An Analysis to Identify the Variables Affecting the Total Derivative Financial Instrument Transaction Volume of Deposit Banks Operating in the Turkish Banking Sector during and after the 2008 Crisis

BY

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Abstract

The most important actors of the financial system, banks, especially in recent years, in order to protect themselves from negativities such as interest rate risk, exchange rate risk, credit risk, decrease in their capital or to manage their risks correctly, especially in recent years, they prefer to use derivative products, which have become more important with globalization. have begun to attach great importance. This study has been carried out with the idea that banks have increased their use of derivative products in fund management today. The aim of this study is to determine which internal factors affect the use of derivative products by banks in terms of revealing derivative market transactions and derivative product usage dynamics, which are important for the banking sector. In the analysis part of the study, the relationship between the variables that affect the derivative product use levels of public, private, and foreign capital deposit banks operating in the Turkish banking sector during and after the crisis will be examined, based on the period of 2008 – 2020. In the study, descriptive statistics, mean and standard deviation values will be calculated and the level of conformity of the measurements to the normal distribution will be made with the Kolmogrov Smirnov test.

Keywords: Derivative products, Banking sector, CAR, Net Interest Margin, Size

Gel Code: G11, G21, G15

1. Introduction

If it is possible to say that the market mechanism applies to a country's economy, there is a generally accepted approach that embraces a competitive environment in the effective performance of economic activities, complies with the basic principles of the economy, is predictable, easily understandable, and values stability. In addition, developments that may cause problems in the functioning of economic life, adversely affect the activities of institutions operating in the financial sector, and push national economies into crisis should be carefully monitored and necessary measures should be taken. Especially in recent years, economic borders between countries have disappeared and flows of goods, services, and capital have acquired an international character. As a result, integration between financial markets has become inevitable. The banking sector is one of the most important actors of the system and needs to continue its activities by taking into account the competitive conditions. Banks need a well-designed risk management

system in order to avoid foreseeable or potential risks. The risk factor is considered together with the return expected in all types of financial ventures. Today, sharing the risk and transferring the risk with the use of rapidly developing technologies and the globalization of the financial sector significantly occupy financial institutions as a current problem. In other words, risk management has become more important for all financial institutions. New financial instruments derived from traditional financial instruments have gained traction due to banks' need for different financial instruments in order to avoid foreseeable or potential risks. These new instruments provide several opportunities for users within the financial system to manage their risks and hedge against interest rate, exchange rate, and cash flow risks, such as achieving risk-free earnings by taking advantage of price differences in different markets in line with forecasts regarding future changes. Actors in the banking sector lend the short-term and floating rate deposits they collect as fixed-rate loans; however, when interest rates increase, the interest rates of short-term deposits change quickly, while the change

in long-term loan rates is slow. As a result, banks may incur losses due to increases in interest rates. In addition, banks take positions in line with their future forecasts due to contracts with their customers and their collections, and they may trade in different currencies. In this case, banks also assume currency risk due to changes in exchange rates. Banks can hedge against all these risks by using derivative instruments. Today, derivatives play an important role in international activities. The contribution of derivatives to the functioning of the economic system and their impact on the sustainability of a stable structure require them to be used in line with their core functions. On the other hand, derivatives can cause significant losses to investors if they are used for speculation purposes. Today, there is no limit to capital movements in integrated markets that can bring buyers and sellers together, even if their cultures and geographical locations are different. In other words, capital is always in circulation in an international arena. In addition to the benefits of this circulation, we can say that it also brings the risk of vulnerability to national economies. In this context, due to the adverse effects of economic crises, the attention of regulators has been directed towards the causes of crises and what kind of measures can be taken to prevent them from occurring again. After the crises experienced in the world and in Turkey, the importance of risk management and the necessity to assess risk at an international level have become evident. To summarize, while the use of derivatives to prevent risks can yield many benefits, uncontrolled use of derivatives can play an active role in the occurrence and spread of crises. In Turkey, the use of derivatives by the banking sector dates back to the 1970s. Especially the introduction of the floating exchange rate system since 1989 has led to the emergence of some financial risk issues. Therefore, the Turkish banking sector's interest in derivatives markets has increased. The modern Turkish banking approach is that the use of derivatives can assist banks in attracting potential new customers and provide balance and convenience in the asset-liability management of their balance sheets. Given the range of risks that banks are exposed to, they need to be protected from any unexpected events that may affect their future profits. For this reason, banks turn to derivatives as users and dealers to reduce their risk levels. As users, they can hedge against unexpected changes in interest rates and exchange rates through derivatives. As dealers, they can predict the future movements of economic variables and participate in the derivatives market. Thus, larger banks in the system can provide over-the-counter derivatives to smaller banks or non-financial institutions. If a bank acts as an end-user, it can use derivatives to hedge against unexpected changes in interest rates, exchange rates, or commodity prices, or to speculate on the future movements of these economic variables. While all user banks participate in the derivatives market as end-users to some extent, only the largest banks act as dealers by providing derivatives to non-financial firms and other banks in over-the-counter (OTC) markets. The recent increase in the banking sector's use of derivatives is directly proportional to the decline in deposits collected to finance loans. Derivatives have been cited as the most important cause of the 2008 crisis

in Turkey. This argument has been advocated by many researchers. Given all these, this study aims to identify the determinants of the level of derivative product usage during and after the 2008 crisis and to investigate the relationship between them. The findings obtained through regression analysis will make it possible to identify the variables affecting the total derivative financial instrument transaction volume of deposit banks operating in Turkey.

2. Literature

Sinkey and Carter (2000) investigated the financial characteristics of derivative users and non-users. The authors found that user banks were associated with riskier capital structures (more notes and debentures and less equity capital), larger maturity mismatches between assets and liabilities, greater net loan charge-offs, and lower net interest margins compared to non-users. They also noted that banks, especially smaller ones, benefit from being associated with bank-holding companies. The study does not support the regulatory hypothesis where banks need to have stronger capital positions to engage in derivative activities.

Shyu and Reichert (2002) investigated the financial and regulatory factors affecting the extent of derivatives activity in twenty-five large international dealer banks over the 1995-1997 period. They found that derivative activities were directly related to the bank's capital ratio, asset size, maturity spread, and credit rating, but inversely related to the bank's profitability.

Hassan and Khasawneh (2009) aimed to test the extent to which the tax regulatory and market discipline hypotheses determined the derivative activities of US commercial banks over the 1992-2008 period. The results showed that derivative activities were real financial innovations that increased over time. The authors also found that the regulatory tax hypothesis was not a significant factor in determining the derivative activities of US commercial banks. They concluded that derivatives are widely used when they require a high degree of specialization and economies of scale are a valid outcome, and that a decrease in the bank's credibility will reduce derivative activities.

Shiu Y-M. et al. (2010) examined the determinants of derivatives use and its impact on bank risk using banks listed on the Taiwan Stock Exchange for the period 1998 to 2005. They utilized probit and panel data methods. The results showed that risk management, information, and scale factors explain the use of derivatives. They also did not find any evidence that derivatives use affects observable risks.

Anbar A. and Alper D. (2011) used data compiled from the balance sheets and income statements of commercial banks listed on the Istanbul Stock Exchange (ISE) for the 1999-2010 period to examine the impact of bank-specific factors and macroeconomic variables on banks' derivative use intensity and found that return on equity and net interest margin are positively related to derivative use intensity according to the results of Tobit regression analysis. In addition, the authors reported an inverse relationship between the intensity of

derivative use and asset size, provisions, and interest rates. The results indicate that banks with higher net interest margin and return on equity and smaller asset size tend to use derivatives more.

Yonga H. H. A. et al. (2014) conducted an analysis of the determinants of derivative activities of Asia-Pacific banks. The study revealed that Asia-Pacific banks tend to use more foreign exchange derivatives, while interest rate derivatives are generally used for hedging purposes. Moreover, banks located in countries with an explicit deposit insurance scheme were found to engage in greater derivative activities. Such behavior may reflect either hedging or speculation.

Şimşek (2015) analyzed the macroeconomic factors affecting the use of foreign exchange swaps, a derivative product used in the Turkish banking sector, in the context of derivative product usage dynamics in the Turkish banking sector. The relationship between foreign exchange swap transactions and macroeconomic variables was analyzed by Granger causality analysis, regression analysis, VAR impulse response analysis, and variance decomposition analysis. The analysis revealed a relationship between foreign exchange swap transactions and off-balance sheet risks, inflation, market risk, central bank reserves, and TRY deposits in banks.

Güçver (2015) aimed to investigate the effects of bank-specific variables and macroeconomic variables on banks' derivative transaction volumes. A multiple regression model was used to explain the relationship between these variables through an econometric model. The results revealed that there is a positive relationship between derivative trading volume and asset size and total profitability, an inverse relationship between equity size, return on equity, return on assets, and USD/TRY exchange rate, and no significant relationship with net interest margin and interest rates on TRY deposits. In addition, it was reported that banks with greater asset size and total profitability tend to use derivative instruments more.

Keffala (2015) investigated whether the use of derivative instruments was responsible for the escalation of the global financial crisis for banks in developing countries for the 2003-2011 period. For this purpose, the impact of derivatives use on the stability of banks in developing countries was measured during the normal period (pre-crisis period) 2003-2006 and the turbulent period (crisis and post-crisis period) 2007-2011. Using the Generalized Method of Moments (GMM) estimator technique, the researchers found that futures, and especially options, undermine the stability of banks in emerging markets, unlike forwards and swaps, which are not disruptive factors. They also noted that only options and futures can be considered risky derivatives and may have been partly responsible for exacerbating the recent financial crisis.

Oktar and Yüksel (2016) applied the MARS method using the quarterly data of Turkish banks for the 2003-2015 period to identify the factors affecting banks' use of derivatives and concluded that the specific provisions that banks set aside for receivables that they believe they will not be able to collect from customers have an inverse relationship with the use of derivatives. In addition, the authors found that banks try to

manage this unfavorable situation by using more derivatives in the event of an increase in the non-performing loan ratio.

Infante et al. (2018) presented empirical evidence on the relationship between some bank balance sheet characteristics and the use of derivatives by Italian banks. Despite the use of multivariate statistical tools, the objective of the study was not to illustrate the main characteristics of derivative use by Italian banks and identify causal links between the variables studied. Based on their observation of a very high concentration in the Italian derivatives market, they concluded that market participation requires an adequate scale of activity combined with dedicated resources to manage contracts. They confirmed the hypothesis that economies of scale exist in the derivatives market. They found that the notional amount of contracts is indeed positively related to bank size.

Zaher Abdel Fattah Al-Slehat et al. (2018) aimed to identify the factors affecting the use of financial derivatives in the Jordanian commercial banking sector. Using an analytical descriptive approach, a survey was administered to managers and department heads of 13 Jordanian commercial banks. The authors found that administrative, financial, accounting, and legal factors all have an impact on the use of financial derivative instruments.

Kuzu and Çelik (2019) investigated whether there is a relationship between macroeconomic variables and foreign exchange swap transactions in their study conducted to determine the effects of macroeconomic variables that may affect foreign exchange swap transactions, which constitute the largest share in terms of derivative product use in the Turkish banking sector, and sought to explain which macroeconomic variables may be effective in the use of foreign exchange swaps through panel data analysis.

Taştemel (2020) analyzed the use of derivative market instruments by Turkish banks in the 2015-2019 period. The use of derivative instruments was analyzed through data analysis of 10 banks ranked in terms of asset size. The results of the study showed that banks mostly use derivatives for trading purposes, increase their derivative use volumes every year, and swaps have the largest share in trading transactions investigated the effect of derivative instrument use of banks in the Turkish banking sector on risk and profitability using annual data for the 2002-2018 period. The cointegration analysis revealed that there is a long-run relationship between derivative instrument usage and ratios.

Alam et al. (2021) aimed to identify the driving forces behind the use of financial derivatives by Pakistani banks for the 2011-2016 period. The researchers conducted a two-stage test to assess the determinants. First, logit regression was used to test the driving forces behind the use of derivatives in banks. Second, Tobit regression was employed to analyze the factors to identify the extent of derivative use. They concluded that Pakistani banks use derivatives for both risk management and speculative purposes as they are both customers and users of derivatives. Value discounts were found for cases where systematic risk is high and managers try to generate non-operating income from speculative activities.

Yenisu et al. (2021) applied correlation analysis and ARDL bounds test to identify which financial and macroeconomic variables are associated with the derivative market transactions of Turkish banks. The period analyzed in the analysis is 2005-2021 with monthly data. The researchers found that banks increase their use of derivative instruments as asset size increases, while the use of derivative instruments increases as risk (financial risk and exchange rate risk) increases. They also found that increased use of derivative instruments decreases banks' return on equity.

Hancı and Akçalı (2021) investigated the effects of banks' use of derivative instruments on profitability and risk. Using balance sheet data for the 2002-2019 period, they analyzed private, public, and foreign capital deposit banks and the Turkish banking system in general in four groups. Selected ratios related to the risk level and profitability of the banks in these groups and their derivative transaction volumes were tested comparatively with Toda-Yamamoto causality test in paired groups. The authors found statistically significant unidirectional or bidirectional relationships between derivative instruments and the risk and profitability of Turkish banks.

Nisha and Madhumathi (2021) presented evidences that Indian commercial banks with high total assets and high capital adequacy ratio and low non-performing assets exhibit the usage of derivatives. They found that high credit risk encourages banks to hedge against such risks and that hedged derivatives support bank stability more than derivative trading.

Akkaynak and Yıldırım (2021) investigated the effect of derivative financial instrument use on banks' capital structure. Banks operating in Turkey and regularly using derivatives in the 2012-2017 period were included in the analysis. The analysis revealed that the effect of derivative use on borrowing is statistically significant and positively correlated within the 4 models formed in the study. In addition, profitability and liquidity variables were found to be negatively correlated with borrowing, while the variables of asset structure, size, risk, and growth opportunities were found to be positively correlated with borrowing for banks using derivatives.

Milos and Milos (2022) investigated whether the use of derivatives by the European Union banking sector affected the sector's market valuation after the financial crisis. For this purpose, the researchers included 120 European financial institutions listed on European Union stock exchanges for the 2008-2021 period. The generalized method of moments (GMM) was used to assess whether the use of derivatives allowed financial intermediaries to increase their market value. They found that market value is negatively affected by the accumulation of derivative assets and the results are consistent with studies investigating the impact of financial derivatives on market value and finding a negative link between the two.

Elijah Brewer III Bernadette A. Minton and James T. Moser explored the relationship between retail banks' lending activities and their participation in interest-rate derivative markets. Banks using over-the-counter (OTC) interest rate swaps experienced greater growth in their commercial and industrial (C&I) loan portfolios than banks that did not use these financial instruments. Consistent with banks that view loans and securities as substitutable assets, securities portfolio growth is negatively associated with banks' use of OTC swaps. In contrast, the use of futures is associated with no change in C&I loan growth and a positive change in securities portfolio growth. This suggests that futures contracts allow banks to better manage their exposure to interest rate risk in their securities portfolios.

3. Data Set and Variables

The population of this study consists of 24 public and private deposit banks operating in the Turkish banking sector. Descriptive statistics mean and standard deviation values were calculated for data analysis. The conformity of the measurements to the normal distribution was analyzed by Kolmogrov Simirnov test. The t-test analysis was used to analyze the measurements by period. Regression analysis was used to examine the relationships between the variables affecting the LGTU level. The statistical significance level was set at $p < 0.05$. SPSS 25.0 was used for analysis. Table 1 shows the dependent and independent variables used in the study. The data of the banks were analyzed by including the 2008-2012 crisis period and the 2012-2020 pandemic period after the crisis. The data regarding the banks were acquired from the online data system of the Banks Association of Turkey (https://www.tbb.org.tr/tr/bankacilik/banka-ve-sektor-bilgileri/istatistiki-raporlar).

Table 1: Variables Used in the Analysis

Independent Variables	Description	Notation
Return on Assets	Net Profit for the Period/Total Assets	ROA
Capital Adequacy Ratio	Equity/(KRET+PRET+ORET)x100	SYO
Size	Natural Logarithm of Total Assets	LGSZ
Return on Equity	Net Profit for the Period / Total Equity	ROE
Credit Risk	Non-performing Loans (gross) / Total Loans	KRR
Liquidity	Liquid Assets / Short-term Liabilities	LKD
Net Interest Margin	Net Interest Income / Total Assets	NIM
Exchange Rate Risk	FX Total Assets / FX Total Liabilities	DK
Dependent		

Variables		
Derivative Financial Instruments	Total Volume of Derivative Financial Instruments Logarithmic Value	LGTU

4. Findings

Table 2: Analysis of Parameters by Period

Measure	Period		p
	2008-2012	2013-2020	
	X±sd	X±sd	
SYO	18.76±7.97	17.4±3.93	0.04*
ROA	1.43±1.21	1.07±1.50	0,01*
ROE	10.83±8.34	8.58±5.95	0.03*
NIM	3.76±1.98	2.79±1.81	0.01*
LKD	54.48±26.83	26.33±11.97	0.01*
KRR	54.28±18.28	62.18±10.79	0.02*
DKR	25.55±11.21	40.05±13.6	0.01*
LGSZ (Size)	3.99±1.04	4.58±0.74	0.01*
LGTU	3.49±1.19	4.24±1.22	0.01*

*Significant difference at the 0.05 level.

The analysis showed that the SYO levels differed between the periods and the SYO levels measured in the 2013-2020 period were lower than the 2008-2012 period (p=0.04, p<0.05).

The analysis showed that the ROA levels differed between the periods and the ROA levels measured in the 2013-2020 period were lower than the 2008-2012 period (p=0.01, p<0.05).

The analysis showed that the ROE levels differed between the periods and the ROE levels measured in the 2013-2020 period were lower than the 2008-2012 period (p=0.03, p<0.05).

The analysis showed that the NIM levels differed between the periods and the NIM levels measured in the 2013-2020 period were lower than the 2008-2012 period (p=0.01, p<0.05).

The analysis showed that the LKD levels differed between the periods and the LKD levels measured in the 2013-2020 period were lower than the 2008-2012 period (p=0.01, p<0.05).

The analysis showed that the KRR levels differed between the periods and the KRR levels measured in the 2013-2020 period were higher than the 2008-2012 period (p=0.01, p<0.05).

The analysis showed that the DKR levels differed between the periods and the DKR levels measured in the 2013-2020 period were higher than the 2008-2012 period (p=0.01, p<0.05).

The analysis showed that the LGSZ levels differed between the periods and the LGSZ levels measured in the 2013-2020 period were higher than the 2008-2012 period (p=0.01, p<0.05).

The analysis showed that the LGTU levels differed between the periods and the LGTU levels measured in the 2013-2020 period were higher than the 2008-2012 period (p=0.01, p<0.05).

While SYO, ROA, ROE, NIM, and LKD levels were high during the crisis periods, there was a significant decrease in these parameters after the crisis. Similarly, KRR, DKR, LGSZ, and LGTU levels were found to increase significantly in the post-crisis period compared to the crisis period.

Table 3: Analysis of LGTU Levels between 2008-2020 (All Periods)

Dependent Variable	Independent Variables			F Model	R²
	LGSZ (Size)	DKR	KRR		
	(β)	(β)	(β)		
LGTU (Y)	0.78	-0.16	0.13	F=521.02	0.68
	p=0.01	p=0.01	p=0.86	(p=0.01)	

D.W.=1.76

The analysis showed that between 2008 and 2020, LGTU levels were only associated with LGSZ, DKR, and KRR at multiple levels. It was found that SYO, ROA, ROE, NIM, LKD levels did not significantly affect the LGTU levels.

The model found in the study was significant (F= 521.02, p=0.01). The coefficients (β) of LGSZ, DKR, KRR variables in the model were found to be significant (p=0.01). The explanatory capability of the model was 68% (R2 =0.68), which can be considered high. No autocorrelation was found in the model (D.W.=1.76).

The model obtained as a result:

LGTU (Y) $_{2008-2020}$ = 0.78* LGSZ - 0.16* DKR+0.13* KRR

LGSZ (Size) had the highest impact on LGTU levels between 2008 and 2020. The impact of DKR (negative impact) and KRR was smaller.

Table 4: Analysis of LGTU levels between 2008 and 2012 (Crisis Period)

Dependent Variable	Independent Variables			F Model	R²
	LGSZ (Size)	DKR	KRR		
	(β)	(β)	(β)		
LGTU (Y)	0.73	-0.17	0.14	F=208.64	0.66
	p=0.01	p=0.01	p=0.86	(p=0.01)	

D.W.=1.88

The analysis showed that between 2008 and 2012 (crisis period), LGTU levels were only associated with LGSZ, DKR, and KRR at multiple levels. It was found that SYO, ROA, ROE, NIM, LKD levels did not significantly affect the LGTU levels.

The model found in the study was significant (F= 208.64, p=0.01). The coefficients (β) of LGSZ, DKR, KRR variables in the model were found to be significant (p=0.01). The explanatory capability of the model was 66% (R2 =0.66), which can be considered high. No autocorrelation was found in the model (D.W.=1.88).

The model obtained as a result:

LGTU (Y) ₂₀₁₃₋₂₀₂₀ = 0.73* LGSZ - 0.17* DKR+0.14* KRR
LGSZ (Size) had the highest impact on LGTU levels in the crisis period between 2008 and 2012. The impact of DKR (negative impact) and KRR was smaller.

Table 5: Analysis of LGTU Levels between 2013-2020 (Post-Crisis Period)

Dependent Variable	Independent Variables				F $_{Model}$	R^2
	LGSZ (Size)	DKR	KRR	SYO		
	(β)	(β)	(β)	(β)		
LGTU (Y)	0.77	-0.18	0.24	0.19	F=338.25	0.72
	p=0.01	p=0.01	p=0.01	p=0.01	(p=0.01)	

D.W.=1.91

The analysis showed that between 2013 and 2020 (post-crisis period), LGTU levels were only associated with LGSZ, DKR, KRR, and SYO at multiple levels. It was found that ROA, ROE, NIM, LKD levels did not significantly affect the LGTU levels.

The model found in the study was significant (F= 338.25, p=0.01). The coefficients (β) of LGSZ, DKR, KRR, and SYO variables in the model were found to be significant (p=0.01). The explanatory capability of the model was 72% (R2 =0.72), which can be considered high. No autocorrelation was found in the model (D.W.=1.91).

The model obtained as a result:

LGTU (Y) ₂₀₀₈₋₂₀₁₂ = 0.77* LGSZ - 0.18* DKR+0.24* KRR+ 0.19*SYO
LGSZ (Size) had the highest impact on LGTU levels in the post-crisis period between 2013 and 2020. The impact of DKR (negative impact), KRR, and SYO was smaller.

In general, we can observe that the variable that had the highest impact on the LGTU level in the 2008-2020 period, both in the crisis and the post-crisis period, is LGSZ, i.e. size. The effects of DKR and KRR levels were observed to be smaller. On the other hand, DKR had a negative effect on the LGTU level. Unlike the other periods, SYO levels started to have a significant effect on the LGTU level in the post-crisis period. Contrary to other models, it can be argued that the impact of KRR increased significantly. In the post-crisis period, the relationships between LGTU and the variables partially changed, but only LGSZ (size) levels were found to have a significant effect in each period.

5. Conclusion

Ensuring the sustainability of the financial system is crucial for Turkey as it is for the rest of the world. Banks are the most important and effective actors in ensuring the basic functioning of the system. The banking sector has developed rational solutions to minimize or avoid risks and future uncertainties while managing their funds or assets. For this purpose, they have adopted the policy of holding derivative instruments in their portfolios. Turkish banks have started to hold derivative instruments in their portfolios, especially after the 2000s. The preference for derivative instruments in today's banking sector is on an upward trend as evidenced by transaction volume. Thus, it is important to identify the factors that determine the extent to which banks will use derivative instruments. Derivatives are important risk management tools that can be used especially during periods of increased uncertainty and volatility in the markets. This study investigated the variables affecting the derivative product usage volume of Turkish banks with respect to the 2008 crisis and subsequent periods. The study revealed that during the crisis period between 2008 and 2012, only size, exchange rate risk, and credit risk were associated with LGTU at multiple levels. Capital adequacy ratio, return on assets and equity, net interest margin, and liquidity levels did not significantly affect LGTU. In addition, only size, foreign exchange risk, and credit risk were found to be associated with LGTU at multiple levels during the crisis period between 2008 and 2012. Capital adequacy ratio, return on assets, return on equity, net interest margin, and liquidity levels did not significantly affect LGTU. Size had the highest impact on LGTU levels in the crisis period between 2008 and 2012. On the other hand, foreign exchange risk had a negative effect and credit risk had a smaller effect. In the post-crisis period between 2013 and 2020, only size, foreign exchange risk, credit risk, and capital adequacy ratio were associated with LGTU at multiple levels. Return on assets and equity, net interest margin, and liquidity levels did not significantly affect LGTU. In general, the variable that had the highest impact on LGTU for the 2008-2020 period was size. While the effect of exchange rate risk was found to be negative, the effects of credit risk and capital adequacy ratio were found to be small, and unlike the other periods, capital adequacy ratio started to significantly affect the LGTU level only in the post-crisis period. Contrary to other models, it was found that the impact of credit risk increased significantly. In the post-crisis period, the relationships between LGTU and the variables partially changed, but only size was found to have a significant effect in each period. Although bank size is the reason for the intensification of derivative activities, it is clear that other variables underlying the bank's decision to use derivatives are also effective. In light of these findings, it is believed that banks that use derivatives may have riskier capital structures than banks that do not use derivatives, may have larger maturity discrepancies between their assets and liabilities, or the lower a bank's exposure to interest rate risk measured by net interest margin, the more likely it is to use derivatives, and banks with higher levels of credit risk may be more likely to use derivatives. In this context, smaller banks are expected to

benefit from derivative markets through holding companies. However, banks that intend to engage in derivative activities should have strong capital positions. It is concluded that further research on the validity of these estimates should be conducted in order to contribute to the literature.

References

1. Alam A. & others (2021) "Determinants and Outcomes of Financial Derivatives: Empirical Evidence from Pakistani Banks" https://koreascience.kr/article/JAKO202109554061455.page

2. Andras P. H. and others (2015) "The future of bank risk management" https://www.mckinsey.com/~/media/mckinsey/dotcom/client_service/risk/pdfs/the_future_of_bank_risk_management.pdf

3. Akkaya M & Torun S. (2020) "Türk Bankacılık Sektöründe Türev Ürünlerin Kullanımı ve Etkileri" https://milas.arel.edu.tr/xmlui/bitstream/handle/20.500.12294/3625/document%20%2888%29.pdf?sequence=1&isAllowed=y

4. Akkaynak B. & Yıldırım S. (2021) "Türev Finansal Araçların Sermaye Yapısına Etkisi: Türkiye'deki Bankalar Örneği" https://dergipark.org.tr/tr/pub/makuiibf/issue/65957/911724

5. Anbar A. & Değer A (2011) "Bankaların Türev Ürün Kullanım Yoğunluğunu Etkileyen Faktörlerin Belirlenmesi" https://dergipark.org.tr/tr/pub/mufad/issue/35629/396040

6. Brewer E. & others (1999) "The Effect of Bank-Held Derivatives on Credit Accessibility" https://fraser.stlouisfed.org/files/docs/historical/frbchi/workingpapers/frbchi_workingpaper_1994-05.pdf

7. Charumathi B. (2009) "On the Determinants of Interest Rate Swap Usage by Indian Banks" https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1663608

8. Comptroller of the Currency Administrator of National Banks (2012) "Risk Management of Financial Derivatives" https://www.occ.gov/publications-and-resources/publications/comptrollers-handbook/files/risk-mgmt-financial-derivatives/pub-ch-risk-mgmt-financial-derivatives.pdf

9. Fan H. (2009) "Hedgıng And Tradıng Actıvıtıes Of Bank Holdıng Companıes: Analysıs Of Foreıgn Exchange Derıvatıves Accounts" https://harvest.usask.ca/handle/10388/etd-09032009-164922

10. Güçver C. (2015) "Türk Bankacılık Sisteminde Türev Ürün Kullanımı İle Bankaya Özgü Değişkenler ve Makro Ekonomik Değişkenler Arasındaki İlişki" https://www.ticaret.edu.tr/uploads/dosyalar/921/2015_10.pdf

11. Hancı A. & Akçalı B.Y. (2021) "Türev Araçların Türk Bankacılık Sistemiyle İlişkisinin Nedensellik Analizi ile İncelenmesi" https://www.tbb.org.tr/tr/bankacilik/arastirma-ve-yayinlar/bankacilar-dergisi/detay/92

12. Hassan M. K. & Khasawneh A. (2009) "The Determinants of Derivatives Activities in U.S. Commercial Banks" https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1481268

13. Hundman K. (1999) "An Analysis of the Determinants of Financial Derivative Use By Commercial Banks" https://digitalcommons.iwu.edu/cgi/viewcontent.cgi?article=1183&context=parkplace

14. Infante & others (2018) "Why do banks use derivatives? An analysis of the Italian banking system" https://ideas.repec.org/p/bdi/opques/qef_441_18.html

15. Keffala M. R. (2015) "How using derivatives affects bank stability in emerging countries? Evidence from the recent financial crisis" https://www.sciencedirect.com/science/article/abs/pii/S027553191500032X

16. Konak F. & Ergenoğlu S. (2020) "2008 Küresel Finans Krizi Sonrası Türk Bankacılık Sektöründe Performans Değerlendirilmesi" https://dergipark.org.tr/tr/pub/hititsosbil/issue/59301/740785

17. Kuzu S. & Çelik İ. E. (2019)"Türk Bankacılık Sektöründe Türev Ürün Kullanımda Etkili Olan Faktörlerin Analizi" https://scholar.google.com.tr/citations?user=Y-qFJhgAAAAJ&hl=tr

18. Mayordomo a S. & others (2014) "Derivatives holdings and systemic risk in the U.S. banking sector" https://www.sciencedirect.com/science/article/pii/S0378426614001204

19. Milos, M. C. & Milos L. R. (2022) "Use of Derivatives and Market Valuation of the Banking Sector: Evidence from the European Union" https://www.mdpi.com/1911-8074/15/11/501

20. Minton B. A. & others (2006) "How much do banks use credit derivatives to reduce risk?" https://www.fdic.gov/analysis/cfr/bank-research-conference/annual-6th/stulzr.pdf

21. Nisha K.A. & Madhumathi R. (2021) "Impact of Derivative Portfolios on Bank Stability" https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4076619

22. Oktar S. & Yüksel S. (2016) "Bankaların Türev Ürün Kullanımını Etkileyen Faktörler: Mars Yöntemi ile Bir İnceleme"

https://dergipark.org.tr/tr/pub/fpeyd/issue/48024/607335

23. Sinkey J. F. & Carter D. A. (2000) "Evidence on the financial characteristics of banks that do and do not use derivatives" https://www.sciencedirect.com/science/article/pii/S1062976900000508

24. Shiu Y-M. & others (2010) "What Motivates Banks to use Derivatives: Evidence from Taiwan" https://www.bayes.city.ac.uk/__data/assets/pdf_file/0006/76929/Shiu-115.pdf

25. Shyu Y. W & Reichert A.K. (2002) "The determinants of derivative use by U.S. and foreign banks"
https://www.researchgate.net/publication/235281123_The_determinants_of_derivative_use_by_US_and_foreign_banks

26. Şimşek K.Ç. (2015) "Türk Bankacılık Sektörü Kur Riski Yönetiminde Türev Ürünler: Döviz Swap İşlemleri İle Makroekonomik Faktörler Arasındaki İlişki"
https://search.trdizin.gov.tr/yayin/detay/198228/

27. Taştemel G. (2020) "Türkiye'deki Bankaların Türev Ürün Kullanım Yoğunluğu" https://dergipark.org.tr/tr/pub/girkal/issue/56284/747492

28. Yenisu & others (2021) "Bankaların Türev Ürün Kullanımını Belirleyen Finansal Ve Makroekonomik Faktörler"
https://dergipark.org.tr/tr/pub/fesa/issue/64955/977060

29. Yonga H. H A. & others (2014) "Determinants of the extent of Asia-Pacific banks' derivative activities"
https://ideas.repec.org/a/ami/journl/v13y2014i3p430-448.html

30. Zaher Abdel Fattah Al-Slehat & others (2018) "The Factors Affecting the Use of Financial Derivatives' Instruments An Applied Study on the Jordanian Commercial Banking Sector"
https://www.sciedu.ca/journal/index.php/afr/article/download/13670/8440