Is Momentum Effect Present in Indian Commodity Market?

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ABSTRACT

In this study, we examine if short term and long term momentum patterns present in commodity futures in Indian commodity futures market. The study employs data of 16 commodities which include agricultural, energy, and metal and the data source is MCX which provides all data for the commodities from November 2005 to October 2016. Besides the above data, the study also uses market returns on National Stock Exchange (NIFTY – 50) and Bombay Stock Exchange BSE - 200) for the same period as the proxies of market. The empirical results show that commodity futures are not found to be an alternative investment class owing to the fact that commodity futures fail to provide the advantage of risk diversification if one uses it as alternative asset class. Capital Asset Pricing Model (CAPM) is unable to describe if one uses the stock market as proxy to market portfolio. It is also found that no prior return patterns are observed in short term as well as long term commodity returns. This study may be useful for investors who are on the pursuit of investing in commodity market to make significant returns.

Introduction

A physical substance, such as an article, food, grains, and metals, which investors buy or sell, usually through futures contracts is called commodity. Commodities have the importance of becoming a separate asset class for investor, arbitrageurs, and speculators. It also provides an efficient portfolio diversification option due to its less volatile nature as compared to equity and debt markets. Though the history of trading of commodity in India goes back to 1875 when Bombay cotton trade association was established, the commodity is traded in a organised way from 2003 when nationwide commodity exchanges such as Multi Commodity Exchange of India ltd. (MCX), National Commodity and Derivatives of India ltd. (NCDEX) were established. From then the commodity trading in India is increasing vibrantly and more number of market participants is being involved to increase their returns by using it as an alternative asset class.

In financial research, many researchers find that trading strategies based on past stock returns yield abnormal returns. Basically there are two types of trading strategies such as- momentum and

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contrarian strategy. Momentum strategy is based on the hypothesis of price continuation that means past winners will remain future winners andpast losers will continue to lose in future as well (Jegadeesh and Titman 1993). Contrarian strategy tells us about price reversal which means past loser are future winners and past winners are future losers (De Bondt and Thaller, 1985, 1987).

Momentum has drawn a significant attention from the researchers and practitioners as it is an economically viable trading strategy giving significant return on stocks. Further the strategy is being used by the investors almost in all the equity markets across the world.Jegadeesh and Titman (1993), De Bondt and Thaller, (1985, 1987), Shen et. al (2006), Schaller (2005), Pirrong (2005) document both the strategies yielding abnormal return in both short term and long term time period.In India many researches have been done to test momentum strategies in Indian equity marketand found that there is price continuation in short term and price reversal in long term if short term momentum effects are controlled (Sehgal and Balakrishnan, 2002 & 2008; Ananthanarayanan, 2004; Sehgaland Jain, 2011 &2014; Sehgal and Vibhuti 2015). As India is one of the major producers of commodity having well-established market structure, it is important to research of the behaviour of Indian commodity market so as to help the investors and other stakeholders. Though Indian commodity market is so vibrant, a limited number of research works have been carried out by testing the presence of short term prior return effect in commodity futures returns. Further whether commodity futures have any relation with long term prior returns of commodity is a researchable issue. Hence, we are motivated to test the momentum strategies in Indian commodity market in both short term and long term time period. This study extends the work of Sehgal and Pandey (2012) on the Indian commodity market in which the sample period was from July 2006 to February 2011. This study covers a longer and recent sample period of 10 years with more number of commodities. We also add BSE 200 as an alternate stock market proxy in addition to NSE-Nifty in this study.

The journey of the paper proceeds as follows. The second session is about review of literature. Third section gives details about data and their source. Fourth section provides methodology. Section five describes analysis and interpretation. The last section throws light concluding remarks

Review of Literature

Review of literature of some empirical issues related to commodities market is provided in this sectio.Lee et al. (1985) find that the risk can be reduced and the portfolio return can be increased by combining the commodity with an equity portfolio but no arbitrage opportunities are found between S&P 500 and commodity future index. Sehgal and Rajput (2011) examinethe risk return behaviour of 12 actively traded commodities in India andfind that commodities can be used as an alternative asset class.

 To answer this question whether CAPM holds commodity market, a few studies have been done. Dusak (1973) has done a price study about whether the speculator in a future market can earn risk premium within the context of CAPM. They found the systematic risk is zero in all the three cases (Wheat, Corn, Soyabean) taken by them and the average realized holding period returns is close to zero on all the contracts. CAPM is less suitable to commodity market if one compares it with equity market is suggested by Holthasusen and Hughes (1978). They also found that the proximity between security market and global commodity index is poor.

In the context of momentum in commodity market, many empirical studies have been done in past several years. Pirrong (2005) examines momentum in commodity market and found existence of both momentum and reversal in future markets as well as in financial future contracts. Schaller(2005) observes momentum in commodity market by examining 25 commodities over a time period of 25 years.Shen et al. did a precise study by taking 28 commodity futures over a time period of 14 years. They observe that momentum profits in commodity are highly significant for a holding period of 9 months and the returns to momentum strategies roughly equal to stocks. Gorton et al. (2007) also found presence of momentum in some commodities compared to others.

Very limited studies have been done on momentum strategies in Indian context for both equity and commodity market. Sehgal and Balakrishnan (2002) find price reversal in long term and continuation in short term in Indian equity market. They reported the availability of momentum profits in Indian equity markets. Sehgal and Balakrishnan (2004) find that momentum returns which CAPM fails to capture are being explained by Fama-French three factor model. Sehgal and Jain (2011) did an extended study of Sehgal and Balakrishnan (2008) and found that momentum profits in Indian context are stronger for 6-6 strategy compared to 12-12 strategy. Sehgal and Jain (2014) observe that momentum patterns exist in long term sector returns for long term portfolio formation period after controlling short-term momentum. Balakrishnan (2015) documents that there is a strong shortterm momentum effect which is not captured by CAPM and Fama- French three factor model. Rather Carhat four factor model captures the momentum profits. Overall if we will see in Indian context there are very few researches that have been done in commodity momentum. The issues such as whether the commodity can be taken as alternative asset class, whether CAPM captures the commodity market, availability of prior return pattern in commodity are still questionable. So in this study we attempt to answer the above question by taking more number of commodities and over a longer period of time.

Data

The data for this study comprises of closing prices for 16 commodities which have at least ten years of data from November 2005 to October 2016. Sample commodities are divided into three baskets such as agricultural (Kapas, Kapas Khali, and Wheat), energy (Natural gas, Crude oil and cpo), and metal (Aluminium, Gold, Silver, and Zinc). The data source for commodity price is MCX website. The closing prices are converted into percentage return for further projection. We have taken NSE 50 and BSE 200 as stock market proxies and for that the data have been taken from NSE and BSE website respectively. For risk free proxy we have used 91-day Treasury bill data that is taken from RBI website.

Methodology

For examining whether the commodity can be taken as alternative asset class for risk diversification we provide descriptive statistic for sample series and the random walk testsare performed by checkingthe property ofserial correlation and normal distribution. In descriptive statistics (Table-2) we provide mean return, standard deviation, skewness, kurtosis, jarque-bera, autocorrelation and correlation to arrive at the result. For testing whether CAPM is capturing the commodity market or notthe commodity returns are regressedon stock market index return by using the excess return version of market model.Sharpe and Linter (1964) model of CAPM is tested to identify abnormal profits in commodity market as it is often used in equity markets to identify abnormal profits as well as to evaluate risk and return relationship. In this study the standard CAPM equation is used

$$E\ (Ri) = Rf + (E(Rm) - Rf)Bi$$

The excess return version of market model is used on a periodicbasis.

$$Rit - Rft = \alpha + \beta\,(Rmt - Rft) + et$$

For evaluating prior return pattern in commodity return in both short term and long term we follow i month / j month ranking strategies as done by Jegadeesh and Titman(1993). Here i is the portfolio formation period and j is portfolio holding period. We test six strategies such as 30/ 30 days, 3/3 month, 12/12 month, 2/2 year and 3/3 year.The procedure for constructing the portfolio is as follows: For 30/30 strategy, the commodities are ranked based on their 30 days excess return and three portfolios namely P_1, P_2, P_3 are formed. P_1 contains bottom 33.33 percent of commodities while P_3 represents top 33.33 percent of commodities in which it is seen that P_1 and $P_3$are loser and winner portfolios respectively. Then the daily equally weighted returns are estimated for next 30 days. This process is continued up to the end of the study period. The same procedure is followed for all other strategies.We use the same methodological procedures which are adopted by Sehgal and Pandey (2012).

Analysis and Interpretation

We start the analysis by checking the stationarity of the return of commodities which we got after converting the price data. The Augmented Dickey Fuller (Unit Root) test of stationarity is used to know the stationarity of the data. The result of the test is given in table 1. It can be observed from table 1 that the commodity returns confirm stationarity at 5 percent level of significance which indicates that the data can be used for further estimations.

Table 1:- Augmented Dickey Fuller test of Stationarity

Sl. no	Commodity	Return	P value
1	Aluminium	-5.472601	0.000
2	BR crude oil	-12.03319	0.000
3	Cardamom	-4.536428	0.000
4	Copper	-5.892171	0.000
5	Cpo	-19.93464	0.000
6	Crude oil	-4.620743	0.000
7	Gold	-4.620743	0.000
8	Guar seed	-4.620743	0.000
9	Kapas	-4.082631	0.001
10	Kapaskhali	-4.620743	0.000
11	Lead	-4.545461	0.000
12	Natural gas	-4.461798	0.000
13	Nickel	-4.620743	0.000
14	Silver	-4.620743	0.000
15	Wheat	-3.958729	0.002
16	Zinc	-4.545461	0.000

Next, the statistical properties of the sample return series is checked that gives information about the alternativity of assets or asset class. That means whether an asset qualifies as alternative asset class so that the asset can be used to earn higher risk adjusted return. In the descriptive statistics (Table 2) the result of Mean, Standard Deviation, Skewness, Kurtosis, Normality (Jarque-Bera), Autocorrelation, Correlation with NSE and BSE of commodity is given from which one can draw the inference about whether commodity qualifies as an alternative investment class.

Table 2: - Descriptive statistics

Commodity/Descriptive statistics	Mean	Std. Dev.	Jarque-Bera	Auto-correlation	Correlation with NIFTY	correlation with BSE
Aluminium	0.002238	0.031823	2240.434	0.155	-0.07224	-0.06646
BR crude oil	-0.00318	0.017153	5956.904	-0.059	-0.00184	-0.01441
Cardamom	-0.00591	0.001609	99.96335	0.108	0.239129	0.190726
Copper	-0.00461	0.007062	2670.396	0.115	0.162729	0.143026
Cpo	-0.0046	0.004505	620.6381	-0.045	0.057637	0.04623
Crude oil	-0.0078	0.001638	878.2785	0.104	0.219674	0.171571
Gold	-0.00225	0.00138	66.85582	0.08	0.226931	0.173574
Guar seed	-0.0048	0.003255	14.15283	-0.394	0.011274	-0.0159
Kapas	-0.00766	0.001562	420.2739	0.103	0.223649	0.173935
Kapaskhali	-0.00989	0.001656	1017.377	0.104	0.218727	0.170964
Lead	0.009297	0.002198	500.6309	-0.137	-0.06383	2.22E-05
Natural gas	0.002511	0.001442	6.615887	-0.407	0.059047	0.092656
Nickel	0.001571	0.001348	79.60819	0.038	0.209886	0.157665
Silver	-0.00158	0.001384	67.35432	0.081	0.227246	0.173957
Wheat	-0.00229	0.001762	6.700948	-0.092	0.063714	0.018505
Zinc	0.00787	0.001967	300.7056	-0.144	-0.04472	0.016261

Table 2 explains us about the statistical properties for the sample return series. We can see from the above table that the all commodities are providing very negligible return lead being the highest of 0.9 percent. There is no significant difference of volatilityamong the commodities as the standard deviations are indistinguishable from zero. We further observe that Jerque-Bera is abnormal for almost all commodities. Box Ljung statistics is used to check autocorrelation properties of sample returns. The above result of serial correlation shows the weak form of efficiency. Next we check the correlation of the commodity return with the NSE and BSE index return. It is observed from the above result that half of the commodity returns are significantly correlated with both NSE and BSE index returns. From the above result it is concluded that it is difficult for investors to use commodity as an alternative asset for risk diversification and earn more return.

Next we try to examine whether CAPM developed by Sharpe (1964) and Linter (1965) can be applicable in commodity market to earn abnormal returns as it is widely used in equity market. We estimate CAPM results by regressing excess return on commodity on both NSE and BSE index returns. The results are shown in table-3 . We find as shown in the following table the adjusted R^2 value for the

stock market proxy is low which suggests that both the index is poor surrogate of economic wealth if we try to explain commodity returns. The beta values in both the cases for all commodities are also very low from which we cannot say which asset is an aggressive asset or which asset is defensive. Thus our results suggest that CAPM is not a good descriptor if one is using stock market index as market proxy. To get a better description one should use a more broad based market proxy.

Table 3: Tests of CAPM for commodities market

CAPM RESULT- NSE AS RISK FACTOR					
COMMODITIES	α	β	Tα	tβ	Adjusted R^2
Aluminium	0.002457	-0.032347	0.840595	-0.786746	-0.003212
BR crude oil	-0.003176	-0.000445	-2.010547	-0.020016	-0.008471
Cardamom	-0.005951	0.005415	-4.14E+01	2.675218	0.049193
Copper	-0.00472	0.01617	-7.355307	1.791575	0.018231
Cpo	-0.00462	0.003654	-11.1543	0.627136	-0.005124
Crude oil	-0.007837	0.005063	-5.33E+01	2.446022	0.040191
Gold	-0.002275	0.004406	-18.38229	2.531134	0.043459
Guar seed	-0.004804	0.000516	-16.0238	0.122478	-0.008346
Kapas	-0.00769	0.004916	-5.49E+01	2.492587	0.041968
Kapaskhali	-0.009928	0.005095	-6.67E+01	2.434943	0.039772
Lead	0.00931	-0.001974	4.61E+01	-0.694805	-0.004366
Natural gas	0.002503	0.001198	1.89E+01	0.642536	-0.004958
Nickel	0.001545	0.003981	12.7272	2.331888	0.035951
Silver	-0.001612	0.004426	-12.98604	2.534844	0.043604
Wheat	-0.002297	0.00158	-14.18017	0.693517	-0.004381
Zinc	0.007879	-0.001238	4.35E+01	-0.48628	-0.006458

CAPM RESULT- BSE AS RISK FACTOR					
COMMODITIES	α	β	tα	tβ	Adjusted R^2
Aluminium	0.002411	-0.02855	0.825531	-0.7235	-0.004021
BR crude oil	-0.00316	-0.00334	-2.00225	-0.15651	-0.008265
Cardamom	-0.00594	0.004144	-40.8743	2.110555	0.02821
Copper	-0.00469	0.013636	-7.29967	1.569802	0.012155
Cpo	-0.00461	0.002812	-11.1424	0.502729	-0.006319
Crude oil	-0.00783	0.003794	-5.27E+01	1.891791	0.021212
Gold	-0.00226	0.003233	-18.1185	1.914558	0.021909
Guar seed	-0.0048	-0.0007	-16.0181	-0.17276	-0.00822
Kapas	-0.00768	0.003668	-5.43E+01	1.918662	0.022035
Kapaskhali	-0.00992	0.003821	-6.61E+01	1.884893	0.021002
Lead	0.009297	6.58E-07	4.60E+01	0.000241	-0.008475
Natural gas	0.0025	0.001804	1.89E+01	1.010852	0.000183
Nickel	0.001554	0.002869	12.69436	1.73437	0.016594
Silver	-0.0016	0.003251	-12.7756	1.91891	0.022043
Wheat	-0.00229	0.00044	-14.1211	0.201054	-0.008129
Zinc	0.007868	0.000432	4.35E+01	0.176658	-0.008208

Table 4: - Prior return pattern in commodity return

	30/30 DAYS	3/3 MONTH	6/6 MONTH	12/12 MONTH	2/2 YEARS	3/3 YEARS
P1	**0.005353**	**0.012921**	**0.000728**	**0.001067**	**0.0004**	**0.001055**
t-stat	3.665608	1.741725	0.676489	0.980027	0.335526	0.878707
P2	**0.004281**	**0.000211**	**0.000413**	**0.000866**	**0.000377**	**-0.000646**
t-stat	3.270986	0.184539	0.372972	0.773715	0.293545	-0.529834
P3	**-0.022161**	**-0.000397**	**-0.00063**	**-0.000829**	**0.000598**	**-0.000386**
t-stat	-1.748181	-0.053548	-0.125101	-0.263036	0.247663	-0.173991

We observe as shown in the above table the average excess return on all sample portfolios for both short term and long term trading strategies are identical that is close to zero. So this indicates the absence of prior return patterns in commodity returns in India. So in Indian context the portfolio managers or investors are not motivated to use prior return pattern to generate strategies that can fetch abnormal profit.

Conslusion

In recent past, commodity attracts more number of investors due to its high risk hedging capacity and the return involved in it. But a less attention from researchers has been given to commodity marketwhich we examined in this article. We try to evaluate whether we can usecommodities as alternative asset class, next we try to examine whether CAPM holds for commodity market as it holds for equity markets. We further test,the presence of prior return patterns in commodity return both in short term and long term time period?

The data includes 16 commodities that are traded in MCX India Ltd and two stock market index of India namely NSE 50 and BSE 200. The study period is from November 2005 to October 2016 which is relatively longer.We observe that mean returns on commodities are very low in almost all the commodities and there is not much difference in volatility also. We find non normality in Jarque-bera and a weak form of efficiency when the autocorrelation is being run. So it is very difficult to say we can take commodity as an asset class for risk diversification. We find that if one uses stock market indices (NSE 50 and BSE 200) as stock market proxy, CAPM is not a good descriptor of commodity return. So our findings suggest that a more broad based market proxy by taking an average of securities and commodities indices may be used to get a better description about risk return relationship for a variety of assets. Finally, we examine whether there is any prior return pattern in commodity return and we don't find any prior return pattern in both short term and long term commodity return as the average excess return of commodities are close to zero. The results of this study are consistent with previous study (Sehgal and Pandey 2015) as some studies across the world have found prior return pattern in commodity return, but in Indian context it may not be relevant for investor to use prior return of commodity for future trading strategies.The findings of this studymay be useful for regulators who want to know the market behaviour for the purpose of policy intervention and the

fund managers to form optimal portfolios by analysing the risk and return characteristics of different asset classes. The present research contributes to the literature of commodity markets in emerging markets.

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