An Analysis of Relationship between Sensex and Selected Agricultural Commodities Indices in India

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Abstract: *This paper attempts to convey the relationship between selected agricultural indices and sensex. The agricultural indices used in the study are Dhaanya- which provides a reliable benchmark for the traded agri-commodities in NCDEX and MCX AGRI- which is a group index of agricultural commodities traded in MCX. The Pearson's correlation and ordinary least squares are applied to understand the impact of agricultural indices on sensex. Granger Causality test is applied to understand the dynamic causal relationship between the variables. The study takes into account the daily closing values of agricultural index of NCDEX (Dhaanya) and MCX(MCXAGRI). The period of the study is 01/01/2014 to 31/12/2015.*

Keywords: Dhaanya, MCX AGRI, Sensex, Commodities, Relationship

1. Introduction

India is predominantly an agricultural economy. It contributes to about 17% of the total GDP and provides employment to over 60% of the population. Commodities market has played an important role in developing agriculture dominated economies. India is one of the top producers of agricultural commodities, 5th largest in the world. Goods made with agricultural raw materials contribute about 20% of Indian exports. Agriculture is still the largest and most vital economic sector which plays significant role in overall economic development and prosperity of India (Source: Business Line). The developments of Indian commodities market have helped to perform two significant functions of price discovery and price risk management. Trading in agricultural commodities futures helps the sellers(Farmers/producers) advance price signals and assists buyers (Consumers) of agricultural commodities for financing from one season to another.**(Maravi, 2015).**

Dhaanya is an agricultural commodities index based on ten most liquid agricultural contracts that are traded in NCDEX. For ensuring proper diversification index components in dhaanya are selected from various subsectors such as oil seeds, grains, spices and other crops of national importance. It is a value weighted index computed on real time on all trading days. It highlights the importance of agriculture in India and provides benchmark to Indian agriculture futures sector. (Source: NCDEX). The following figure shows the components of Dhaanya index along with the weights.

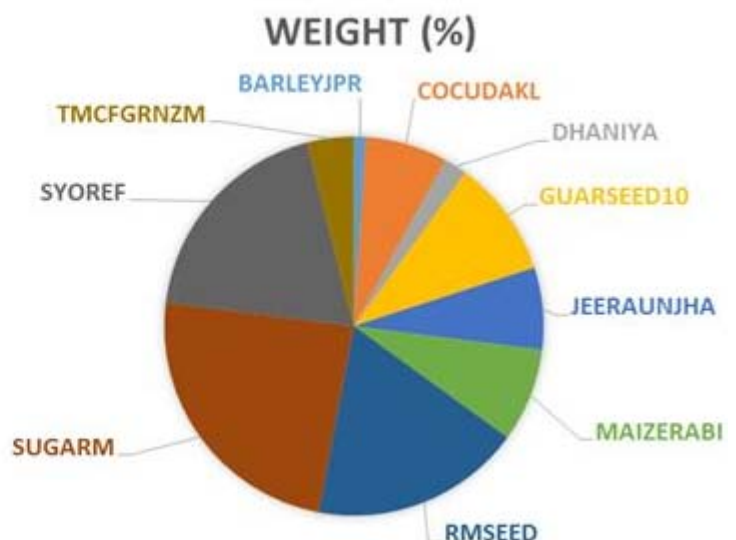| Components	Symbol	Weight (%)
Barley	BARLEYJPR	1%
Cotton Seed Oil Cake	COCUDAKL	7%
Coriander	DHANIYA	2%
Guar Seed	GUARSEED10	10%
Jeera	JEERAUNJHA	7%
Maize Rabi	MAIZERABI	8%
Ref. Soy Oil	SYOREF	19%
RM Seed	RMSEED	18%
Sugar	SUGARM	24%
Turmeric	TMCFGRNZM	4%

Figure 1: Components of Dhaanya Index

(Source: NCDEX)

MCX AGRI Index is a group index of MCX. It is based on the geometric mean of the agricultural commodities traded in MCX. The share of MCX AGRI in MCX COMDEX is 20% out of which 2.13% is cardamom, 3.38% is mentha oil, 6.09% is crude palm oil and 8.4% is cotton.

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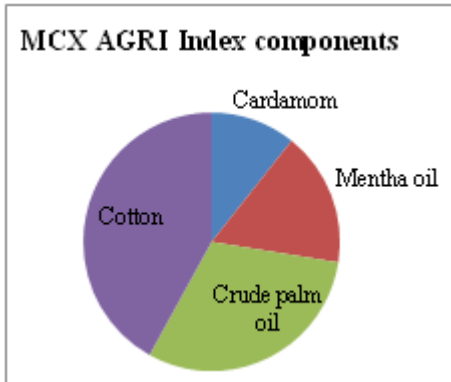
Figure 2: MCX AGRI Index components
(Source: MCX)

In an economy stock market plays a very important role in development of economy. The correlation between agricultural commodities prices and stock market returns tend to increase during the period of financial turmoil. The impact of financial turmoil on the correlation gets stronger as the share of financial investors in agricultural derivatives market rises (**Girardi, 2014**).

Traditionally the asset allocation theory suggests, investing in commodities not only protect against inflation, but also helps to diversify the risk. This paper attempts to find the relationship between agricultural indices and stock market index and to find out whether they actually provide room for diversification.

2. Objectives of the Study

The study has been performed to meet the following objectives:
- To examine the relationship between agricultural indices and sensex
- To analyze the impact of agricultural indices on sensex
- To identify the causal relationship among sensex and agricultural indices

3. Research Methodology

The SENSEX is India's most tracked bellwether index. It is designed to measure the performance of the 30 largest, most liquid and financially sound companies across key sectors of the Indian economy that are listed at BSE Ltd. The agricultural indices used in the study are Dhaanya (NCDEX) and MCX AGRI (MCX). The period for the study is 01/01/2014 to 31/12/2015. The tools used for the study are correlation, ordinary least square method and granger causality test. Daily closing prices of Sensex, MCX AGRI and Dhaanya are taken from websites of BSE, MCX and NCDEX.

Analysis & Interpretation of the Study
The analysis of the study involves correlation, ordinary least squares method, unit root test and granger causality test.

Correlation Analysis

Table 1: Correlation matrix of BSE sensex and selected agricultural indices

Dhaanya_closing_price	MCX_AGRI Close	Sensex_closing_price	
1.0000	-0.3638	0.1892	**Dhaanya_closing_price**
	1.0000	-0.7548	**MCX_AGRI Close**
		1.0000	**Sensex_closing_Price**

From the above table it can be seen that MCX AGRI is having a high negative correlation with BSE Sensex. On the other hand, Dhaanya index is having a low correlation with sensex. This shows that there is a chance for diversification for investors.

Ordinary Least Square Method

Table 2: OLS, using observations 2014/01/01-2015/12/31 (T = 525)
Dependent variable: Sensex_closing_price

	Coefficient	Std. Error	t-ratio	p-value	
Const	49934.7	1702.6	29.3285	<0.00001	***
Dhaanya_closing_price	-1.54738	0.479748	-3.2254	0.00134	***
MCX_AGRIClose	-9.05475	0.349572	-25.9024	<0.00001	***

Mean dependent var	25913.13		S.D. dependent var	2490.769
Sum squared resid	1.37e+09		S.E. of regression	1620.975
R-squared	0.578085		Adjusted R-squared	0.576469
F(2, 522)	357.6081		P-value(F)	1.53e-98
Log-likelihood	-4623.599		Akaike criterion	9253.199
Schwarz criterion	9265.989		Hannan-Quinn	9258.207
Rho	0.980279		Durbin-Watson	0.036917

From the above table it can be concluded that 1% change in MCX AGRI will lead to an decrease in sensex price by 9.05%. Whereas 1% change in Dhaanya will lead to a decrease in sensex price by 1.55%. The R squared value is 57.8%. So the variation in model due to change in dhaanya and MCX AGRI is explained by 57.8% and rest of the variation is explained by other factors. The MCX AGRI and Dhaanya effect sensex by 57.8% and is proved statistically significant by having a p-value 0f 0.000 which is less than

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0.05. From the above analysis following regression model can be arrived:

$$BSE\ Sensex = 49934.7 - 1.54738 * Dhaanya\_closing\_price - 9.05475 * MCX\_AGRIClose$$

Unit Root Test

Unit root test is applied to find out the stationarity of data. There are many test to check the stationarity of data, but Augmented dickey fuller test is the most commonly used test to analyze the stationarity. The application of unit root test is the first step before doing granger causality test. It can be seen from the table below that all the variables are non stationary at level. But they are found to be stationary at their first difference. So it is said that they are integrated in the order one.

Table 3: Result of unit root test

Variable	At Level				At first Difference			
	ADF test statistics		P value		ADF test statistics		P value	
	C	C&T	C	C&T	C	C&T	C	C&T
BSE Sensex	-2.03869	-1.03938	0.2703	0.937	-5.37718	-5.6809	0.000	0.000
Dhaanya	-2.01063	-0.0248405	0.2824	0.1197	-6.08566	-6.0797	0.000	0.000
MCX AGI	-1.2835	-1.83999	0.6396	0.6853	-5.0483	-5.0487	0.000	0.000

Note: C represents constant and C&T represents constant and trend
Source: Computed

Granger Causality Test

Table 4: Granger causality test of Sensex and selected agricultural indices

Null Hypothesis:	Observations	F-Statistic	Prob.
MCX_AGRICLOSE does not Granger Cause DHAANYA_CLOSING_PRICE	523	0.95763	0.385
DHAANYA_CLOSING_PRICE does not Granger Cause MCX_AGRICLOSE		2.44958	0.087
SENSEX_CLOSING_PRICE does not Granger Cause DHAANYA_CLOSING_PRICE	523	0.68791	0.503
DHAANYA_CLOSING_PRICE does not Granger Cause SENSEX_CLOSING_PRICE		0.37643	0.687
SENSEX_CLOSING_PRICE does not Granger Cause MCX_AGRICLOSE	523	3.43764	0.033
MCX_AGRICLOSE does not Granger Cause SENSEX_CLOSING_PRICE		0.0843	0.919

The Granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another. From the above table it can be seen that there is only one causal relationship among sensex and MCX agri. There is a unidirectional relationship between sensex and MCX Agri but not with any other variables in the study. This shows that sensex is useful to forecast MCX AGRI but not vice versa.

4. Conclusion

This study concludes that Dhaanya index is having a low correlation with sensex, whereas MCX Agri is negatively correlated with sensex. Dhaanya index and MCX Agri is having a negative impact on sensex. The granger causality test shows that there is a unidirectional relationship between sensex and MCX Agri but not with any other variables. This shows that investment in agricultural commodities will help the investors in diversifying the risk of their investment

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