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What Drives Derivatives: An Indian Perspective

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Abstract: This study investigates the determinants for the use of derivatives by firms in the Indian market. Using a sample of 433 firms listed in the National Stock Exchange (NSE) in India for the period 2013–2018, we find that firm size, debt to equity, turnover, price–earnings ratio and the magnitude of international transactions are significant influential drivers responsible for pushing the firm to use derivatives for risk management. The findings also document that the financial distress of the firm, which is one of the important reasons for the use of derivatives in advanced economies, happens to be insignificant when it comes to developing countries like India. Using logistic regression, it is observed that highly levered firms condense the use of derivatives as part of a financial risk management strategy, which contradicts existing literature. All other findings are generally consistent with the theory of derivatives as well as with international evidence.

Keywords: financial derivatives; risk management; financial distress; market capitalisation; interest coverage; international transaction

JEL Classification: G3; F4; F3

1. Introduction

By far, the most significant event in finance during the past decades has been the extraordinary development and expansion of financial derivatives (Greenspan 1997). In a competitive financial market, firms are forced to use a host of financial innovations and risk management strategies to maximise the wealth of equity holders; the financial derivative is one of them. The increasing use of financial derivatives over a period of time challenges the impact of volatility of the exchange rate and the interest rate on future cash flows of the firm. Price fluctuations in an open market economy also compound the firm's problem of estimating future costs, revenues, and cash flows. In India, the market for derivative instruments started in the year 2000, and since then, Indian companies in large numbers have been found to use financial derivatives to hedge against a varied number of corporate risks.

Surveys are conducted in developed countries to figure out the corporate temperament to go for financial derivatives, which is used as a corporate risk management tool, as their derivatives market is fairly experienced. However, in India, only a handful number of studies have been undertaken because corporations have started using derivatives for only a decade or so, and also, there has been inaccessibility of corporate data about the use of financial derivatives. Moreover, derivatives are not categorically disclosed either in the financial statements or in the directors' reports. With the implementation of Indian Accounting Standards through Companies (Indian Accounting Standards (IND AS) Rules 2015 by the Ministry of Corporate Affairs (MCA), which stipulated the adoption of Ind.AS in a phased manner, derivatives were voluntarily disclosed from the financial year 2015–16 and then mandatorily disclosed from the financial year 2016–2017, for all listed companies. Ind AS-107

(Financial Instruments: Disclosures), Para-23A requires "*Unless exempted by paragraph 23C, an entity shall disclose by risk category quantitative information to allow users of its financial statements to evaluate the terms and conditions of hedging instruments and how they affect the amount, timing and uncertainty of future cash flows of the entity*". Almost all listed companies voluntarily adopted the implementation of Ind AS from 2015–2016, but they had to prepare a comparative (3rd balance sheet) at the beginning of the accounting period of implementation. So effectively, companies adopting Ind AS from 2015–2016 had to have Ind AS-complied financial statements from 2014–2015. Prior to Ind AS, the regime used was the Accounting Standard regime as per Accounting-AS30 (Financial Instruments: Disclosures), which required the disclosure of financial and derivative instruments in annual reports and was effective from 1 April 2011. In addition to accounting standard requirements, the Securities Exchange Board of India (SEBI), the Indian capital market regulator, issued listing and disclosure regulations in the year 2015 and mandated the listed firms to disclose risk management policy and derivative exposure. In this way, the firms in India are obligated to disclose their year-end open exposure and their hedging with derivatives in the annual reports (as a part of their corporate governance reports).

The conventional wisdom of finance says that the value of a firm can be optimised by proper administration of value-deterrents like agency problems, expected cost of financial distress, potential foreign exchange losses, and input price variations. Proven theoretical arguments give strength to the concept that levered capital structure and firm size positively influence corporate behaviour to use financial derivatives for business risk management (Nguyen and Faff 2002). Firm-size and leverage effects are larger exponents of derivative use in Australian mining and manufacturing firms, according to Berkman et al. (2002). A firm's propensity to risk management using derivatives is inversely related to short-term solvency and interest coverage ratio (Nance et al. 1993; Froot et al. 1993; Smith and Stulz 1985). Géczy et al. (1997) confirmed that higher financial distress and growth potential propels the firm's motive to use currency derivatives. Their analysis also divulges that prolonged and high magnitude of risks and exposures promotes the hedging activity, particularly the use of currency derivatives. Shu and Chen (2002) studied the use of derivatives by the companies listed in the Taiwan stock exchange during 1997–1999. They found that the vital determinants of a firm's derivatives use are size, ratio of long-term debt to total debt, industry dummy, and export ratio.

The existing literature on determining the factors influencing the use of derivatives has mostly focused on developed economies, and little work has been done on the developing economies in general and the Indian market in particular. Further, existing studies have used a narrow set of variables specifically related to capital structure and firm size. Therefore, this study attempts to fill this gap by taking a broad range of variables, i.e., the interest coverage ratio, market to book value, and turnover, including other variables affecting the use of derivatives in the Indian market setting. This paper aims to analyze the pattern of derivative use by Indian firms for the period 2013–2014 to 2017–2018 by means of different possible factors contributing to the corporate behaviour responsible for using financial derivatives for risk management through cross-sectional data analysis. Hence, a multivariate regression model has been used to investigate the key factors accountable for the use of derivatives by the firms, applying a cross-sectional time series data analysis technique

The study was undertaken on the Indian capital market, which has some distinguishing features with respect to developed economies. First, it moved with the spectacular achievement of the Indian National Stock Exchange (NSE), notching up six billion contracts in the year 2019, leaving the CME Group way behind to become the world's largest derivatives exchange (https://economictimes.indiatimes.com/). We tried to understand whether or not the underlying factors available in extant literature are still valid, and if they contribute to the use of derivatives in Indian corporations and what the nature (same way or other) of the influence of those factors on corporate behaviour to use derivatives is. Second, in India, the emergence and growth of the derivatives market is a relatively recent phenomenon. Third, the national stock exchange (NSE), which is the leading exchange in India, provides options and futures contracts on nine major indices and more than a hundred stocks. Fourth, another peculiarity of the Indian economy that motivates the companies to use derivatives is the highly volatile Indian rupee

exchange rate against the US dollar, which is clearly evident from this study. There are two extreme sets of companies apart from others who get significantly affected by either-way movements of the exchange rate. The IT industry, which is predominantly export-oriented, is greatly concerned about the appreciation of the rupee, whereas the petroleum companies are, on the other hand, deeply anxious about the depreciation of the rupee. Fifth, the Indian market is one of the fastest-growing capital markets, where economic and financial setups get integrated with advanced economies. In addition to this, firms in emerging economies like India face tremendous pressure from risks arising from foreign exchange fluctuations, which are not the case for companies in the USA or advanced countries. So, an India-centric study may help us understand corporate behaviour better and also produce a contrasting view with the extant literature predominantly based on the western world. This paper is designed on the assumption that the variables contributing to the behaviour of companies to use derivatives in the developed world may not necessarily be the same variables that mould the corporate decisions to use derivatives in the Indian context. Interestingly, we found a few deviations from the western research viewpoint about the factors shaping corporate behaviour to use derivatives, which is the major contribution of this research paper to the existing literature.

Using a sample of 433 firms listed in the National Stock Exchange (NSE) in India for the period 2013–2018, we found that firm size, debt to equity, turnover, price–earnings ratio, and the magnitude of the international transactions are significant and influential drivers responsible for forcing the firm to use derivatives for risk management. The findings also document that the financial distress of the firm, which is one of the important reasons for the use of derivatives in advanced economies, happens to be insignificant when it comes a developing country like India. Using logistic regression, it is observed that highly levered firms condense the use of derivatives as part of a financial risk management strategy. These findings are generally consistent with the theory of derivatives, as well as with international evidence.

The study has been divided into eight sections. Section 1 introduces the research work. Section 2 gives a glimpse of the theoretical background of the topic, while Section 3 provides a review of existing literature. In Section 4, we provide the data and sample. The following two sections, i.e., Sections 5 and 6, discuss the variables and narrate model specifications along with an algorithm of logistic regression and intuition behind the choice of the logistic regression model for the study. Section 7 focuses on the analysis and discussion of the empirical results. Section 8 concludes the paper along with the implication for theory and practice.

2. Theoretical Background

The derivative is a special type of financial instrument that derives its value from the change in the underlying variable. This underlying variable may be the value of an asset, index of any exchange, or interest rate, and in financial jargon is referred to as the "underlying" (Sahoo 2015). It does not have any value of its own, but its value, in turn, depends on the value of other assets, which are called an underlying asset. A derivative is a contract between the counterparties, which specifies conditions about the date, quantities, and notional amounts, wherein the consideration is settled in terms of the underlying variable or the transaction settles for loss or gains if it is speculative in nature. Derivatives have significant relevance in providing an alternative for corporate risk management and containment. With the use of derivatives, an investor can shift any undesired or excess risk, for a price, to another who either wants to assume that risk or have risks offsetting that risk. Hence, it is a very effective risk management instrument in its own right.

Our motivation for the study of derivative-use is germane to the theoretical background borrowed from traditional finance theories based on the premise that better risk management leads to higher corporate value creation by avoiding headwind coming from financial distress and agency problems (Stulz 1996), along with other push factors for using derivatives. By taking financial derivatives as a proxy to risk management, we tried to elicit the relationship between corporate behaviour to use financial derivatives from two perspectives, i.e., the company's urgency to control and reduce the risk,

and the ability of the firm to do so. We have taken two sets of variables, i.e., financial characteristics (debt–equity ratio, total asset, total turnover, interest coverage ratio, exposure to foreign currency cash flow) and market-related characteristics (such as P/E ratio, market value to book value ratio), representing the affordability of a company to advantageously use derivatives and being cognizant of the fact that it might cause serious trouble sometime. These variables are further explained with literature support in the latter part of the paper.

3. Extant Literature

According to a financial magazine, *Asia Money*, a complete sequence of risk management consists of "identifying, analysing, measuring, capturing, controlling, managing, re-evaluating, reporting, and disclosing the risks and possible hedges involved". The corporate tendency for risk mitigation and management to optimise firm value in one way or the other has been neatly and evidently captured through the brilliant research work and contemporary empirical studies by eminent research scholars all over the world. Broadly speaking, a number of academic research studies carried out so far have covered the plurality of dimensions of financial risk management and justified its value relevance and contribution to wealth maximization. It is an established convention that corporate risk management is an integral part of the overall business excellence strategy by minimizing avoidable risk. Stulz (1996), one of the pioneers of corporate risk management, tried to impress that the objective of corporate risk mitigation and management strategy is to insure against unfavorable consequences in terms of improper execution of business plans or else aberrations in strategic business outcomes.

The research papers testifying the *value relevance* of currency foreign exchange risk management (Logue and Oldfield 1977; Shapiro and Rutenberg 1976; Jacque 1981; Dufey and Srinivasulu 1983), analyzing the *hedge effectiveness of derivative financial* instruments (Swanson and Caples 1987; Ederington 1979) and *modes of risk management* and their contemporary application (Drury and Errunza 1985; Malek 1976; Rodriguez 1981; Jilling 1978; Mathur 1982; Collier and Davis 1985) are well accepted. Empirical studies have noticed that firms prudently use derivatives as an instrument of risk-reduction and a value-enhancing mechanism without giving much weight to their possible adverse consequential outcomes, especially nonfinancial firms (Bartram 2019). The positive value addition is higher than the negative consequences of derivatives, subject to certain exceptions. Many studies in the past have shown that companies use risk management techniques to minimise transaction and translation losses (Ho and Singer 1982; Mathur 1982). Teoh and Er (1986) also found that forward exchange contracts were a hedging and risk management technique commonly used by companies. On the other hand, Rodriguez (1981) study found that forward exchange contracts were often referred to as a measure of last resort to cover exposure. Among the recent studies, a study conducted by Sahoo (2016) on top nonfinancial listed companies in India revealed that 61.2% of the sampled firms used derivatives for risk management and hedging, which they have expressly declared in their annual reports.

In past years, research has been done to expose the corporate behaviour of using derivatives for risk management in different parts of the world. Existing literature shows that firms choose to use financial derivatives as external measures, compared to internal strategies for corporate financial risk management (Joseph 2000; McRae and Walker 1980; Hakkarainen et al. 1998). The use of derivatives for risk management is to address several corporate uncertainties like foreign exchange risk, credit risk, and cash flow volatility (Belk and Edelshain 1997; Belk and Glaum 1990; Bodnar et al. 1998; Grant and Marshall 1997; Bodnar et al. 1995; Berkman et al. 1997; Jalilvand et al. 2000; Ali and Glaum 2000). Brewer et al. (2000) found that banks that are the users of interest-rate derivatives register higher growth in their lending activities in comparison to their nonuser counterparts. Gay et al. (2011) investigated the consequential effect of financial risk management on a firm's cost of equity in general and whether the use of derivatives reduces the cost of equity in particular. They found that the cost of capital for common stocks of users of a derivative is lower by 24 to 778 basis points in comparison to nonusers. Zhou and Wang (2013), by studying large UK nonfinancial firms, provided support that derivatives are used by UK nonfinancial firms as deterrence against loss due to movements in foreign exchange rates.

Amongst various derivative contracts, exchange rate derivatives, commodity derivatives, and interest rate derivatives are frequently and widely used derivative contracts across the world.

A few studies had gone one step further to investigate the determinants of corporate hedging policies (Géczy et al. 1997; Jalilvand et al. 2000; Shu and Chen 2002; Adedeji and Baker 2002; Berkman et al. 2002). The conventional wisdom of finance says that the value of a firm can be optimised by proper administration of value-deterrents like agency problems, expected cost of financial distress, potential foreign exchange losses, and input price hikes. Based on our literature review, we found several determinants or variables influencing corporate behaviour to use financial derivatives for risk management. The first being the *affordability factor* emanating from the size of the firm, which determines a firm's ability to have the necessary expertise to use complex derivative instruments for the benefit of the firm simultaneously with down-sizing the inherent risk of the instrument (Nance et al. 1993). They contended that large firms could have the necessary expertise to handle derivative instruments, hence they are more prone (positively related) to use derivatives in comparison to smaller firms. To represent the size of the firm, we have used total assets and total turnover as the proxies, which are widely used.

The next determinant, *financial distress,* is considered as another important influencer of corporate behaviour to use financial derivatives. Proven theoretical arguments give strength to the concept that levered capital structure and firm size positively influence corporate behaviour to use financial derivatives for business risk management. A similar view was also floated by Nguyen and Faff (2002) in their study. Firm-size and leverage effects are larger exponents of derivative use in Australian mining and manufacturing firms, according to Berkman et al. (2002). A firm's propensity to risk management using derivatives is inversely related to short-term solvency and interest coverage ratio (Nance et al. 1993; Froot et al. 1993; Smith and Stulz 1985). Géczy et al. (1997) confirmed that higher financial distress and growth potential propel the firm's motive to use currency derivatives. Their analysis also discovered that prolonged and high magnitude of risks and exposures promote the hedging activity, particularly the use of currency derivatives. Haushalter (2000) came up with a result that levered firms have more tendency to use derivative contracts to hedge against price risks. Several studies have used different proxies to represent financial distress. Nance et al. (1993) and Jalilvand (1999) used the proportion of debt in the capital structure as a measure of financial distress and construed that higher debt would lead to higher financial distress and hence become a motivator to use derivatives to manage distress risk. Géczy et al. (1997) used the interest coverage ratio along with the debt ratio to represent financial distress and found that the interest coverage ratio is inversely proportional and the debt ratio is directly proportional to the choice of derivative use. Similarly, Jalilvand (1999) used credit-ratings to proxy financial distress and found that it is inversely related to derivatives. We take the interest coverage ratio and the long-term debt to equity ratio as measures of financial distress.

We also found that the *growth variable* potentially influences corporate behaviour to use derivatives. Studies by several researchers (Li and Li 1996; Mian 1996; Nance et al. 1993) have found that firms on high growth trajectories are more interested in using derivatives than their counterparts. In our regression model, we have used the price–earnings ratio fraction and the market-to-book-value ratio fraction to proxy the growth variable. Along with other factors, *foreign exchange exposure* is a major influencer for derivative use. It has been found that firms' exposure in terms of foreign currency transaction and degree of international operation is an important factor positively influencing the use of derivatives (Kim and Sung 2005; Shu and Chen 2003; Allayannis and Ofek 2001; Marshall 2000; Allayannis et al. 2012). On the basis of a study on a leading US manufacturer of consumer durables, Brown (2001) find that exchange rate risk advocate the use of hedging through derivatives. Transactional and translational exposures also contribute in terms of motivating the firms to use financial derivatives, as evidenced by Hagelin (2003). We have used export to sales or import to purchase, whichever is higher, as a proxy for foreign exchange exposure. Firms use derivatives to get protection against the variations in cash flow and this is another contention along with other factors like economies of scale and greater growth opportunities (Géczy et al. 1997; Martin and Mauer 2004).

This piece of research has been designed on Indian capital, the market setting where there are very few works of literature on the use of financial derivatives; we hardly found any organised work on corporate use of derivatives for risk reduction and hedging. Additionally, few researchers have focused on examining the factors affecting the extent of the use of derivatives for financial risk management. It is plausible to assume that the generalizations obtained from empirical analysis in developed countries may not yield the same result if tested in the Indian context as the Indian capital market has some structural differences to the developed market. In order to fill this gap in the existing literature, this paper intends to investigate the driving factors behind the extensive use of derivatives by Indian firms. The current study focuses on the following aspects:

1. To what extent do firms' characteristics (i.e., size, growth, international operation, financial distress) affect the derivatives hedging?
2. What are the significant differences between users of derivatives and nonusers of derivatives, with respect to the abovementioned financial indicators?

4. Data and Sample Selection

In this section, we discuss the data and sample selection, description of the variables and econometric model. Data has been collected from the published annual reports of sampled companies and the website of the National Stock Exchange of India (NSE). The data relating to the proxies used in the logistic model have been collected from the Bloomberg database, PROWESS database of CMIE, and ACE equity database administered by Accord Fintech Pvt Ltd. Since the study focuses on analyzing Indian corporate behaviour with regard to derivative use, we took sample companies from the Indian Top 500 companies on the Economic Times Magazine list of 2018. Out of the 500 listed companies, we took 433 nonfinancial companies, after an appropriate screening in confirmation with our dataset criteria, belonging to fifteen different industries: automobiles and auto components; conglomerates; consumer durables; energy, power and equipment; fast-moving consumer goods; fertilisers and agricultural chemicals; health, pharmaceuticals and biotechnology; industrials and engineering; information technology; infrastructure and real estate and construction materials; leisure and entertainment; metals and mining; telecom services; textiles and apparels and jewellery; transport services. The dataset offers high heterogeneity, encompassing firms from different sectors and enabling us to apply cross-sectional data analysis. The dependent variable is a dichotomous variable, which will assume values of "1" for the user and "0" for the nonuser of the derivative. Proxies of independent variables are selected based on existing literature and a conceptual basis. These proxies for independent variables are chosen based on both short-term and long-term perspectives. The cross-sectional data analysis is based on 433 nonfinancial firms for a five-year window, including 2013–2014 to 2017–2018. The variables are discussed in detail in the following section.

5. Description of Variables

5.1. Corporate Behaviour (CB)

Corporate behaviour is the dependent variable of the logistic regression model. It is defined as how corporations are responding to financial derivatives conditional on other financial and economic indicators. Corporate behaviour and response are a function of many variables, which may be internal, external, isolated, coordinated, and interdependent or interrelated to each other. What the response of a corporation will be to a particular situation depends upon many aspects, but some important aspects take the lead and a decisive role in shaping a corporate decision. In our present research, the response of today's Indian sector to some of the sophisticated risk management instruments and what could be the potential variables or factors responsible for such a response is inquired into. Corporate behaviour in terms of responses in annual reports is classified into two simple categories, i.e., users of derivatives and nonusers of derivatives. Hence, it happens to be a binary kind of response, coded as 1 for users of derivatives and 0 for nonusers of derivatives. This binary response has been perceived to be related to

some financial variables or indicators selected on the basis of past literature, and some other important variables are country-specific in nature.

5.2. Interest Coverage Ratio (ICR)

The interest coverage ratio is a yardstick of measuring a firm's ability to serve its debt holders with regard to interest. It is a ratio of earnings before interest and tax (EBIT) scaled by interest expense for that year. A higher ratio of interest coverage suggests that the company is in a better position to meet the demand of lenders in time. However, the flip side of high ICR suggests a company is "too defensive" and is not capitalizing on the opportunities to magnify earnings through leverage. Hence, there should be an optimum debt holding by a firm to achieve a balanced capital structure and higher market capitalization. Therefore, it is very clear that ICR is a very good indicator of a company's financial risk. Then, it would be very interesting to know whether there is any relationship between ICR and the company's response to using financial derivatives, individually and in combination with other factors. Therefore, ICR has been included in the regression model because of its significance on the dependent variable as a proxy of a short-term financial distress variable. Based on the conventional finance theory in the parlance, ICR is presumed to be inversely related to financial distress and, hence, with motivation towards derivative use.

5.3. Long-Term Debt to Equity Ratio (LTDE)

It is a measure of a firm's long-term financial solvency and financial leverage, explaining the expected financial distress of a firm, which is a ratio of a firm's total long-term outsiders' liability to its shareholders' fund. The LTDE transpires how much long-term debt a firm is diverting to own its assets, contrasted with the value representation of shareholders' equity, thereby reflecting upon the long-term solvency or financial distress and its ability to magnify the earnings. It has been intuitively presumed that LTDE is directly proportional to financial distress and corporate incentive to use financial derivatives.

5.4. Price Earnings Ratio Fraction (PERF)

The price–earnings ratio indicates the earnings-multiple of share price and growth of the firm. Hence it is an important indicator of growth in the short-term and has been used as a proxy for the growth variable. We have considered the ratio of current PER to its lag, as PERF as a measure of growth in the regression model and an enabler to use financial derivatives, presumably influencing companies positively to use financial derivatives.

5.5. Market-to-Book-Value Ratio Fraction (MBVF)

The price-to-book ratio (i.e., market-to-book-value ratio) represents the ability of the firm to create value on the total investment over a fairly long-term window. It represents the incremental value added to the capital employed by the operation of the firm and reflects the growth of the firm in the long run. We have considered the ratio of the current market to book value ratio to its lag as an MBV fraction as a measure of growth in the regression model. We expect that MBVF is directly proportional to the corporate incentive to use financial derivatives.

5.6. Market Capitalisation (MC)

Market capitalisation is the market value of outstanding shares traded in the market for a publicly traded company. It has been a widely accepted yardstick of measuring the size of the company by various researchers and finance experts, with comparison to sales or asset size. The total capitalization has been chosen as a proxy of the size variable of a long-term nature. It has also been premised as an enabler to derivative use.

5.7. Total Turnover (TO)

Turnover means total income appearing in the statement of profit and loss of the company, which includes income from the operation and other income, as per the Schedule-III of the Indian Companies Act 2013. The turnover of the company reflects the magnitude of its activities. It has been used as a proxy for the size of the firm in contemporary times.

5.8. International Transactions Ratio (ITR)

The international transactions ratio (ITR) refers to the extent of involvement of the company in international trade and transactions. International transactions include both import and export transactions. The international transaction ratio is calculated as export to total revenue or import to the total cost of revenue, whichever is higher. ITR is the proxy for the level of international transactions, which is the higher percentage of import or export for the company to its turnover. It is expected that ITR positively contributes to the use of derivatives.

6. Choice and Explanation of the Model

We use a logistic regression model as a maximum likelihood estimator. The sample companies include those who expressly declared the use of derivatives for risk management in their annual report. The study is directed towards assessing the possible effects of certain identified variables on the corporations, meaning whether they happen to be users or nonusers of derivatives. Here, the dependent variable is a dichotomous variable assuming the value of 1 for users and 0 for nonusers. A logistic regression model is a probability estimation model of binary responses with regard to one or more independent predictors or variables, where Pr(Y = 1|X = x) as a function of x and any unknown parameters are to be estimated by maximum likelihood. It manipulates the variables using a cumulative normal distribution curve. Here, Y is an indicator variable and can only obtain binary values, the value of 1 and value of 0 for success and failure, respectively. The logistic formula states, in terms of the probability, that Y = 1, which is referred to as $\hat{p}$ (the probability of a company happening to be a user of derivatives, in this case). The probability that $Y = 0$ (for nonusers of derivatives) is $(1 - \hat{p})$. The algorithm of $\hat{p}$ is structured as follows:

$$ln\left(\frac{\hat{p}}{1-\hat{p}}\right) = \log(odds) = \beta_0 + \beta_1 x_1 + \ldots + \beta_n x_n \tag{1}$$

where

$$0 < \hat{p} < 1 \tag{2}$$

$$\text{Probability of outcome} = (\hat{p} = \text{Outcome of Interest}|\, X = x) = \tag{3}$$

$$\hat{p} = \frac{e^{\beta_0+\beta_1 x_1+\ldots+\beta_n x_n}}{1 + e^{\beta_0+\beta_1 x_1+\ldots+\beta_n x_n}} \tag{4}$$

or

$$\hat{p} = \frac{1}{1 + e^{-(\beta_0+\beta_1 x_1+\ldots+\beta_n x_n)}} \tag{5}$$

or

$$\hat{p} = \frac{1}{1 + e^{-(Y)}} \tag{6}$$

Here, Y is a linear function of a single or multiple explanatory variables represented by $x_1, x_2 \ldots\ldots x_n$. (in this case, x represents the determinants of the use of derivatives).

Here, $\hat{p}$ is construed as the probability of success of the dependent variable (in this case, success represents the firm is a user of derivatives). The interpretation of logistic regression can be made with a simple example. Let us say a bank is going to understand and forecast the behaviour of a borrower, e.g., whether or not (s)he will repay the loan. For that, the bank uses certain indicators (independent

variables) such as remaining service life, income, and nature of employment. Here, the dependent variable is a dichotomous variable, the borrower behaviour (Y), carrying value Y = 1 for the borrower will repay, and Y = 0 for the borrower will not repay. By applying logistic regression with the given independent variables, we can predict the probability of the behaviour of the borrower, whether he will repay or not.

The independent variables of our study are leveled as firm size, expected cost of financial distress, the potential to grow, and the variable representing the extent of involvement of the firm in international transactions of a revenue nature. The size of a firm relates to its value, either based on efficiency (Peltzman 1977) or profitability (Mueller 1987). As a proxy to size, we have taken market capitalization (MC) and turnover (TO). The natural logarithm of proxies of size-variables is taken to improve normality and bring homogeneity. Financial distress is defined as the lack of a company's capacity to satisfy its financial obligations (Grice and Dugan 2001; Grice and Ingram 2001; Pindado et al. 2008). We represented financial distress through the interest coverage ratio (ICR) and the long-term debt-to-equity ratio (LTDE), in accordance with Altman (1968). According to Guay (1999), market-to-book-value can be used as a proxy for growth variables. However, we have considered an incremental market-to-book-value ratio as the growth proxy, which is calculated as a market-to-book-value fraction (MBV), mathematically expressed as (MBV_t/MBV_{t-1}). Another representative of growth that has been used is the price-earnings ratio fraction (PERF), calculated as (PER_t/PER_{t-1}). The P/E ratio is well-accepted in literature as a firm-level growth proxy (Penman 1996; Beaver and Morse 1978). The international transactions ratio (ITR) is an important indicator for Indian listed firms in terms of international transaction involvement, and the calculation represents the minimum of ratios of exports to sales or imports to purchase for a given firm.

The difference between individual proxies between users of derivatives and their counterpart (nonusers) are compared through *t*-tests and Mann–Whitney U-tests (Mann and Whitney 1947). To regress the dichotomous dependent variable, we use a logistic regression model as a maximum likelihood estimator. The possible determinants of corporate hedging are put through a regression model as follows:

$$Y = \beta_{0t} + \beta_{1t}ICR_t + \beta_{2t}LTDE_t + \beta_{3t}PER_t + \beta_{4t}MBV_t + \beta_{5t}\ln(MC)_t + \beta_{6t}\ln(TO)_t + \beta_{7t}ITR_t + \varepsilon \quad (7)$$

where the identified variables are as follows:

ICR = interest coverage ratio;
LTDE = long-term debt to equity ratio;
PERF = price–earnings ratio fraction [PER_t/PER_{t-1}];
MBVF = market to book value ratio fraction [MBV_t/MBV_{t-1}];
MC = market capitalisation;
TO = total turnover;
ITR = international transactions ratio.

7. Empirical Results and Analysis

Empirical tests were conducted by using the data of five years for 433 companies, out of which 298 have been expressly declared to be users, and the rest, nonusers. Firstly, the *t*-test and *u*-test were administered on individual variables on a yearly basis, which is presented in the year-wise panel in Table 1 (Panels I–V). These nonparametric tests will explain any substantial difference between users and nonusers of financial derivatives, with regard to individual financial indicators or proxies by comparing their means and medians. A *t*-test and a nonparametric *u*-test have been applied to compare and contrast the proxies of the independent variable for users of derivatives and nonusers of derivatives. The *t*-test uses the mean to test the significance of differences, whereas the *u*-test uses the median to test the significance of the difference.

Table 1. Comparison of financial indicators through *t*-test and *u*-test results between users and nonusers of financial derivatives.

Panel-I: 2017–2018	Users		Nonusers		*t*-Test Result	*u*-Test Result
Variables	**Mean**	**Median**	**Mean**	**Median**		
Ln(TO)	9.52147	9.03659	7.82574	6.36851		
Ln(MC)	20.52415	20.24715	12.9254	12.85412	***	***
ICR	121.85292	10.82	125.9829	7.5984	*	*
LTDE	39.7127	1.852	58.625	1.025	*	
PERF	1.22411	1.17312	1.18528	1.11824	**	**
MBVF	1.2514	1.2041	1.0524	1.284	*	*
ITR	12.8957	14.5207	5.628	0.84	***	***
Panel-II: 2016–2017	**Users**		**Nonusers**		***t*-Test Result**	***u*-Test Result**
Variables	**Mean**	**Median**	**Mean**	**Median**		
Ln(TO)	9.588332	9.363826	6.386708	5.340157	**	**
Ln(MC)	26.2332	26.22267	15.49281	15.77504	***	***
ICR	130.1551	5.24	299.8332	3.24	*	
LTDE	44.41797	0.43	156.6612	0.71	*	
PERF	1.181961	1.16312	1.186667	1.06093		*
MBVF	1.144753	1.376019	1.070574	1.276591	**	**
ITR	27.0516	15.1	11.848	0	***	***
Panel-III: 2015–2016	**Users**		**Nonusers**		***t*-Test Result**	***u*-Test Result**
Variables	**Mean**	**Median**	**Mean**	**Median**		
Ln(TO)	8.484802	8.261719	7.367612	7.28374	**	
Ln(MC)	25.96926	26.19866	15.38674	15.41325	***	***
ICR	156.3839	4.91	265.9564	8.69	**	*
LTDE	4.56492	0.35	25.5792	0.61	**	
PERF	1.27476	1.56067	1.10758	1.32094	**	**
MBVF	1.040059	1.260798	1.0978903	1.218636	*	*
ITR	27.12419	13.75	10.668	0	***	***
Panel-IV: 2014–2015	**Users**		**Nonusers**		***t*-Test Result**	***u*-Test Result**
Variables	**Mean**	**Median**	**Mean**	**Median**		
Ln(TO)	8.401987	8.125025	7.740057	7.959101	**	*
Ln(MC)	26.0159	26.2115	15.59273	15.52987	***	***
ICR	145.2811	5.85	550.3324	9	***	
LTDE	4.529027	0.31	28.2396	0.55	**	**
PERF	1.49437	1.99404	1.43102	1.89941	*	
MBVF	1.154828	1.363843	1.05296	1.377438	**	*
ITR	25.952	14.2	10.62	0	***	***
Panel-V: 2013–2014	**Users**		**Nonusers**		***t*-Test Result**	***u*-Test Result**
Variable	**Mean**	**Median**	**Mean**	**Median**		
Ln(TO)	9.28705	9.85745	6.47259	5.85713	*	**
Ln(MC)	25.5823	25.29856	16.58279	16.82475	***	***
ICR	115.8241	10.529	199.8332	12.48063	**	*
LTDE	39.826541	1.0258	142.6093	0.92428	**	
PERF	1.22503	1.29227	1.28650	1.2626	**	*
MBVF	1.0582	1.37925	1.048628	1.3819	*	*
ITR	27.5551	15.14290	11.2136	0.2415	***	***

This table explains a contrasting view between users and nonusers of financial derivatives with regard to the chosen financial indicators. We tried to contrast the variables' mean through *t*-tests and the median through *u*-tests. Abbreviations of variables: Ln(TO) represents the natural logarithm of turnover; Ln(MC) represents the natural logarithm of market capitalisation; ICR represents the interest coverage ratio; LTDE represents the long-term debt to equity ratio; PERF represents price–earnings ratio fraction; MBVR represents the market-to-book value ratio; ITR represents the international transaction ratio. *** explains significance at a 1% level, ** explains a 5% level of significance, * explains a 10% level of significance.

Table 1 (Panels I–V) explains the *t*-test and *u*-test results of independent variables for five sampling years, namely, 2013–2014 to 2017–2018. The variables put through the nonparametric tests are taken at their absolute values except for two proxies of the size variable, for which we have taken the natural logarithm of their absolute values as a method of transformation of values, having greater variance

and asymmetric distribution to more congruent and symmetrical distribution. These two proxies are, namely, total turnover (TO) and market capitalisation (MC). The intuition behind taking the natural logarithm is to reduce the scale of the variables without affecting their statistical properties (Michener 2003). The usefulness of logarithmic transformation is that it increases the normality of the dataset by bringing the high values closer and taking small values farther (Dallal 1999). Table 1 (Panels I–V) reports *t*-test and *u*-test results of different years' understudy for firms divided into users and nonusers based on their specific declarations in the annual reports. Both the statistical techniques are used to see the difference in average between the users vis-à-vis the nonusers of derivatives.

It has been found from the test results that the difference of means and medians are statistically significant in almost all independent variables across all the years. Among all independent variables, it appears that market capitalisation and the international transactions ratio are highly statistically significant variables (1% level of significance) with regard to users and nonusers of financial derivatives. These are followed by moderately important variables like the price–earnings ratio fraction, market-to-book value fraction, interest coverage ratio and long-term-debt-to-equity ratio, where the differences are significant at a 5% or 10% level of significance.

Table 2 (Panels I–V) represents the correlation matrix of proxies of independent variables presented panel-wise for different years, and by seeing the coefficients of correlations, we can mark that not a single coefficient is crossing the cut-off level of 0.7, as per Bhattacharyya (2007). Another important point is that the problem of autocorrelation will not be there in the case of a binary logistic regression model.

Moving towards analysis and interpretation of the regression results, we tried to comprehend the result in the Indian context by providing the most plausible reason behind the deviation from extant finance theories. The past literature upholds the positive correlation between financial distress and the propensity to use derivatives for its management (Smith and Stulz 1985). We have empirical evidence supporting the effect of leverage on hedging in a number of studies comprising Wall and Pringle (1989), Block and Gallagher (1986), and Nance et al. (1993). Some studies showed that derivative use is negatively associated with financial distress (Allayannis and Ofek 2001; Nance et al. 1993). The empirical study conducted on Australian public-sector companies by Brailsford et al. (2005) provided that the magnitude of external liabilities is a motivator for derivative use. The empirical study of Aretz and Bartram (2010) analysed leverage with regard to the incentive for the use of derivatives and so also for profitability. In the same line, Berkman and Bradbury (1996) made an important study on large firms in New Zealand and confirmed that leverage is one of the catalysts for companies using derivatives.

However, our regression results differ in direction from the past literature pertaining to financial distress. The results of Table 3, Panels II–IV show that firms with better interest coverage ratios (ICRs) and lower or moderate long-term debt ratios (LTDEs) are inclined towards using derivatives, which is against the conventional finance theory that financially distress firms are more prone to using derivatives and vice-versa. However, the findings are that more levered firms are less prone to use derivatives, which is a contradiction to financial distress theory. This is perhaps due to the typical nature of the Indian economy. As the hypothesis is based on studies that are undertaken in western countries with a developed derivatives market, the corporations are economically sounder and technologically more advanced in comparison to their Indian counterparts. The companies have a long experience of dealing with derivatives because the use of financial derivatives has been in western countries since the 20th century. In India, the derivative market had just started a few years ago, and corporations are not well accustomed to it, which means if derivative contracts are not properly executed with utmost sincerity and well within the appetite for risk, it may lead to huge detrimental consequences. Hence, the financial distress theory advocacy does not hold well in the Indian context since conventional theory says highly distressed firms go for higher use of derivatives, which is the opposite in the Indian context.

Table 2. Correlation matrix of independent variables.

Panel-I: 2017–2018	TO	MC	ICR	LTDE	PERF	MBVF	ITR
TO	1	0.453	0.059	0.043	−0.019	−0.015	0.286
MC	0.453	1	0.003	0.124	0.008	−0.111	0.08
ICR	0.059	0.003	1	0.033	−0.007	0.065	0.011
LTDE	0.043	0.124	0.033	1	−0.003	0.091	0.063
PERF	−0.019	0.008	−0.007	−0.003	1	−0.153	−0.069
MBVF	−0.015	−0.111	0.065	0.091	−0.153	1	0.001
ITR	0.286	0.08	0.011	0.063	−0.069	0.001	1
Panel-II: 2016–2017	**TO**	**MC**	**ICR**	**LTDE**	**PERF**	**MBVF**	**ITR**
TO	1	0.533	0.19	0.033	−0.02	−0.024	0.291
MC	0.533	1	0.132	0.148	−0.03	0.055	0.279
ICR	0.19	0.132	1	0.011	−0.005	0.004	−0.015
LTDE	0.033	0.148	0.011	1	0.001	0.142	0.056
PERF	−0.02	−0.03	−0.005	0.001	1	−0.087	−0.063
MBVF	−0.024	0.055	0.004	0.142	−0.087	1	−0.012
ITR	0.291	0.279	−0.015	0.056	−0.063	−0.012	1
Panel-III: 2015–2016	**TO**	**MC**	**ICR**	**LTDE**	**PERF**	**MBVF**	**ITR**
TO	1	0.321	−0.022	0.032	0.019	−0.002	0.279
MC	0.321	1	−0.051	0.148	0.015	0.066	0.288
ICR	−0.022	−0.051	1	0.011	0.01	0.144	0.011
LTDE	0.032	0.148	0.011	1	−0.008	0.17	0.068
PERF	0.019	0.015	0.01	−0.008	1	0.16	−0.005
MBVF	−0.002	0.066	0.144	0.17	0.16	1	0.009
ITR	0.279	0.288	0.011	0.068	−0.005	0.009	1
Panel-IV: 2014–2015	**TO**	**MC**	**ICR**	**LTDE**	**PERF**	**MBVF**	**ITR**
TO	1	0.582	−0.007	0.03	0.008	0.004	0.295
MC	0.582	1	0.015	0.133	0.076	−0.058	0.276
ICR	−0.007	0.015	1	0.247	−0.005	0.076	0.014
LTDE	0.03	0.133	0.247	1	0.008	0.067	0.066
PERF	0.008	0.076	−0.005	0.008	1	0.094	−0.003
MBVF	0.004	−0.058	0.076	0.067	0.094	1	0.035
ITR	0.295	0.276	0.014	0.066	−0.003	0.035	1
Panel-V: 2013–2014	**TO**	**MC**	**ICR**	**LTDE**	**PERF**	**MBVF**	**ITR**
TO	1	0.57	0.007	0.038	0.007	0.006	0.278
MC	0.57	1	0.027	0.128	0	−0.065	0.279
ICR	0.007	0.027	1	0.382	0.01	0.167	−0.028
LTDE	0.038	0.128	0.382	1	0.003	0.097	0.067
PERF	0.007	0	0.01	0.003	1	−0.167	−0.122
MBVF	0.006	−0.065	0.167	0.097	−0.167	1	0.029
ITR	0.278	0.279	−0.028	0.067	−0.122	0.029	1

This table represents the correlation matrix of the independent variables used in the logistic regression model. In the table, Ln(TO) represents the natural logarithm of turnover, Ln(MC) represents the natural logarithm of market capitalisation, ICR represents the interest coverage ratio, LTDE represents the long-term debt to equity ratio, PERF represents the price–earnings ratio fraction, MBVR represents the market-to-book value ratio, and ITR represents the international transaction ratio.

Table 3. Regression results determinants of derivative use.

Panel-I: 2017–2018 Independent Variable	**Regression Coefficient**	***p*-Values**
Turnover (TO)	0.001 **	0.048
Market Capitalisation (MC)	0.014 ***	0.0017
Interest Rate Coverage (ICR)	0.029 *	0.049
Long-Term Debt to Equity (LTDE)	−0.470 *	0.095
Price Earnings Ratio Fraction (PERF)	−0.474	0.193
Market to Book Value Ratio Fraction (MBVF)	0.294 *	0.097
International transactions ratio (ITR)	0.031 ***	0.009
Constant	−9.988 *	0.059
Pseudo R-squared:		
Cox and Snell R Square	0.391	
Nagelkerke R Square	0.224	
Hosmer and Lemeshow Statistics	32.671 *** df = 8	0.0035
Number of Iterations	6	
Explanatory Power of the Model (%)	89.6	
Panel-II: 2016–2017 Independent Variable	**Regression Coefficient**	***p*-Values**
Turnover (TO)	0.294 **	0.0327
Market Capitalisation (MC)	0.470 ***	0.045
Interest Rate Coverage (ICR)	0.004	0.178
Long-Term Debt to Equity (LTDE)	−0.101 **	0.048
Price Earnings Ratio Fraction (PERF)	0.304 *	0.0867
Market to Book Value Ratio Fraction (MBVF)	0.029 **	0.049
International transactions ratio (ITR)	0.031 ***	0.009
Constant	−9.988 *	0.059
Pseudo R-squared:		
Cox and Snell R Square	0.288	
Nagelkerke R Square	0.226	
Hosmer and Lemeshow Statistics	28.681 *** df = 8	0.0014
Number of Iterations	8	
Explanatory Power of the Model (%)	86.2	
Panel-III: 2015–2016 Independent Variable	**Regression Coefficient**	***p*-Values**
Turnover (TO)	0.444 *	0.076
Market Capitalisation (MC)	0.348 ***	0.049
Interest Rate Coverage (ICR)	0.015	0.189
Long-Term Debt to Equity (LTDE)	−0.008 *	0.082
Price Earnings Ratio Fraction (PERF)	0.021 **	0.048
Market to Book Value Ratio Fraction (MBVF)	0.081 *	0.0953
International transactions ratio (ITR)	0.034 ***	0.003
Constant	−8.608 **	0.050
Pseudo R-squared:		
Cox and Snell R Square	0.297	
Nagelkerke R Square	0.232	
Hosmer and Lemeshow Statistics	26.929 *** df = 8	0.001
Number of Iterations	5	
Explanatory Power of the Model (%)	91.8	

Table 3. *Cont.*

Panel-IV: 2014–2015 Independent Variable	**Regression Coefficient**	***p*-Values**
Turnover (TO)	0.215 *	0.0924
Market Capitalisation (MC)	0.543 ***	0.001
Interest Rate Coverage (ICR)	0.001 *	0.068
Long-Term Debt to Equity (LTDE)	−0.009	0.365
Price Earnings Ratio Fraction (PERF)	−0.022 **	0.0108
Market to Book Value Ratio Fraction (MBVF)	0.065 *	0.088
International transactions ratio (ITR)	0.040 ***	0.008
Constant	−10.421 *	0.091
Pseudo R-squared:		
Cox and Snell R Square	0.257	
Nagelkerke R Square	0.201	
Hosmer and Lemeshow Statistics	26.461 *** df = 8	0.001
Number of Iterations	5	
Explanatory Power of the Model (%)	82.7	
Panel-V: 2013–2014 Independent Variable	**Regression Coefficient**	***p*-Values**
Turnover (TO)	0.001 ***	0.0088
Market Capitalisation (MC)	0.004 ***	0.058
Interest Rate Coverage (ICR)	0.019 **	0.0258
Long-Term Debt to Equity (LTDE)	−0.370 **	0.0429
Price Earnings Ratio Fraction (PERF)	−0.464 *	0.085
Market to Book Value Ratio Fraction (MBVF)	0.284 **	0.0493
International transactions ratio (ITR)	0.031 ***	0.009
Constant	−9.988 *	0.06272
Pseudo R-squared:		
Cox and Snell R Square	0.287	
Nagelkerke R Square	0.219	
Hosmer and Lemeshow Statistics	35.247 *** df = 8	0
Number of Iterations	7	
Explanatory Power of the Model (%)	82.37	

This table presents the results of the logistic regression model that tries to estimate the potential impact of the chosen independent variables on the dependent variable, which is a company's behaviour to use or not use financial derivatives. As stated earlier, the dependent variable is a dichotomous variable that assumes the value of 1 for "User" and 0 for "Nonuser". In the table, Ln(TO) represents the natural logarithm of turnover, Ln(MC) represents the natural logarithm of market capitalisation, ICR represents the interest coverage ratio, LTDE represents the long-term debt to equity ratio, PERF represents the price–earnings ratio fraction, MBVR represents the market-to-book-value ratio, and ITR represents the international transaction ratio. *** explains significance at a 1% level, ** explains a 5% level of significance, * explains a 10% level of significance.

Firms in high-growth trajectories tend to use derivatives more to even-out the underinvestment issue related to information asymmetry (Shapiro and Titman 1986). Growth potential variables include the market capitalization to book value ratio (Guay 1999). The studies by other researchers have confirmed that higher growth opportunities endorsed by financial soundness give companies a cushion to use financial derivatives. Goldberg et al. (1998) found that the variables related to the decision to use derivatives and the scale of usage of derivatives are different. In our regression model, we have used the market-to-book value-ratio fraction (MBVF) and the price–earnings ratio fraction (PERF) as the proxies for the growth variable (Li and Li 1996; Mian 1996; Nance et al. 1993). Our regression results also show the same direction. In all five years, the market-to-book-value ratio fraction is positively related to the dichotomous dependent variable, i.e., the use of derivatives, and also, it is statistically significant at a 5% level of significance. The results of Table 3, Panels I and IV indicate that users of derivatives have a larger market-to-book-value ratio fraction than their counterparts, which corroborates the growth

potential theory of high growth, enabling the firm to take extra risk in pursuance of getting extra-return since the firm has the ability to bear the negative effects. In other years, the MBVF is significant at a 10% level of significance, which supports the abovementioned plausibility.

However, in some cases, the price–earnings ratio fraction is not positively related to the use of derivatives, which the regression result shows. It implies that the higher the price–earnings ratio fraction, the lower the chance that the company will use financial derivatives. It is not consistent with the assumption that the companies with better growth trajectories are leaned in favor of using derivatives by considering that high growth is reflected by high price–earnings ratio fractions. It means the price-earnings ratio fraction may not be an appropriate representative of the growth potential of companies in the Indian context. This is because there is a growth of the Indian economy at a steady and fast rate, and companies at a high growth stage can raise funds by issuing equity instruments at a regular interval, by which their price-earnings ratios will remain low in comparison to the companies with more stable capital structures, with lower marginal growth rates.

According to Goldberg et al. (1998), Bodnar et al. (1998), and Nance et al. (1993), firm size may have a positive correlation with corporate behaviour to use financial derivatives. The rationale behind the intuition of the above authors is generally based on the cost–benefit analysis. The bigger the size of the firm, the more it can afford to deploy dedicated experts for risk management, with the fact that the firm will also have a sizable amount of exposure to be managed that is commensurate with the costs involved. The logistic regression results in Table 3 Panels I–V are evidence that large-sized firms happen to be users of derivatives, with statistical significance at a 1% level of significance, probably based on the intuition of the expected differential benefit of risk management, although it may outweigh the expected differential cost of financing the distress of such derivative use, given the fact that the history of risk management through derivatives by Indian firms are at a very rudimentary stage and small firms are not well equipped with the required expertise to harness financial derivatives to their interests. Market capitalisation is the most evident size-variable proxy, displaying a sharp contrast between users and nonusers with regard to derivative use.

Being commensurate with the univariate comparison of users and nonusers, the international transactions ratio holds a positive impact on corporate behaviour to use derivatives for risk management. It is also statistically significant at a 1% level of significance. In the typical Indian economy, international transactions in terms of imports and exports have increased in the last few years due to economic liberalisation and a continuous push by the Government for companies to earn foreign exchange to even out and improve the "balance of payment situation". As import and export increases, it exposes the companies to another kind of risk, that is, the volatility of the domestic exchange rate with regard to the foreign currency, and more particularly, the US dollar. The data analysis also shows that out of the users, a large proportion use financial derivatives to manage foreign currency risks. Hence, the international transactions ratio is the most significant variable that positively affects corporate behaviour to use financial derivatives.

We used Pearson correlation coefficients to examine the multicollinearity among the proxies. The proxies under each variable are chosen in order to represent both short-term as well as long-term perspectives or behaviour of the variable, even though a slightly increased correlation coefficient is marked between them. For example, the market capitalisation of a firm and turnovers are moderately correlated, which is quite obvious and logical, but both the proxies are taken to give short-term and long-term perspectives to the size variable, and the analysis also found that the proxies are statistically significant in explaining the derivative use behaviour of firms[1]. The analysis and interpretation of the rest of the independent variables are made in a similar fashion on the basis of their prior (theoretical intuition and direction and evidence of past literature) regression results and

[1] The coefficient of correlation has been high varying between 0.5 to 0.7 among market capitalization, total assets and total turnover.

country-specific peculiarities. It is important for the study to build a model that has greater explanatory power of estimation, keeping in mind that the relationship between dependent and independent variables is non-linear.

It is clearly evident from the logistic regression model that a firm's size, international transactions ratio, and growth potential in terms of the market-to-book-value fraction principally explains a firm's behaviour to use or not use derivatives. The positive correlation between size and the growth potential further substantiates the natural theory of economies of scale, enabling larger firms to be able to afford the cost of acquiring and maintaining the expertise required to manage risks while using derivatives. Since Indian firms are generally cash-flow hedgers (Anand and Kaushik 2008; Sahoo 2017), the high international transactions ratio becomes a motivating factor to use derivatives for risk management. We have tried to perceive negative long-term-debt-to-equity ratios as the firm's demotivating factor in the use of financial derivatives, which may further intensify and aggravate the financial distress of a company.

8. Conclusions

We investigated the determinants for the use of derivatives by firms in the Indian market. Using a sample of 433 firms listed on the National Stock Exchange (NSE) in India for the period 2013–2018, we found that the size is one of the important factors influencing corporate behaviour to use financial derivatives. Along with size, the international transactions ratio happens to be another important explanatory variable that is statistically significant. Growth variables are moderately significant as the statistical result shows that these are significant at a 5% or 10% level in some sample years. The financial distress variable does influence the use of derivatives but not as strongly as international transactions ratio and size, and interestingly, in some cases, it carries an inverse effect, which we explained as an essence of country-specific peculiarity. Further, we examined the cross-sectional differences between users and nonusers of derivatives with respect to firm characteristics, i.e., interest coverage ratio, long-term debt to equity, price–earnings ratio, market to book value, market capitalisation, turnover, and international transactions ratio. We document that the international transactions ratio, market capitalisation, and the book-to-market-value ratio were consistently significant for all five sampling years, hence significantly strengthening and corroborating the regression result and, in a way, explaining the corporate behaviour to use derivatives for risk management and hedging. One of the striking features of our study revealed that Indian companies seem to be extra conservative when compared to their global counterparts. Our study suggests that derivative use in India is mostly for limited risk management purposes, which the sampled companies explicitly expressed in the shareholders' report, which is a good sign for the economy when compared to derivative use for speculation.

Consistent with the present policy perspective, a firm's size, which later translates in terms of its capacity and affordability, plays a major role in harnessing the potential use of derivatives. Small and medium companies are not so significantly relying on derivatives for risk management, possibly because of the complexity of the setup. Hence, as a matter of fact, there is ample scope for regulators to protect companies, mostly at the time of economic misfortunes, which will, in turn, attract more small firms to take advantage of this market. Therefore, more reforms and rationalization of the derivative market for governance is required.

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