DERIVATIVES AS AN INSTRUMENT FOR MANAGEMENT OF MARKET AND CREDIT RISK.

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ABSTRACT

India is witnessing a wave of Derivatives in Indian Financial Sector as a innovative instrument. Derivatives have been associated with a number of high profile corporate events which have been reasons for breakdown of global financial market. To some critics derivatives have played an important role in the near collapses or bankruptcies of baring banks, But if "properly" handled it can bring substantial economic benefits. The present paper is an attempt to investigate, how the derivatives as a instrument help economic agents to improve their management of market and credit risk. The empirical result obtained indicate what is the main challenge to policymaker and how he can ensure that derivatives are being traded properly and how it can be prudently supervised, and designing regulation and rules that aims to prevent the excessive risk taking of participants, as well to keep track with financial innovative aspects.

Keywords; Securities, Instruments, Markets and Participants, What, Why and Who use derivatives.

INTRODUCTION

The popular assertion is that derivatives securities are tend to be called as financial weapons of mass destruction. But to what extent is the statement justified? To what extent it has been supported by empirical evidence?

The purpose of the paper is to provide a comprehensive review of the empirical literature on this issue and more generally on how derivative allows the users to meet the demand for cost effective protection against risk associated with movement in prices of the underlying. In other words, users of derivatives can hedge against fluctuations in exchange and interest rates, equity and commodity prices as well as credit worthiness, specifically derivatives transaction involves transferring those risks from entities less willing or able to manage them to those who are able to do so. Derivatives are totally different from securities. They are financial instruments that are mainly used to protect against and manage risks, and very often also serve arbitrage or investment purposes, providing various advantages compared to securities. Derivatives come in many varieties and can be differentiated by how they are traded.

A derivative is a contract between a buyer and a seller entered into today regarding a transaction to be fulfilled at a future point in time, for example, the transfer of a certain amount of US dollars at a specified USD-EUR exchange rate at a future date.

Over the life of the contract, the value of the derivative fluctuates with the price of the so-called "underlying" of the contract – in our example, the USD-EUR exchange rate. The life of a derivative contract, that is, the time between entering into the contract and the ultimate fulfillment or termination of the contract, can be very long – in some cases more than ten years. Given the possible price fluctuations of the underlying and thus of the derivative contract itself,

Risk management is of particular importance.

This paper aims to contribute an objective and fact based foundation to the ongoing debates concerning the global derivative market. It defines derivatives as a category of financial instrument and explains their benefits. It looks at market development and the effect of using derivatives as to why derivative exists, what it is as an instrument, and what is the market for derivatives, who are participants in the market, who can use these instruments and what purpose it can be used as an effective tool for economic growth and stabilization.

LITERATURE REVIEW

Why derivatives exist, what it is an instrument?

Derivatives make future risks tradable, which as an instrument gives rise to two main uses from them. The first is to eliminate uncertainty by exchanging market risks, commonly known as hedging. Corporates and financial institutions for example, use derivatives to protect themselves against changes in raw material prices, exchange rates, interest rates etc. They serve as insurance against unwanted price movements and reduce the volatility of companies cash flows, which in turn results in more reliable forecasting, lower capital requirements, and higher capital productivity. These benefits have led to the widespread use of derivatives: 92 percent of the world's 500 largest companies manage their price risks using derivatives

The second use of derivatives is as an investment. Derivatives are an alternative to investing directly in assets without buying and holding the asset itself. They also allow investments into underlying and risks that cannot be purchased directly.

Examples include credit derivatives that provide compensation payments if a creditor defaults on its bonds, or weather derivatives offering compensation if temperatures at a specified location exceed or fall below a predefined reference temperature.

Benefits of derivatives are

- Make them indispensable to the global financial system and the economy
- Derivatives provide risk protection with minimal upfront investment and capital consumption.
- Allow investors to trade on future price expectations.
- Have very low total transaction costs compared to investing directly in the underlying asset.
- Allow fast product innovation because new contracts can be introduced rapidly.
- Can be tailored to the specific needs of any user.

How can it be used as effective tool for economic growth and development?

Derivatives have not only widened the investment universe, they have also significantly lowered the cost of investing. The total transaction cost of buying a derivatives contract on a major European stock index is around 60 percent lower than that of buying the portfolio of underlying shares. If one compares the cost of gaining exposure to less liquid assets such as real estate, the cost differential between the derivative and the direct investment in the underlying is even significantly higher. Derivatives also allow investors to take positions against the market if they expect the underlying asset to fall in value. Typically, investors would enter into a derivatives contract to sell an asset (such as a single stock) that they believe is overvalued, at a specified future point in time. This investment is successful provided the asset falls in value. Such strategies are extremely important for an efficiently functioning price discovery in financial markets as they reduce the risk of assets becoming excessively under or overvalued.

Derivatives contracts are mainly designed for professional users. Exchange-traded derivatives contracts are typically in the range of €20,000 to €1 million notional. Financial institutions and corporates therefore make up the majority of derivatives users – more than 90 percent for some underlying and therefore contributing in economic growth and development.

What is the market for derivatives? Who are the participants in the derivative market and who use derivatives?

Derivatives are traded either on organized exchanges or in OTC markets. The differences between the exchange-traded and OTC derivatives are not confined to where they are traded but also how. In exchange-traded markets, derivatives contracts are standardized with specific delivery or settlement terms. Negotiation between traders traditionally was conducted by shouting on the trading floor (open outcry). But electronic trading system has become increasingly popular in many major exchanges. Exchange-traded derivative trades are publicly reported and cleared in a clearing house. The clearing house will be obliged to honor the trade if the seller defaults. The solvency of the clearing house was protected by marking all positions to market daily through a system of margins. By contrast, derivative trades in OTC markets are bilateral in nature. All contract terms such as delivery quality, quantity, location, date and prices are negotiable between the two parties. Transactions can be arranged by telephone or other communication means. Prices are not reported publicly. The different characteristics of the two types of markets mean that they complement each other in providing a trading platform to suit various business needs On the one hand, exchange traded derivative markets have better price transparency than OTC markets. Counterparty risks are also smaller in exchange-traded markets with all trades on exchanges being settled daily with the clearing house. On the other hand, the flexibility of OTC markets means that they suit better for trades that do not have high order flow and or with special requirements. In this context, OTC markets perform the role as an incubator for new financial products. Participants in the derivative markets are Hedgers, Speculators, Day-Traders/ Scalpers, and Arbitrageurs. Hedger is a user of the market, who enters into futures contract to manage the risk of adverse fluctuation in respect of his existing of future asset. A trader, who reads or takes position without having exposure in the physical market, with the sole intention of earning profit is a speculator. Day traders take positions in futures or options contracts and liquidate them prior to the close of the same trading day. Arbitrage refers to the simultaneous purchase and sale in two markets so that the selling price is higher than the buying price by more than the transaction cost, resulting in risk-less profit. to the arbitrageur.

RESEACH METHODOLOGY

The principal aim of this paper is to study the behavior of the volatility and trading volume of the Indian market when the derivative markets are introduced. In order to analyze the volatility, the use of conditional volatility models seems to be appropriate. To determine the robustness of our conclusions three models of the ARCH family have been chosen for use in our study. Following the paper of Antoniou and Holmes (1995) a dummy variable that indicates the introduction of derivatives is included in the conditional volatility models proposed. This dummy variable is zero before the date of the introduction of derivative markets and 1 after this date. The error term, which is subsequently modeled, is obtained from the following equation:

$$Rt = 1DM + 2DTU + 3DW + 4DTH + 5DFR + 6Rt\text{-}1 + ut \text{ --------- } (2)$$

Where DM, DTU, DW, DTH and DFR are dummy variables, which identify the day of the week, and the Rt-1 variable is the lagged dependent variable. We include these variables because in a preliminary analysis we have detected not only the presence of daily seasonality but also the presence of autocorrelation. Initially the GARCH model (proposed by Bollerslev, 1986) is used. The GARCH(1,1) model specification has proven to be an adequate representation for most financial time series, Lamoreux and Lastrapes (1990). The specification of the GARCH (1,1) model is:

$$t2 = 0 + 1u2\ t\text{-}1 + 2t2\text{-}1 \text{ -------------- } (3)$$

Where ut follows a N(0,σt2)

Nevertheless, the estimation from the GARCH model imposes a restriction on the parameters because they must be positive. Furthermore, possible asymmetric effects that appear in the series are not taken into account. Nelson (1991) proposes the EGARCH model which makes it possible to solve some of these questions. The structure of variance is:

$$\text{Log } (t2) = 0 + 1 \log (t2\ \text{-}1) + ut\text{-}1 + 3 \{ ut\text{-}1 - \sqrt{2}/\ 1\} \text{------------------------ } (4)$$

$$2\sqrt{t2} \quad 2\sqrt{t2\text{-}1}$$

Wher

e ut follows a N(0,σt2)

Additionally we have used an asymmetric model that is less sensitive to outliers than the EGARCH model (Engle and Ng, 1993). This is the GJR model (Glosten et al, 1993). The GJR model is:

t2 = 0 + 1t2 -1 +2u2 t-1 + 3St- 1 u2 t-1 ---------------------------------- (5)

Where ut follows a N(0,σt2) and where St is 1 when is negative and 0 when ut is positive or zero.

As we have mentioned before, the significance of the dummy variable introduced in the models will provide an idea about the impact of the introduction of derivative markets on the conditional volatility of the underlying asset. Table I contains the results obtained from the estimation of the three models and shows the coefficients of the conditional volatility, the dummy variable and the log likelihood function that could help us to choose the model. The most interesting conclusion that we can emphasize is the significance of the dummy variable (0,1) in the three models and specially the negative sign of the coefficient. So in the GARCH model and in the EGARCH and GJR models are significant at conventional levels3. Therefore these results lead us to think that the introduction of derivative markets in India produced a decrease in the conditional volatility of the underlying market. Thus the increase of the stability of the spot market seems to be clear. Another question arising from the results in Table I is the existence of asymmetric effects in the series analyzed. Coefficients in EGARCH and in GJR prove that negative shocks increase the volatility in a greater way than positive shocks do. Thus, the asymmetric component in volatility must be reflected when the volatility of Nifty- 50 is modeled.

We are aware that the dummy variable used is measuring the effect of the introduction of derivative markets together with any other effect that happened at the same time. The idea of creating a new dummy variable is to try to separate the introduction effect from other effects. The aim of using this variable is to distinguish the effect most directly associated with the derivative assets and for this reason we think that the dummy variable must be very closely related to the derivative markets. We therefore take the approach of including the trading volume of options on the Ibex-35. The dummy variable is calculated as the ratio of the volume of options on the Ibex-35 divided by the volume of the underlying index traded. The models presented above are estimated with the new dummy variable. Results from these estimations are shown in Table II. Coefficients associated with the dummy variable in GARCH and in EGARCH and GJR models are again negative and significant in all cases. Asymmetric components in variance in EGARCH and in GJR models also appear significant as in Table I. The sign of the dummy variable indicates that since April 2001 the volatility of the NSE Nifty-50 index has decreased and this decline in the level of conditional volatility has been produced by the introduction of derivatives on the NSE Nifty-50 index. So the hypothesis detected in the first estimates is confirmed by these second ones, which demonstrate that the decrease in volatility is associated with derivative markets. As we have found the same results in all estimates it is not necessary to determine the best model. However in both Tables I and II the log likelihood function is also presented. This is useful when choosing which model is preferable. Using the Likelihood Ratio test and the Akaike Information Criteria to distinguish and choose between nested and non-tested models respectively, the GJR model is the best when the dummy variable is 0,1 and the EGARCH model when the dummy variable is the ratio of volumes of trading. Nevertheless, we stress the importance of the results because of the unanimity obtained from all models and the fact that this offers a greater guarantee of the reliability of the results.

Therefore we can summarize as follows:

1. That the introduction of derivative markets on the NSE Nifty-50 index does not produce an increase in the uncertainty in the underlying market. On the contrary the net effect on the volatility of the index has been a considerable decrease.

2. The most satisfactory explanation of this question could be the presence of new investment possibilities, thus making the market more complete. Derivative markets improve the transmission and speed of the information, which provides stability for the market. This situation may be more noticeable in Spanish market because it is a small size market. So, any improvement in the running of the market has a large effect on the market.

3. Trading volume of the underlying NSE Nifty-50 index could also be influenced by the introduction of derivative markets. The net effect on volume is not clear, as we have commented before. The decrease in volatility of the Ibex-35 index is consistent with a possible increase in the trading volume. If trading volume increases, a greater liquidity will be reflected in the prices of the underlying market and then the market will become more stable.

However it is also possible to expect a fall in trading volume if investors move from the market for stocks to the market for derivative assets. To reveal any effects of derivatives trading on the trading volume of the NSE Nifty-50 index this regression model is estimated:

$$\mathbf{LVOLt = 1DM + 2DTU + 3DW + 4DTH + 5DFR + 6Dint + \sum_{t=1}^{5} 6{+}tLVOLt{-}1 + ut \text{ ---- } (6)}$$

Where LVOLt is the logarithm of trading volume in day t, where DM, DTU, DW, DTH and DFR are dummy variables related to the day of the week, Dint is the dummy variable which is one in the period after the introduction of derivatives and zero otherwise and LVOLt-I are the different variables obtained by lagging the dependent variable by different periods (represented by I). Results obtained from OLS estimation are in the left hand column of Table III. The coefficient related to the introduction of derivatives is significantly different from zero at the 5% level. An increase in trading volume is observed from the date of introduction of derivative assets. Autocorrelation and heteroskedasticity are not detected as the Ljung- Box, Breusch and Pagan and Engle test prove. Therefore the OLS procedure is an appropriate method. In order to take into account a virtual increase in trading volume on the expiration days that could be more closely related to the expiration effects, we have removed the observations of the expirations days (last Thursday of the month). The previous regression model is replicated again. The results are reported in the right hand column of Table III. The sign and significance of the dummy variable confirms that trading volume on the underlying index has increased significantly. This effect cannot only be due to effects of the expiration day but also to a greater average trading of the underlying asset. Consequently it can be concluded from Table III that derivatives trading has a significant positive effect on the volume of the NSE Nifty-50 index

Conclusions

The chapter provides an overview of derivatives markets, products and participants. Derivatives are invented in response to some fundamental changes in the global financial system. They, if properly handled, should help improve the resilience of the system and bring economic benefits to the users. In this context, they are expected to grow further with financial globalization. However, past credit events exposed many weaknesses in the organisation of derivatives trading.

The aim is to minimize the risks associated with such trades while enjoying the benefits they bring to the financial system. An important challenge is to design new rules and regulations to mitigate the risks and to promote transparency by improving the quality and quantity of statistics on derivatives markets.

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Table I. Effect on the Conditional Volatility.

	α_0	α_1	α_2	α_3	α_4	L-L
(1)	5.20	0.11	0.59	-1.74		4003.52
	(4.42)	(3.50)	(7.29)	(-3.32)		
(2)	-1.54	0.53	-0.05	0.13	-0.06	3995.30
	(-2.18)	(2.61)	(-1.06)	(1.95)	(-1.62)	
(3)	2.96	0.02	0.74	0.12	-1.06	4090.30
	(5.07)	(1.35)	(15.84)	(3.12)	(-4.05)	

Results from ARCH models, using dummy variable 0,1.Figures in parentheses are t-statistics. L-L: Log Likelihood function. Coefficients α_0 and α_3 in GARCH model and α_0 and α_4 in GJR model are multiplied by 10^5 , α_4 in EGARCH model is multiplied by 10. Residuals are estimated from the following expression:

$$R_t = {}_1 D_M + {}_2 D_{TU} + {}_3 D_W + {}_4 D_{TH} + {}_5 D_{FR} + {}_6 R_{t-1} + u_t$$

(1) GARCH(1,1) $\ {}^2_t = {}_0 + {}_1 u^2{}_{t-1} + {}_2 {}^2_{t-1} + {}_3 D_{\text{int}}$

(2) EGARCH $\log\left({}^2_t \right) = {}_0 + {}_1 \log\left({}^2_{t-1} \right) + {}_2 \frac{u_{t-1}}{\sqrt{{}^2_{t-1}}} + {}_3 \left[\frac{|u_{t-1}|}{\sqrt{{}^2_{t-1}}} - \sqrt{2/} \right] + {}_4 D_{\text{int}}$

(3) GJR $\ {}^2_t = {}_0 + {}_1 {}^2_{t-1} + {}_2 u^2{}_{t-1} + {}_3 S^-_{t-1} u^2_{t-1} + {}_4 D_{\text{int}}$

Table II. Effect on the Conditional Volatility.

	α_0	α_1	α_2	α_3	α_4	L-L
(1)	1.84	0.08	0.78	-0.02		4131.37
	(3.56)	(3.79)	(14.66)	(-2.00)		
(2)	-0.94	0.71	-0.09	0.17	-0.05	4170.07
	(-3.84)	(9.97)	(-2.99)	(4.10)	(-2.88)	
(3)	3.14	0.02	0.68	0.15	-0.05	4007.35
	(5.79)	(1.25)	(13.77)	(3.10)	(-2.78)	

Results from ARCH models, using dummy variable ratio of trading volume. Figures in parentheses are t-statistics. L-L: Log Likelihood function. Coefficients α_0 and α_3 in GARCH model and α_0 and α_4 in GJR model are multiplied by 10^5, α_4 in EGARCH model is multiplied by 10. Residuals are estimated from the following expression:

$$R_t = {}_1 D_M + {}_2 D_{TU} + {}_3 D_W + {}_4 D_{TH} + {}_5 D_{FR} + {}_6 R_{t-1} + u_t$$

(1) GARCH(1,1) $\ {}^2_t = {}_0 + {}_1 u^2{}_{t-1} + {}_2 {}^2_{t-1} + {}_3 D_{\text{int}}$

(2) EGARCH $\log\left({}^2_t \right) = {}_0 + {}_1 \log\left({}^2_{t-1} \right) + {}_2 \frac{u_{t-1}}{\sqrt{{}^2_{t-1}}} + {}_3 \left[\frac{|u_{t-1}|}{\sqrt{{}^2_{t-1}}} - \sqrt{2/} \right] + {}_4 D_{\text{int}}$

(3) GJR $\ {}^2 = \ + \ {}^2 + \ u^2{}_{t-1} + \ S^- u^2 + \ D$