Correlation Analysis Between Commodity Market And Stock Market During A Business Cycle

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The past few years have seen an unprecedented rise in the investments in the new types of financial instruments particularly being the commodity – by directly purchasing commodities, by taking outright positions in commodity futures, or by acquiring stakes in exchange-traded commodity funds (ETFs) and in commodity index funds. This pattern has accelerated in the last few years. In this paper we have compared the returns on the equity and commodity market over the year 2003-2011 for Indian market the data have been taken for nifty and Comdex from year 2003 to 2010. Which is further divide in Business Cycle like the period between 2003-2007 shown a inflationary market, in the same manner the period between 2007-2009 shown a recession and thereafter from 2009-2011was a period of recovery of Indian markets. The correlation is calculated between both the forms of investments over the different periods of investment in Indian history. This paper helps us to understand of trading investments during a business cycle, this also helps us to check the various changes in these markets time to time and understanding us the way of investment during a Business Cycle.

Keywords: Business Cycle, Hedging, Stock, Commodity, Investments, Market, Recovery, Inflation, Recession, Correlation etc.

INTRODUCTION

Business Cycle
The term **business cycle** or **economic cycle** refers to the fluctuations of economic activity (**business fluctuations**) around its long-term growth trend.

Commodity Market
Commodity market is similar to an equity market, but instead of buying or selling shares oneb buys or sells commodities. The commodity derivatives differ from the financial derivativesb mainly in the following two aspects:

- Due to the bulky nature of the underlying assets, physical settlement in commodity derivatives creates the need for warehousing.
- In the case of commodities, the quality of the asset underlying a contract can vary largely.

The commodities can be broadly classified into the following:

- Precious Metals: Gold, Silver, Platinum, etc.
- Other Metals: Nickel, Aluminum, Copper, etc.
- Agro-Based Commodities: Wheat, Corn, Cotton, Oils, Oilseeds, etc.
- Soft Commodities: Coffee, Cocoa, Sugar, etc.
- Live-Stock: Live Cattle, Pork Bellies, etc.
- Energy: Crude Oil, Natural Gas, Gasoline, etc.

Some of the major market players in commodities market are:

- Hedgers, Speculators, Investors, Arbitragers
- Producers - Farmers

- Consumers - refiners, food processing companies, jewelers, textile mills, exporters & importers

The commodities market exists in two distinct forms:

The Over the Counter (OTC) market: The OTC markets are essentially spot markets and are localized for specific commodities. Almost all the trading that takes place in these markets is delivery based.

The exchange-based market: In these markets everything is standardized and a person can purchase a contract by paying only a percentage of the contract value.

A person can also go short on these exchanges.

The major commodity exchanges in India are:

- National Multi-commodity Exchange Ltd., Ahmadabad (NMCE)
- Multi Commodity Exchange Ltd., Mumbai (MCX)
- National Commodities and Derivatives Exchange, Mumbai (NCDEX)
- National Board of Trade, Indore (NBOT).

Equity Market

A Stock Exchange is the place where investors go to buy/sell their shares. In India we have two major stock exchanges. the NSE is India's largest and the world's third largest stock exchange in terms of Transaction volumes & amounts.

NSE Index or NIFTY: The NSE Index or the Nifty Index as it is popularly known; is the index of the performance of the 50 largest & most profitable, popular companies listed in the index.

Bombay Stock Exchange: The BSE is the oldest stock exchange in Asia. It is the third largest stock exchange in south Asia and the tenth largest in the world. BSE has over 5000 companies that are listed in it.

BSE Index or SENSEX: The BSE Index or the Sensex as it is popularly known, is the index of the performance of the 30 largest & most profitable, popular companies listed in the index.

LITERATURE REVIEW

Black, F. and J. C. Cox, 1976, studied that Portfolio diversification is very important for the investors, especially for financial institutions, such as banks, pension funds. Based on the structure of Synthetic CDO, this paper provides an alternative innovative product, CDCO, which include two inverse correlation products: credit of debt obligations and commodities. The numerical results shown that tranche premium of CDCO, depends on two inverse effects. One effect is the price risk of spot commodity and another is the benefits of diversifying portfolio risk. If the price risk of spot commodity dominates the benefits of diversifying portfolio risk, the tranche premium rises up as commodity numbers increases, whereas the tranche premium reduces as commodity numbers increases.

Ankrim, E. & Hensel, C. (1993), studied that sharp rises in commodity prices and in commodity investing, many commentators have asked whether commodities nowadays move in sync with traditional financial assets. We provide evidence that challenges this idea. Using dynamic correlation and recursive co integration techniques, we find that the relation between the returns on investable commodity and equity indices has not changed significantly in the last fifteen years. We also find no evidence of an increase in co movement during periods of extreme returns. Our findings are consistent with the notion that commodities continue to provide benefits to equity investors in terms of portfolio diversification.

Erb, C., and Harvey, C.(2006), they studied that the way returns on commodity futures differ over time from those of traditional asset classes (as peroxide by stock and bond indices around the world). We find that the conditional return correlations between S&P50 index and commodity futures fell over time. This suggests that commodity futures and equity markets have become more segmented and, thus, commodity futures have become over time a better tool for strategic asset allocation. We also observe that for more than half of our cross section, the conditional correlations between commodity futures and equity returns fell in periods of market turbulence. We see this as good news to institutional investors with long positions in equities and commodity futures. Indeed, it is precisely when stock market volatility is high that benefits of diversification are most appreciated. i) that institutional investors treat commodity futures (such as precious metals) as refuge assets in periods of high market volatility and ii) that major events (hurricanes, a rise in unexpected inflation) do not affect the prices of commodity futures and equities in the same ways. It is important to note,

however, that the evidence is not uniform across commodities and that for some commodities conditional correlation rises with the volatility of equity markets. This is somehow to be expected since commodities behave differently from one another (Erb and Harvey 2006) and cannot be treated as substitutes. Finally, our analysis could be further refined to account for the fact that institutional investors also hold corporate bonds of different grades, real estate, artwork, or hedge funds as part of their asset allocation. A thorough analysis of the temporal variations between commodity futures and this broader range of assets might therefore be of interest. We offer this as a possible avenue for future research.

Hull, J. and White, A., 2004, studied that the impressive rise in commodity prices since 2002 and their subsequent fall since July 2008 have revived the debate on the role of commodities in the strategic and tactical asset allocation process. Commonly accepted benefits include the equity-like return of commodity indexes, the role of commodity futures as risk diversifiers, and their high potential for alpha generation through long-short dynamic trading. This article examines conditional correlations between various commodity futures with stock and fixed-income indices. Conditional correlations with equity returns fell over time, which indicates that commodity futures have become better tools for strategic asset allocation

Mauro, P. (1995), studied that Commodity markets are markets where raw or primary products are exchanged. These raw commodities are traded on regulated commodities exchanges. The primary objective of this research paper is to study the impact of commodity market on equity market. Secondary source of data has been used in order to understand the relationship between the commodities market and equity market. In order to compare the commodities and stocks we have used MCX index value for the past 4 years, NIFTY/SENSEX index value for past 4 years. Using various mathematical functions on excel we have calculated –Risk, Return, Standard Deviation, Beta, Correlation between the two variables viz. MCX index with Nifty index. Graphs have been used to understand the trends of the stock index and the commodity index.

This has had direct impact on the liquidity of commodity markets as becomes evident from the substantial decrease in the turnover of online commodities exchanges. **Daniel and Michael (2001)** studied the relation between commodity returns and volatility. **Sandhya (2008)** in her study brought out that the extent to which spot and futures markets influence each other depends on the level of integration of the two markets. **Nath and Tulsi (2008)** studied whether the seasonal/cyclical fluctuations in commodities prices have been affected by the introduction of futures in those commodities.

Mid-May 2009 saw a record turnover in the equity market. At the same time, turnover at the country's leading commodity exchange, MCX, was declining since March. In March, the turnover at MCX was Rs 5.28 lakh crore, which came down to Rs 4.03 lakh crore in April and till Mid-May; it touched Rs 2.71 lakh crore. The increase in the prices of crude and gold, that accounts for 80% of the traded commodity on MCX, played a significant role in the volume. Earlier, both the commodities market and equity market were appreciating simultaneously.

PROBLEM STATEMENT

"To do a descriptive research in understanding the scope and usage of the nature of correlation between commodities and traditional financial assets like security indices and to further improve opportunities that exist between these two forms of market".

RESEARCH OBJECTIVES

The primary objective of this research paper is to study the impact of commodity market on equity market. Secondary source of data has been used in order to understand the relationship between the commodities market and equity market. In order to compare the commodities and stocks we have used MCX index value for the past 5 years, NIFTY index value for past 5 years. Using various mathematical functions on excel as well as SPSS we have calculated –Risk, Return, Standard Deviation, Beta, Correlation between the two variables viz. MCX index with Nifty index. Graphs have been used to understand the trends of the stock index and the commodity index.

The project goals can broadly be stated as:

- To study and understand the relationship between equity markets and commodity Markets

- To study the timing of the market from investor's perspective on when to enter and exit
- Minimizing portfolio exposure to risk

SCOPE OF RESEARCH

Investing successfully in the stock market and a commodity market requires similar qualifications: intensive study, a sensible plan of investment and sufficient capital to endure inevitable downswings. The two markets also have similar risk-reward profiles. Both positive and negative correlations exist between the two markets. so our area of concern is to analyze the type of correlation that exist between them in various instances of time may be short run or may be long run.

Our idea is "to help investors gain confidence in the wonderful order underlying random change."

We are aiming our study to" traders with common sense and a deep desire to become wealthy." we will see what are the various diversifications that we can follow to reduce the risk of traders.

HYPOTHESIS

H0: There does not exist a correlation between changes in commodity markets and Equity markets in India

H1: There exists a correlation between changes in Commodity markets and Equity markets in India

METHODOLOGY

Moving averages are one of the most popular and easy to use tools available. They smooth a data series and make it easier to spot trends, something that is especially helpful in volatile markets. We have used the simple moving averages in our context. We have chosen the simple moving average because of the following points:

- The greater the time period, the less sensitive the MA is to price movements.
- If the MA period is too short, then it will have too many false signals.
- A too long MA period will often lag a little.

Out of the various methodologies available we have used the **Pearson product-moment correlation coefficient** to find the degree of

association between the stock and commodity index.

- Using various mathematical functions on excel we have calculated –**Risk, Standard Deviation, Beta, Alpha, Correlation between the two variables viz**. MCX **index with Nifty index**. Graphs have been used to understand the trends of the stock index and the commodity index.
- We have calculated **average index price movement** and average return of each index
  (MCX, SENSEX and NIFTY).
- We have then calculated **correlation** for short term and different economic situations between MCX and SENSEX and MCX and NIFTY.
- We then calculated **BETA** value, to the find the change in one index due to 1% change in another index.
- We have also calculated **ALPHA** to check the performance of the Indices.

RESEARCH DESIGN

Descriptive research, also known as **statistical research**, describes data and characteristics about the population or phenomenon being studied. Although the data description is factual, accurate and systematic, the research cannot describe what caused a situation. Thus, Descriptive research cannot be used to create a causal relationship, where one variable affects another. In other words, descriptive research can be said to have a low requirement for internal validity.

Actually, here we trying to identify that how these factors affect both the market and it also help us in understanding the scope and usage of the nature of correlation between commodities market (MCX) and traditional financial assets like security indices(NIFTY) and to further manage risk opportunities that exist between these two forms of market" via different instruments like MA, Coefficient of correlation etc.

RESEARCH INSTRUMENTS
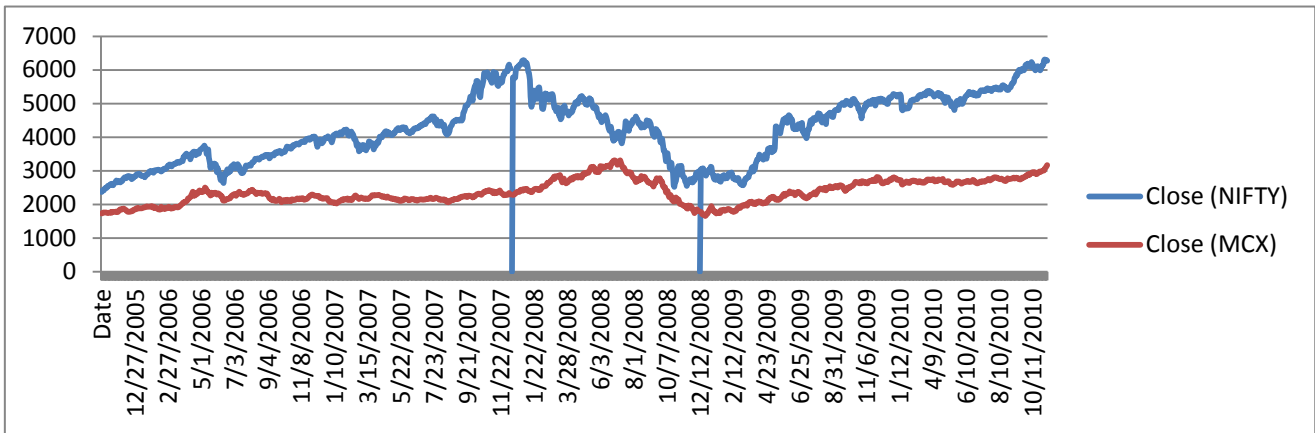
MS-Excel and SPSS

RESEARCH TECHNIQUES

Moving average (Simple & Exponential), Correlation (Karl-Pearson) Long, Short and

Cyclical, Simple Regression, Standard Deviation, T-Test, Beta, Alpha

ANALYSIS AND FINDINGS

Below is the chart showing the Daily index prices of MCX and NIFTY **from** November 2005 to November 2010.

We can see that initially, both the commodities market (MCX) and equity market (NIFTY) were appreciating simultaneously. However, equity markets started depreciating from December 2007 but commodities market started declining after Jun 2008. But once the commodities market started declining, the equity markets reached the lowest point (in the period) calculated. Thus, we can see the impact of commodities market on equity market.

Trend line by Simple Moving Average (SMA) and Exponential Moving Average (EMA)
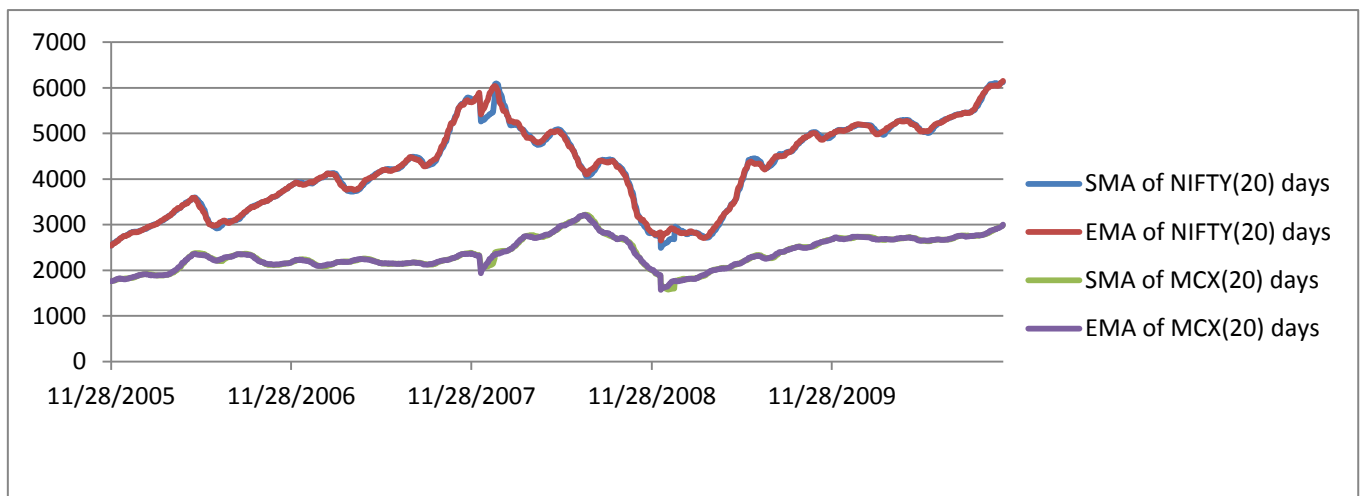
Exponential moving averages reduce the lag by applying more weight to recent prices. The weighting applied to the most recent price depends on the number of periods in the moving average. There are three steps to calculating an exponential moving average. First, calculate the simple moving average. An exponential moving average (EMA) has to start somewhere so a simple moving average is used as the previous period's EMA in the first calculation. Second, calculate the weighting multiplier. Third, calculate the exponential moving average. The formula below is for a 20-day EMA.

20-period exponential moving average applies an 9.52% weighting to the most recent price. A 20-period EMA can also be called an 9.52% EMA. A

20-period EMA applies a 9.52% weighing to the most recent price $(2/(20+1) = .0952)$. Notice that the weighting for the shorter time period is more than the weighting for the longer time period. In fact, the weighting drops by half every time the

moving average period doubles. The exponential moving average starts with the simple moving average value (2542.01) in the first calculation. After the first calculation, the normal formula takes over. Because an EMA begins with a simple moving average, its true value will not be realized until 20 or so periods later.

Correlation Analysis

Cyclical co-moments:

Economic cycle	Inflation (2003-Dec 2007)	Recession (Dec 2007-Dec2009)	Recovery (Dec 2009-2010)
Correlation	0.546336	0.382643	0.9676

Long term Co-Moments

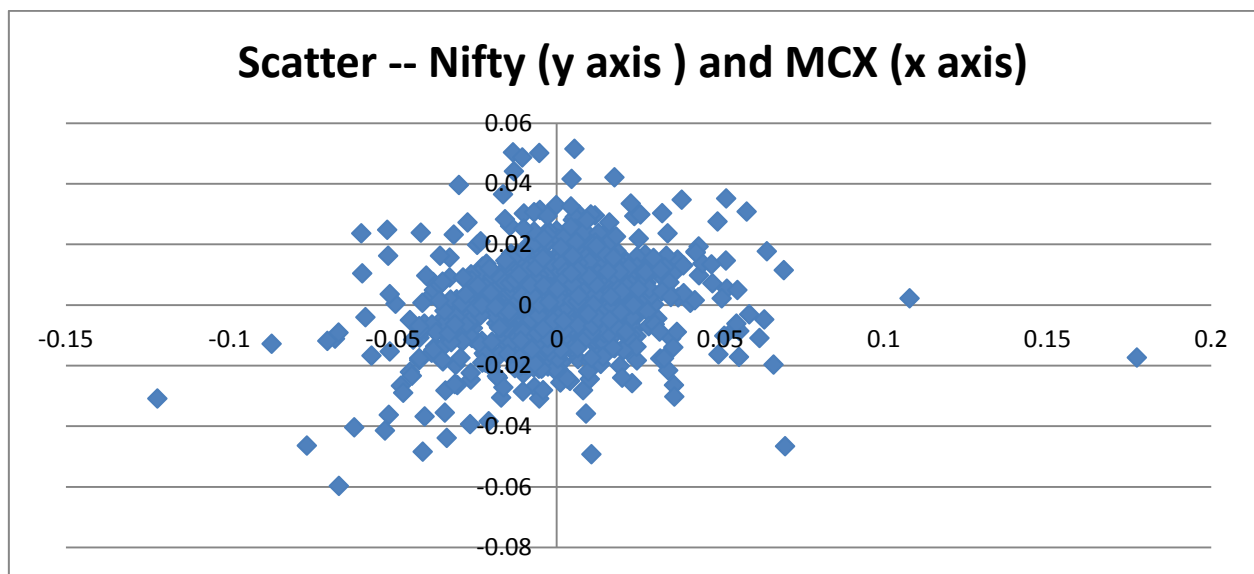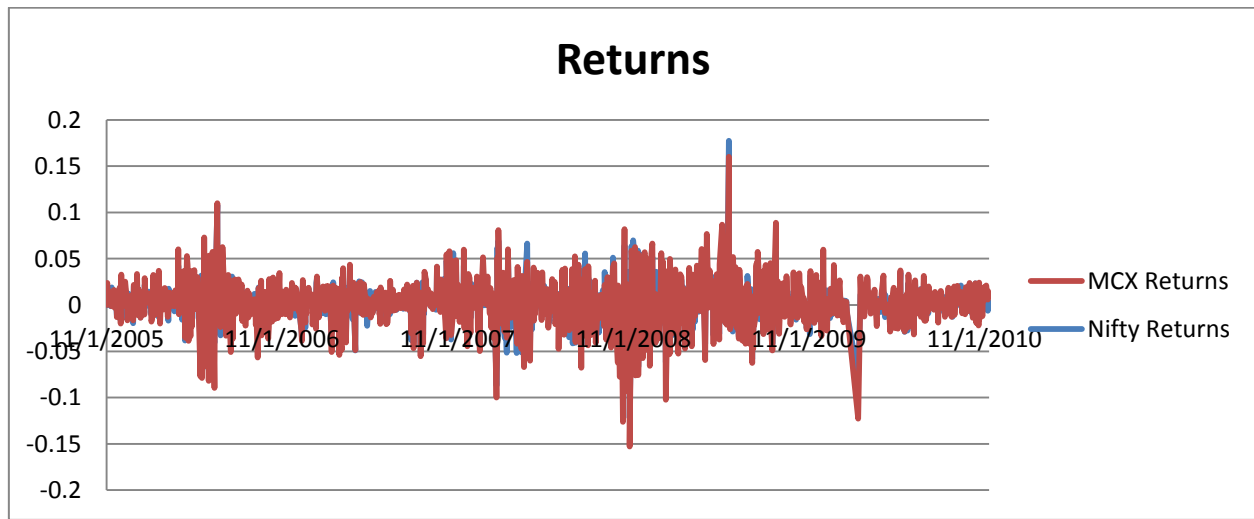| INFLATION	CORRELATIONS
Q1 (jan2006-march2006)	0.866166
Q2	0.506717
Q3	-0.46521
Q4	0.275263
Q5	0.524433
Q6	-0.10437
Q7	0.798961
RECESSION	
Q8	0.607349
Q9	-0.37614
Q10	-0.77612
Q11	-0.02635
RECOVERY	
Q12	-0.47872
Q13	0.761209
Q14	0.037995
Q15	-0.03526
Q16	0.333219

Q17	0.15889
Q18	0.592717
Q19	0.332268
Q20	0.696539

Correlation between Equities & Commodities:

Sampling various periods showed that commodities not only have maintained their low correlation, but they also maintained the lowest correlation among the indexes analyzed. Further, when equity markets performed poorly, commodities performed the best relative to the other asset classes, while the correlation between equities and commodities remained the lowest. We can see that initially, both the commodities market (MCX) and equity market (SENSEX and NIFTY) were appreciating simultaneously. However, equity markets started depreciating from December 2007 but commodities market started declining after Jun 2008. But once the commodities market started declining, the equity markets reached the lowest point (in the period) calculated. Thus, we can see the impact of commodities market on equity market.
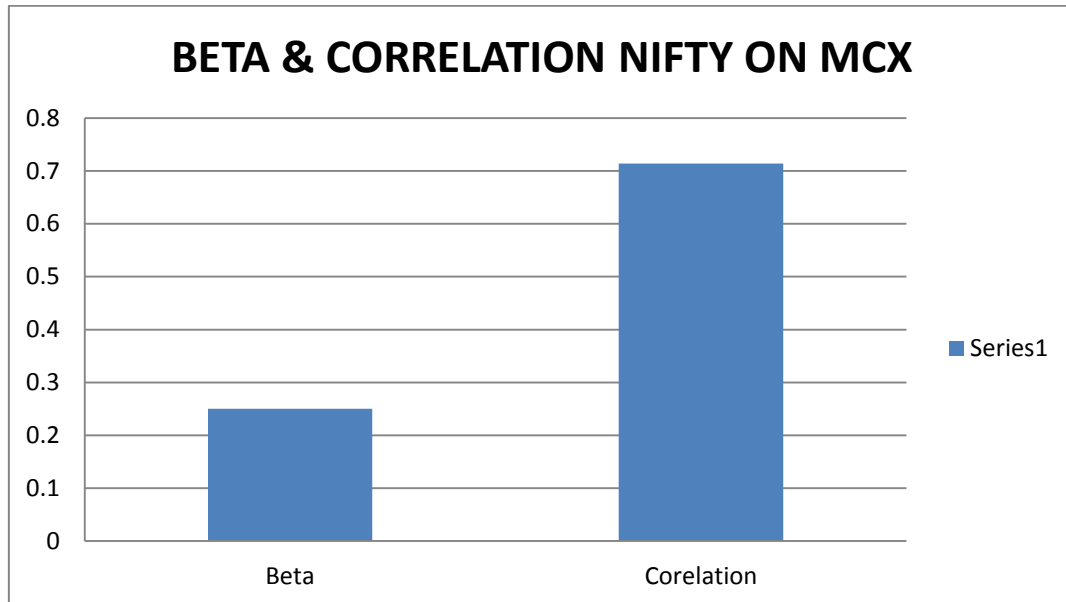
RETURNS OF NIFTY AND MCX

SENSTIVITY OF NIFTY ON MCX

We can see that with every 1% change in NIFTY, there is 0.38% change in MCX. The correlation between MCX and NIFTY is 27% and the correlation between MCX and
SENSEX is 26%.

Beta	Correlation
0.25	0.713888

Commodities have maintained their low correlation:
Studies about correlations of various commodities with indexes, foreign stocks and hedge funds
have showed:

- Correlations are more volatile over shorter periods
- The correlation between commodities and equities has consistently remained low, IN SHORTER PERIOD of time but when we talk about LONG RUN as 5 years data the correlation is 0.0 to 0.71

ALPHA

A measure of performance on a risk-adjusted basis. Alpha takes the volatility (price risk) of a mutual fund and compares its risk-adjusted performance to a benchmark index. The excess return of the fund relative to the return of the benchmark index is a fund's alpha. The abnormal rate of return on a security or portfolio in excess of what would be predicted by an equilibrium model like the capital asset pricing model (CAPM)
If a CAPM analysis estimates that a portfolio should earn 10% based on the risk of the portfolio but the portfolio actually earns 15%, the portfolio's alpha would be 5%. This 5% is the excess return over what was predicted in the CAPM model.

Alpha	12.86

Alpha
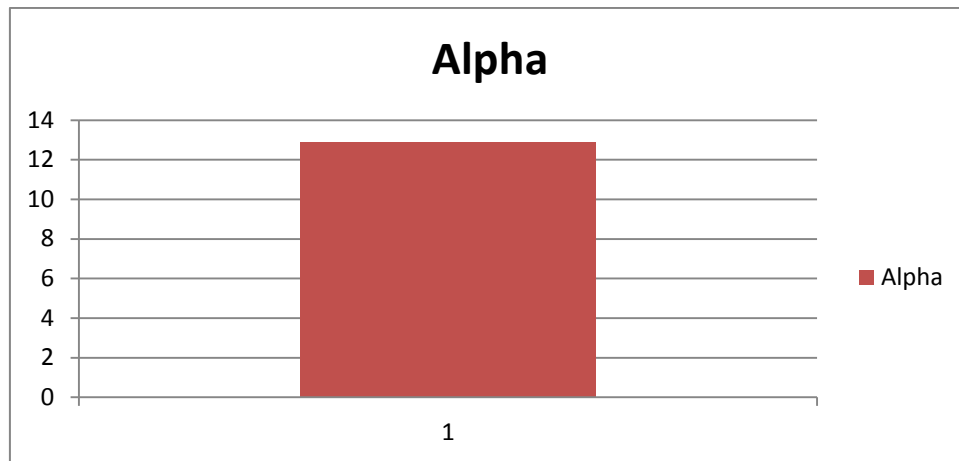
From above chart and figures we can say that NIFTY's performance is below the performance of MCX by 12.86%

Factors that affect short-term versus long-term returns:
Whilst it is possible that correlations may rise over the short-term but the correlation should not rise over the longer term if the asset classes really are driven by different factors. Commodities are affected by many different factors including exploration success, technological advances, supply-demand (and the time lags to respond to supply/demand changes), the weather, and the depletion of finite resources.

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	VAR00002	4.2583E3	1220	989.13020	28.31872
	VAR00003	2.3685E3	1220	352.17604	10.08277

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	VAR00002 & VAR00003	1220	.714	.000

Paired Samples Test

	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	df	Sig. (2-tailed)
Pair 1 VAR00002 VAR00003	-1.88974E3	777.84550	22.26965	1846.04409	1933.42628	84.857	1219	.000

T-Test For Long Term Data (Average Month Wise)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	VAR00001	4320.03	61	998.528	127.848
	VAR00002	2399.20	61	352.708	45.160

Paired Samples Correlations

	N	Correlation	Sig.
Pair 1 VAR00001 & VAR00002	61	.727	.000

Paired Samples Test

	Paired Differences					T	df	Sig. (2-tailed)
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1 VAR00001 VAR00002	1.921E3	780.821	99.974	1720.849	2120.805	19.213	60	.000

FINDINGS

1. In our study we find that commodity market is less volatile than stock market

2. If we take the data on Daily basis we find a positive correlation in between both Commodity and Stock market which is more than 0.5

3. If we calculate the correlation on the basis of long term co-moments we find some sort of positive and negative correlation

4. we found that stock market is dependent on commodity market if a slide change came in commodities it hit entire stock market very highly

5. we found that if market is overbought than it is better from investors prospective to sell that stock and take short position in market, on the other hand if the market is oversold then it would be the best time to take a long position in market

6. The Paired sample T-Test use to compare two means that are repeated measures for the same participants, Scores might be repeated across different measures or across time.

7. We also find the simple Regression to analyze the statistical relationship between two variables one would be dependent and another would independent so we find a significant relationship between two variables

SUGGESTIONS

1. In our study we find that commodity market is less volatile than stock market so, if our investor have ability to take risk than he should invest in stock market other wise better to invest in commodity markets

2. If we take the data on Daily basis we find a positive correlation in between both Commodity and Stock market which is more than 0.5, which shows a positive correlation and at this time we should follow the technical analysis because it would give us more suitable returns

3. If we calculate the correlation on the basis of long term co-moments we find some sort of positive and negative correlation which would explain the exit and entry time for an investor in well manner, as well as better time to Hedge which helps us to diversify our portfolio

4. We found that stock market is dependent on commodity market if a slide change came in commodities it hit entire stock market very highly so, if investor is able to take risk he should invest in stock market and vice-versa

5. We found that if market is overbought than it is better from investors prospective to sell that stock and take short position in market, on the other hand if the market is oversold then it would be the best time to take a long position in market

6. The long term and cyclical co-moments give a better presentation of Hedge period as it explains that when to diversify For eg… we find that in recession period the correlation between NIFTY and MCX was negative (–ve) which help us to choose a diversified portfolio because at that level we can hedge by diversified portfolio which include both stocks and commodity.

CONCLUSION

From the above research study, we can conclude several things about the relationship between commodities market and stock market. Firstly, when we measure both indexes over a long period

of time (Daily basis data) we find a High positive correlation but there are few instances like if we talk about cyclical Co-Moments we find some sort of negative correlation for cyclical periods of time in between which would give us best possible chance to hedge in a particular time period In US markets, a negative correlation has been observed between commodities and stock market unlike Indian markets.

So, we find that there is a less correlation include in stock and commodity market which provide us better way to avoid risk and maintain a diversified portfolio all around which would give us better way for hedging in differ time spans or cycles.

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