)	(-)	(+)

7. Conclusion and Recommendations

Lehman Brothers' bankruptcy demonstrated that any banking sector instability could threaten the global economy. Therefore, monitoring banking risks is imperative. This research analyzes the institutional and macroeconomic variables affecting the individual, systemic, and systematic risks of nine deposit banks operating in the Turkish banking sector. Within the framework of this study, we first examined the stationaries of the series using panel-unit root analysis. For this purpose, we analysed macroeconomic variables using a first-generation conventional analysis and institutional series with cross-sectional dependency problems using a second-generation panel unit root analysis. We estimated the econometric relationships between the variables using panel regression analyses to find all series stationary at the level. Because of the analysis, comprehensive findings were revealed. Thus, institutional and macroeconomic sources of risks in banking are revealed. We demonstrate that capital adequacy ratios can play a critical role in mitigating systemic risks. Increasing banks' capital adequacy can secure them against financial instabilities and risks of default. The results of the analysis reveal that improvements in profitability, asset quality, and liquidity ratios reduce SRISK. On the other hand, we documented that profitability and liquidity ratios have a positive relationship with LRMES. We found that bank size positively correlated with SRISK but a negative correlation with LRMES. However, the estimation results showed that leverage ratios increase banks' instability and financial risks for both SRISK and LRMES. We reached very strong conclusions about the effects of macroeconomic variables on systemic risks. Economic growth and improvements in real effective exchange rates have a positive impact on banks' systemic risk. These findings demonstrate that the stability of the banking sector will increase in an economic system in which exchange rates are stable and sustainable economic growth is achieved. The results of the analysis reveal that banks are more cautious despite increasing risks and uncertainties both in the United States and abroad. There is an inverse relationship between inflation and increases in the VIX index and systemic risks. On the other hand, it has been determined that expansionary monetary policies, deposit interest rates, and sovereign credit risk are significant sources of instability in the banking sector. Second, we analyse the effects of selected institutional and macroeconomic variables on market risks. Although capital adequacy did not have any significant effect on BETA, it was determined that bank profitability, leverage ratios, income-expense ratios, and liquidity ratios increased market risks. In contrast, positive developments in bank size and asset ratio have an inverse relationship with banking sector market risks. When we analysed the effects of macroeconomic drivers on market risks, we observed positive changes in economic growth and exchange rates that reduced market risks. Similarly, the effects of global market uncertainties on Turkish banks' market risks are negative. The results show that expansionary monetary policies, inflation, deposit rates, and CDS spreads contributed to increased market risk. Third, we estimate the econometric relationship between bank returns and explanatory variables. The findings indicate that capital adequacy, profitability, asset quality, and liquidity ratios contribute to an increase in equity returns and thus individual risk. However, leverage and income-expense ratios have reduced banking returns. The effects of the VIX index, GDP, and CDS spreads on banking returns are negative, whereas the effects of deposit interest and real effective exchange rate on the dependent variable are positive. The effects of inflation on stock returns are mixed.

The results contain helpful recommendations for researchers, market participants, and politicians. These findings can help policymakers shape macroprudential and monetary policies and make fine-grained adjustments. Policymakers can evaluate the effects of their policies on banking sector risks. It can also help bank managers adjust to macroeconomic changes that affect their institutions' risks. Bank managers who evaluate results can reduce risks and increase investor interest in stocks by adjusting financial ratios. Conversely, they can avoid regulations that increase the likelihood of default. Agents who invest in bank assets can adjust their portfolios by observing the effects of macroeconomic and financial ratios on stock returns. Market participants and researchers can anticipate defaults and financial instability using selected macroeconomic and institutional variables. These results are important to demonstrate institutional soundness, financial performance strength, and the extent to which Turkish banks are effective in performing their financial intermediary roles. The findings demonstrate that the SRISK index is more effective than LRMES in representing systemic risks. These results show that sustainable economic growth and stable foreign exchange markets play critical roles in the banking sector and financial stability. Moreover, it has been revealed that increasing uncertainties in global markets encourage Turkish banks to not engage in risky behaviour.

Ethics Committee Approval: Since secondary data was used in the econometric analysis process of our study, there is no need for ethics committee approval.
Peer-review: Externally peer-reviewed.
Author Contributions: Conception/Design of Study- H.A., S.B.; Data Acquisition: H.A., S.B.; Data Analysis/Interpretation: H.A., S.B.; Drafting Manuscript- H.A.; Critical Revision of Manuscript- S.B.; Final Approval and Accountability- H.A., S.B.
Conflict of Interest: The authors have no conflict of interest to declare.
Grant Support: The authors declare no financial support.

References

Abbate, A. & Thaler, D. (2019). Monetary policy and the asset risk-taking channel. *Journal of Money, Credit and Banking, 51*(8), 2116-2143.

Acharya, V. V., Pedersen, L. H., Philippon, T. & Richardson, M. P. (2010). Measuring Systemic Risk. *FRB of Cleveland Working Paper,* No. 10-02. SSRN: https://ssrn.com/abstract=1595075

Acharya, V. V. & Thakor, A. V. (2016). The dark side of liquidity creation: leverage and systemic risk *Journal of Financial Intermediation*, *28*, 4–21. http://dx.doi.org/10.1016/j.jfi.2016.08.004

Adami, R., Gough, O., Muradoğlu, G. & Sivaprasad, S. (2010). The leverage effect on stock returns. 1-34. http://10.2139/ssrn.1690183

Adhikari, N. (2015). Determinants of systemic risk for companies listed on Nepal stock exchange. *Global Journal of Management and Business Research: C Finance*, *15*(5), 1-11.

Aharon, D.Y. & Yagil, Y. (2019). The Impact of financial leverage on shareholders' systematic risk. *Sustainability,* 11, 6548. https://doi.org/10.3390/su11236548

Ahmad, M. I., Ur Rehman, R. & Raoof, A. (2010). Do interest rate, exchange rate effect stock returns? A Pakistani Perspective. *International Research Journal of Finance and Economics*, *50,* 146-150.

Akyol, H. & Baltacı, N. (2018). Ülke kredi risk düzeyi, petrol fiyatları ve temel makroekonomik göstergelerin hisse senedi getirilerine etkisi: BIST 100 örneği. *Kafkas Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *22*, 459-476.

Alaghi, K. (2011). Financial leverage and systematic risk. *African Journal of Business Management*, *5*(15), 6648-6650.

Allen, F. & Carletti, E. (2013). Systemic risk from real estate and macro-prudential regulation. *International Journal of Banking, Accounting and Finance*, *5*(1/2), 28-48.

Alper, D. & Kara, E. (2017). Borsa İstanbul'da hisse senedi getirilerini etkileyen makroekonomik faktörler: BIST sınai endeksi üzerine bir araştırma. *Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, *22*(3), 713-730.

Al-Qudah, A. & Laham, M. (2013). The effect of financial leverage & systematic risk on stock returns in the Amman Stock Exchange (Analytical study-ındustrial sector). *Research Journal of Finance and Accounting*, *4*(6), 136-144.

Amtiran, P. Y., Indiastuti, R., Nidar, S. R. & Masyita, D. (2016). Determinants of systematic risk of banking sector in Indonesia stock exchange. *Global Journal of Business and Social Science Review*, *04*(1), 1-8.

Anginer, D. & Demirguc-Kunt, A. (2014). Bank capital and systemic stability. The World Bank Development Research Group, *Policy Research Working Paper*, 6948.

Andrieş, A. M. & Nistor, S. (2018). Systemic risk and foreign currency positions of banks: Evidence from Emerging Europe. *Eastern European Economics,* 56(5), 382-421.

Bai, J. & Ng, S. (2004). A panic attack on unit roots and cointegration. *Econometrica, Econometric Society*, *72*(4), 1127-1177.

Bai, J. & Ng, S. (2010). Panel unit root tests with cross-section dependence: A further investigation. *Econometric Theory*, *26*(4), 1088-1114.

Baltagi, B. H. & Wu, P. X. (1999). Unequally spaced panel data regressions with ar (1) disturbances. *Econometric Theory*, *15*(6), 814-823.

Baltagi, B. H, Feng, Q. & C. Kao (2012). A lagrange multiplier test for cross-sectional dependence in a fixed effects panel data model. *Journal of the Econometrics*, *170,* 164–177.

Banz, R. W. (1981). The relationship between return and market value of common stocks. *Journal of Financial Economics*, *9*, 3-18.

Belen, M. & Karamelikli, H. (2015). Türkiye'de hisse senedi getirileri ile döviz kuru arasındaki ilişkinin incelenmesi: ARDL yaklaşımı. *İstanbul Üniversitesi İşletme Fakültesi Dergisi*, *45*(1), 34-42.

Berke, B. (2012). Döviz kuru ve İMKB100 endeksi ilişkisi: yeni bir test. *Maliye Dergisi*, *163*, 243-257.

Bhagat, S., Bolton, B. & Lu, J. (2015). Size, leverage, and risk-taking of financial institutions. *Journal of Banking & Finance*, *59,* 520–537.

Bianconi, M., Hua, X. & Tan, C. M. (2015). Determinants of systemic risk and information dissemination. *International Review of Economics and Finance*, *38*, 352–368.

Borde, S. F. (1998). Risk diversity across restaurants: an empirical analysis. *Cornell Hospitality Quarterly*, 39(2), 64-69.

Borri, N., Caccavaio, M., Di Giorgio, G. & Sorrentino, A. M. (2014). Systemic risk in the Italian banking industry. *Economic Notes by Banca Monte dei Paschi di Siena SpA*, *43*(1), 21–38.

BORSA ISTANBUL (2019). *Günlük Bülten*. Retrieved December 2, 2019 from https://www.borsaistanbul.com/veriler/verileralt/gunluk-bulten

Bowman, R.G. (1980). The importance of a market-value measurement of debt in assessing leverage. *Journal of Accounting Research*, *18*(1), 242-254

Bouheni, F. B. (2014). Banking regulation and supervision: can it enhance stability in Europe? *Journal of Financial Economic Policy*, *6*(3), 244-269.

Bouheni, F. B. & Rachdi, H. (2015). Bank capital adequacy requirements and risk-taking behavior in Tunisia: A Simultaneous Equations Framework. *The Journal of Applied Business Research*, *31*(1), 231-238.

Booth, J. R., Officer, D. T. & Henderson, G. V. (1985). Commercial bank stocks, interest rates, and systematic risk. *Journal of Economics and Business*, *37*, 303-310.

Boztosun, D. (2010). İMKB'de işlem gören banka hisse senetlerinin getirileri ile makro ekonomik faktörler arasındaki ilişkinin analizi. *Üçüncü Sektör Kooperatifçilik*, *45*(4), 39-53.

Breitung, J. (2000). The local power of some unit root tests for panel data. nonstationary panels, *Panel Cointegration and Dynamic Panels, 15*, 161–177.

Breusch, T. S. & Pagan, A. R. (1980). The lagrange multiplier test and its applications to model specification in econometrics. *Review of Economic Studies*, Oxford University Press, *47*(1), 239-253.

Chung, T. F., Ariff, M. & M., S. (2017). Banking liquidity and stock market prices in three countries in ASEAN. *Pertanika Journal of Social Sciences and Humanities, 25* (1), 291- 316.

CME Group Company (2010a). *Global sovereign credit risk report, 1st quarter 2010.* Retrieved June 15, 2018 from http://www.cmavision.com

CME Group Company (2010b). *Global sovereign credit risk report*, *2nd quarter 2010.* Retrieved June 15, 2018 from http://www.cmavision.com http://www.cmavision.com

CME Group Company (2010c). *Global sovereign credit risk report*, *3rd quarter 2010.* Retrieved June 15, 2018 from http://www.cmavision.com

CME Group Company (2011a). *Global sovereign credit risk report*, *4th quarter 2010.* Retrieved June 15, 2018 from http://www.cmavision.com

CME Group Company (2011b). *Global sovereign credit risk report*, *1st quarter 2011*. Retrieved June 15, 2018 from http://www.cmavision.com

CME Group Company (2011c). *Global sovereign credit risk report*, *2nd quarter 2011.* Retrieved June 15, 2018 from http://www.cmavision.com

CME Group Company. (2011d). *Global sovereign credit risk report*, *3rd quarter 2011*. Retrieved June 15, 2018 from http://www.cmavision.com

CME Group Company (2012a). *Global sovereign credit risk report*, *4th quarter 2011.* Retrieved June 15, 2018 from http://www.cmavision.com

CME Group Company (2012b). *Global sovereign credit risk report*, *1st quarter 2012.* Retrieved June 15, 2018 from http://www.cmavision.com

CME Group Company (2012c). *Global sovereign credit risk report*, *2nd quarter 2012.* Retrieved June 15, 2018 from http://www.cmavision.com

CME Group Company (2012d). *Global sovereign credit risk report*, *3rd quarter 2012*. Retrieved June 15, 2018 from http://www.cmavision.com

CME Group Company (2012e). *Global sovereign credit risk report*, *4th quarter 2012.*Retrieved June 15, 2018 from http://www.cmavision.com

Colletaz, G., Levieuge, G. & Popescu, A. (2018). Monetary policy and long-run systemic risk-taking. *Journal of Economic Dynamics & Control*, *86*, 165–184.

Daelemans, B., Daniels, J. P. & Nourzad, F. (2018). Free trade agreements and volatility of stock returns and exchange rates: evidence from NAFTA. *Open Economies Review*, *29,* 141-163.

Daves, P. R., Ehrhardt, M.C., Kuhlemeyer, G. A. & Kunkel, R. A. (2000). Increases in the systematic risk of large firms. *American Business Review*, *18*(2), 62-74.

Dedunu, H. H. (2017). Financial variables impact on common stock systematic risk. *International Journal of Scientific Research and Innovative Technology*, *4*(10), 23-32.

Dell'ariccia, G., Laeven, L. & Suarez, G. A. (2017). Bank leverage and monetary policy's risk-taking channel: evidence from the United States. *The Journal of Finance*, *LXXII* (2), 613-654.

Dreyer, J. K., Schmid, P.A. & Zugrav, V. (2018). Individual, systematic and systemic risks in the Danish banking sector. *Finance a úvěr-Czech Journal of Economics and Finance*, *68* (4), 320-350.

Driscoll, J. C. & Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *The Review of Economics and Statistics*, *80*(4), 549-560,

Drobetz, W., Menzel, C. & Schröder, H. (2016). Systematic risk behavior in cyclical industries: the case of shipping. *Transportation Research Part E*, *88,* 129–145.

ECB (2009). *The Concept of Systemic Risk.* Financial Stability Review, 134-142.

Fahmi, S., Geetha, C. & Mohidin, R. (2017). The effect of systematıc risk factors on the performance of the Malaysia stock market. *Proceedings of International Conference on Economics*, 57-68.

Festic, M., Kavkler, A. & Repina, S. (2011). The macroeconomic sources of systemic risk in the banking sectors of five new EU member states. *Journal of Banking & Finance, 35,* 310–322.

Frees, E.W. (1995). Assessing cross-sectional correlation in panel data. *Journal of Econometrics*, *69*, 393-414.

Frees E.W. (2004). *Longitudinal and panel data: analysis and applications in the social sciences*. Cambridge University Press.

Friedman, M. (1937). The use of ranks to avoid the assumption of normality implicit in the analysis of variance. *Journal of the American Statistical Association*, *32*, 675-701.

Fu, X., Sandri, M. & Shackleton, M. B. (2016). Asymmetric effects of volatility risk on stock returns: evidence from VIX and VIX futures. *The Journal of Futures Markets*, *36* (11), 1029–1056.

Giacomini, E., Ling, D. C. & Naranjo, A. (2015). Leverage and returns: a cross-country analysis of public real estate markets. *The Journal of Real Estate Finance and Economics*, *51*, 125–159. http://10.1007/s11146-014-9489-5

Greene, W. (2000). *Econometric analysis. upper saddle river*. New Jersey: Prentice–Hall.

Grill, M., Lang, J. H. & Smith, J. (2016). The leverage ratio, risk-taking and bank stability. ECB, *Working Paper*, 2079.

Ha, N. T. T. & Quyen, P. G. (2018). Monetary policy, bank competitiveness and bank risk-taking: empirical evidence from Vietnam. *Asian Academy of Management Journal of Accounting and Finance*, *14*(2), 137–156.

Hadri, K. (2000). Testing for stationarity in heterogeneous panel data. *Econometrics Journal, 3,* 148–161.

Hamada, R. S. (1969). Portfolio analysis, market equilibrium and corporation finance. *The Journal of Finance*, *24*(1), 13-31.

Hamada, R. S. (1972). The effect of firms's capital structure on the systematic risk of common stock. *The Journal of Finance*, *27*(2), 435-452.

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, *46*(6), 1251-1271.

Hussain, S. & Shah, S. M. A. (2018). Macro-economic factors and firm downside systematic risk: socio-political index as moderation. *Journal of Managerial Sciences*, *XI* (3), 221-242.

Im, K. S., Pesaran, M. H. & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, *115*, 53 – 74.

Investing.Com (2019). *Investing*. Retrieved December 2, 2019 from https://www.investing.com/

Iqbal, M. J. & Shah, S. Z. A. (2012). Determinants of systematic risk. *The Journal of Commerce*, *4*(1), 47-56.

Kabundi, A. & De Simone, F. N. (2019). Monetary policy and systemic risk-taking in the Euro area banking sector. *Economic Modelling,* https://doi.org/10.1016/j.econmod.2019.10.020

Karakuş, R. (2017). Determinants of affecting level from systematic risk: evidence from BIST 100 companies in Turkey. *Eurasian Journal of Business and Economics*, *10*(20), 33-46.

Kasman, S., Vardar, G. & Tunç, G. (2011). The impact of interest rate and exchange rate volatility on banks' stock returns and volatility: evidence from Turkey. *Economic Modelling*, *28*, 1328–1334.

Kim, J. (2019). The effect of systematic default risk on credit risk premiums. *Sustainability*, *11*(6039), 1-17.

Kownatzki, C. (2016). How good is the VIX as a predictor of market risk? *Journal of Accounting and Finance*, *16*(6), 39-60.

Kubinschi, M. & Barnea, D. (2016). Systemic risk impact on economic growth- the case of the CEE countries. *Romanian Journal of Economic Forecasting*, *XIX* (4), 79-94.

Kuzubaş, T. U., Saltoğlu, B. & Sever, C. (2016). Systemic risk and heterogeneous leverage in banking networks. *Physica A*, 462, 358–375.

Laeven, L., Ratnovski, L. & Tong, H. (2014). Bank size and systemic risk. *Internatıonal Monetary Fund*, 1-33.

Laeven, L., Ratnovski, L. & Tong, H. (2016). Bank size, capital, and systemic risk: some international evidence. *Journal of Banking & Finance*, *69*, 25–34.

Langfield, S. & Pagano, M. (2016). Bank bias in Europe: effects on systemic risk and growth. *Economic Policy*, *31*(85), 51–106.

Lakonishok, J. & Shapiro, A. C. (1984). Stock returns, beta, variance and size: an empirical analysis. *Financial Analysts Journal*, *40*(4), 36-41.

Lee, U. (1997). Stock market and macroeconomic policies: new evidence from Pacific basin countries. *Multinational Finance Journal*, *1*(4), 273-289.

Lee, C. C. & Hsieh, M. F. (2013). The impact of bank capital on profitability and risk in Asian banking. *Journal of International Money and Finance*, *32*, 251–281.

Lee, J. S. & Jang, S. (2007). The systematic-risk determinants of The US airline industry. *Tourism Management*, *28*, 434–442.

Levine, R. (1997). Financial development and economic growth: views and agenda. *Journal of Economic Literature*, *35*(2), 688-726.

Longstaff, F. A., Pan, J., Pedersen, L. H. & Singleton, K. J. (2007). How sovereign is sovereign credit risk? *Working Paper,* 13658, National Bureau of Economic Research.

Longstaff, F. A., Pan, J., Pedersen, L. H. & Singleton, K. J. (2011). How sovereign is sovereign credit risk? *American Economic Journal*, 1-31.

Lopotenco, V. (2017). What is the ımpact of monetary policy on systemic risk of republic of Moldova's Banking Sector? *The Journal Contemporary Economy*, *2*(1), 157-163.

Macau, M. M. & Ambrose, D. J. (2018). Systematic risk factors, investor sentiment and stock market performance in Kenya. *International Journal of Management and Commerce Innovations*, 5(2), 1132-1143.

Maddala, G. S. & Wu, S. (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics*, Special Issue, 0305-9049, 631-652.

Mandelker, G. N. & S. Ghon Rhee, S. G. (1984). The impact of the degrees of operating and financial leverage on systematic risk of common stock. *The Journal of Financial and Quantitative Analysis*, 19(1), 45-57.

Marozva, G. (2019). Liquidity and stock returns: new evidence from Johannesburg stock Exchange. *The Journal Developing Areas*, 53(2), 79-90.

Maysami, R. C., Howe, L. C. & Hamzah, M.A. (2004). Relationship between macroeconomic variables and stock market indices: cointegration evidence from stock exchange of Singapore's all-sector indices. *Jurnal Pengurusan*, *24*, 47-77.

Mazviona, B.W. & Nyangara, D. (2014). Does firm size affect stock returns? evidence from the Zimbabwe stock exchange. *International Journal of Business and Economic Development*, 2(3), 13-17.

McCurdy, T. H. & Morgan, I. G. (1991). Tests for a systematic risk component in deviations from uncovered interest rate parity. *Review of Economic Studies*, 58, 587-602.

Mcgraw Hill Financial (2013a). *Global sovereign credit risk report. S&P capital IQ, 1st quarter 2013*. Retrieved June 15, 2018 from http://www.spcapitaliq.com

Mcgraw Hill Financial (2013b). *Global sovereign credit risk report. S&P capital IQ, 2nd quarter 2013*. Retrieved June 15, 2018 from http://www.spcapitaliq.com

Mcgraw Hill Financial (2013c). *Global sovereign credit risk report. S&P capital IQ, 3rd quarter 2013*. Retrieved June 15, 2018 from http://www.spcapitaliq.com

Mcgraw Hill Financial (2013d). *global sovereign credit risk report. S&P capital IQ, 4th quarter 2013.* Retrieved June 15, 2018 from http://www.spcapitaliq.com

Mcgraw Hill Financial (2014a). *Global sovereign credit risk report. S&P capital IQ, 1st quarter 2014.* Retrieved June 15, 2018 from http://www.spcapitaliq.com

Mcgraw Hill Financial (2014b). *Global sovereign credit risk report. S&P capital IQ, 2nd quarter 2014.* Retrieved June 15, 2018 from http://www.spcapitaliq.com

Mcgraw Hill Financial (2014c). *Global sovereign credit risk report. S&P capital IQ, 3rd quarter 2014.* Retrieved June 15, 2018 from http://www.spcapitaliq.com

Mcgraw Hill Financial (2014d). *Global sovereign credit risk report. S&P capital IQ, 4th quarter 2014.* Retrieved June 15, 2018 from http://www.spcapitaliq.com

Merton, R. C. (1973). An intertemporal capital asset pricing model. *Econometrica*, *41*(5), 867-887.

Mirza, N., Rahat, B. & Reddy, K. (2016). Financial leverage and stock returns: evidence from an emerging economy, *Economic Research-Ekonomska Istraživanja, 29*(1) 85-100.

Modigliani, F. & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review,* 48(3), 261-297.

MSCI.Com (2019). *MSCI*. Retrieved December 2, 2019 from https://www.msci.com/

Muradoğlu, G. & Sivaprasad, S. (2008). An empirical test on leverage and stock returns. Retrieved June 15, 2020 from https://www.semanticscholar.org/paper/AN-EMPIRICAL-TEST-ON-LEVERAGE-AND-STOCK-RETURNS-Muradoglu/90e3cacad068843bd71ec75916d620482fae3e3fv

Narayan, P. K., Narayan, S. & Singh, H. (2014). The determinants of stock prices: new evidence from the Indian banking sector. *Emerging Markets Finance & Trade*, *50*(2),5–15.

Nimalathasan, B. & Pratheepkanth, P. (2012). Systematic risk management and profitability: a case study of selected financial ınstitutions in Sri Lanka. *Global Journal of Management and Business Research*, *12*(17), 1-4.

Öztürk, H. & Yılmaz, A. A. (2015). Leverage and stock returns: evidence from Istanbul stock exchange. *Accounting and Finance Research*, *4*(4), 140-146.

Pais, A. & Stork, P. A. (2013). Bank size and systemic risk. *European Financial Management*, *19*(3), 429–451.

PARAGARANTI.COM (2019). *Para-garanti*. Retrieved December 2, 2019 from https://www.paragaranti.com/

Patrick, H. T. (1966). Financial development and economic growth in underdeveloped countries. *Economic Development and Cultural Change*, *14*(2), 174-189.

Pesaran, M.H. (2004). General diagnostic tests for cross section dependence in panels. *CESifo Working Paper Series*, No. 1229; IZA Discussion Paper No. 1240.

Pesaran, M. H. (2007). A simple panel unıt root test in the presence of cross-section dependence. *Journal of Applied Economy*, *22*, 265–312.

Pesaran, M. H. (2015). Testing weak cross-sectional dependence in large panels. *Econometric Reviews*, *34*(6-10), 1089-1117.

Puspitaningtyas, Z. (2017). Estimating systematic risk for the best investment decisions on manufacturing company in Indonesia. *Investment Management and Financial Innovations, 14*(1), 46-54.

Rahman, M. M., Chowdhury, A. A. & Dey, M. (2018). Relationship between risk-taking, capital regulation and bank performance: empirical evidence from Bangladesh. *Eurasian Journal of Business and Economics*, *11*(22), 29-57.

Rahim, A., Khan, Z., Alam, T. & Khan, H. (2016). Effect of leverage on stock returns and systematic risk: evidence from Pakistani industries. *Sarhad Journal of Management Sciences, 2*(1), 39-48.

Ranciere, R. & Tornell, A. (2004). Systemic risk and growth. 1-28. Retrieved May 15, 2019 from https://www.imf.org/external/pubs/ft/staffp/2004/00-00/tornel.pdf

Ranciere, R., Tornell, A. & Westermann, F. (2008). Systemic crises and growth. *The Quarterly Journal of Economics*, 123(1), 359-406.

Ranciere, R., Tornell, A., Vamvakidis, A., Nocke, V., Alberola, E. & Del Rio, P. (2010). Currency mismatch, systemic risk and growth in Emerging europe [with Discussion]. *Economic Policy*, *25*(64), 597-658.

Rubinstein, M.E. A (1973). Mean variance synthesis of corporate financial theory. *The Journal of Finance, 28* (1), 167–181.

Rutkowska-Ziarko, A. & Pyke, C. (2017). The development of downside accounting beta as a measure of risk . *Folia Oeconomica Stetinensia*, 151-161. *Economics and Business Review*, 3(17) (4), 55-65.

Sarwar, G. & Khan, W. (2017). The effect of US stock market uncertainty on emerging market returns. *Emerging Markets Finance & Trade*, *53*, 1796–1811.

Sirivige, R. (2017). The relationship between profitability and the risk factors and other macroeconomic factors. *Munich Personal RePEc Archive*, 78625.

Smaga, P. (2014). The concept of systemic risk. The London school of economics and political science, *E.S.R.C.,* 5, 1-26.

Stever, R. (2007). Bank size, credit and the sources of bank market risk. *BIS Working Papers*, 238.

Stolbov, M. (2017). Assessing systemic risk and ıts determinants for advanced and major emerging economies: the case of ΔCoVaR. *International Economics and Economic Policy*, 14, 119–152.

Sullivan, T. G. (1978). The cost of capital and the market power of firms. *The Review of Economics and Statistics*, 60(2), 209-217.

Şentürk, M. & Dücan, E. (2014). Türkiye'de döviz kuru-faiz oranı ve borsa getirisi ilişkisi: ampirik bir analiz. *Business and Economics Research Journal*, *5*(3), 67-80.

Taylor, M. P. & Sarno, L. (1998). The behavior of real exchange rates during the post- bretton woods period. *Journal of International Economics*, *46,* 281-312.

TBB (2019). *İstatistikler*. Retrieved December 2, 2019 from https://www.tbb.org.tr/tr

TCMB (2019). *EVDS*. Retrieved December 2, 2019 from https://www.tcmb.gov.tr/

Toader, O. (2015). Estimating the ımpact of higher capital requirements on the cost of equity: an empirical study of European banks. *International Economics and Economic Policy, 12,* 411–436.

Varotto, S. & Zhao, L. (2018). Systemic risk and bank size. *Journal of International Money and Finance*, *82*, 45–70.

NYU-Stern (2019). *V-lab.* Retrieved December 2, 2019 from https://vlab.stern.nyu.edu/

Wibowo, B. (2017). Systemic risk, bank's capital buffer, and leverage. *Economic Journal of Emerging Markets*, *9*(2), 150-158.

Xu, T. T., Hu, K. & Udaibir, S. D. (2019). Bank profitability and financial stability. *IMF Working Paper*, No. WP/19/5.

YAHOO FINANCE (2019). *CBOE volatility index*. Retrieved December 2, 2019 from https://finance.yahoo.com/

Yeşin, P. (2013). Foreign currency loans and systemic risk in europe. *Federal Reserve Bank of St. Louis Review*, *95*(3), 219-235.