Relation between Export and GDP of India An Empirical Study of Post Liberalization Period (1990-91 to 2013-14)

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***Abstract*- Before 1990, India had many restrictions in Trade. The composition of India's foreign trade has undergone substantial changes, particularly after Liberalization. Export is a major part of foreign trade which contributes to GDP. In this paper we will find out the relation between Export and GDP of INDIA after liberalization (1990-91 to 2013-14).**

The main objective of this paper is to find out how GDP depends on EXPORT. Here, we have used secondary data over the years. By using some statistical tools we get a positive correlation between exports and GDP. So, as exports increase, GDP also increases. By using hypothesis testing we observed that the result is statistically significant at 99% and 95% confidence limit.

Keywords: Export, GDP, Post Liberalization, Economic growth.

I. INTRODUCTION

Most nations today focus on improving their quality of living. Higher GDP is a contributing factor for a nation to build a developed country. Increase in GDP reflects the economic growth of a nation. Export is a key component of GDP. The export-led growth hypothesis believes that export promotion through export subsidies and different measures leads to economic growth.

The export led growth hypothesis (ELGH) Postulates that export expansion is one of the main determinants of growth. It holds that the overall growth of the countries can be generated not only by increasing the number of factors of production within the economy but also by expanding exports. The Indian economy had gained considerable momentum over the last one decade before 2013, by achieving and sustaining an annual GDP growth rate over 7%.

Now let us look into the wide area of Agricultural Export, Manufacturing export and Service sector export.

Agricultural exports are largely unrestricted in India. However, a few items considered as essentials are prohibited like pulses and sugar (excluding the sugar that are subjected to a tariff rate quota in the United States and EC) to maintain domestic supplies of these products in order to keep the price at a reasonable level. Government has set up AGRI EXPORT ZONES in order to boost agricultural exports. These zones receive assistance from the central and state Government. Currently there are 60 agri export zones.

In the Indian context, exports of agricultural and allied products witnessed a decline in share from 19.4% in 1990-91 to 9.9% in 2013-14. This may be due to the fact that self-reliance has been taken into consideration in post liberalized scenarios. The share of the manufacturing sector thus increased during 1990-2000.

Service sector is not only the dominant sector in India's GDP, but has also attracted significant foreign investment flows, contributed significantly to exports as well as provided large scale employment. India's services sector covers a wide variety of activities such as trade, hotel, transport, storage and communication, financing, insurance, real estate, business services, community, social and personal services associated with construction.

In this paper we will discuss relation between export and GDP of India in post liberalization (after 1990).The economic liberalization in India refers to the economic liberalization of the country's economic policies, initiated in 1991 with the goal of making the economy more market and service oriented, and expanding the role of private and foreign investment. Liberalization has been credited by its proponents for the high economic growth recorded by the country in the 1990's and 2000's.

Before 1991, India was under a restricted economy. There were several restrictions on international trade. In this year the country faced a balance of payments crisis as a result of which a number of economic reforms were introduced to liberalize the economy. Several economists believe that the high growth rates that India has been enjoying are a result of increase in international trade. High exports enabled the economy to access international markets and better technology which in turn enhanced the growth rate.

This paper is an attempt to investigate the relation between export and GDP of India from the period 1990-2014 by using statistical tools.

The paper is organized as follows-

Section 1 is the introduction part which we have discussed above. In section 2 I review and discuss the literature on "The relation between EXPORT and GDP of India (post liberalization period)". Then section 3 provides data and methodology used in this study. Thereafter in the next section I have shown empirical results done by using various statistical tools and econometrics. Next section compels interpretation of the result. Conclusion part has been included in the last part.

II. OBJECTIVE OF THE STUDY:

The followings are the objective of the study

1) To understand the trend of export and GDP of India.
2) To analyze the agricultural sector, manufacturing sector and service sector exports.
3) To examine the effect of the increase in export on GDP.

III. LITERATURE REVIEW

We can say EXPORT directly contributes to GDP growth. Higher export leads to higher economic growth (Export Led Growth Hypothesis). Many economists have discussed the role of export in the GDP of the INDIAN economy. There is a wide body literature review analyzing the theoretical links between export and GDP.

Mukherjee & Mukherjee (2012) analyzed the performance of India's exports and the various factors which contributed to its growth. The study revealed that since the manufacturing sector generated large scale employment for low and medium skilled workers, it was imperative to develop features which would create a pleasant environment for industries to grow further.

Taneja (2010) analyzed the impact of the downturn of the world economy on the Indian Export sector, particularly the export of principal items and suggested a few strategies to promote India's exports for long term growth. The study found that India's merchandise exports after recording a steady growth of 33.7% during April-August 2008, witnessed deceleration in September 2008.Subsequently exports recorded a decline.

Veeramany (2007) "Sources of India's Export Growth in Pre and Post reform period". This article provided a brief review of the pace of India's export growth in pre liberalization (1950-1990) and post liberalization (1991-2006). The pace of growth was increased due to world demand after 1991, mainly focusing on years after 1993, because in that year the Government adopted full convertibility of the current account. The study of this article is divided into 3 parts. The first part provided a historic review of export performance before 1991.Second part provides detailed analysis of the export trend and pattern since 1993.Last part provides the export growth the acceleration in growth was mainly due to real effective exchange rate after 1991.

Marin (1992) through his analysis demonstrates that an "OUTWARD-LOOKING" regime enhances the productivity of a developed nation which in turn leads to higher economic growth.

Kaldor (1968) states that increasing returns to scale existing in the industry sector increase investment returns. Due to such features, the industry sector provides positive externalities in the economy in general and accelerates economic growth via this externality. The growth of the industry sector increases productivity not only in itself but also in other sectors with a

large range of facilities for division of labor. That is, Kaldor considers the industry sector as "GROWTH ENGINE". Kaldor maintains that growth in industrial manufacturing can be possible only through external demand with growth rate; that is, through export.

Vernon (1966) focused on the opposite causality channel in which self-propelled growth of the domestic economy leads to improved competitiveness and eventually to the expansion of export. Balassa (1985) and Bhagwati (1988) developed some of Vernon's ideas further and suggested bi-directional causation between export and growth.

IV. DATA AND METHODOLOGY:

SOURCE OF DATA:

The study is based on secondary data. The series of data from 1990-91 to 2013-14 has been collected from sources like Economic survey, RBI, planning commission etc.

ANALYTICAL TOOLS: -

In this paper we want to see the relation between exports and GDP of India. For this we will use some data and statistical tools. Our preliminary work is to see Export and GDP data over the time. To check that we will use correlation coefficients. here we have taken export as variable x and GDP as variable y so; the formula is as follows –

Correlation coefficient ($\square_{\square\square}$) = $\frac{\square\square\square\ (\square,\square)}{\square_{\square}\square_{\square}}$

This value is a measure of degree of association between two variables. For comparing two series of observations, it is sometimes necessary to determine whether they are associated or not, and to establish relations of cause and effect.

After that we want to see how the variable x is regressed on the variable y. To see that result we have to find the regression equation. Regression of a variable y on another variable x we mean the dependence of y on x, on the average. So, the methods of regression equation of y on x is,

$y - \underline{\square} = \square_{\square\square} (x - \underline{\square})$

or, $y = \alpha + \beta x$

Regression is used to denote estimation or prediction of the average value of one variable for a specified value of the other variable. That coefficient appearing in the regression equation of y on x is known as the Regression coefficient of y on x. The geometrical representation of linear regression equation is known as Regression line. This line is the "best fitting" straight line obtained by the Method of Least Squares.

Now, we will use Method of Least Squares to choose $\hat{\alpha}$ and $\hat{\beta}$ as estimates of α and β respectively, so that $Q = \sum_{\square=1}^{\square}(\square_{\square} - \hat{\square} - \hat{\square}\square_{\square})^2$ is minimum. Here Q is the sum of squares of the prediction errors when we predict $\square_{\square}$ given $\square_{\square}$ and the estimated regression

equation. Normally, we will want to reduce errors. So to minimize Q with respect to $\hat{\alpha}$ and $\hat{\beta}$, we equate its first derivatives with respect to $\hat{\alpha}$ and $\hat{\beta}$ to zero.

$\frac{\partial Q}{\partial \hat{\alpha}} = 0$

or, $\sum_{i=1}^{n} 2(y_i - \hat{\alpha} - \hat{\beta} x_i)(-1) = 0$

Or, $\sum_{i=1}^{n} y_i = n\hat{\alpha} + \hat{\beta} \sum_{i=1}^{n} x_i$

Or, $\bar{y} = \hat{\alpha} + \hat{\beta}\bar{x}$ .....(1)

And,

$\frac{\partial Q}{\partial \hat{\beta}} = 0$ or, $\sum_{i=1}^{n} 2(y_i - \hat{\alpha} - \hat{\beta} x_i)(-x_i) = 0$

Or, $\sum_{i=1}^{n} x_i y_i = \hat{\alpha} \sum_{i=1}^{n} x_i + \hat{\beta} \sum_{i=1}^{n} x_i^2$ .....(2)

These equations (1) and (2) are called the normal equations. Now, substituting the value of $\hat{\alpha}$ from equation (1) into equation (2), we get

$\sum_{i=1}^{n} x_i y_i = \sum_{i=1}^{n} x_i (\bar{y} - \hat{\beta}\bar{x}) + \hat{\beta} \sum_{i=1}^{n} x_i^2$

Or, $n\bar{x}(\bar{y} - \hat{\beta}\bar{x}) + \hat{\beta} \sum_{i=1}^{n} x_i^2$

Let us define,

$S_{xx} = \sum_{i=1}^{n}(x_i - \bar{x})^2 = \sum_{i=1}^{n} x_i^2 - n\bar{x}^2$

$S_{xy} = \sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y}) = \sum_{i=1}^{n} x_i y_i - n\bar{x}\bar{y}$

And

$S_{yy} = \sum_{i=1}^{n}(y_i - \bar{y})^2 = \sum_{i=1}^{n} y_i^2 - n\bar{y}^2$

Then equation (2) can be written as

$\hat{\beta} S_{xx} = S_{xy}$ or, $\hat{\beta} = \frac{S_{xy}}{S_{xx}}$

Hence the Least Square estimator of α and β are

$\hat{\beta} = \frac{S_{xy}}{S_{xx}}$ and $\hat{\alpha} = \bar{y} - \hat{\beta}\bar{x}$

So, the estimated errors or residuals are-

$$\hat{\varepsilon}_i = y_i - \hat{\alpha} - \hat{\beta} x_i$$

So, our main objective is to get the minimum value of the sum of residual i.e. the sum of residuals tends to be zero then this estimated value is best fitted.

The residual sum of squares (RSS) is given by,

$$RSS = \sum_{i=1}^{n}(y_i - \hat{\alpha} - \hat{\beta}x_i)^2$$

$$= \sum_{i=1}^{n}[y_i - \bar{y} - \hat{\beta}(x_i - \bar{x})]^2$$

$$=\sum_{i=1}^{n}(y_i - \bar{y})^2 + \hat{\beta}^2 \sum_{i=1}^{n}(x_i - \bar{x})^2 - 2\hat{\beta} \sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})$$

$$= S_{yy} + \hat{\beta}^2 S_{xx} - 2\hat{\beta} S_{xy}$$

But $\hat{\beta} = \frac{S_{xy}}{S_{xx}}$

we have

$$RSS = S_{yy} - \frac{S_{xy}^2}{S_{xx}} = S_{yy} - \hat{\beta} S_{xy}$$

Now, denoting new terms

S_{yy} = Total Sum of Squares (TSS)

$\hat{\beta} S_{xy}$ = Explained Sum of Squares (ESS)

Then ,

TSS = ESS + RSS

Now, coming to the problem of hypothesis testing, we want to test the hypothesis for the true value of $\hat{\beta}$. We know that $t_0 = \frac{\hat{\beta} - \beta}{SE(\hat{\beta})}$ has a t- distribution with (n-2) degrees of freedom.

To calculate SE $(\hat{\beta}) = \sqrt{Var(\hat{\beta})}$

$$= \frac{\sigma}{\sqrt{S_{xx}}}$$ here, σ is an unbiased estimator of σ.

Here, $\sigma^2 = \frac{RSS}{n-2}$

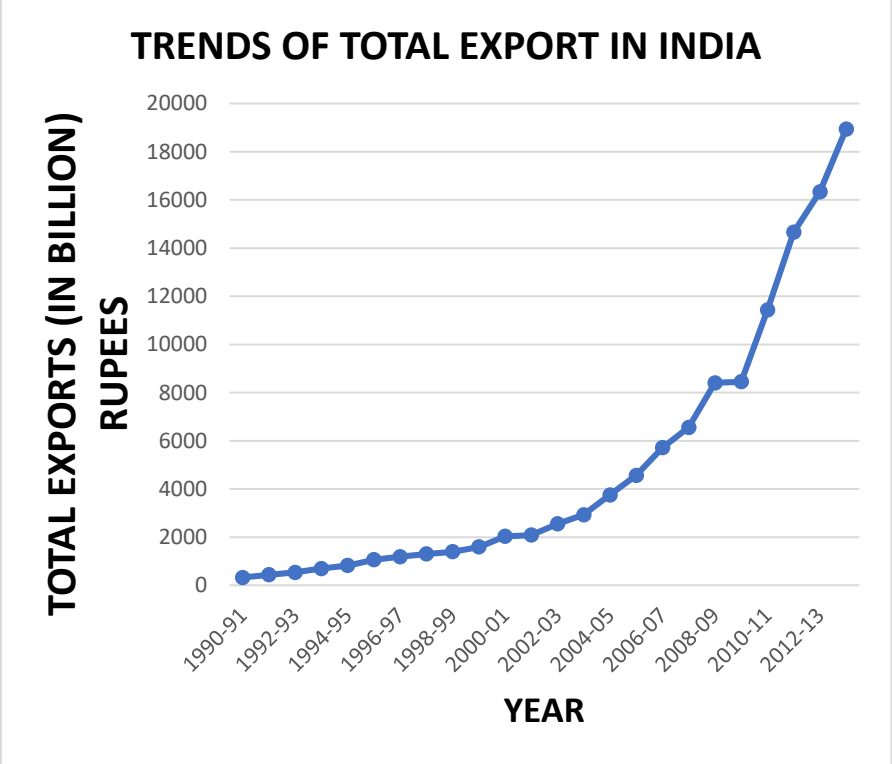
For this hypothesis testing the null hypothesis of no relationship between x and y is- H_0: $\beta = 0$ and we have to test it against the alternative hypothesis H_1: $\beta > 0$.

This hypothesis testing shows that our alternative hypothesis is accepted or rejected at $\alpha\%$ level of significance i.e. the tabulated value of $t_{\alpha,n-2}$ has to be compared with the observed value t_0. If null hypothesis is accepted then these variables have no relation. To check this with a certain confidence level we use this hypothesis testing.

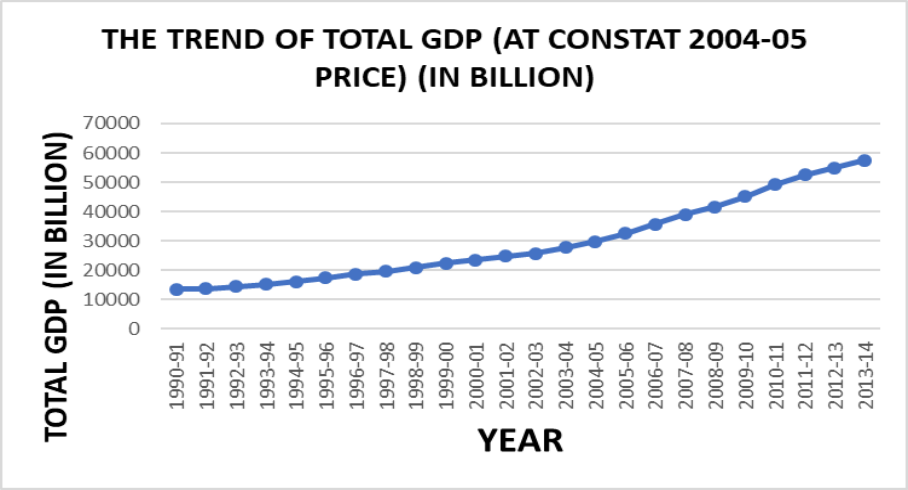
Here we have used Line diagrams to show the year to year data of total export and GDP. We use line diagrams in business and commerce, where data are shown in accordance with the time of occurrence. The line diagram shows by means of a curve or a straight line.

V. DATA ANALYSIS

Previously we have decided we will show the year to year data of total export and GDP from 1990-91 to 2013-14 (the post liberalization period).



(THE TREND PATTERN OF TOTAL EXPORTS OF INDIA) (source-RBI)



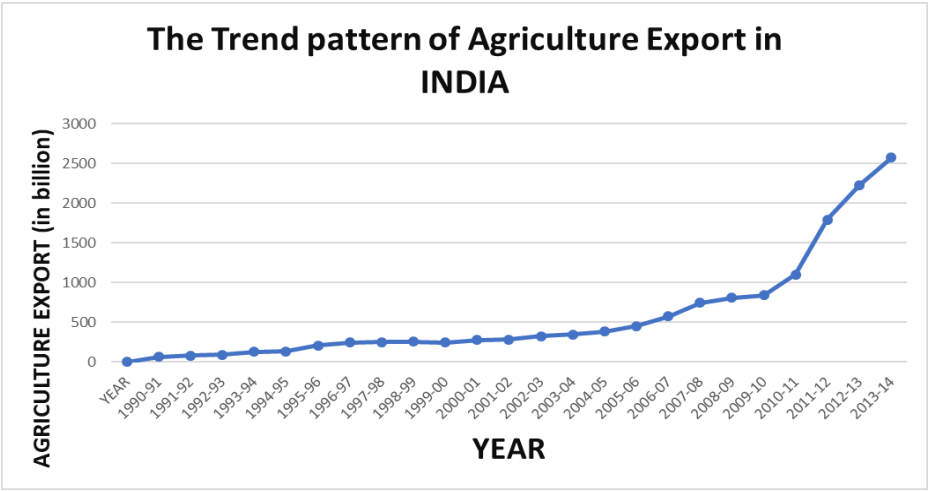
(THE TREND PATTERN OF TOTAL GDP OF INDIA)

(source- planning commission complete data book 2014)

Table-1 (for agriculture sector export) (SOURCE-RBI)

YEAR	AGRICULTURE EXPORT (in billion) (RUPEES)
1990-91	60.19
1991-92	78.95
1992-93	90.82
1993-94	126.33
1994-95	132.69
1995-96	203.44
1996-97	243.63
1997-98	246.26
1998-99	253.87
1999-00	243.63
2000-01	272.88
2001-02	281.44
2002-03	324.73
2003-04	346.16
2004-05	380.78
2005-06	452.2
2006-07	573.92
2007-08	742.09
2008-09	806.49
2009-10	841.36
2010-11	1102.96
2011-12	1795.3
2012-13	2227.42
2013-14	2575.59

From the above data table, we can see that agricultural exports rose rapidly after 1995. It rises from 132.69 billion to 203.44 billion and after that again there is a slowdown, it increases but less than rapidly. After 2005-06 again it started rising rapidly.



(source-Reserve bank of India)

Table -2 (for manufacturing sector export) (source-RBI)

YEAR	MANUFACTURING EXPORT (in billion) (RUPEES)
1990-91	233.19
1991-92	324.13
1992-93	406.6
1993-94	522.45
1994-95	640.67
1995-96	794.33
1996-97	873.33
1997-98	986.6
1998-99	1085.06
1999-00	1287.61
2000-01	1568.58
2001-02	1591.46
2002-03	1947.65
2003-04	2228.29
2004-05	2728.72
2005-06	3212.61
2006-07	3842.61
2007-08	4145.99
2008-09	5664.02
2009-10	5464.56
2010-11	7198.63
2011-12	8885.99
2012-13	9954.41
2013-14	11623.83

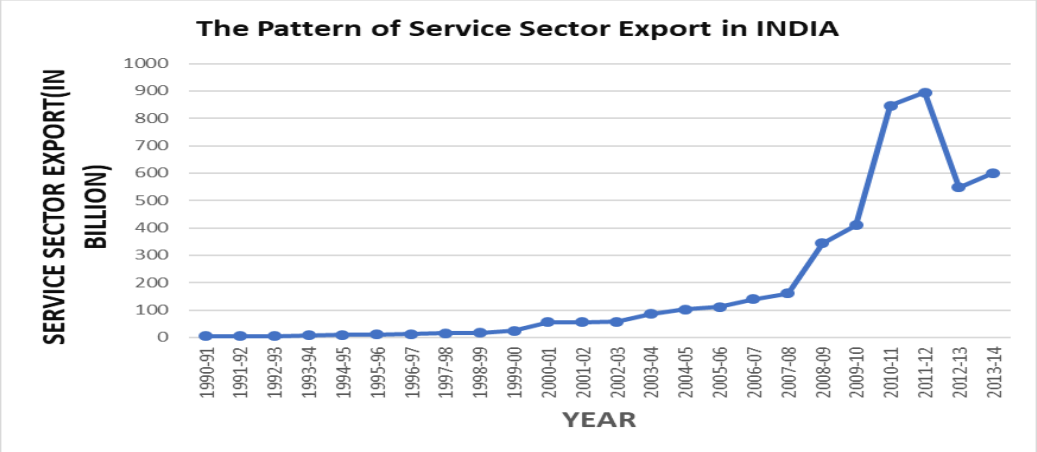
From the above data table we can see that manufacturing exports increased rapidly after 2000. In 1990-2000, majority of the joint venture buy-outs were by Indian partners, while in 2000-01, foreign partners acquired the Indian partner's stake in the joint venture. So FDI played a major role in boosting up capital formation in the manufacturing sector in India and export rises .

(source -Reserve Bank of India)

Table-3 (for service sector export) (source-RBI)

YEAR	SERVICE SECTOR EXPORT (in billion) (RUPEES)
1990-91	5.42
1991-92	4.19
1992-93	5.31
1993-94	8.41
1994-95	9.26
1995-96	11.28
1996-97	12.05
1997-98	15.6
1998-99	17.25
1999-00	23.61
2000-01	56.15
2001-02	56
2002-03	57.7
2003-04	86.4
2004-05	101.66
2005-06	111.16
2006-07	139.2
2007-08	161.47
2008-09	344.29
2009-10	409.45
2010-11	846.33
2011-12	893.66
2012-13	547.49
2013-14	600.92

From the above data table, we can see that the service sector suddenly rose rapidly after 2007-08 from 161.47 billion to 344.29 billion. After 2011-12 there was a drastic decrease in exports from 893.66 to 547.49.

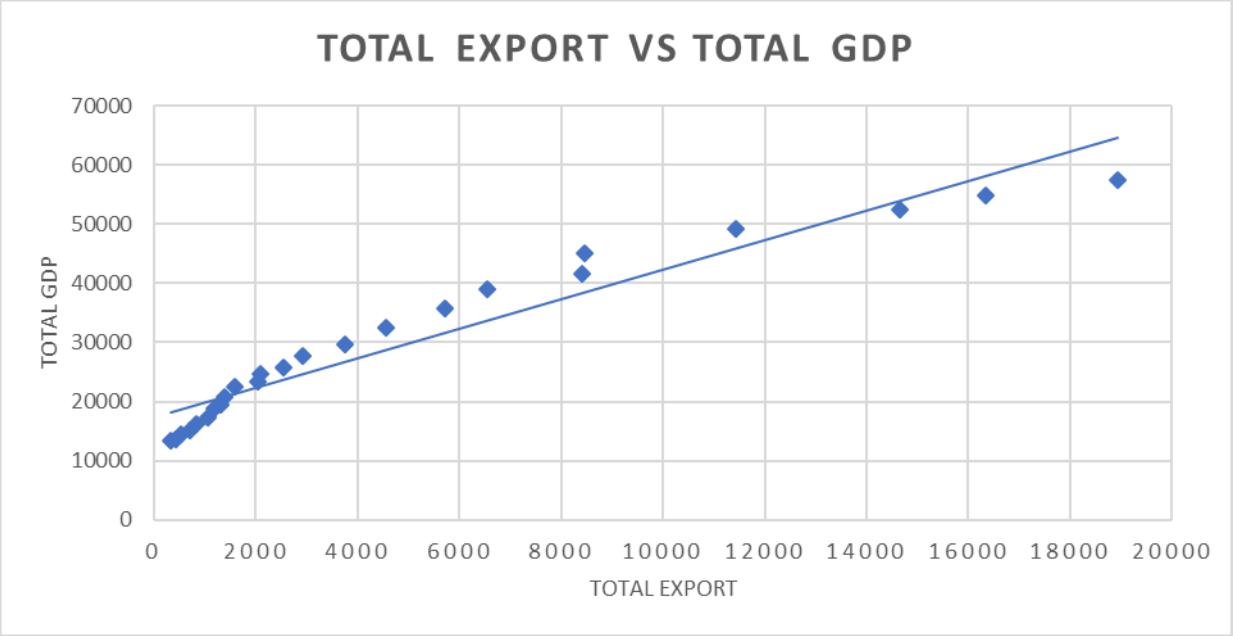


Our aim is to develop the relation between total export and GDP. For this we have already discussed the statistical tools that we used before. The correlation coefficient shows the relation between these two economic variables. We have taken export in x-axis and GDP in y-axis i.e. here EXPORT is an independent variable and GDP is dependent variable. Calculating this our result is as follows –

$r_{xy} = 0.96$ (Appendix-1)

This implies they are positively correlated i.e. if EXPORT increases GDP tend s to increase. As we know correlation coefficient lies between -1 to 1.

Now, the regression equation is, y = 2.49x + 17408.14 which shows how the variable y is dependent on x. The regression line is given below – (Appendix-2)



This regression line shows the linear dependency between TOTAL EXPORT and TOTAL GDP. Slope of this line implies the correlation coefficient i.e. the association between these two variables.

Here, $\sum_{=1}$ $= 0$ (by assumption)

For hypothesis testing we want to test the hypothesis for the true value of $\hat{\beta}$ using t-statistics.

The null hypothesis is $H_0 : = 0$ i.e. x (EXPORT) and y (GDP) has no relation against the alternative hypothesis is $H_1 : \beta > 0$ i.e. x (EXPORT) and y (GDP) is positively related.

$t_0 = 16.71$ (APPENDIX-3)

t_0 is the observed value from the testing of hypotheses. At 1% level of significance from t table we obtain the value of $t_{0.01,22} = 2.51$. This implies

$t_0 > t_{0.01,22}$

i.e. the observed value exceeds the critical value. Hence, we reject the null hypothesis(H_0) at 1% level of significance and accept the alternative hypothesis (H_1) for 99% confidence limits.

At 5% level of significance from t table we obtain the value of $t_{0.05,22} = 1.71$. This implies

$t_0 > t_{0.05,22}$

i.e. the observed value exceeds the critical value. Hence, we reject null hypothesis(H_0) at 5% level of significance and accept alternative hypothesis (H_1) for 95% confidence limits.

VI. CONCLUSION

The study attempts to answer the question whether there is any relationship between total export and GDP of India from the year 1990-91 to 2013-14 (post liberalization period). We have data on export and GDP of India from different sources like RBI, PLANNING COMMISSION and we empirically estimate the relation between the relationship between export and GDP. We also analyse the pattern of agricultural sector, manufacturing sector and service sector exports.

The result of this study reveals that there is a positive relation between total export and GDP. In this framework as we know they are highly positively related to each other so, as export increases GDP will also increase. So increased GDP will lead to economic growth in our country.

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