

Relationship of Futures and Spot Prices in the Indian Derivative Market: A Study

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ABSTRACT

The changing nature of financial industry, especially as reflected in the developments in the financial derivatives market, provides considerable opportunities for risk sharing or inters temporal smothering. Derivatives can complement the traditional methods of matching asset and liability to minimise the interest rate risk. Though, the pricing of derivatives, based on arbitrage and required conditions in financial markets which may not be met in fact, is a complex and extremely useful in pricing the risk of insurance against bad financial outcomes and pricing complex cash flows associated with a variety of financial instruments. The temporal relationship among stock and futures markets has been and continues to be of intense interest to researchers, regulators, financial analysts and practitioners. The root cause for examining this relationship is that in perfect efficiently and ideally organized futures and stock markets, informed investors are indifferent among trading in either market, as the new information disseminates in both markets at the same time. That means that changes in the logarithm of futures and stock price (futures and spot returns) would be estimated to be perfectly contemporaneous correlated and non cross-auto correlated.

Key Words: Derivatives, Future Prices, Price Discovery, Spot Prices.

1. Introduction

In the past two decades the world has moved even closer. Within the economic sector, it is in the financial markets that globalisation has been particularly dynamic. Financial innovation, internationalisation and institutionalisation of investment activities are differently inseparable aspects of the radical fundamental changes in the financial sector. The markets for financial derivatives — futures and options — can be regarded as the epitome of these new structures. The infrastructure of derivatives markets is geared to international transactions. The contract volumes and trading practices are tailored to meet the challenges of professional market

players. Taking this fact into consideration, the derivatives market are characterised by exceptionally high degree of internationality.

Economies that do not have systems for derivative trading are supposed to be deprived of the benefits of beneficial financial instruments and are considered to be at comparative disadvantage. Stulz (2004) while unfolding some benefits of derivatives argued that derivatives allow individuals and businesses to achieve payoffs that they would not be able to achieve in the absence of derivatives. Derivatives can make the underlying markets more efficient. Derivatives facilitate investors to trade on information that otherwise might be costly

to trade on. Fratzscher et al., (2002) compared advantages of derivatives such as market efficiency, risk sharing & transfer, low transaction costs, capital intermediation, liquidity enhancement, price discovery, cash market development, provide hedging tools and regulatory savings, with their disadvantages such as more leverage, less transparency, dubious accounting, regulatory arbitrage, hidden systematic risk, counterparty risk, tail-risk future exposure, weak capital requirements and zero-sum transfer tools, and concluded that derivatives trading is increasingly migrating towards some of the world's largest and most innovative areas but at the same time dangers are still lurking.

Financial futures contracts exist to provide risk management services to participants. Risk and uncertainty in the form of price volatility and opportunism are major factors giving rise to future trading. Futures trading evolved out of autonomous forward contracting by merchants, dealers and processors, designed to increase price efficiency. This evolution from spot to forward to futures contract suggest a progressive adaptation of institutions to more efficient methods of dealing with price risk. The futures market is best viewed as side market designed to deal with price volatility that is poorly handled by spot and forward markets. This transactional superiority of futures market comes mainly from their transactions — cost reducing attributes.

Futures markets, by forming prices relating to delivery dates, project their prices into the future. These prices are used by

agents to plan the future production to price forward contracts for the supply of commodities and tender for forward contracts. Agents may also use the futures market in deciding whether to store a commodity. In addition, futures market may help the agents to decide the timing of inputs purchases and of processing activities according to the expected outcome of hedging. Thus futures market performs a forward pricing function, and in these ways futures prices facilitate the allocation of resources between present and future uses. By providing a centralized platform, the future market disseminates the information about the supply and demand conditions of a commodity, which in turn results in determination of prices. Thus, the hedging improves the market's ability to discover true prices. Prices in the derivative market reflect the perception of investors in the cash market. The prices of derivatives converge with the prices of the underlying at the expiration of the derivative contract. Thus derivatives help in discovery of future as well as current prices.

One of the three basic economic functions provided by the derivatives market is the process of price discovery. The role of price discovery is an essential part of an efficient economic system. The prices in the market must reflect exactly the relative cost of production and the relative consumption utilities if optimum allocation of resources is to be achieved in an economy. The futures and options markets provide a pricing mechanism through which relative cost and utilities are brought to an alignment both in present and in the future.

Another important reason for examining this particular relationship between the two markets, as supported by many researchers, is that derivatives markets play an important price discovery role. According to Booth et al. (1999), price discovery is the procedure by which markets incorporate the new information to arrive at equilibrium asset prices. Analytically, price discovery denotes if price changes in derivatives markets lead price changes in stock markets more frequently than the opposite. If so, then lead lag relationship among the two markets exists, with derivatives prices enclosing valuable information about subsequent stock prices.

Lastly, motive for studying this relationship is whether volatility spill over (transmission of volatility) exists from one market to the other. More analytic, the existence of volatility spill over between the two markets indicates that the volatility of returns in one market has an important effect on the volatility of returns in the other market.

2. Review of Literature

Various studies have been conducted to analyze the impact of price discovery mechanism in case of stock prices. The debate about speculators and the impact of futures on spot price volatility suggests that increased volatility is undesirable. Prices depend on the information currently available in the market. Futures trading can alter the available information for two reasons: first, futures trading attract additional traders in the market; second, as transaction costs in the futures market are lower than those in the spot market, new information may be transmitted to the futures market more quickly.

Thus, future markets provide an additional route by which information can be transmitted to the spot markets and therefore, increased spot market volatility may simply be a consequence of the more frequent arrival and more rapid processing of information.

On the other hand, arguments suggesting that the future and option markets have become important mediums of price discovery in cash markets are equally strong. Several authors have argued that trading in these products improve the overall market depth, enhance market efficiency, increase market liquidity, reduce informational asymmetries and compress cash market volatility (Kumar, Sarin and Shastri, 1995; Antoniou, Holmes and Priestley, 1998).

It has been argued that the introduction of derivatives would cause some of the informed and speculative trading to shift from the underlying cash market to derivative market given that these investors view derivatives as superior investment instruments. This superiority stems from their inherent leverage and lower transaction costs. The migration of informed traders would reduce the information asymmetry problem faced by market makers resulting in an improvement in liquidity in the underlying cash market. In addition, it could also be argued that the migration of speculators would cause a decrease in the volatility of the underlying cash market by reducing the amount of noise trading. This hypothesis would also suggest that the advent of derivatives trading would be accompanied by a decrease in trading volume in the underlying security.

One school of thought argues that the introduction of futures trading increases the spot market volatility and thereby, destabilises the market (Cox 1976; Figlewski 1981; Stein, 1987). Others argue that the introduction of futures actually reduces the spot market volatility and thereby, stabilises the market (Powers, 1970; Schwarz and Laatsch, 1991 etc.). The advocates of the first school perceive derivatives market as a market for speculators. Traders with very little or no cash or shares can participate in the derivatives market, which is characterised by high risk. Thus, it is argued that the participation of speculative traders in systems, which allow high degrees of leverage, lowers the quality of information in the market. These uninformed traders could play a destabilising role in cash market (Chatrath, Ramchander and Song, 1995). However, according to another viewpoint, speculation could also be viewed as a process, which evens out price fluctuations.

Studies that have been undertaken to evaluate the effect of introduction of derivative products on volatility of Indian spot markets reveal a mixed response. There is a wide disagreement among researchers at both the conceptual and the empirical front regarding the introduction of derivative trading. Regardless of the vast literature that has scrutinized the impact of futures on spot price volatility, little consensus has emerged. In short, it can be concluded that the emergence of derivatives market has brought about radical changes to the nature of financial transactions. The futures contracts have provided investors flexibility, with regard

to their portfolio synthesis and rapidity in their transactions. Furthermore, their use has led to the application of strategies that aim to the minimization of systematic risk of portfolios, as well as to their more effective synthesis. As a result, a significant number of transactions have moved from spot markets to futures markets.

The Present study has been carried out with the specific objective of assessing the relationship between futures and spot market. For analysing the relationship, the hypothesis (H_{01}) being formulated is: There is no relationship between futures and spot price.

3. Methodology

The present paper attempts to study the relationship between futures market and spot market. The data has been collected from various secondary sources of official websites of NSE, RBI SEBI and also related literatures. For analysis of the objective of the study, closing prices of both futures and spot market for a period of three months from 27/4/12 to 20/7/12, i.e. 60 trading days have been taken into account. For the purposes of smoothening of data, 15 day moving average has been applied. The sample consists of ten consistent performing scrips from S&P CNX Nifty. The data has been analyzed using statistical tools like simple regression analysis, ordinary least squares method and ANOVA test.

4. Results and Discussion

India's experience with the launch of equity derivatives market has been extremely encouraging and successful. Since its

inception in June 2000, derivatives market has exhibited exponential growth in terms of both volume and number of traded contracts. The turnover of derivatives at NSE has increased tremendously from Rs 2365 crores in 2000-2001 to Rs 29248221 crores in 2011-12. The derivatives turnover on the NSE has surpassed the equity market turnover. Significantly, its growth in the recent years has surpassed the growth of its counterpart globally. Trends in Equity Derivatives Market Exchange traded derivatives form an important segment of Indian Stock markets. The derivatives market has grown substantially over the years in India. Trading in derivatives is dominated by NSE with a market share of 100 percent in the total equity derivatives turnover. Over the years, the ratio of derivatives market turnover to cash market turnover has been gradually increasing. For the year ended on 31st December 2011, turnover in the equity derivatives segment was 13.12 times that of the turnover in the cash market segment, during October-December, 2011 as compared to 11.93 times in the previous quarter. The turnover in the cash market decreased by 16% while turnover of equity derivatives decreased by 8% during the current quarter as compared to the previous quarter. In this context, it may be stated that, equity derivatives (Futures and options) turnover is reported on a notional basis whereas for trading and settlement of options, only option premium is taken into account. As premium value is merely about 1% of notional value, therefore, reporting on the basis of notional value inflates the equity derivatives turnover. Turnover in the equity derivatives segment was 13.12 times that of the turnover

in the cash market segment, during October-December, 2011 as compared to 11.93 times in the previous quarter. The turnover in the cash market decreased by 16% while turnover of equity derivatives decreased by 8% during the current quarter as compared to the previous quarter. NSE stands at third position in terms of single stock futures traded registering 161 million contracts traded in 2011, even after registering a negative growth rate of 8.4%. By accounting a tremendous growth of 64.4% in terms of stock index options, NSE occupies second position with a total of 871 million contracts traded in 2011. The growth rate shows the uniqueness in success of Index options in the Indian Market. In terms of single index futures, NSE with a negative growth rate of 0.4%, retains its third position as per the volume of contracts traded.

From the viewpoint of total equity derivatives turnover, NSE of India stands at third position depicting a massive growth of 37.1% as compared to the other stock exchanges in the list provided. The growth rate of NSE is almost the twice that of EUREX, occupying second position in the list, once more asserting the fact India is an emerging economy in terms of derivatives market.

For analysing the relationship between futures and spot prices, a null hypothesis has been formulated. The ANOVA test has been used to test the null hypothesis thus formulated. The descriptive statistics as given as per the Table 1 indicates that the Futures and the Cash returns series follow a normal

distribution as given by the measures of skew ness and kurtosis. It is seen that the skew ness and kurtosis are well within the range of -2 to +2 complying with the normal distribution pattern .Compliance of this

feature satisfies the assumption taken up for regression analysis further in this study. A comparison of the population variance of the Futures is found out to be less than that of Cash returns.

Table 1: Descriptive Statistics of Futures and Cash Market (Non-standardised Data)

Column 1	Futures	Cash	Wtd Futures	Wtd Cash
Mean	742.7878	740.7418	734.3905	732.5372251
SD	597.26	599.248	573.13	575.3841159
Variance	356718.40	359098.1	328481.59	331066.8808
Kurtosis	0.109146	0.136446	0.133199	0.166932661
Skewness	0.959285	0.97079	0.947994	0.961178316
Range	2158.50	2172.4	2158.50	2158.5
Min	60.90	59.6	62.39	61.42666667
Max	2219.60	2232	2185.68	2200.166667
Count	600	600	585	585
No of Trading days	60	60	60	60

Source: Author’s Compilation from various sources.

Table 2: Statistical Tools for Analysis of Data

Column	27/4/12 to 25/5/12		28/5/12 to 22/6/12		24/6/12 to 20/7/12	
	Futures	Cash	Futures	Cash	Futures	Cash
Mean	705.7645	698.8918018	713.539045	713.9025586	741.0293694	741.7053694
SD	493.6358	495.7805036	531.4950879	532.1530768	541.1455354	544.0145235
Count	185	185	185	185	185	185

Source: Author’s Compilation from various sources.

In order to examine whether the differences in the volatility in the spot market is more than that of futures market, volatility of futures and cash market is also examined by creating a structural breakup of the period under study to three segments of 20 trading days The

analysis shows that the volatility has increased and decreased at different periods of time and the trend in Futures and Cash is similar though the percentage change has sharply taken a decline in both the cases of futures and spot market during the second structural break

Table 3: Futures

Period	SD %	% change
27-4-12 to 25-05-2012	493.6358	
28-5-12 to 22-06-2012	531.4950879	7.67%
25-6-2012 to 20-07-2012	541.1455354	1.82%

Source: Author’s Compilation from various sources.

Table 4: Cash

Period	SD	% change
27-4-12 to 25-05-2012	495.7805036	
28-5-12 to 22-06-2012	532.1530768	7.34%
25-6-2012 to 20-07-2012	544.0145235	2.23%

Source: Author’s Compilation from various sources.

Regression Statistics

Multiple R	0.9999595				
R Square	0.999919001				
Adjusted R Square	0.998206672				
Standard Error	8.38847745				
Observations	585				
ANOVA					
	<i>Df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	507299844.9	507299844.9	7209388.787	0
Residual	584	41094.0675	70.36655394		
Total	585	507340939			

By applying the closing prices of futures and spot prices of ten consistently performing scrips of Nifty for a period of 60 trading days as y and x variables respectively, the regression analysis was applied for analysing the change in volatility. Of these two variables, the future price returns have been identified as independent variable and the other one, spot price returns has been considered as dependent variable. For that purpose the following regression equation has been used – $Y = aX + b$ variables, the future price

returns have been identified as independent variable and the other one, spot price returns has been considered as dependent variable. For that purpose the following regression equation has been used – $Y = aX + b$.

From the calculations, it is evident that calculated F value exceeds Table F value at df (1, 583) at 5% level of significance. Therefore, we arrive at a conclusion that of rejecting H0. Thereby, we conclude that there exists a relationship between futures

and spot price returns and also both these variables have a very high degree of correlation.

5. Conclusion

India is one of the most successful developing countries in terms of a vibrant market for exchange-traded derivatives. This reiterates the strengths of the modern development of India's securities markets, which are based on nationwide market access, anonymous electronic trading, and a predominantly retail market. There is an increasing sense that the equity derivatives market is playing a major role in shaping price discovery. Factors like increased volatility in financial asset prices; growing integration of national financial markets with international markets; development of more sophisticated risk management tools; wider choices of risk management strategies to economic agents and innovations in financial engineering, have been driving the growth of financial derivatives worldwide and have also fuelled the growth of derivatives here, in India. From the analysis, it can be found that NSE has been rated as one of the top two exchanges in Asia with 918.5 million contracts traded topped only by KOSPEI. Single stock futures has found a unique success in the Indian market. The reasons are found to be familiarity of investors with badla trade, transactions being of small volumes. The regression analysis reinforces the statement made earlier in the review that changes in logarithm of futures and spot returns is found to be perfectly contemporaneous correlated and non cross-auto correlated. Even though derivative trading has significantly altered the

movement of stock prices in Indian spot market, it is yet to be proved whether derivative products have served the purpose as claimed by Indian regulators.

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