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Determinants of Corporate Hedging Policy: The Use of Interest Rate Derivatives by Non-Financial Firms of Pakistan

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A B S T R A C T

Usually, firms use interest rate derivatives to hedge interest rate risk. Similarly, some non-financial firms in Pakistan are also engaged in the use of interest rate derivatives to hedge their exposure to interest rate risk.

Purpose: The purpose of this study is to identify determinants of interest rate derivatives used by non-financial firms in Pakistan and to identify any differences between non-financial firms using interest rate derivatives and non-interest rate derivatives.

Methodology: Since interest rate derivatives are taken as dependent binary variables, binary digits 1 and 0 are assigned to firm and non-user interest rate derivatives. As a result, the Logit model is used to identify the determinants of interest rate derivative use. Besides, users and non-users of interest rate derivatives are two groups independent of each, and therefore the Mann Whitney U test is used to identify the difference between them.

Results: In line with the literature, the non-parametric Mann Whitney U test resulted in significant differences between interest rate derivative users and non-users. While using the Logit model, there was a significant positive relationship between financial distress costs, asset growth, cash flow, firm size, and interest rate derivatives use. However, there was a negative relationship between profitability (ROA) and interest rate derivatives.

Limitation: Since most financial firms use derivatives for trading rather than hedge purposes, the scope of the study is limited to non-financial firms that use derivatives for hedge purposes. Also, the study was launched in 2013-14, so the data collected and used for the period 2006-12 will be used.

Implication: The findings suggest that large, financially distressed firms can hedge their interest rate risk and benefit from the optimal utilization of interest rate derivatives.

Originality: The study was the first attempt to explore interest rate derivatives in non-financial firms in Pakistan and pave the way for further exploration of the subject matter. Besides, the original data were extracted from the annual reports of the sampled firms.

Keywords: Hedging, Interest rate derivatives, Non-financial firms, Pakistan.

1. INTRODUCTION

Background of the Study

The concept of risk cannot be ignored when it comes to investment management. Portfolio managers and financial analysts regularly identify risks, measure risks and try to manage them. After 1950, most corporations reduced their systematic risk while implementing the diversification strategy of Markowitz (1952). In traditional markets, where people dealt only with bonds and stocks, the risk was only associated with fluctuations in market values and the potential for default by the creditor. At that time, risk measurements often took the form of betas, standard deviations, and the probability of default. In such a simple setting, risk management was limited to transactions in stocks and bonds that made changes in the direction of risk. But now it's the 21st century, and we don't live in the traditional world of bonds and stocks, and investors can adjust their risk levels in different ways and techniques. For example, insurance is one way to reduce the risk, which means paying someone to take the risk for you. The derivative is defined as "Derivative is a product whose value is derived from the value of an underlying asset contractually while the underlying asset can be an asset, commodity, equity or forex (Sreelatha T., 2018)". The financial market has entered into a contract called "Derivative" which provides insurance against financial losses. A derivative is a financial instrument offering a return based on the return of certain underlying assets or security (Chance, 2003).

Over the past two and a half decades, the use of derivative instruments by corporations for risk management purposes has increased rapidly. As a result, many researchers are motivated to explore the idea behind company decisions to use derivatives for risk hedging purposes. Corporations with high financial distress costs, growth opportunities, leverage, and tax complexity expose themselves more to high-interest rates and thus make more profitable use of derivative instruments (Smith and Stulz, 1985). Net cash flow has become more vulnerable to interest-rate volatility due to unstable economic and political situations and has therefore increased the use of financial instruments such as derivatives on the Asian market. Despite other financial instruments that have been used for many years, the use of interest rate derivatives has increased significantly over the last one and a half decades. The International Swaps and Derivative Association (ISDA) reported that interest rate derivative use increased from $69.2 trillion (2001) to $464.7 trillion (2007).

Research Problem

Financial derivatives have been studied many times in different contexts around the world (Tai-Yuen Hon (2012), Sohnke M. B. (2019), by Yesildag E. (1919), Patricia, B. *et al*. (2020), Hui, *et al*. Al (2020). Pakistan's study of financial derivatives attracted little attention (Iqbal *et al*. (2014), Afza and Alam (2011)). Although earlier work on derivatives contributed a lot to the available literature, a study is still needed to explore Pakistan's derivatives environment, especially the interest rate derivatives market. Besides, Pakistani companies are continuously exposed to interest rate risk, so the use of interest rate derivatives is increasing enormously. A study is therefore needed to explore the idea behind the use of interest rate derivatives. To fill the gap, this study explores the determinants of corporate hedge policy and interest rate derivatives use in non-financial firms in Pakistan. Also, this study identifies the difference between users and non-users of interest rate derivatives.

Research Question

The present study answers two main questions;

What are the determinants of corporate hedge policies of non-financial firms in Pakistan using interest rate derivatives?

Is there a significant difference between users and non-users of interest rate derivatives?

Research Objectives

The objective of the study is to:

• Identify the relationship between corporate hedge policies and interest rate derivatives of non-financial firms in Pakistan.

• Identify differences between users of interest rate derivatives and non-users in Pakistan's non-financial sector.

The study is based on two assumptions:

H1: There is a relationship between corporate hedge policies and interest rate derivatives.

H2: There is a significant difference between interest rate derivatives users and non-users.

Significance and Originality of the Study

The available literature shows that interest rate derivatives have received little attention from researchers (Liu and Shiu, 2009). Also, little is known about interest rate derivatives in developing economies such as Pakistan, which need to be enhanced and supplemented. The current study is the first of its kind, which focuses specifically on interest rate derivatives. The current study on interest rate derivatives and their determinants will enhance and further elaborate on the literature available on the use of derivatives in Pakistan. The aim of this study is also to target the difference between users and non-users of interest rate derivatives and to give the non-financial sector a deep understanding of interest rate derivatives. This study will also help non-financial firms in Pakistan to understand the use and outcomes of interest rate derivatives. This study will explore various factors that could have a significant impact on the operations and profitability of non-financial firms in Pakistan. The current study will also provide future insights to researchers interested in studying interest rate derivatives.

2. LITERATURE REVIEW

After 1950, most corporations reduced their systematic risk while implementing Markowitz's (1952) diversification strategy. When firms were investing in an unrelated project, financial managers used the diversification approach as an operational hedge instrument. Although this approach has given a lot of support to firms, with the adoption of mixed floating exchange rates and interest rates by many countries, the exposure of expected cash flows to interest rate and exchange rate volatility has increased. Much work has been done on hedge and derivative instruments so far, and most of them have been targeted at the U.S. market. As a result, most of the literature review consists of U.S based studies.

Hui, *et al*. (2020) studied the use of interest rate derivatives by US public life insurance companies and established a relationship between the exposure of interest rate risk and the use of interest rate derivatives. The study found that insurers with higher exposure to interest rate risk have extensive involvement in the use of interest rate derivative instruments. It was also revealed that life insurers observed higher interest rate risk during 2000-2009 and therefore extensively used derivative instruments.

Yung (2020) applied three structural model equations to examine non-life insurers in the United Kingdom and found that those insurers using more derivatives tended to have lower financial performance. It was also found that insurers with a high loss ratio also showed lower financial performance. Xing and Antonio (2019) took a sample of 555 banks from 18 different developed markets and looked at the relationship between equity risk and financial derivatives. Finding the study suggested that the use of financial derivatives increases the risk due to the use of derivatives for speculative purposes. The overall study suggested that the impact of the use of derivatives on bank risk and the consequences of risk.

Hahnenstein, *et al*. (2020) presented a new approach to testing the theory of financial distress costs in the context of corporate hedging. 189 German mid-market companies were studied using single-contract derivatives data. The results of the study explained a significant proportion of the hedging ratio differences. The study's analysis supported the financial distress cost theory of corporate hedges from a financial intermediary perspective.

Patricia, *et al*. (2020) investigated whether or not the use of derivatives results in higher firm value. Meta analyzes of 51 studies were used and it was found that using foreign currency derivatives alone or along with other types of financial instruments drives positive firm value. It was also noted that hedging has an economic advantage for almost all firms, particularly those with a common law or located in developed economies.

Choi, *et al*. (2020), examined the use of derivatives for hedge purposes by155 U.S. oil and gas companies to determine the effect of derivatives on the marginal value of cash holdings. The use of derivatives instruments for hedge purposes has resulted in a reduction in the marginal value of cash holdings of oil and gas companies. Besides, strong effects of the use of derivatives have been observed for firms exposed to higher risk. It was concluded that both derivatives and cash holdings act as a substitute for hedge risk in the oil and gas industry.

Jerome (2020) analyzed the effect of corporate financial hedges on firm value through a meta-regression analysis. The results of the study show that the firm value effects of hedging are greater for foreign exchange derivative users than for interest rate and commodity price derivatives. It was also suggested that the hedging premium significantly increases by considering operational hedging strategies with financial hedging. Evidence was found for higher hedge premiums in countries with higher tax rates and less developed financial markets.

Houcem, *et al*. (2020), investigated the impact of liquidity risk on the risk-taking behavior of both conventional banks and Islamic banks. Bank-level and country-level data were collected from 18 countries and it was found that lower liquidity financing results in higher risk-taking behavior by conventional banks. However, this effect has rarely been seen in Islamic banks.

Yesildag (2019) conducted a study on non-financial firms in the BIST 100 index operating in Turkey to identify financial risks arising from the activities of these firms and the use of derivatives to manage such risks. Differences between derivative users and non-utilisers have also been identified. For this purpose, 58 companies, which were continuously in existence in the index from 2013 to 2018, were analyzed. The results of the study show that only half of the companies used derivatives to hedge risk, including currency risk, interest risk, credit risk, liquidity risk, and other types of risk. It was also noted that most of the derivatives were used by liquid and large companies. Sonhnke M. B. (2019) investigated the impact of the use of derivatives on the exposure and risk of non-financial firms around the globe. The study presented evidence that non-financial firms use derivatives for hedge purposes. No evidence was found on the use of derivatives for speculation in individual countries. However, firms with higher net exposure to commodity prices are using commodity price derivatives.

Lili, *et al*. (2019) used the idea of a dichotomy distinction and proposed a new method of distinguishing hedging from speculation. The study was based on the voluntary disclosure of hedging activities by firms, and Chinese non-financial listed firms were categorized as hedge and speculative groups. Results of the study found that the effect of price risk management is attributed only to firms that use derivatives for hedge purposes. More specifically, it was argued that the use of future commodity derivatives for hedge purposes significantly reduces higher price risk to a slightly lower level. However, the use of commodity futures for speculative purposes has shown little effect on the exposure of firms to price risks.

Yulia, *et al*. (2018) examined the characteristics of the bank relationship and the exposure to the contract for financial derivatives. 109 European publicly traded banks were studied in the period 2005-2010. It was concluded that, after controlling the specific characteristics of the bank, results show that banks that use hedge instruments efficiently and have lower risk with a higher value. The study also insisted on the purpose of the use of derivatives, either for trading purposes or for hedge purposes.

Sung, *et al*. (2017) studied Korean firms using firm-level data. Results show that firms with more exports, high exchange-rate exposure, and more foreign-currency debt hedge their risk by using currency derivatives. 2SLS regressions have shown that the increased use of currency derivatives does not lead to lower firm risk, but leads to higher firm value. Also, the use of derivatives by high-exposure firms tends to have a lower firm risk with lower firm value. Finding the study suggested that currency exchange derivatives are a useful hedge and value protection tool for firms with manageable exposures.

Pinghsun, *et al*. (2017) studied the potential impact of corporate derivatives on the market risk of stock-return volatility. A sample of 3000 UK-based firms was taken as a sample and found that the use of derivatives is instrumental in reducing the standard deviation of weekly stock return and market risk. These results were particularly pronounced for firms using currency derivatives or interest rate derivatives. During the financial crisis of 2007 to 2009, it was noted that the use of derivatives hurt the volatility of equity returns and that market risk was significantly higher during the crisis period. Analysis of the study suggested that the use of currency derivatives by global firms, along with interest rate derivatives, could be beneficial with an additional reduction in stock return volatility and systematic risk. The results were summed up by stating that firms are more likely to use derivative instruments for risk management than for speculation.

Chee (2016) studied the use of corporate derivatives and their impact on firm performance. The study used three models of performance, i.e. market value, return on assets and return on equity. A two-stage regression model was used to estimate performance at the same time. It was found that the use of derivatives is negatively associated with the company's market value. However, this trend was found to be positively associated with asset returns and equity returns. Derivative use better contributes to the return on assets, which is a key driver of firm market value. Besides, firms with a lower operating income margin were found to use derivatives to save their small margin and thus avoid potential financial risks.

Iqbal, *et al*. (2014) while taking over 75 non-financial firms operating in Pakistan for the period 2007-2011, studied the determinants of hedge policies and the use of derivatives in risk management. Derivative users and non-users have been differentiated through a non-parametric Mann-Whitney U test. The findings suggest that derivatives users are large corporations with volatile cash flow, high growth opportunities with foreign currency exchange, and exposure to interest rates. There was a significant relationship between the use of derivatives and liquidity, foreign purchases, firm size, and growth. It has also been suggested that users of derivatives have a competitive advantage over non-utilisers of derivatives because the use of derivative instruments has led corporations to sound risk management and has given them economies of scale. Georgios and Henri (2013) studied corporations using currency exchange derivatives and their exposure to currency crises. While studying Latin American countries, derivatives markets have at least been found to be an effective place for corporations in the crisis era.

Tai (2012) investigated listed companies in Hong Kong and their risk management practices through the use of derivatives. Tai analyzed the financial reviews and annual reports of these companies. Results show that 38 out of 46 (82.6 percent) corporations used derivatives in 2010. Also, 58.7% of these corporations used swaps to hedge their interest rate risk. 54.3 percent of corporations have been identified as hedgers of their foreign exchange risk through forwarding contracts. It was also reported that 69.6 percent of corporations manage their risk transactions to meet their foreign exchange objectives. These results show a high degree of

consistency with the expected results that corporations manage their financial risk through derivative instruments.

Chernenko and Faulkender (2011) studied non-financial firms using derivatives as hedge instruments. Panel data was used to differentiate between the implementation of hedge and the use of derivatives. The findings of the study suggested that the use of interest rate derivatives is directly linked to external financing and high investment by firms.

Afza and Alam (2011) also conducted another study using 105 non-financial firms' data from 2004-2008. They involved a variety of factors that influence the firm's hedging decision to support earlier Smith and Stulz (1985) studies. Firms made optimal use of their hedging technique to achieve the shareholder's primary objective of maximizing wealth. Managerial ownership and higher growth opportunities have been identified as key determinants that enhance firm value. Excessive use of derivative instruments has also been found in those corporations with a high ratio of leverage and low tangible assets. It was suggested that these corporations reduce the variation in their net income through the use of derivatives. Employment of hedge instruments has also been identified in corporations facing higher foreign exchange exposures. While contradicting the FDC (Financial Distress Cost) theory, a positive relationship was identified between the use of derivatives and the interest-bearing ratio, given the support of the lag-period effect.

Adedeji and Baker (2002) studied 140 U.K. firms and found reasons for the use of currency and interest rate derivatives. Findings suggest that high-interest rate coverage and financial leverage are important determinants that motivate corporations to hedge through interest rate derivatives. However, no such effect has been identified with the use of currency exchange derivatives.

Bali *et al*. (2007) studied the use of interest rate derivatives and currency exchange derivatives by non-financial firms for the period 1995-2001. Results have shown that the use of derivatives is not only significant for the profitability of the firm but is also associated with other economic and non-financial factors. Mian (1996) and Froot (1993) investigated the hypothesis that hedging enhances the value of the firm or not. A positive relationship was established between the value of the firm and the hedging.

Alkeback *et al*. (2002) conducted a comparative study of the use of derivatives between the USA, Sweden, and New Zealand. Results have shown that 53 percent of US, 52 percent of Swedish, and 39 percent of New Zealand corporations use derivative instruments. Hedging risk was identified as the main purpose behind the use of derivatives. In comparison to smaller firms, large firms have been identified as users of derivatives.

Haushalter (2000) considered the oil and gas producing companies of the United States as a sample for his study. The study used the Tobit model to determine the determinants and extent of the decision in the use of derivatives for hedging purposes. A positive relationship has been estimated between the use of firm derivatives and leverage, investment expenditure, debt constraint, and tax convexity. While the negative relationship between the use of derivatives, the management ownership and dividend payment has identified.

Fok *et al*. (1997) studied the determinants of derivative instruments, using publicly available data, and found that the risk of financial distress, the equity cost of the agency, and the debt cost of the agency could be reduced through the use of derivative instruments. They also found that, compared to small firms, large firms have a strong tendency to hedge.

Mian (1996) used a large sample of 771 U.S.-based companies to study hedging decisions and concluded that hedging risk results in economies of scale. Kritzman (1993) studied an optimal policy on currency hedges. His findings suggest that to minimize risk, investors must be willing to sacrifice their expected return. Simply put, a negative relationship between expected return and hedging has been observed. Bessembinder (1991) argues that hedging increases the value of firms by providing incentives to firms to reduce the opportunistic behavior of bondholders.

From the available literature, it is concluded that derivatives instruments have been explored by many researchers in different contexts, particularly in developed countries. However, little attention has been paid to the study of derivatives in developing countries like Pakistan (Afza and Alam, 2011). The current study is being conducted to fill the gap and explore the determinants of corporate hedge policies and the use of interest rate derivatives by non-financial firms in Pakistan.

3. RESEARCH METHODOLOGY

The empirical study explored different methods and techniques while studying derivatives in different contexts. The current study identified the impact of financial distress, Interest Coverage Ratio, profitability, size, and asset growth cash flow on corporate hedge policy. The following method and procedures were followed to determine the impact of these variables.

The Population of the Study

All non-financial firms listed on the Pakistan Stock Exchange were considered as the study population. The financial sector is excluded from the study as it uses derivative instruments for speculative purposes (Smith and Stulz, 1985).

Sampling Design

A sample of 92 non-financial firms listed on the Pakistan Stock Exchange was selected for the study. The sample was limited to 92 firms because of the limited use by non-financial firms of interest rate derivatives. The sample includes equally proportionate interest rate derivatives for users and non-users. Since there is no appropriate source showing a list or number of derivative users, for the selection of interest rate derivative users, a convenient sampling technique was used (Kumar, 2005). Afza and Alam (2011) and Iqbal et. Al (2013), non-financial firms' annual reports were studied and users and non-users of derivative instruments were identified. Each company must disclose their use of derivatives, as per International Accounting Standards 32 and 39.

Collection of Data

Secondary data was collected from the database of the State Bank of Pakistan and Karachi Stock Exchange for 92 non-financial firms for the period (2006 to 2012). It is mandatory for companies, following International Accounting Standards (IAS) 32 and 39, to disclose their use of hedging instruments in the notes of their annual reports. For the identification of users and non-users of interest rate derivatives, annual reports have been studied. Since the study was launched in 2013-14, the data used in the study was taken from 2006 to 2012.

Variables for the Study

This section provides a brief explanation of the variables and their measurements.

1. Dependent Variable

i. Derivate

Derivatives are considered to be a dependent variable of the study. A derivative is a financial term that means a security or contract that derives its value from the performance or outcome of the underlying asset or entity (Stulz, 2004). Underlying can be almost anything, often other economic goods or financial instruments. Binary values 0 and 1 are used to identify non-users and users of interest rate derivatives (Afza & Alam, 2011).

Derivatives = binary value one is used for firms using interest rate derivatives and zero for non-users.

2. Independent Variable

i. Cost of Financial Distress

Costs are incurred by corporations when they are unable to meet their financial obligations. High financial distress costs expose corporations more to interest rate risk and therefore corporations are more likely to use interest rate derivatives (Smith and Stulz, 1985).

Financial distress costs = ratio of tangible assets to total assets.

ii. Interest Coverage Ratio

To determine the ability of the firm to pay interest on its outstanding debt, the interest rate is used. The interest rate is used to measure the company's earnings relative to the amount of interest paid by the corporation's (Afza and Alam, 2011). Sometimes it's also known as time interest earned. The interest coverage ratio is calculated by dividing the EBIT by the interest expense (Pandey, 2010).

Interest Coverage Ratio = Earnings before Interest and Tax/Interest Expenses.

iii. Firm Size

Firm size is considered to be an important determinant of a corporate hedge policy. Significant parts of large firms usually engage in risk management practices. The log of total assets is used as a proxy to measure the size of the firm (Iqbal *et. al*, 2014).

Firm Size = Logarithm for total assets.

iv. Assets Growth in Cash Flow

Firms use derivatives when the tangible assets of firms are expected to grow relative to their cash flow (Afza and Alam, 2011). This is the ratio of change intangible assets plus depreciation by the addition of net income and depreciation.
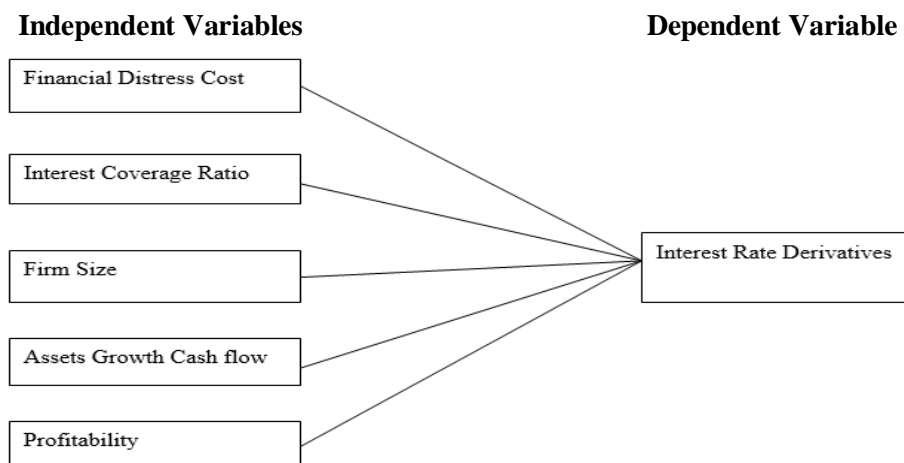
Assets Growth Cash Flow = Ratio of change intangible assets plus depreciation by net income and depreciation.

v. Profitability

Profitability is the ability of an entity to generate profit, and the performance of the firm is measured by profitability. The return on assets is a well-known proxy for measuring firm performance (ROA). It means how well a firm uses its assets to generate profit. The level of profitability for users of derivative instruments is low compared to non-users (Afza and Alam, 2011).

Return on assets = net income/total assets.

Conceptual Framework

Panel Data

Panel Data on corporate hedging policy determinants is used. Data collected for a given sample over a period of time is known as panel data. Panel data provides multiple observations of each individual in the sample (Hsiao, 2003). In this study, 90 non-financial firms were identified for the period 2006-2012. The following model and test was used while testing panel data.

Logistic Regression

Logistic regression usually measures the relationship between dependent variables (with binary values) and one or more independent variables. Independent variables usually, but not necessarily, have a continuous value. This type of regression may be binomial or multinomial. Binomial logistic is based on binary values and deals with a condition in which the dependent variable could have only two types (i.e. yes or no, success or failure etc.). The output of binary logistic is usually coded with "0 and 1" which gives us a simple and easy interpretation of the model. On the other hand, the outcome of multinomial logistic regression may have three or more possible types (i.e. small, medium or large). As the current study focuses on users and non-users of interest rate derivatives, binary logistic regression with binary value 0 was used for non-users and 1 for users.

The data sample is divided into two groups, i.e. users and non-users, in order to compare in detail the operating characteristics between companies using derivatives as hedge instruments and firms not using derivatives. Non-parametric (Mann-Whitney) U Test was used to test the mean difference between the two groups (Iqbal *et. al*, 2014). However, it is assumed that firms use interest rate derivatives to hedge risk. Therefore, the Logit Model (Binary Value One for Derivative Users and Zero for Non-Users) is used to determine whether or not firms use Derivative for hedge interest risk exposure.

Econometric Model

The Model is a Logit model and represents that the use of derivatives is a function of the cost of financial distress, interest coverage, firm size, asset growth cash flow and profitability.

$$Deriv_{it} = \alpha + \beta_1 FDC_{it} + \beta_2 INC_{it} + \beta_3 Size_{it} + \beta_4 AGCF_{it} + \beta_5 ROA_{it} + \varepsilon_i$$

Whereas,

$Deriv_{it} = Derivatives$

$INC_{it} = Interest\ coverage\ Ratio$

$Size_{it} = Size\ of\ a\ firm$

$AGCF_{it} = Asset\ Growth\ Cash\ flow$

$ROA_{it} = Return\ on\ Assets$

$\varepsilon_{it} = Error\ term$

Mann Whitney U Test

The Mann Whitney U test is also known as the Wilcoxon Rank-sum (WRS) or Mann-Whitney Wilcoxon (MWW). It is a non-parametric test of the null hypothesis and assumes that the two populations are the same as the alternative hypothesis. It's used when we don't have a normal distribution. It has greater efficiency than the t-test while dealing with non-normal distribution. This type of statistical test is used when we have two separate samples taken randomly from the population. As the current study also focuses on two independent samples, the Mann Whitney U test was used to identify the difference between users and non-users of interest rate derivatives.

Users   Non Users

$$U_1 = n_1 n_2 + \frac{n_1(n_1 + 1)}{2} - \sum R_1 \qquad U_2 = n_1 n_2 + \frac{n_1(n_2 + 1)}{2} - \sum R_2$$

Where,

$U_1 \, and \, U_2$ = Mann Whitney U - test, U_1 *for users* and U_2 for non - users of interest rate derivities respectively

$n_1 \, and \, n_2$ = Sample Size , n_1 *for users* and n_2 for non - users of interest rate derivities respectively

$\sum R_1 \, and \, \sum R_2$ = Sum of rank of the sample size of *users* and non - users of interest rate derivities respectively

4. RESULTS AND DISCUSSION

Table 1. Assumptions of Mann Whitney U Test.

Assumptions	Remarks
Ordinal Value dependent Variable	Since 0 and 1 are used for dependent variable
Independence of both sampled groups	Here derivatives users and non users are independent.
Normality test	Table 2 and 3 show non normally distribution of data.

Before the Mann Whitney U-test is used, the data must pass its basic assumptions. Table **1** examines the basic assumptions of the Mann Whitney U-test.

Mann Whitney U-test assumes that the dependent variable of the study should have an ordinal or binary value. As binary values, 1 and 0 are used as dependent variables for interest rate derivative users and non-users, respectively. Mann Whitney U-test also assumes that the observations of the two groups sampled should be independent of each group. The study data set consists of two independent groups, i.e. users of interest rate derivatives and non-users. In the current study, there is no intersection between the data of both groups, which means that the participants or the observations of one group are different from the other and independent of each other. The third assumption of the Mann Whitney U-test is that the data should not be distributed normally. The normality test was used while checking this assumption. The results in Table **2** and Table **3** show that all non-parametric test assumptions are passed on to the data.

Table 2. Normality Test for Interest Rate Derivative Users.

Variables	Kolmogrovo-Smirnov		Shapiro-Wilk	
	Statistic	P-Value	Statistic	P-Value
FDC	0.526	0.000	0.159	0.000
INC	0.157	0.000	0.897	0.000
SIZE	0.059	0.009	0.961	0.000
AGCF	0.179	0.000	0.867	0.000
ROA	0.098	0.000	0.985	0.002

Table 3. Normality Test for Interest Rate Derivative Non Users.

Variables	Kolmogrovo-Smirnov		Shapiro-Wilk	
	Statistic	P-Value	Statistic	P-Value
FDC	0.472	0.000	0.104	0.000
INC	0.330	0.000	0.803	0.000
SIZE	0.071	0.001	0.976	0.000
AGCF	0.128	0.000	0.893	0.000
ROA	0.103	0.000	0.984	0.001

For an in-depth analysis of the data, the normality of the data was checked to meet the basic assumption of the Mann Whitney U test. Kolmogorov-Smirnov & Shapiro-Wilk tests are used for normality purposes. The null hypothesis of the Kolmogorov-Smirnov and Shapiro-Wilk tests assumes that the data is normally distributed. Table **2** and Table **3** show a significant p-value for both normality tests for all interest rate derivative variables, both users and non-users. The p-value < 0.05 of the Kolmogorov-Smirnov and Shapiro-Wilk tests for all variables rejects the null hypothesis. Thus, the normality table indicates that the data is not normally distributed.

Table 4. Difference between interest rate derivatives users and non-users.

Variables	Mean Non Users	Mean Users	Mann Whitney U Test (Z- Value)	Sig. P-Value
FDC	316.52	328.48	4.992E4 (-1.996)	0.046
INCOV	246.81	398.19	2.747E4 (-10.615)	0.000
SIZE	214.31	430.69	1.700E4 (-14.758)	0.000
AGCF	286.39	358.61	4.021E4 (-4.943)	0.000
ROA	338.56	306.44	4.667E4 (-2.193)	0.028

Table **4** shows the difference between average users of interest rate derivatives and non-users. The findings of the study are more likely to favor the available literature and show consistent results for earlier research work (Hui, *et al*. (2020), Lili, *et al*. (1919), Sohnke M. B. (2019), by Yesildag (2019), Pinghsun, *et al*. (2017) shows that interest-rate derivatives firms are financially distressed, have a large, high interest-coverage ratio and are more capable of converting growth options into assets. Yesildag (2019) conducted a study on non-financial firms in the BIST 100 index operating in Turkey to identify differences between derivative users and non-derived users. For this purpose, 58 companies, which were continuously in existence in the index from 2013 to 2018, were analyzed. The results of the study show that only half of the companies used derivatives to hedge risk, including currency risk, interest risk, credit risk, liquidity risk, and other types of risk. It was also noted that most of the derivatives were used by liquid and large companies.

Results explain that interest rate derivatives users have significantly higher financial distress costs (348.48) compared to non-users (316.52). Smith and Stulz (1985) conducted similar studies and identified a significant difference in the cost of financial distress (FDC) for derivative users and non-utilisers. The higher interest-bearing ratio for users (398.19) compared to non-users (246.81) defines the ability of users to pay

their financial costs. The value of firm size for users (430.69) versus non-users (214.31) is aligned with the market conditions for Pakistani derivatives. Iqbal *et al*. (2014) found similar results for firm size while studying the Pakistani derivatives market. Assets growth cash flow for users has a higher value (358.61) indicating that users are more likely to convert their growth into assets than non-users with a higher value (286.39). However, in terms of profitability, the results are consistent with the Iqbal *et al*. study (2014) and show that the profitability of users (306.44) is significantly different from that of non-users (338.56) of interest rate derivatives.

Table 5. Logistic Regression Results.

Variables	B	S.E	Wald	P-Value
FDC	18.968	3.63766	11.245	0.001
INCOV	0.533	0.055	67.489	0.000
SIZE	2.428	0.286	114.612	0.000
AGCF	0.395	0.118	10.387	0.001
ROA	-3.048	1.360	6.478	0.011
Constant	-28.593	4.085	23.995	0.000

McFadden R-squared= 0.448918

The logistic regression results are presented in Table **5**. Since the dependent variable is represented by binary digits 1 and 0, the Logit model was used to identify the determinants that influence the firm's decision to use interest rate derivatives. The value of R2 (0.448918) shows that 44.89 percent variation has been explained by independent variables (McFadden, 1974). It can be argued that financial distressed costs, along with firm size, contribute too much to the use of interest rate derivatives. The sign for the cost of financial distress coefficients, the size of the firm, the cash flow growth of assets, and the return on assets are consistent with the hedging theory. Whereas, the positive sign of the interest-bearing ratio contradicts the hedging theory.

The cost of financial distress has a significantly positive relationship with interest rate derivatives. Financially distressed firms are using interest rate derivatives. Similar findings have also been documented by Hahnenstein, L. *et al*., (2020) by presenting a new approach to the theory of financial distress costs and derivatives testing in the German context. The results of the study explained a significant proportion of the hedging ratio differences. The study's analysis supported the financial distress cost theory of corporate hedges from a financial intermediary perspective. Nguyen and Faff (2002) studied the use of derivatives and their determinants in the Australian context and found that most Australian corporations reduce their expected cost of financial distress through frequent use of derivative instruments. Financial distress theory states that financially distressed corporations often use derivative instruments to hedge risk.

The positive sign of the firm size coefficient supports economies of scale and indicates a significant positive relationship between the firm size and the use of interest rate derivatives. Aligned with the Yesildag (2019), Allayinnis and Opek (2001), Schiozer and Saito (2009), and Afza and Alam (2011), the trend in the use of hedged derivative instruments is more evident in large-scale firms. It is easy for larger firms to pay the initial costs of setting up the derivatives market. As larger firms have set up heavy fixed costs, it is, therefore, necessary for them to use derivatives to protect themselves against this enormous fixed cost. Yesildag's study (2019) also concluded with similar remarks and argued that most large and liquid turkey firms hedge their risk (interest rate risk, currency risk, credit risk) through the use of a derivative instrument.

The result shows a positive and significant relationship between the ability of the firm to pay its financial costs and the use of interest rate derivatives. The more companies can pay their interest costs, the more interest rate derivatives they use. Afza and Alam (2011) also concluded similar results and argued that the positive relationship between interest coverage ratios contradicts the hedging theory. To avoid an unexpected situation and negative consequences, some firms can pay their interest costs but still use hedge instruments. Adedej, Baker, (2002) studied 140 U.K. firms and found that the high-interest rate coverage ratio is an important determinant that motivates corporations to use interest rate derivatives. Hui *et al*. derived similar results. Hui *et al*. (2020) studying interest rate derivatives and interest rate risk exposure. The study argued that firms with more exposure to interest rate risk are more likely to use interest rate derivatives.

Nance *et al*. (1993) studied hedging policy determinants and identified that corporations capable of converting their growth potential into assets use risk-based hedge instruments. In support of the findings of Nance *et al*. (1993), the results of the current study show a positive and significant relationship between the growth option and the use of derivatives.

The results show a significant negative relationship between profitability and interest rate derivatives. Result provides evidence that firms with lower profitability tend more to use interest rate derivative instruments. Kritzman (1993) studied hedge policy. His finding suggests that to minimize risk, investors must be willing to sacrifice their expected return. Due to a better position, profitable firms are expected to feel no need for the use of derivative instruments. Similar to Jerome, G. K. (2020) analyzed the effect of corporate financial holdings on firm value using a meta-regression analysis. The results of the study show that the firm value effects of hedging are greater for foreign exchange derivative users than for interest rate and commodity price derivatives. Results derived by Yung M. S. (2020) applied three structural model equations to examine non-life insurers in the United Kingdom and found that those insurers using more derivatives tended to have lower financial performance. It was also found that insurers with a high loss ratio also showed lower financial performance. However, Chee, K. L (2016) studied the use of corporate derivatives and their impact on firm performance. A two-stage regression model was used to estimate performance at the same time. It was found that the use of derivatives is negatively associated with the company's market value. Besides, firms with a lower operating income margin were found to use derivatives to save their small margin and thus avoid potential financial risks.

The overall result shows that the cost of financial distress, the size of the firm, the interest rate coverage ratio, and the cash flow growth of assets have a positive relationship with the use of interest rate derivative instruments. While asset returns show a significant negative relationship with the use of derivatives.

5. CONCLUSION AND RECOMMENDATIONS

Conclusion

The use of corporate interest rate derivatives for risk management has increased rapidly over the last few decades. The current study investigated the determinants of corporate hedge policy and the use of interest rate derivatives by non-financial firms in Pakistan. The study also analyzed the difference between interest rate derivatives users and non-interest rate derivatives users.

There was a significant difference between users of interest rate derivatives and non-users. The study concluded that, compared to non-users, users are financially distressed, have a high-interest rate coverage ratio, large size, and have a high value for asset growth cash flow. However, the results did not favor users in terms of profitability compared to non-users. Empirical findings of logistic regression confirm and endorse the earlier study (Smith and Stulz, 1985). Findings supported financial distressed costs as a key determinant

of hedge policy for non-financial firms in Pakistan. Financially distressed corporations are more likely to use hedge instruments for risk management purposes. Besides, corporations that can pay their financial costs tended to use interest rate derivatives. Although the results for the interest coverage ratio contradict the hedging theory, similar results have been concluded (Afza and Alam, 2011) and argued that to avoid any unexpected situation and negative consequences, some companies can pay their interest costs but still use hedging instruments. There is a positive relationship between the cash flow growth of assets and the use of derivatives. However, the return on assets shows a significant negative relationship with the use of interest rate derivatives.

Recommendations

The study will help academics identify determinants of corporate hedge policies in developing countries such as Pakistan. Besides, it will enhance the available literature and guide researchers in a specific direction that needs further study.

For policymakers, the current study recommends that they develop an organized market for interest rate derivatives, so that economically troubled, large firms with less profitability can benefit from effective use hedge policies. As a result, together with securing them against risk, it will also lead to increased economic growth

The current study will improve the understanding of derivatives market decision-makers. It will also provide them with insight into their decision-making process on the use of interest rate derivatives. It also provides a path for decision-makers that less profitable and financially distressed firms can enhance their value by using interest rate derivatives.

Limitations

The current study was initiated in 2013-2014 and, as a result, data were available from time to time until 2012, so the data used in the study is for the period 2006-2012. However, the study is further refined in the light of recent literature to support the results. The sample was limited to 92 firms due to the limited use of interest rate derivatives by non-financial firms. The sample includes users and non-users of interest rate derivatives who are equally proportionate. Since there is no proper source that shows a list or number of derivative users, a convenient sampling technique was used to select interest rate derivative users (Kumar, 2005).

Future Direction

Future research could be undertaken by taking on a notional amount of interest rate derivatives. Further study is needed to explore the extent of interest rate derivative use in specific sectors, such as the textile industry, the banking sector, and the like, to gain a better understanding of interest rate derivatives. A comparative study of the financial and non-financial use of derivatives can be conducted to see both sides of the picture. Further study can also be carried out using up-to-date and updated data for better results.

DISCLOSURE

This paper is extracted from author's own research thesis.

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