The commodities derivative market – An intricate study of commodity options and commodity index investing
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ABSTRACT
Hedging using derivatives both exchange traded and over the counter has assumed significant proportions in today’s globalised economy. Within the two categories of exchange traded and over the counter derivatives (OTC), exchange traded products have assumed superiority mainly because they set aside the counterparty and liquidity risks, OTC on the other hand has assumed more significance in case there is a need for customization. Among these exchange traded products, futures and options have emerged as the most popular and widely used. The hedgers in other words those seeking protection would primarily comprise of farmers, merchandisers, food processors, importers and exporters, they would take a position opposite to their cash market position in order to insulate themselves against the risk of price fluctuation.

Stulz (2002) shows that derivatives are also widely used by companies for risk management. Not only companies but also countries primarily developing and agrarian economies have been using commodity derivative markets to hedge commodity price risks. This was documented by Larson, Varangis and Yabuki (1998).

Trading in Commodity derivatives in India has been time and again suspended in select commodities on the pretext that it causes price fluctuations and this being the precise reason why commodity options and index funds have not been introduced in the market. On the contrary, it has been observed that commodity options are widely traded in both developed as well as developing economies across the world. Globally Commodity Index investing has gained a lot of ground as it provides an effective diversification tool. Numerous studies have documented the negative correlation between commodities and other traditional investment avenues.

This paper attempts to put forth a strong case for introducing commodity options and index funds in the Indian commodities market.

Key words: Commodity options, Commodity index investing, Price fluctuations, Hedging and speculation.

1. Introduction
Risk Management and Investment Management using derivatives has become a common phenomenon today. These derivatives are essentially exchange trade products or over the counter products, Prominent among the exchange traded products are Futures and options and
where the underlying is a commodity, they are referred to as commodity Futures and options. Contemporary commodity options are generally not derived from the commodity itself, but are based on future as most of the trading takes place in the future market, this in a way ensures the liquidity of the underlying. Options could be derived from the physical commodity itself but that would entail problems associated with physical delivery.

Another significant feature that distinguishes a commodity option from an option based on any other underlying is the seasonal behavior of many of the commodity prices. In fact this seasonality forms an important component of the option valuation process and numerous academic studies have documented the seasonal behavior of commodities, examples being Fama and French (1987), Sorenson (2002), Lucia and Schwartz (2002) and Manoliu and Tompaidis (2002)

Investing in commodity derivatives apart from using them for their primary function of risk management has also assumed a lot of significance. Commodity index investing essentially refers to investing in a portfolio of commodities with an objective to diversify the investment portfolio. These commodity index products can take multiple forms including managed funds, exchange Traded Funds (ETFs), Exchange Traded Notes (ETNs) and OTC return swaps. The logic behind investing in commodity derivatives is well founded. The returns of commodity investments are negatively correlated with stock and bond returns and they serve as a natural hedge against inflation. Empirical Studies has clearly brought out this fact.

Part 1 of the Paper briefs on the origins of commodity options, Part 11 of the paper then goes to examine through a literature review whether increased Trading in commodities has been the cause for price fluctuations in commodities, Part 111 delves into the relative merits of commodity options as a tool for risk management and also provides supported by literature review, the rationale behind commodity index investing, Part IV introduces certain key aspects of the mechanics of using commodity options. The paper then concludes by putting forth a strong case for introducing commodity options and index funds in the Indian commodities market.

1.1 Part I

1.1.1 Origins of commodity options

Commodity options have quite a long history. Aristotle was the first to document the use of the same, he reported in his book Politics (published 332 B.C.) a story about the philosopher Thales, who used to make good predictions on the next year’s olive harvest, but he did not have enough money to make direct use of his predictions. As a solution to this Thales used to buy options on the usage of olive presses, which were available for small premiums early in the year. When the harvest season arrived, and the crop yield was, as expected by Thales, high, olive presses were in huge demand, and he was able to sell his usage options for a small fortune. (Williams and Hoffman (2001), Options trading on the floor of an exchange began in April 1973 when the Chicago Board of Trade (CBOT) created the Chicago Board Options Exchange (CBOE) for the sole purpose of trading options on a limited number of New York Stock Exchange-listed equities. Options on futures contracts were introduced at the CBOT in October 1982, when the exchange began trading Options on U.S. Treasury Bond futures. Later in the year of 1982, options on gold futures and sugar futures were started on exchanges in US. They were traded as “privileges” in the late 1800s in the US and grew into the options market which was eventually banned by the congress in the Commodity Exchange Authority Act of 1936 due to poor experience.
The commodities derivative market – An intricate study of commodity options and commodity index investing
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The ban on options in agricultural commodities remained in effect until President Ronald Reagan signed into law the Futures trading Act of 1982. This legislation authorized trading in agricultural commodities options in the US and allowed the CFTC to set up a three year pilot program with US futures exchange to initiate options trading in agricultural commodities. The CFTC made regulatory reforms that govern the commodity sector; it restricted the number of options allowed to be traded for better surveillance of these markets. The result was that over time markets which accepted options grew in terms of volumes.

The first exchange-traded commodity option contracts were introduced for sugar in 1982 on the New York CSCE. Over the years, trading in commodity options has spread both across sectors and geographies. By 2012, trading in commodity options could take place on about 20 commodity exchanges across the globe, which includes exchanges from developing nations of Africa and South America. Currently, major exchanges like CME, ICE, LME and others offer commodity options on underlying commodity futures, while exchanges like TAIFEX and EUREX offer options on underlying commodity spot. Overall, volume in commodity options trading across the globe admirably grew over the period.

Given the growth in trading volumes and an increasing integration of the Indian economy due to globalization, the Indian commodity derivative market has started being recognized among the top derivative exchanges across the world. The Government of India however has been quite skeptical and increased financialization of commodities has often been blamed for causing increased price fluctuations.

The changing face of option contracts

Traditionally, there are two types of options: European options, for which settlement payments are made only if the index price exceeds the strike price at maturity (that is, the option can only be exercised on the expiration date); and American options, for which the settlement payment is based on a specific time chosen by the buyer (that is, the buyer decides when to exercise the option). The use of these options is not restricted to the regions they are named after. However, neither of these structures of settlement payments is well suited for hedging an ongoing risk such as the regular export of a commodity, or for hedging contracts such as those common in the metal industry, in which prices are defined as the monthly average of daily LME prices. Moreover, they can be very expensive, especially in the case of American options. They are, as a result, mostly attractive to speculators.

Other types of options have flourished on the over-the-counter market. To tap the largely unexploited market of producers and consumers, a private bank, Bankers Trust, recently developed a new type of option, called the Asian or average price option. A settlement payment is made if the average of the index price over the life of the option exceeds the strike price. This conforms to the hedging of a regular flow of products, and is not very suitable for speculation. The costs are much lower than those of the traditional types of options: for example, a three-year European put option for oil, at a strike price of US$ 20/barrel, in early 1990 cost $2.5 per barrel; a three-year Asian put option would have cost only $1.5 per barrel. A March-December 1991 conventional put option for copper, at a strike of $2,300 a ton, cost $146 a ton; an Asian put option would have cost $100 a ton. Asian options are growing increasingly popular for metals, and the first ones have now been introduced on a futures exchange - the LME.

Source: United Nations Conference for Trade and Development (UNCTAD) - 6 April 1998
Empirical Research however has proved that fluctuations in commodity prices have no interlink age with the Financialisation of commodities but are mainly the after effects of demand- supply structural imbalances. Commodity options have not been introduced in India on this very pretext and there is a clear hesitance on part of the government in doing so. In fact a bill relating to the amendment of the Forward contract regulation act (FCRA) has long been awaiting clearance. The bill if successfully passed would allow the introduction of commodity options and index funds in the exchanges. The Chicago Board of Trade (CBOT) introduced another variant of an option termed as the Serial option. It essentially facilitates short term hedging. The major difference is that standard options are traded for the months in which the commodity contracts expire and the serial options are traded for the other months, another difference is that serial options trade for approximately 30 days only.

1.2 Part II

1.2.1 Does financial speculation lead to price fluctuations in commodities? Is it desirable?

As earlier highlighted a crucial reason behind not introducing commodity options in the markets is that it may lead to excessive trading and in a way may lead to speculation. One of the viewpoints states that the financial speculation adversely affects the futures market and this percolates to the spot markets, leading to increase in prices of commodities causing food inflation and subsequent evils, thus financial speculation must be regulated and in some cases should be prohibited, Academic studies have however contrasted this, Numerous studies both those that have been academically peer reviewed as well as the empirical contributions to grey literature have concluded that financial speculation does not have a harmful affect on the agricultural commodities market. Examples: Sanders and Irwin (2011), Stoll and Whalley (2010), McPhail et all (2012).

Hamilton and Wu (2012) tried to examine whether commodity index fund investing has a measurable effect on commodity future prices or not. Very little evidence was found to support the hypothesis.

Researchers have clearly demonstrated that future markets perform two significant functions of Price Discovery and transfer of risk (working 1962 and Garbade and Silber, 1983). Future commodity exchanges serve to provide a centralized marketplace where market users can discover the prices of commodities for future delivery and where risk-averse people can shift commodity price risk to others willing to bear it (Schap and Dan, 2003). Price risk management thus essentially assumes the existence of two parties, hedgers who want to transfer the risk and speculators who are willing to assume the risk, the derivatives market serves as the meeting place for both these parties. This very clearly brings out the need for the existence of speculators in the derivative market. Speculators facilitate hedging by providing liquidity to the market- the ability to enter and exit the market quickly and easily. The speculators can either be the general public or the floor traders. The very function of price risk management would not be possible if the market did not have a set of people willing to assume risk.

Price risk management as earlier mentioned is done not only at individual level but also at company level Stulz (2002) and at Country level -Larson, Varangis and Yabuki (1998). The country level price risk is of crucial importance for developing and agrarian economies. Heavy reliance on commodities exposes these economies to price fluctuations which can cause volatility in their revenue collections, complicate their public debt management and
also affect the fiscal balances of such economies. Many of the countries that are importers and exporters of commodities such as crude oil have almost in all cases adopted derivatives to hedge risks. For Example, Mexico has been a predominant exporter of oil and its economy was in a way totally dependent on the oil revenue. It largely used commodity options to hedge the price risk.

1.3 Part III

1.3.1 Why commodity options for risk management?

The beauty of an option is at has a limited loss potential in terms of option premium and an unlimited gain potential. In a more generic sense options offer non linear payoffs as compared to linear payoffs provided by forwards and futures, also since option provides the buyer of the option with a right but not an obligation, the option buyer does not have any margin requirements. In times of uncertain supply, options would serve to be better hedging instruments that futures. From an option seller’s point of view, selling an option would provide limited protection against unfavorable market changes and would require the option seller to comply with the margin requirements, the option would provide additional income apart from the option premium in case the prices remain stable or move in a favorable direction. It is true that an option seller cannot initiate the exercise of the option but he can offset the short option position by purchasing an identical option during the tenure of the last trading day.

The other characteristic of the option that it makes it much more flexible as compared to other derivatives is in the number of ways in which it can be closed namely exercising it/offsetting it or letting it expire. There are numerous studies that advocate the use of commodity options for price risk management because of the aforementioned features. Catlett and Bohlej (1982) studied the use of commodity options for hedging risk with respect to live cattle, Breeden (1984) proved that the optimal allocation of consumption of commodities across time states can be ensured through the use of commodity options.

In addition to the benefits arising out of the very characteristics of options, Introducing commodity options would promote a higher level of liquidity in the market as it would attract additional risk averse participants, improve the transmission of information and all in all strengthen the price discovery mechanism and the price risk management function of the market.

Camerer (1982) in his study relating to the boiler market has clearly brought out that exchange traded commodity options would not only help to hedge risk but option prices also have a tendency to reflect prices quickly. He also states that exchange traded commodity options would also bring in social benefits by making stakeholders aware of commodities trading and thereby reducing ignorance in this regard. Also by combining options with other derivatives a wide variety of payoff structures can be generated, this in a way imparts further flexibility by providing a more comprehensive choice.

2. Commodity index investing as a tool for diversification

Today, globally the the Standard and Poor’s–Goldman Sachs Commodity Index (S&P-GSCI) and the Dow Jones–UBS Commodity Index (DJ-UBSCI) have emerged as well-known benchmarks for the commodity market. Both these indices are quite well diversified.
and liquid commodity future market has been both the cause and outcome of increased investment activity in these derivatives. Institutional investors such as pension funds and endowment funds have heavily diversified their traditional investment portfolios by including commodities in it this has lead to increased flow of institutional funds in the commodity derivative market thereby promoting their liquidity.

Empirical research has proved that there is a significant negative correlation between returns on equity and commodities, thereby investing in commodity derivatives as an asset class makes perfect sense, Greer (2000) & Erb and Harvey (2006). Returns from commodity investments are not highly correlated with stock and bond returns, Gorton and Rouwenhorst (2006). This negative correlation aspect prompted institutional funds to invest in commodity derivatives on a large scale mainly to use it as a hedge against equity risk.

Studies have also documented the negative co variation between equity returns and Inflation. J Lintner (1975), E. Fama and G. W Shwert(1977) & Z.Bodie (1976). Commodity prices and inflation are directly related and therefore in an inflationary scenario the rise in the price of commodities can serve as a possible hedge against the declining returns on equity due to inflation. A portfolio having both the asset classes therefore makes perfect sense.

Multiple products have emerged to serve the need for investing in commodities, Commodity ETFs, ETNs and mutual funds have come out as popular options. For retail investors investing thorough the mutual fund route makes complete sense as neither would they have large sums of money nor the risk take capacity of directly investing in futures. Some of these mutual funds would invest in stocks and bonds of companies producing commodities whereas some would directly invest in commodity futures. However in a particular research study it was empirically brought out that commodity company stocks behave more like other companies stocks as compared to their counterparts in commodity future market , it was thus concluded that investing in commodity company stocks has not been a close substitute for investing in commodity futures- Gorton and Rouwenhorst (2006)

Holding commodities, thus, in an investment portfolio in a way therefore is risk reducing as commodities serve as a natural hedge against inflation, the diversification advantage obtained from investing in commodities is very prominently highlighted in the promotional literature for commodity index funds.

3. Part IV

3.1 Mechanics of using commodity options for price risk management

3.1.1 Determining Option prices

A put option would provide insurance against drop in commodity prices whereas a call option would insure against a price rise. It is noteworthy to mention that the call option and the put option are two distinct contracts and a put is technically not the opposite side of a call.

There are essentially three steps to consider in evaluating option prices to hedge price risk. The first factor is the selection of the appropriate contract month, generally the option contract which expires closest to but not before the time the commodity is sold or purchased is selected, For example if wheat were to be harvested in May, the July option contract would be selected, The may option contract would not be selected since trading on it would have been closed prior to the actual harvest and sale. The second step relates to the selection of the
type of option, as earlier stated if the hedger wishes to hedge against price decline, a put option would be selected and if the motive is to insure against a price rise, a call option would be selected, the third and final step is to calculate the Minimum Selling price in case of a put option and the Maximum purchase price in case of a call.

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MSP = \text{Strike Price} - \text{Expected Basis} - \text{Option Premium} - \text{Commission}
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3.1.2 Significance of option premium and value of an option

Apart from the obvious difference between a future and an option, the other significant difference between a future and an option is that trading in a future contract is based on the prices of it while trading in the option contract is based on the premiums associated with it, the premium in fact is the only negotiated element in the option contract, other terms and conditions are standardized and exchange determined. The value of an option consists of two components, the intrinsic value and the time value, on the expiry of the option it would be left only with the intrinsic value, the time value of the option would be zero as the option has expired. As the option approaches expiration, the option buyer starts losing the time value component of it, it makes sense therefore that the hedgers using options should offset their long position prior to significant decay due to loss of time value and replace it with another position in the cash, futures or options market. Because of this loss in the time value, options are categorized as wasting assets, the hedger therefore has to be much more careful while using options and have a reasonable amount of information as regards the direction of the market. Surely an option which has a higher time value will command a higher premium.

3.1.2 Pay offs from commodity options

As is well know options are exercised, if they are in the money (ITM) and not exercised when they are out of Money (OTM). A Simple pay off diagram showing the status of the option contract in case of a Long call and long put can be demonstrated as under (Assuming a Strike price of $ 7.00 per Bushel of Wheat). Similar pay off diagrams can be generated for a short call and a short put.

**Figure 1:** Pay off diagram- long call
4. Conclusion

Introducing commodity options has multiple advantages in terms of providing enhanced liquidity, facilitating price discovery and providing an alternative and a more flexible tool for price risk management. A Parliamentary standing committee in its report tabled on 22 December 2011 states the under “The Committee feel that these instruments particularly the options, which are essentially similar to insurance products, will offer small producer a way to hedge against risk, their participation in large numbers will make the price discovery process more democratic and efficient. ………….The Committee, therefore, recommend that options in commodities should be allowed as it will be beneficial to the farmers” (para 1.32 of the 15th Report of the Parliamentary Standing Committee of the Ministry of Consumer Affairs, Food and Public Distribution). As earlier mentioned economies like Mexico and many South American economies where dependencies on commodities are high, have introduced commodity options in their markets. Even China launched mock trading of options on Dalian commodity exchange in the year 2012. Commodity index investing also entails multiple benefits as returns from commodities are negatively related with those of bonds and stocks, also investing in commodities serves as a hedge against inflation. Empirical research has also clearly brought out the fact that trading in commodity derivatives does not lead to price fluctuations in commodities, these price fluctuations are more so an outcome of supply demand structural imbalances, curbing commodities trading and not introducing options and index funds on this pretext, therefore would not be justified.

Future Work: Future research studies can focus on evaluating the effectiveness of commodity swaps with reference to price risk management and investment management.

4.1 Annexure I: Basic terminologies

Basis

The difference between the local cash price of a commodity and the price of a related futures contract, i.e., cash price - futures price = basis.

Call option
An option that gives the option buyer the right to purchase the underlying futures contract at the strike price on or before the expiration date.

**Commission**

Fees paid to the broker for execution of an order.

**Exercise**

The action taken by the holder of a call if he wishes to purchase the underlying futures contract or by the holder of a put if he wishes to sell the underlying futures contract.

**Expire**

When option rights are no longer valid after the option’s expiration date.

**Futures contract**

A contract traded on a futures exchange for the delivery of a specified commodity at a specified price at a future time.

**Hedge**

The buying or selling of futures contracts and/or options contracts for protection against the possibility of a price fluctuation in the physical commodity.

**In-the-money option**

An option that has intrinsic value, i.e., when a call strike price is below the current underlying futures price or when a put strike price is above the current underlying futures price.

**Intrinsic value**

The dollar amount that would be realized if the option were to be exercised immediately.

**Long**

A position established by purchasing a futures contract or an options contract (either a call or a put).

**Margin**

In commodities, an amount of money deposited to ensure fulfillment of a futures contract at a future date. Option buyers do not post margin, since their risk is limited to the option premium, which is paid in cash when the option is purchased. Option sellers are required to post margin.

**Option buyer**

The purchaser of either a call option or a put option; also known as the option holder. Option buyers receive the right, but not the obligation, to enter a futures market position.

**Option seller**
The commodities derivative market – An intricate study of commodity options and commodity index investing
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The seller of a call or put option; also known as the option writer or grantor. An option seller receives the premium and is subject to a potential market obligation if the option buyer chooses to exercise the option rights.

Out-of-the-money option

A put or call option that currently has zero intrinsic value. That is, a call whose strike price is above the current futures price or a put whose strike price is below the current futures price.

Premium

The price of a particular option contract determined by trading between buyers and sellers. The premium is the maximum amount of potential loss for an option buyer and the maximum amount of potential gain for an option seller.

Put option

An option that gives the option buyer the right to sell (go “short”) the underlying futures contract at the strike price on or before the expiration date.

Serial option

Short-term option contracts that trade for approximately 60 days and expire during those months in which there is not a standard option contract expiring. These options are listed for trading only on the nearby futures contract, unlike standard options, which can be listed for nearby and deferred contract months.

Short

The position created by the sale of a futures contract or option (either a call or a put).

Speculator

A market participant who buys and sells futures and/or options in hopes of making a profit adding liquidity to the market.

Strike price

The price at which the holder of a call (put) may choose to exercise his right to purchase (sell) the underlying futures contract.

Time value

The amount by which an option’s premium exceeds the option’s intrinsic value. If an option has zero intrinsic value, its premium is entirely time value.

5. References


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