CHAPTER 1
INTRODUCTION

Globalization has made this world a smaller place. The world economies have integrated with each other through trade and financial flow. The commodities are key building blocks for the basic economic activity and the development of an economy. India is a price taker for almost all commodities. The trade relation and changes in the international currency makes a strong correlation between international and domestic commodities. The report of World Economic Outlook (Oct, 2016) suggests that global commodity market prices have rebounded 22 percent since the last year. Due to the involuntary outage, oil prices have increased by 44 percent. Natural gas prices have been declined due to the strong supply from Russia. Coal prices have also risen due to tighten demand and supply patterns. Metal prices and agriculture commodity prices have increased by 12 percent and 9 percent respectively. The risen control measures of the government on the trade of metals in Asia and unwillingness of producers to activate idle capacity has made the metal prices more volatile.

![Figure 1.1: Fluctuations in Global Commodity Indices](image)

Source: SEBI Annual Report 2016-17

Figure 1.1 shows the fluctuations in the prices of global commodity indices. X axis depicts the years and Y-axis depicts the price of global commodity indices. It has been noted that all the indices have shown increasing trend after February 2016. It is due to the strong demand and supply tightness globally during this time period (SEBI Annual Report, 2016-17)
1.1 A Brief introduction to commodity Market and Stock Market

The commodity future trading was started in the seventeenth century in Osaka, Japan. The historical evidences suggested that commodity future trade in China was originated 6000 years earlier. The organized and exchange oriented trading in the commodity future was started with the establishment of Chicago board of trade in the United States. In India, the commodity future trading was started with the establishment of Bombay Cotton Trade Association in the year 1875. In the beginning of the year 2002, there were about 20 commodity exchanges in India with 42 commodities traded actively in these exchanges.

Multi Commodity exchange is India’s first listed exchange incorporated in the year 2003. It provides a platform for online commodity future trading in India. According to the future industry association, Multi Commodity Exchange is the world’s seventh largest commodity exchange. National commodity and derivative exchange is a public limited company incorporated in the year 2003. NCDEX is multi commodity exchange professionally managed by national level institutions and public sector banks and companies. These exchanges are providing risk management opportunities to the traders and producers of the commodities to hedge against excessive price fluctuations in the real market. Besides it, MCX also plays a significant role in economic growth of the country by incentivizing the growth of modern warehouse and other supportive infrastructure. Recently the commodity market has undergone through a number of reforms aims at broadening and deepening the market due to which the investors’ participation in the commodity market has been raised.

Forward Market Commission regulated commodity exchanges of India till 2015. In September 2015, there is merger of FMC with the Securities and Exchange Board of India (SEBI) under Security Contract Regulation Act (SCRA), 1956. Global Commodity Exchanges have flourished due to high liquidity, large market participation and forward looking regulation. This merger has provided more depth to the market liquidity, investor participation and price discovery (Modi, 2015). The main motive of SEBI is to widen the commodity derivative market as stated in the SEBI Annual Report. SEBI is taking necessary measures to increase the integration among commodity market and security market to boost up the participation rate and
The commodity exchange turnover has been boosted up by 9 percent in the year 2015-16. In the major commodity exchanges Multi Commodity Exchange and National Commodity Derivative Exchange, the number of traded contracts increased up by 56.5 percent in the year 2015-16. This continuous growth of commodity market will increase the confidence of the investors in the market which in turn increase the participation of investors in the commodity market.

The commodity market in India has been developing enormously since the establishment of commodity exchanges (Sinha and Mathur, 2013). The report of WFO stated that some of the emerging economies have witnessed more than expected growth rate and some of them have experienced slowdown. The growth rate of two emerging markets India and China has remained strong. The Indian commodity market has shown mixed trends in the year 2016-17 due to turnaround in international commodity markets, increased impact of domestic macro-economic indicators, price stability and impact of demonetization. The huge gain has been attributed in metal segment in the form of volume and value traded.

![Figure 1.2: Fluctuations in the Prices of Benchmark Indices](image)

Source: SEBI Annual Report 2016-17

The price trend in commodity market has been presented in Figure 1.2, discerned from the price trends in the benchmark indices of two major commodity exchanges which are Multi Commodity Exchange and National Commodity and Derivative Exchange of India. X axis depicts the years and Y-axis depicts the price of benchmark
index. Two indices have been taken into account, out of which the first one is MCX COMDEX. It is combined index of three indices which are MCX Agriculture, MCX Metal and MCX Energy indices. The second index is NCDEX Dhaanya index which is a composite index of 10 agricultural commodities.

Figure 1.2 indicates that the percentage increase in MCX COMDEX and NCDEX Dhaanya index is 18.7 percent and 7.8 percent respectively in the year 2016-17. The MCX COMDEX and NCDEX Dhaanya have gained 512 points and 224 points respectively from March 2016 to April 2017. Further the MCX COMDEX is at highest level on February 2017 while the NCDEX Dhaanya index is at highest close on July 2016. The annualized volatility recorded in MCX COMDEX is 11.7 percent and for NCDEX Dhaanya index, it is 10.6 percent. The total number of permitted commodities as on March, 2017 is 25 for NCDEX, 16 for MCX and 13 for NMCE (See Figure 1.3)

![Figure 1.3: Number of Permitted Commodities (Sector Wise)](image)

Source: SEBI Annual Report 2016-17

The contribution of top 10 agricultural commodities in the National Commodities and Derivatives Exchange turnover in the FY 2016-17 is 93.2 percent. The highly traded agricultural commodity in NCDEX is refined soy oil with its percentage share of 21.5 percent in total turnover, followed by mustard seed with a share of 14.2 percent. Despite the increasing growth of Indian commodity market since the last few years, the participation of investors is still very less. The liquidity in commodity market can be increased by financial investors rather than actual producers.
Figure 1.4: Turnover of Commodity Market (Product Segment Wise)
Source: SEBI Annual Report 2016-17

Figure 1.4 indicates that the share of agricultural commodities in the total turnover of commodity market is less as compare to non-agricultural commodities. There is decrease in the turnover of agricultural commodities in the year 2016-17 comparative to previous year, while the turnover of non agricultural commodities has been increased in the year 2016-17 as compared to previous year. The volume of trade has also been increased in non agricultural commodities. The highest increase has been witnessed in energy commodities, followed by metal, agriculture and bullions.

Figure 1.5: High Volatile Commodities (Exchange Wise)
Source: SEBI Annual Report 2016-17

Figure 1.5 shows the top five high volatile commodities. The most volatile commodity is natural gas in the year 2016-17. Among the agricultural commodities, guar gum is the most volatile commodity. The nickel is the highly volatile among the base metals (SEBI Annual Report, 2017).
The first stock exchange in India was commenced in an organized manner with the establishment of Native Share and Stock Brokers’ Association of Bombay in the year 1875. In the year 1956, Government of India named this stock exchange as Bombay Stock Exchange (BSE) and recognized it as a first stock exchange of India. National Stock Exchange has started working in the year 1994. It is the first exchange in India which has provided modern and fully automated trading system. In India, now 24 regional and national stock exchanges are working.

![Figure 1.6: Fluctuations in the Price of Benchmark Stock Indices](source)

The Indian stock market has witnessed strong growth in the year 2016-17 due to rising inflow of foreign institutional investors. NIFTY index has been increased up by 18.5 percent at the end of financial year 2016-17. Figure 1.6 shows the fluctuations in the price of SENSEX and NIFTY considered as benchmark indices. X-axis depicts years and Y-axis depicts the price of benchmark index. Both SENSEX and NIFTY has attained their highest level on March 2017. Both the indices reached at lowest level on November 2016 immediately after the announcement of demonetization of currency (SEBI Annual Report, 2017).

1.2 Volatility and Seasonality
Volatility in commodity market is global issue since the financial crisis 2007-08. The uncertain movement in the prices of commodity over the period of time is known as volatility. Therefore, as a result of these uncertain movements in the commodity prices, the income of producers and traders is affected which in turn reduce the performance of commodity market (World Bank, 1997). The global economic growth
cycle is commodity intensive. The increased demand of commodities due to increasing industrialization in emerging economies like India and China led to surge the commodity price. Therefore the demand side shocks are most prominent that pulls the commodity prices up. The supply side factors are mostly prominent in agricultural commodities which occur due to adverse weather conditions. The increased variability in the price of commodities affects the economic growth of a country (Devlin et al., 2012).

The excess variability in the price of commodities is due to speculative activities. Speculation means transfer of risk from less risk bearing investors to the investors who have greater appetite and capacity to bear high risk. Speculators play destabilizing role in the commodity market (Devlin et al., 2012; Brunetti et al., 2016). Due to increase in speculative activities the agricultural commodity prices became more prone to the macro-economic shocks (Tang and Xiong, 2012). Further the increased variability in the prices of commodities increases the speculative activities in the commodity market which in turn affects the future trading on commodity market (Ramadas et al., 2014). The absence of arbitrage opportunities in the commodity market raises the asset prices due to increasing flow of information which lead to increase volatility (Mahalik et al., 2009).

The volatility is high in the commodity prices during short run. Price volatility is transferred across different commodities which makes the matter worse (Brown et al., 2008). Mishra (2018) suggested that high volatility in crude oil prices affects the whole commodity markets and other financial markets through production and mining which in turn affects the global economy and economic growth of the country. Rising volatility in price of commodities also have long term impact on the economy. Over the long run, the primary commodity prices start decreasing relative to the price of manufacturing goods. This has made it very costly to spend in technology and on buying of other commodities (Brown et al., 2008). The variations in the price of commodities pose challenges to the traders and more specifically to commodity importing developing countries. They can face problems related to balance of payment because of rising cost of import of these commodities. When the rising price
of commodities globally transferred to the domestic countries, it will erode the purchasing power of household and buyer of other commodities (Mugera, 2015).

The high variability in the prices of the commodities leads to increase trading volume of commodities by increasing the trading opportunities for the investors (Ram, 2012). According the structural view, the rising prices of commodities are important for economic growth but sometimes these are detrimental to the economic growth as per monetarists view (Ramadas et al., 2014). The instability in the prices of commodities complicates the financial planning of commodity dependent economies (Brown et al., 2008). The unexpected fluctuations in the price of commodities increase the chances of getting losses to the producers, traders and market players.

Further the existence of volatility in stock prices is associated with two factor process. The first one is long run process which is slowly changing and the second one is short run process which is strongly mean reverting. The long run process includes macro-economic fundamentals such as future cash flows and discount rates. The short run process includes transitory factors such as investor’s sentiments (Chiou and Lee, 2009). Financial markets follow economic cycle which is one of the reasons for excess volatility in these markets. Economic cycle includes boom followed by recession and then again market starts reviving that increases the confidence of investors towards the market and followed by boom period (Ahmed et al., 2017).

The high variability in the stock market has adverse effect on the confidence of investors and therefore affects the trading volume negatively (Kupiec and Studies, 1991). The large fluctuations in the stock market prices disturb the monetary policy transmission process and thereby create instability in the whole economy. It is required to have financial stability and liquidity in financial markets for transmission of information from one market to other market smoothly and efficiently. The excess variability in the prices of financial markets adversely affects the willingness of investors to invest in the financial markets because the volatility is transferred to the real economy and the transmission process become weaker and inefficient (Gugerell, 2003).
The rise in volatility increases the risk which dissuades the investors to invest in financial markets. Due to cyclical fluctuations related to calendar year in commodities, the volatility in the commodity market cannot be studied alone (Maitra, 2018). Seasonality in commodity returns is anticipated if mean returns are different over the period of one year. It is also a sign of market inefficiency (Kumar and Singh, 2008). Seasonality refers to the market trend whereby the return and volatility of certain period is different from other periods and the investors can earn the extra return during this time period by taking more risk (Wang et al., 2018).

The efficient market hypothesis stated that the perception of investors varies with the arrival of new information in the market and therefore, investors start revising their portfolio and these changes are immediately reflected in the price of financial assets (Tursoy & Faisal, 2017). Efficient market hypothesis affirmed that the information available in the financial markets is reflected in the price of financial security. It means it is impossible for the investors to generate extra profits from the market. It implies that price change adjusts itself in order to reflect the available information in the market.

This hypothesis is contradicted due to the occurrence of seasonality in the financial markets. The seasonality has been largely attributed in both commodity and equity prices even though the factors affecting both the markets are different from each other (Brooks and Prokopczuk, 2013). The imbalance in demand and supply is an underlying reason for seasonal fluctuations in commodity prices (Crain and Lee, 1996). Demand side fluctuations occur due to the dependence of demand of the particular commodity on the performance of its related industry while the supply side variability exists due to the unfavorable weather conditions especially in agricultural commodities.

Secondly there is increase in number of investors, who are considering commodity market similar to the other financial markets like stock and bond market. Therefore, the sentiments of investors during the unexpected shocks in the markets that affect the stock market will also become one of the reasons for increased fluctuation in the prices of commodities. In addition, the third reason is the financial market bubble that
has exceeded the volatility in price of commodities. When the stock market is continuously rising, the investors start investing in commodities. If there is any shock in the stock market, the investors withdraw their money from the commodity market and vice versa because they no longer want to bear more risk due to which prices of these assets change from their fundamental value. It leads to create excess variability in the prices of financial assets which in turn increase the chances to earn abnormal return from the market.

1.3 Co-integration

Integration is the process of association between two segmented markets so that the investors can get the benefits of same unconstrained access to the financial assets. It is considered as the tendency of the markets and price of financial assets to come together in the long run. It also refers to the flow of funds from less profitable markets to highly profitable markets and unites these returns into one (Misra and Mahakud, 2009).

Co-integration is an important issue to take into consideration while modeling time series data that has many applications in financial markets. Sometimes the terms co-integration and correlation are used interchangeably. These terms are related to each other but a different concept. If the correlation between two assets is high, it does not mean that co-integration between them is also high. The correlation describes the co-movement in return but the prices are instable over the period of time. It is the short run phenomenon. On the contrary, the co-integration between two assets represented the long run association. The hedging strategies based only on correlation cannot guarantee the long run performance. There is required to include both risk and return to take into account the long term trends in the prices (Alexander, 1999).

Volatility spillover refers to the effect of lagged return and volatility of one market on the volatility of other markets. Risk-return relationship and time varying correlation are the important concept to develop optimal hedging strategies.

The modern portfolio theory stressed on the fact that investors are required to diversify their portfolio to lessen the unsystematic risk by using different assets classes which are negatively correlated with each other. Commodities are considered
as safe haven due to their less correlation with conventional assets like equities and bonds (Gormus, 2012). Commodities are considered as fortune of the nation. The increased dependence of worlds’ economies on commodities has raised the fluctuations in commodity prices. The domestic and international markets are affected due to these variations. This is regarded as the predictor of economic downturn (Hamilton, 2011). The variations in the stock prices affect the investor’s confidence significantly, which in turn affects the commodity market. It is thus very important to examine the impact of changes in commodity prices on stock prices (Nguyen et al., 2015). The cross market linkage and interlocking markets is the subject of rigorous research area (Soucek and Todorova, 2013).

Over the past, there is swift increment in the investment in commodity market due to its low correlation with other financial assets. The underlying reason behind this is that the factors affecting the price of commodities are not similar to the factors affecting other financial markets. The investment in commodity market through financial instrument is considered as financialization. This concept has changed the concept of co-integration between commodity market and other financial markets. Financialization impacts the commodity markets in two ways. Firstly, it affects the diversification benefits of the investors. Secondly policy makers consider it important as it has strong impact on the real economy (Baldi et al., 2016)

Further the herding behavior of investors causes the bubble bursts in the financial markets which lead to increase volatility in financial markets. The behavior of investors regarding their portfolio strategies affects the trading strategies of other investors due to which the fundamental value of the assets deviates from the actual values. This phenomenon is driven by informed investors who affects the relationship between two markets through their speculative activities and secondly through noise investors who does not have much knowledge about the market and tried to imitate the behavior of others (Peri et al., 2014).

Moreover the linkage between commodity market and equity market has strong implications for retail participants of financial markets and policy makers. Policy makers concentrate on the volatility of commodity market and its impact on other
related sectors to reduce the inflation pressure. The investors observe the behavior of commodity market and stock market to develop hedging strategies by including both raw material and their related stock indices in their portfolio (Creti et al., 2013).

1.4 Justification of the Study

Since the financial crisis 2007-08, co-integration between commodity and equity prices has become one of the attractive topics in the world (Tang and Xiong, 2010; Baldi et al., 2016). Research has shown that there is increase in co-integration between commodity market and stock market since past few years. The logic behind this is the increase in number of financial investors in commodity market which is termed as financialization. These investors consider commodities as other financial assets like stocks and bonds. Therefore, the factors affecting stocks and bonds have similar effect on the commodities also.

Some researchers have given contradictory definition related to the co-integration between commodities and stocks. The increase in price of commodities is considered as one of the elements of higher inflation and interest rate in the economy which affects the stock prices negatively. The long position in commodity market can provide hedge against the unexpected fluctuation in the stock market prices (Conover et al., 2010). Therefore there is no common ground among researchers in explaining the concept of relationship between these two markets. Despite the surge in literature on the linkage between commodity market and stock market, this concept is still very confusing in Indian context. The lack of empirical research is one of the reasons surrounding the confusion regarding this concept in Indian context.

Further recent development in Indian commodity market by Security and Exchange Board of India (SEBI) has increased the exposure of commodities to individual investors. SEBI has recently taken step toward strengthening the integration between commodity market and stock market by integrating the investors, intermediaries and operational framework. The process of integration is implemented in two phases. The first phase stressed on the measures taken by SEBI to increase integration at intermediary level. In the second phase, the necessary measures have been discussed to be taken to integrate the commodity market and stock market by enabling a single
exchange for operating all market segments such as equity, commodities, equity derivatives and commodity derivatives (Sharma, 2017). The two major stock exchanges of India BSE and NSE have recently applied for license to initiate the trading of commodity derivatives. It is an interesting step taken towards the integration of financial markets and to boost the confidence of investors (Zachariah, 2018).

Recently, SEBI has approved the option contracts in non-agricultural commodities. This has resulted in increased participation of investors in the commodity market as there is increase in the daily turnover of gold from 64 crore on December 2017 to 700 crore on July 2018 with the introduction of gold option contract. Currently the option contracts are available for soft metals, crude oil, copper and zinc. Investors are using these commodities as hedging tool against fluctuations in real economy (Rukhaiyar, 2018).

Given the evidence of recent developments and amendments in the commodity trading to increase the confidence and participation of investors, the co-integration between commodity market and stock market is examined in this study to provide better insights regarding the hedging effectiveness of commodities against the unexpected fluctuations in the stock market. Furthermore the linkage between prices of raw material and their related stock indices will provide relevant information regarding the potential substitution strategies between commodities and stocks (Creti et al., 2013). This study will help SEBI to extend the investors’ participation in commodity market and stock market by using optimal weights and hedge ratios, computed by taking into consideration the results of this study. Investors can use these weights and ratios to hedge their risk effectively. This way they will be better equipped to anticipate and prepare for unexpected fluctuations in commodity and stock prices.
1.5 Chapter Plan

The thesis is structured into eight chapters.

Chapter 1: Introduction
This chapter highlights the origin and trends in the commodity market and stock market. The chapter highlights the causes and consequences of increased volatility, seasonality and co-integration between the stock market and commodity market. Further the chapter also provides the justification for conducting this study.

Chapter 2: Review of Literature
This chapter provides the theoretical as well as empirical framework on the concept of Efficient Market Hypothesis, seasonality in stock market and commodity market and co-integration between stock market and commodity market. The literature review has also identified the research gap and provides the basis for further study.

Chapter 3: Research Methodology
This chapter discusses in detail research methodology employed in this study. This study provides the detailed overview of need of the study, objectives of the study, data related to commodities and their related stock indices. This study highlights the econometrics tools used in this study.

Chapter 4: Seasonality in Commodity Market and Stock Market
This chapter discusses the monthly seasonality in different commodities and their related stock indices. This chapter throws light on the extent of volatilities in these markets.

Chapter 5: Co-Integration and Causality between Commodity Market and Stock Market
This chapter discusses the long run association between commodity market and stock market. It also provides the details related to the direction of relationship between commodity market and stock market.

Chapter 6: Return Spillover, Volatility Spillover and Dynamic Conditional Correlation between Commodity Market and Stock Market
This chapter discusses the short run linkage between the commodity market and stock market. It provides the important information regarding the return and volatility spillover across commodity market and stock market. It discusses the dynamic conditional correlation between stock market and commodity market.

Chapter 7: Findings, Conclusion and Suggestions
This chapter discusses the major findings of the study with conclusion. This chapter provides the optimal weights and hedge ratio to the investors and provide suggestions to the investors and policy makers.

References