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Research paper

Spatial proximity and SWB a study across nations

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Abstract

Subjective wellbeing (SWB) has gained importance as a key indicator of an individual's level happiness, as well as the happiness of a nation as a whole. This paper examined the influence of a spatial proximity variable like population density on the level of individual subjective wellbeing, along with established sociodemographic and economic variables. Respondent level data from 44 countries in Wave 6 of the World Values Survey was used to perform a cross country TOBIT analysis. Results showed that spatial proximity at the respondent level has a positive and significant impact on the SWB of individuals, with the inclusion of population density adding to the explanatory power of our model. This study relies on respondent level information from the World Values Survey about spatial proximity, whereas other studies have utilized country level statistics.

Keywords: *Subjective Wellbeing; Spatial Proximity; Population Density; World Values Survey Database; Easterly Paradox; Cross Country; Respondent Level Data.*

1. Introduction

Subjective wellbeing, in the last decade or so, has been the focus of several studies that have tried to better understand the state of an individual's happiness. Happiness in the literature is defined as the level at which one is able to judge their quality of life [1]. The field of 'happiness economics' along with quality of life and life satisfaction, has become the current focus of governments, policymakers and academics. Human Development Index's popularity rose with increased calls to examine non-economic factors that influence the happiness levels of people. It is to the Bhutan government's credit that 'Gross National Happiness' has today become a policy agenda for several countries around the world.

This momentum was due to the development of non-conventional methods and indicators of happiness, driven by innovative and extensive research into this area. Studies in the literature have defined differently the key metrics that help determine the levels of happiness, wellbeing or satisfaction1. [5] in his study in 1997, examined income and unemployment and ventured that a government should be more concerned with lack of satisfaction due to joblessness. Furthermore, factors like culture [6] are also relevant. Few other studies focused on spatial proximity and its impact on happiness. In a study across the United States, [7] showed that density of households not only increased pathological behavior, but taken across the US, showed a high influence on level of people's wellbeing. Another study, [8] examined the impact of population density in cities on the health and wellbeing levels of people in Italy.

The focus of the present study is to analyze the impact of spatial proximity on SWB. Growing population, increased urbanization and migration to cities have caused resources to be strained and competitiveness to increase. Moreover, studies that have used cross country data have relied on official statistics for spatial proximity, but our study has respondent level data for population density across a diverse group of nations. Municipal bodies like city planning and development divisions can better plan transportation hubs, hospitals and convenience centers based on the proximity of people to them. Policymakers of developing countries looking to expand their urban areas, will also find it useful in planning and designing residential spaces and metropolitan hubs.

2. Literature review

The term happiness has come to mean quality of life, life satisfaction, as well as subjective wellbeing. Several statistical techniques can be found in the literature, which are used to study the influence of various individual, social and national level factors on an individual and a nation's level of happiness. Reference [9], in their comprehensive review of SWB examine the key definitions of SWB, the methods used to measure and analyse SWB, issues in defining and studying these variables, as well as the key influencers of SWB. over the last few years. The authors argue that income, age, education, religion and marital status as being the dominating forces that determine the level of wellbeing of an individual. The authors also note that there is a need to operationalize national level factors in the context of wellbeing. We now examine studies that observed the key variables in SWB literature that were found to be important influencers – income, sociodemographic factors such as age, gender, and marital status, political orientation, and the variable of interest, spatial proximity.

2.1. Income

Income, a key variable in determining levels of SWB, has had its share of studies in a cross-country context, with national income or income inequality as its proxy. Reference [10] in his seminal paper, sought to understand whether an improvement in the wealth of an individual would improve their level of happiness or wellbeing. The author found that those belonging to a higher income group reported themselves to be much happier when compared to those from the lower status group. The author goes onto cross reference and compare different datasets across different nations, as well as taking into account the presence of sociodemographic differences, income was

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found to have a lesser effect over time on the level of wellbeing. This constituted the paradox that some nations have a strong relationship between happiness and income among its citizens but had a different relationship when examined at a national level across other nations and over time.

Reference [11] revisited the paradox by examining the long-term relationship between income and happiness across 37 countries overall, as well as three distinct groupings of the countries. Results showed that the effect of income on happiness is of a diminishing nature, confirming the earlier paradox. They concluded that while there is a short-term relationship between income and level of satisfaction, it does not hold in the long term, even when examining countries that have been classified based on income growth rates.

Reference [12] surveyed 271,224 Americans and Europeans (12 countries) over 18 years to examine the impact that macroeconomic factors had on levels of subjective wellbeing. SWB was recorded as the response to the question "Taking all things together, how would you say things are these days-would you say you 're very happy, fairly happy, or not too happy these days?", answered on a 4-point scale. The authors concluded while GDP and national income variables have a strong overarching effect, their interaction with other sociodemographic and personal factors can also affect happiness levels.

2.2. Sociodemographic factors

The following studies examine multiple sociodemographic factors and their impact on SWB. Reference [13] used [3] waves of the World Values Survey from 1980 to 1997, to study the combined effects of individual and national factors on SWB. The author used 5 distinct models containing individual variables; individual and societal variables; individual and national measures of education; individual variables and education, estimated as OLS as well as a fifth model that used ordered probit method, by classifying countries into deciles based on income. Results showed that age, religion and state of health all have a significant relationship with SWB, but education did not. Social capital was also found to be positive and significant in its impact on SWB. National level factors were found to be more powerful in influencing SWB, with trust, quality of government and residents of OECD nations having a positive and higher level of SWB. However, at the overall level, national factors like the social and political institutions also drove the levels of SWB more strongly.

Reference [14] examined subjective wellbeing by using the International Social Survey Program's 2002 data, which included 50,000 randomly sampled individuals from 35 nations. Results showed that age had a nonlinear relationship with wellbeing, and that single/divorced or separated couples are less happy when compared to those in relationships. While unemployment and disability indicated lower levels of wellbeing, educated people were found to be happier. Control variables like age and marital status were found to have a dominant effect on SWB.

Reference [15] proposed an integration of both SWB and progress through a WIP (Wellbeing and Progress) Index, arguing that economic, demographic and social factors all combine to contribute to wellbeing, and by extension, progress. By collecting data from 66 nations they found that not only do country rankings differ in spite of higher national incomes, but also dropping GDP and health from the WIP calculations caused countries to be shuffled with no regard to objective wellbeing factors.

2.3. Political factors

Yet another emerging influence on the levels of subjective wellbeing across nations, was the level of political freedom and democratic process. The influence of political factors - through influence of democratization and freedom has also been studied in the literature. Studies have examined the quality of government, the transition to democracy, participation in the democratic process. A cross country study on the relationship between democracy and happiness, as conducted by [16] showed that democracy and related aspects of political freedom have a short-term effect on happiness levels, but taken over time, the results are not conclusive. Reference [17] examined the impact of culture and democracy on the levels of happiness across 28 nations. Results showed that even after controlling for culture in the form of languages and religion, democracy has a very significant and positive relationship on the level of subjective wellbeing across countries. Reference [18] examined in detail the link between SWB and government quality. They used four waves of the WVS for obtaining life satisfaction data (10-point scale) of seventy-five countries and used World Bank's Governance Matters IV database to proxy for government quality. Results of that analysis shows that delivery quality of government services were more significant for lower income nations, whereas democratic quality was more important for the affluent nations. They concluded that the stage of the nation's income and efficiency in government process is stabilized, there is a clearer influence on SWB.

The variable of interest in this study is spatial proximity, often proxied by crowding levels of population density. Spatial proximity as a key determinant of SWB has been studied by References [19], [20], [21] and [22].

Reference [19] aimed to add to existing literature on reported happiness and satisfaction levels by looking at the potential of spatial dimension factors having an impact on subjective wellbeing. Results showed that proximity variables all have a large and significant effect on the levels of wellbeing, but the nature of the variables influenced the magnitude and direction of their relationship – for example, proximity to airports had a positive impact on wellbeing, while proximity to a landfill has a negative impact. Reference [20] sought to develop a comprehensive quality of life index that encompassed sociodemographic and economic indicators of wellbeing, while also accounting for factors such as health and population density. Results showed that the combination of good somatic health, stable and married relationship, low population density, good education and income, and being a young female had a strong influence on an individual's quality of life overall.

Reference [21] focused on Swedish microdata, from the Level of Living Survey, 1991, about happiness, using a sample of 5106 adults. They found that happiness rises with the level of income and extent of education, whereas a strong drop in happiness is seen when there is presence of unemployment, urbanization, lack of relationship, particularly for the male gender. They found in particular that living in larger cities has a negative effect on happiness, and the probability of being happier is also lower in larger cities. Reference [22] explored the highly populated metropolitan areas in United States and their residents' levels of wellbeing. Results showed that there is a significant positive relationship between population density and wellbeing levels in the United States.

The present study hypothesizes that spatial proximity, taken at the respondent level, will have a positive impact on SWB. Furthermore, our study includes respondent level data across nations for variables such as age, gender, marital status, income, as well as political orientation. We also strongly believe that the spatial proximity factor will help add to the explanatory power of control variables in determining the level of SWB.

3. Data and methodology

3.1. Data

The data for this study is sourced from the World Values Survey. WVS is a network consisting of social scientists and led by a group of international scholars, who examine the impact of changing values on the social and political lifestyles of individuals around the world. WVS utilizes a common questionnaire and follow a representative sampling procedure to ensure that over 90% of the population of the world is represented in data collection. For the present study, Wave 6 (2010 to 2014) of WVS was used. Starting with 90,350 observations across 60 countries, data was cleaned and filtered for non -response bias and errors in transcription. The final count of observations used for this study was 61,379 observations

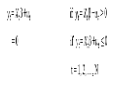
across 44 nations. In the survey, the respondent is asked to rate their current status of wellbeing as a whole, taking into account all factors, over a recent time frame. The response variable is measured on an ordinal scale of 1 to 10, with 1 indicating that they are not satisfied with their level of wellbeing, and 10 indicating that they are very satisfied with their level of wellbeing.

Variables such as 'Gender' and 'Marital Status' were grouped and converted into dummy variables for analysis. Country dummy variables were also generated to account for any country specific differences in wellbeing in our analysis, with Algeria being the baseline for comparison. Further, this study focuses on capturing the impact of spatial proximity on subjective wellbeing, through the Population Density variable. This has been defined as the size of the town the respondent lives in. There are [8] levels of measurement, in ascending order going from 1 to 8, with 1 representing a density of less than 2000 people, and 8 representing over 500,000 people. We hypothesize that the increasing population density would result in a significant and positive increase in the level of subjective wellbeing.

The control variables include income, age, gender, marital status, and political orientation. The political dimension is encapsulated in the survey by the question, "And how democratically is this country being governed today?" The responses are recorded on a scale from [1] to 10, where [1] represents "Not at all democratic" and 10 represents "Completely democratic". We include this as 'Political Orientation' in our analysis. Our study also includes GDP per capita for the year 2014 for all countries, sourced from the World Bank database.

3.2. Methodology

The dependent variable, SWB, is measured on a scale of 1 to 10. To account of the censored values, at lower and upper limits, the present study estimates the relationship between spatial proximity and subjective wellbeing using a Tobit estimation model [23]. The relationship is represented by Equation (1) as follows:



(1)

The estimation in this study follows [3] models, beginning with examining the established relationships in the literature between subjective wellbeing and the control variables such as income, followed by age, gender, marital status, and political orientation. Then, we move onto adding our variable of interest into the model, spatial proximity, and measuring its impact on subjective wellbeing. The three models are further explained next. In model 3, we estimate the relationship after introducing our variable of interest, spatial proximity. In doing so, we try to test if there is any incremental impact of spatial proximity on SWB. For comparison purposes, we also performed an OLS regression estimation for the three models.

3.2.1. Model 1

Model 1 estimates the Easterlin Paradox, following [10] which studied the relationship between happiness and income and argued that it was a nonlinear relationship. Model 1 of our study is estimated using equation (2), where we proxy GDP per capita for the income level of countries. Thus, we hypothesize that a negative and significant â2 coefficient would indicate that the Easterlin Paradox still holds true.

$$SWB = \beta_0 + \beta_1 GDP\ per\ capita + \beta_2 (GDP\ per\ capita)^2 + u_t \quad (2)$$

3.2.2. Model 2

Model 2 adds to Model 1, by including the other control variables like income, age, gender, marital status and political orientation. This model (3) will test whether the coefficients for the control variables, once added to Model 1, will continue to have a significant impact on subjective wellbeing, as shown in previous literature.

$$SWB = \beta_0 + \beta_1\ GDP\ per\ capita + \beta_2\ (GDP\ per\ capita)^2 + \beta_3 Income + \beta_4\ Age + \beta_5 Female + \beta_6 Relationship + \beta_7 Single + \beta_8 Political\ Orientation + u_t \quad (3)$$

3.2.3 Model 3

In Model 3 (as in (4)) of our study, our variable of focus, spatial proximity, is introduced. Town size, which is used to proxy for the spatial proximity variable, is measured on a scale of 1 to 8, with 8 being a highly populated locale. A significant coefficient for the spatial proximity variable will highlight its influence on subjective wellbeing, even after controlling for other factors.

$$SWB = \beta 0 + \beta 1\ GDP\ per\ capita + \beta 2\ (GDP\ per\ capita)\ 2 + \beta 3 Income + \beta 4\ Age + \beta 5 Female + \beta 6 Relationship + \beta 7 Single + \beta 8 Political\ Orientation + \beta 9 Population\ Density + ut \quad (4)$$

4. Results and discussion

The results of the study differ from prior literature in that the official statistics pertaining to population density have not been used in the estimation process. Tables 1, 2 and 3 outline the estimation results of the Tobit analysis. Also given are the regression results of OLS estimation. Winsorization was done at 5% level at the highest and lowest end of the subjective wellbeing variable, in order to control for the extreme concentration of scores across sample data. Three models were estimated, beginning with Model 1, which examined the non-linear relationship between the income variables (GDP per capita and GDP per capita squared) and subjective wellbeing. Model 2 extended it further by examining the influence of the other control variables like income, age, gender, marital status, and political orientation along with the non-linear income relationship variables from Model 1. Finally, Model 3 examined the influence of spatial proximity on subjective wellbeing, while controlling for all the variables tested in Model 1 and Model 2. Results in Table 1 show that both GDP per capita as well as GDP per capita squared are statistically significant.

Table 1: Estimation Results, Model 1

Variable	Coefficients (p value)	
	TOBIT	OLS
GDP per capita	.0000351 (0.00)	.0000348 (0.00)
$(GDP\ per\ capita)^2$	-3.23e-10 (0.00)	-3.12e-10 (0.00)
	Adjusted R^2	0.0184

From the results represented in Table 2, where all control variables such as age, gender, marital status, income levels and political orientation are also introduced to the existing model, we find that almost all variables show a significant and positive impact on SWB, except for age, which has a negative impact (at 1% level of significance).

Table 2: Estimation Results, Model 2

Variable	Coefficients (p value)	
	TOBIT	OLS
GDP per capita	.0000338 (0.00)	.0000341 (0.00)
$(GDP\ per\ capita)^2$	-3.36e-10 (0.00)	-3.29e-10 (0.00)
Income	0.2044996(0.00)	.1927701 (0.00)
Age	-.0029977 (0.00)	-.0035172 (0.00)
Female	.1071728 (0.00)	.0966903 (0.00)
Relationship	.5240451 (0.00)	.4735085 (0.00)
Single	.4135387 (0.00)	.3797957 (0.00)
Political Orientation	.1419732 (0.00)	.1265535 (0.00)
	Adjusted R^2	0.0951

Results from Table 3 show that population density, measured using town size, has a positive and significant (at the 1% level) impact on the level of SWB. It is also important to note that it is statistically

significant, indicating that there is a relationship between the population of people in a locality and their corresponding level of well-being. Moreover, it is able to generate influence even in the presence of control variables that have been tested rigorously over time and across studies. The OLS results show that the explanatory power of the model is highest when the spatial proximity variable is included.

Table 3: Estimation Results, Model 3

Variable	Coefficients (p value)	
	TOBIT	OLS
GDP per capita	.0000319 (0.00)	.0000322 (0.00)
(GDP per capita)^2	-3.19e-10 (0.00)	-3.13e-10 (0.00)
Income	.2019044 (0.00)	.1903121 (0.00)
Age	-.002939 (0.00)	-.0034634 (0.00)
Female	.1042536 (0.00)	.0939617 (0.00)
Relationship	.5353504 (0.00)	.4846712 (0.00)
Single	.4231794 (0.00)	.3891761 (0.00)
Political Orientation	.1426411 (0.00)	.1265535 (0.00)
Population Density	.0323316(0.00)	.031584(0.00)
	Adjusted R^2	0.0951

5. Conclusion

Happiness across individuals and nations have been studied using measures such as quality of life, subjective wellbeing and life satisfaction. Subjective wellbeing examines the level of wellbeing or satisfaction of the individual at a given time, taking all other factors into account. Our study examined the influence of these control factors, along with the key variable of spatial proximity, and assessed their impact on SWB. By using data from Wave 6 of the World Values Survey, and employing a TOBIT estimation, we found that spatial proximity, proxied by population density, is a variable that is influential enough to have an impact on an individual's subjective wellbeing, even after controlling for the aforementioned socioeconomic and demographic variables. As the population of the towns they reside in increased, their level of subjective wellbeing also increased. This highlights the importance of spatial proximity and its related dimensions to the level of wellbeing of an individual. Furthermore, this study has used respondent level information about town size and population, as opposed to official statistics which shed light on how spatial dimensions at a local level can also influence reported levels of wellbeing. City planners and developers can enhance urban designs to maximize proximity to amenities. Policymakers can set clearer targets and locations for their expansion strategies for urbanization. The overall transition from traditional, economic and income driven measures of happiness heralds a new direction that research in development and wellbeing can take. Furthermore, access to respondent level data can help future research perform country level studies by breaking down into various geographical regions.

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