International Journal of Social Science and Economic Research

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

SYSTEMIC RISK AND DIVERSIFICATION IN TURKISH BANKING SYSTEM

ASS. PROF. NESLİHAN TOPBAŞ

Management Faculty, Atılım Universitesi, Turkey

ABSTRACT

Since the global financial crisis, the attention of financial market actors, especially regulators, have focused on the systemic risk concept. The systemic risk can be defined as the situation when the failure of a (limited number of) financial institution(s) or the crash of a financial market creates domino effect on several other financial institutions or markets resulting with their failure emanating from the initial idiosyncratic shock. This study contributes to literature by being the one of the rare analysis of Turkish banking system in terms of diversification and systemic risk. In the analysis, diversification was measured by classifying bank's non-interest- related activities into net commission revenue, net trading revenue and all other net revenue. The systemic risk was measured by using Contingent Claims Analysis (CCA) that incorporates market-based and balance sheet information to obtain financial risk indicators, such as Distance-to-Default (DD). The data consist of quarterly calculated average diversification indicator (ADI), weighted average diversification indicator (WADI), distance-to-default (DD) and weighted average distance-to-default (WADD) for top 6 Turkish commercial banks in in the period between 2009 and 2016. The results show that the relation between diversification and systemic risk is ambiguous as parallel to the analysis performed other countries.

Keywords: systemic risk, distance to default, diversification

INTRODUCTION

Since the 2008 financial crisis, the attention of broad spectrum of financial market actors, especially regulators, has focused on the systemic risk concept. The systemic risk occurs financially when the problems of financial institution or the collapse of a financial market creates domino effect on several other financial institutions or markets resulting with their failure emanating from the initial idiosyncratic shock. The systemic risk widens as the financial institutions affected in the second wave also fail as a consequence of the initial shock or as the other markets are affected thereafter. From this perspective, a systemic crisis can be defined as

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

systemic event that affects a large number of financial institutions or markets adversely, thereby severely impairing the functioning of the financial system (De Bandt and Hartmann, 2000). This paper conceptually agrees to IMF in their definition of systemic risk as a risk of disruption to financial services that is caused by an impairment of all or parts of the financial system and has the potential to have serious negative consequences for the real economy[1].

The systemic risk arise from three interrelated features of the financial systems which are the structure of banking system, the interconnection of the financial institutions through direct exposures and settlement systems and the information intensity of financial contracts and related credibility problems. Formally, the Basel Committee on Bank Supervision (BCBS) used the banking criteria such as size, interconnectedness, and lack of readily available substitutes, cross-jurisdictional activity and complexity of the bank activities in order to determine the potential banks, the possible failures of which can create vulnerability in the financial system (BCBS, 2011). This approach formulates the theories that proposes large and complex banks contribute to the systemic risk. The unstable banking hypothesis stipulates that large banks have a greater tendency to expose to more risky investments funded by relatively shorter borrowings, thus creating more severe systemic liquidity risk for the whole system (Shleifer and Vishny, 2010; Gennaioli et al.,2013). Too-big-to-fail hypothesis proposes the reluctance of the regulators to take action against large banks in order not to adversely affect the whole market. Such an approach of regulators motivates larger banks to take on excessive risks in the expectation of bailouts. Another theory is based on the agency cost hypothesis proposing that agency problems increases as the banks gets larger in terms of activities which creates counter exposures leading drivers of systemic risk.

This study contributes to literature by being the one of the rare analysis of Turkish banking system in terms of diversification and systemic risk. The diversification of Turkish banks are generally analyzed in relation with bank performance (Gurbuz et.al., 2013, Turkmen and Yigit, 2012). The studies on systemic risk in Turkish financial system are also very limited and generally use other banking sector related variables such as stock market return co-movement (Binici, 2013) and network centrality (Kuzubas et.al, 2014). For our knowledge, the only analysis revealing the systemic risk generated by individual Turkish banks belongs to Akkoyun et.al.(2013) who realized for Central Bank of Turkey. From a portfolio perspective and by using contingent claims analysis and Shapley values, they assessed the systemic importance of each bank according to its marginal contribution to the calculated system wide risk measure and proposed that since the crisis times of 2002, Turkish banking sector eliminated the idiosyncratic shocks within the system.

[1] https://www.imf.org/external/np/g20/pdf/100109.pdf

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

LITERATURE

Federal Deposit Insurance Corporate Improvement Act of 1991 in US was the first occasion whereby the systemic risk was referred and a big bulk of research has been realized thereafter. Each of the researchers has made its own definition of systemic risk (Bartholomew and Whalen, 1995; Goldstein, 1995; Kaufman, 1995). However, it is agreed that systemic risk is associated with the likelihood of experiencing a systemic failure of the financial system that is triggered by a strong systemic event which severely and negatively impacts the financial markets and the whole economy (Patro et.al., 2012). It is a fact that the literature on systemic risk has been build up after the global financial crisis that started in 2007. The analysis can be categorized under two headings; indicator-based and model-based methodologies.

Indicator-based methodologies was introduced by BCBS in 2011 and it identified global systemically important banks for which it required additional capital requirement depending on their potential to create systemic risk for the whole market (BCBS, 2011). Under this methodology, by using bank financial data and capital market data, some indicators are calculated to signal possible deterioration in the systemic risk level. The debut analysis using indicator-based methodologies was realized by Illing and Liu (2006). They generated an index called the Financial Stress Index (FSI). FSI was built by using nine indicators collected from the bond, foreign exchange and stock markets in Canada and signals the deterioration in the systemic risk level. Hakkio and Keeton (2009) adapted the model to be applied to larger economies such as US by employing 11 variables basically using the capital market data and create the Kansas City Financial Stress Index. Moreover, Grimaldi (2010) used 16 variables to explain the system risk of the Euro Area and Morales and Estrada (2010) applied the same set to Columbian financial system. Under indicator based methodology, some researchers focused on individual determinants such as inter-bank lending (Rochet and Tirole, 1996), financial system consolidation (De Nicolo and Kwast, 2002), VaR-induced herding behavior in bank trading patterns (Jorion, 2006), and the opaque and largely unregulated hedge funds (Chan et al., 2006; Kambhu et al., 2007).

Model based methodologies utilize econometric modelling by using capital markets data. The most well known analysis belongs to Adrian and Brunnermeier (2011) in which they introduced the concept of Conditional Value at Risk (CoVaR), which is defined as the VaR of the financial system conditional on the default of one bank. They examined the correlation between a bank's share price and the respective index of all institutions for the period 1986–2010 in order to determine the level of risk of contagion. Another indicator calculated by the use of an econometric model is Marginal Expected Shortfall (MES) which can be defined as the losses of a bank during the periods of 5% highest share price losses of the financial system over time by

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

Acharya et al. (2010). Under this model, the systematic risk is composed of the losses of a bank during these periods (MES) as a share of the corresponding losses of the total market equal its systemic risk. Brownlees and Engle (2011) adopt the methodology of Acharya et al. (2010) by applying a systemic risk index, which is determined by the expected MES defined as time varying share price volatility and the degree of leverage. Other examples of model-based measures include Acharya et al. (2011), Allenspach and Monnin (2006), Aspachs et al. (2007), Avesani et al. (2006), Goodhart et al. (2005, 2006), Lehar (2005), Zambrana (2010) and Zhang et al. (2009).

Apart from the empirical analysis, it is a realized fact that there exist interdependencies within the banking sectors in times of stress. Diversification has been considered as the key to mitigate individual bank risk of solvency, however it may simultaneously increase the systemic risk for the whole financial system. The more vivid example is the exposure of EU banks to US sub-prime mortgages of about equal size as US banks; a perfect example of international risk diversification and contagion (Slijkerman et.al., 2013). The relation between diversification and systemic risk is ambiguous, some of the researchers propose that diversification at financial institutions support the stability of the financial system (Wagner, 2010). However, other perspective indicates that diversification has a dark-side as it makes banks more similar contributing to the systemic risk of the financial system (Van Oodt, 2010; Wagner, 2010; Shaffer, 1994 and Ibragimov et al., 2011) addressed the full diversification condition and indicated that diversification may benefit individual institutions but often increases systemic risk.

All the regulatory efforts on banking in every country aims to lower the risk exposure of individual banks by limiting the concentration of credit, liquidity, foreign exchange and all other risks. At the bank and portfolio level, in order to control concentration of exposures, diversification seems a preferred solution. However, especially for the bigger banks which have the potential to influence the overall banking system, the strategies of diversification may result with increased systemic risk for the financial system, which, in turn will adversely affect the banks. It is fact that there exist a gap of research in relation with the individual bank diversification and the systemic risk. The aim of this paper is to contribute to the literature to determine the relation between diversification and systemic risk by employing Turkish data.

METHODOLOGY

Diversification in banking sector can be achieved by means of using different types of financial products and services, geographic expansion and a combination of geographic and business line diversification (Merceria et al., 2007). However, in this paper, bank diversification will be evaluated by means of distribution of non-interest income amongst the sources as proposed by

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

many researchers. This method originated by Herfindahl has been modified and used by many researchers such Morgan and Samolyk (2003); Stiroh (2004a), Thomas (2002) and Li (2016).

Referring to the study of Elsas et al. (2010), diversification has been measured by classifying bank's non-interest-related activities into net commission revenue, net trading revenue and all other net revenue and the formulation to illustrate the diversification indicator of bank i at time t as follows:

$$DIV_{it} = \left[\left(\frac{INT_{it}}{TOR_{it}}\right)^2 + \left(\frac{COM_{it}}{TOR_{it}}\right)^2 + \left(\frac{TRAD_{it}}{TOR_{it}}\right)^2 + \left(\frac{OTH_{it}}{TOR_{it}}\right)^2\right]$$

where INT denotes gross interest revenue, COM net commission revenue, TRAD net trading revenue, and OTH all other net revenue, respectively. TOR indicates total operating revenue, which is equal to the sum of the absolute values of INT, COM, TRAD, and OTH. For each quarter in the period between 2009-2016, an average diversification indicator (ADI) and a weighted average diversification indicator (WADI) were calculated by using the individual bank market capital values.

The research on systemic risk measurement has focused on developing an understanding about the interrelationship between the individual bank risk and financial system stability. The institution-level measurement approaches include but not limited to CoVaR (Adrian and Brunnermeier, 2008), CoRisk (Chan-Lau, 2010), Systemic Expected Shortfall (SES) (Acharya and others, 2009, 2010, and 2012) (as well as extensions thereof, such as the Distress Insurance Premium (DIP) by Huang and others (2009 and 2010)), Granger Causality (Billio and others, 2010), SRISK (Brownlees and Engle, 2011), and the Joint Probability of Distress (Segoviano and Goodhart, 2009).[2] In this paper, Contingent Claims Analysis (CCA) is used as a measure of banking systemic risk which incorporates market-based and balance sheet information to obtain financial risk indicators, such as Distance-to-Default (DD), probabilities of default etc (Saldias, 2013). Referring to the study of Singh et al. (2014),DDit, the distance-to-default of bank i at time t, is calculated by the following equations:

[2] https://www.imf.org/external/pubs/ft/wp/2013/wp1354.pdf

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

$$DD_{it} = \frac{A_{it} - D_{it}}{A_{it}\sigma_{it}} \quad (1)$$

$$E_{it} = A_{it}N(d_1) - D_{it}e^{-rT}N(d_2) \quad (2)$$

$$\sigma_{it}^{*} = \frac{A_{it}}{E_{it}} N(d_1)\sigma_{it} \quad (3)$$

$$d_1 = \frac{\ln\left(\frac{A_{it}}{D_{it}}\right) + \left(r + \frac{\sigma_{it}^2}{2}\right)T}{\sigma_{it}\sqrt{T}} \quad (4)$$

$$d_2 = d_1 - \sigma_{it}\sqrt{T} \quad (5)$$

In the calculation A represents accounting value of bank assets, T the time horizon of debt, D the face value of the debt, σ the volatility of bank assets, r the risk-free rate, E the market value of bank and the volatility of bank in the capital market, respectively. In the calculation, Equations 2 and 5 are used to obtain the implied asset value A and volatility σ_A for the calculation of DD_{it} which are not observable and must be estimated by inverting the two relationships. As an addition to the simple distance-to-default (DD) for each bank and each quarter, weighted average distance-to-default (WADD) were calculated by using the individual bank market capital values.

DATA AND EMPIRICAL RESULTS

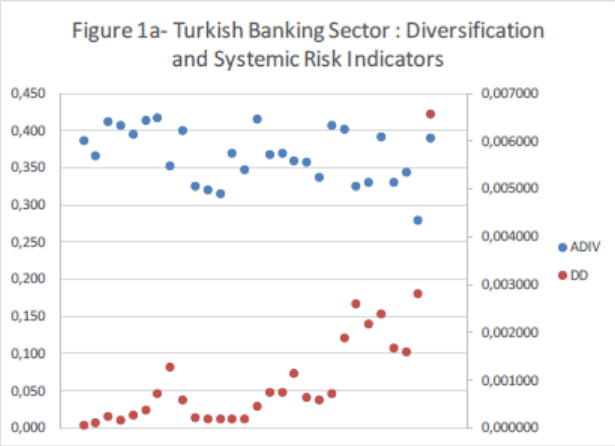
As of December 2016, in the Turkish banking sector there are 47 banks in total, 34 of them being deposit banks out of which 21 are owned by foreigners, 13 development and investment banks. The total asset size is 737.5 billion US Dollars, total loans and receivables amounts to nearly 293 billion US Dollars (66% of balance sheet). 56% of the balance sheet has been funded by the deposits and 11% by share-holders equity. In the period after the 2000–2001 financial crisis in Turkey, structural reforms designed to ensure the banking sector could overcome fragilities became the engine of economic growth and accelerated the resolution of the crisis. In the 2000s, autonomous Regulatory and Supervisory Agencies (Boards) were established and the Banking Sector Restructuring Program was announced in May 2001, and was focused on the intermediation function aiming to make the banking sector internationally competitive and resilient to internal and external shocks.

The data consist of quarterly calculated average diversification indicator (ADI), weighted

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

average diversification indicator (WADI), distance-to-default (DD) and weighted average distance-to-default (WADD) for top 6 Turkish commercial banks that have the highest market share in terms of total assets, total deposits and all other relevant indicators for each quarter in the period between 2009 and 2016. Top 6 Turkish commercial banks have a market share of 60% in terms of nearly all indicators such as total assets, deposits etc. The data sources are Banking Regulation and Supervision Agency (BRSA), The Banks Association of Turkey (BAT) and Borsa Istanbul (BIST). Figure 1a and 1b plots the data of average and weighted average (weights are assigned as market capital) diversification indicator of top 6 Turkish banks, as well as the systemic risk indicators banks for the period Dec 2016-Dec 2009, respectively. The systemic indicators represents an increasing trend since the end of 2013 when the political tension increased as a result of the domestic social unrest beginning with Gezi Park demonstrations in June 2013 especially the way they were settled and the reaction were reflected in domestic government bond market and stock exchange together with foreign exchange market. The timing of the occurrences coincided with the tightening decision of FED which contributed to the degree of reaction. The second wave of political events in the form of corruption investigations took place in late December 2013, causing more deterioration in domestic and international markets. All those political events has increased the systemic risk affecting the whole Turkish banking system and has continued to increase thereafter as the social, political and geographical factors have worsened.



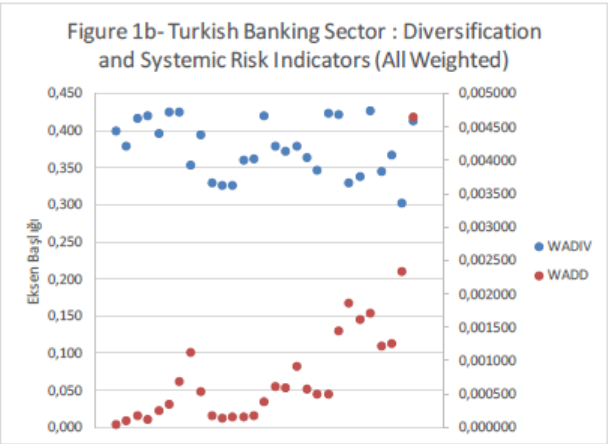


Table 1 stipulates the descriptive statistics, referring to the Augmented Dickey- Fuller (ADF) test results the quarterly diversification indicators (ADIV and WADIV) of top 6 Turkish banks for the period Dec 2016-Dec 2009 have no unit root. However, the no unit root hypothesis are rejected for the systemic risk indicators of DD and WADD. ARDL model was introduced by Pesaran et al. (2001) in order to incorporate I(0) and I(1) variables in the analysis as conventional OLS cannot be used if any one of the variables or all of them are I(1). In order to run ARDL some

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

preconditions are needed to be checked; first of all, dependent variable must be non-stationary in order for the model to behave better and none of the variable should be I(2) in normal conditions according to Augmented Dickey- Fuller (ADF) test. The descriptive data given together with ADF shows that the diversification indicators of ADIV and WADIV which are also the dependent variables are non-stationary. As a second step of ARDL, by performing Vector Auto Regressive Specification Order Criteria, the lag order is 4 for DD and WADD which means that it is appropriate to perform ARDL test.

Table 1: Descriptive Statistics

	ADIV	**DD**	**WADIV**	**WADD**
Mean	0.3666	0.0011	0.3776	0.0008
Std. Dev	0.03668	0.001335	0.037451	0.00096
Min	0.279	0.000045	0.303	0.000041
Max	0.418	0.006572	0.428	.004652
ADF-statistic	-4.786	0.309	-4.595	0.438

By using MICROFIT 5, the ARDL approach to cointegration has been used firstly for distance to default as dependent variable (DD) and diversification indicator (ADIV) as independent variable by using Scwarz Bayesian Criterian. Table -2 stipulates the results and referring to F- statistic (30.4505) which is higher than lower (7.3961) as well as upper (8.1594) limit, it can be said that there exist cointegration among the set of variables. There exist positive relationship, however the t-ratio is below requirement and the relationship between distance to default as dependent variable (DD) and diversification indicator (ADIV) as independent variable by using Turkish banking data for the period Dec 2016-Dec 2009 seems ambiguous.

Table-3 gives the ARDL results for weighted distance to default as dependent variable (WADD) and diversification indicator (WADIV) as independent variable by using Scwarz Bayesian Criterian. Referring to F-statistic (23.9373) which is higher than lower (7.3961) as well as upper (8.1594) limit, it can be said that there exist cointegration among the set of variables. There exist positive relationship, however the t-ratio is below requirement and the relationship between weighted distance to default as dependent variable (WADD) and weighted diversification indicator (WADIV) as independent variable by using Turkish banking data for the period Dec 2016-Dec 2009 seems ambiguous.

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

Table 2: Autoregressive Distributed Lag Estimates ARDL(1,0) selected based on Schwarz Bayesian Criterion

```
**********************************************************************************
Dependent variable is DD
28 observations used for estimation from 2017Q1 to 2023Q4
**********************************************************************************
Regressor        Coefficient     Standard Error      T-Ratio[Prob]
DD(-1)             .31927         .089059          3.5849[.001]
ADIV             .9522E-3         .0025942          .36706[.717]
C                .8707E-3         .9460E-3          .92043[.367]
T               -.4475E-4         .1510E-4         -2.9625[.007]
**********************************************************************************
R-Squared             .75069  R-Bar-Squared            .71952
S.E. of Regression    .4403E-3  F-Stat.  F(3,24)    24.0882[.000]
Mean of Dependent Variable  .8812E-3  S.D. of Dependent Variable   .8313E-3
Residual Sum of Squares   .4652E-5  Equation Log-likelihood     178.8148
Akaike Info. Criterion    174.8148  Schwarz Bayesian Criterion   172.1504
DW-statistic           1.0419  Durbin's h-statistic    2.8741[.004]
**********************************************************************************

Testing for existence of a level relationship among the variables in the ARDL model
**********************************************************************************
F-statistic  95% Lower Bound  95% Upper Bound  90% Lower Bound  90% Upper Bound
  30.4505       7.3961         8.1594          6.0681          6.7722

W-statistic  95% Lower Bound  95% Upper Bound  90% Lower Bound  90% Upper Bound
  60.9010       14.7923        16.3188         12.1362         13.5444
**********************************************************************************
```

The findings given above are in line with the results of the study of Li (2016) who used the banking data of 14 listed banks in China in the period between October 2007 to June 2014. The results of the analysis reveal that there is no linear or nonlinear causal relationship from diversification to banking systemic risk.

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

Table 3: Autoregressive Distributed Lag Estimates ARDL(1,0) selected based on Schwarz Bayesian Criterion

****

Dependent variable is WADD

28 observations used for estimation from 2017Q1 to 2023Q4

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
WADD(-1)	.38349	.090719	4.2272[.000]
WADIV	.1545E-3	.0017564	.087961[.931]
C	.7330E-3	.6626E-3	1.1064[.280]
T	-.2733E-4	.1097E-4	-2.4906[.020]

****

R-Squared	.76733	R-Bar-Squared	.73824
S.E. of Regression	.3214E-3	F-Stat. F(3,24)	26.3828[.000]
Mean of Dependent Variable	.6986E-3	S.D. of Dependent Variable	.6282E-3
Residual Sum of Squares	.2479E-5	Equation Log-likelihood	187.6255
Akaike Info. Criterion	183.6255	Schwarz Bayesian Criterion	180.9611
DW-statistic	1.1485	Durbin's h-statistic	2.5682[.010]

****

Testing for existence of a level relationship among the variables in the ARDL model

****

F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
23.9373	7.3961	8.1594	6.0681	6.7722

W-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
47.8745	14.7923	16.3188	12.1362	13.5444

****

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

CONCLUSION

Since the global financial crisis, the attention of broad spectrum of financial market actors, especially regulators, have focused on the systemic risk concept. The systemic risk can be defined as the situation when the failure of a limited number of financial institutions or the crash of a financial market creates domino effect on several other financial institutions or markets resulting with their failure emanating from the initial idiosyncratic shock.

Apart from the empirical analysis, it is a realized fact that there exist interdependencies within the banking sectors by means of are the structure of banking system, the interconnection of the financial institutions through direct exposures and settlement systems and the information intensity of financial contracts and related credibility problems. Some of the analysts argue that diversification has been the key to mitigate individual bank risk of solvency, however it may simultaneously increase the systemic risk for the whole financial system. The relation between diversification and systemic risk is ambiguous, some of the researchers propose that diversification at financial institutions benefits the stability of the financial system. However, other perspective indicates that diversification has a dark-side as it makes banks more similar contributing to the systemic risk of the financial system.

This study contributes to literature by being the one of the rare analysis of Turkish banking system in terms of diversification and systemic risk. In the analysis, diversification was measured by classifying bank's non-interest-related activities into net commission revenue, net trading revenue and all other net revenue. For each quarter in the period between 2009-2016, an average diversification indicator (ADI) and a weighted average diversification indicator (WADI) are calculated by using the individual bank market capital values for top 6 Turkish commercial banks that have the highest market share in terms of total assets, total deposits and all other relevant indicators for each quarter.

Contingent Claims Analysis (CCA) is used as a measure of banking systemic risk which incorporates market-based and balance sheet information to obtain financial risk indicator of Distance-to-Default (DD). Distance-to-default (DD) and weighted average distance-to-default (WADD) for each quarter in order to measure the systemic risk of Turkish banking system.

The quarterly diversification indicators (ADIV and WADIV) of top 6 Turkish banks for the period Dec 2016-Dec 2009 have no unit root. However, the no unit root hypothesis are rejected for the systemic risk indicators of DD and WADD. ARDL model was introduced by Pesaran et al. (2001) in order to incorporate I(0) and I(1) variables in the analysis. The results indicate that the relationships between distance to default as dependent variable (DD) and diversification indicator (ADIV) as independent variable, also the relation between weighted distance to default

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

as dependent variable (WADD) and diversification indicator (WADIV) as independent variable by using Turkish banking data for the period Dec 2016-Dec 2009 seem ambiguous. The findings given above are in line with the results of the study of Li (2016) who used the banking data of 14 listed banks in China in the period between October 2007 to June 2014. The results of the analysis reveal that there is no linear or nonlinear causal relationship from diversification to banking systemic risk.

REFERENCES

Acharya, V. V., Cooley, T., Richardson, M., Walter, I. (2010), "Manufacturing tail risk: a perspective on the financial crisis of 2007-2009", Foundations and Trends in Finance, 4, 247–325.

Acharya, V.V., Pedersen, L.H., Philippon, T., Richardson,M., (2010), "Measuring systemic risk", Federal Reserve Bank of Cleveland Working Paper No. 10-02.

Adrian, Tobias, A., Brunnermeier, M.K., (2016), "CoVaR". American Economic Review, 106.7 (2016): , 106, 7, 1705-1741.

Akaike, H., (1974), "A New Look at the Statistical Model Identification. System Identification and Time-Series Analysis", IEEE Transactions Automatic Control, 19, 716–723.

Akkoyun, H.Ç., Karaşahin, R. and Keleş, G. (2013), Systemic Risk Contribution of Individual Banks, Central Bank of Turkey Workıng Paper NO: 13/18.

Allenspach, N., Monnin, P., (2006), "International integration, common exposures and systemic risk in the banking sector: an empirical investigation", Swiss National Bank Working Paper.

Aspachs, O., Goodhart, C., Tsomocos, D., Zicchino, L., (2007), "Towards a measure of financial fragility", Annals of Finance, 3, 37–74.

Avesani, R., Pascual, A.G., Li, J., (2006), "A new risk indicator and stress testing tool: a multifactor nth-t-default CDS basket", IMF Working Paper, 105.

Badarudin Z.E., Ariff M., Khalid A.M., (2013), "Post-Keynesian Money Endogeneity Evidence in G-7 Economies", Journal of International Money and Finance, 33, 146-162.

Basel Committee on Banking Supervision (2011). Global Systematically Important Banks: Assessment Methodology and the Additional Loss Absorbency Requirement, Rules Text. Bank of England Quarterly Bulletin, 2014 Q1,

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

http://www.bankofengland.co.uk/publications/Pages/quarterlybulletin/2014/qb14q1.aspx.

Billio, M., Getmansky, M., Lo, A.W., Pelizzon, L. (2010), "Econometric Measures of Systemic Risk in the Finance and Insurance Sectors," National Bureau of Economic Research (NBER) Working Paper No. 16223.

Binici, M., Köksal, B., Orman, C., (2012), "Stock Return Comovement and Systemic Risk in the Turkish Banking System", Central Bank Review, 13, 2013. Available at SSRN: https://ssrn.com/abstract=2054436 or http://dx.doi.org/10.2139/ssrn.2054436.

Brownlees, C.T., Engle, R.F., (2011), "Volatility, correlation and tails for systemic risk measurement", Working Paper. Stern School of Business, New York University, New York, NY.

Chan, N.M., Getmansky, M., Haas, S.M., Lo,A.W., (2006), "Systemic risk and hedge funds" In: Carey, M., Stulz, R.M. (Eds.), The Risks of Financial Institutions. University of Chicago Press, Chicago/London, 235–338.

Chan-Lau, J., (2010), "Regulatory Capital Charges for Too-Connected-To-Fail Institutions: A Practical Proposal" IMF Working Paper 10/98.

De Bandt, O., Hartmann, P. (2000), "Systemic Risk: A Survey", European Central Bank Working Paper No. 35.

De Nicolò, G., Lucchetta, M. (2010), "Systemic Risks and the Macroeconomy," IMF Working Paper No. 10/29, International Monetary Fund.

De Nicolo, G., Kwast, M., (2002), "Systemic risk and financial consolidation: are they related?", Journal of Banking and Finance, 26, 861–880.

Elsas, R., Hackethal, A., Holzhauser, M.,(2010), "The anatomy of bank diversification," Journal of Banking and Finance, 34/6, 1274–1287.

Giesecke, K., Kim, B. (2011), "Systemic Risk: What Defaults Are Telling Us," Management Science, 57 (8), 1387–1405.

Goodhart, C., Sunirand, P., Tsomocos, D., (2005), "A Risk Assessment Model For Banks", Annals of Finance, 1, 197–224.

Goodhart, C., Sunirand, P., Tsomocos, D., (2006), "A Model To Analyse Financial Fragility". Economic Theory, 27, 107–142.

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

Gurbuz, A.O., Yanik,S.,Ayturk, Y.(2013), "Income Diversification and Bank Performance: Evidence From Turkish Banking Sector", BDDK Bankacılık ve Finansal Piyasalar - Cilt:7, Sayı:1, 2013.

Huang, X., Zhou, H., Haibin, Z. (2009),"A Framework for Assessing the Systemic Risk of Major Financial Institutions", Journal of Banking and Finance, 33 (11), 2036–2049.

Huang, X., Zhou, H., Haibin, Z. (2010), "Assessing the Systemic Risk of a Heterogeneous Portfolio of Banks during the Recent Financial Crisis," BIS Working Paper No. 296, Bank for International Settlements.

Huang, X., Zhou, H., Haibin, Z. (2011), "Systemic Risk Contributions," Finance and Economics Discussion Series, Federal Reserve Board.

Ibragimov, R., Jaffee,D., Walden,J. (2011), "Diversification disasters", Journal of Financial Economics, 99/ 2, 333–348.

Illing, M., Liu, Y., (2006), "Measuring Financial Stress In A Developed Country: An Application To Canada", Journal of Financial Stability, 2, 243–265.

Jorion, P., (2006), "Bank trading risk and systemic risk",In: The Risks of Financial Institutions. NBER.

Kambhu, J., Weidman, S., Krishnan, N., (2007), New Directions for Understanding Systemic Risk. National Academies Press.

Kuzubaş, T.U. , Ömercikoğlu, İ., Saltoğlu, B. (2014), "Network Centrality Measures And Systemic Risk: An Application To The Turkish Financial Crisis", Physica A: Statistical Mechanics and its Applications, 405, 203–215.

Laeven, L., Levine, R. (2007), "Is there a diversification discount in financial conglomerates?" Journal of Financial Economics, 85/2, 331–367.

Lehar, A., (2005), "Measuring Systemic Risk: A Risk Management Approach", Journal of Banking and Finance, 29, 2577–2603.

Li,S., (2016), "Does Diversification Affect Banking Systemic Risk?", Discrete Dynamics in Nature and Society, Artcle ID 2967830.

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

Mercieca, S., Schaeck, K. and Wolfe, S. (2007), "Small European Banks: Benefits from Diversification?," Journal of Banking and Finance, 31, 1975-1998.

Morales, M.A., Estrada, D., (2010), "A financial stability index for Columbia", Annals of Finance, 6 (4), 555–581.

Morgan, D.P., Katherine S., (2003), "Geographic Diversification in Banking and its Implication for Bank Portfolio Choice and Performance", Working Paper, Federal Reserve Bank of New York.

Patro, D. K., Qi, M. and Sun, X., (2013), "A Simple Indicator of Systemic Risk", Journal of Financial Stability, Journal of Financial Stability, 9, 105–116.

Rochet, J.C., Tirole, J., (1996), "Interbank Lending and Systemic Risk", Journal of Money, Credit and Banking, 28, 733–762.

Saldıas, M., (2013), "Systemic risk analysis using forward-looking distance-to-default series, Journal of Financial Stability, 9/ 4, 498–517.

Segoviano, M.A., Goodhart, C.A.H., (2009) "Banking Stability Measures," IMF Working Paper No. 09/04.

Shaffer,S., (1994), "Pooling intensifies joint failure risk," Research in Financial Services, 6, 249–280.

Shleifer, A., Vishny, R.W., (2010), "Unstable banking", Journal of Financial Economics, 97 (3), 306–318.

Singh,M. K., Gomez-Puig, M., Sosvilla Rivero, S. (2014) *Forward Looking Banking Stress in EMU Countries,* 2014.

Slijkerman J.F., Schoenmaker, D.,Casper G. de Vries (2013), "Systemic risk and diversification across European banks and insurers", Journal of banking & finance, 37/3, 773-785.

Stiroh, K. J., Rumble,A.(2006), "The dark side of diversification: the case of US financial holding companies", Journal of Banking &Finance, 30/ 8, 2131–2161.

Stiroh, K.J., (2004a), "Do community banks benefit from diversification", Journal of Financial Services Research, 25 (2–3), 135–160.

ISSN: 2455-8834

Volume:02, Issue:10 "October 2017"

Talaslı, İ. (2013), "Systemic Risk Analysis of Turkish Financial Institutions with Systemic Expected Shortfall", Central Bank of Turkey Working Paper, Working Paper No: 13/11.

Thomas, S., (2002), "Firm diversification and asymmetric information: Evidence from analysts forecasts and earnings announcements", Journal of Financial Economics, 64, 373–396.

Turkmen, S.Y., Yigit, İ. (2012), "Diversification in Banking and its Effect on Banks' Performance: Evidence from Turkey", American International Journal of Contemporary Research, 2 No. 12.

Van Oordt, M. R. C. (2014), "Securitization and the dark side of diversification", Journal of Financial Intermediation, 23/2, 214–231.

Wagner, W. (2010), "Diversification at financial institutions and systemic crises", Journal of Financial Intermediation, 19/3, 373–386.

Zambrana, M.S., (2010), "Systemic risk analysis using forward-looking distance to-default series", Federal Reserve Bank of Cleveland Working Paper, 10-05.

Zhang, B.Y., Zhou, H., Zhu, H., (2009), "Explaining credit default swap spreads with equity volatility and jump risks of individual firms", Review of Financial Studies 22, 5099–5131.

