Fair Value of Derivative Contracts of NIFTY50 Companies: An Analysis of Cash Flow Volatility and Forex Transaction Value

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Abstract:

The paper examines to assess whether foreign exchange transaction amount (Forex) and cash flow volatility are being hedged using the derivative contracts and whether is there any difference in the value of derivative contracts for manufacturing sector companies and service sector companies with Forex as a covariate. The sample companies are the large non-finance companies that are part of the NIFTY50 index. The statistical techniques OLS regression and ANCOVA are used to study the two objectives. The results disclosed that Forex is the significant explanatory variable for the fair value of derivative contracts but cash flow volatility is not; however jointly Forex and cash flow volatility explain fair value of derivative contracts. It is also found that there is no significant difference in the fair value of derivative contracts for manufacturing sector companies and service sector companies. The findings help create derivative markets systematically.

Keywords: Fair Value of Derivative Contracts, Hedging, Forex, Cash Flow Volatility, ANCOVA

JEL Classification: G1, C1, M4, F3

1. Introduction

In the dynamic global market, companies encounter a wide range of financial risks that have the potential to greatly influence their anticipated profits and overall financial stability. The continuous profitability of the companies is significantly challenged by the volatility arising from various causes, including interest rates, foreign exchange exposures, and the unpredictable fluctuations in commodities prices. In light of the rising uncertainty, companies are progressively placing greater emphasis on the establishment and execution of resilient risk management strategies to protect their financial well-being.

Derivative instruments have evolved into indispensable instruments utilized by the companies to manage and mitigate a wide range of financial risks. Companies confront an extensive array of risks in the dynamic and unpredictable business activities and in response to these obstacles, companies utilise derivative instruments as tactical financial instruments to mitigate

the impact of unfavourable fluctuations in prices and interest rates.

Futures, Options, Swaps, and Forwards are the derivative instruments, that are used to successfully control the financial risks. The derivative contract Future is an agreement to exchange assets at a specified price on a certain date in the future, allowing businesses to hedge against changes in the value of the underlying asset. The companies using Options get the right but not the obligation to exchange assets at a fixed price on or before the date of expiry of the contract. It allows them to protect against adverse price changes while capitalizing on favourable ones. Swaps include the exchange of cash flows or financial instruments between parties over a set period, with interest rate swaps, currency swaps, and commodity swaps being the most frequent forms used to control interest rate and currency risk. Forwards contracts, which are similar to futures contracts but are customizable and traded over the counter, give businesses more flexibility in risk management, but with the added consideration of counterparty risk. Companies can use these derivative products to help them negotiate the challenging modern financial landscape.

The researchers have been working on the various facets of use of the derivative contracts by the companies including the identification of determinants of use of derivative contracts. The current research will add to the literature on determinants of hedging

with the financial derivative contracts with a new dimension of measuring the financial derivative contracts at fair value. Prior to Ind AS included in the reporting framework, the Indian companies have been disclosing the notional value of derivative contracts in the annual reports voluntarily. The voluntary disclosures have created uneven playing field, with some and not all companies fully disclosing the information to its stakeholders (Bal, 2022). However, with the change in the reporting framework to Ind AS, the converged IFRS, the Indian companies have been disclosing the fair value of derivative contracts in the balance sheet in compliance with Ind AS 109. The Ind AS has been implemented voluntarily with effect from 1st April 2015 and has become mandatory from 1st April 2016.

Given these complexities and the evolving financial reporting landscape, there is a need for a comprehensive investigation into the determinants of hedging practices with financial derivative contracts, with a specific focus on the fair value measurement introduced by Ind AS 109.

The fluctuations in the foreign exchange rate pose the greatest risk to international trade operations (Zakia, 2018). The companies can hedge the forex fluctuation risk with currency derivative contracts. According to Kodriyah, Mahardini, & Rosnia, (2019), companies that deal in foreign currencies should hedge to avoid currency value fluctuations.

Derivative instruments, including futures and options, are frequently employed to alleviate the adverse effects of market volatility on cash flows. Businesses can mitigate the risk associated with their financial flows by engaging into these contracts, which protect them from price fluctuations in commodities, interest rates, and currency exchange rates. According to the findings of Smith and Stulz (1985), companies that experience higher levels of volatility in their cash flows as a result of financial price risks stand to gain more from hedging. When the variability in cash flow for a firm increases it may cause financial distress to the firm and it hedges the risk using the derivative instruments (Chaudhry et al., 2014).

The exchange rate fluctuations in the international business and variations in cash flows cause financial distress for the companies. The current research work is to determine the relationship between fair value of derivative contract with forex transactions and cash flow volatility of the non-financial Indian companies which will give insight into the hedging practice by such companies.

The report prepared by Deloitte in 2021 states that the companies in the manufacturing sector spend more forex than their earnings and according to The Business Standard dated 22nd July 2022, the companies in the service sector led by the IT sector generate more forex earnings. These observations indicate that companies in the manufacturing sector spend more money in foreign currency and companies in the service sector earn more money in foreign currency. So, another research question drags attention that 'Do the companies in both the sectors hedge their forex fluctuation risk using the derivative contracts?'.

In this context, the current research work aims to determine the dependency of fair value of derivative contracts on forex transactions and the cash flow volatility of non-financial Indian companies. The first segment of the work replicates the justification of the work, research question, and literature review while the second part of the work explicates the objective, hypothesis, methodology, and data analysis. The last part specifies the implication and conclusion.

2. Review of Literature

Risk in business is inevitable. The companies can minimize the risk by hedging it. The derivative instruments are used to hedge the risk. The literatures are studied to explore what are the factors that determine the hedging of risk using the derivative instruments by the companies in different countries. Firms hedge to reduce foreign exchange risk from foreign operations, bondholder-shareholder tensions, and higher default risk from lesser liquidity. Forex derivatives lessen currency and investment risk (Goldberg et al., 1994). Joseph (2000) observed that UK firms hedge foreign exchange exposure using derivative contracts. Ameer (2010) conducted a study on the determinants of Malaysian corporations' hedging practices.

The study revealed a significant correlation between the use of derivative instruments and foreign sales. It is also found that liquidity, firm growth, managerial ownership, and firm size are also determinants for the use of derivative instruments. Kim and Kim (2008) studied about American hospitality firms and concluded that users of derivative instruments have more volatility in cash flow and earnings than the non-users of derivative instruments. The study of Säterborg (2010) studied the use of derivative contracts of the Swedish companies listed on the Stockholm OMX. The companies that use derivative has higher mean sizes and higher mean values of exposure to foreign currency. Kintu and Ngugi (2013) investigated the hedging practices of the companies listed on the Nairobi Securities Exchange. The study found that the companies have protected the future cash flow with their hedging policy. The cash flow volatility besides the size of the firm and liquidity of the firm are the determinants for hedging using derivative instruments by the listed Kenyan companies. Chaudhry et al. (2014) did research on the factors determining the business hedging practices and derivative usage in risk management in Pakistan. The results categorised users as having volatile cash flow, foreign exchange, and interest rate exposure. The size and growth potential of the companies are also determining the use of derivative instruments by the Pakistani companies. The result is similar to the findings by the study of Afzal and Alam (2013) for the

companies listed with the Karachi Stock Exchange. Paligorova and Staskow (2014) found that the use of derivatives is widespread across all sectors and the Canadian firms can reduce the volatility by using the derivative contracts. Ahmad et al. (2015) studied the hedging by the manufacturing companies listed on the Indonesia Stock Exchange. These companies hedge with foreign currency derivative instruments. González et al. (n.d.) researched to investigate why publicly traded Spanish corporations utilise derivatives to hedge against exchange-rate risk. The research showed that companies use derivatives for currency hedging rather than speculation, and foreign currency debt was used as a complementary hedging tool by companies. The size of the firm is a determining variable for currency hedging. The study of Ali (2017) for 64 Nairobi Stock Exchange-listed firms found that corporate hedging is weakly correlated with foreign exchange. Wahyudi et al. (2019) studied on hedging practices by the listed companies in Indonesia. This study aimed to analyse the effect of factors on hedging policies through the use of derivative instruments by taking the firm size as a control variable during the period 2014-2016. The result of the study shows that cash flow volatility besides liquidity has a significant positive effect on the use of derivative instruments. Oliveira (2023) examined the factors determining the hedging and speculation with foreign exchange derivatives doe Brazilian firms. It was found that large-sized firms with high exposure to foreign currency

transactions hedge with derivative contracts.

From the study of literature, it is found that the companies, having foreign exchange exposure and volatility in cash flow, are hedging using derivative contracts in different countries. The study of Ahmad et al. (2015) was for manufacturing companies only but other studies were covering non-financial firms. The gap is identified as very few research works are on the hedging by Indian companies using derivative contracts. Also, the difference in the value of derivative contracts between manufacturing sector companies and service sector companies needs to be explored.

3. Objectives and Hypotheses

3.1 Objectives

The objectives for the current research work are mentioned below:

a) To assess the impact of foreign currency transactions and cash flow volatility on the fair value of derivative contracts.

b) To compare the fair value of derivative contracts of manufacturing sector companies with the service sector companies when covariate with forex transactions.

3.2 Hypotheses

The null hypotheses are:

H_{01}: There is no significant impact of foreign currency transactions and cash flow volatility on the fair value of derivative contracts.

H_{02}: There is no significant difference in the value of derivative contracts of manufacturing sector companies and service sector companies

4. Research Methodology

4.1 Statistical Techniques

OLS regression is used to study the dependency of the value of derivative contracts with the value of foreign currency transactions (Forex) and cash flow volatility. The cash flow volatility is calculated as the 'standard deviation of the cash flow from operations' over the sample period for each of the sample companies. Forex and cash flow volatility are the explanatory variables whereas the value of derivative contracts is the dependent variable for the regression analysis. The major assumptions of OLS regression - collinearity, homoscedasticity, and normality of residuals are tested and verified.

Analysis of Covariance (ANCOVA) is used to study the relation between the value of derivative contracts for manufacturing sector companies and service sector companies with Forex as a covariate. The value of derivative contracts, the dependent variable is measured in ratio scale; in sectors such as manufacturing and service, the independent variable is categorical; and Forex, the covariate is measured in ratio scale. The important assumption of the test besides the OLS regression assumptions is homogeneity of variance which is tested and verified.

4.2 Sample Companies

The derivative market is complex. Large corporations face significant risk as a result of their involvement in geographically diverse regions and a wide range of projects; and also these companies may allocate resources to mitigate their risk through hedging strategies. Hence, the universe for the study is large Indian companies listed on NSE and included in NIFTY50. The universe for the study is NIFTY50 companies. However, eleven banking and financial services companies are excluded being their reporting framework and risk exposure are quite different from other companies. Hence, the sample included 39 companies. Again 7 companies are dropped being their residuals are more than 2.5 times of standard error. The final sample included 32 companies.

4.3 Study Period

The listed companies are required to disclose the fair value of derivative contracts in the balance sheet, according to Ind AS 109, since the financial year beginning from 1.4.2016 with a comparative figure for the financial year ending 31st March 2016. The period of current study is from the financial year ending 2016 to the financial year ending 2023 i.e. 8 financial years.

5. Verification of Assumptions

5.1 Multiple Regression: For the study, multiple regression analysis with two independent variables is used. The regression analysis is to observe whether the value of forex transactions and cash flow volatility of the sample Indian companies explain the fair value of derivative contracts disclosed by the select companies. The regression equation for the study is as follows:

$Derivative\_FV = \hat{a}_0 + \hat{a}_1 Forex + B_2 Cash\ Flow\ Volatility + \mu$

Before the discussion on the results of the regression, the assumptions (Panda et al., 2021) discussed in the following sub-sections, are verified.

5.1.1. Collinearity: The assumption for linear regression is that there is no collinearity among the explanatory variables used in the regression model. In the study, 'Forex Transaction Amount (Forex)' and 'Cash Flow Volatility' are the explanatory variables. For checking the collinearity, the Variance Inflating Factor (VIF) is applied.

Table 1: Variance Inflating Factor

Variables	VIF
Forex	1.002
Cash Flow Volatility	1.003

Source: Authors' Compilation

When VIF>10, the variable is said to be highly collinear. As VIF<10, there is no collinearity for the variables in the model.

5.1.2. Homoscedasticity: The OLS regression has the assumption of homoscedasticity or equal variance of the error term. The variation around the regression line is the same across the values of explanatory variables. White's test is

used to check the homoscedasticity. The result of the test for the null hypothesis of "there is no heteroskedasticity" is the probability of the LM test statistic is greater than 5%.

Since the p-value is greater than 0.05, the test failed to reject the null hypothesis and hence the homoscedasticity test is verified by the regression equation model.

5.1.3. Normality of Residuals: For the OLS regression, the assumption is that the residuals must be normally distributed. The null hypothesis of "Error is normally distributed" for the test for the normality of residuals is verified. For the test, the probability of chi-square is greater than 5%. The test failed to reject the null hypothesis and hence it is concluded that the residuals are normally distributed. Further, the mean and standard deviation of the residuals should be 0 and 1 to qualify for such a test (Panda et al., 2020) which is replicated in the research work as well.

5.2. ANCOVA

Analysis of covariance (ANCOVA) is used to study whether there is any significant difference in the means of a dependent variable (DV) across one or more categorical independent variables (IV) with a covariate as a control variable. The dependent variable and control variable need to be measured in a continuous scale. For the current study, the fair value of derivative contracts is the dependent variable, and the value of forex transactions is the control variable; the sample companies are categorised into the

manufacturing sector and service sector and this categorical variable is the dependent variable.

The ANCOVA is the blend of ANOVA and linear regression. One of the significant assumptions for ANCOVA other than the assumptions for linear regression is the homogeneity of variances.

5.2.1. Homogeneity of Variances: The significant assumption for ANCOVA is that the error variance of the dependent variable is equal across the groups. For testing this assumption, Levene's Test is used. The result of Levene's test is shown in the following table.

Table 2: Homogeneity of Variances with Levene's Test

F Stat.	df1	df2	P value
0.568	1	30	0.457

Source: Authors' Compilation

The null hypothesis for the test is variance in the fair value of derivative contracts is the same for both manufacturing sector companies and service sector companies. Since the p-value of the test is more than 0.05, it is failed to reject the null hypothesis and hence variance is homogeneous.

6. Results and Discussion

In order to explore whether the value of derivative contracts measured at their fair value is being explained by the value of forex transactions and cash flow volatility, regression results are interpreted. The average of fair value of derivative contracts for the financial years ending from 31st

March, 2016 to 31st March, 2023 is being the dependent variable and the average for same period for value of forex transactions and cash flow volatility are being the explanatory variable. The result of the model is shown in the table below.

Table 3: Result of OLS Regression

Variables	Coefficient	Std. Error	t-ratio	P-values
Constant	102.19	74.29	1.376	0.1795
Forex	0.19	0.03	6.271	0.00
Cash Flow Volatility	0.07	0.06	1.184	0.24
R-squared		0.58		
Adjusted R-squared		0.55		
F (2, 29)		20.05		
P-value(F)		0.00		

Source: Authors' Compilation

Note: Dependent variable: Derivative_FV

The result of regression analysis shows that the value of forex transaction (forex) explains the fair value of the derivative contract for which the probability (t-statistic) is less than 1% but cash flow volatility fails to explain. However, jointly both forex and cash flow volatility explain the value of derivative contracts. Being R^2 is 0.58 indicating 58% of the variation in the value of derivative contract is explained by the two variables. The overall regression model is significant as the probability (F-statistic) is less than 5%. The coefficients of the variables 'Forex' and 'Cash Flow Volatility' are respectively 0.19 and 0.07. This explains that one rupee change in each of these two variables causes rupee 0.19 and rupee 0.07 change in the fair value of derivative contracts.

Analysis of Covariance (ANCOVA) is used to study whether there is any significant relationship between the fair value of derivative contracts for the manufacturing sector and that for the service sector with value of forex transaction (Forex) is being considered as a covariate. The result of ANCOVA is shown in the table:

Table 4: ANCOVA Results

Variables	Sum of Squares	df	Mean Square	F	p
Overall model	3.81e+6	2	1.90e+6	19.190	< .001
Forex	3.74e+6	1	3.74e+6	34.304	< .001
Sectors	70096	1	70096	0.644	0.429
Residuals	3.16e+6	29	108888		

Source: Authors' Compilation

As can be witnessed from the result, the variable 'Forex' is the control variable justified by the Probability value which is less than 5%. The study is made for the categorical variable 'Sectors' having two groups – Manufacturing and Service. For the variable 'Sector', the p-value is greater than 5% and thus fails to reject the null hypothesis for the test. Therefore, there is no significant difference in the fair value of derivative contracts for the manufacturing sector and service sector with value of forex transaction as a covariate.

7. Implications and Conclusion

Besides adding to the literature on the use of derivative contracts as hedging tool, the current research is expected to give insight that may help companies and regulators in developing and exploring derivative market in managing the risk,

particularly foreign currency fluctuation risk.

The derivative contracts are the tools to hedge the risk. The non-financial companies, hedge their risk of fluctuations in exchange rates which affect the payments and receipts in foreign currencies, using currency derivatives and hedging their cash flow volatility using commodity derivatives. From the financial year beginning in 2016, the large listed Indian companies have been adopting the Ind-AS as the financial reporting framework. According to Ind-AS 109, the companies are required to disclose the fair value of their derivative contracts in the balance sheet.

The current study investigated the relationship between the fair value of derivative contracts with underlying risk i.e. forex transaction amount and cash flow volatility. For this OLS regression is used and observed that as an individual variable 'Forex' is an explanatory variable and not 'Cash Flow Volatility' but jointly both are the explanatory variable.

ANCOVA test is used to verify whether is there any difference in the fair value of the derivative contract for the manufacturing sector and service sector with the variable 'Forex' as a covariate. The result of the test led to the conclusion that there is no significant difference in the value of derivative contracts for both sectors.

8. Limitations and Scope for Further Research

The study is valid only for the sample non-finance companies that are part of NIFTY 50 and is to be verified for a large sample. The regression analysis is made with only two explanatory variables and it is to be studied with more number variables.

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