
Risk-Return Analysis of Different Commodity Futures in Indian Derivative Market

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Abstract

Commodity Futures Trading in India had experienced an explosive growth, both in volumes and value over the years among all contracts. Till date, different studies were undertaken on the price volatility, stabilization, causality between futures and spot prices etc. Despite these, there is no consensus on the characteristics of return from the different kinds of commodity futures. This paper provides a comparative analysis of risk-return on different groups of commodity futures and the groups are Agricultural commodity futures, Metals, Energy and Oil & Oil related commodity futures. Thus the paper attempts to study the performance of these futures in the presence of risk-free assets and inflation.

Keywords: Agricultural Commodity Futures, Metals, Energy, Oil & Oil related products, risk & return

JEL Classification: G10, G11, G12, G13

Introduction:

Derivatives have emerged as widely traded instruments around the world. Among the various types of derivatives like futures, forwards, options etc. commodity futures trading has been a combative issue across the world over the last few decades. Particularly, it has emerged with the altercation that commodity futures trading encourages excessive speculation and is responsible for an upsurge in commodity prices. Such a common belief is rampant since 2008 with worldwide rise in the inflationary pressure on food and energy. Naturally since then, the issues related to commodity futures are put at the centre of concern. In India too, this is no exception. The objective of this current research is to study the nature of different groups of commodity futures in the Indian context. To begin with, this present study club together different traded commodity futures under different categories. And this is followed by a brief comparison of returns among the different categories. Moreover, different forms of returns like nominal return, real return and excess return are explicitly considered. The rationale of taking all these forms of returns is to shed light on inflation adjusted returns (that is, the real returns) and the risk premium (that is, the excess returns). The study period is 2004-2012 which is however not without any reasons. Casual empiricism suggests that, in India, futures trading started in full swing from 2004 onwards and the selected commodity futures were actively traded during this time frame.

In India, very few works on commodity futures are notable till now and most of the published research is centralized on the issue of price discovery and the value and volume of trading on commodity futures. Generally, the literature on futures trading is dominated by empirical works. K.G. Sahadevan (2002) explained about the efficiency of commodity futures, the constraints and policy options for Indian commodity futures market. The impact of Commodity Transaction Tax (CTT) in the Indian context is discussed by Pravakar Sahoo and Rajiv Kumar (2008). Golaka C. Nath and Tulsi Lingareddy (2008) explained the effects of commodity futures trading on spot prices of pulses. The role of commodity futures and its impact on commodity prices are highlighted by Nilanjan Ghosh (2009). Sunanda Sen and Mahua Paul (2010) explained the futures trading on agricultural commodities in India. The role and growth of commodity futures and the relationship between commodity futures and others economic factors are examined by Dharambeer and Barinder Singh (2011). P. Vinod Kumar (2012) selected two

crops and explored the impacts of futures trading in India. The relation between commodity derivative market and price inflation are discussed by Nissar A. Barma & Devajit Mahanta (2012). B. Goswami and I. Mukherjee (2013) explained the Indian agricultural commodity futures market by empirical analysis and also discussed about a comparative analysis of risk-return between agricultural commodity futures and others financial assets as common stocks, long term government bond and t-bill. Using a theoretical framework, Madhoo pavaskar (2005) discusses about the recommendations of government task force for the integration of the security market and commodity futures market.

The present study derives its value addition by addressing the research gap. The crucial research gap identified is a cross sectional comparison of different forms of returns. Thus, a comparative study between the rates of return of different groups of commodity futures in terms of all forms of returns is the contribution of this paper. The relationship between various kinds of commodity futures with inflation is also provided in this paper. Furthermore, this study paper would like to focus on the volatility aspects of these different groups of commodity futures.

The plan of the paper is as follows. Section 2 contains methodology and source of data. The result and observations are set out in Section 3. And section 4 concludes the paper.

Section 2: Source of data and methodology

For the present study, the selection choice of the commodities futures is based on two criterions - (i) frequency of future contracts within the study period and (ii) volume/value of such futures. These two criterions serve as a proxy of the relative importance of these selected commodity futures in overall futures trading and has been referred as actively traded. The study considers that the contracts for the different commodities were held for three months and then liquidated. The required data related to these commodity futures have been taken from the official website of Multi Commodity Exchange (MCX), Mumbai, from 2004 to 2012.

Out of a total 20-25 (twenty-twenty five) agricultural commodity futures that are traded, 10(ten) most actively traded agricultural commodities as Chana, Jute, Kapas, Pepper, Wheat, Rice, Potato, Yellow peas, Sugar and Urad are selected. From the group of metal commodity futures, 5(five) most actively traded metal commodities as Aluminum, Copper, Gold, Lead and Silver are selected. Crude Oil and Natural Gas futures are selected from the energy group of commodity futures. For the Oil & Oil related products, 6(six) most active commodity futures selected are Coconut Cake, Soy seed, Mustard seed, Mentha oil, Castor Oil and RBD Palmolein.

For calculating the nominal returns of the commodities, the following steps are used:

- Nominal return for every individual contract for three months holding period = $\frac{[(\text{closing price of the last date of individual contract/expiry date}) - (\text{opening price of the first date of individual contract/expiry date})]}{(\text{opening price of the first date of individual contract/expiry date})} \times 100$
- Then the Annual Nominal return is calculated and the average is taken for each individual year.

The real returns of these commodity futures are calculated as:

$$\frac{[(\text{nominal return of individual commodity for that year}) - (\text{rate of inflation as measured by proportional change in average weighted wholesale price index (wpi)})]}{[1 + (\text{rate of inflation as measured by proportional change in average weighted wpi for that commodity on that year})]}$$
 and then the Real return per year is the average of real return of selected commodities for individual year.

In terms of excess returns (that is, the risk premium) of these commodity futures, simply the difference between the nominal return of individual commodity for that year and the average T-bill return on that year is taken and the average of it taken into consideration.

Data related to other assets like long term government bonds, T-bill and the Price Index (PI) are collected from the RBI site.

Section 3: Observation:

Table No.1: Comparison of Nominal Returns (per cent per year)

	mean	s.d	s.e	no. of years returns are negative	mean annual loss ¹	highest annual returns(yr)	lowest annual returns(yr)
Agricultural Commodity Futures	16.96	27.81	9.27	3	-4.03	80.71	-8.15
						2011	2005
Metal Futures	28.47	30.54	10.18	2	-9.40	81.08	-11.51
						2006	2007
Energy Futures	-9.53	27.69	9.23	5	-28.34	29.06	-51.45
						2008	2009
Oil & Oil related Products	28.27	40.69	13.56	3	-3.80	115.35	-4.86
						2010	2012

Table no. 1 presents the comparison between nominal returns of the selected agricultural commodity futures, metal futures, energy futures and futures of oil & oil related products. The mean and standard deviation (s.d) of total nominal returns for agricultural commodity futures over the said study period are 16.96 and 27.81 respectively. In the case of metal futures, the average return is 28.47 with the standard deviation 30.54. In the case energy futures, the mean return is negative (-9.53) and standard deviation is as similar as agricultural commodity futures, that is, 27.69. The mean return and standard deviation are 28.27 and 40.69 respectively in the case of oil & oil related products futures and thereby signifying high volatility in this futures market. Quite evidently, energy futures provided negative returns for maximum years in said study period. For this reason mean annual loss is also higher for this class of asset among the others assets. Oil & Oil related products futures yield the maximum return compared to others three assets while the Energy futures provided the lowest return among those. Moreover, the figures of standard error (s.e) imply that oil & oil related products futures (13.56) are characterized by high instability than the others group of futures market.²

¹ Mean annual loss is defined as the sum of the annual losses (negative rates return) divided by the number of years consisting negative returns.

²According to Boyce's theory, higher is the value of s.e. of a market, greater is the instability of that market. However, this is not a strict version of defining s.e.

Table No.2: Comparison of Real Returns (per cent per year)

	mean	s.d	s.e	no. of years returns are negative	mean annual loss	highest annual returns(yr)	lowest annual returns(yr)
Agricultural Commodity Futures	20.61	32.41	10.80	2	-8.85	95.51	-9.36
						2011	2005
Metal Futures	24.15	28.31	9.44	2	-8.55	71.99	-10.07
						2006	2007
Energy Futures	-9.09	25.53	8.51	5	-26.46	27.02	-47.84
						2008	2009
Oil & Oil related Products	25.86	36.25	12.08	3	-3.93	101.64	-4.79
						2010	2012

Table no. 2 captures the real returns (or said in other words, the wpi adjusted returns) of the different groups of commodity futures. Similar to the case of nominal returns, here we also see that, the oil & oil related products futures consist of the highest mean real return and also the highest standard deviation. The average real return of agricultural commodity futures are 20.61 and standard deviation is 32.41, which are higher than the nominal average return and standard deviation of this commodity futures. But, the mean nominal return is higher than the mean real return in the case of others group of commodity futures. An economic intuition behind these observations can be posited as follows- the inflation rate is inherent in the computing the real returns, the most likely case is that the prices of agricultural commodities is one of the major source of the inflationary phenomenon within this study period.

Table No.3: Comparison of Excess Returns (per cent per year)

	mean	s.d	s.e	no. of years returns are negative	mean annual loss	highest annual returns(yr)	lowest annual returns(yr)
Agricultural Commodity Futures	10.88	27.38	9.13	4	-8.13	72.71	-14.92
						2011	2005
Metal Futures	23.53	33.06	11.02	2	-17.26	74.71	-18.68
						2006	2007
Energy Futures	-16.22	27.08	9.03	6	-28.90	22.14	-55.17
						2005	2009
Oil & Oil related Products	21.65	40.99	13.66	3	-11.03	109.96	-13.39
						2010	2012

Table no.3 illustrates the summary of the measures of excess returns, that is, the risk premium. In this case the mean risk premium of metal futures is higher than the others futures. But, the standard deviation that means volatility of such risk premium is higher in the case of oil & oil related products. In the case of excess return the energy futures provides the maximum number of years yielding negative returns.

Section 4: Conclusion

This study compares the risk & return performance of different groups of commodity futures in India over the study period 2004-2012³. All the forms of returns (nominal, real and excess) are greater for oil & oil related products. At the same time, the volatility component is also higher for this group compared to other group of commodity futures. For this group of commodity futures, the best (worst) performance is in the year 2010 (2012). Here we see that, the lowest returns in all forms are provided by the energy futures. Furthermore, the standard deviation of the nominal rates of return of agricultural commodity futures is lower than the standard deviation of their real rates of return. But, in the case of others group of futures, the opposite result holds, that is, the standard deviation of real return is lower than the standard deviation of nominal returns. It is clear that, from the view point of all forms of returns, oil & oil related products earned the highest return as well as it is the most risky asset among the various group of commodity futures. Energy futures earned lowest return, but it is also the least risky asset. Agricultural commodity futures and metal futures occupy a modest position with respect to both risk and return. This paper confirms that high returns are generally associated with high risk, which is in conformity with the general theory of risk-return. The result suggest that although oil & oil related products gave the highest return among the all commodity futures but it proves to be an ineffective hedge against the inflationary pressure.

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³ The study covers 9 years of observation which by any standard might appear to be a small sample period. But then, for any meaningful comparison between the alternative assets, it is necessary that all the types of assets (intended for the comparative study) must be operational simultaneously. In the Indian context, data reveals that agricultural commodity futures market were active post 2004 onwards without any break or disruptions in trading of the selected commodities.

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