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HEDGING AND FIRM VALUE IN INDIAN MANUFACTURING COMPANIES

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ABSTRACT

The practice of hedging using derivatives by firms and its impact on the value of the firm has received much attention in the last few years. Its main motive is to study the relationship between hedging and firm value. This study focuses on the hedge effectiveness of financial derivatives used by BSE500 listed Indian manufacturing companies. The entire sample for the study was made up of 1845 firm year from 2016-2022. It also focuses to conclude if the results are consistent among the subsamples of large & small companies. Using Tobin's Q as a measure of firm value and by employing different models; we find a positive and significant impact of derivatives use (hedging) on the firm value. We also find that within the subsamples the hedgers have a higher hedging premium as compared to the non-hedgers.

KEYWORDS: *Hedge effectiveness, firm value, derivatives, Tobin's Q.*

INTRODUCTION

Corporate Risk Management (CRM) has emerged as a very important practice among companies for assessing, managing and optimizing risks. It also resulted in the development of various risk management techniques which could add value to the firm. Almost all firms make use of financial contracts as a part of corporate risk management. They enter into contracts that can fix the price of raw materials, output, the foreign exchange rate, etc. Such financial contracts are collectively known as 'derivatives' and such instruments derive their value from their underlying assets. It is seen that out of the world's 500 largest companies, most of them made use of derivatives to manage different types of risks. Majority of them use derivatives for hedging currency risks, followed by interest rate risks and commodity risk.

However, a classical finance theory given by (Modigliani & Miller 1958) posits that financial transactions undertaken solely for reducing risk will not add any value to the firm in the presence of perfect capital and efficient market conditions. Yet, some evidence has shown that in the real world with imperfect market conditions, such derivative contracts can add value. Conditions like presence of taxes, agency problems, financial distress, underinvestment, etc. can help in value addition. Many previous works have focused on the effect of the use of derivatives and the value of the firm but the results are mixed as well as conflicting. Through this particular study, we are reassessing the effect of derivatives use on the value of the firm in the Indian context. Most of the previous studies were conducted in the developed countries like U.S., U. K., China, etc. and very little evidence is available focusing on developing nations including India.

The Indian Derivatives Market has also evolved a lot in the last few decades as it gave a new investment options for people. Originally the farmers were in need of such derivative instruments to protect themselves from the risk of fluctuations in the price of their crops. Later on a number of organised commodity future exchanges were set up. However, in the year 1952 government put a ban on the trading of options and other derivative instruments. It was in the last two decades that the government has liberalized the futures trading and also introduced the national electronic exchanges. After the liberalization, the derivatives market has grown rapidly.

The annual reports of the Indian companies are the main source of derivatives information useful for various shareholders, investors, financial analysts, etc. However, the disclosure of such financial derivatives instruments is not done in a detailed and consistent format. The disclosures mostly appears in the notes to financial statements. Moreover, complete disclosure of derivative position is not a mandatory requirement for firms in India and firms do it voluntarily. Even though there is no obligation on the part of Indian firms for disclosures but still it was seen that over the years the financial derivatives disclosure has increased a lot. Many countries around the world have introduced Accounting Standards for derivatives in order to improve the disclosure process. For example- in United States (US) the Financial Accounting Standards Board (FASB) issued statement 133 and 137 in this regard, United Kingdom (UK) issued FRS 13, etc. After the introduction of such mandatory standards, the disclosure of derivatives process has improved in those countries. TheIndian government is also now working on to align our accounting standards with global standards and improve the overall disclosure and reporting norms.

REVIEW OF LITERATURE

According to Modigliani and Miller (1958) in the presence of perfect capital market conditions, risk management has no value addition, as the shareholders can manage their risks themselves. An alternate view (e.g. Smith and Stulz 1985) states that corporate hedging can enhance firm value by reducing the risk of cash shortfalls or financial stress, reducing

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the bankruptcy costs, asymmetric information, costly external financing, taxes and agency costs. Empirical tests on this topic have given conflicting results.

Early evidence (Allayannis and Weston 2001) has shown the positive effects of the use of Foreign Currency Derivatives (FCD) for hedging on the firm value. The paper revealed 4.87% higher firm value for non-financial firms which have foreign sales and undertake hedging activities as compared to firms without foreign sales. It was also found that firms that begin hedging exhibit a higher value than the non-hedging firms. Bartram et al (2006) used a sample of 6888 non-financial companies and found that the use of FCD and Interest Rate Derivatives (IRD) increases the firm value. Adam and Fernando (2006) reveal positive cash flows for gold mining firms from the use of derivatives, which would result in increased shareholder value. However, there is no evidence of reduction in the systematic risks of such gold mining firms. The use of derivatives to hedge fuel price risk by the airline industry has also been shown by Carter et al (2006) to increase the firm value. In the study conducted by Bartram, Brown, and Conrad (2011) it was found that after employing the propensity score matching technique hedging increases the firm value. The study initiated by Bae, Kim & Kwon (2017) focused on Korean firms. They found that firms with low exposures and manageable risk undertaking FCDs for hedging experience an increase in the firm value. However, there is not much significant reduction in the risks of those firms. Operational hedging along with the financial hedging activities also increases the shareholder's value of firms as is revealed by Allayannis & Weston (2001). Other studies which show the positive impact of derivatives use on the firm value include the works of Clark & Judge (2009), Zhou & Wang (2013), Leland (1998) &Froot, Scharfstein and Stein (1993). Clark & Judge (2009) states that hedge with financial derivatives taken against foreign currency debt increases firm value. The work of Zhou & Wang (2013) revealed that hedging activities when numerically disclosed to investors reduces the risk exposures and raise the value of the firm. Leland (1998) found that hedging increases a firm's debt capacity and thus it ultimately increases the firm value by increasing the debt tax shield. Froot, Scharfstein, and Stein (1993) also studied that hedging by reducing the costs of external financing also increases firm value.

But in contrast to this positive impact of derivative usage on the firm value some studies have concluded a negative or insignificant impact of hedging and firm value. Jin & Jorion (2006) by taking a sample of firms from the oil & gas industry found that there is no significant impact of hedging on the firm value. Firms with higher basis risk (arising due to imperfect hedging) or financial distress undertaking hedging activities face a reduction in the overall firm value that was revealed by Gilje and Taillard (2017). Santos, Lima, Gatsios and Almedia (2017) also revealed through their study that hedging does not add any value as companies use derivatives not for adding any value to the firm but rather for managing the cash flows. Again Fauver & Naranjo (2010) revealed that a firm with higher agency and monitoring problems faces a negative impact of hedging on the firm value. The work of Belghitar, Clark & Mefteb (2013) also showed that hedging has no significant impact on firm value. Nguyen and Faff (2010) concluded that there is a negative impact of derivative usage on firm value and is more significant for Interest Rate Derivatives.

Some of the studies also revealed ambiguous or conditional positive results. The study initiated by Law, Chee &Kwong (2016) revealed that hedging activities had a negative impact on the firm value measured by Tobin's Q but had a positive impact on Return on Equity (ROE) and Return on Assets (ROA). Bae, Kim and Kwon (2017) also concluded that hedging with more derivative use does not reduce any risk but it increases firm value. While for firms having high exposures, high foreign sales and foreign debt when undertake hedging activities experience lower firm value. The work of Jankensgard (2015) also said that centralised hedging activities lead to a higher firm value while decentralised results in no value addition. Treanor, Rogers and Carter (2014) found that in the airline industry hedging with more exposures experience no significant impact on the firm value. While on the other hand firms hedging with no exposure increases the firm value.

Thus, many articles have shown a positive impact of derivative use on the value of the firm which indicates that hedgers have a higher value as compared to the non-hedgers. While there are other articles that have concluded either a negative, insignificant or conditional positive relationship between the two.

Hypothesis Development

After going through the literature, we find that the impact of derivatives use on the value of the firm has not been conclusively determined. There can be a number of reasons for such conflicting and different results, such as incorrect set of control variables, differences in risks faced by firms, endogeneity issues in the model, choice of methodology, etc. This paper empirically investigates the same objective. We re-examine the impact of derivative use on firm value while attempting to avoid a recurrent issue in past studies, that of endogeneity and control variables. We do this by using different models to study the same underlying objectives. It may be hypothesized that:

Hypothesis 1: Hedgers have a higher firm value as compared to the non-hedgers.

Size has been known to influence the value creation by hedging (Nance et al. (1993), Geczy et al. (1997)). Mostly the larger firms are able to undertake more hedging activities by bearing the cost of hedging. Such firms by identifying and assessing the risks are able to hedge accordingly and have higher Tobin's Q as compared to smaller firms. Thus, it may be hypothesized that larger hedging firms have higher firm value as compared to smaller firms undertaking hedging activities. This leads us to the following hypothesis:

Hypothesis 2: Hedging adds more value to larger firms, than to smaller firms.

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METHODS OF STUDY

The scope of this study was restricted to BSE500 companies, as on financial year 2019. Out of those companies, only the manufacturing companies were selected for the study. From National Industries Classification 2008, industry codes 14 to 34, except 1412 (Production of milk from cows or buffaloes), 1410(Manufacture of wearing apparel) and 17093 (Manufacture of printing, writing and photocopying paper) were taken. A total of 205 companies were found appropriate for the study out of the top 500 companies. The data for these companies from 2016 to 2022 was considered for the study. So a total of 1845 firm years form a sample of the study.

The financial statements and the annual reports of the companies were obtained from ProwessIQ and BSE websites. Data related to the use of derivatives, types of derivatives used, etc. was extracted manually from the special notes of such annual reports. As in the Indian context, it is not a mandatory requirement for the companies to reveal the notional value of derivative contracts and to disclose the mark- to- market profits or gains arising out of such transactions so, many companies did not disclose the same. So there were companies who had revealed the use of derivatives for hedging as well as its different types but without any notional value of the contracts. So there is still a lot to develop in the information disclosure process of risk management. The rest of the data related to the companies was obtained from the ProwessIQ website. We employed a number of combinations of different variables in order to study the impact of derivatives use in the presence of different control variables. A variety of such models were studied in all the subsamples, however, for lack of space, we report only the following 5 models:

Model 1: $Leading\ Tobin'sQ(t+1)\alpha\ \beta_1 \cdot ROA + \beta_2 \cdot ROE + \beta_3 \cdot Leverage + \beta_4 \cdot Size + \beta_5 \cdot R\&D\ ratio + \beta_6 \cdot Dummy\ derivatives\ use$

Model 2: $Leading\ Tobin'sQ(t+1)\ \alpha\ \beta_1 \cdot ROA + \beta_2 \cdot Leverage + \beta_3 \cdot Size + \beta_4 \cdot R\&D\ ratio + \beta_5 \cdot Dummy\ derivatives\ use$

Model 3: $Leading\ Tobin'sQ(t+1)\ \alpha\ \beta_1 \cdot ROA + \beta_2 \cdot ROE + \beta_3 \cdot Leverage + \beta_4 \cdot Dummy\ derivatives\ use$

Model 4: $Leading\ Tobin'sQ(t+1)\ \alpha\ \beta_1 \cdot ROA + \beta_2 \cdot Leverage + \beta_3 \cdot Dummy\ derivatives\ use$

Model 5: $Leading\ Tobin'sQ(t+1)\ \alpha\ \beta_1 \cdot Tobin'sQ + \beta_2 \cdot Leverage + \beta_3 \cdot R\&D\ Ratio + \beta_4 \cdot Foreign\ sales\ to\ assets + \beta_5 \cdot Dummy\ Derivatives\ use$

For studying the relationship between the usage of derivatives (hedging) and firm value we have used variables similar to some of the previous studies. They are stated as below:

Dependent Variable: Leading Tobin's Q(t+1) is used as a measure of firm market value which is the leading year's Tobin's Q. Tobin's Q is calculated as a ratio of the (Market value of Equity + Book Value of Assets - Book Value of Equity) to the Book Value of Total Assets. It is selected as a measure of firm value as it is very simple, accurate and a very popular measure of representing the same. Tobin's Q = (Market Value of Equity + Book Value of Assets - Book Value of Equity)/ Book Value of Assets

Independent Variable: We have used a dummy variable as a proxy for measuring corporate hedging or the use of derivatives. [1] A dummy variable (1) for the use of either Foreign Currency Derivatives (FCD) or Interest Rate Derivatives (IRD) or Commodity Derivatives for hedging and (0) otherwise. We have used the dummies for measuring this variable because it is a more reliable proxy for measuring the use of derivatives for hedging.

Control Variables: There are also a number of control variables which can have an impact on the value of the firm. The details of such variables are stated below:

Profitability- Return on Equity (ROE) and Return on Assets (ROA) are taken as two proxies for measuring profitability or the financial performance of the companies. ROE = Net Income/ Total Equity. ROA = Net Income/ Total Assets

Size of the Firm- We have used natural log of total assets as a measure of firm size. Size= Natural log of total assets

Leverage- In our study we have used the ratio of total debt to total assets as a measure of leverage. Leverage= Total Debt/ Total Assets

Research & Development Expenses- The Research & Development (R&D) ratio is measured as a proxy for future or upcoming investment opportunities and identification of various possible risks. R&D Ratio= Research and Development expenses / Total Assets

Foreign Sales- The foreign sales to total assets ratio is taken as a proxy for measuring foreign sales of firms. Foreign Sales -to-Assets Ratio= Foreign Sales/ Total Assets

EMPIRICAL RESULTS AND DISCUSSION

The Table 1 gives summary statistics of main variables used in the study. It shows the mean values of all variables for the entire sample. It also reveals the means values for hedgers and non-hedgers separately. In addition to this the values of standard error of mean is mentioned within the brackets below each mean value. The last column reveals the t-statistics for both hedgers and non-hedgers. We perform our analysis separately by dividing the entire sample on the basis of size i.e., large (natural log of total assets > median) and small (natural log of total assets < median) companies.

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Table 1: Descriptive Statistics (Full Sample)

		Full	Hedgers	Non-hedgers	t-statistics
	N	Statistic	Statistic	Statistic	
Return on Equity (ROE)	1773	0.127	0.086	0.161	.696
		(0.038)	(0.065)	(0.006)	
Return on Assets (ROA)	1754	0.253	0.364	0.109	-.608
		(0.145)	(0.250)	(0.008)	
Size (Natural log of assets)	1813	10.443	10.669	10.336	-4.313
		(0.034)	(0.041)	(0.062)	
Leverage	1564	0.384	0.506	0.133	-.807
		(0.157)	(0.264)	(0.011)	
R&D Ratio	1845	0.011	0.014	0.010	**-2.201***
		(0.001)	(0.001)	(0.001)	
Foreign sales-to-assets ratio	1845	0.816	1.324	0.103	-.639
		(0.646)	(1.147)	(0.014)	
Tobin's Q (Firm Value)	1813	3.768	3.525	3.784	.236
		(0.387)	(0.657)	(0.213)	
Leading Tobin's Q(t+1)	1611	4.071	4.024	3.737	-.427
		(0.247)	(0.388)	(0.235)	

We started our hypotheses tests by comparing mean firm values of hedgers and non-hedgers. For large companies, it can be seen from the Table 2 that the hedgers have a significantly (t= 2.7) higher firm value (Tobin's Q) than the non-hedgers. For small companies also the mean firm value of hedgers was higher as compared to non-hedgers but it was not statistically significant. It ultimately shows that whether it is a case of small or large companies the hedgers have a higher firm value (Leading Tobin's Q) as compared to that of non-hedgers. But when compared between large and small companies, the small companies have a higher firm value compared to the larger ones. The possible reason for this is that as small firms have smaller risk exposures and manageable risks, so hedging becomes more effective in adding more value to smaller firms.

Table 2: Descriptive Statistics (Large Companies) and (Small Companies)

	LARGE			SMALL		
Derivatives Dummy	**Hedgers**	**Non Hedgers**	**t-statistic**	**Hedgers**	**Non Hedgers**	**t-statistic**
Return on Equity (ROE)	0.024	0.139	0.511	0.160	0.179	1.207
Return on Assets (ROA)	0.086	0.060	**-1.798****	0.710	0.146	-0.68
Size (Natural log of assets)	11.566	11.442	-1.454	9.568	9.545	-0.409
Leverage	0.191	0.111	**-5.071***	0.903	0.151	-0.8
R&D Ratio	0.015	0.009	**-1.345***	0.013	0.011	-0.75
Foreign sales- to- assets ratio	0.141	0.058	-1.28	2.803	0.137	-0.708
Tobin's Q Firm Value	2.926	1.890	**-2.784*****	4.261	5.138	0.413
Leading Tobin's Q(t+1)	2.723	1.714	**-2.472****	5.538	5.092	-0.368

Finally, in order to study the relationship between the derivative's use and firm value we have used five different models by using different combinations of control variables. Table 3 shows the results of regression analysis showing the impact of the use of derivatives on the value of the firm using the full sample. It reveals that in all the first four models there is a positive and significant impact of the use of derivatives on the leading Tobin's Q. The coefficients state that the hedging contributes positively to firm value.

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Table 3: Regression of derivatives use (dummy) on Leading Tobin's Q (t+1)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Return on Equity (ROE)	-0.047		.021		
	0.165		.166		
Return on Assets (ROA)	**9.089*** **	**8.993*** **	**2.656***	**2.679***	
	1.919	1.888	1.127	1.111	
Size (Natural log of assets)	**0.180** **	**0.179** **	**.228*** **	**.228*** **	-.007
	0.063	0.063	.063	.063	.026
Leverage	-1.811	-1.757	**-2.737***	**-2.761***	**2.157*** **
	1.168	1.152	1.165	1.148	.034
R&D Ratio	13.548	13.688			**-7.940***
	9.172	9.155			3.387
Foreign sales- to- assets ratio	**-1.564*** **	**-1.555*** **			
	0.335	0.333			
Tobin's Q (Firm Value)					**.930*** **
					.012
Dummy Derivatives Use	**0.537***	**0.536***	**.640***	**.641***	-.011
	0.257	0.256	.260	.259	.104
Adjusted R^2	0.129	0.130	0.102	0.102	.854

The coefficients of some of the control variables are also significant. It is seen that the more profitable firms i.e., the firms with high ROA have a higher value of leading Tobin's Q; size also has a positive and significant coefficient with leading Tobin's Q stating that larger firms have a higher firm value; firms with more amount of leverage have a lower firm value due to the increase in the financial distress of firms; negative and significant coefficient of foreign sales ratio and firm value states that firms with more foreign exposures have lower firm value; current year's firm value is related to last year's firm value as seen from the coefficient of the last model 5. But only in case of R&D ratio, we have a very contrasting and opposite results i.e., the negative impact of R&D expenses on the firm value.

We conducted the same analysis again by undertaking the subsamples of large and small companies and also controlling the same set of control variables. The results of the analysis are reported in Table 4 and Table 5, respectively.

Table 4: Regression (Large Companies) of derivatives use (dummy) on Leading Tobin's Q (t+1)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Independent Variable	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q_{t+1}
Return on Equity (ROE)	**-.204*** **		**-.170*** **		
	.044		.046		
Return on Assets (ROA)	**23.565*** **	**22.497*** **	**18.519*** **	**17.908*** **	
	1.075	1.069	.857	.850	
Leverage	-.234	.325	-1.080	-.561	-.399
	.695	.696	.716	.710	.511
R&D Ratio	**-24.715*** **	**-23.068*** **			**-9.465*** **
	3.349	3.390			2.129
Foreign sales- to- assets ratio	.152	.151			.045
	.146	.149			.110
Tobin's Q Firm Value					**.926*** **
					.026
Dummy Derivatives Use	**.346*** **	**.330** **	**.417*** **	**.401*** **	.099
	.066	.068	.069	.069	.051
Adjusted R^2	0.618	0.604	0.582	0.573	.783

The results of the subsample of large companies are somewhat similar to that of the full sample. It also reveals that large hedging firms using derivatives have a higher firm value as compared to large non-hedging companies. It is also found that large profitable companies with higher ROA have a higher firm value; R&D ratio is again negatively and significantly related to the firm value. But there was a contradicting result stating a negative relationship between the ROE and firm value. The possible explanation for this is that ROE (control variable) and

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leading Tobin's Q (dependent variable) are arithmatically related, giving rise to co-linearity.

Table 5: Regression (Small Companies) of derivatives use (dummy) on Leading Tobin's Q (t+1)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Independent Variable	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q_{t+1}
Return on Equity (ROE)	3.924		**6.457***		
	3.111		3.015		
Return on Assets (ROA)	5.380	6.925	-.289	.365	
	4.204	4.024	1.913	1.895	
Leverage	.020	-.462	.281	-.387	-.078
	1.999	1.964	1.977	1.959	.616
R&D Ratio	44.398	43.218			5.067
	24.947	24.944			8.329
Foreign sales- to- assets ratio	-1.155	**-1.384***			**.464****
	.719	.696			.128
Tobin's Q Firm Value					**.934****
					.017
Dummy Derivatives Use	**1.331*****	**1.533*****	**1.570*****	**1.945*****	.134
	.337	.297	.330	.281	.118
Adjusted R^2	0.115	0.114	0.096	0.090	0.864

In case of small companies also we found that the use of derivatives has a positive impact on the value of the firm. Small profitable companies having higher ROE also have a higher firm value which is as expected initially in our study. The positive coefficient of Tobin's Q and leading Tobin's Q states that current year's Q is affected positively by the last year's Q. So the above stated results in all the various tests are consistent with the initial hypotheses that hedgers have a higher firm value as compared to the non-hedgers.

CONCLUSION AND POLICY IMPLICATIONS

This paper studies the relationship between the use of derivatives for hedging and the value of the firm of BSE500 listed Indian manufacturing firms. The study was conducted for a period ranging from 2016-2022. Using leading Tobin's Q as measure of firm value, we found a positive and significant impact of derivatives use on value of the firm. The results were also significant and consistent within the subsamples of large as well as small companies. We also found that small companies using derivatives have a higher firm value as compared to the large companies. As they are small and have manageable risk exposures, the use of derivatives ultimately adds value to the firm. The results are also robust to various control variables (profitability, size, foreign sales, leverage, and R&D expenses). Thus, the paper sheds light on the consistency of basic fundamental hedging theory and reveals the positive relationship between hedging and firm value.

According to the Companies Act, 1956 the risk management of enterprise was not mandatory. However as per the new law enacted in 2013, all the firms were required to comply with the specific requirements related to risk management. It also specified the framework and provided guidelines to define, measure, report, control and mitigate the identified risks. As the Companies Act mandates risk management and reporting, we investigate whether there is a need to prescribe hedging (risk management) to companies, when investors themselves can take a hedge. In India firms are able to hedge over and above what the investors can. It may be partly due to the restrictions imposed on the use of contracts such as FCDs by entities and individuals not directly exposed to foreign currency risks. There is also a large amount of transaction costs involved in undertaking such contracts which again restricts the investors from hedging. The presence of information asymmetry among the investors also limits the ability of individual investors to hedge of their own. Until these asymmetries between investors and firms remain, it may be prudent to prescribe risk management through regulation such as Companies Act 2013.

FUTURE GUIDELINES

We plan to empirically investigate the explanations stated in the above section as well as a few other unanswered questions. We also want to explore more on auto regression of Tobin's Q and the possible methods of dealing with such issues. The reasons for completely conflicting results for various control variables such as R&D expenses, foreign sales ratio, etc. can also be studied. It can also be seen if the results are consistent with in other industries too.

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