RESEARCH REVIEW JOURNALS
Volume-03
Issue-12
December -2018

ISSN: 2455-3085 (Online)
RESEARCH REVIEW International Journal of Multidisciplinary
www.rrjournals.com [UGC Listed Journal]

Impact of Steel and Rubber Industry on Automobile Sector

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ARTICLE DETAILS

Article History
Published Online: 10 December 2018

Keywords
Automobile industry, steel, rubber, share prices.

ABSTRACT

India is one of the fastest growing economies of today's world. In such a scenario, it is quite imperative for industries to overlap and affect each other. For instance, airlines industry is impacted by crude oil. Their relation is calculated using simulation methods, which is used in predicting costs. With respect to the automobile industry, the same can be said for steel and rubber as these two are major components used in manufacture of vehicles. Using statistical tools, this paper has attempted to establish a relationship of automobile industry with steel and rubber industries. It has taken into account five Indian companies for each industry, viz. Maruti Suzuki, HeroMotocorp, Hindustan Motors, Tata Motors and Mahindra & Mahindra for the automobile industry. The findings of the paper can be utilized in separately predicting stock market changes in the Indian automobile industry given the changes in rubber and steel industry.

1. Introduction

The car industry uses a number of materials to build cars, including iron, aluminum, plastic steel, glass, rubber, petroleum products, copper, steel and others. The materials have been evolved technologically over the decades, in order to create more sophisticated, better built, and safer cars. More than half of the total volume in the production of a modern car consists of cast iron and steel parts (55%) and7% rubber

According to a recent report by Kotak Institutional Securities, steel cost accounts for around 7 per cent for two-wheelers, 10 per cent for passenger vehicles, and 16 per cent for medium and heavy commercial vehicles. When a car is being manufactured, it is crucial to keep its mass as less as possible in order to maintain the basic characteristics of the car.Steel has high strength and reliability, but it is prone to corrosion, and the parts made of it, differ a fairly large mass.

In the automotive industry, the presence of rubber is seen in fluid transfer systems, body sealing systems, transmission systems, automotive antivibration, sealants, adhesives and coatings, molded parts, flat seals, foam and converting products, body parts, spare parts etc.The automobile industry is directly related to rubber industry. The growth of the industry and importance of rubber goes hand-in-hand. It is a known fact that 75% of rubber produced in the world is used in the production of tires.

Thus, car share prices may depend on share prices of materials that go into manufacturing one.

2. Review of Literature

a) Brown et al (Brown Jacqueline J, 2007) evaluated the behavior of consumers towards European, Japanese and the US cars. Their findings revealed that origination country, name of brand, price and status of supplier are important factors in customers' attitude. A company's status is very evidently depicted by the way its products are priced.

b) A study showed that rise in price of base metals globally has fuelled the attraction for metals stocks. Domestic metal names will report sequential decline in earnings led by lower prices, increased input costs and lower volumes.(Steel, 2016)

c) The study by Dr. Govind Shinde (Shinde D. G., 2011)analyzed the industry for the period of 2005 to 2010 and say that the Indian automobile industry has been able to sustain during the tough time of the recession and have had record breaking sales growth.

d) Arno Jambor(Jambor, 1997) studied that as the demand for cars rise in terms of comfort and safety measures, the weight of cars have risen compared to past. With development of every new car there has been improvement in considering demands of customers and also decreases weight of cars by making it lighter. Metals like aluminum, magnesium, plastics also help in reducing weight of cars. Cars can be made lighter only if proper materials are used.

e) Since cars are becoming fuel efficient the regular steel and cast irons are getting replies with aluminium and magnesium. Aluminum has the advantage of being used comprehensively in making lighter cars when converted into sheets(Cole, July 1995) found that when compared to steel aluminum is harder to blend but aluminium, magnesium et c. are replaced with other metals as they have the latent abilities in making structures lighter. They face challenges in reducing cost when these materials are used.

3. Scope of Study

This paper has evaluated the impact of rubber and steel industries on the automobile industry using the following listed stocks:

Steel Industry	Rubber Industry	Automobile Industry
Bhushan Steel	Ceat	Hindustan Motors
JSW Steel	Apollo Tyres	Tata Motors
SAIL	Goodyear	Maruti Suzuki

Tata Steel	MRF	Mahindra & Mahindra
Visa Steel	JK Tyres	Hero Motocorp

4. Research Design

1. Statement of Problem

As per a study by the Government, in 2015, 167 households out of every 1000 owned a car. The automobile industry is colossal and caters to several markets via domestic sales as well as exports. In the financial year 2017-18, 24.97 million cars were sold. The CAGR of automobile industry for 2013 to 2018 is 7.08%.For an industry that contributes over 7% to the GDP of the country, it is important to analyze what factors affect its sales.

In cars, steel is used to create the underlying chassis or cage beneath the body that forms the skeleton of the vehicle and protects you in the event of a crash. Door beams, roofs and even body panels created during auto manufacturing are made of steel on most cars today. Steel is also used in a variety of areas throughout the body to accommodate the engine or other parts. Exhausts are often made from stainless steel, for example.

2. Objective of Study

To study the impact of steel and rubber industries on the automobile industry using a portfolio of five stocks for each industry.

3. Sources of Data

Secondary data has been taken for the purpose of this research paper. The historical stock data has been collected from the following websites:

- http://www.bloomberg.com/asia
- http://www.moneycontrol.com/
- https://in.finance.yahoo.com/

4. Limitations of the Study

- Only five randomly chosen stocks have been taken into account for the purpose of this study.
- Automobile industry is affected by multiple factors; only two other industries have been considered.
- The time frame of historical data is 12 months which does not give a complete picture of the performance of the stock.
- This study does not use any other statistical tool apart from correlation and regression.
- It has been assumed that the prevailing political and economic circumstances are and shall be stable.
- Volatility of unexpected nature has not incorporated for.

- As the contract between automobile and rubber or steel companies are normally set well in advance, change in prices of steel or rubber industry might not impact automobile companies for manufacturing purpose to a great extent.

5. Hypotheses

Automobile and Steel:

H_0: There is no significant relationship between share prices of automobile and steel industry.

H_1: There is a significant relationship between share prices of automobile and steel industry.

Automobile and Rubber:

H_0: There is no significant relationship between share prices of automobile and rubber industry.

H_1: There is a significant relationship between share prices of automobile and rubber industry.

6. Data Analysis Tools

Correlation is a method of statistical evaluation used to study the strength of a relationship between two variables.

The value of a correlation coefficient can vary from minus one to plus one. A minus one indicates a perfect negative correlation, while a plus one indicates a perfect positive correlation. A correlation of zero means there is no relationship between the two variables. When there is a negative correlation between two variables, as the value of one variable increases, the value of the other variable decreases, and vice versa. In other words, for a negative correlation, the variables work opposite each other. When there is a positive correlation between two variables, as the value of one variable increases, the value of the other variable also increases.

Regression goes beyond correlation by adding prediction capabilities. Simple regression is used to examine the relationship between one dependent and one independent variable. After performing an analysis, the regression statistics can be used to predict the dependent variable when the independent variable is known. The regression line (known as the least squares line) is a plot of the expected value of the dependent variable for all values of the independent variable. Technically, it is the line that "minimizes the squared residuals". The regression line is the one that best fits the data on a scatter plot.

Using the regression equation, the dependent variable may be predicted from the independent variable. In the regression equation, y is always the dependent variable and x is always the independent variable. The coefficient of determination is the proportion of the variance in the dependent variable that is predictable from the independent variable.

5. Data Analysis

The data used for analysis consisted of daily share prices of five stocks of automobile, steel and rubber industry each. The absolute values of share prices were converted into change percentages for a more apt analysis. The daily average change of the five companies of each industry was calculated in order to arrive at an aggregate value for each industry.

These values were then used to find correlation of auto industry with steel and rubber industries.

Change Percentage= $\frac{P_1-P_0}{P_0}$

Correlation

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[\, n\Sigma x^2 - (\Sigma x)^2 \,][\, n\Sigma y^2 - (\Sigma y)^2 \,]}}$$

Regression (equation):

$$y = a + bx$$

where

y = the dependent variable

a = the intercept

b = the slope of the line

x = the independent variable

6. Findings & Interpretations

Correlation:

Correlation	Automobile
Steel	0.455259
Rubber	0.516072

The correlation value for both the industries with auto industry is around 0.5 which suggests that the automobile industry is moderately affected by steel and rubber industries. The positive values indicate that an increase in share prices of rubber and steel industry individually has an upward effect on automobile industry as well.

Regression Line:

The following equations were obtained:

(Auto) = -0.00001373 (Steel) + 0.00026237

(Auto) = -0.00001746 (Rubber) + 0.00156977

Hypothesis Testing:

ANOVA					
	df	***SS***	***MS***	***F***	***Significance F***
Regression	1	0.011185	0.011184562	62.74758	**0.00**
Residual	240	0.042779	0.000178247		
Total	241	0.053964			

Automobile and Steel:

H_0: There is no significant relationship between share prices of automobile and steel industry.

H_1: There is a significant relationship between share prices of automobile and steel industry.

As the p-value is less than 0.05, we reject null hypothesis; that implies there is a significant relationship between automobile and steel share prices.

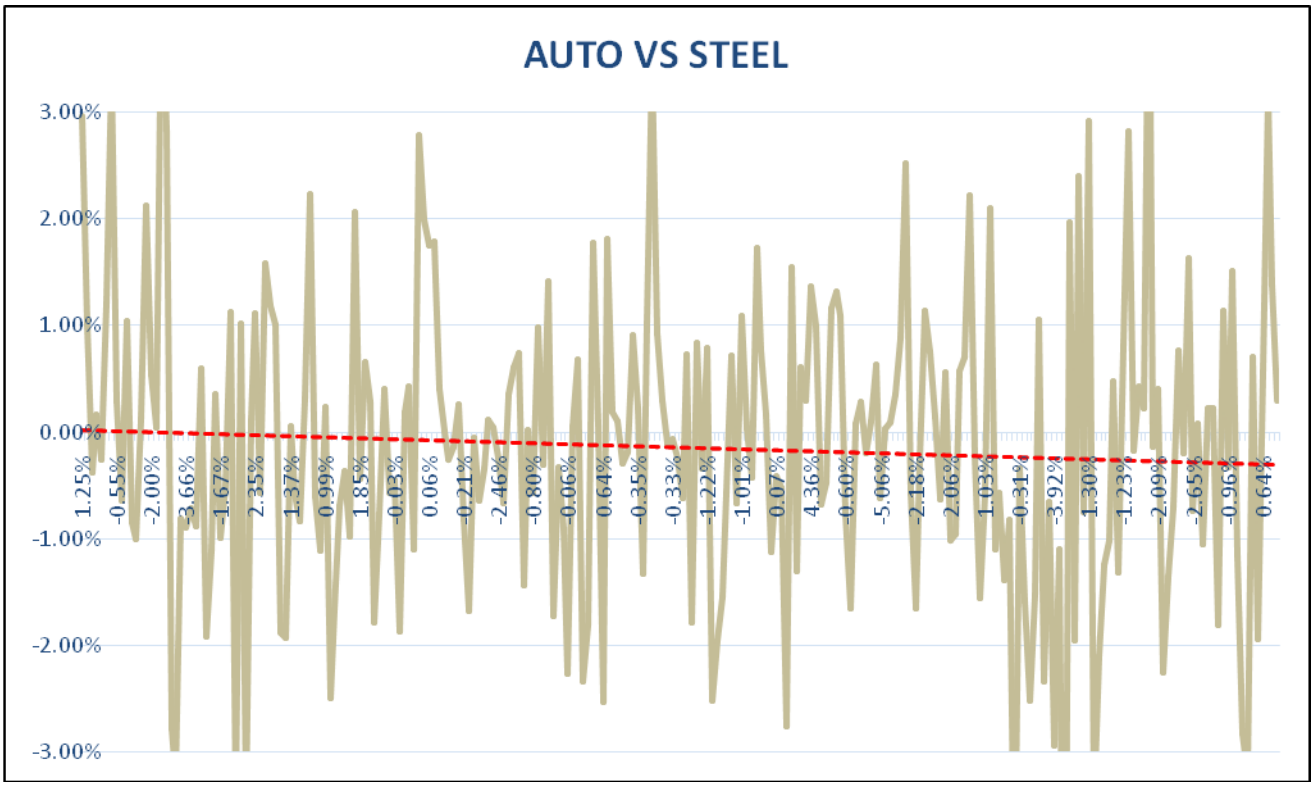
Automobile and Rubber:

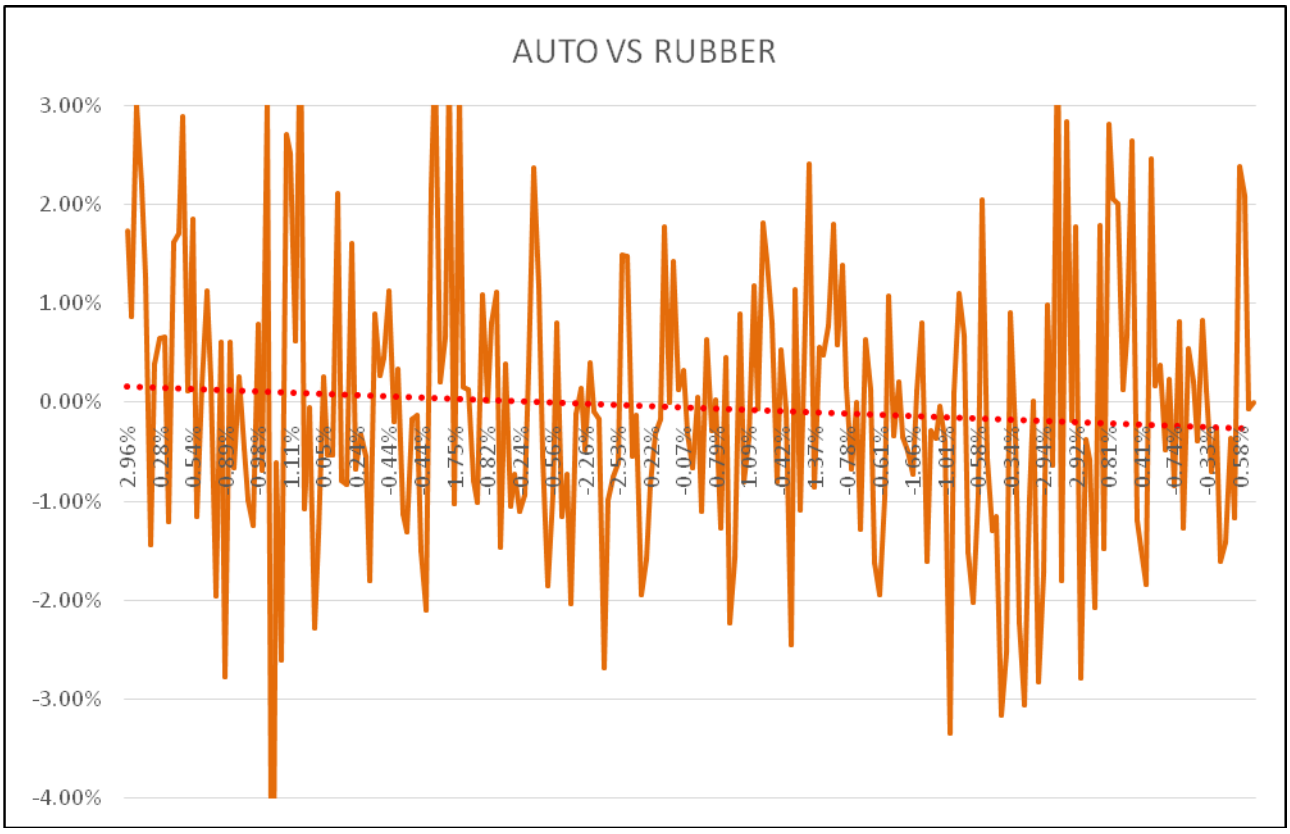
ANOVA					
	df	***SS***	***MS***	***F***	***Significance F***
Regression	1	0.014372	0.014372	87.12273	**0.00**
Residual	240	0.039592	0.000165		
Total	241	0.053964			

H_0: There is no significant relationship between share prices of automobile and rubber industry.

H_1: There is a significant relationship between share prices of automobile and rubber industry.

Similarly, for automobile vs rubber, the p-value is less than 0.05, hence, we reject null hypothesis. Therefore, thereis a significant relationship between automobile and rubber share prices.





7. Conclusion

It has been stated by expert analysts that automobile industry is currently seeing double-digit growth across all segments, and shall continue to do so in the coming years. In such a scenario, this analysis can be used for risk management and efficient return purposes. It is observed that

the impact of rubber and steel industries' stocks on automobile stocks is significant as stocks of steel and rubber are positively correlated to stocks of auto industry. Regression analysis

showed that there is a significant relationship between automobile and, steel and rubber industries' stock prices. Thus, simple statistical tools like correlation and regression analyses can be used to predict values and make one's earnings steady.

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