



International Conference of Sabaragamuwa University of Sri Lanka 2015 (ICSUSL 2015)

A study on the impact of industrial production index (IPI) to beverage, food and tobacco sector index with special reference to Colombo Stock Exchange

A.A.M.D. Amarasinghe

*Department of Accountancy & Finance, Faculty of Management Studies,
Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka*

Abstract

This study attempts to explore the impact of Industrial Production Index to sector performance of Beverage, Food and Tobacco in Colombo Stock Exchange Sri Lanka. Secondary data were used for the analysis. Sector index was taken from the Data Library of Colombo Stock Exchange and Industrial Production Index was taken from Annual Reports of Central Bank Sri Lanka. Monthly data were gathered from January 2002 to December 2014. For the time series data set, first, the stationary was checked using Augmented Dickey-Fuller and Phillips Perron Tests of E-views software. The results of stationary check show that the sector index is stationary at 1st difference in both ADF and PP tests. Industrial Production Index is stationary at 2nd difference in ADF test but 1st difference is stationary in PP test. Because of the seasonal trend in IPI 12th difference also considered and it is stationary in both ADF and PP tests. Granger Causality test was used to find out the causal relationship between variables. Results show the one way causality that the changes occurring in IPI will have an effect on changes in sector index. But changes in sector index will not have any effect on changes in IPI. Finally a regression was used to find out the relationship between variables. A Pearson Correlation coefficient was checked to find the correlation among variables before moving to the regression. Result of correlation test shows 84% higher correlation between variables and regression result shows a significant positive relationship among variables. The study concludes that Industrial Production Index will positively impact on Beverage, Food and Tobacco sector Index in Sri Lanka. It can be recommended that the changes occurring in the IPI be considered by Investors when they buy and sell stocks in BFT sector.

© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of International Conference of Sabaragamuwa University of Sri Lanka 2015 (ICSUSL 2015).

Keywords: Sector Return; Industrial Production Index (IPI); Granger Causality; Regression

* Corresponding author. E-mail address: malithamarasingha@yahoo.com

1. Introduction

Food and beverage sector of Sri Lanka plays an important role in terms of its considerable contribution towards the growth in Gross Domestic Product (GDP) of the country. Processed food & beverage industry has become a booming product sector during last few years contributing around 10% to the GDP. Sri Lanka is blessed with natural resources and climatic conditions from tropical to sub-tropical, suitable for a wide range of fruits & vegetables. The factors such as quality, taste and flavor which are unique to Sri Lankan products are associated with the intrinsic quality of resources available in different geographical locations of the country.

In Sri Lanka, Industrial Production (IP) measures the output of businesses integrated in industrial sector of the economy such as manufacturing, mining, and utilities. When calculating the IPI it is considered Food, beverage and tobacco products (46.9%), Textiles, wearing apparel and leather products (22.7%), Wood and wood products (0.9%), Paper and paper products (0.4%), Chemicals, rubber, plastics and petroleum (14.2%), Non-metallic mineral products (5.1%), Basic Metal Products (0.2%), Fabricated metal products (7.7%), and Products (not elsewhere states) (1.9%). IP in Sri Lanka increased 13.50 percent in December of 2014 over the same month in the previous year 2013. IP averaged 6.03 percent from 2002 until 2014, reaching an all time high of 35.20 percent in July of 2010 and a record low of -7.95 percent in September of 2012.

Investors believe that macroeconomic events occurring in the country have a great influence on volatility of the stock prices which implies that macroeconomic variables can influence investors' investment decisions and motivates many researchers to observe the relationships between stock returns and macroeconomic variables. Thus detecting the association between sector index and IPI has become crucial for the academicians, practitioners and policy makers.

Less research have been done to identify the relationship between Beverage, Food and Tobacco sector index with IPI. But numerous studies have been examined the relationship between stock returns and IPI. Malliaris and Urrutia¹, Maysamiet al², Errunza and Hogan³ found a significant relationship between stock returns and IPI while Humpe and Macmillan⁴ found a positive relationship. Some studies have shown a significant causal relationship between variables.

2. Methodology

2.1 Data and Data collection

This study attempts to investigate the relationship between IPI and sector market index in Sri Lanka. The data used in this study are sampled on a monthly basis over the period from January 2002 to December 2014. Sector Market Index is taken from Colombo Stock Exchange publications and IPI that are hypothesized to influence stock returns are obtained from the publications of Central Bank of Sri Lanka.

2.2 Development of hypotheses

In order to find the relationship between IPI and BFT sector index the following hypothesis is formed.

$$H_0: \beta_1 = 0 \text{ Vs}$$

$$H_1: \beta_1 \neq 0$$

β_1 = the coefficients of IPI

2.3 Econometric model

Time series data assumes that the underlying time series is stationary (Gujarati 2003). Therefore, prior to deciding on the appropriate model, the stationary of the variables are tested using unit root testing. There are a variety of unit root tests used in econometric literature principally Augmented Dickey-Fuller (ADF) test and Phillip-Perron (PP) test. In this study both unit root test were used to investigate whether the time series data used in this study are stationary or not.

Phillips and Perron⁵ test suggests a non parametric method of controlling for higher order autocorrelation in a series and is based on first order auto-regressive AR(1) process. It is applied Granger causality test⁶ to find out any causal relationship between stock prices and IPI.

Finally a regression was run to check the relationship between sector index and IPI, using following model,

$$Y = \alpha + \beta x + \varepsilon_t \quad (01)$$

Where Y considered as sector index and X denotes IPI. It is considered as $\alpha = 0.05$ which indicate the P value is in between 0.01 to 0.05. There 95% confidence level was expected.

3. Results, Discussion, Conclusion and Recommendations

This study attempts to explore the impact of Industrial Production Index to sector performance of Beverage, Food and Tobacco in Colombo Stock Exchange Sri Lanka. Secondary data were used for the analysis. Sector index was taken from the Data Library of Colombo Stock Exchange and Industrial Production Index was taken from annual reports of Central Bank Sri Lanka. Monthly data were gathered from January 2002 to December 2014.

Because of the time series data set, first, the stationary was checked using Autocorrelation Function of Minitab software and Augmented Dickey-Fuller and Phillips Perron Tests of E-views software. The results of stationary check show that the sector index is stationary at 1st difference in both ADF and PP tests. Industrial Production Index is stationary at 2nd difference in ADF test but 1st difference is stationary in PP test. Because of the seasonal trend in IPI 12th difference also considered and it is stationary in both ADF and PP tests.

Table 01 Result of Stationary Tests

Variables	ADF			PP	
	Level	1st Difference	2nd Difference	Level	1st Difference
Test Statistics					
BFT Sector Index	5.9870	-3.2154*		5.3905	-9.8104**
IPI	1.8684	-2.7692	-10.2832**	-0.7534	-19.9057**
Critical Values					
1 percent	-3.4728	-3.4746	-3.4771	-3.4728	-3.4731
5 percent	-2.8801	-2.8809	-2.8820	-2.8801	-2.8802
10 percent	-2.5767	-2.5771	-2.5777	-2.5767	-2.5768

Note: * Indicates stationary at 1% level, ** indicates stationary at 5% level

Granger Causality test was used to find out the causal relationship between variables. Results show one way causality that the changes occur in IPI will have an effect on changes in sector index because P value corresponding to F Statistic is significant (< 0.05). But changes in sector index will not have any effect on changes in IPI.

Table 02 Granger Causality Result

Null Hypothesis:	Obs	F-Statistic	Probability
IPI does not Granger Cause BFT	154	1.26052	0.28651
BFT does not Granger Cause IPI		3.30045	0.03958

Finally a regression was used to find out the relationship between variables. A Pearson Correlation coefficient was checked to find the correlation between variables before moving to the regression. Result of correlation test shows 84% ($P = 0.000$) higher correlation between variables and regression result shows a significant positive relationship between variables.

Table 03 Regression Analysis: BFT versus IPI

The regression equation is $BFT = -4328 + 44.0 IPI$						
Predictor	Coef		SE Coef	T		P
Constant	-4328.4	220.8	-19.60		0.000	
IPI	44.031	1.642		26.82		0.000

$S = 379.345$ $R\text{-Sq} = 85.5\%$ $R\text{-Sq (adj)} = 85.4\%$

Analysis of Variance						
Source	DF	SS	MS	F		P
Regression	1	103523593	103523593	719.40		0.000
Residual Error	122	17556141	143903			
Total	123	121079734				

Thus the study concludes that Industrial Production Index will positively impact on Beverage, Food and Tobacco sector Index in Sri Lanka. Investors who prefer to deal with stocks in beverage, food and tobacco sector are advised to consider the changes occur in IPI when they buy and sell stocks in that sector because any change occur in IPI will have an effect on beverage, food and tobacco sector index.

References

1. Malliaris AG, Urrutia JL. An Empirical Investigation among Real, Monetary and Financial Variables, *Economics Letters*, Elsevier 1991;37(2), 151-158.
2. Maysami RC, Howe LC, Hamzah MA. Relationship between Macroeconomic Variables and Stock Market Indices: Cointegration Evidence from Stock Exchange of Singapore's All-S Sector Indices. *Journal Pengurusan* 2004; 24, 47-77.
3. Errunza V, Hogan K. Macroeconomic Determinants of European Stock Market Volatility. *European Financial Management* 1998;4 (3), 361-377.
4. Humpe A, Macmillan P. Can Macroeconomic Variables Explain Long-Term Stock Market Movements? A Comparison of the U.S. and Japan. *Applied Financial Economics* 2009;19 (2), 111-119.
5. Phillips PCB, Perron P. Testing for a Unit Root in Time Series Regression. *Biometrika* 1988;75, 335-346.
6. Granger, CWJ. Investigating Causal Relations by Econometric Models and Cross Spectral Methods. *Econometrica* 1969; 37, 428-438.
7. Dickey D, Fuller W. Distributions of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association* 1979; 75, 427-431.