

Dispelling the myth that stock index futures destabilize underlying markets

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Abstract

This paper investigates the impact that index futures have on their underlying markets. Specifically, the paper examines the volatility effect of the introduction of futures trading on the underlying, the lead - lag relationship between futures prices and cash prices, and the ways in which futures markets facilitates stability in the underlying markets, thus improving efficiency voluminously. To explore the volatility effect of the introduction of futures markets on the underlying market, empirical evidence from various countries is analyzed, comparing volatility levels from the pre-inception period of futures trading with those from the post-inception period. The lead-lag relationship between the futures and cash markets is used to explore the positive dynamics of the price discovery mechanism introduced by futures trading. The conclusive results of these findings indicate strongly that the introduction of index futures helps stabilize the underlying market, and that the introduction of derivatives tends to improve liquidity and informativeness of the market as a whole. Further, a theoretical model is used to corroborate the results from the study, and application of the model to significant current issues reveals that its conclusions hold firm to the present day.

Introduction

As economies develop over time and financial systems become increasingly sophisticated, there is an ever greater need to examine the relationships between parallel financial markets. Derivative markets have experienced exponential growth as exchange-traded futures are increasingly gaining momentum over forwards contracts. The advantages that derivatives bring to financial systems have been extensively studied. Much research has been expended on the effects of stock index futures on their underlying indices.

Analysis of the relationship between stock index futures and their underlying markets is important because such information can provide valuable insights on the dynamics of the two markets. Decision making processes are made more efficient by increasing the level of information and awareness amongst market participants. Hedging effectiveness achieves greater sophistication and individuals can use such tools to make informed investment decisions. Corporations and institutions can further utilize critical market information in planning budgets and employing their resources in the most productive manner.

To provide a comprehensive analysis of the effect of stock index futures, the paper first utilizes empirical evidence of a study conducted by Huseyin Gulen and Stewart Mayhew's, to analyze the volatility effect of stock index futures on underlying markets. The results of their research strongly suggest that volatility either decreases or remains

constant post-inception of stock index futures in developing countries. Their sample comprises of approximately 25 countries, possibly the largest sample in studies done on the subject matter. They further support their results by analysis of the relationship between volatility in cash markets and open-interest in futures markets.

Next, we use a case study, by Alexakis, Kavussannos, and Visvikis, on the lead-lag relationship in returns and volatility between cash and stock index futures in Greece, as primary resource for understanding the implications of this lead-lag relationship. Evidence is then used from Mayhew's research on the lead-lag relationship in various countries to support the case study's claim that futures prices lead underlying prices, in most developed and developing countries.

Finally, we use Parchure's theoretical model of the impact of futures markets on cash markets, as a general model which proves the intuitive hypothesis that futures markets stabilize cash markets. Parchure's model is then analyzed in the framework of Pakistan's stock market to provide corroborative real life evidence that his model holds firm when tested in current market scenarios.

Empirical Evidence

A. Volatility Effect of Stock Index Futures on Underlying Market

Following is a table that summarizes studies that have been deployed to examine the effects that the commencement of futures trading has on the underlying index, measured through changes in volatility levels. Many researchers find no significant increase in volatility after the inception of stock index futures trading. Still others find that volatility in fact decreases in underlying indices of many developing countries after index futures are listed.

The earliest studies which attempted to collect empirical research, examining the effects of futures market introduction on cash markets, simply compared standard deviations between pre-inception periods of futures trading and post-inception periods. Econometric fine-tuning has allowed for greater sophistication in such data collection. Researchers now compare volatility across the time horizon, using new innovative models to refine their findings.

The table used refers to the empirical research conducted by Gulen and Mayhew¹ in 25 countries. The results show that with the exclusion of the United States and Japan, all the other countries either witnessed a decrease in volatility or no volatility effect at all after the inception of futures trading. 16 countries experienced a volatility-dampening effect post-inception and 7 countries exhibited no significant volatility effect. Shenbagaraman's research adds India as the 26th country in the table, and similarly shows

¹ Gulen, H., Mayhew, S. "Stock Index Futures Trading and volatility in International Equity Markets." The Journal of Futures Markets, Vol. 20, No. 7, 661- 685 (2000)

that the Nifty experienced no significant volatility effect after the introduction of Nifty Futures.²

The evidence provided by the studies on these countries strongly suggests that in developing countries, the inception of futures trading either stabilizes the underlying index by dampening the volatility effect or has no significant effect on it. It could be plausible to assume that derivative trading plays a more-important stabilizing role in markets that lack alternative stabilization mechanisms, as in the case of developing countries. The study underscores the notion that the introduction of derivatives trading in developing economies can stabilize underlying markets and enhance overall market efficiency.

Furthermore, the researchers found another interesting aspect of the impact of futures trading on cash markets. They employed a model to test whether there appears to be any relationship between the level of futures trading activity and the volatility of the underlying markets after the inception of stock futures.

The study divided futures trading volume and open interest into expected and unexpected components. Results indicate that the unexpected (measured by unexpected prices changes) component of futures trading activity, volume or open-interest, is positively related with spot market volatility, which suggests that futures market volume responds to unexpected volatility events. The expected component of futures volume, termed “background” level of futures trading, was negatively related to spot market volatility, which suggests that futures markets further have a stabilizing influence on underlying market prices. In other words, volatility tends to be lower in periods when open interest in stock index futures is high, and vice versa, exclusive of unexpected events.

Table 1: Results of various countries showing the volatility effect of stock index futures³

Country	Underlying Index	Volatility	Data Collection Period
Australia	All Ordinaries	Decrease	Jan 1980 - Dec 1997
Austria	ATX	Decrease	Nov 1987 - Dec 1997
Belgium	BEL 20	Decrease	Jan 1990 - Dec 1997
Canada	TSE 300	No Effect	Jan 1973 - Dec 1997
Chile	IPSA	Decrease	Jan 1987 - Dec 1997
Denmark	KFX	Decrease	Dec 1979 - Dec 1997
Finland	FOX	No Effect	Jan 1987 - Dec 1997
France	CAC 40	Decrease	Jul 1987 - Dec 1997
Germany	DAX	Decrease	Nov 1977 - Dec 1997
Hong Kong	Hang Seng	Decrease	Jan 1973 - Dec 1997
Hungary	BSI	No Effect	Jan 1991 - Dec 1997
India ⁴ *	Nifty	No Effect	Oct 1995 - Dec 2002

² Shenbagaraman, P. “Do Futures and Options trading increase stock market volatility.” p. 9.

³ Gulen, H., Mayhew, S. “Stock Index Futures Trading and volatility in International Equity Markets.” The Journal of Futures Markets, Vol. 20, No. 7, 661- 685 (2000)

Israel	Maof 25	Decrease	Jan 1992 - Dec 1997
Italy	MIB 30	Decrease	Jan 1973 - Dec 1997
Japan	Nikkei 225	Increase	Jan 1980 - Dec 1997
Korea	KOPSI 200	No Effect	Jan 1990 - Dec 1997
Malaysia	KLCI	Decrease	Jan 1980 - Dec 1997
Netherlands	AEX	Decrease	Jan 1983 - Dec 1997
Norway	OBX	Decrease	Jan 1983 - Dec 1997
Portugal	PSI 20	No Effect	Jan 1993- Dec 1997
South Africa	All Share	Decrease	Apr 1984 - Dec 1997
Spain	IBEX 35	No Effect	Jan 1987 - Dec 1997
Sweden	OMX	No Effect	Jan 1986 - Dec 1997
Switzerland	SMI	Decrease	Jul 1988 - Dec 1997
United Kingdom	FT-SE 100	Decrease	Jan 1973 - Dec 1997
United States	S & P 500	Increase	Jan 1973 - Dec 1997

B. Lead – Lag Relationship between Futures and Underlying Prices

We now move on to examine the hypothesis that derivatives markets greatly improve the efficiency of the overall market, by analyzing the stabilizing force of price discovery that stock index futures bring to capital markets. One of the ways to analyze the impact that the price discovery mechanism has on futures and cash markets is to examine the lead-lag relationship. The lead- lag relationship referred to is that between the price movements of stock index futures and the underlying cash market. This relationship illustrates how quickly one market reflects new information relative to the other, and how well the two markets are correlated. In a perfectly efficient market, news should be absorbed simultaneously in both markets. However, in all countries there is one market that reacts quicker to information, this market is said to lead, whilst the other market is the laggard.

Empirical evidence from research conducted in stock index futures in various countries overwhelmingly suggests that futures prices lead the reported current prices of the underlying index. These results are significant because they clearly show not only that the price discovery mechanism initiates from futures markets, but also that futures markets are more efficient in responding to economic events and incorporating new information. Thus absence of futures markets has considerable opportunity costs associated with losses in efficiency and information effectiveness. Price Discovery cannot be efficiently achieved without a futures market. Futures therefore help the cash market achieve greater stability since they help spread the impact of shocks across markets and over time.⁵

Kwaller, Koch and Koch, (1987) in their analysis of the S & P 500, find that the

⁴ * Shenbagaraman. Results from India were used from Shenbagaraman's research and have been added to the Mayhew's table for the purpose of the reader's convenience.

⁵ Alexakis, P., Kavussanos, M., Visvikis, I. "An Investigation of the Lead-Lag Relationship in Returns and Volatility between Cash and Stock Index Futures: The Case of Greece."

S & P 500 Futures Index leads the cash index by approximately 20- 45 minutes. The results of other economists, such as Harris (1989), Stol and Whaley (1990), Nigman (1997) also researching the S & P 500, vary in terms of the actual time adjustment between the leading market and the laggard, but all reach the same conclusion that stock index futures lead their counterpart underlying indices. Mexico, Greece, Japan, Hong Kong, Sweden, Germany, Finland, France, South Africa, Korea, The Netherlands and the United Kingdom, amongst a host of other countries, further show a strong leading derivatives market and a lagging underlying index.⁶

Many explanations can be provided for the lead shown by futures markets over cash markets that also reiterate the well-documented advantages of derivative trading. One explanation is that due to the availability of leverage, futures traders can invest in derivatives for a fraction of the cost of buying the underlying. Futures markets have greater liquidity, lower transaction costs, lower margins and provide an avenue for easy exposure to both the up as well as downside view, which makes them more appealing to a wider spectrum of investors. Another explanation highlights the predictive power of futures returns, which may be relevant for long term investors.

Theoretical Evidence

Parchure provides theoretical proof that the presence of derivatives markets facilitates smoothening of fluctuations in spot markets without any disruption in the price discovery mechanism. His theoretical model refers to the specific functional importance of arbitrageurs in futures trading.⁷

First he examines the scenario where a futures market operates parallel to a spot market. In cases of extreme price movements in the spot market, the spot market is afflicted with a dynamic shift in demand and supply positions. In a rising market or falling market, the spot price will respond accordingly. However, Parchure argues that such extraneous movements create an arbitrage opportunity and traders will move to the futures markets to hedge their positions; in a falling spot market, they will immediately purchase the spot and sell futures, whereas, in a rising market traders will sell the spot and purchase futures.

The actions of these forward looking traders have important significance. The ability to effectively hedge positions in the futures markets slows down the rate of extreme price movements. The arbitrageurs thus provide a moderating influence by absorbing the brunt of price fluctuations. This phenomenon clearly suggests that cash markets are less sensitive to changes in extreme price fluctuations in the presence of a futures market.

Parchure tests the implications of his theoretical model to show that not only do futures markets act as a counterbalancing force to stabilize the cash market, but also that the cash market's sensitivity to changes in stock fundamentals in the presence of a futures market remains unchanged, which implies that futures trading in no way distorts the price discovery mechanism vis-à-vis fundamentals. This conclusion provides confirmation of

⁶ Mayhew, S. "The Impact of Derivatives on Cash Markets: What Have We Learned." (1999)

⁷ Parchure, R. "Proof that Spot With Its Derivative is Stabler than Spot Alone."

our earlier findings that illustrate that price discovery actually initiates in the futures market.

Furthermore, Parchure argues that:

Worse than a situation of spot alone would be a situation of spot market with Badla that was prevalent in India, a situation with no opportunities for arbitrage between the spot and forward segments. In the spot market with Badla any disturbances in the spot price would tend to fuel speculation in the *direction of the disturbance* e.g. a decline in the price to short sales and a rise in the price to long purchases.

This is exactly the phenomenon witnessed at the KSE in March 2005 crisis. The presence of Badla, and the inherent inability of traders to hedge their respective positions, only served to exacerbate the strong bear market. Adding the disastrous component of downward price limits, set at 5 % of the current spot price, it becomes easy to understand the chaos created by market participants anxious to unwind their heavily leveraged positions.

Conclusion

Based on the analysis of the results of various papers that examine the impact of stock index futures on underlying markets, the conclusion is reached that futures markets never have a destabilizing effect on underlying markets. The analysis of empirical research in the volatility impact of stock index futures on cash markets and the lead- lag relationship between futures prices and cash prices supports the intuitive hypothesis that futures trading acts as a stabilizing influence. The theoretical model provided a strong corroborative element and proved to be comprehensively applicable to real life scenarios, showing that Badla is a problem rather than a solution.

The primary goal of the research papers is to impart knowledge and shed light on the dynamics of a market, which may previously have remained unexplored. As information gathers, a plethora of different findings leads to greater understanding of the current, future, or past state of affairs, and helps dismiss misplaced views of the market. A general misconception amongst market participants in Pakistan is that futures trading leads to increased volatility in cash markets. This view must be dispelled from the market if we wish to achieve any significant advancement in our capital markets. Pakistan, as a developing country, has an added advantage in that we can learn from the example of developed countries that underwent extenuated cycles of trial and error, and bypass many steps in the process. It is left up to us to shed dead-weight, in the form disinformation, myths and fables, from our markets and take the initiative towards modernization, development, and innovation of our archaic capital structure.