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Interest Rate Risk Management by Financial Engineering in Pakistani Non-Financial Firms

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Abstract

The study aimed to investigate firm decisionsofusing interest rate derivatives and factors affecting this decision. Study is conducted by selecting data of 191 non-financial sector companieslisted on PSX from 2010 to 2015.Logit model was employed to detect contribution magnitude of foreign sales, profitability, leverage, liquidity, price to earnings, interest coverage ratio and dividend payout towards decisions by firm of using the interest rate derivatives. The expected users of interest rate derivatives for purpose of interest rate exposure management were the firms with high foreign sales,lesser leverage, low profits,low dividend payout ratio andlow interest coverage ratio. The examination concludes that these derivatives are financial engineering tools and serve as immunization instruments for a firm from anticipated future financial risk.

Keywords: Risk management, Interest rate derivatives, Foreign sales, Hedging, Panel logit model

Introduction

In past few decades, various businesses expanded worldwide because of development in financial reforms and growing globalization (Donohoe, 2015). Factors such as economic liberalization, elimination of free trade blocks, relaxingrestrictions on wealth and economic movement supported the evolution of worldwidecommerce (Giambona, Graham, Harvey, &Bodnar, 2018). On oneside, company's profitability rapidly increases after entry in international market and at same time companies face numerous financial risksleading to increased uncertainty in cash flows (Khan, Khan, Mahmood& Sheeraz,2019). Businesses,therefore, shifted their focus on risk controlling strategies in order to deal with this

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cash flowsuncertaintyresulting from unexpected variations in interest rate exposure (Lundqvist&Vilhelmsson, 2018).

Circumstances like the financial crunch of 90's and mega financial disaster in USin 2007(U.S. Department of the Treasury, 2012)not only triggered but amplified interest rate exposure for businesses in general, and international traders in particular. Furthemore, factors such as political and economic instability played a vital role in making currencymovementsextrasubtleemerging from exposure of interest rates thus increasingtrade of interest rate derivatives in Asian countries. ISDA (2018) reported that practice ofusing derivatives for interest rate risk management hasincreased substantiallyfrom $69.2 Trillion in 2001 to $563 Trillion in 2014 signifying a dramatic hype of 813% overall.

The enormous increase in usage of interest rate derivatives has encouragedinvestigators to studyafter effects emerging from usage of interest rate derivatives for managing the risk to equip with interest rate volatility (Geyer-Klingeberg, Hang, &Rathgeber, 2019).Current research analyzes the elements affecting the usage of interest rate derivatives as company's risk management strategy by incorporating data from non-financial sector of 191 companies for the period 2010 to 2015 listed at PSX.Pakistan being a developing country is exposed to higher political and economic uncertainty in comparison to developed countries, and thereby are more susceptible towards derivatives usage for hedging interest rate volatility. Also, it has been observed that Pakistani Financial Institutions are less conscious of the paybacks of the derivatives and more cautious to use them, even though they face high-interest rate exposure, high market instability and transaction cost (Bashir, Sultan &Jghef, 2013). The study aims to analyzecontribution by magnitudeof foreign sales, profitability, leverage, liquidity, price to earningsand dividend payout influence upon the usage of risk hedging financial instruments. Currentinvestigation will guide to non-financial firms that they can minimize their interest rate exposure by using interest rate derivative instruments (Bashir, Sultan &Jghef, 2013).

Literature Review

Risk minimization by portfolio diversification is an established concept where investorscombine variety of assets, stocks, securities etcinto the portfolio. Perfect market situations explained by Modigliani and Miller (1958) suggested zero contribution by derivatives in risk minimization.Markowitz (1952) notion prevailed for diversifiable riskand later studies suggested that operating features such as managerial holdings, liquidity constraints, growth opportunities, tax convexity and

higher financial distress cost, are capable of increasing firm value by using hedging techniques in an optimal way, (Smith &Stulz, 1985; Donohoe, 2015; Muneer, 2015).

Few studies found that firm's value can be enhanced by usage of financial derivatives in partially imperfect markets. Afza and Alam (2011)found that firm with high foreign sales have high tendency of using foreign exchange derivatives to reduce exchange rate exposure. Moreover, another studyconcluded that highly financially distressed firms face financial constraints after extensive use of foreign exchange derivatives(Donohoe, 2015).

Froot, Scharfstein and Stein(1993) concluded that organizationshavingfinancial constraints but advanced growth opportunities are best suitable to choose derivatives for hedging risk volatility. Positive impact of dividend payout and size but negative impact of leverage and liquiditywas found on foreign exchange risk (Muller and Verschoor,2007).

Faizullah, Azizan and Hui, (2008) also found positive impact of leverage and financial distress cost on firm's choice to buy risk hedging financial instruments. Another study took sample of gold mining firms and found no significant effect and large size firms were found more likely to hedge than small ones. Malaysianfirms were found high user of derivatives to face risk exposure arising from volatility in earning per share but detected insignificant relationship with usage of risk hedging financial instruments, signaling that country have an established capital market and the Malaysian corporations are much diversified geographically than the Pakistani corporations. However, significant relationship was detected between Pakistani firm's consumption of risk hedging financial instrument and firms Value.(Adam, 2002; Alam and Afza, 2017;Geyer-Klingeberget al., 2019).

Buyukkara et al., (2019) found support for financial distress hypothesis of hedging instead of agency cost or investment opportunities hypotheses in Turkish market.Ameer (2010) empirically found that firms with higher foreign sales and growth opportunities were more likely to use derivative with strong inclination towards use of derivative instrument for foreign exchange exposure.

Alam, and Gupta, (2018) reported that firms engaged in hedging practices face lesser decline in their values in comparison to non-hedgers even during the crisis period. Similarly, for USA financial markets, Borokhovich, Brunarski, Crutchley and Simkins (2004) found significant positive impact of debt on consumption of risk hedging financial instruments and firms with higher outside holdings were most probable usersderivatives. Haushalter (2000), Mian (1996) and Horng and Wei

(1999) found positive impact on usage of risk hedging financial instruments by the company's debt ratio whereas few other studies found reverse phenomenon (Geczy,Minton & Schrand, 1997). Nance,Smith, &Smithson(1993) detected positive coefficient for tax convexity, growth opportunity and sizewhereas, Donohoe, (2015), Horng and Wei (1999) and Mian (1996) documented opposite evidence for tax convexity, growth and firm size.

Research Methodology

Sample and Data

The data constituted of two clusters, one is users of interest rate hedging financial instruments and others is non-user, to differentiate between consumers and non-consumers in their operating features, and logit model is used to testdata of 191 firms from non-financial sector for the period 2010 to 2015, listed atPSX as per availability from their annual reports available online.

Procedure

Following equation is used to test interest rate hedging financial instrument usage for firm risk immunization:

$$DERIV_{it} = \alpha + \beta_1 DP_{it} + \beta_2 FS_{it} + \beta_3 INCOV_{it} + \beta_4 LEV_{it} + \beta_5 LIQ_{it} + \beta_6 PE_{it} + \beta_7 ROE_{it} + e_{it} \ldots (1)$$

Table 1: Description of Variables

Symbols	Variables	Description
DERIV	Interest rate derivative usage	Dummy "1" if firm use interest rate derivative instruments and "0" otherwise.
DP	Dividend Payout	DPS/EPS
FS	Foreign Sales	Log of foreign sales
INCOV	Interest coverage	EBIT/Interest expense
LEV	Debt to Asset ratio	TD/TA
LIQ	Liquidity ratio	CA - inventory /CL
PE	PriceEarnings ratio	MPS/EPS
ROE	Return on Equity	Net Income/Total equity

Analysis and Findings

Logit model is applied to analyze the elements affectingcompany'schoice to use the interest rate derivatives. The signs (+/-) of the coefficient demonstrate the nature of relationship between the possibility of hedging and respective independent variable. Whereas, due to minor change in the independent variable, the multiple of marginal outcome and the extent of minor change in the that variable shows the magnitude of increase or decrease in the likelihood of hedging.

Table 2. Correlation Matrix

Var	DP	INCOV	FS	LEV	LIQ	PE	ROE
DP	1						
INCOV	0.021	1					
FS	0.077	-0.074	1				
LEV	0.094	-0.060	0.861	1			
LIQ	-0.009	0.216	0.126	-0.188	1		
PE	0.936	-0.020	-0.073	-0.075	-0.071	1	
ROE	0.132	0.184	0.314	-0.264	0.277	0.049	1

Table 3. Logit Regression

Variables	Predicted Signs	Coefficient	p-value
DP	-	-0.472	0.0606
FS	+	0.037	0.0017
INCOV	-	0.256	0.0331
LEV	+	0.011	0.0404
LIQ	-	0.235	0.5854
PE	+	-0.195	0.0355
ROE	-	3.644	0.0415

The findings support previous studies and theories for impact of foreign sales, profitability, interest coverage ratio and leverage however findings about liquidity and price to earning signs are contrary to the financial distress theory whereas debt ratio have a positive impact upon firm's probability ofusing derivative (Nguyen and Faff,2002; Nguyen and Faff,2003; Nance et al., 1993). Therefore, it is concluded that greater debt ratio increases financial distress and leads to increase in cost of hedging, thereby making it unavoidable for a highly leveraged firm to bear greater risk management cost.

Furthermore, negative effect of dividend payout ratio is found on derivative usage ability of firm, again supporting the signalling theory. Companies facing comparatively greater cash flow fluctuations are more likely to reduce dividend payout and thus show a smaller DP ratio at their year-end signaling an economic situation frailtyof the firm (Sprcic&Sevic, 2012). Most Likely the companies with high foreign sales, high financial distress cost,less debt ratio, DP ratio, CR (ratio) and profits (ROE)are highly susceptible users of interest rate derivatives for managing interest rate volatility faced by them.

Conclusion

Generally, debate isthat transformation of a state's political & economic situation generate fluctuations in rates of interest, thereby increasing firm risk level leading towards usage of interest rate derivatives by majority companies for risk immunization while maximizing firm wealth. Risk management theories sustain for returns, profits and the financial distress cost but nullified for DP ratio against theory of the hedging, whereas consistent with the signaling theory. The firm's overseas revenue has a positive impact on the firm's choice to use the interest rate hedging financial instruments, regardless of the amateur Pakistani derivative market. By using the interest rate hedging financial instruments the firm have benefit as it borrows money as the lower cost of interest, because of this the firms are easily able to pay the cost of borrowed money in the following years.

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