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AN EMPERICAL STUDY ON PRICE ANALYSIS OF COMMODITY BASE METALS WITH SPECIAL REFERENCE TO ALUMINIUM AND COPPER

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ABSTRACT

This paper aims upon analysis of aluminum and copper price analysis. It uses econometric tools and found the corresponding results. The results are given below. The paper has brought out that there is no unit relationship between the spot and future price of respective metals.

KEYWORDS: price analysis, aluminum, copper

INTRODUCTION

The derivatives market has been a good avenue of investment. The attention of the investors has turned towards the development of portfolio in the area of derivative market. We can clearly understand that though it has a high risk we can evade it by managing the portfolio effectively. The price discovery becomes a main part in the investment decisions the relationship of individuals. To them price variations may inculcate a major profit. This may foster a major speculative activity. It helps the investor in projecting towards the best source of commodity investments where they may not be able to invest in the asset physically but they may trade upon the values.

LITERATURE REVIEW

Dr. Chinmaya Behera have studied the co integration between the spot and future prices of the

gold, silver, copper, crude oil, natural gas. The data has been collected through MCX database and the data have been evaluated through Engle-Granger Co-Integration methodology. The paper puts forth the finding that based upon the calculations the results of gold does not support the price discovery co-integration whereas the other commodities have supported the calculations. (Behera, 2015)

Shahriar Hasan et.al have studied the price of the oil markets have been a great influential factor in the Canadian stock market using the cause and effect relationship study. They have analysed the data by Augmented Dickey-Fuller test (ADF) and Phillips-Perron (PP) tests. The results of the study shows that there is a healthy growth in the price indices and market growth. The paper also indicates that the markets may have a positive influence over the investors' perception. The main drawback of the paper is that the variables taken into consideration are

the exchange rate and oil price whereas the price discovery may contain many other market variables. (Hasan & Mahbobi, 2013)

Sanjay Sehgal et.al have deliberated the relationship price discovery and volatile spill over for Indian commodity market. Twelve commodities (Chana, Guar seed, Soy bean, Kapas, Potato agra in Agriculture commodity. Gold, Silver, Zinc, Lead, and Copper in metals commodity. Natural gas and crude oil in Energy commodity) and four indices (Mcx-Comdex, Mcx-Agri-Index, Mcx-Metal-Index Mcx-Energy-Index) have been taken into consideration for calculation in this empirical paper. The error correction model has been taken into consideration where the corrections are made between the short run and long run adjustments. The paper finally states that the introduction of the commodity contracts have improved the liquidity of the investors. (Sehgal, Rajput, & Florent- Deisting, 2013)

P.Natarajan et.al have interrogated the relationship of cardamom in spot and future prices. The data has been collected from MCX between the time periods of February 2006 to march 2012. They have used johansen co-integration test. Hypothesis was setup to find out whether there is a relationship between the spot and future prices. Deployment of granger causality test have boosted the occurrence of the unbiased results. They have come to a conclusion that there is a close relationship between the spot and future prices. It is been understood that the wise

FINDINGS

Analysis of aluminum price:

Dickey-Fuller test: DF(intercept)

Phillips-Perron test: PP(intercept)

Significance level (%): 5

Tau (Observed value)	-3.8211
Tau (Critical value)	-0.0711
p-value (one-tailed)	0.0024
Alpha	0.05

Test interpretation:

H0: There is a unit root for the series.

Ha: There is no unit root for the series.

As the computed p-value is lower than the significance level alpha=0.05, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha

The risk to reject the null hypothesis H0 while it is true is lower than 0.18%.

Phillips-Perron test (PP (intercept) / Lag: Short / Box-Cox(future date)):

Tau (Observed value)	-3.9409
Tau (Critical value)	-2.8634
p-value (one-tailed)	0.0018
Alpha	0.05

selection of portfolio units may earn a good profit in future. (P.Natarajan & E. Nirupama, 2015)

Ms. Shalini H S et al have sad that the commodity market have developed to a greater extent. The market turnover has turned up from rs2365 cr in 2000-2001 to rs 26444804 cr in 2013-2014. The financial derivative has become a important tool in the investment and portfolio management. The paper has been successful in finding out the significance and other concepts have been exhibited well. There is a positive and significant growth in the derivative market in India and it plays a imminent role in global market. (Ms. Shalini H S & Dr. Raveendra P V, 2014)

DATA COLLECTION AND METHODOLOGY

The secondary data has been collected from the MCX website with data of future and spot prices. The data consists of data from March 2012 to February 2017 with total of 1378 observations for aluminum, 1328 observations of copper. Time series transformation has been performed to the data to easily calculate the data. Dickey-fuller test and phillips-perron test has been performed to analyze the unit root and stationery test of the data. Co-integration test was performed to analyze the price relationship of future and spot price of both aluminum and copper.

Test interpretation:

H0: There is a unit root for the series.

Ha: There is no unit root for the series.

"As the computed p-value is lower than the significance level $\alpha=0.05$, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha."

The risk to reject the null hypothesis H0 while it is true is lower than 0.16%

Dickey-Fuller test (DF(intercept) / Box-Cox(spot date)):

Tau (Observed value)	-3.9357
Tau (Critical value)	-0.0711
p-value (one-tailed)	0.0016
Alpha	0.05

Test interpretation:

H0: There is a unit root for the series.

Ha: There is no unit root for the series.

"As the computed p-value is lower than the significance level $\alpha=0.05$, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha."

The risk to reject the null hypothesis H0 while it is true is lower than 0.16%.

Phillips-Perron test (PP(intercept) / Lag: Short / Box-Cox(spot date)):

Tau (Observed value)	-3.8617
Tau (Critical value)	-2.8634
p-value (one-tailed)	0.0024
Alpha	0.05

Test interpretation:

H0: There is a unit root for the series.

Ha: There is no unit root for the series.

"As the computed p-value is lower than the significance level $\alpha=0.05$, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha."

The risk to reject the null hypothesis H0 while it is true is lower than 0.24%.

Model: H1* (c1=0,d0=0,d1=0)

VAR order: Automatic

Significance level (%): 5

VAR order estimation:

Number of lags	AIC	HQ	BIC	FPE
1	-18.2379	-18.2294	-18.2151	0.0000
2	-18.3325	-18.3183	-18.2945	0.0000
3	-18.3360	-18.3160	-18.2827	0.0000
4	-18.3354	-18.3098	-18.2669	0.0000
5	-18.3334	-18.3020	-18.2496	0.0000

The VAR order estimate according to AIC is 3.

Lambda max test:

H0 (Nbr. of cointegrating equations)	Eigenvalue	Statistic	Critical value	p-value
None	0.0585	82.8880	15.8919	< 0.0001
At most 1	0.0100	13.8718	9.1644	0.0060

Lambda max test indicates 1 cointegrating relation(s) at the 0.05 level.

Trace test:

H0 (Nbr. of cointegrating equations)	Eigenvalue	Statistic	Critical value	p-value
None	0.0585	96.7598	20.2619	< 0.0001
At most 1	0.0100	13.8718	9.1644	0.0060

Trace test indicates 1 cointegrating relation(s) at the 0.05 level.

Adjustment coefficients (alpha):

Box-Cox(future date)	-0.0009	-0.0010
Box-Cox(spot date)	0.0019	-0.0009

Cointegration coefficients (beta):

Box-Cox(future date)	65.2144	8.5862
Box-Cox(spot date)	-59.9285	8.4960
Intercept	-26.1259	-80.2574

Normalized to beta'.S11.beta = Id.

Analysis of copper price:

Dickey-Fuller test: DF(intercept)

Phillips-Perron test: PP(intercept)

Significance level (%): 5

Dickey-Fuller test (DF(intercept) / Box-Cox(future price)):

Tau (Observed value)	-2.8525
Tau (Critical value)	-0.0710
p-value (one-tailed)	0.0513
Alpha	0.05

Test interpretation:

H0: There is a unit root for the series.

Ha: There is no unit root for the series.

As the computed p-value is greater than the significance level alpha=0.05, one cannot reject the null hypothesis H0.

The risk to reject the null hypothesis H0 while it is true is 5.13%.

Phillips-Perron test (PP(intercept) / Lag: Short / Box-Cox(future price)):

Tau (Observed value)	-2.8844
Tau (Critical value)	-2.8635
p-value (one-tailed)	0.0474
Alpha	0.05

Test interpretation:

H0: There is a unit root for the series.

Ha: There is no unit root for the series.

As the computed p-value is lower than the significance level alpha=0.05, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha.

The risk to reject the null hypothesis H0 while it is true is lower than 4.74%.

Dickey-Fuller test (DF(intercept) / Box-Cox(Spot Price)):

Tau (Observed value)	-3.4975
Tau (Critical value)	-0.0710
p-value (one-tailed)	0.0076
Alpha	0.05

Test interpretation:

H0: There is a unit root for the series.

Ha: There is no unit root for the series.

As the computed p-value is lower than the significance level alpha=0.05, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha.

The risk to reject the null hypothesis H0 while it is true is lower than 0.76%.

Tau (Observed value)	-3.1172
Tau (Critical value)	-2.8635
p-value (one-tailed)	0.0256
Alpha	0.05

Test interpretation:

H0: There is a unit root for the series.

Ha: There is no unit root for the series.

As the computed p-value is lower than the significance level alpha=0.05, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha.

The risk to reject the null hypothesis H0 while it is true is lower than 2.56%.

Co integration test:

Model: H1* (c1=0,d0=0,d1=0)

VAR order: Automatic

Significance level (%): 5

VAR order estimation:

Number of lags	AIC	HQ	BIC	FPE
1	40.2402	40.2490	40.2637	299281494386160000.0000
2	40.0341	40.0488	40.0733	243556185409524000.0000
3	39.9540	39.9746	40.0089	224798627055535000.0000
4	39.9255	39.9520	39.9961	218494620307754000.0000
5	39.9014	39.9338	39.9877	213293481613106000.0000

The VAR order estimate according to AIC is 5.

Lambda max test:

H0 (Nbr. of co integrating equations)	Eigenvalue	Statistic	Critical value	p-value
None	0.0283	37.9886	15.8919	< 0.0001
At most 1	0.0068	9.0339	9.1644	0.0529

Lambda max test indicates 1 co integrating relation(s) at the 0.05 level.

Trace test:

H0 (Nbr. of co integrating equations)	Eigenvalue	Statistic	Critical value	p-value
None	0.0283	47.0225	20.2619	< 0.0001
At most 1	0.0068	9.0339	9.1644	0.0529

Trace test indicates 1 co integrating relation(s) at the 0.05 level.

Adjustment coefficients (alpha):

Box-Cox(future price)	198.9869	197.5326
Box-Cox(Spot Price)	-	11184.3048

Co integration coefficients (beta):

Box-Cox(future price)	-0.0002	0.0000
Box-Cox(Spot Price)	0.0000	0.0000
Intercept	0.0415	-0.1746

Normalized to beta'.S11.beta = Id.

CONCLUSION

The portfolio must consist of the metals at a reliable rate. Majority of people and investors are aware of derivatives. The main reason behind this is high amount of investment, high risk and lack of awareness. It is a best tool for hedging the risk. A good portion of investment in the portfolio can fetch a good amount of profit. The knowledge to the investors should be initiated and they should be cleared with the basics and the processes of investment where they can understand the risk and can earn a good profit.

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