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Abstract

The main aim of this work is to find the effects of rapid population growth on economic development in India. This is very important because India is second most populated country in the world and many studies show that India will overtake china soon based on the population growth rate in both of these countries. So the study of relationship between these variables may help the government to consider the effect of population growth on their policies in future.

This paper is mainly divided into five parts. In part 1, we try to make the reader familiarize with the existing works on this topic. Part 2 lists the variables which are relevant to show how population growth and economic development interact. In part 3, we will look upon how the developed countries have progressed and the interaction between these variables in those countries. In part 4, the relationship between these variables in the Indian context is looked upon and we also try to project the expected values of the variables concerned for the coming 20 years. In part 5, using the projected data and the case studies of developed countries, we try to suggest a few policies which can fasten the economic progress in the country. This paper ends with the conclusion and a few remarks.

Index Terms:

Population growth, Economic development, Economic progress, Developed and developing countries, Linear regression model.

Background:

Based on the history of all the developed countries, we can find that the human capital is a major component of growth. This can be basically said from the fact that resources required for economic growth are driven by the availability of human capital. Other positive affects of population growth are economies of scale, the possibility of increasing market for the goods produced in the country, and the new attitudes, ideologies, creativity they bring compared to the older population. But population growth may also have adverse affect on a nation's growth. This is because many resources has to be spent on the rising human population and it creates pressure on the limited natural resources a country has and diverts the

resources to maintain the capital than increasing the stock of capital per worker. Therefore the study of a relationship between these variables is important.

The actual evidence on the relation between population growth and economic growth does not lead to any uniform or standard conclusion. This just varies from country to country and something which is found in the past may not be applicable to the future. But there is a higher probability that history of a relationship between these variables in a country can predict the future relationship. So the focus on these variables in India is important. This paper is quite different from the other papers in terms of the variables used and the way the theories are explained.

Introduction:

Effect of Population Growth Rate on Economic development is one of the most debatable topic on earth. There are a lot of theories which show that rise in population has negative effect on both economic growth and development of a country. All these debates have started since Malthus proposed his theory in the book "Essay on the Principle of Population". He tried to find out the reason for diminishing returns in most of the countries and he said that Population growth is the major reason. His theory goes in as follows:-

- Population increases by compounding
- Food Production doesn't get compounded
- The new population will not get sufficient amount of food.
- Some adverse event(Starvation, crisis etc) causes decline in the population. Then this leads to food production and population coming back to the equilibrium.

There are generally three different types of views on how population effects the economic development of a nation. One, opposing the positive impact on economic development. Two, supporting the negative effect of economic development. Three, they believe that there is no relation between economic development and population growth.

Malthusian Population Trap is the main example for the theories which support negative impact. There are a few other theories which support the positive impact stating the importance of human capital on economic development in a country. This also rises from the fact that any growth in the economic development needs human capital as its main weapon and the rise in population can act as a provider of human capital. According to this view population growth is the real strength and power of a country. They also say that with higher population, we will have high labor force and this will help for creating labor diversity in the nation and in turn will help for the rise in output of a nation.

But there is a possibility of other way around too. This population rise can be a disaster if we don't use them properly. This

is the major problem with most of the developing countries face.

Both the stands of views present their arguments about population growth and economic development. Each of the views is supported both theoretically and empirically.

Objective:

The main objective of the study is to analyse the impact of population growth rate on economic development in India by doing the regression analysis of different variables which act as indicators for economic development and the population growth. Then we plan to compare the results with the other studies.

Literature Review:

Many researchers analyzed the relationship between economic and demographic variables in the past. Most of them has produced mixed results and they vary in their conclusions.. Professor Schultz used time series data of Sweden and produced the result that 25% decline in fertility is explained by 50% decrease in infant mortality rate.

Xiujian Peng (2002) examined the relationship between rise in the productivity of population growth and the labor divison. He found that the change is productivity is not explained by the growth of population. But he found that division in labour has increased the productivity. He also explained that the increase in population of a nation helps the improvement in division of labor in a country.

Kothare(1999) investigated the relationships between population growth and economic development of the indian economy. of 1988 to 1998. He concluded that India is one of the world's fastest growing economies, primarily due to the rise in population growth creating a positive effect on its long run economic growth. India is now ranked one of the top producers in agriculture and is a top nation in terms of GDP in a developing country. In many cases, economists are correct in saying that population growth has a positive effect on economic growth of a nation. In reality, economists might say, "If it weren't for its high populations India would still be a suffering developing nation.

Gill (1992) investigated the relationships between population growth and economic development for the economy of India. He concluded that population growth is good but up to some extent, while large population growth caused pressure on resources within the economy. Large population growth has negative impact on economic development.

According to Aguirre (1999), ―There are many debates going on the impact of huge population growth of a nation. The approach for almost all of them is different and their motivation is different too. A working knowledge of the parties and their underlying philosophies will allow one to shift through the diverse rhetoric and hold them up to the light of scientific data.

Indian Scenario

In India, the population has increased from 682.5 million in 1980 to 1259.695 million in 2015. Whereas the GDP in 1980 is 186 billion US Dollars and it has reached a new heights by getting almost close to 2 trillion dollars. Luckily in India, the rise in GDP has outsmarted the Population growth and this led to a positive progress in the country. But at the same time when we compare the progress of our nation with the other nations which were in level with us 30 years ago, we did let ourselves down. Most of the studies state that the continuous increase in the population of the nation has led to the slow growth rate of nation. But they do agree that the increase in population has led to the variety in labor. This variety in labor also led to the overall increase in productivity of the nation. So we just can't blame the population growth to be the main reason to slow the progress.

If we compare ourselves with the China, they also had a huge population rise but they are able to cope up with that and they created one of the top most economies in the world. The inefficiencies in the Government may be one of the reasons for slowing down the progress of our nation. So we considered the Corruption Perception Index as a variable in our model and we wish that this will produce some good results.

The low literacy rate may be one of the reasons for the slow economic growth of our nation and at the same time the unemployment in the nation also created a lot of chaos in the country. The government is unable to live up to the expectations and they didn't create enough employment opportunities in the nation. So we considered unemployment rate of the country as a variable.

Many studies have shown that economic freedom of a nation plays a key role in the growth of output of a nation and also in the economic progress. India has consistently performed badly in terms of economic freedom and the inefficiencies in the centralized implementation of rsources made it worse. So this can also be one of the reasons for slow performance of our nation. So we considered the economic freedom index also as an variable in our model.

Poverty and Inequality:

Poverty and income inequality are the direct as well as indirect result of the above mentioned factors. Thus rapid population growth is one of the important problems of India. For the betterment of the economy, if the population growth must be slow.

Pressure on Natural Resources: India was an agricultural nation for majority of the years in the past. The cultivable land and almost all other things depend on irrigation. Supply of both cultivable land and the water for agriculture became stagnant in India. But the population growth remained to be consistently high. So this increased the pressure on other factors too. Population pressures are alarming for arable land, forests and water resources. The size

of arable land has decreased due to population pressure, inadequate arable land reforms and inheritance patterns. Before the mid of this century, India is projected to face a scarcity of cultivable land and other resources. The projections also state that in another 150 years, India will face the scarcity of electricity and this will also lead to chaos in the nation.

Methodology

Different papers use different models to explain the theory. For our paper we are going to use the model of Sher Ali (2009).

$$Y = ß_0 + ß_1 PG + ß_2 UN + ß_3 HRD + ß_4 TOP + µ(F)$$

Y = GDP Growth

POP = Population growth

UN = unemployment rate

HRD = Human Resource Development

TOP = trade openness

µ = White noise error term

This research study has adopted the same model. But we made a few changes in the variables used. We replaced a few of those variables and included Unemployment rate, Corruption Perception Index, Foreign Direct Investment and Economic Freedom. Our model is of this form

$$Y = ß_0 + ß_1 PG + ß_2 UN + ß_3 FDI + ß_4 CPI + µ.$$

Y = Real GDP growth

PG = Population Growth

UN = Unemployment Rate

FDI = Foreign Direct Investment

CPI = Corruption Perception Index

NAT = Natural Resource Depletion

Data Source:

The data for this model are collected from different sources like Reserve Bank of India (RBI), National Sample Survey Organization (NSSO), Heritage, Population Census. We have used the regression analysis to find out the estimates of these coefficients. The World Bank data is also used to re-verify the data.

Results:

After the initial regression analysis, we have have found the following conclusions which are shown in the table below.

R Square	0.961307
Adjusted R Square	0.947488
Standard Error	136.0381
Observations	20

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	5	6436942	1287388	69.56459	2.2E-09
Residual	14	259089.3	18506.38		
Total	19	6696032			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-1368.22	1153.978	-1.18565	0.25543	-3843.26	1106.88	-3843.26	1106.88
X Variable 1	328.001	192.0778	1.70767	0.10971	-83.9649	739.968	-83.9649	739.968
X Variable 2	-493.409	137.7615	-3.58162	0.00306	-788.878	-197.94	-788.878	-197.94
X Variable 3	3.009302	0.750224	4.01127	0.00127	1.400233	4.61832	1.400233	4.618372
X Variable 4	6.874176	7.143433	0.96237	0.35223	-8.44697	22.1952	-8.44697	22.19532
X Variable 5	-36.9894	73.35758	-0.50423	0.62199	-194.326	120.3469	-194.326	120.3469

Where X1 is Corruption Perception Index

X2 is unemployment rate (yearly)

X3 is population (in million)

X4 is FDI inflows (in billion USD)

X5 is natural resource depletion (% of GNP)

Having a closer look at the p values, we had to omit the FDI variable and natural resource depletion, it's p value being much greater than 0.1 and hence it lead us to a model with three independent variables.

Natural resource depletion(% of GNP)

It is the sum of net forest depletion, energy depletion, and mineral depletion. Net forest depletion is unit resource rents times the excess of round wood harvest over natural growth. Energy depletion is the ratio of the value of the stock of energy resources to the remaining reserve lifetime (capped at 25 years). It covers coal, crude oil, and natural gas. Mineral depletion is the ratio of the value of the stock of mineral resources to the remaining reserve lifetime (capped at 25 years). It covers tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate.

Unemployment rate(% of total labor force)

Unemployment refers to the share of the labor force that is without work but available for and seeking employment.

Corruption Perceptions Index (CPI)

Since 1995,annually ranking countries "by their perceived levels of corruption, as determined by expert assessments and opinion surveys." The CPI generally defines corruption as "the misuse of public power for private benefit."

The CPI ranks around 177 countries "on a scale from 10 (very clean) to 0 (highly corrupt).

The regression is run again after omitting the variables FDI and Natural Resource Depletion. Now the regression results are in the table given below.

Regression Statistics	
Multiple R	0.978975
R Square	0.958393
Adjusted R Square	0.950591
Standard Error	131.9572
Observations	20

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	6417429	2139143	122.8497	2.94E-11
Residual	16	278603	17412.69		
Total	19	6696032			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-2050.5	862.0924	-2.37851	0.030181	-3878.05	-222.942	-3878.05	-222.942
X Variable 1	426.3572	160.9928	2.648301	0.01753	85.06782	767.6467	85.06782	767.6467
X Variable 2	-504.11	132.594	-3.80191	0.001566	-785.197	-223.024	-785.197	-223.024
X Variable 3	3.383108	0.63438	5.332938	6.73E-05	2.038283	4.727933	2.038283	4.727933

Where X1 is Corruption Perception Index

X2 is unemployment rate (yearly)

X3 is population (in million)

Conclusion:

Our analysis has shown that the population growth had a positive impact on the economic development in India. We can also find that Population Growth, Unemployment and Corruption Perception Index has explained 97.895% variation of Y. The p values are well below 0.05 and the multiple R^2 is 0.97895. Therefore the above three independent variables can be considered and they explain about 97.89% of changes in GDP and thus the final equation we obtained is:

Y = -2050.5+ 426.3572 CPI – 504.11 UN + 3.383108 POP.

From this we can say that for every unit increase in population, the GDP grows by 3.383108 units. This shows that Population growth has a positive impact on the economic development of India.

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