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Preliminary Statistical Analysis of Steel Industry

Dr Samridhi Tanwar

Assistant Professor, Technological Institute of Textile & Sciences, Bhiwani

Email: samridhi.tanwar@gmail.com

Ph# 9416176634

Monika Aggarwal

Research Scholar, Maharashi Dayanand University

Email: monikaagg85@gmail.com

Ph# 9891698203

Chandan Parsad

Research Scholar, Faculty of Management Studies, IIM Raipur

Email: chandanparsad@gmail.com

Ph# 8349501142

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Preliminary Statistical Analysis of Steel Industry

Abstract

The present study attempted to focus on Indian Steel Market and its price movements. The study with the use of various statistical tools helped to analyze the price movement of Indian Steel market with respect to World steel market price. The study also attempted to conceptualize the relationship between Steel production and Index of Industrial Production (manufacturing Index). The study attempts to opt out the fallacy that international or world steel price have affect on the Indian steel price.

Keywords: Indian steel industry, World steel industry, Index of Industrial Production (IIP)

I. Introduction

India economic development is contingent upon the growth of the Indian steel industry. Consumption of steel is taken to be an indicator of economic growth. Steel continues to have a stronghold in traditional sectors such as construction, housing and ground transportation; special steels are increasingly used in engineering industries such as power generation, petrochemicals and fertilizers. India occupies a very important position on the global steel map, with the establishment of new state-of-the-art steel mills, acquisition of global scale capacities by players, continuous modernization and up gradation of older plants, improving energy efficiency and backward integration into global raw material sources.

Market Size

Latest figures by World Steel organization has revealed that India's steel production increased by 0.9 per cent to 6.45 million tonne (MT) in June 2013, as against 6.39 MT in June 2012. Moreover, the data showed that India fared better than rest of the world in terms of average output for the first six months of 2013.

Global Ranking of Indian Steel

World crude steel production stood at 1547.8 million tonnes during 2012, an increase of 1.2 per cent over 2011. During 2012, Chinese crude steel production reached 716.5 mt, a growth of 3.1 per cent over 2011. China remained the largest crude steel producer in the world, accounting for

72 per cent of Asian and 46 per cent of world crude steel production during 2012. India was the 4th largest producer during this period and recorded a growth of 4.6 per cent over 2011.

Table 1

World Crude Steel Production in 2012 (mt)			
Rank	Country	Qty (mt)	% change over 2011
1	China	716.5	3.1
2	Japan	107.2	-0.4
3	US	88.6	2.5
4	India	76.97	4.6
5	Russia	70.6	2.5
6	South Korea	69.3	1.2

World Steel market in 2012 and 2013

Sluggish demand growth and range-bound steel prices are predicted in 2013. Steel prices, which had significantly weakened in the last few months of 2012, will find support from production cuts and capacity reductions by global steelmakers and near marginal production cost levels for Chinese steel producers.

Excess capacity remains the most significant issue in the steel sector. Global steelmakers continue to witness supply growth outpacing demand, with capacity utilization rates remaining stubbornly below 80%. Slowdown in demand growth from China and subdued steel prices will continue to weigh on the global steel sector in 2013.

Lower industrial production and reduced investment in large scale infrastructure projects have resulted in a marked decrease in the growth of steel demand from both the developed and emerging markets. Apparent global steel usage in 2012 is expected to have grown by only 2.1% (compared to 6.2% growth in 2011), and steel demand is expected to grow by only 3.2% in 2013. The most affected region is the Euro zone. With the debt crisis weighing heavily on economic activity, apparent steel use in the EU is expected to have declined by 5.6% in 2012. Spain and Italy are expected to see particularly dramatic drops in 2012, with apparent steel use falling by 11.9% and 12.6%, respectively. Even Germany, the most resilient of European economies, is estimated to experience a decline of 4.7% in 2012

Index of Industrial Production (IIP)

Index of Industrial Production (IIP) is one of the Prime indicators of the economic development for the measurement of trend in the behavior of the Industrial Production over a period of time with reference to a chosen base year. It indicates the relative change of physical production in the field of industries during a specified year as compared to previous year. Index of Industrial Production (IIP) in simplest terms is an index which details out the growth of various sectors in an economy. E.g. Indian IIP will focus on sectors like mining, electricity, Manufacturing & General

Index of Industrial Production and Production of Steel Industry:

IIP is an indicator of the industrial progress of the country and the variation of IIP depicts the growth or decline of the economy of the country. The steel industry contributes a significant production to the IIP of the country. Sectors like automobiles, infrastructure, and consumer durables etc. depend on steel to a greater extent. These industries production vary with the variation in IIP (i.e.) the demand for the steel falls if the IIP is in contraction. This indirectly affects the demand for steel in the country reducing the production of the steel industries causing the steel industry to be sensitive to the changes in the economic scenario of the country.

II. Research Methods

Study Objectives:

- 1) To the Study Indian Steel Market and movement of price with World steel market.
- 2) To analyze the relationship between steel production and IIP manufacturing Index.
- 3) To analyze the relationship between steel prices and different variants of steel.

Research Design:

Conclusive Research Design

Data Collection:

The data collected in this study is through a non-probabilistic method. The data is selected using convenience sampling technique wherein the data is collected for steel production rate, Steel Price (national & world market) and the Index of Industrial Production (IIP) of the nation.

Data Source:

Secondary data is taken from the various website as well as various published annual reports

III. Analysis and Result through various Statistical Tools

1) Hypothesis for correlation

H0: There is no relationship between steel production and Index of Industrial Production (IIP).

H1: There is a relationship between steel production and Index of Industrial Production (IIP).

Table 2

Correlations (SPSS)			
		IIP	Percentage
IIP (annual Growth rate)	Pearson Correlation	1	.616
	Sig. (2-tailed)		.005
	N	19	19
Steel production growth	Pearson Correlation	.616**	1
	Sig. (2-tailed)	.005	
	N	19	19
IIP annual growth rate from 1994-95 to2012-13			
Steel production growth rate from 1994-95 to2012-13			
Correlation is significant at the 0.01 level (2-tailed)			
For Data Refers Table no 01			

- Reject this null hypothesis because P value (0.005) is less than α (0.01).
- There is 99% chance the IIP manufacturing Index (from 1994-95 to 2012-13) and Steel production growth rate (from 1994-95 to 2012-13) have positive correlation (0.616).
- Generally it is assume that annual production rate of steel is subjected on the IIP rate of the country, there are many other significant factors which affect the steel industry. There is significance correlation between IIP rate and annual steel production rate, as per above sample, which indicates that Steel Industry is cyclical in nature.

2) Hypothesis For independent T test

H0: There is no significance difference between Indian steel market price and world steel market price ($\mu_I = \mu_W$) for HR coil, HR Sheet, CR coil and Wire Rod .

H1: There is significance difference between Indian steel market price and world steel market price ($\mu_I \neq \mu_W$) for HR coil, HR Sheet, CR coil and Wire Rod.

Table 3

Independent Samples Test								
		t-test for Equality of Means						
		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Price HR coil	Equal variances assumed	6.883	26	.000	2950.716	428.688	2069.535	3831.898
Price ROD	Equal variances assumed	4.316	26	.000	2654.633	615.117	1390.241	3919.025
Price Cr coil	Equal variances assumed	6.759	26	.000	2595.421	384.002	1806.092	3384.749

The P value for hot roll coil, rod and cold roll coil indicates that if the population means are equal, the probability of observing a difference this large or larger in two sample means is only 0.000. Because P value is less than α ($\alpha = 0.05$), there is a sufficient evidence to reject the null hypothesis. It specifies

- Null hypothesis for Price Hr Sheet ($P < \alpha$) is rejected and for that reason using of t Tail test cannot be applied on this, but for rest of them t Test is applied
- There is significance difference between Indian steel market price for hot roll coil and world steel market price for hot roll coil.
- There is significance difference between Indian steel market price for steel wire rod and world steel market price for steel wire rod.

- There is significance difference between Indian steel market price for cold roll coil and world steel market price for cold roll coil

3) Hypothesis for One Way Anova test

H0: The mean price of different types of Indian steel (HR coil, HR Sheet, CR coil and Wire Rod) are equal. (μ HR coil = μ HR Sheet = μ CR coil = μ Wire Rod)

H1: The mean price of different types of Indian steel (HR coil, HR Sheet, CR coil and Wire Rod) are not equal. (μ HR coil \neq HR Sheet \neq μ CR coil \neq μ Wire Rod)

Or

H1: At least one of the mean price of different types of Indian steel (HR coil, HR Sheet, CR coil and Wire Rod) are not equal.

Table 4

ANOVA					
Price					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	231564500.000	3	77188166.667	61.913	.000
Within Groups	64829792.857	52	1246726.786		
Total	296394292.857	55			
We reject our hypothesis if P(sig.) value is less than α i.e. $P < \alpha(0.05)$					

- Anova test indicates that mean price of different steel are not equal or at least one of the mean price of different types of Indian steel (HR coil, HR Sheet, CR coil and Wire Rod) are not equal.

To find out which variant of the steel have different mean value of price, we do the Post Hoc Tuky test

Our hypotheses are:

For HR coil and others

H0: μ HR coil = μ HR Sheet (there is no difference between the price)

H1: μ HR coil \neq HR Sheet (there is difference between the prices)

H0: μ HR coil = μ CR coil (there is no difference between the price)

H1: μ HR coil \neq CR coil (there is difference between the prices)

H0: μ HR coil = μ Wire Rod (there is no difference between the price)

H1: μ HR coil \neq Wire Rod (there is difference between the prices)

For HR sheet and others

H0: HR Sheet = μ CR coil (there is no difference between the price)

H1: HR Sheet \neq μ CR coil (there is difference between the prices)

H0: HR Sheet = μ Wire Rod (there is no difference between the price)

H1: HR Sheet \neq Wire Rod (there is difference between the price)

For CR coil and others

H0: CR coil = μ Wire Rod (there is no difference between the price)

H1: CR coil \neq μ Wire Rod (there is difference between the price)

Table 5

Multiple Comparisons								
Dependent Variable: Price								
Tukey HSD								
(I) lable_Steel	(J) lable_Steel	Mean Difference (I-J)	Std. Error	Sig.	A	H0	95% Confidence Interval	
							Lower Bound	Upper Bound
HRCOIL	HRsheet	-680.71429	422.02349	.380	0.05	Accept	-1800.8063	439.3778
	CRcoil	-5238.57143*	422.02349	.000	0.05	Reject	-6358.6635	-4118.4794
	ROD	-1326.42857*	422.02349	.014	0.05	Reject	-2446.5206	-206.3365
HRsheet	HRCOIL	680.71429	422.02349	.380	0.05	Accept	-439.3778	1800.8063
	CRcoil	-4557.85714*	422.02349	.000	0.05	Reject	-5677.9492	-3437.7651
	ROD	-645.71429	422.02349	.427	0.05	Accept	-1765.8063	474.3778
Crcoil	HRCOIL	5238.57143*	422.02349	.000	0.05	Reject	4118.4794	6358.6635
	HRsheet	4557.85714*	422.02349	.000	0.05	Reject	3437.7651	5677.9492
	ROD	3912.14286*	422.02349	.000	0.05	Reject	2792.0508	5032.2349
ROD	HRCOIL	1326.42857*	422.02349	.014	0.05	Reject	206.3365	2446.5206
	HRsheet	645.71429	422.02349	.427	0.05	Accept	-474.3778	1765.8063
	CRcoil	-3912.14286*	422.02349	.000	0.05	Reject	-5032.2349	-2792.0508

We reject our hypothesis if P(sig.) value is less than α i.e. $P < \alpha(0.05)$

- There is no difference between the price of HRCOIL and HR Sheet
- There is no difference between the price of Wire ROD and HR Sheet
- The mean prices of different types of the steel are different in nature except HRCOIL and HR Sheet and Wire ROD and HR Sheet.

4) Hypothesis for Linear regression

Ho: Linear regression model define relationship between IIP (Index of Industrial Production) and steel production in India from the year 1995 to 2013.

Or

H0: Linear regression model is used for forecasting the IIP by using steel production growth rate.

H1: Linear regression model can't define relationship between IIP (Index of Industrial Production) and steel production India from the year 1995 to 2013.

Or

H1: Linear regression model can't be used for forecasting the IIP by using steel production growth rate.

$$Y = \beta_0 + \beta_1 X + \epsilon$$

Y = dependent variable in our case it is IIP rate because IIP rate is changed due to change in the manufacturing activities of the country, it measure the effect of the independent variables

X = Independent variable or alternatives that are manipulated and whose effects are measured and compared.

ϵ = error

Table 6

Model Summary ^b						
Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate	Durbin-Watson
1	.616 ^a	.379	.342		3.630	1.063
a. Predictors: (Constant), percentage growth						
b. Dependent Variable: IIP						

- R= 0.616 indicates IIP and production growth rate is correlated and have positive correlation.

- R Square is 37.9% which is not very high and indicates that this model is not up-to the mark.
- Due to only one independent variable are consider, other factors also play very important role.
- Std. error of the estimates is the difference between the straight line and point. Lower the value better is the model and in above case the value is 3.630 which indicates that the model is not very good

IV. Implications

The present study was carried out with the objective of analyzing Indian Steel Market and its movement of price with world steel market. The study reveals that there is significance difference between Indian steel market price for hot roll coil and World steel market price for hot roll coil, Indian steel market price cold roll coil and World steel market price for cold roll coil and Indian steel market price for steel wire rod and world steel market price for steel wire rod

The second objective was to analyze the relationship between steel production and IIP manufacturing index. The above study reveals that there is significant correlation between IIP rate and annual steel production rate, as per the sample, which indicates that Steel Industry cyclical in nature

The third objective was to cogitate the relation between steel prices and different variants of steel. The statistical analysis shows that there is no difference between the price of HRCOIL and HR Sheet as well as there is no difference between the price of Wire ROD and HR Sheet. But the mean prices of different types of the steel are different in nature except HRCOIL and HR Sheet & Wire ROD and HR Sheet.

Hence there is always assumption that steel price are determine by world steel price, but we forget that it is a commodity whose prices are changed according to the local consumption, Our study shows the steel prices of India and world steel price have some significance difference, and this indicate that steel price also determine by the domestic demand not only the international demand or international market price.

IV. References

- 1) E & Y Global steel 2013 A new world, a new strategy Report
- 2) India Central Statistical Organization. Monthly Abstract of Statistics. New Delhi
- 3) Government of India, Ministry of Steel, Annual reports 2009-10,2010-11 2011-12 and 2012-13.
- 4) Government of India. Ministry of Steel, National Steel Policy, 2005. (www.steel.nic.in, 2013)
- 5) Indicus Analytics Prepared for the Competition Commission of India January 2009
- 6) Industry analysis services (CMIE)
- 7) Malhotra, Naresh K. (2008) Marketing Research- An Applied Orientation, 5th edn. New Delhi: Pearson Education.
- 8) Robert, B. (2000) Introduction to Research Methods. London: Sage Publication.
- 9) Kothari, CR. (1990) Research Methodology Method and Techniques. 2nd edn. New Delhi: Wiley Eastern limited.

Websites

- 10) <http://www.ibef.org/industry/steel.aspx>
- 11) <http://steel.gov.in/development.htm>
- 12) <http://www.worldsteelprices.com/>
- 13) http://mospi.nic.in/Mospi_New/site/inner.aspx?status=2&menu_id=21
- 14) http://data.gov.in/catalogs/?filter=catalog_type%3Acatalog_type_raw_data&sort=updated%20desc
- 15) <http://www.x-rates.com/average/?from=USD&to=INR&amount=1&year=2012>
- 16) <http://dbie.rbi.org.in/DBIE/dbie.rbi?site=home>
- 17) <http://www.meps.co.uk/indian%20steel%20prices.htm>