

# ANALYZING THE CAUSAL RELATIONSHIP BETWEEN SELECTED MACRO-ECONOMIC VARIABLES AND HAPPINESS INDEX: EMPIRICAL EVALUATION FROM INDIAN ECONOMY

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## ABSTRACT

*Happiness index represents the personal, social and national wellbeing of a country evaluated on the basis of non-economic parameters viz. health, education, freedom, cultural resilience, psychological wellbeing, governance, living standard etc. The current study covers another dimension by investigating the causal relationship of happiness index with selected economic variables. It includes- Happiness Index as 'dependent variable' and Unemployment Rate, GDP Per Capita, CPI and Government Consumption Expenditure as 'independent variables'. Yearly data from 2010 to 2019 have been taken for the analysis. Augmented Dickey Fuller (ADF) of unit root test is applied on each time series data, Johansen Co-integration Test is used to check long run association of time series data and Granger Causality is used for estimating causal relationship among the variables. The findings reveal, GDP\_PC and GCE Granger cause happiness index of the country, whereas CPI and UR doesn't. All four variables show short run relationship with HI and proved to be crucial economic variables for predicting happiness index of the country.*

**Keywords:** Happiness Index, Granger Cause, Economic Variables, Causal Relationship.

## Abbreviations

GNHI- Gross National Happiness Index  
 ADF- Augmented Dickey-Fuller  
 SIC- Schwartz Information Criterion  
 GDP\_PC– Gross Domestic Product Per Capita  
 GCE- Government Consumption Expenditure  
 CPI- Consumer Price Index  
 UR- Unemployment Rate  
 HI- Happiness Index

## INTRODUCTION

### Conceptual Background

Countries happiness index is calculated ever year by national and international agencies to demonstrate the level of peoples' happiness of a particular country. Usually, the gross national happiness is measured through peoples' actions and reactions in the society and their belief of how the society is for living? Technology becomes a strong platform of measuring social participation of individual and their wellbeing. The most prominent domains of measuring GNHI are- social and psychological wellbeing, social security, social freedom, education, health, religion resilience, governance, occupation autonomy, environment etc Morton & Edwards (2012). These are being considered as the most important factors across the world and many researches have also been done using them. But, there are various researches indicating crucial role of country's economic indicators in deciding GNHI which are- rate of unemployment, income distribution, economic growth of the country, rate of inflation, GDP per capita, government expenditure, etc. Lang (2012). Studies indicating towards the significant role of these economic variables on peoples' wellbeing that reflect happiness. Which means, somehow these economic variables have direct and indirect relationship

with GNHI of the country. The current study basically follows the same theme and studying the causal relationship between selected economic variables and happiness index- with special reference to Indian economy.

### A Quick Look at India's Happiness Ranking

According to the 'World Happiness Report 2019' India ranked at 140<sup>th</sup> position which is far behind from its neighbor countries including- Pakistan, Nepal, Bangladesh, Sri Lanka etc. These countries are way behind from India in various economic terms, but people are found happier there than India. Here, question arises, how and in what sense they are happy? The fundamental economics shows different picture in reality, these nations are economically poor comparing to Indian economy, then, what makes these countries happier? The question is quite interesting. Despite, a rapidly growing economy, Indian happiness index couldn't grow Solanki (2019). Its position is quite volatile in nature (according to the report) and almost every year it changes like- 2015- 117<sup>th</sup> position, 2016- 118<sup>th</sup> position and 2017- 122<sup>nd</sup> position etc. According to the UN World Happiness Index, in the year 2020 India slipped to 144<sup>th</sup> rank out of 156 countries surveyed whereas Pakistan ranked 66<sup>th</sup>. The biggest reasons found by Forbes India were income distribution and poverty, India has never come out from these problems. Rich are getting richer and poor are getting poorer, the unequal income distribution affects qualitative indexes of the country which directly hits happiness and wellbeing. Hence, on qualitative issues India beaten by its neighbor countries and ranked poor year after year.

### Determinants of Gross National Happiness

Many developed countries rank very low despite having huge development in quantitative terms. The happiness index of a country is majorly determining by subjective elements which are more of psychological than physical Cummins (2012). Ranking significantly affected by both subjective and objective attributes of the country. For better understanding and clear differentiation below table 1 is prepared-

<b>Subjective Determinants</b>	<b>Objective Determinants</b>
Living Standard- resources availability, access to material, equality, sharing etc.	GDP- Total GDP, Growth, Consistency
Education- Quality, Availability, Variety, Standard, Demand etc.	CPI- Inflation Rate, Difference between CPI and WPI, Trend
Health- General Health, Hygiene, Supporting Factors	Govt. Investment on Consumption- Plan, Area Covered, Frequency of Investment
Environment- Pollution, Air Quality Index, Resource Utilization, Public Access	Unemployment- Rate of Unemployment, Employment disparity across the regions
Community Vitality- Togetherness, Belongingness, Volunteerism, Sharing	GDP Per Capita- National domestic production per person
Time-Use- Work Activity, Enjoyment, Leisure	FDI/FII- Infuse foreign capital in economy, Facilitate investments into required sectors
Psychological Wellbeing- Satisfaction, Feel Accomplished, Optimism	IIP- Total Industrial Production which facilitate products for domestic demand
Governance- Govt. Functions, General Trust, Transparency, Corruption	Stock Market- Represents country's sectors performance and strength
Cultural Resilience- Cultural Freedom, Recognition, Diversity, Acceptance	Interest Rate- Represents industrial and consumers' cost of capital

Economic variables although represents the country's situation in economic terms but there is a disparity among economists and philosophers for this theory. Economic indicators though reveal country's power but it doesn't reach out to everyone. For instance, per capita income of India in PPP terms shows 7680 \$, but actually it doesn't, because income of few richest people mislead the average earning of the country. Therefore, role and importance of per capita become meaningless Mishra (2017). Therefore, majority of countries follow Bhutan's model of happiness wherein mental health and wellbeing is given more weightage to happiness than income. But, there is always conflict between economic researchers and philosophical researchers. Economic factors like GDP with its growth carry other parameters like- generate employment, reduce poverty and unemployment etc Perovic & Golem (2010). Economic factors

undoubtedly play significant role in country's happiness index although its impact may not be measured directly from low income individuals. Hence, happiness responses differ in the same country when it is collected from two different income group individuals.

## REVIEW OF LITERATURE

This section collect results and findings of studies conducted on related topics and areas to justify the extension of topic along with its relevance in current scenario. The study is being carried out with respect to seeing the India's latest happiness ranking during 2020 which fallen significantly comparing to few previous consecutive years. By collecting literature evidences on role, importance and impact of economic variables on happiness and economic prosperity the study trying to portray real situation of India's happiness status. Some important literature reviews are presenting as follows:

The study Bhattacharyya et al. (2019) shows the key learning points of keeping happiness across the nation from Denmark which is being consistently ranked among top five happiest countries in the world surveyed by United Nations. Though, the study elaborated the significance of various subjective attributes but it is also very crucial the source of these attributes. For example, psychological wellbeing, health, education, good governance etc. all it comes from economic activities. Without economic indicators such subjective attributes cannot be assumed. May be people cannot relate it with these parameters but fundamentals of economics cannot overlook the functions of important economic factors. The researcher presented declining position of India in world happiness ranking despite being a world's largest and fastest growing economy. The GDP growth during 2019 was slacked to below 5% and continuous to early 2020. This could be one of the potential reasons of India's position drops in happiness survey. Author revealed that, GDP per capita was reduced from 0.792 to 0.721 in 2018 along with other subjective variables studied. It shows, how GDP per capita contributes to social prosperity which in turn appears in people's happiness. It facilitates goods for basic necessity and increase social satisfaction Mahajan (2019).

The study collected different subjective parameters from happiness scale and observed their relation with happiness index. Even though, these variables are subjective in nature but their existence strictly derived from economic variables. Parameters like- environment, governance, social resilience, education, health etc. all comes from economic performance of the nation. Without strong GDP, FDI/FII, IIP etc. such social prosperity is hard to assume. Therefore, macroeconomic variables are equally important for happiness Jency (2019). Further, the study discussed various subjective variables which are prominent in measuring happiness status of the respondents. For example, 'life expectancy' is one of the important measures, the author argued, without adequate medical facilities and advancement how 'life expectancy' can be increased. It comes out of country's earning ability and economic performances. It doesn't mean that other subjective parameters are not so important but indirectly economic factors have great significance Sachs et al. (2018). Another research examined and presented the impact of macroeconomic factors on happiness. The study opined that, economic factors like GDP per capita and government expenditure have significant and positive correlation with happiness. Authors also revealed that, favorable condition of various subjective indicators also depends upon various economic factors. Inflation and rate of unemployment shows negative but significant relationship with country's happiness status. Therefore, to ensure happiness in the society favorable condition of various economic parameters is advisable Abounoori & Asgarizadeh (2013).

## Purpose & Hypotheses

### Objective

Research purpose represents the basic foundation of the research by stating specific objectives. The primary purpose of the research is to determine (if any) whether selected economic variables have causal relationship with country's happiness index (ranking)? Can we consider them for predicting happiness ranking of the country? Are they relative and having cause and effect relationship? Also, the study would identify the potential reasons of why & why not these variables affect country's happiness index or ranking.

### Hypotheses

Following research hypotheses are derived from the literature review and primary objectives of the current research-

$H_{01}$ : Rate of 'unemployment' doesn't Granger Cause country's happiness index.

$H_{02}$ : GDP Per Capita doesn't Granger Cause country's happiness index.

$H_{03}$ : CPI doesn't Granger Cause country's happiness index.

$H_{04}$ : Government's Consumption Expenditure doesn't Granger Cause country's happiness index.

## Method and Material Description

The current research includes various empirical approaches to test different time series data for 'stationarity, co-integration and causal relationship' among them. First, the study conducted 'unit root test' for each data series to check data stationarity. Second, test for co-integration is conducted to examine long run relationship between two data series. Third, Granger Causality test is applied to study causal relationship between various economic variables and happiness index of the country. Time series data on selected variables are included for the period of 10 years from 2010 to 2019. Yearly data is selected as the happiness ranking is available on yearly basis only.

Granger Causality Test follows the following procedure-

### Test of Stationarity and Lag-Length Finding

To ensure that the time series data are stationary in nature and the shocks (trend or seasonality) are temporary 'unit root test' is applied. Augmented Dickey-Fuller (ADF) test is performed on each data series with the help of designing hypothesis viz.

$H_{01}$ : All data series has unit root.

Lag length selection is also subject to statistical approval to perform causality test between two long run time series. The current study adopted 'Schwartz Information Criterion (SIC)' for Lag length selection. Appropriate Lag length is important to maintain test effectiveness as too many lag lengths may reduce power of the test. More lag length increases the 'degree of freedom' which affects estimation power of the test. Therefore, multivariate forms of SIC is employed to determine adequate lag length for the ADF test.

**Test of co-integration between data series-** Co-integration is a mandatory aspect of Granger Causality Test, it examines the long run linear relationship between two or more data series. Johansen co-integration test for examining long run association between series is adopted. It is presented by following hypothesis-

$H_{02}$ : No co-integration present in data series.

**Test of Causality-** Granger Causality Test between each economic variables and happiness index is calculated using bivariate method. In this step, VAR model is generated while testing 'Granger Causality' using Wald test. It helps to have linear restrictions among variables used in the causality test. Number of lags is determined using SIC.

## Material Description

Yearly data is obtained from various authenticated data sources like- mospi.gov.in, data.worldbank.org, data.gov.in etc. The time series data of selected economic variables like- unemployment rate, GDP per capita, Government Consumption Expenditure and CPI is collected for analysis. The cross sectional analysis would provide direction of thinking towards association of economic variables with happiness index of the country. The sectoral data analysis may also indicate about its long run linear association and causal relationship with happiness index. If the

analysis finds causal relationship among them one can use these variables to predict happiness ranking of the country. Also, country can target desired position at global happiness index by controlling these variables.

## RESULT

### Augmented Dickey-Fuller Test (Unit Root Test)

$H_{01}$ : All data series has unit root

Time series data must fulfill requirement of stationarity to further apply causal relationship, co-integration or auto-regression test. The null hypothesis  $H_{01}$  is found to be rejected. The P value for each ADF test is found less than 0.05 at 5% level of significance. The below table 1 represents the calculated value of ADF test for each data series Table 2.

Data in levels			Data in first differences		
Variable	t-statistic	p-value	Variable	t-statistic	p-value
CPI	-2.511	0.143	CPI	1.314	0.040
GDP_PC	-2.536	0.145	GDP_PC	1.167	0.048
GCE	1.946	0.998	GCE	-1.097	0.039
UR	2.051	0.095	UR	-2.265	0.041
HI	-0.522	0.617	HI	-1.656	0.018

Source: Author Preparation.

The ADF test is found to be significant at 5% level of significance for all data series. The P value for all time-series data falls under the rejection area i.e.  $<0.05$ . The above table 1 represents the test statistics wherein p value for CPI = .04, GDP\_PC= .048, GCE= .039, UR= .041, HI= .018 etc. The null hypothesis  $H_{01}$  stands rejected. The test reveals that, all data series has no unit root, data series are stationary in nature and meet statistical requirements for causality test.

### Johansen Co-Integration Test

$H_{02}$ : No co-integration present in data series.

The primary requirement of adequate data series for causality test is checked through ADF test which were found integrated by order 1 and allow the study to perform co-integration between variables. The below table 2 represents the calculated values with description of each variable Table 3.

Variables	Data of Trace Statistics		Data of Eigen Statistics	
	Trace Statistic	P Value	Eigen Statistic	P Value
HI v/s CPI	31.429	0.001	28.157	0.000
HI v/s GDP_PC	16.418	0.036	16.382	0.022
HI v/s GCE	22.011	0.004	13.892	0.057
HI v/s UE	21.903	0.004	21.588	0.002

Source: Author Preparation.

P values for all four combinations are found significant. The null hypothesis  $H_{02}$  found to be rejected at 5% level of significance. The test indicates that, there is a co-integration exist between HI and all economic variables viz. CPI (.001), GDP\_PC (.036), GCE (.004) & UE (.004). The bivariate variables are found linearly associated with each other and long run integration is present. Trace statistics are considered in which sig. values are fall under the rejection

area and made the tests significant. The presence of co-integration depicts that at least one-way causal relationship exist between series, hence, series are statistically eligible to perform Granger Causality test.

### Result of Granger Causality Test

Granger causality test is applied on 'Log values' of all data series, log values are used to stabilize the variance of series. The study taken yearly data for 10 years (2010-2019), hence, the scores are less in numbers to perform causality test with adequate number of lags. Result shows both significant and non-significant causal relationship among variables. The null hypothesis H01 is not rejected at 5% level of significance, that indicate no significant relationship exist between HI and UR. Unemployment rate doesn't influence happiness index and become a weaker economic variable to predict it. The p value is found to be  $0.589 > 0.05$  (greater than 5%) and the test is said to be not significant. The null hypothesis H02 is rejected, p value is found  $0.044 < 0.05$ . The test is found significant and indicate that GDP\_PC has causal relationship with HI. GDP per capita is a prominent economic variable to predict happiness index of the country. The third hypothesis H03 cannot be rejected as its sig. value is calculated  $0.431 > 0.05$ . The test is found not significant at 5% level of significance, and shows no association between the variables.

CPI (inflation) is not a strong economic variable which can predict happiness index for the economy. The fourth null hypothesis H04 is found rejected at 5% level of significance with p value of  $0.037 < 0.05$ . The casual relationship of HI and GCE found significant, which indicate that government consumption expenditure is an important predictor of happiness index. Two economic variables viz. 'GDP Per Capita and Government Consumption Expenditure' do Granger Cause HI, whereas, 'CPI and UR' doesn't. The detailed discussion of the result with literature evidences is given in next section i.e. discussion.

## RESULTS & DISCUSSION

The study found GDP\_PC Granger Cause HI, it is always debatable that what is more important GDP or Happiness? The study Ellsmoor (2019) discussed about the significance of GDP\_PC to economic health of the country and citizens' wellbeing. It is a great indicator of peoples' living standard within an economy. Although, it has mixed results, depending on the functions of other macroeconomic variables causal relationship and its predictive power differ country to country. In current study, it shows significant association with happiness index. Granger causality is found in one direction which means GDP\_PC Granger cause HI, but HI doesn't Granger cause GDP\_PC. The result also supports to the findings of Emmanuel & Dipietro, (2006) which opined that GDP per capita is a fair means of measuring happiness status of the society. It denotes amount of goods and services produced by the country per person during one financial year. Hence, from Indian context, it can be said that, GDP\_PC can predict/influence the happiness index of the country.

Government consumption expenditure or government spending play crucial role in societal happiness result also support to this concept, GCE Granger cause HI. Happiness is a byproduct of good governance and government's spending on resource availability and social development. In a cross country survey found that government spending has relative effect on citizens' happiness level Ram (2009). Social wellbeing and prosperity are relative to government's spending. It is a significant variable which leads to subjective wellbeing of the society. The study has been carried out a panel data research on 183 countries to investigate the relationship between government expenditure and happiness. It is proven that, it has both direct and indirect effect on social happiness through positive transformation of income, employment, education, equality, resource sharing, economic growth etc. Therefore, GCE can be considered as an important measure of predicting happiness index of the country.

Happiness is subjected to both 'objective and subjective wellbeing'; these are defined through economic development, healthcare system, education, employment, income etc. CPI (inflation) is a strong factor which leads to unapproachable conditions to these objectives. Current study finds CPI as weaker predictor to happiness index in India context based on 10 years of yearly data on CPI and HI. Economists believed that, inflation and happiness are inversely relative, rise in inflation eat up peoples' savings and make income short to meet expenses. But, this relation doesn't show uniformity, it varies country to country. Strong economies don't experience much impact on its happiness ranking. Nominal rise in consumer price index get easily absorbed by the market as other economic factors are stronger than CPI increase. General phenomenon is that, higher CPI leads to low life satisfaction which negatively affects the

subjective wellbeing of the society, thus result into low happiness index Blanchflower et al. (2014). But here in this case, CPI is not proven to be a strong parameter to predict happiness index.

Unemployment rate predominantly influence social wellbeing and life satisfaction of an individual. In current study, statistics doesn't prove any association or cause and effect relationship between UR and HI. In case of India, with reference to yearly statistics on both the variables doesn't shows influencing power to each other, that means, unemployment rate do not lead to happiness index. It may be because many authors believed that, unemployment is voluntary in nature and people tend to be jobless in certain situations Ohtake (2012). It is due to disequilibrium in wage rate in labor market. Lower wage leads to unemployment but it may not create unhappiness. Author Oswald (1997) found in his empirical research that, unemployment and happiness have negative relationship. Similarly, in current study no relationship is found and concludes that unemployment doesn't leads/influence happiness index of the country.

## CONCLUSION

### Reasons, Why GDP\_PC & GCE influence Happiness Index of India? -

Both the terms are correlated with each other in positive manner. Government spends huge money on resources building and making needed goods and services available in the country. With this view, government's expenditure directly and indirectly influences GDP per capita. It represents the availability of goods and services to the citizens for consumption. Hence, countries wherein GDP per capita and government consumption is higher it helps to predict happiness index of that country. The type of relationship many vary country to country it means for some economies the relationship may be of short run and for others it may be for long run relationship. For current study, the relationship is identified for short run for both the economic variables.

### Reasons, Why CPI & Unemployment Rate doesn't influence Happiness Index of India

CPI is a negative term to economists as well as the economies. Statistics reveal inflation rise in the economy, but for developing economies where cost advantage to labor oriented production viz. agriculture, fish & fisheries, dairy farming etc. neutralize its effect. It means, inflation appears big in percentage but its actual effect is not much in the economy. Despite high inflation rate in India, food and other basic consumables are quite affordable, whereas for many countries CPI and HI experienced negative relationship and influence people's subjective wellbeing. Similarly, it nullifies the dissatisfaction level arise from unemployment. Lowest foods prices and affordable services somehow reduces the people tendency of being unemployed. But, both shows short term relationship. In long run unemployment rate may affect happiness index of the country and everyone has to take it as a negative indicator.

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