Empirical analysis of Financial Risk on Bank's Financial Performance: An Evidence from Turkish Banking Industry

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Abstract

This research is analytical it's about finding out the impact of financial risk on a bank's financial performance, this study aims to find the influence of foreign exchange risk, credit risk, interest rate risk, and liquidity risk on the financial performance of banking industry in Turkey, whereas performance measured by ROA and ROE, past literature suggests various theories that show the relationship in between financial risks and financial performance of banks risk management theory were adopted for this study. A conceptual model has been developed and eight hypotheses are formed and supported by the literature. The data was collected from financial and annual reports of eight banks in Turkey. The data analyzed by E-Views 12 version, E-Views is good to test the financial models, several statistical tests have been used to interpret the model, unit root test, co integration, OLS, residual test, stability test, model specification test, normality tests and in last GMM model has been used to reduce the heteroscedasticity and serial correlation problem, total eight hypotheses prepared for the study, GMM p-values considered for hypotheses. All hypotheses supported by this study and model is good and specified by Ramsey reset test. ine health information (OHI), Health information source (HIS), Perceived Usefulness, Cyberchondric effects

Key words: Foreign Exchange risk, ROA, ROE, Credit risk, Liquidity risk, interest rate risk.

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INTRODUCTION:

Financial risk is not a newly discovered for banks but the current evolution in the banking industry has been related to top executives (Oudat and Ali, 2021). Current days, banks have plenty of financial risks such as foreign exchange risk, treasury risk, credit risk, interest rate risk, and liquidity risk. In the 1980s there were economic issues that stained the state banks of G ten sovereign states to extract corrective actions for the protection of financial risk (BCBS,2009; Walls et al., 2021), whereas the Board of Capital famed as an essential system of capital which is indigenous attention was on market risk by necessities to subjection credit risk based on Basel Accord, this reflects the main three regulations of banks (Basel one, Basel two and Basel three) for providing the suggestions regarding financial risk and based on and approved Basel committee. Basel has rarefied accompanied by (Asian issue 1997) along with the publication of the modern structure of capital adequacy. Above stated three Basels from that Basel I 1988, that's attention on the essentials of capital directed in the domain of credit risk, in Basel II 1999 formulated III pillars that based on low essentials of capital, trade control, and administrative evaluation, in the first pilar evaluated 3 sorts of general risk that are market and operational risk and one financial risk that is credit risk by using understood guidance levels to evaluate their essentials of capital by banks. Pilar two is concerned with an administrative evaluation where banks regulate the interest rate risk within the recordable journals of banks, emplacement all public administrative needs banks to convey out pressure, when they expose if banks have good command corresponding to IRR and capital (Azevedo et al., 2022; Hudsan,2003) while the third Basel based on market regulations and disciplines, that is developed in a time of financial crises, from 2007-2009 whereas purpose is to allowing banks with some stockpile to authorize bear up all upcoming issues based on liquidity risk, CR and market risk (Amin et al., 2021). (Dimitrova et al., 2022) currently days, every financial institution are facing different risk includes, including FER, CR, LR, IRR, and all other business risk and non-business risk. European banks disintegrated a larger number completely controlled by a government that created crushing short-term obligations unsympathetic administrative and running system of the state bank of Kenya in 2003. After that in 2009 bill on money laundering was passed by the government, (WanjohiWanjohiand Ndambiri M, 2017) when the banks meet their financial obligations expect any losses, thus the liquidity risk emerges, (Hajini et al., 2021). Almost every bank is composed of various types of products and services, it includes involving any financial intervention to bringing on settlement, banks debit and credit cards, providing loans to loan holders, providing other services, and risk management. This is a complete system of banks that are evaluated from an operational outlook rather than a corporate outlook (Wang et al., 2021) to control the future losses and reduce the financial risk of financial institutions, developed financial risk management (Chen &Sivakumar, 2021) various techniques banks used to minimize risk, and risk management come into view like a protecting measure of financial risk in banks. Risk management is one of the basic functions to handle and make the best investment decision that is taken by individual investors or institutional investors; many the investors recognize that abortion pills bring the amount of uncertainty that follows the whole market regarding the investment decisions while anticipating the actual return, abortion pills are inarticulate in

exchange for exclusively, where ordinary prudence is actionable (In et al., 2022). The Black Sholes standard that was introduced by (Ross, 2011) which are amazing, as an individual investor of abortion pills expects to acquire hyper-awareness of future return. Investors contribute to future return and standard risk, which shows a significant relationship between risk and return, where an individual investor could accomplish experience rely on basic knowledge postulated by standard finance theory (Shah and Malik, 2021). Managing risk analyze the losses vulnerability for the banks and picking the applicable risk management techniques to overcome that loss. Modern Portfolio Theory called Pre Markowitz Approach model defined "Financial risk examined as altering element for future return, Markowitz also shows that how to calculate the risk and their relationship with the expected return of each portfolio, where ever he used standard deviation (Taylor, 2022).

(Polinkevych et al., 2021) corporate investors make their businesses very aggressive by using corporate policy, risk management techniques, and financial theory, many portfolios were judged through financial accounting, which enhances the value of adjusted risk. One of the studies done in Germany (Frankfurt Stock Exchange) in time between 1962-2006 by (Kemp, Merkle, and Niessen, 2012) studied more than nine hundred non-financial stocks, which shows a positive significant relationship between low risk and high return by effective attitude. In that study, participants are those who have low financial knowledge compared with those who have the high financial knowledge and their willingness to right their effective attitudes, thinking, perception, and cognition when resisted along to predicting standard deviation and expected return. The same study has been promoted by many other scholars who contended that the companies apply commercials to make adjustments in the investor's behavior (Dong et al., 2021). Most of the currencies for African sovereign states shows the big fluctuations in the worth of currencies, due to taxation, leading to FER, instability of markets, and fluctuations of accounting standards, many securities bank could not be sold rapidly in absence of losses which is the indication of liquidity risk in banks, it also emerges due to liabilities of banks as well or bank stock prices, IRR, FER, currency risk, and other elements affects the value of investment (Gorbhani et al., 2022). (Achinmugu et al., 2021) suggested the bank's financial performance is very mediocre in Nigeria. The IBT (Income before taxes) was violated and diminished many good fortunes for the banks in a time of 2002-2005. Eventually, this was effectuating global economic crises. One of the studies has done at banks in Bahrain (Oudet and Ali, 2021) in order to measure the bank's financial performance and financial risk among various banks in Bahrain, where most branch managers over trying to enhance their bank's performance by reforming of the banking industry, consequently tight race has been arising in banks to contrivance refinement strategies. Bhrainian banks developed an innovative type of lending mechanics to grow the financial performance more the less these differences intimidate banking industry have high risk, debts and assets have to make a convoluted balance sheet. (Bika et al., 2022) suggests that- Banking and microfinance are not good for customers and there is very much risky investment because most of the customers do not know how to run the bank's applications and software, and even some of the customers don't know how to use the internet services.

Research Objectives

- To identify the effect of foreign exchange risk on banks' financial performance in Turkey.
- To identify the effect of credit risk on banks' financial performance in Turkey.
- To identify the effect of interest rate risk on banks' financial performance in Turkey.
- To identify the effect of liquidity risk on banks' financial performance in Turkey.

Justification of research:

The research is conducted in the Turkish banking industry from the time of 2010-2020. After the Global financial crisis. All banks were recovered and financial risk was increased because of low investment opportunities. Many annual reports and financial reports were studied for this research. It is purely related to liquidity risk, foreign exchange risk, interest rate risk, and credit risk. All are negative effects on return on assets and return on equity.

LITERATURE REVIEW:

Theoretical Backgrounds:

Theoretical backgrounds stated to know models and past theories for the researcher to know the similar concepts on the topic of research (Bătae et al., 2021; Kiaritha, 2014) there are many theories show links between financial risk and financial performance, but this presented four theories but after considering all picked one theory from them. First theory namely "Financial Distress Theory" given by Beaver in 1996 famed that when a company comes into bankruptcy, corporate restructuring, mergers, acquisition, and liquidation, then that will come as financial distress. This theory also links with liquidity risk / short-term obligations and financial performance. The second Theory is the "Prospects Theory" which is concerned with EUT (Expected Utility) & Behavioral finance (Hon et al., 2021) whereas, investor treats profits and losses, separately Kahneman&Tversky, 1986. The third theory focused is "Financial Intermediation Theory" modeled by Akerlof, Benson & Diamond in 1980 which relies on the minimization of the unnecessary cost that's compulsory for counterfeit borrower's attitude toward creditors. Another Theory is the "Risk Management theory" which is given by David in 1997 and shows the relationship between credit risks on firm performance. For this research risk management theory has been applied, because this theory reflects the direct impact of financial risk on the bank performance (Song and Wu, 2021; Al – Khouri, 2011).

Foreign Exchange Risk:

Foreign Exchange risk concerns the influence of presumed interchange or trading rate differentiates on the worth of banks and other organizations, FER is an unmediated and accidental disaster of the company's valuable things, capital, stock in trade, and debt caused by anticipated interchange rate (Chen, 2022). Banks revealed three interchange rate uncertainties that involve "Translation

Risk", which concerns balance sheet interchange rate uncertainty associated with the combination and estimation of the firm's debt and assets of international limb for assets, liabilities, and owner's equity rely on financial ruling that includes persisting revelation in assets, liabilities and owner's equity, the second type is "Transaction Risk", depends upon the capital risk on interchange rate fluctuations on per business accounts on the revelation of the banks and last type is "Economic Risk", which states the company's PV of future CF in operating activities due to interchange rate fluctuations (Hunjra et al., 2021). One research on FER and crucifix part of US outcome in time between 1973 to 2003, states that companies with high-level responsiveness to international interchange have below required ROR, as compared to other shares. There is a negative relationship between stock returns and the market price of interchange rates (Sreenu et al., 2021). (Hunjra et al., 2021) researched between foreign exchange fluctuations and stock returns based on daily interchange rates between 1973 to 2010 by taking a sample of thirty-four European sovereign states, and reflects that foreign interchange fluctuations did not do the better presentation of a replica. One other study conducted in Shanghai China shows the negative relationship between foreign exchange and stock returns in China banks where they uses (GARACH) replica to measure the impact of FER on Stock returns by taking the sample of fourteen banks listed in (SSE) Shenzhen Stock Exchange. (Meng et al., 2018). The second study on Romanian financial markets in the time of 2000 to 2012 shows positive effects of FER on financial performance also their relationships rely on international disasters, cash comings, and the approach of the country's wealth, as (Stefanescu andDumitriu, 2018) presented in their research by using already collected data of interchange rate to calculate the risks of FER.

Credit Risk:

The main origins of credit risk are bank loans, debentures, bonds, interbank transactions other derivatives such as swap contracts, forward contracts, futures contracts, call options, and put options. The committee of BASEL 1 has begun to start the concept of Credit risk strategy, where BODs check, update, monitor, and manage the credit risk periodically (BCBS, 1999; Rizvi et al., 2021). In one study on European banks (Kuntashula, 2021) see the effect of credit risk on financial performance which measured by four dimensions; return on assets, return on equity, capital adequacy ratio, and non-performing loans in a period of time 2007 to 2012 by taking forty-seven samples of conventional banks, whereas non-performing loans are positive effects on financial performance while capital adequacy ratio shows negative effects, so that's why study suggests that management must be held on non-performing loans. Two similar studies show a negative impact of credit risk on financial performance (Roa et al., 2021) in Latin American commercial banks between the time of 2004 to 2008 and (Ndayishimye, 2021) in Rwanda Commercial banks. One study in Iran suggests as a dimension of financial performance is shareholder's value, by measuring the impact of credit risk on financial performance by taking the dimension as "Shareholder's Value", which also shows the negative effects of CAR. (Hadi, Hamed, and Samez 2013). Another study by (Owlawale, Tomola, Ayodele&Ademola, 2015) suggests an insignificant relationship between financial performance and credit risk by taking a sample of six

commercial banks' data in time between 2000 to 2013 and using panel estimation for analyzing that study. It's understood that bank enlarged disclosure of credit risk minimized incomes.

Interest Rate Risk:

(Khalid et al., 2021) refers IRR evolves from interest relevance invested money, allowances, lend and credit to banks and investments by commercial banks. If the interest rate is upswing after applying to a specific rate of interest then an investor will definitely deprive of future returns (Dang et al., 2022). Its future fluctuations in rates of interest decrease the earnings of banks (Ngunjiri, 2021). Term structure shows the relationship between short-term interest rates and long-term interest rates same index but has various maturities (Santika et al., 2021). (Ngunijri, 2021) suggest that interest rate risk and financial performance are negatively correlated, he used panel data analysis of four years from 2008- 2012 of five banks of Kenya, besides this (Santika et al., 2021) also show the insignificant relationship between interest rate risk and bank performance in the time of 2002 to 2011, taking a sample of capital banks in Nigeria.

Liquidity Risk:

This refers to cash availability for credit provision, marketable equity, and debt securities and to preserve enough amount of cash (Adusei, 2022). One research is done on Pakistani banks (Alim et al, 2021) on the impact of liquidity risk on bank performance, whereas liquidity risk is measured through changes in deposits, exchange ratio, bank funding, and loan fluctuations in total assets between 2006 - 2019 by taking panel data of different banks where's research findings show there is the negative impact of liquidity risk on Pakistani Bank's performance. In one empirical study done on Malaysian banks in Malaysia by (Rahman et al., 2015) in-between time 2005 – 2013, a sample was taken from twenty-one private banks in Malaysia, whereas banks' performance was measured by CAR (Capital Assets Ratio), and the ratio of loan to deposit. This research also shows a negative relationship between liquidity risk and bank performance.

Financial Performance:

(Ayton et al., 2022) suggested that Return on Assets (ROA) and Return on Equity (ROE) are assumed to adopt a measure of financial performance Return on assets is equal to net income divided by the summation of total assets. If ROA is more than a risk-free rate of return then shut down the bank or company and lay down, while ROE is concerned with owners, which is calculated through net income divided by total shareholder's equity. These measures ROA and ROE are major indicators of a bank's financial performance (Noja et al., 2021). ROA consider the capacity of commercial banks' board to earn more income from assets, than might be prejudiced because of off-balance-sheet condition on the other side ROE use the shareholder's perspective, if the banks have more capital that will describe a more return on assets and have a low return on equity. ROE measures the financial leverage & it inclines to ignore considerable risk linked with lofty financial leverage (Crous et al., 2021).

Hypothetical Model:

Independent Variables
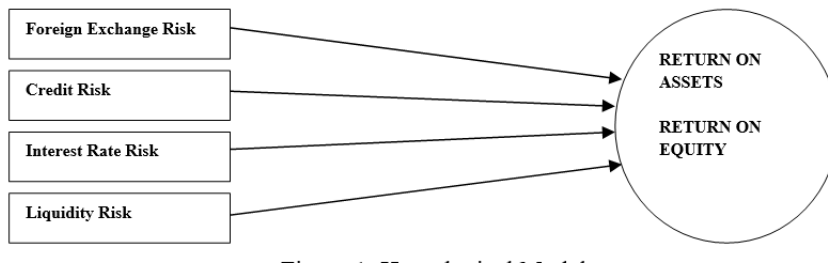(Financial Risk)

Dependent Variables
(Financial Performance)

Figure 1: Hypothetical Model

Hypotheses:

H1A = Foreign Exchange risk has a negative impact on Return on Assets in the Turkish banking industry.

H1B = Foreign Exchange risk has a negative impact on Return on Equity in the Turkish banking industry.

H2A = Credit risk has a negative impact on Return on Assets in the Turkish banking industry.

H2B = Credit risk has a negative impact on Return on Equity in the Turkish banking industry.

H3A = Interest Rate risk has a negative impact on Return on Assets in the Turkish banking industry.

H3B = Interest Rate risk has a negative impact on Return on Equity in the Turkish banking industry.

H4A = Liquidity risk has a negative impact on Return on Assets in the Turkish banking industry.

H4B = Liquidity risk has a negative impact on Return on Equity in the Turkish banking industry.

RESEARCH METHODOLOGY:

Choosing a sample for limiting your population. In this study eight Turkish banks were studied as a sample namely: QNB Bank, Is Bank, Deniz Bank, YepiKredi

Bank, Vakif Bank, Garanti Bank, Ak Bank, and Ziraat Bank. Secondary data is used for this research and will be accumulated by websites of commercial banks. Annual reports of banks were studied from 2010-2020. Total assets ratio and interest income to total assets are both used as secondary data to measure the interest rate risk. The current ratio measured Liquidity risk. VAR measures the foreign exchange risk and the Debt to income ratio measure the credit risk.

There are several methods for checking the unit root test; like Augmented Dickey-Fuller and PP (Dickey, 1979: Phillips, 1988), but for this study, the Dickey-Fuller test has used to reduce the unit root problem in the model. To find out the cointegration among independent variables like Foreign Exchange risk, Credit risk, interest rate risk, and Liquidity risk JJ test has been used (Johansen, 1990) that proves the model will be working in the long run and variables have long-term relationships together. While for co integration there are some other tests are available too like EG (Engle & Granger, 1987), PH (Phillips & Hansen, 1990), and BH (Bayer &Hanck, 2013), BH is the latest co-integration test that connects all above given four tests together and run the combine co integration among the variables. The research model for this study is simple no logarithms or binary variables are used.

$$ROA = \beta0 + \beta1\ FER. + \beta2\ CR. + \beta3\ IRR. + \beta4LR. + u.$$
$$ROE = \beta0 + \beta1\ FER. + \beta2\ CR. + \beta3\ IRR. + \beta4\ LR. + u.$$

Two research models are proposed in the research. where ROA is Return on Assets, ROE is Return on Equity, these both are dependent variables that measure the financial performance of the banking sector in Turkey, $\beta0$ is intercepted, $\beta1$ is the slope of foreign exchange risk, FER is 1st independent variable known as foreign exchange risk, $\beta2$ is the slope of credit risk, CR is 2nd independent variable known as credit risk, and $\beta3$ is the slope of 3rd x variable IRR that known as Interest rate risk. $\beta4$ is the slope of LR known as Liquidity risk. Whereas combining these variables is known as Financial Risk.

Initially, the model was run by simple OLS to find out the heteroscadiscity, serial correlation, and autocorrelation problems, and after that check the stability of the model. Firstly Reset test has been applied for model specification. Reset tests are really good to check the significance of regression equations and error terms in linear form, which is generated from simple OLS of the y variable. The impact of the Ramsey reset test on error terms of specification of parameters is examined. Ramsey test is also useful for nonlinear models. F test is more common in the Ramsey test for the interpretation, while Prob. Value of F test is used for support to null hypothesis (J.B, Ramsey, 1969) and recursive estimates (OLS only) we have several tests available, like as recursive residuals, recursive betas, Cusum of square test, Cusum test, one step forecast test, but we choose Cusum test for stability checking in the model because Cusum test graphically represents the ranging of parameters and series wise analytics technique that's introduced by E.S page (Page, 1954). The data which is run by normal and simple OLS it that model has a problem with serial correlation and autocorrelation so, GMM model is very good to resolve those problems but if the sample size is more than 50, GMM is a common way for estimating and predicting variables in econometrics models, also useful for semi

parametric and parametric models. GMM estimators are compatible and efficient and the line of distribution never touches the x-axis, while their curve follows a normal distribution. In 1982 Generalized Methods of moments were recommended by Hansen Peter Lars (Hansen, 2008) and in 1894 it is launched by Karl Pearson (Hansen, 1982), and these predictors are mathematically equal to "unrelated shapes" studied by (Sargan, 1958). GMM works in many software's like you can run in R-Programming, SAS, E-Views, and Stata.

RESEARCH ANALYSIS:

Unit Root Tests:

Null Hypothesis: There is unit root problem in this model.

Table 1: Unit root estimations

Sno.	Variables	Level	1st Dif.	2nd Dif.	Unit root	No unit root
1	Return on Assets	0.0013	-	-	I (0)	No Unit root
2	Return on Equity	0.0181	-	-	I (0)	No Unit root
3	Foreign Exchange risk	0.0000	-	-	I (0)	No Unit root
4	Credit risk	0.0000	-	-	I (0)	No Unit root
5	Interest rate risk	0.0121	-	-	I (0)	No Unit root
6	Liquidity risk	0.0226	-	-	I (0)	No Unit root

Co Integration Test:

Null Hypothesis: There is Co integration in this model.

Table 2: Co integration estimations

Hypothesized No. of CE (s)	Eigen Value	Trace Statistics	0.05 Critical Value	Prob.**
None *	0.463026	153.8787	95.75366	0.0000
At most 1*	0.260593	93.56355	69.81889	0.0002
At most 2*	0.229963	64.27865	47.85613	0.0007
At most 3*	0.186887	38.93093	29.79707	0.0034
At most 4*	0.142018	18.86307	15.49471	0.0149
At most 5*	0.040452	4.005406	3.841466	0.0453

OLS Regression with respect to Return on Assets:

Table 3: OLS estimations with ROA

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Foreign Exchange risk	-0.123547	0.073118	1.689685	0.0944
Credit risk	-0.234089	0.092808	2.522281	0.0133
Interest rate risk	-0.097683	0.093977	1.039441	0.3013
Liquidity risk	-0.710905	0.100627	7.064790	0.0000
Return on Assets	0.129693	0.137239	0.945019	0.3471

R-Squared	0.976615	**Mean y variable**	4.247500	
Adjusted R-squared	0.975371	**S.D y variable**	0.850204	
S.E of regression	0.133428	**Akaike info cr.**	-1.132391	
S.R of regression	1.673475	**Schwarz Criterion**	-0.976081	
Log likelihood	62.61955	**Hannan -Quinn Cr.**	-1.069129	
F-Statistic	785.1340	**Durbin Watson**	0.642388	
P (F-Statistic)	0.000000			

OLS Regression with respect to Return on Equity:

Table 4: OLS estimations with ROE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Foreign Exchange risk	-0.243547	0.066118	2.289685	0.0166
Credit risk	-0.324089	0.054808	3.322281	0.1132
Interest rate risk	-0.127683	0.043977	4.039441	0.3122
Liquidity risk	-0.430905	0.134627	5.064790	0.0000

Return on Equity	0.239693	0.143239	0.935019	0.3324

R-Squared	0.936615	**Mean y variable**	4.547500
Adjusted R-squared	0.935371	**S.D y variable**	0.3550204
S.E of regression	0.144428	**Akaike info cr.**	-1.152391
S.R of regression	1.624475	**Schwarz Criterion**	-0.576081
Log likelihood	32.43955	**Hannan -Quinn Cr.**	-1.369129
F-Statistic	785.1340	**Durbin Watson**	0.742388
P (F-Statistic)	0.000000		

Residual Diagnostic:

Null Hypothesis: Homoscedasticity.

Table 5: Homoscedasticity estimations

F-Statistics	3.026336	**Prob. (F-Stat.)**	0.0141
Observed R-Sq.	13.86552	**P Chi-Square (5)**	0.0165
Scaled Explain SS	49.44473	**P Chi-Square (5)**	0.0000

Serial Correlation Test:
Null Hypothesis: No Serial Correlation at up to 2 lags.

Table 6: Serial correlation estimations

F-Statistics	49.38744	**Prob. (F-Stat.)**	0.0000
Observed R-Sq.	51.77562	**P Chi-Square (2)**	0.0000

Coefficient Diagnostic:

Table 7: Auto correlation estimations

Sno.	Variables	Level	Un centered VIF	Centered VIF
1	Return on Assets	0.018834	105.7942	N/A
2	Return on Equity	0.005346	517.9930	N/A
3	Foreign exchange risk	0.008613	863.1875	37.94165
4	Credit risk	0.008832	918.4599	36.42036
5	Interest rate risk	0.010126	1048.300	35.41772
6	Liquidity risk	0.017770	1830.128	60.97764

RAMSEY REST TEST:

Null Hypothesis: Model is specified correctly

Table 8: Model Specifications

	Value	DF	Probability
t-Statistics	0.358577	93	0.7207
F-Statistics	0.128578	(1.93)	0.7207
Likelihood ratio	0.138160	1	0.7101

F-Test Summary:	**Sum of Square**	**DF**	**Mean Square**
Test SSR	0.002310	1	0.002310
Restricted SSR	1.673475	94	0.017803
Unrestricted SSR	1.671164	93	0.017970

LR test Summary:	
Restricted Log L	62.61955
Unrestricted Log L	62.68863

Normality Test:
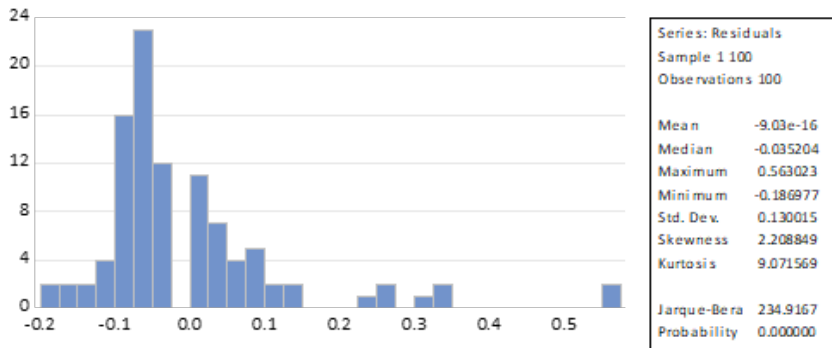Null Hypothesis: There is no normality in this model.
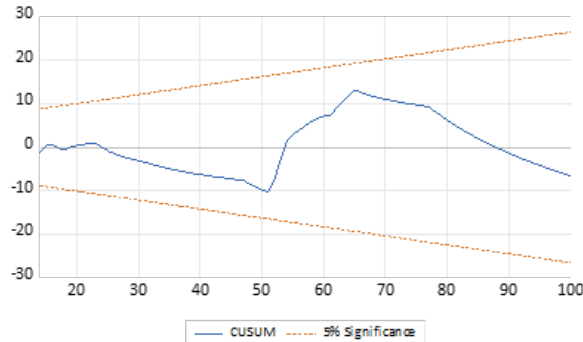

Figure 2: Normality estimations

CUSUM TEST

Figure 3: Stability in parameters

Generalized Method of Moments:

Table 9: GMM estimations with ROA

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Foreign Exchange risk	-0.123547	0.081115	1.524112	0.0311
Credit risk	-0.234089	0.091528	2.557567	0.0121
Interest rate risk	-0.097683	0.104594	0.933915	0.0427
Liquidity risk	-0.710905	0.111978	6.348626	0.0000
C	0.129693	0.192309	0.828985	0.0036

R-Squared	0.926615	**Mean y variable**	4.247500
Adjusted R-squared	0.925371		0.850204
S.E of regression	0.133428	**S.D y variable**	1.673475
S.R of regression	0.194703		6.85E-40
Durbin Watson	0.6423883	**Sum Square resid.**	
Instrument Rank	6	**J-Statistics**	

Table 10: GMM estimations with ROE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Foreign Exchange risk	-0.223547	0.031115	2.524112	0.000
Credit risk	-0.334089	0.031528	0.552567	0.042
Interest rate risk	-0.497683	0.024594	1.933915	0.010
Liquidity risk	-0.179551	0.012309	-0.933661	0.000
C	0.329693	0.459309	0.128985	0.4036

R-Squared	0.946615	**Mean y variable**	4.247500
Adjusted R-squared	0.945371	**S.D y variable**	0.850204
S.E of regression	0.133428	**Sum Square resid.**	1.673475
S.R of regression	0.194703	**J-Statistics**	6.85E-40
Durbin Watson	0.6423883		
Instrument Rank	6		

Table 11: Hypotheses testing by GMM estimations

Variable	Beta (StnD.)	Std. Error	t-Statistic	Prob.	Result
FER ⟶ ROA	-0.123547	0.081115	1.524112	0.0311	Supported
CR ⟶ ROA	-0.234089	0.091528	2.557567	0.0121	Supported
IRR ⟶ ROA	-0.097683	0.104594	0.933915	0.0427	Supported
LR ⟶ ROA	-0.710905	0.111978	6.348626	0.0000	Supported
FER ⟶ ROE	-0.223547	0.031115	2.524112	0.000	Supported
CR ⟶ ROE	-0.334089	0.031528	0.552567	0.042	Supported
IRR ⟶ ROE	-0.497683	0.024594	1.933915	0.010	Supported
LR ⟶ ROE	-0.179551	0.012309	-0.933661	0.000	Supported

DISCUSSIONS:

Table 1 presents the Augmented Dickey-Fuller test has been used to check the unit root problem in the model for Return on Assets P-value is 0.0013, Return on Equity P-value is 0.0181, Foreign exchange risk p-value is 0.0000, Credit risk p-value is 0.000, interest rate risk p-value is 0.0121 and Liquidity risk p-value is 0.0226 hence these all variables are below than 0.05 at 95% confidence interval so all null hypotheses will be rejected and all these variables have no unit root problem so we did not use lag of variables in this model (Kirikkaleli, 2021; Qin et al., 2021). Table 2 indicates the co-integration test among variables According to MacKinnon Haug Michel, There is Co integration in this model because the p-value is 0.000 and it is below 0.05 so the null hypothesis will reject that there is co-integration in the model, hence alternative hypothesis will be accepted. And this model will be working in long run and these variables have a strong relationship (Sachdeva et al., 2021). Table 3 is presenting OLS estimation results. After solving the unit root and co-integration tests, now running this model as OLS simple regression analysis, and R square is 0.9766. Financial risk variables have 97.66% variations in Return on Assets in the banking sector in Turkey. Credit risk and Liquidity risk are statistically significant at a 5%, significance level. P values are below 5%, while Foreign Exchange risk and Interest Exchange risk are not statistically significant because P values are above 0.05. Adjusted R square is more trustable hence the result is almost the same 0.975371, as R square (Dalwai and Salehi, 2021) also supported these results. Table 4 presents the OLS Regression of Financial risk variables with Return on Equity. By running this model as OLS simple regression analysis, and R square is 0.9366. Financial risk variables have 93.66% variations in Return on Equity in the Banking sector in Turkey. Foreign Exchange Risk and Liquidity risk are statistically significant at a 5%, significance level. P values are below 5%, while Credit risk and Interest Exchange risk are not statistically significant because P values are above 0.05 (Ayton et al., 2022) support this. Adjusted R square is more trustable hence the result is almost the same 0.9353, as R square. After running OLS in this model some variables are not significant, so for further analysis Breusch Pagan Godfrey test has been used for diagnosing the residual and heteroscedasticity problem, in this model presented table 5 P-value is 0.0141 which is below 0.05 at 95% confidence interval so that null hypothesis will be rejected and that there is no

homoscedasticity hence there is heteroscedasticity problem with this model. Table 6 is used for SM estimations. After deducting out the heteroscedasticity problem in this model again Breusch Godfrey Serial Correlation LM test has been used to check the serial correlation problem hence the P-Value is 0.0000 and it is again below 5% hence null hypothesis is rejected and the alternative hypothesis will be accepted, so in this model, there is also serial correlation problem at up to 2 lags, while Durbin Watson statistic is 1.72 that is below than 2 so in this model, there is very small autocorrelation among return on assets, return on equity, foreign exchange risk, credit risk, interest rate risk and liquidity risk. Table 7 represents the multi co-linearity that how much foreign exchange risk, credit risk, interest rate risk, and liquidity risk are correlated with each other, Variance Inflation factors have been used to deduct out the multi co linearity and the value for Centered VIF in this model all are above than 4 all variables are highly correlated with each other and there is perfect multi co linearity in this model. Table 8 shows the Ramsey Reset test has been used to check that model is specified correctly or not in this model there are restricted SSR of 1.6734 and an unrestricted SSR by cutting one degree of freedom and the value is almost the same 1.671164, F statistic is 0.12 and it is P-value is 0.7207 hence it is above than 0.05 at 5% critical value, so reject the alternative hypothesis and null hypothesis is accepted and model is correctly specified. Return on Assets and Return on Equity are correctly specified by Foreign exchange risk, Credit risk, Interest rate risk, and Liquidity risk. In figure 2 it is clearly identified that the data is not normal this is positively skewed, and there is no normality in this model because P-Value is 0.000 and it is below 0.05 at a 5% critical value hence the null hypothesis will be rejected. Model data is dispersed by 0.130015, the model is highly skewed with the value of 2.20849, kurtosis is 9.0715 represents a very heavier tail with leptokurtic distribution in this model, while Jarquebera is 234.9167 that tells us the goodness of fit in the model and it is joint of skewness and kurtosis. Figure 3 is used for checking the stability among parameters, Cusum test is applied and run by Recursive estimates OLS only, the red line represents the data at a 5% significance level and the blue line is the cusum, hence the line is in between the red lines and has not crossed the red lines so the parameters are stable in this model. Table 9 presents the GMM results of financial risk with ROA (Boukhatem, 2022) run the Cusum test in Sukuk bonds effects on market development and financial performance and his parameters are also in range and stable. Generalized methods of moments GMM model is good to reduce the heteroscedasticity and serial correlation problem in the model, initially model was run by simple OLS P-values and coefficients were changed but in that data, there were problems of serial correlation and autocorrelation and to reduce such problems GMM model (AHMED et al., 2021) with estimation weighting matrix White has been applied. R square is still the same at 0.9266 which means foreign exchange risk, credit risk, interest rate risk, and liquidity risk declare 92.6% variations in Return on Assets in the Turkish banking industry. Beta coefficient 1 is -0.12 which means if Turkish banks increase 1 unit in foreign exchange risk then a return on assets will be decreased by 12.35%. Beta coefficient 2 is -0.234089 which means if Turkish banks increase 1 unit in credit risk then the return on assets will be decreased by 23.40%. Beta coefficient 3 is -0.0976 which means if Turkish banks increase 1 unit in interest rate risk then return in assets will be decreased by 9.76%, it has low variation and it is not too effective variable while banks measuring financial risk.

Beta coefficient 4 is -0.710905 which means if Turkish banks increase 1 unit in liquidity risk then the return on assets will be decreased by 71.09%. Table 10 represents the GMM results when the model is run by ROE. Beta coefficient 5 is -0.223547 which means if Turkish banks increase 1 unit in foreign exchange risk then the return on equity will be decreased by 22.35%. Beta coefficient 6 is -0.334089 which means if Turkish banks increase 1 unit in credit risk then the return on equity will be decreased by 33.40%. Beta coefficient 7 is -0.497683 which means if Turkish banks increase 1 unit in interest rate risk then return in equity will be decreased by 49.76%. Beta coefficient 8 is -0.179551that means if Turkish banks increase 1 unit in liquidity risk then return on equity will be decreased by 17.09%. To test the hypotheses for the study Generalized Method of Moments model has been used. In the first model with ROA, all variable's P-values are less than 0.05 which indicates support for all hypotheses. Foreign exchange risk, credit risk, interest rate risk, and liquidity risk with ROA p-value are less than hence those all supported to H1A, H2A, H3A, and H4A. In the second model with ROE, all variable's P-values are less than 0.05 which indicates support for all hypotheses. Foreign exchange risk, credit risk, interest rate risk, and liquidity risk with ROE in Turkish banking industry p-value are less than hence those all supported to H1B, H2B, H3B, and H4B. Results also suggested our research objectives each financial risk dimension has negative effects on financial performance in the Turkish banking industry.

CONCLUSIONS:

The aim of this research is to identify the impact of financial risk on financial performance in the banking industry of Turkey. Data was collected by the secondary method by using financial reports and annual reports for 2010-2020, considering the top eight banks operated in Turkey for four variables measure financial risk and 2 variables measure financial performance. There is also studied by (Ayton et al., 2022) used panel data and granger causality of UK companies and studied systematic and unsystematic risk effects on financial performance. The augmented Dickey-Fuller test has been applied to solve the unit root problem and we did not use lag of the variables because there is no unit root problem identified in this model, Co integration approach has been used to check the co-integration in the model. Return on assets and return on equity have strong co-integration with foreign exchange risk, credit risk, interest rate risk, and liquidity risk. These results are also supported by (Rodriguez et al., 2022). After the model was running by simple OLS results suggested that foreign exchange risk and interest rate risk have positively significant with ROA in the Turkish banking Industry, while credit risk and liquidity risk have negatively affected financial performance with respect to ROA. The second OLS model was run with respect to ROE and suggested that credit risk and interest rate risk have a positive effect on ROE, while foreign exchange risk and liquidity risk have a negative effect on financial performance with respect to ROE. A study occurred in saving centers and co-operative centers in Kenya (Ochieng, 2021) and proved that credit risk and interest rate risk both have a negative effect and suggested that ROA and ROE are statistically significant with financial risk. (Ramzan et al., 2021) suggest that financial risk, CSR, and financial stability are negative effects on financial performance in Pakistani banks, while all financial

risk is negative effects on financial performance. Later for Residual Diagnostic, the Bresuch Pagan test was used to check the heteroscedasticity and serial correlation problem, and the model run by OLS they have both problems so that, Generalized method of moments has been used to solve the serial correlation, heteroscedasticity, and autocorrelation problems, in the OLS ROA model foreign exchange risk and interest rate risk both are not statistically significant. In the OLS ROE model credit risk and interest rate risk were positive effects on financial performance. Centered Variance Inflation factor has been used for checking the autocorrelation among foreign exchange risk, credit risk, interest rate risk, and liquidity risk, and this model has also an autocorrelation problem because all variables VIF values are above 5, so all variables are strongly auto correlated. Ramsey Reset test is applied for model specification Prob. (0.72) hence model is specified correctly and this model can be used in the long run and short run. Cusum test is used for stability in parameters hence in the graph blue line is in between so that all parameters are in range and stable. In the last GMM model.

RECOMMENDATIONS AND FUTURE RESEARCH:

Being a researcher after concluding all the research in banks of Turkey all variables of financial risk are statistically significant, it is highly recommended that use this same model and apply it to logistics firms in Turkey and see that is there any impact of these four variables on financial performance or not. Secondly, run this model by ARDL test as well as other more reliable statistical tests and compare the results with previous studies.

Thirdly use other dimensions like shareholder's value and Tobin's Q as dependent variables and see the relationship with financial risk. Further in this research hypotheses developed separately its recommend that combine all independent variables financial risk and see the impact dependent variable. This study is limited to just Banks it's recommended that apply the same model to some other financial sectors, like insurance companies, mutual funds, saving centers, securitizations, currency exchange firms, and other financial markets.

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