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Quality of Life and the Standard of Living - Insights from Indian Context

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Abstract

GDP per capita as proxy of Standard of living and life expectancy at birth as proxy of quality of life has been a thought provoking concern in the minds of researchers. In the Indian context the data for the period 1965-2015 hasbeen gathered, massaged and interpolated by the authors and has yielded plausible results. The authors investigated the problem and from the review of literature found that no empirical analysis if there from the Indian standpoint .The authors applied various econometric tools viz. unit root test , Co-integration and further putting in the vector correction model to capture both the short-and long-run behavior of the variables. In the short run, lagged changes in India's GDP per capita is not significantly associated with changes in life expectancy of people in India. The authors have concluded through the vector error correction model that per capita Gross Domestic Product and life expectancy have a significant long -run adjustment mechanism. The long run causality is directional for Indian government to significantly increase GDP expenditure ratio on health to achieve holistic growth of India but not just GDP per capita growth rate.

Keywords: Life expectancy, per capita Gross domestic product (GDP per capita), Johansen co integration test, augmented Dickey -Fuller Test (ADF) , Vector error correction model (VECM)

Introduction

Economic growth implies increase in a country's real output of goods and services over a period of time. While human development implies increasing the well- being of the people. The economic growth of a country is measured through GDP (gross domestic product) growth rate but to the extent the composition of output of goods and services benefits society and future generations is difficult to be determined. The proportion of GDP growth rate

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spend on education and health of the citizens is of great significance for all the stakeholders of the economy. Government expenditure on education, health, nutrition will result in healthy and educated people which in turn will be more productive. Thus productivity will accelerate the sustainable economic growth. According to Joseph Stiglitz(2001), impact of government policies need to be evaluated notin terms of higher GDP growth rate but what impact it has on our society in terms of measures of wellbeing. Income is one of the components, its acquisition makes people happy but it is just one of the components not all in itself. We need the matrix to measure whether that growth occurs is at sustainable level.Economist today believes GDP is not a good measure of social and economic well-being. According to Angel Gurria, Secretary General of OECD (2017), India needs to invest in its people, in their health and well -being, in their skills and opportunities. Because growth is inclusive if it is people centered that represents "the true wealth of a nation".

MattoCervellati (2009), in his research on life expectancy and economic growth has concluded that life expectancy of an individual has a significant impact on decisions regarding level of education among children. Increase in life expectancy leads to increase in the productivity of human capital, decrease in cost of production and increase in per capita income of the citizens. Increase in life expectancy with decrease in mortality rate may result in higher level of dependent population in the country hence human capital may become liability for the economy. With increase in population growth rate and overutilization of fixed factors the earning workforce productivity will decline Government through policy measures can invest in health services and reduce mortality rate. The lower mortality rate and better quality of education and health services can generate higher level of return with long term sustainability of growth rate. For educated parents better education of children is a yardstick of secured future and hence individual decides to have small family size. Higher education with better health conditions will enhance return on investment in education. But if decline in death rate is less than the birth rate, it will be difficult for earning member to educate children because it will be more profitable to make children work at a very young age rather than going for a higher education. With increase in GDP growth rate, increase in per capita income, increase in spending on health, better quality of education and lower level of death rate, India can effectively make young workforce more productive.

Literature Review

Angus Deaton (2003) hypothesized that the health is entirely determined by income, and the theory of mortality risk derived, establishes positive relationship between income and health of the people. In other words, lower level of income adversely affects investment in health. Investment in health is about accessibility and affordability to basic health services

for the family members and young child in the family. Healthy family can be more productive and will have better quality of life. Preston (1975)had conducted a study on cross section of countries for the successive three decades from 1900 to 1960 and had established strong correlation between life expectancy and per capita income. He found that per capita national income contribution to better health of the people was marginal but the major contributory factor for improvement in health of the citizens was research and development in medicine and higher government allocation on health services in the country. As Mckeown, (1976), raised fundamental issues of human well -being about important determinants of health and the efficient distribution of resources. The thought provoking article by Preston (1975) generated conventional theory and resulted in inception of policy discussion. He emphasized that higher economic growth cannot be associated with level of mortality rate in the country. But innovative health services can increase GDP growth rate of the country. There are evidences that citizens can have higher life expectancy despite of lower economic growth rate. Acemoglu and Johnson (2007) through their study have concluded that innovation at global level in health sector has contributed to transition in life expectancy , fertility rate and infant mortality rate but it did not significantly contributes to increase in per capita economic growth (Matteo Cervellate, Uwe Sund (2009)). At cross country level there is significant relationship between health services and higher level of income generation. François Bourguignon; Christian Morrisson (2002) have investigated the distribution of well- being among world citizens during the two centuries (1820 to 1992). The estimates depicted that inequality in longevity had increased during the 19th century, but then was reversed in the second half of the 20th century due to minimize the failure of income inequality to improve in the last decades. OdedGodor, OdedStartk (1993), have highlighted longer life expectancy encourages larger investments in human capital which in turn facilitates higher per capita income. It has been highlighted that economy where life expectancy is long and the transfer to offspring of the familial resources – land takes place late in life, individuals invest more in human capital formation than if life expectancy is short and the parental transfer takes place early in life. This is of great significance for agrarian economy like India. Hence keeping into consideration of significance of higher life expectancy, this paper tires in current economic scenario of India tries to analyze the impact of GDP per capita on life expectancy in India.

Theoretical framework

Many researchers through panel data analysis have established the relationship between economic growth and distribution of income for group of developing and developed countries butnegligible work has been done from a time series perspective to study the life expectancy and economic growth in terms of per capita income link for emerging economy

like India. In particular Indian economy is significant because of two reasons .Firstly, India is the fastest growing economy with respect to slowing world economy and has been considered as the only bright spot by International Monetary Fund and World Bank .The productive efficiency of India has undergone a transitional shift due to stable government, liberal economy and young population contributing significantly to standard of living and quality of life. Even after 1990 economic reforms, there is still low level of quality of life in terms of accessible health services in India and marginal increase in life expectancy of citizens, despite higher growth rate of 6% and above. Secondly, standard of life in terms of GDP per capita and quality of life in terms of higher life expectancy are important parameters of Human Economy and need to be analyzed from long term as well as short term perspective. The objective of this research paper is to explore these parameters by considering long term time series data from 1965 to 2015 of India's per capita gross domestic product growth rate and number of years of life expectancy since birth of Indians.

Chart 1: India's Life Expectancy at Birth

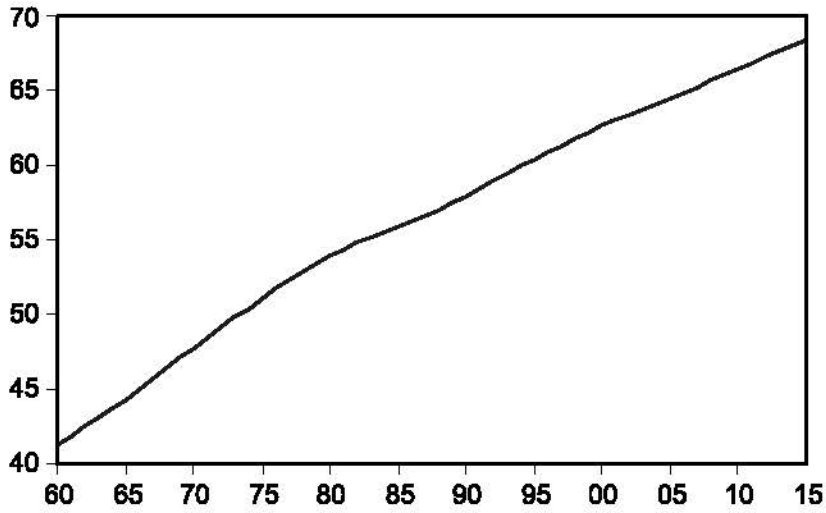
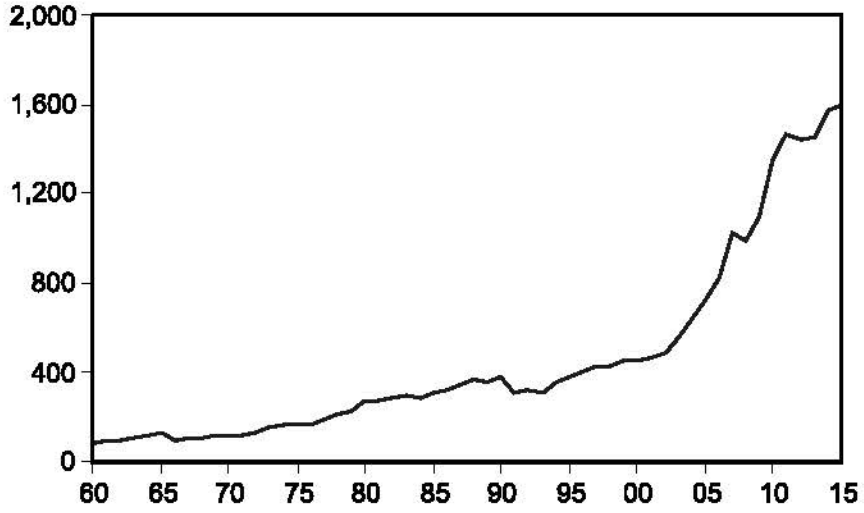


Chart 1: India GDP Per Capita in US$



Life expectancy seems to grow over time so adding a time trend may improve the fit of the model. India's GDP per capita moves together with Life expectancy and also grows over time.

Indian Economy and Life Expectancy

As per Census of India report, the life expectancy at birth in India has increased to 67.5 years from 20 years in 1920. The government of India in its new health policy 2017 has set a target of achieving 70 years of life expectancy by 2025. The Infant Mortality Rate (IMR) per thousand has decreased to 44 (2011) from 100 (1970) and the target is to reduce this figure to 28 by 2019. . At the same time with advancement in health care services the mortality rate under the age group of five years has declined to 55 (2011) from 200 per thousand (1970) and government is determined to further reduce it to 23 by 2025. But still the survival rate of children above 5 years is quite low and we need to enhance reach and awareness of health services to people at grass root level. The fall in post neonatal mortality has been greater than in neo-natal mortality, the government in its new health policy has proposed to reduce neo natal mortality rate and still birth rate in India. The rate of mortality under the age of five years among girls has been reported higher than boys in India. The negligence of girl child at young age and preference to a male child could be a possible reason of higher girl mortality rate in India. To achieve this target the government has proposed increase in public health facilities by 50% from current levels by 2025.Antenatal care coverage to be sustained above 90% and skilled attendance at birth above 90% by 2025. The proposal to increase the percentage of GDP expenditure on health care sector by almost double the amount by 2025

as well to increase State sector health spending to greater than 8 percent by 2020 will facilitate the process of reduction in fertility rate, mortality rate and improvement in quality of life in India. Establish primary and secondary health care facility as per norms in high priority norms.It is worth to note that increase in GDP with increase in per capita of income is not an indication of better quality of life but if government of India with higher level of GDP will increase percentage of GDP expenditure on better health services in India than only we can achieve sustainable and inclusive long term economic growth. Hence through this paper authors have tried to capture movements in Life expectancy based on GDP per capita.

Data and Source

World Health organization (WHO) guidelines defines life expectancy as average number of years that a newborn is expected to live with respect to the present mortality rate. The twoparameters taken into consideration for the study are quality of life, proxied by number of years of life expectancy at birth (total in men and women) and standard of living proxied by the annual growth rate of GDP per Capita. The growth rate of Gross Domestic Product (GDP) per determines the economic development of the country. The levels of GDP per capita are obtained by dividing GDP at current prices by the population. The data has been obtained from the World Bank's online Database (World Bank International Comparison Programme Data Base, Meta Data)over the period 1965 to 2015.The software used for analysis by the authors is Eviews version 8.0.

Model Specification

The authors have applied a Vector Error Correction Model (VECM)toanalyze the co-integration relationship of standard of living as proxy of growth of GDP per capita) on quality of life as proxy of life expectancy in India during 1965-2015. The VECM is an extension of the Vector Autoregressive Model (VAR) for variables that are stationary in their first I (I) or second difference I (II). The proposed assumption in the present modelis the presence of at least one long-run co-integrationvector among the variables and the value of the dependent variable can be defined asa function of preceded values of the dependent variable, preceded values of the independentvariable and error term as follows:

LE = f (LIFEEXP (-1) , LIFEXP(-2) ,..., LIFEXP(-n) , GDPPC (-1) , GDPPC(-2) ,..., GDPPC(-n) , e)

Equation one depicts relationship between life expectancy (LIFEXP) as a dependent variable as a function of its lagged values and lagged values of independent variable (per capita Gross Domestic Product (GDPPC)) and e as the error term. By applying two lagstructure to get linear combination of two series the model has been proposed as the following linear relation:

(2) LIFEEXP= β1LIFEEXP (-1) +β2LIFEEXP (-2) +β3GDPPC (-1) +β4GDPPC (-2) +β5e +c

Empirical Results

The present empirical study, applying econometrictools tries to find the stationary ofthe variablesin time series data and to further analyze the co-integration between the variables. Thus to test the stationary of the variables in level, ADFUnit Root Test has been applied using Eviews-8, the results are shown in Table 1.

Table 1: The results of ADF Unit Root Test for Life Expectancy

Levels	Independent Variable	Adjusted T-statistics	Critical Value at three level of significance			Probability
			At 1%	At 5%	At 10%	
Constant	LIFEEXP	-2.932385	-3.562669	-2.918778	-2.597285	0.0485
Linear Trend	LIFEEXP	-2.438700	--4.148465	–3.500495	-3.179617	0.3562
None	LIFEEXP	0.009069	-2.611094	-1.947381	-1.612725	0.6811
First difference Constant	LIFEEXP	0.728632	-3.562669	-2.918778	-2.597285	0.8302
Linear Trend	LIFEEXP	-2.490474	--4.148465	–3.500495	-3.179617	0.3314
None	LIFEEXP	-1.768293	-2.611094	-1.947381	-1.612725	0.0732
Second Difference Constant	LIFEEXP	-4.704022	-3.562669	-2.918778	-2.597285	0.0003
Linear Trend	LIFEEXP	-4.657895	--4.148465	–3.500495	-3.179617	0.0024
None	LIFEEXP	-4.345253	-2.611094	-1.947381	-1.612725	0.0000

Source : Authors Compilation

The results indicate that for the variable Life expectancy (LIFEEXP), the null hypothesis of non-stationarity cannot be rejected at any reasonable level of significance; same is true for first difference. Hence we accept null hypothesis of unit root at first difference. The t - statistic at constant in second differenced is 4.704022 which is greater than the critical value 2.918778 at p value .0003 (less than 5%) and at linear trend (t-statistic is 4.657895 > critical value 3.500495 at p .0024) as well as in case of None also t-stat (4.345253) is greater than critical value (1.947381) at p value .0000.Therefore ADF Unit Root Test for variables in 2nddifference is applied. We reject the Null hypothesis of unit root series and accept the alternative hypothesis.

Table 2: Results ofADF Unit Root Test for GDP Per Capita

Levels	Variables	Adjusted T-statistics	Critical Value at three level of significance			Probability
			At 1%	At 5%	At 10%	
Constant	GDPPC	3.649050	-3.562669	-2.918778	-2.597285	1.0000
Linear Trend	GDPPC	0.757009	–4.148465	–3.500495	-3.179617	0.9996
None	GDPPC	5.873700	-2.611094	-1.947381	-1.612725	1.0000
First difference Constant	GDPPC	-5.121050	-3.562669	-2.918778	-2.597285	0.0001
Linear Trend	GDPPC	-6.167198	–4.148465	–3.500495	-3.179617	0.0000
None	GDPPC	-1.129323	-2.611094	-1.947381	-1.612725	0.2320
Second Difference Constant	GDPPC	-8.263984	-3.562669	-2.918778	-2.597285	0.0000
Linear Trend	GDPPC	-8.177276	–4.148465	–3.500495	-3.179617	0.0000
None	GDPPC	-8.343501	-2.611094	-1.947381	-1.612725	0.0000

Source : Authors Compilation

The results indicate that for the variable per capita GDP (GDPPC), the null hypothesis of non-stationarity cannot be rejected at any reasonable level of significance; same is true for first difference. Hence we accept null hypothesis of unit root at first difference. The t - statistic at constant in second differenced is 8.263984 which is greater than the critical value 2.918778 at p value .0000 (less than 5%) and at linear trend (t-statistic is 8.177276 > critical value 3.500495 at p .0024) as well as in case of None also t-stat (8.343501) is greater than critical value (1.947381) at p value .0000.Therefore ADF Unit Root Test for variables in 2nddifference is applied.

Above ADF operation reveals that GDP per capita and Life expectancy are stationary at second difference. So we have used second differenced data of GDP and Life expectancy as VAR or VECM model requires stationary data. Engle R. E, CWJ Granger (1997), the granger causality test indicate the existence of a long-runrelationship between the variables if they are stationary at the level. To establish the co-integration between timeseries variables, using Eviews-8Johansen (1988) Co-integration Test has been applied to examine the long-runrelationship between GDP per capita and life expectancy

Table 3: Results of Johansen (1988) Co-integration Test for variables

Hypothesized		Trace Statistic	Critical Value at 0.05 level of significance	Probability**
No. of Co-integrated Equations	Eigenvalue			
None *	0.624594	52.42002	15.49471	.000
At most 1	0.009266	0.493393	3.841466	0.4824
**MacKinnon-Haug-Michelis (1999) p-values				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.624594	51.92663	14.2646	.000
At most 1	0.009266	0.493393	3.841466	0.4824
**MacKinnon-Haug-Michelis (1999) p-values				

Source : Authors Compilation

According to the Table 3, Johansen`s trace statistic52.42002 is greater than criticalvalue 15.49471 at the 0.000 level which indicates that there is at least one long-run co-integrationvector among the variables with the certainty of more than 95%. This provides thebasis of using estimation methods. As mentioned earlier, in this paper we have employedVector Error Correction Model (VECM) using Eviews-8 to estimate the model which theresults are shown in Table 4.

Table 4: Results of Vector Error Correction Estimates for variables

	Coefficient	Std. Error	t-Statistic	Prob.
C1 (error Correction Term)	-0.00095	0.000117	-8.08855	.000
C2	1.884718	0.027129	69.47125	.000
C3	-0.95946	0.026421	-36.3147	.000
C4	5.53E-06	9.66E-06	0.572619	0.5696
C5	3.33E-06	9.76E-06	0.34136	0.7344
Constant	0.036028	0.003637	9.906884	.0000
R-squared	0.99933	Mean dependent var		0.489267
Adjusted R-squared	0.999259	S.D. dependent var		0.117762
S.E. of regression	0.003205	Akaike info criterion		-8.54191
Sum squared resid	0.000483	Schwarz criterion		-8.31886
Log likelihood	232.3607	Hannan-Quinn criter.		-8.45614
F-statistic	14030.79	Durbin-Watson stat		0.75092

Source : Authors Compilation

Based on the estimated coefficients, the general linear relation can be described as follows:

$$D(LIFEEXP) = -0.00095^{*}(LIFEEXP(-1) + 0.00208254559713^{*}GDPPC(-1) - 57.5869016316) + 1.884718^{*}D(LIFEEXP(-1)) - 0.95946^{*}D(LIFEEXP(-2)) + .0000053^{*}D(GDPPC(-1)) + .0000033^{*}D(GDPPC(-2)) + 0.036028$$

The error correction term (C1) or the speed of adjustment towards equilibrium, the coefficient of the co-integrating equation is -.00095 and is significant at less than 5 percent level of p value. Hence we can say there is along term causality runningfrom GDP per capita to Life expectancy. Further to find short term causality Wald Test has been performed.

Table 5: Short Term Granger Causality Wald Test Result

Wald Test:			
Test Statistic	Value	df	Probability
F-statistic	0.256058	(2, 47)	0.7752
Chi-square	**0.512116**	**2**	**0.7741**
Null Hypothesis: C(4)= C(5)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(4) (coefficient of GDPPC (-1)		5.53E-06	9.66E-06
C(5) (coefficient of GDPPC (-2)		3.33E-06	9.76E-06

Lagged value of coefficients in each equations are zero i.e.restrictions are linear in coefficients.Since the granger test follows chi-square distribution hence we follow chi square result. AsC4 and C5 are zeroand p-value is 77.41 percent i.e. greater than 5 percent, hence wecannot reject the null hypothesis and accept the null hypothesis thatthere is no short run causality running from per capita gross domestic product to life expectancy.

Conclusion and Implications

This paper examines the long term and short association of standard of living and quality of life in India.To achieve the research objectives, the variables introduced are the per capita GDP growth rate and life expectancy at birth. Themodel proposed in research has been estimated via Vector Error Correction Model (VECM) and Granger Causality Test by using Wald Test.ADF Unit Root Test for variables showed that per capita gross domestic product and life expectancy both the variables have unit root at level and first difference and were found stationary after second differencing (Table 2). Based on the results ofJohansen (1988) Co-integration Test for research variables, the long term co-integration (Table 3), between per capita GDP and life expectancy has resulted at 95 percent was found. Based on the results of Vector Error Correction Estimates for variables(Table 4), the coefficient of the co-integrating equation is -.00095 and is significant at less than 5 percent level of p value. The tendency for long-runequilibrium relationship among the research variables has been proved with negative sign of error correction coefficient, depicting long term convergence of two variables. Also long term co-integrating equation depicts positive co-integration of GDP per capita and life expectancy in India with one percent increase in GDP per capita leads to 0.00208254559713 percent increase in Life expectancy at birth.The findings show thateconomic development has a positive and significant impact on life expectancy in India during the period of 1965 to 2015, so that one percent increase in per capita GDP growth rate has led to approximately .0000053 percentrise in number of years of life expectancy in the next period and 0.00003 percent rise in number of years of life expectancy in the next two periods. But there is no short term impact of increase in GDP per capita on life expectancy in

India. The proposed policy measures through this research paper implies that the government of India has to increase percentage of budget allocation as percentage of GDP growth rate on health services in India so that the poor and rural population can have easy access to affordable health services. India in era of digital and structural transformation can increase per capita income of the country by investing in health of people, increasing life expectancy, lowering fertility rate and investing at higher level in human capital .It canhelp the country to achieve sustainable long term growth. The short term returns from expenditure on health services cannot be evaluated in terms of better quality of life of the citizens but in the long term country can have more productive and efficient work force. The inclusive GDP growth rate of the country can lead to inclusive and sustainable growth with better health services in India at affordable price.

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Appendix

	LIFEEXP	GDPPC
Mean	56.31799	456.8841
Median	56.82478	313.087
Maximum	68.34856	1593.258
Minimum	41.17195	83.79468
Std. Dev.	7.95008	426.7445
Skewness	-0.27331	1.512446
Kurtosis	1.940595	4.130753
Jarque-Bera	3.31597	24.33333
Probability	0.190523	0.000005
Sum	3153.808	25585.51
Sum Sq. Dev.	3476.207	10016098
Observations	56	56

Source : Authors ' calculations