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Effects of Derivative Use on Firm Value: Evidence from Pakistan

Nouman Nasir * Jaleel Ahmed Malik † Muhammad Ammar Bashrat ‡

Abstract: *This study examines the effect of derivative usage on a firm's value in Pakistan. By the testing sample of 55 non-financial Pakistani firms from 2018 to 2022. This study aims to determine whether using derivatives increases and decreases company (firm) value. In multivariate tests, Tobin's Q was used as a proxy for firm value and found a positive relationship between firm value and hedging. On the other hand, there is little relation between the coefficients of hedging variables. Further, this study's test result shows. Thus, the impact of the study is consistent with MM theory.*

Keywords: Hedging, Derivatives, Firms value, and Tobin's Q.

Introduction

The variability of risk among businesses is influenced by the rapid development and globalization of technology. At its core, risk management is about addressing uncertainty, with any factor that could impact a business's long-term success being considered a risk. Although risks can come in different levels and have varying outcomes, businesses must confront these challenges and devise effective strategies for dealing with them. James Jam has created a comprehensive framework for managing various types of risk, such as operational, economic capital, credit, market, and risk transfer, in order to maximize a firm's value. As we entered the 1990s, the importance of risk management in enhancing firm value has become increasingly critical.

In 1997, East Asian Financial Crisis and the 2007- 2008 Global Financial Crisis, numerous firms and financial institutions failed as a result of poor risk management (Siddika & Haron, 2020). Utilizing derivatives instruments, which are financial tools used to calculate the prices of the primary financial assets traded on markets, effectively reduces risk. Risk reduction is the main driver behind the use of derivatives. Derivatives' main function is hedging, which is a method of sharing and transferring risk. Thus, risk was effectively managed by using the derivative instrument. Now, firms know about derivatives and use them for speculative and risk management reasons. A company's financial statement demonstrates the benefits of these derivatives changing over time and exposing them to the transparency needed by financial reporting regulatory authorities (Graham & Rogers,

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2002). However, most countries are still shuffling from the effects of the 2008 financial crisis, which significantly impacted the global economy.

An emerging stage and comparative studies were limited An compared with different financial system derivatives topics. As a result, there have been few scholarly articles recently on this topic because scholars have not paid much attention to derivatives. However, the importance of derivatives increased after the financial crisis of 2008. After that, scholars pay more attention to investigating derivatives' role in the world economic crisis. Derivatives are agreements between parties that can be two or more parties. Derivatives derived their value from underlying assets. These agreements may be in commodity, currency, and interest rate. Besides, derivatives used in risk management generally involve an early investment to moderate unfavorable future price movements. Therefore, most companies are using derivatives for speculation purposes instead of hedging. In the 17th century, the derivatives were applied only in agriculture markets, and during the 1970s world developed rapidly in organized markets and over-the-counter. As of June 2018, the total OTC derivatives stood at 10.3$ trillion, and 595 trillion dollars worth of derivatives were traded (Bank for International Settlements [BIS], 2022). In Pakistan, derivatives were utilised for the first time in the 2001s.

The Interest rate and Foreign exchange are the primary sources of financial derivatives used as hedging to protect a company's earnings. Cash flows from adverse interest and exchange rate fluctuations. The different range of products provided by financial institutions and financial derivatives also manages organizational financial risks. The most commonly used financial derivatives are forwards, futures, options, and swaps. Most studies examined the fundamental determinants of hedging policy and their relationship with various business characteristics such as growth opportunities, investment, and Leverage. However, there has been very little research into how derivatives affect a firm's value, and there aren't several scholarly articles on the topic in Pakistan. It was proposed by Miller and Modigliani in 1958 that hedging doesn't effect a firm value when there are no market defects. Instead, they recommended that shareholders fully access information when the market situation was perfect and ideal regarding risk management or risk exposure tools. Hence, there was no need for hedging. In this situation, the shareholders can hedge by investing in healthy portfolios.

On the other side, several hedging theories were discovered, as well as theories in favor of derivatives, which claim that the correct use of derivative products for risk management can raise an organization's value because companies oppose a variety of issues in financial markets, such as financial distress, under-investment issues, high taxes, external financing costs, bankruptcy costs, and so on. Therefore, proper use of the derivatives in the form of hedging can increase organization value over tax payments reduction, external financing cost, chance of low financial distress then problem of under-investment. The developed and liquid financial markets have seen the majority of derivatives research. However, Pakistan does not adequately examine this subject nor does it become increasingly relevant. In order to assess the existing research, this study will look at how the use of financial derivatives effect firm value. Additionally, the objective for risk management are the same for U.S and Pakistani businesses. However, the effect of derivatives usage could be different in Pakistan and the U.S. because the Pakistan corporate governance en-

vironment is very bad. The concept of single-oriented ownership and rules are very weak in terms of protection for investors.

This study will help in a variety of ways. In the starting, this study will provide empirical evidence of the controversial connection between derivatives and firm value in Pakistani companies. Results vary among boundaries, and previous study has not yet come to an agreement in this regard. Determining whether employing derivatives adds value to Pakistani enterprises will be made easier with the aid of this study for policymakers, managers, and practitioners.

Literature Review

lot of research has been done on hedging. It all began with Modigliani and Miller's classic paradigm theory, which suggested that financial policy decisions have a minor impact on firm value (Modigliani & Miller, 1958). Later experts on risk management strategies disagree with the Modigliani–Miller (MM) paradigm. According to some researchers, hedging with derivatives is a value-enhancing technique for the company. Hedging is a term used to describe operations carried out by a company to reduce the impact of uncertainty on its value. Other research examined the value significance of derivatives by concentrating on certain sectors, such as banking, or the use of particular derivatives, such as weather derivatives, and literature started to take into account other nations as well. These studies discovered either a positive, negative, or no impact on company value.

Furthermore, despite many studies in different sectors, past research has not in-depth investigated the relationship between the use of derivatives and firm value in countries with distinctive corporate governance features. Akpınar and Fettahoğlu (2016) examined data from a period of 1999 to 2015, when the risk revealed by the firms was relatively very low. There were no excessive fluctuations in the exchange rate, commodity, and interest rate prices in that time period. When volatility was in its extreme position, it became essential for firms to determine the significant hedging relationship on its value.

The funding decision, including internal and external finance sources, significantly impacts the firm's worth. A Debt to Equity Ratio is used to confirm the funding decision in this study (DER). This ratio shows how much money is being raised through equity and debt financing. When compared to debt, a company uses less of its own capital the greater its debt-to-equity ratio. The Study of Berkman and Bradbury (1996) was important because they were the first who briefly elaborated on the calculation of the extent of hedging. Bartram, Brown, and Conrad (2011) presented the first international evidence on the value significance problems. They examined how financial derivatives affect firm value and their risk. They found that there was a positive relationship between the firm's value and the use of derivatives.

The use of derivatives by hedging is a value-improving strategy, and general and financial derivatives are associated with lower firm value. Allayannis and Weston (2001), after studying the eight countries, also support the value-enhancing theories based on hedging. Afza and Alam (2011) used a sample of 102 non-financial Pakistani firms in their study of the drivers of hedging. Tax protection benefits, management incentives,

financial difficulties and under-investment difficulties have been important factors in the hedging policy for Pakistani companies. They also examined the factors influencing Pakistani companies' decisions to use FX derivatives. According to the results, companies with more foreign sales must use forward exchange transactions to reduce their exchange rate risk. Leland (1998) stated that the firm's borrowings would expand the impact of expense saving and add to firm value. In contrast, hedging would increase the firm's debt capacity (Bartram et al., 2011); among all the studies, they analyzed that any firm decreased its total risk and systematic risk with the help of using financial derivatives.

According to Nguyen and Faff (2007), swap contracts have a statistically significant negative impact on a firm value. Bartram et al. (2011) analyzed many non-financial companies. They offered evidence that supported the idea that hedging is a value-adding activity. Furthermore, they revealed in their research that interest rate risk has a much greater firm value for hedgers in all countries. At the same time, the evidence concerned with the foreign exchange risk was also positive and weaker. Dan, Gu, Xu, et al. (2005) concluded that the Leverage was the only control variable significantly and negatively associated with the value. Still, using derivatives has no significance on the firm's value. Hagelin, Holmén, Knopf, and Pramborg (2007) presented their study on managerial motives. They identified that every firm value would be decreased when hedging strategy based on the manager's stock option incentives. Allayannis and Weston (2001) stated that using derivatives tends to minimize the volatility of a firm's cash flows, and hedging affects the firm value. This is made through the exact mechanism. They investigated the overall cash flow fluctuations and their effect on the firm value.

Akpınar and Fettahoğlu (2016) determined that the derivatives can increase or decrease any firm value. Zhou, Wang, and Wu (2012) said that hedging is the most important function of financial derivatives or its basic aim is to minimize the risk. The idea of financial derivatives is to carry the features of contracts in the derivatives market. As contracts are to be held at spot quality, derivatives help to meet that quality and protect the investors from any losses due to future market fluctuations, whatever the market situation is. A lot of national and international scholars have presented their perspectives empirically as well as theoretically (Siyal, Yaseen, Ahmed Siyal, & Fayaz Ahmad, 2021). Lenee and Oki (2017) explained that a day's financial derivatives had become a prominent instrument for hedging risk or losses related to the firm's financial value. Akpınar and Fettahoğlu (2016) investigated that those firms that use a derivative as a tool can affect the firm's value. Further, they explained the other factors like size, liquidity, and profitability, all of which affect the company's value and interaction of these variables.

Smith and Stulz (1985) explained using derivatives, any firm can make itself away from the bankruptcy cost. Bartram et al. (2011) examined that a firm's total risk can be reduced using financial derivatives. The total risk of firms is positively related to the firm's value. In general, commodity prices, interest rate risk, and exchange rate are higher exposure for the firms. According to research by Dhanani, Fifield, Helliar, and Stevenson (2007), the impacts of hedging on businesses differ by nation and have an impact on tax and regulatory policies. Hedging and firm value have a poor relationship in a company with poor corporate governance, according to (Fauver & Naranjo, 2010).

Methodology

First, this study applied the univariate model, which efficiently helps the separated group of firms that use and do not use financial derivatives. This study also analyzed the hypothesis test in the result of this study. It shows a significant difference between risks and value (Akpınar & Fettahoğlu, 2016).

The following Table discusses different variables (Firm's value and risks) tested in the model through various proxies. The proxy for Leverage was calculated through Lev =(Total debt)/(Total assets)

Stock returns were used in calculating total risk.

Foreign sales ratio was calculated through FSR= (Export sales)/(Total sales)

Table 1
Definition of the variables with Formula

Variables (Risk and Value)	Proxies	Abr.	Formula
Firm value	Tobin's Q	Q	(a firm value indicator)
Currency risk	Foreign Sales Ratio	FSR	FSR=export sales / total sales
Interest risk	Leverage	LEV	LEV=total debt /total assets
Total risk	Standard Deviation of Stock Returns	SR	Stock returns used in calculating total risk
Systematic risk	Beta Coefficient of Stock		$R_i = lnR_{it} - lnR_{it-1}$

The logarithmically was used to calculate systematic risk as given below:

$$R_i = lnR_{it} - lnR_{it-1}$$

The above equation is denoted as Logarithmic stock return is Ri, Closing price of the period stock is R_{it}. In R_{it-1}, the t-1 period is the stock closing price.

The sensitivity of stock returns can be identified through the beta coefficient. In addition, systematic risk in the market is an indicator of the sensitivity of stock returns and can be calculated by the following equation (Litterman, 2004).

$$\beta_i = \sigma_{i,m}/(\sigma_m^2)$$

The beta coefficient of stock is β_i The covariance between market returns and stock returns is $\sigma_{i,m}$ And market returns variance is σ_m^2.

By following Erickson and Whited, 2006 and Akpınar and Fettahoğlu 2016, they used Tobin's Q as an alternative for firm value. Previous studies also suggest that Tobin's Q enables analysis of different firms of various sizes. So the calculation and measurement of Tobin's Q is following:

$$\frac{BV\ of\ TA - BVofEq + MV\ of\ Eq}{Total\ Assets}$$

B.V. of TA= Book Value of Total Assets, B.V. of Eq. = Book Value of Equity, MV of Eq. = Market Value of Equity

The principal point of this study is to look at the impact of subsidiaries on a company's worth. So this study utilized multivariate models. First, the model for the multivariate

was given beneath with the reliant, autonomous factors, and Control factors. Then, the multivariate model was given underneath.

The main aim of this study is to examine the effect of derivatives on a company's value (Vuong, Vu, & Mitra, 2017). So this study used multivariate models, and the impact on firms inside the extent of the concentration on firm worth was dissected. The model for the multivariate is given below with the dependent, independent, and Control variables. The multivariate model is given below.

$$Q_{it} = \alpha + \beta_1 DER_i + \beta_2 SIZE_i + \beta_3 LIQ_i + \beta_4 GRW_i + \beta_5 ROE_i + \beta_6 LEV_i + \beta_7 ET_i + \beta_8 FSR_i + \epsilon_i$$

The dependent variable in this model is the natural logarithm of Tobin's Q and is also used to represent firm value. The financial derivatives are used as independent variables only for firms that use financial derivatives. This study divided firms into two groups whether they are users of financial derivatives. The companies using financial derivatives can be defined as those reporting using them in their financial tables. The financial derivative was independent in this model, a Dummy variable. The firms using derivatives were carried out using a value of "1" and others "0". So this study follows (Akpınar & Fettahoğlu, 2016).

Moreover, variables like (Size, Leverage, Liquidity, Return on Equity, Growth, Equity turnover, and foreign sales Ratio) affected firm value and were also tested as control variables.

Table 2
Model Specification

SR. No	Variable	Dependent variable or Independent variable	Abr.	Formula	Predicted Sign
1	Tobin's Q	Dependent variable	Q	$\frac{BV\ of\ TA - BV of Eq + MV\ of\ Eq}{Total\ Assets}$	
2	Derivative	Independent variable	DER	(Dummy variable with a value of 1 if the firm uses derivatives;0 otherwise)	
3	Size	control variable	Size	(Natural Logarithm of Total Assets)	+
4	Leverage	control variable	LEV	(Total Debt/Total Assets)	+
5	Liquidity	control variable	LIQ	(Current Assets/Short Term Liabilities)	
6	Return on Equity	control variable	ROE	(Net Profit/Stockholder's Equity)	+
7	Growth	control variable	GRW	(Capital Expenditures/Total Sales)	+
8	Equity Turnover	control variable	ET	(Total Sales/Stockholder's Equity)	

Results

Results of Univariate Analyses

Firstly the focus of this study is to apply univariate analyses, then a Mann-Whitney, t-test, and U test were used. In addition, parametric data were tested using a t-test. Finally, a Mann-Whitney U test was applied to non-parametric data. Results of these tests, including the mean value and significance levels, are presented below the table.

The result of Tobin's Q (means Firm value) of companies using derivatives was constantly less than those that do not use them. Furthermore, the results are statistically significant but negative for 2017, 2018, and 2019. On the other hand, the enterprises adopting

international trade risk (also known as currency risk) were more significant than those who did not. Surprisingly, this study discovers that there is a negative and statistically significant association between derivatives and foreign trade risk.

As conflicting with my expectations, firms using derivatives with interest rate risk were higher than firms that don't use derivatives in Pakistan. Although the interest rate in Pakistan is higher, it very well may be recognized that organizations with higher risk rates use derivatives regularly. Further, the calculations for different years were reliably massive at a pace and consistently significant 1-30%. Based on these results, firms using derivatives showed the risk of these firms differently from firms that do not use them. Particularly in interest rate risk, this difference is seen very clearly. As a result of the fact that derivatives are perceived to have detrimental effects on company value, the finding demonstrates that companies utilising derivatives have a lower Tobin's Q. Due to the co-controlled factors used to assess risk management strategies and firm risk, firms using financial instruments as opposed to derivatives significantly differ in terms of risk criteria.

The normal difference of total risk was calculated using stock return, but the outcome was neither steady or reliable. Additionally, except for 2022, differences with weak rationality were not substantial. Derivatives-using organisations typically face larger systemic risks. For the years 2020, 2021, and 2022, the calculated differences were significant.

Table 3
Univariate test results

			Mean			
Risk and value	**Years**	**No of Co**	**Users**	**Non-Users**	**Mean Difference**	**Test**
	2018	47	1.68431	1.82023	-0.13592	M-W
	2019	50	1.63201	1.90866	-0.27665	M-W
	2020	49	1.64321	1.90147	-0.25826	M-W
Firm value	2021	41	1.68312	1.99722	-0.3141	M-W
	2022	55	1.09511	1.66321	-0.5681	M-W
	2018	47	0.11531	0.01242	0.10289	M-W
	2019	50	0.15201	0.11223	0.02398	M-W
	2020	49	0.13621	0.13323	0.0029	M-W
Currency Risk	2021	41	0.11351	0.10422	0.00929	M-W
	2022	55	0.11433	0.02333	0.091	M-W
	2018	47	0.32313	0.22142	0.10171	T
	2019	50	0.34531	0.22142	0.11398	T
	2020	49	0.35223	0.21013	0.1421	T
Interest rate Risk	2021	41	0.35223	0.11013	0.2421	T
	2022	55	0.33421	0.21125	0.12296	T
	2018	47	0.43055	0.31351	0.11704	T
	2019	50	0.55253	0.43525	0.11728	M-W
	2020	49	0.5133	0.53315	-0.01985	T
Systematic Risk	2021	41	0.31443	0.21115	0.10328	T
	2022	55	0.34532	0.33055	0.01477	T
	2018	47	0.11301	0.11513	-0.00212	M-W
	2019	50	0.12223	0.12511	-0.00288	T
	2020	49	0.10123	0.10021	0.00102	T
Total Risk	2021	41	0.12151	0.11435	0.00716	M-W
	2022	55	0.11234	0.10322	0.00912	M-W

Significance levels: 0.01**, 0.05*and 0.10*.

As expected in previous studies, high-risk companies would use derivatives more often. As a result, it has been more difficult to distinguish between companies that do not

use derivatives with a low-risk profile. Therefore, results from multivariate tests must be supported with it. (Bartram et al., 2011; Akpınar & Fettahoğlu, 2016).

Results of Multivariate Models

The major goal of this study is to ascertain how derivatives affect a firm's value and significance level. The multivariate model that was used to analyse independent variables and reach a significant level is shown in the table below. With the exception of 2018, the major variable in this model, derivatives, had a positive impact on company value. Furthermore, none of the coefficients in the analysis were statistically significant.

All of the research have consistently found positive and substantial effects of the Return on Equity and Growth variables among independent variables in the model. With the exception of 2022, there was a significantly negative correlation between business value and size. While Return on Equity, size, and growth factors typically have a major impact on firm value and are consistent with prior research and literature, they are also important. Throughout the investigation, there was a positive impact of the leverage values on firm value.

Additionally, throughout the investigation, leverage had a favourable effect that was statistically significant, and the assumptions were supported by the beneficial impact of leverage values factors on firm value. There is inconsistency in the liquidity, equity turnover, and foreign sales ratio metrics.

Table 4
Multivariate test results

	2018		2019		2020		2021		2022	
Variables	Eff	Sig.	Eff	Sig.	Eff	Sig.	Eff	Sig.	Eff	Sig.
Derivative	-		+		+		+		+	
Size	-		-	†	-	†	-		+	
Liquidity	+		-	†	-		+		+	†
Growth	+	**	+	**	+	*	+	*	+	*
Return on Equity	+	†	+	**	+	†	+	**	+	*
Leverage	+	†	+	**	+	†	+	**	+	**
Equity Turnover	-		-		+		+	†	-	*
Foreign Sales Ratio	-		-		-		-		-	*

Significance levels: 0.01**, 0.05* and 0 .01†.

Conclusion

This study first begins by asking how the use of derivatives affects enterprise value, specifically Pakistani enterprise value. To this end, this study began with a sample of 55 (275 observations) non-financial companies listed on the PSX (Pakistan Stock Exchange). The study period covers five years (2018 to 2022) during which most companies use derivatives in their business activities. Previous studies show mixed results with positive, negative and no impact on the use of derivatives for goodwill. Therefore, the result of this study corresponds to the previous literature and theories.

As per the consequence of the univariate models, companies utilizing derivatives have a lower Tobin's Q esteem compared with those that don't utilize derivatives. This outcome shows that derivatives adversely influence firm value and relate to past literature. The risk positions of firms that utilize financial derivatives are not the same as those that don't yet, and their firm worth is lower. So it tends to be expressed that the firm purposes financial derivatives for well-being from a few specific risks that would help it.

The result of the multivariate models does not show any clear indication of the effect of financial derivatives on goodwill. A positive relationship was generally found, but this relationship was not significant. The use of financial derivatives to create value was not suggested. The result of the multivariate models differed from the results of the univariate models.

The above results differ from studies showing that there are significant differences in Pakistani and foreign markets. There are a few reasons for this difference. Adequate regulatory authority to protect investors' rights was not foreseen in Pakistan as the Pakistani market is a developing economy. Pakistan's bond, money and stock markets have not been properly organized and managed, which is essential for buying and selling derivatives. Bonds, money and stock market instruments were apparently made available as underlying assets on a number of occasions. Finally, the investor in Pakistan is unaware of the benefits and functions of derivatives. Therefore, Pakistani investors do not value companies that use derivatives to hedge their financial risks.

In summary, future studies on the use of derivatives or enterprise value relationships in financial firms can be conducted, as described in the issues section of this study, which examines the inconsistency between study findings on the subject. So there must be a deeper effort by future researchers to bring this inconsistency to a convincing conclusion that all researchers will agree with.

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