Article

On the Determinants of Derivative Usage by Large Indian Non-financial Firms

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B. Charumathi
Hima Bindu Kota

Abstract

Corporations in India, as in the rest of the world, use hedges to protect themselves against a quartet of exposures: swings in interest rates, commodity prices, foreign exchange rates and equity values. In the wake of the global financial crisis and significant losses on derivatives transactions announced by Indian companies recently, a study on the determinants of derivative usage by these companies is especially significant. This paper examines the factors which determine the usage of derivatives by large Indian non-financial companies. It is found that a total of 121 large Indian non-financial firms use derivatives. Taking 173 data points (49 companies in 2007, 68 companies in 2008, 56 companies in 2009) which have disclosed the derivative data in their annual reports, this study uses cross sectional panel data for three years from 2007 to 2009 and applies a multiple regression model. For this purpose, the firm-specific characteristics such as financial distress cost, underinvestment cost, multinationality, economies of scale, firm size and agency variables are regressed against the notional amount of derivatives reported for hedging activities. It is found that size is the major determinant of the derivative usage by large Indian non-financial companies.

Keywords

Derivative usage, financial distress, underinvestment, size, multinationality

Introduction

Corporations in India, as in the rest of the world, use hedges to protect themselves against a quartet of exposures: swings in interest rates, commodity prices, foreign exchange rates and equity values. One of the instruments used for hedging are financial derivatives. Using derivatives is like using a double-edged

B. Charumathi is Associate Professor at the Department of Management Studies, School of Management, Pondicherry University (a Central University of Government of India), Puducherry 605 014, India.
E-mail: charumathipu@gmail.com
Hima Bindu Kota is a Ph.D. Research Scholar at the Department of Management Studies, School of Management, Pondicherry University, and Assistant Professor at NIILM-Centre for Management Studies, New Delhi, India.
E-mail: hkota@niilm.com

sword. If the manager has expertise in using them, then they are beneficial for the organizations or else, they can cause havoc. This is evident by the recent, and ongoing, large losses on derivatives transactions announced by Indian companies. Feeling the heat of the global economic recession, more companies with higher debt have approached the Corporate Debt Restructuring Cell in the fiscal 2010 than in 2009. Apart from the other reasons, derivative contracts backfiring during the past year was one of the main reasons. Therefore, the ensuing fears for systemic risk highlight the need for focused research on corporate risk management activity and derivative practices in particular.

Literature Review

Hedging is the main motive of firms using financial derivatives rather than as a tool for speculation (Hentschel and Kothari, 2001). However, there are two divergent views on whether hedging has any effect on the firm value. The first view was propagated by Modigliani and Miller (1958) where they presumed that hedging does not alter firm value under perfect capital market assumptions like the absence of taxes, financial distress costs, contracting costs, information costs and other capital market imperfections.

On the other hand, Smith and Stulz (1985) develop a value-maximizing theory and found that relaxing the capital market assumption can lead to circumstances where hedging adds value. Similarly other studies also argue that risk management can add value to a firm if there are capital market imperfections such as costs of financial distress, progressive tax rates, and conflicts of interest between shareholders and senior claimholders (Bessembinder, 1991; Froot et al., 1993). In addition, several other empirical studies have examined the relevance of hedging to firm value. The majority of these studies found that hedging is a value-enhancing exercise for a firm through alleviating costs (for example, Berkman and Bradbury, 1996; Bessembinder, 1991; Froot et al., 1993; Géczy et al., 1997; Haushalter, 2000; Howton and Perfect, 1998; Nance et al., 1993; Tufano, 1996). The above studies have analyzed the purpose and incentives for using derivatives. Derivatives have been used to minimize risks, as it is assumed that reducing or eliminating this type of risk is more likely to enhance firm value.

Some of the firm-level attributes and their relation to hedging decision are discussed in the following.

Reduction in Costs of Financial Distress

A corporation is said to be in the state of financial distress when a fall in its earning power creates a trivial probability that it will not be able to pay interest and principal on its debt. It has also been noted that bankruptcy impairs the value of the firm (Altman, 1984). The financing problems, the costs of bankruptcy and other market imperfections make financial distress an undesirable state of affairs. Since previous studies show that financial distress proves costly to any firm, it is imperative for any firm to reduce the costs of financial distress. It may be possible that a firm can reduce the expected costs of financial distress by hedging. Diamond (1984) argues that bankruptcy costs lead to hedging. According to Smith and Stulz (1985), one of the methods by which a firm can reduce its earnings volatility is by hedging.

Furthermore, it can also be implied that the probability of hedging is higher for firms with higher expected costs of financial distress. This is also confirmed by the studies of Dolde (1995) and Love and Argawa (1997).

According to Goldberg et al. (1998) and Singh and Upneja (2007), firms hedge with derivatives to reduce the costs associated with financial distress. On the contrary, Shu and Chen (2003) find that firms with low debt ratio are prone to use derivatives, which contradicts the financial distress hypothesis that financially risky firms demand more derivatives used in hedging risk. Hagelin (2003) examines the use of currency derivatives of Swedish firms and finds no significant positive association between leverage and use of derivatives. Mian (1996) also finds that hedging is uncorrelated with leverage. Berkman and Bradbury (1996) use leverage and interest-coverage ratio as measures of the probability of financial distress and got mixed results. Corporate derivative use increases with leverage but decreases with interest coverage.

Reduction in Incentives to Under-invest and Ensuring Availability of Funds for Investment Opportunities

A firm is said to have an underinvestment problem when it is not able to make capital expenditure due to the fact that the external funding is costly and at the same time it does not have enough internally generated funds. Companies reduce their capital expenditures by roughly $0.35 for each dollar reduction in cash flow (Lewent and Kearney, 1990). This situation is considered an indirect cost of financial distress.

Lessard (1991) and Froot et al. (1993) describe costly external financing as a market imperfection that makes hedging a value-enhancing strategy. Bessembinder (1991) concludes that hedging increases the value of a firm by improving contracting terms. Hedges improve net cash flows in those states where the firm's cash flows are low, bonding its ability to meet commitments in additional states. Géczy et al. (1997) suggest that underinvestment might be more severe for highly levered firms with significant growth opportunities. Goldberg et al. (1998) find that firms hedge with derivative to reduce risk exposure to ensure the availability of internal funds for value enhancing investments, to reduce the costs associated with financial distress, to reduce the underinvestment problem resulting from shareholder–debtholder conflicts.

Reduction of Managers' Risk

Managers have strong incentives to reduce firm risk as substantial amount of managers' human capital and wealth is tied to the performance of the firm. Amihud and Lev (1981) and Stulz (1984) develop a risk-reduction rationale based on personal risk avoidance by managers and find that risk-averse managers can be expected to reduce employment risk by reducing the possibility of adverse business results.

Smith and Stulz (1985) argue that managers with more wealth invested in a firm's equity will have greater incentives to manage the firm's risks and that the managers' compensation plans can influence their hedging choices. According to Breeden and Viswanathan (1996) and DeMarzo and Duffie (1992),

some managers undertake hedges in an attempt to influence the labour market perception. Risk aversion may cause managers to deviate from acting purely in the best interest of shareholders and make them more motivated to hedge, expending resources to hedge diversifiable risk (May, 1995; Mayers and Smith, 1982; Smith and Stulz, 1985; Stulz, 1984, 1990; Tufano, 1998). Géczy et al. (1997), Haushalter (2000) and Jalilvand (1999) find no evidence that managerial risk aversion or shareholdings affect corporate hedging.

Multinationality

The recent empirical research which focuses on the relationship between the use of derivatives and a firm's exposure to foreign exchange rate risk is mixed in its results, with one group reporting that the use of derivatives is value-destructive or has low potential benefits (Copeland and Joshi, 1996; Hentschel and Kothari, 2001) and a second group reporting that the use of derivatives is a beneficial and value-enhancing exercise (Chiang and Lin, 2005; Hagelin and Pramborg, 2004; Nguyen and Faff, 2003, 2006; Simkins and Laux, 1998).

Size

Warner (1977) found that smaller firms are more likely to experience default, possibly due to the less diversified nature of their assets and restricted access to external capital. Other things being equal, this observation implies that smaller firms should have a higher demand for derivatives in order to hedge their risk. Focusing on firms that did take a view on the market, Dolde (1993) found that smaller firms report relatively larger derivatives activities than larger firms. Alternatively, size may also reflect a firm's scale economies for maintaining an effective hedging programme, implying a positive correlation between a firm's size and the magnitude of its hedging activities (Berkman and Bradbury, 1996; Goldberg et al., 1998; Jalilvand, 1999; Mian, 1996; Nance et al., 1993; Singh and Upneja, 2008).

Research Gap

There are several studies in the area of derivatives in the Indian context. Anand and Kaushik (2008) examined management motivations for usage of foreign currency derivatives in corporate India and compared it with the rest of the world. Srivastava et al. (2008) studied the derivative trading in Indian stock markets from a broker's perspective. Ganeshan et al. (2004) studied the perceptions and influences of derivative markets on Indian investors. Vipul (2006) investigated the changes in volatility in the Indian stock market after the introduction of derivatives. Sehgal and Vijaykumar (2008) investigated the relationship between the stock market characteristics and option market liquidity using daily data for equity options and underlying stocks. Charumathi (2009) studied the determinants of interest rate swap usage by Indian banks. However, there are no studies on the determinants of derivative usage in non-financial Indian firms in India. So the present study intends to fill this gap.

Objective of the Study

This paper aims to model the factors which determine the usage of derivatives by large Indian non-financial firms.

Rationale of the Study

In the wake of the global financial crisis and significant losses on derivatives transactions announced by Indian companies recently, a study on the determinants of derivative usage by these companies is especially significant. Derivative contracts backfiring during the past year was one of the main reasons. Therefore, the ensuing fears for systemic risk highlight the need for focused research on corporate risk management activity and derivative practices in particular.

Research Methodology

Sample

The sample is constructed by studying the annual reports of the large cap (market capitalization over 10 billion Indian Rupees) companies that are listed on the National Stock Exchange (NSE) for the financial years of 2007 through 2009. The annual reports are available on the NSE website or company websites. There is no regulation in India to disclose the derivative position by any companies, so there are not many companies which have disclosed the details of derivative usage in their annual reports. To qualify for a derivative user, the company's annual report should mention at least once that it uses derivatives to hedge risk. To understand the extent of derivatives used by the firms, they need to use any one of the derivative instruments like interest rate swaps, forwards, options, currency swaps, principal only swaps, etc., and the notional values have to be disclosed in their respective annual reports.

As this study intends to investigate the extent of derivative usage by Indian companies, all foreign companies were excluded from the sample. Furthermore, consistent with most studies, firms belonging to the banking sector were deleted from the sample due to the specific nature of their business that often requires them to use derivatives for trading purposes or for performing dealer activities for their clients.

Method of Data Collection

The Centre for Monitoring Indian Economy (CMIE) database generated a list of 334 large cap companies. Out of these, 165 companies which were either foreign companies or were in the financial services industry were removed. The remaining companies constituted the sample for the study. The remaining 169 companies were classified either as derivative users or non-users. A total of 121 companies

used derivatives. Out of these 121 companies, 56 companies in 2009, 68 companies in 2008 and 48 companies in 2007 have disclosed the derivatives data.

Variables of the Study

Table 1 shows the variables chosen for the study.

Table 1. Variables chosen for the study

Factors		Proxy Variables
Financial Distress	DRATIO (Debt Ratio)	Total debt divided by the book value of assets
	INTCOVER (Interest Coverage Ratio)	Ratio of the earnings before interest and tax to the interest expense.
	DER (Debt-equity Ratio)	Ratio of long-term debt to shareholders' equity
Under Investment	PE (Price-Earnings Ratio)	Ratio of Price per share to the annual earnings per share
	RDEXP (R&D Expenses/sales)	Ratio of R& D expenses to total sales
Multinationality	FE (Foreign exchange sales/ total sales)	Ratio of foreign exchange sales to total sales
Size	REV (Revenue)	Natural logarithm of the total revenue
	SIZE OF THE FIRM	Book value of debt and preferred stock plus market value of common equity
Agency Variable	MANGINC (Managerial incentive)	Number of shares held by promoters and managers scaled by the total number of shares

Source: Compiled by the researchers based on earlier studies.

Dependent Variables

The dependent variable is the extent of derivative use which is defined as the total notional value of all types of derivatives (such as interest, currency and commodity derivatives) used by large companies. It is scaled by (*a*) revenue; and (*b*) total assets as shown below:

TOTDER/Rev = Notional value of total derivatives/Revenue and

TOTDER/Assets = Notional value of total derivatives/Assets

Independent Variables

Financial Distress Costs

To proxy for financial distress costs, we use three variables: Debt Ratio (DRATIO), Interest Cover (INTCOVER) and Debt–Equity Ratio (DER). Debt Ratio is defined as total debt divided by the book

value of assets. Interest cover is defined as the ratio of the earnings before interest and tax over the interest expense. Debt–Equity Ratio is a measure of a company's financial leverage calculated by dividing its total liabilities by stockholders' equity. We expect a positive relationship between proxies of financial distress costs and derivative usage.

Underinvestment Costs/Investment Opportunities

To proxy for investment opportunities, we again use two variables: PE Ratio (PE) and R&D Expenses/Sales (RDEXP). A firm with more growth opportunities suffers from a greater extent of underinvestment and is more inclined to use derivatives to hedge. Accordingly, a positive relationship is predicted between derivative use and proxies of underinvestment.

Sources of Cashflow Volatility/Multinationality

To proxy for multinationality, we use one variable: Foreign Sales/Total Sales (FE). We predict a positive relationship between multinationality and derivative usage.

Economies of Scale and Firm Size

To proxy for economies of scale and size, we use two variables: Revenue (natural logarithm of the total revenue) (REV) and Size (SIZE) that is measured by the book value of debt and preferred stock plus market value of common equity. Ultimately, the relationship between use of derivatives and size is an empirical question.

Agency Variables

To measure managerial stockholding (MANGINC), we use the number of shares held by promoters and managers scaled by the total number of shares. A positive relationship is predicted between managerial stock holdings and derivative use.

Model Used

The two linear multiple regression models developed for this study are as follows:

$$\text{TOTDER/Rev} = \beta_0 + \beta_1 \text{DRATIO} + \beta_2 \text{INTCOVER} + \beta_3 \text{DER} + \beta_4 \text{PE} + \beta_5 \text{RDEXP} + \beta_6 \text{CURR} + \beta_7 \text{REV} + \beta_8 \text{MANGINC} + \beta_9 \text{SIZE} + \beta_{10} \text{FE} + \varepsilon_i$$

$$\text{TOTDER/Assets} = \beta_0 + \beta_1 \text{DRATIO} + \beta_2 \text{INTCOVER} + \beta_3 \text{DER} + \beta_4 \text{PE} + \beta_5 \text{RDEXP} + \beta_6 \text{CURR} + \beta_7 \text{REV} + \beta_8 \text{MANGINC} + \beta_9 \text{SIZE} + \beta_{10} \text{FE} + \varepsilon_i$$

Hypotheses

To achieve the objectives, the study tested the following null hypotheses:

H_{01}: There is no relationship between derivative usage (when scaled by revenue) and

H_{01a} : Debt Ratio as a proxy for financial distress.

H_{01b} : Interest cover as a proxy for financial distress.

H_{01c} : Debt equity ratio as a proxy for financial distress.

H_{01d} : PE ratio as a proxy for under-investment.
H_{01e} : R & D Expenses/sales as a proxy for under-investment.
H_{01f} : Current ratio as a proxy for control variable
H_{01g} : Revenue as a proxy for size.
H_{01h} : Managerial stock holding as proxy for agency variable.
H_{01i} : Book value of debt and preferred stock plus market value of equity as a proxy for size.
H_{01j} : Foreign sales/total sales as a proxy for multinationality.
H_{02}: There is no relationship between derivative usage (when scaled by assets) and
H_{02a} : Debt Ratio as a proxy for financial distress.
H_{02b} : Interest cover as a proxy for financial distress.
H_{02c} : Debt equity ratio as a proxy for financial distress.
H_{02d} : PE ratio as a proxy for under-investment.
H_{02e} : R & D Expenses/sales as a proxy for under-investment.
H_{02f} : Current ratio as a proxy for control variable
H_{02g} : Revenue as a proxy for size.
H_{02h} : Managerial stock holding as proxy for agency variable.
H_{02i} : Book value of debt and preferred stock plus market value of equity as a proxy for size.
H_{02j} : Foreign sales/total sales as a proxy for multinationality.

Gaps in Research Methodology and Data

As mentioned, this study is first of its kind in India, as none of the studies have been done in India on the determinants of derivative usage by non-financial firms. The research method used for this study is empirical in nature unlike other previous studies on derivative usage. However, the tools used are similar to that of majority of the financial empirical studies, namely, multiple linear regression models and correlation. Regarding the data, this study used the notional value of derivatives disclosed in the annual reports of the non-financial firms, which is yet to be captured by the major data bases available in India.

Analysis

Determinants of the Extent of Derivative Usage when it is Scaled by Revenue

Table 2 portrays the descriptive statistics for the variables chosen for the study. Table 3 shows the model summary of the regression for the sample firms. The R-Square of the model equals 16.1 per cent and the R-Square adjusted of the model equals 10.9 per cent. This means that only 10.9 per cent of the changes in the dependent variable (TOTDER/Rev) are due to the variations of the independent variables used in this model. Some other factors which influence the usage of total derivatives, if included, may improve the model fit better. Table 4 shows the result of ANOVA. By using the analysis of variance, it is found that F-test of the model is equal to 3.093 and it is significant at the 1 per cent level of significance.

Table 2. Descriptive Statistics

	Mean	Std. Deviation	N
TOTDER/REV	300.7382	1054.65481	172
DRATIO	0.5192	0.20126	172
INTCOV	56.2541	183.34182	172
DERATIO	0.8855	2.00976	172
PE RATIO	17.3200	86.49825	172
R&DEXP	0.0081	0.02742	172
REV	8.2465	1.49151	172
MANGINC	18.6965	16.40712	172
SIZE	37083.0437	65921.16965	172
FE	0.0850	0.10947	172
CURR	1.6311	1.22617	172

Source: Annual reports of the respective companies.
Note: Results computed by using SPSS 15.0.

Table 3. Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.401[a]	0.161	0.109	995.48111	2.051

a. Predictors: (Constant), CURR, DER, PE, SIZE, RDEXP, FE, INTCOV, MANGINC, DRATIO, REV
b. Dependent Variable: TOTDER/REV

Note: Results computed by using SPSS 15.0.

Table 4. ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30654539.665	10	3065453.966	3.093	0.001[a]
	Residual	159548206.348	161	990982.648		
	Total	190202746.013	171			

a. Predictors: (Constant), CURR, DER, PE, SIZE, RDEXP, FE, INTCOV, MANGINC, DRATIO, REV
b. Dependent Variable: TOTDER/REV

Note: Results computed by using SPSS 15.0.

From Table 5(a), it is clear that there is a positive relationship between the use of derivatives and (*a*) debt ratio; (*b*) debt equity ratio; (*c*) research and development expenses; (*d*) revenue; and (*e*) managerial incentives. The coefficient of these variables, namely, 1.024, 0.536, 0.861, 0.245 and 1.1319 respectively are positive but not significant at both the 1 per cent and 5 per cent confidence levels. Hence, the null hypotheses H_{01a}, H_{01c}, $H_{01e,}$ $H_{01f,}$ and H_{01g} are accepted. There is a negative relationship between the use of derivates and (*a*) interest coverage; (*b*) PE ratio; (*c*) multinationality in terms of foreign sales/total sales; and (*d*) current ratio. The coefficient of these variables, namely, −0.323, −0.032, −0.533 and −0.640 respectively are negative but not significant at both the 1 per cent and 5 per cent confidence levels. Hence, the null hypotheses H_{01b}, H_{01d}, H_{01i} and H_{01j} are accepted. However, there is a positive

Table 5 (a). Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	−372.231	707.888		−0.526	0.600		
	DRATIO	475.632	464.406	0.091	1.024	0.307	0.663	1.507
	INTCOV	−0.149	0.461	−0.026	−0.323	0.747	0.812	1.231
	DERATIO	21.017	39.185	0.040	0.536	0.592	0.934	1.070
	PE RATIO	−0.029	0.894	−0.002	−0.032	0.975	0.970	1.031
	R&DEXP	2491.323	2893.787	0.065	0.861	0.391	0.920	1.087
	REV	17.456	71.193	0.025	0.245	0.807	0.514	1.946
	MANGINC	6.907	5.235	0.107	1.319	0.189	0.786	1.273
	SIZE	0.006	0.001	0.395	4.242	0.000	0.602	1.660
	FE	−389.205	729.782	−0.040	−0.533	0.595	0.908	1.101
	CURR	−47.849	74.764	−0.056	−0.640	0.523	0.690	1.450

a. Dependent Variable: TOTDER/REV

Note: Results computed by using SPSS 15.0.

Table 5 (b). Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	−375.1143	3217.6702	300.7382	423.39853	172
Residual	−929.69891	11971.14258	0.00000	965.93501	172
Std. Predicted Value	−1.596	6.889	0.000	1.000	172
Std. Residual	−0.934	12.025	0.000	0.970	172

a. Dependent Variable: TOTDER/REV

Note: Results computed by using SPSS 15.0.

relationship between the derivative use and size. The coefficient of size is positive (4.242) and is significant at the 1 per cent and 5 per cent confidence levels. Hence, the null hypothesis H_{01h} is rejected. The values of variance inflation factor (VIF) for all the independent variables have also been checked and none indicates any presence of a serious multicollinearity problem. Table 5(b) contains the residuals statistics which comprises the unstandardized predicted and residuals values along with the standardized predicted and residuals values. Standardized values have a mean of 0 and a standard deviation of 1. It means that residuals are normally distributed and there are no outliers of influential data points. It is also clear from Table 6 that no two independent variables are highly correlated. The final results are tabulated and shown in Table 7.

Determinants of the Extent of Derivative Usage when it is Scaled by Assets

Table 8 portrays the descriptive statistics for the variables chosen for the study. Table 9 shows the model summary of the regression for the sample firms. The R-Square of the model equals 15.6 per cent and the R-Square adjusted of the model equals 10.4 per cent. This means that only 15.6 per cent of the changes

Table 6. Correlation Matrix

	CURR	DER	PE	SIZE	RDEXP	FE	INTCOV	MANGINC	DRATIO	REV
CURR	1.000	−0.098	−0.059	−0.090	−0.064	0.038	−0.006	−0.182	0.360	0.291
DER	−0.098	1.000	−0.026	0.057	0.036	−0.095	0.073	0.046	−0.171	−0.056
PE	−0.059	−0.026	1.000	0.025	0.014	0.143	−0.018	−0.046	0.026	−0.042
SIZE	−0.090	0.057	0.025	1.000	0.086	0.080	0.007	0.015	0.142	−0.575
RDEXP	−0.064	0.036	0.014	0.086	1.000	−0.061	0.079	0.187	0.162	0.059
FE	.0038	−0.095	0.143	0.080	−0.061	1.000	−0.130	−0.139	0.028	−0.181
INTCOV	−0.006	0.073	−0.018	0.007	0.079	−0.130	1.000	0.201	0.331	−0.026
MANGINC	−0.182	0.046	−0.046	0.015	0.187	−0.139	0.201	1.000	0.121	0.208
DRATIO	0.360	−0.171	0.026	0.142	0.162	0.028	0.331	0.121	1.000	0.057
REV	0.291	−0.056	−0.042	−0.575	0.059	−0.181	−0.026	0.208	0.057	1.000

Note: Results computed by using SPSS 15.0.

Table 7. Results when Derivative is scaled by Revenue

Variables	Relationship	Sig. at 1% & 5%	Hypothesis	H_0 Accepted/Rejected
DRATIO	Positive	No	H_{01a}	Accepted
INTCOV	Negative	No	H_{01b}	Accepted
DER	Positive	No	H_{01c}	Accepted
PE	Negative	No	H_{01d}	Accepted
RDEXP	Positive	No	H_{01e}	Accepted
REV	Positive	No	H_{01f}	Accepted
MANGINC	Positive	No	H_{01g}	Accepted
SIZE	Positive	**Yes**	H_{01h}	**Rejected**
FE	Negative	No	H_{01i}	Accepted
CURR	Negative	No	H_{01j}	Accepted

Source: Results compiled by the researchers.

Table 8. Descriptive Statistics

	Mean	Std. Deviation	N
TOTDER/ASSETS	289.2671	1031.52065	172
DRATIO	0.5192	0.20126	172
INTCOV	56.2541	183.34182	172
DER	0.8855	2.00976	172
PE	17.3200	86.49825	172
RDEXP	0.0081	0.02742	172
REV	8.2465	1.49151	172
MANGINC	18.6965	16.40712	172
SIZE	37083.0437	65921.16965	172
FE	0.0850	0.10947	172
CURR	1.6311	1.22617	172

Source: Annual reports of the respective companies.
Note: Results computed by using SPSS 15.0.

Table 9. Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.395[a]	0.156	0.104	976.51478	2.052

a. Predictors: (Constant), CURR, DER, PE, SIZE, RDEXP, FE, INTCOV, MANGINC, DRATIO, REV

b. Dependent Variable: TOTDER/ASSETS

Note: Results computed by using SPSS 15.0.

in the dependent variable (TOTDER/Assets) are due to the variations of the independent variables used in this model. Some other factors which influence the usage of total derivatives, if included, may improve the model fit better. Table 10 shows the result of ANOVA. By using the analysis of variance, it is found that F-test of the model is equal to 2.981 and it is significant at the 1 per cent level of significance.

From Table 11(a), it is clear that there is a negative relationship between the use of derivatives and (*a*) debt ratio; (*b*) debt equity ratio; (*c*) R&D expenses; (*d*) revenue; and (*e*) managerial stock holding. The coefficient of these variables, namely, 1.041, 0.520, 0.824, 0.319 and 1.327 respectively are positive but not significant at both the 1 per cent and 5 per cent confidence levels. Hence, the null hypotheses H_{02a}, H_{02c}, H_{02e}, H_{02f} and H_{02g} are accepted. However, there is a negative relationship between the derivative use and (*a*) interest cover; (*b*) PE ratio; (*c*) multinationality measured in terms of foreign sales/total sales; and (*d*) current ratio. The coefficient of these variables, namely, −0.285, −0.025, −0.474 and −0.595 are negative but not significant at the 1 per cent and 5 per cent confidence levels. Hence, the null hypotheses H_{02b}, H_{02d}, H_{02i} and H_{02j} are accepted. However, there is a positive relationship between the derivative use and size. The coefficient of size is positive (4.119) and is significant at the 1 per cent and 5 per cent confidence levels. Hence, the null hypothesis H_{01h} is rejected. The values of VIF for all the independent variables have also been checked and none indicates any presence of a serious multicollinearity problem. From Table 11(b) which contains the residual statistics, it clear that the residuals are normally distributed and there are no outliers. It is also clear from Table 12 that no two independent variables are highly correlated. The final results are tabulated and shown in Table 13.

We find that larger firms have significantly higher use of derivatives. This basically suggests only the large firms are capable of engaging in derivatives trading due to economies of scale in establishing and at the same time maintaining the expertise. Consistent with the notion that larger firms have economies of scale in setting up a hedging programme, we find a positive and significant relationship between firm

Table 10. ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28423398.402	10	2842339.840	2.981	0.002[a]
	Residual	153526560.133	161	953581.119		
	Total	181949958.535	171			

a. Predictors: (Constant), CURR, DER, PE, SIZE, RDEXP, FE, INTCOV, MANGINC, DRATIO, REV

b. Dependent Variable: TOTDER/ASSETS

Note: Results computed by using SPSS 15.0.

Table 11(a). Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	−419.901	694.401		−0.605	0.546		
DRATIO	474.364	455.558	0.093	1.041	0.299	0.663	1.507
INTCOV	−0.129	0.452	−0.023	−0.285	0.776	0.812	1.231
DER	19.979	38.439	0.039	0.520	0.604	0.934	1.070
PE	−0.022	0.877	−0.002	−0.025	0.980	0.970	1.031
RDEXP	2339.802	2838.653	0.062	0.824	0.411	0.920	1.087
REV	22.252	69.836	0.032	0.319	0.750	0.514	1.946
MANGINC	6.812	5.135	0.108	1.327	0.187	0.786	1.273
SIZE	0.006	0.001	0.384	4.119	0.000	0.602	1.660
FE	−339.353	715.877	−0.036	−0.474	0.636	0.908	1.101
CURR	−43.658	73.339	−0.052	−0.595	0.552	0.690	1.450

a. Dependent Variable: TOTDER/ASSETS

Note: Results computed by using SPSS 15.0.

Table 11(b). Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	−357.6308	3087.3857	289.2671	407.69928	172
Residual	−893.08783	11783.50098	0.00000	947.53160	172
Std. Predicted Value	−1.587	6.863	0.000	1.000	172
Std. Residual	−0.915	12.067	0.000	0.970	172

a. Dependent Variable: TOTDER/ASSETS

Note: Results computed by using SPSS 15.0.

Table 12. Correlation Matrix

	CURR	DER	PE	SIZE	RDEXP	FE	INTCOV	MANGINC	DRATIO	REV
CURR	1.000	−0.098	−0.059	−0.090	−0.064	0.038	−0.006	−0.182	0.360	0.291
DER	−0.98	1.000	−0.026	0.057	0.036	−0.095	0.073	0.046	0.171	−0.056
PE	−0.059	−0.026	1.000	0.025	0.014	0.143	−0.018	−0.046	0.026	−0.042
SIZE	−0.090	0.057	0.025	1.000	0.086	0.080	0.007	0.015	0.142	−0.575
RDEXP	−0.064	0.036	0.014	0.086	1.000	−0.061	0.079	0.187	0.162	0.059
FE	0.038	−0.095	0.143	0.080	−0.061	1.000	−0.130	−0.139	0.028	−0.181
INTCOV	−0.006	0.073	−0.018	0.007	0.079	−0.130	1.000	0.201	0.331	−0.206
MANGINC	−0.182	0.046	−0.046	0.015	0.187	−0.139	0.201	1.000	0.121	0.208
DRATIO	0.360	−0.171	0.026	0.142	0.162	0.028	0.331	0.121	1.000	0.057
REV	0.291	−0.056	−0.042	−0.575	0.059	−0.181	−0.026	0.208	0.057	1.000

Note: Results computed by using SPSS 15.0.

Table 13. Results when Derivative is scaled by ASSETS

Variables	Relationship	Sig. at 1% & 5%	Hypothesis	H_0 Accepted/Rejected
DRATIO	Positive	No	H_{02a}	Accepted
INTCOV	Negative	No	H_{02b}	Accepted
DER	Positive	No	H_{02c}	Accepted
PE	Negative	No	H_{02d}	Accepted
RDEXP	Positive	No	H_{02e}	Accepted
REV	Positive	No	H_{02f}	Accepted
MANGINC	Positive	No	H_{02g}	Accepted
SIZE	Positive	**Yes**	H_{02h}	**Rejected**
FE	Negative	No	H_{02i}	Accepted
CURR	Negative	No	H_{02j}	Accepted

Source: Compiled by the researchers.

size and likelihood of derivative usage. This finding supports the capacity-willingness hypothesis. The results are in line with previous studies by Ameer (2010), Block and Gallagher (1986), Booth et al. (1984), Charumathi and Kota (2011a, 2011b, 2011c), Fazillah et al. (2008), Géczy et al. (1997), Goldberg et al. (1998), Graham and Rogers (2002), Hagelin (2003), Haushalter (2000), Jalilvand (1999), Mian (1996), Nance et al. (1993), Nguyen and Faff (2002), Marsden and Prevost (2005), Shu and Chen (2003), Spano (2007), Suriawinata (2005), Yang et al. (2001), and Yilmaz and Kurun (2007).

The arguments of financial distress, investment opportunity, managerial incentives and alternatives for hedging fail to provide convincing evidences in predicting a firm's derivative use. Billio et al. (2001), Davies et al. (2006), Mian (1996), Nguyen and Faff (2002), Marsden and Prevost (2005), and Shu and Chen (2003) also reported similar results.

Conclusion

In this research article, we examined the major determinants of derivative use by large Indian non-financial firms in the years 2007 through 2009. This study is particularly important due to huge mark-to-market losses undergone by Indian companies and an imperative need to study the derivative usage by them. The theoretical rationale for hedging includes financial distress costs, underinvestment hypothesis, managerial incentives, size related issues and alternative approaches for hedging. The empirical evidence shows that the vital determinant of a firm's derivative use is firm size, which suggests that only large companies are able to afford derivatives. The financial distress hypothesis, underinvestment hypothesis, managerial risk aversion and rationale for alternate methods of hedging fail to provide convincing evidences in predicting a firm's derivatives use.

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