

**Relationship between Economic Growth and Fixed Capital of the
Manufacturing Sector: An Empirical Analysis of the North-Indian States**

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Abstract

Investment in the fixed capital is highly indispensable for the industrial development, which ultimately has a strong bearing on the growth of the economy. The main objective of the present study is to assess the impact of fixed capital on the economic growth of the manufacturing sector for the northern region in the post-reform period (1992-2014). The economic growth of the manufacturing sector at the sub-national level can be reflected by the Net State Domestic Product (NSDP) of the said sector for each state. The northern states have been selected specifically because of its significant sizable contribution in the growth of the Net State Domestic Product of the manufacturing sector. To study the relationship between the amount of fixed capital and the NSDP of the manufacturing sector, double log regression analysis has been conducted and elasticity coefficients have been calculated wherein, the state of Punjab has shown the highest elasticity followed by Himachal Pradesh. Additionally, all the elasticity coefficients came out to be statistically significant and the results indicate that among the five major north Indian states, the percentage of explained variations by the fixed capital in the economic growth was maximally reflected by Haryana followed by Rajasthan and Himachal Pradesh.

Keywords: Double Log Regression, Economic Growth, Fixed Capital, Manufacturing Sector

Subject Area under which the Research Paper is included: **Social Sciences**

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1. Introduction

Economic growth of any country both at the national and sub-national level is dependent upon the investment in physical assets such as tools, equipments, machinery, buildings, technology, etc, which ultimately leads to the capital formation. The accumulation of capital can be achieved through the investment in the fixed capital which is the initial fundamental step in the building up of a factory, corporation or a business unit. The term fixed capital is generally used for investment in fixed assets such as factories, units, tools, buildings, transport, machines etc., that normally have a life of more than one year (Ministry of Statistics and Programme Implementation, 2014). In the capitalistic economy, sizable attention has been accorded to the investment in the fixed capital as an important indicator of growth of an economy. Fixed capital basically brings in substantial addition to the productive capacity of organization at the micro level and at the level of the entire economy and thus can also be treated as a synonym to the growth in capital formation. Furthermore, J.M. Keynes in his landmark theory of “Investment multiplier” has specifically pointed out the multitude effect of investment on the economic growth via the manifold increase in the income (Song, Jiang, Song & Wang, 2013). The research evidence also has indicated that the investment in fixed capital is highly indispensable for the industrial development, which ultimately has a strong bearing on the growth of the economy (Ali, 2015) Therefore, in this context the present research work aims to evaluate and analyse the effect of fixed capital on the economic growth of the manufacturing sector for the northern region in India during the post-reform period. The five northern states namely, Haryana, Himachal, Punjab, Rajasthan and Jammu & Kashmir have been selected specifically selected because of its considerable large contribution in the growth of the Net State Domestic Product (NSDP) of the manufacturing sector. The NSDP has been purposely chosen in the present study as it is a standard indicator and proxy for economic growth in a particular economy or a specific sector. Using specialized statistical tool, the study has further attempted to assess the magnitude of the impact of fixed capital on the economic growth (NSDP) of the manufacturing sector during the time period under study.

2. Objectives

The present study aims to analyse the relationship between economic growth and fixed capital of the manufacturing sector for the north Indian states during the post reform period. The main purpose of the study is to assess the magnitude of the impact of fixed capital on the Net State Domestic Product (NSDP) of the manufacturing sector, which is an indicator of economic growth for each respective state for the time period under study.

3. Data Source and Methodology

In the present research work, the data with regard to gross fixed capital and NSDP of the manufacturing sector for each of the five north Indian states have been procured from reports of the “Annual Survey of Industry (ASI), Ministry of Statistics and Programme Implementation” for the period pertaining to the post reform era (1992 to 2014) of the Indian economy. Double log linear regression model has been used to study the impact of gross fixed capital on the economic growth of the manufacturing sector as represented by the NSDP of each state. The regression model has been explained in detail below:

$$\text{NSDP} = \lambda_1 \text{FC}^{\lambda_2} e^u$$

Taking log on both sides,

$$\text{LogNSDP} = \text{Log}\lambda_1 + \lambda_2 \text{LogFC} + u$$

$$\text{LogNSDP} = \alpha + \lambda_2 \text{LogFC} + u$$

Where,

NSDP is the Net State Domestic Product and the indicator of economic growth

FC represents Fixed Capital

λ_2 and α are the regression coefficients

The slope coefficient (λ_2) is in fact the elasticity coefficient which represents the percentage change in NSDP due to a given percent change in amount of the fixed capital. Further, the

overall significance of the statistical relationship between economic growth and fixed capital is tested by the F test and the value of “Adjusted R square” (Gujarati, 2004).

4. Results

Table 1: Results of the Regression Analysis between Economic Growth and Fixed Capital of the Manufacturing sector

States	Elasticity Coefficient	t – values
Haryana	0.529	24.073* (0.00)
Himachal Pradesh	0.559	11.404* (0.00)
Punjab	0.718	9.762* (0.00)
Rajasthan	0.631	13.648* (0.00)
Jammu & Kashmir	0.325	8.409* (0.00)

Note: * represents that the results are significant at 1 per cent level

Source: Computed from the data procured from ASI reports (several years)

Table 1 depicts the elasticity coefficients of the regression analysis between the NSDP and the amount of fixed capital of the manufacturing sector for five north Indian states in the post reform period. In the present context, the elasticity coefficients depict the percentage change in NSDP of the manufacturing sector for a given percentage increase in the amount of fixed capital in the respective state. The results of regression analysis are statistically significant for all the five states at 1 per cent level. The impact of fixed capital on the NSDP has been found to be highest for Punjab followed by Rajasthan and Himachal Pradesh, where increase in fixed capital has resulted in 71.8 per cent, 63.1 per cent and 55.9 per cent rise in the NSDP of the respective states. Further, it can be seen that amongst the north Indian states, the effect of rise in fixed capital on the economic growth as indicated by the NSDP has been recorded to be lowest for Jammu & Kashmir (32.5 per cent).

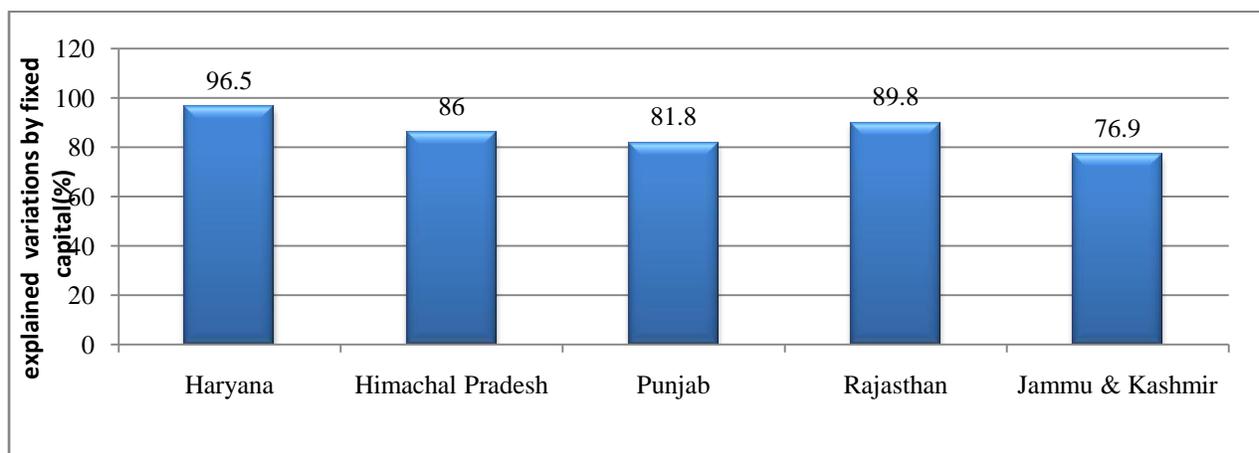
Table 2: Overall Significance of the Regression Relationship between Economic Growth and Fixed Capital of the Manufacturing sector

States	F- test Values	Adjusted R Square
Haryana	579.525 (0.00)	0.965*
Himachal Pradesh	130.061 (0.00)	0.86*
Punjab	95.294 (0.00)	0.818*
Rajasthan	186.262 (0.00)	0.898*
Jammu & Kashmir	70.715 (0.00)	0.769*

Note: * represents that the results are significant at 1 per cent level

Source: Computed from the data procured from ASI reports (several years)

The overall significance of the regression relationship between economic growth and fixed capital of the manufacturing sector has been shown in table 2. The F- values indicate that the regression relationship is overall statistically significant for each state. In the context of present research work, the adjusted R square explains the amount of variations in the NSDP of the manufacturing sector that are explained by the fixed capital. The adjusted R square values for each north Indian state are represented in the percentage form in the graph below.



Graph 1: Percentage Variations in Economic Growth as explained by changes in Fixed capital of the Manufacturing Sector

Graph 1 depicts the percentage of explained variations by the fixed capital in the economic growth of the in the post reform period for the five major north Indian states, whereby Haryana reflected the highest percentage of explained variation (96.5 per cent) followed by Rajasthan (89.8 per cent) and Himachal Pradesh (86 per cent).

5. Conclusion

In the backdrop of the multitude effect of investment on the economic growth in general, the present study has analysed the relationship between economic growth and fixed capital of the manufacturing sector for the north Indian states during the post reform period. The magnitude of the impact of fixed capital on the Net State Domestic Product (NSDP) of the manufacturing sector was assessed through the regression approach of the double log model. The results indicated that amongst the north Indian states, the effect of rise in fixed capital on the economic growth as indicated by the NSDP was recorded to be highest for Punjab and lowest for Jammu & Kashmir. The regression relationship was found to be robust as exhibited by the overall statistically significant F test values for each state. Since, the percentage of explained variations by the fixed capital in the economic growth was maximally reflected by Haryana, it can be deduced that the investment in fixed capital has a substantial effect on the growth of the manufacturing sector in this particular state.

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