Hacettepe University Graduate School Of Social Sciences

Economics Department

Economics Master's Programme

THE GLOBAL SOCIAL PROGRESS FRONTIER

Shokhida KARIMOVA

Master's Thesis

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ABSTRACT

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The need to measure social well-being of a society has gained the same importance as the estimation of national wealth, since many have started to notice that national wealth is not efficiently used in the benefit of the society. Until 2014, there were no indices that have captured the most vital aspects of the social welfare without interacting with any existing economic attributes. Our analysis uses the most recent data of Social Progress Index to investigate these inefficiencies through the stochastic frontier model. Due to the short time variation, we have applied a two-stage estimation procedure of the JMLS technique. We find that these inefficiencies are impacted by exogenous factors, such as culture, history and geography. Each society can be distinguished by religious beliefs, geographical location, historical traces, and for that reason, these factors impact the societal well-being. We conclude that, Sub-Saharan African countries demonstrate the highest inefficiency levels due to their colonial history, geographical features and religious beliefs. Besides, we also estimate that this continent has the highest ethno-linguistic division, causing considerable negative deviations from the frontier line. Still, most of the countries are so driven around economic prosperity, that inefficiency levels vary noticeably compared to the inefficiency variations in real GDP per capita levels. It is apparent that at similar GDP levels, these countries may experience very different social progress levels.

Keywords

social progress index, global stochastic frontier, inefficiency, wealth distribution, social well-being, modernization

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CHAPTER 1

INTRODUCTION

How do countries successfully generate social progress? The idea of achieving a certain level of social progress has received increased attention in recent decades because of the inefficient utilization of the distribution of economic wealth towards human development. Ideally, a country's progress can be thought of as a balanced social and economic development. The balance is disrupted when a state directs its efforts solely on economic growth, causing a disproportionate distribution of resources over growth versus social progress. However, this statement does not support the idea that economic growth is an obstacle toward social progress. Instead, because the resources are limited, a fair distribution of wealth is a primary key for successful social development.

Almost a century ago, economists started using real economic activity as the measurement of a country's well-being. Simon Kuznets, a Russian-born economist and a statistician, has proposed a worldwide interpretation of an economic growth measurement indicator known as Gross Domestic Product (GDP). After the publication of the *National Income, 1929-32* by the *Acting Secretary of Commerce of United States of America*, GDP has become a proxy for real economic activity, and GDP per capita a measure of economic success. Defined as *the market value of the final goods and services produced within a country in a given period*, Kuznets's (1934) discovery of GDP has helped policymakers who were struggling to react accurately in reacting to the Great Depression. Kuznets's report has built upon accurate and reliable annual data for the production of the United States economy. Soon, the measure has become a leading proxy of real economic activity of other economies in the world.

Kuznets himself notes that "*The welfare of a nation can, therefore, scarcely be inferred from a measurement of national income*" (Kuznets, 1934, p. 7). These words highlight the fact that GDP's role is to examine the *wealth* but not the *welfare* of a nation. However, GDP is still one of the main instruments which policy-making decisions dependent on. Some countries are wealthy and over-performing on their GDPs relative to other countries; these countries include Saudi Arabia, Kuwait,

Russia, China, United States, United Arab Emirates, etc. However, statistics on societal progress show that they are underperforming relative to their GDP levels.

Despite sustained growth of GDP per capita, societies may not be fully benefiting from the growth of material living standards. The quality of life has not been improved at a pace consistent with the growth rate of GDP per capita, and basic human needs have not been equitably provided. Developing and least developed economies, still observe inequality and poverty along with several development problems such as gender inequality, political oppression, and lack of opportunities. Hence, the qualitative conditions of large majorities of people are not at their full potential. It should be noted that there is no country in the world that has met all the requirements of a society's needs and wants. It is vital to consider and measure access to basic human needs and welfare.

The world has been and is facing drastic changes; the 21st century is characterized by continuing armed conflicts and civil wars in some areas of the world, climate change, tariff wars, and unexpected crises such as the COVID-19 pandemic. These affect the decision-making processes of policymakers, and GDP helps governments design suitable fiscal and monetary policies. However, GDP fails to consider the indirect effects of such events and crises on people's well-being. A single instrument that focuses entirely on production cannot be adequately covering the dimensions of well-being and welfare that matter most to human beings. There is now a vast literature arguing that GDP should not be the benchmark measuring device for a country's economic fate in the global historical context.

While GDP is far from being the most appropriate measure of social progress, we presume that GDP per capita is an input that produces social progress. We rest on the idea of *Modernization Theory* initiated by Lipset (1959). He believes that economic and industrial change leads to social and political development. As an example, he argues that the wealthier the society is, the more developed and educated are its people. As a result, there is a larger middle class, and there is less social inequality. Our main argument is that, when national wealth is distributed equitably, countries can achieve desired social progress. However, Daron Acemoglu, in the book *Introduction to Modern Economic Growth* introduces a simple model on institutional development and structural change. This model assumes that if an economy is at a very low steady-state, where the capital-labor ratio and a social variable, such as family structure, urbanization and monetary

improvement are at low levels, the development in this economy is followed by a gradual increase of the proportion of capital stock relative to labor hours worked and an increase in social variables. This model is a form of development-induced structural change (Acemoglu, 2009, p. 766). Acemoglu (2009, p. 767) also explains that higher steady states refer to economies where more significant levels of social productivity are supported by higher capital-labor ratios. All the economies at some point converge to a steady-state, and these steady states vary according to exogenous factors. An example might be historical factors that may affect the development of an economy. Hence, countries that converge to a lower steady-state are in a development trap caused by weak structural changes.

Acemoglu (2009) puts into question the effects of chosen economic institutions on encouraging economic growth (p. 782). Every country follows different institutional structures. we see that the lives of the population are different across societies when these changes are examined across states, nations and continents. Acemoglu explains that, due to accessibility and variety of public goods, people living in developed and developing countries can invest in their personal development. In contrast, less developed countries do not share the same opportunity (2009, p. 782). These differences across societies can also be explained by other factors such as culture, history, geography, etc. Hence, these differences reflect on economic arrangements and inefficiencies of the economies. Society's behavior and well-being reflect the efficient allocation of national wealth. To study these dimensions, there exist various tools of measurement that serve as an alternative to GDP.

Different organizations and economists have introduced alternative proxies for societal and human well-being. According to the World Bank Database, there are six categories for environment-related indicators, for instance, and each of these has different sub-categories of narrowed data (World Bank, 2020). Since GDP ignores any kind of environmental issues, these variables should be collected independently. The environment is one of the main external factors that need to be considered, but there are others.

United Nations Development Program initiated the Human Development Index (HDI) in 1990 that focuses on education, real income per capita, and life expectancy. These three indicators are the basics of human well-being and social

development. However, HDI[1] does not cover inequality, corruption, happiness, governance, justice, and other related issues. All the listed factors are collected by different organizations and individuals separately.

There have been other attempts to measure progress beyond GDP. These new sets of measurements are being established to capture human development from a broader perspective. United Nations' *Development Goals* programs aim to unite these attempts and demonstrate the whole progress of society (economic and social). However, due to the variability of social development indicators and their similarities, it has been challenging to choose a specific measurement that is capable of reflecting a straightforward interpretation of a society's health. Consequently, in 2014, *Social Progress Imperative*, a nonprofit organization, established the social development indicator called the *Social Progress Index* (SPI). Since its initiation, this organization aims to provide data on questions that hold priority in each human being's life, from medical care, sanitation, and environmental quality to access to education, personal rights, and personal freedom. Because this index goes beyond the evaluation of economic activities, it has been assisting the United Nations *Development Goals* in evaluating the progress. Considering its scope and reliability, we have chosen to use SPI in our further investigations.

1.1 QUESTION

This thesis aims to estimate the *global social progress frontier* and assess the impact of exogenous factors on the economies' inefficiencies. We believe that not all countries are efficient in using their material wealth for social progress due to certain external factors, and not all the countries are fully aware that it is the time to move beyond GDP. In order to do that, policymakers need a factual analysis of the causes of inefficiencies occurring while countries are attempting to initiate social development. We achieve this by introducing SPI into our stochastic frontier model, from which we evaluate a country's measures taken towards its society's benefit, and stimulate further social development by prioritizing specific matters of concern.

[1] More information about HDI, social development, prosperity index and other related measurements is presented in the following chapters.

The significance of this question has been raised by many; however, there has been no econometric work that explicitly studies whether and how countries remain inefficient in creating social progress. *Social Progress Imperative* has been able to develop an index that represents only social indicators and has later found that countries with similar GDP per capita levels have attained very different social progress levels, and those countries with similar social progress values would be at varying levels of GDP per capita (Social Progress Imperative, 2019, p. 5). These findings lead us to question how some societies are more efficient in converting their material wealth into social progress, and to what extent exogenous circumstances affect the production of social development.

1.2 APPROACH

To achieve the objective of the thesis, we use *stochastic frontier analysis* for the estimation of inefficiency levels of countries. Developed initially by Aigner et al. (1977) and Meeuse and van den Broeck (1977), stochastic frontier models help firms detect the inefficiencies present in the production or cost functions. Similarly, we assume that there exist barriers for countries to achieve a fully efficient outcome when converting their GDP per capita to social progress. The stochastic frontier approach helps us identify the inefficiency terms by decomposing the residuals into (i) idiosyncratic zero-mean error terms and (ii) inefficiency levels that have a positive mean. This approach, however, is not a widely used method in comparative economic development. For that reason, we use stochastic frontier modelling to address the social progress limitations that have been existing in recent years, from 2014 to 2018. However, our modelling specifications have been changed due to shorter time variance, that is why, we run a two-stage specification model, where in the first stage we extract the inefficiency terms using maximum likelihood estimation technique. In the second stage, we regress inefficiency terms with the exogenous covariates using OLS estimation technique.

1.3 RESULTS AND CONTRIBUTION

Geographical, cultural, and historical indicators (including the colonial experience) are the main exogenous variables of interest in the comparative development literature (i.e., Acemoglu et al., 2001; Alesina et al., 2002; Rodrik et al., 2002; Sachs, 2003; Acemoglu et al., 2008). We hypothesize and confirm empirically that

such indicators have significant impacts on the inefficiency levels countries face in transforming material wealth into social progress. Our results demonstrate that each country should develop social progress strategies according to their geographical attributes, historical backgrounds, and cultural heritages. To be precise, geographical attributes have shown that continental location of the countries has an impact on inefficiency levels in various ways. For example, Sub-Saharan African countries have the most considerable inefficiency levels; an almost 0.14 percentage point increase in inefficiency levels compared to being located in Europe, Oceania, or North America. Also, we find that being surrounded and enclosed by solid land results in noticeable shifts from the frontier line. We conclude that geography has consequences for various dimensions of social progress, including gender equality, sanitation, access to water, safety, education, and personal freedoms.

Besides, our results reveal the importance of cultural differences when explaining variations relative to the frontier line. Despite the importance of culture in the comparative development literature, we know little about how culture affects social progress inefficiencies. We introduce religion and ethno-linguistic fractionalization into the analysis. We find that, while ethno-linguistic fractionalization has significant positive effects on inefficiency levels, different religious beliefs have differing effects. For example, countries that practice Islam demonstrate that their religious belief system has no significant impact the inefficiency levels. Yet, the religious belief systems of Judaism, Hinduism and Buddhism have a negative correlation with inefficiency levels, indicating that countries that practice these particular religious beliefs have higher efficiencies to generate social progress.

Lastly, we investigate the role of colonial histories. Many African, Latin American, and Asian countries have been ruled under an established control of powerful imperial states. However, we consider only three main European colonial empires. Daron Acemoglu, Simon Johnson, and James Robinson, AJR (2001) hereafter, believe that institutional features introduced by the Europeans to their colony countries have traces into the modern days. We hypothesize that countries that have been colonized have social progress patterns dissimilar with those that have not been colonized at all. Our outcomes show significant positive influences on inefficiencies of social progress. The only exceptional positive trend towards social progress we observe in Spanish colonization.

1.4 OUTLINE

The aim of this thesis is to give an insight into why the inefficiencies are occurring and why some states are failing to convert their wealth into social progress. Though, before giving concluding remarks, we provide an overview on other works regarding social progress, human development index, and most importantly, discussing why moving beyond Gross Domestic Product in today's modern world is so crucial and beneficial for the economies. However, the second chapter does not only summarize the researches conducted, but also highlights the drawbacks of relevant papers, and focuses on the importance of this research. The third chapter introduces the reader to the Social Progress Index and analyzes the SPI scores in more details. The reader needs to have an understanding of what is the primary goal of SPI, its noteworthiness, and why SPI is a new wave of measuring society's health. For that, readers are provided with a deeper knowledge on the data that is included within the subcategories of this index, statistics, and other necessary information. Besides, this chapter contains the evolution of this index; before this index's initiation, other development indexes played and still do carry significant importance on human well-being. It is also critical to reminisce about socio-economic instruments that have served as a basement in the initiation of SPI.

Chapter 3 is followed by the description of social progress frontier model, on which the whole study is based on. Chapter 4 is about the methodology implied, the theoretical and empirical background of the model, as well as a proper interpretation of all the real-time data collected and used. Finally, the discussion is followed by the results section, where a broader analysis of the results is presented. In conclusion, the thesis ends with a discussion section to finalize the investigation and provide remarks on future research.

CHAPTER 2

RELATED LITERATURE

2.1 STOCHASTIC FRONTIER ANALYSIS

Stochastic frontier models estimate the production or cost function parameters by differentiating firm-level inefficiency terms from idiosyncratic errors. Hence, stochastic frontier analysis allows researchers to identify a firm's deviation from the efficient frontier (Cornwell and Schmidt, 2008). The notion to develop this method has been originated from the thought that, in practice, an economic agent can't go beyond the given extreme frontier. The deviations from the frontier line are defined as inefficiencies after the idiosyncratic shock is accounted for in the regression model (Belotti et al., 2013).

The original papers that develop SFA are those of Aigner, Lovell and Schmidt (1977) and Meeusen and Van den Broeck (1977). The distinguishing feature of their analysis is that it suits for the cross-sectional analysis of production functions and allows the examination of the sources of the overall residual term (Aigner et al., 1977). For more than forty years, SFA is being used in the measurement of firm-level inefficiencies in many sectors and in many countries. On the other hand, other econometric theory papers extend the initial analysis. In general, the stochastic frontier model can be represented in production and cost frontiers. The production frontier model represents the maximum amount of output obtained from a given level of input, and cost frontier model depicts the minimum amount of expenses being used to a given level of production.

Battesse and Corra (1977) introduce a re-parameterized version of the initial model by dismissing the technical inefficiencies of production. By doing so, negative values are set to zero, and the technical inefficiencies are assumed to have a half-normal distribution. They use the gamma parameter in formulating maximum likelihood function, which allows the gamma ratio of variances of random errors to be between 0 and 1.

However, there is another widely used way to estimate stochastic frontier models; by using corrected ordinary least squares (OLS). While one can specify the

parameters of probability distributions of technical inefficiency and random error terms in the maximum likelihood estimation, the inefficiencies can be derived from the OLS residuals in corrected OLS method. Førsund et al. (1980) state that this corrected OLS method is less efficient than the Maximum Likelihood Estimation (MLE) method. Olson et al. (1980) have tested a large sample size from their Monte Carlo study and rather present that corrected OLS measurement is as efficient as MLE.

Other studies have also attempted to modify the initially proposed SFA. Pitt and Lee (1981) revisit their 1978 Indonesian weaving industry study and implement half-normal distribution to the panel data stochastic frontier model. This modification allows the measurement of average efficiency, and the results suggest that there is a statistical significance of their results when inefficiencies are present in time-variant models. Their method is suitable for cross-sectional data because the error terms are assumed to be independently distributed across the cross-section units.

Later, Schmidt and Sickles (1984) have also attempted to estimate stochastic frontier models using panel data. The advantage of using panel data, according to their study, is avoiding three complexities of the stochastic frontier model:

1. The error term contains statistical noise and technical inefficiencies
2. The separation of these two requires certain assumptions about technical inefficiencies
3. Inefficiencies are not independent of their regressors.

Later on, panel data frontier models have become popular in firm-level studies, including studies on the US airlines (Cornwell et al. 1990), on agricultural producers (Battese 1992; Battesse and Coelli, 1995), on Egyptian manufactories using unbalanced panel data (Seale, 1990). At the same time, the use of panel data has allowed further advancements of stochastic frontier models. Battese and Coelli (1992) and Schmidt and Sickles (1984) use time-invariant technical inefficiency models of unobserved heterogeneity as an inefficiency measurement.

In the initial stochastic frontier model, inefficiencies are specified as either half-normal or truncated normal. James Jondrow, Ivan Materov, Knox Lovell and Peter Schmidt (1982) have proposed a model that separates inefficiency and the error term, known as JMLS estimator. JMLS estimator enables the calculation of

technical inefficiency in each of the observation samples by removing already calculated technical inefficiencies from each observation. Some studies have tested JMLS (Battese and Coelli, 1995; Simar and Wilson, 2007) and have exposed the drawbacks of this inefficiency measurement tool.

Along with mentioned stochastic frontier model specifications, Greene (1990) modifies the original model and introduces *gamma distribution*. By using corrected OLS estimator in the modified model, one-sided disturbance (error term) has two-parameter gamma distribution. Ritter and Simar (1994) have noted that gamma distribution is difficult to estimate when the sample size is large. Kumbhakar and Lovell (2000, p. 90) have run their calculations on rank correlation coefficients within the efficiency estimates, and their results have shown that the smallest correlation coefficient is between exponential and gamma distributions, meaning that it is sufficient to use simpler distributions.

Greene (2005a) continues the study of heterogeneity in panel data. His paper examines the application of "true" fixed and random effects models. Fixed effect estimation allows the presence of inefficiency terms in the model, while the firm specific heterogeneities are analyzed in terms of dummy variables. Greene (2005a) points out that this estimation technique has not been encountered in previous studies. Nevertheless, Greene's model imposes minor bias parameter estimators. Wang and Ho (2010) have resolved this problem by generating an alternative model. Random effects model resembles the linear regression model; however, it has not provided inconsistent estimates. Battese and Coelli's (1988) random effects time-invariant inefficiency model can be applied as the true random effects model; however, it does not solve the imposed problems of inconsistency in estimates. Both of the models allow various distributional assumptions and are estimated using the MLE.

This thesis uses SFA at a domain that is not typically used for, i.e., comparative economic development. Here, we presume that a society may be inefficient in transforming its material wealth into social progress. More specifically, societies need to invest into various public sectors to "produce" social progress.

2.2 COMPARATIVE ECONOMIC DEVELOPMENT

Long before the matter of subjective well-being has gained importance, society has been living in a Malthusian epoch. Malthus (1978) believed that the population is increasing faster than the food supply. His theory relies on the idea that, as the population continues to grow and if no preventive measures are taken, diseases, wars and unhealthy conditions will cause deaths. Eventually, reduction in population size will balance out resource availability. Hence, technological improvements in agriculture will improve people's standards of living until another population boom occurs. Generally speaking, for an extended period of time, economies have been trapped in a state of Malthusian stagnation where technological improvements did not necessarily improve the standards of living, the population has continued to grow, and income per capita did not exhibit sustained growth. Adverse shocks such as the Black Death have decreased the size of the population and have caused real wages to rise, but later generations have experienced a higher population growth rate (Galor and Weil, 2000). Pritchett (1997) reports that only from the last century (20^{th} century) changes in the standards of living are present in the records of modern economic history.

After entering the Post-Malthusian regime, the economy has moved towards Modern Economic Growth when specialists can observe sustained economic growth (Galor and Weil, 2000). However, as the economies continue to grow, variations in progress are noticed between developing and developed countries. Smith (2007) presents highlights of the causes of comparative development in the long-run. His observations reveal that the role of institutions is the major deterministic factor for changes in comparative development. AJR (2001) examine the exogenous effects that cause institutional differences. They argue that the differences in European colonization have set up diverse institutions. Using mortality rates of European settlers in the colonies as an instrument for given institutions and controlling for geographical attributes, disease environment, ethno-linguistic fractionalization, religion and other variables alike, they document the positive relationship between institutions and income per capita. Their study depicts that, when the effect of institutions is controlled for, African countries and countries located near the equator do not have low income levels. North (1990) and Yifu Lin and Nugent (1995) have already argued the importance of institutions in economic development since institutions are humanly set rules controlling and shaping human

activity. The quality of institutions, though, depends on income levels; the higher the income, the better the quality of institutions (Smith, 2007).

In recent years, there is an expanding literature on whether democracy causes economic growth or whether this relationship is reversed. Daron Acemoglu, Simon Johnson, James Robinson, and Pierre Yared, as of now AJRY (2008), present that countries do not have the motivation to adopt democratic leadership style as their income levels get higher. These findings are controversial to Lipset's (1959) *Modernization Theory*. He states that economic development creates a more democratic society. Later on, AJRY (2009) find a causal effect between income per capita and democratization; however, they think that this relationship is mostly caused by historical factors that may have shaped the political structure of the societies. Yet, not all researchers have found the same positive relationship between democracy and growth. Gerring et al. (2005), for example, have found that there is a negative relationship while Murtin and Wacziarg (2014) find that there is no significant correlation between democracy and economic growth. On the other side, there is a controversial debate that economic development provokes democratization. Treisman (2015) adds his own findings to the discussion by stating that economic growth does promote a more democratic society in the medium run, and this effect varies according to the current leadership style. As soon as a democrat replaces a dictator, high income levels may spur democratization.

In some cases, there is a reverse relationship. Kennedy (2010) finds that, in more developed countries with low rates of economic growth, the government chooses to change towards a more democratic leadership. However, there are exceptional countries for which economic improvements do not spur a political reform towards a more democratic society (Bueno de Mequita and Downs, 2005). To conclude, there is no single answer to the related debate. While some argue that democracy causes economic modernization via investments, economic reforms, and education (Acemoglu et al., 2019), others say that the effectiveness depends on the regime that exists at the current time even if economic growth stimulates democratization.

Even if researchers believe that institutions are critical for economic development, most of them also admit the role of geography. In his monumental book *The Wealth of Nations,* Adam Smith (1776) already summons that Sub-Saharan African and Central Asian countries have not been able to speed up development and reduce poverty due to high transport costs for international trading because of their

geographical locations. Sachs (2003) mentions that papers of AJR (2001) and Rodrik et al. (2002) prioritize the importance of institutions by stating that they influence the movements in economic development while geography, gender inequality, ethno-linguistic division, and a few other geographical and social characteristics have little or no effect. However, AJR (2001) use geographical elements to study the exogenous impact of colonial origins on the quality of institutions. Rodrik et al. (2002) find an indirect effect of geography on institutions but a weak direct effect on income is present when institutions are controlled for. Sachs (2003), on the other hand, argues that, even if institutions matter, geography and resource endowments have a significant contribution in determining the path of development, e.g. economically successful countries located in East Asia with favorable geography, and Sub-Saharan African and Central Asian countries with a poor geographical location, and adverse economic and political conditions. Location is only one of the aspects of geographical attributes. Gallup et al. (1998) find that climate, along with ecology affect agricultural productivity, causing declines in human health (diseases), population increases. Perhaps more importantly, geographical location may be the cause of implementation of policies that are only suitable for that specific region. Transmittable diseases, such as malaria, cause poverty, and those regions with a higher risk of malaria have lower per capita incomes (Sachs, 2003). This finding proves that there is a direct effect of geography on per capita incomes. Even if the geographical location is a disadvantageous feature for the above mentioned geographic regions, some of the African and Latin American countries have benefited from European colonization. Those countries (European colonies) with European interventions have adopted their institutional structures, encouraging investments in economically unsuccessful regions (AJR, 2002). As a result, these societies have taken the advantage to industrialize.

A large body of literature on comparative economic development has emerged over these past two decades. Most of the recent research have either bypassed or paid little attention to the importance of other growth elements (e.g. religion, ethno-linguistic fractionalization, cultural beliefs, etc.), instead have prioritized the discussion about institutions and geography. Even though an influential body has aimed its focus on the study of institutions' and geography's impact on development, many experts are highlighting the importance of ethno-linguistic fractionalization. Driessen (2008) states that this measurement became a common

control variable used in the study of comparative politics. Geographical, institutional or cultural factors do not explain genetic diversification; however, it has a strong effect on the relative development (Ashraf and Galor, 2013). When Easterly and Levine (1997) have tried to explain the variations in growth rates in the case of Sub-Saharan Africa, they have concluded that ethnic diversity explains the differences in political and economic instabilities. Their findings show that societies with high ethnic diversity implement weaker policies and are prone to ethnic conflicts. To back up, Ashraf and Galor (2013) have made a broader analysis of genetic diversity capturing the Americas, Africa, Europe, and Asia. Africa, as found by Easterly and Levine (1997), has the largest genetic diversity levels, causing conflicts within the societies; hence, communities cannot perform at their efficient levels. Native American community with the least amount of ethnic division is weaker in physical and intellectual evolution, and tend to develop slower. Europeans and Asians with an average level of diversity are more likely to enhance their development.

Alesina et al. (2002) expand their research by including religious and linguistic fractionalizations. Their results show partial consistency with those of Easterly and Levine (1997). However, due to data variability during Alesina et al.'s (2002) research, their investigation includes religious and linguistic fractionalization. Their results demonstrate a negative correlation with economic growth. Besides, they have found a negative link between ethnic diversity and latitude. In terms of institutional quality, ethno-linguistic diversity has resulted in more deficient governance. In contrast, extensive religious diversification has been observed in countries with good governance that have a higher tolerance and freer self-expressive values. Barro and McCleary (2003) confirm these findings and additionally state that, when an individual demonstrates religious traits, he/she contributes in the expansion of economic growth by using the resources of places of worship.

The main contribution to the comparative development literature that this thesis makes is analyzing how countries are failing to convert their material wealth to social progress. After estimating the inefficiency levels of the countries, this paper estimates the regression model to explain the variations in inefficiency levels through the exogenous variables, such as indicators of geography, religion, colonial history, etc.

2.3 THE *BEYONG GDP* LITERATURE

The earliest criticism of GNP's (mostly referred as GDP today) inadequacy in many aspects of human life was mentioned by Robert F. Kennedy, the US President John F. Kennedy's brother, at his speech at the University of Kansas in 1968. He argued that this measurement tool does not consider intelligence, learning, political stability; instead, "*It measures everything in short*" (Jackson, 2018, para. 4). It was not only Kennedy who questioned the validity of GDP. In 1990, United Nations initiated the Human Development Index referring to the fact that assessment of people and their capabilities contribute to the development of a country, and the index is aimed at measuring health, knowledge, and standards of living dimensions (UNDP, 2019). HDI is a limited measure of social welfare, even leaving environmental sustainability unmeasured, bearing in mind that environmental disasters are direct causes of human health and security. It has been criticized by many, and some even questioned if it is another unnecessary complex development tool (McGillivray, 1991). Later, it has even been called an empirically flawed instrument (Srinivasan, 1994). Human Development Reports (HDR) have failed to widen the scope of HDI's utility; hence, the HDRs and HDI have been exposed as "*lost touch with their original vision and the index fails to capture the essence of the world*" (Sagar and Najam, 1997, p. 263). Despite its drawbacks, countries have been investing in the analysis and data collection of the index's parameters, and in the improvement of their statistics and their position at the world HDI ranking (Khodabakshi, 2011). Governments' effort to improve the HDI's ranking have shown considerable changes in the health expenditures (Razmi et al., 2012), food security, trade, energy consumption, employment and many more aspects of social development (Gani and Chand Prasad, 2007; Gunduz et al., 2009; Ouedraogo, 2013; Feriyanto, 2016). Nevertheless, some findings conclude that HDI does not capture the future of a country's development level (Ivanova et al., 1999). Besides, HDI includes economic dimensions, which makes it difficult to make contrasts between the effects of HDI and GDP within the research.

Many relevant indices have been created to have an accurate measurement of social well-being, but unfortunately failed to unify a suitable measurement into one specific index. In 2009, the French Government, commanded by the Former French President Nicolas Sarkozy, established *the Commission on the Measurement of Economic Performance and Social Progress* under the supervision of a Nobel prize

economist Joseph Stiglitz. The report uses the 2008 financial crisis as an example of how the economy has been severely damaged and interrelated with simultaneous crises of societally important issues. The report gives suggestions on how to respond to structural changes and various crises. It builds a basement for strong economic and financial institutions by considering policy changes for widening the scope of measurement of economic and social progression (Stiglitz et al., 2009). After the establishment of Commission on the Measurement of Economic Performance and Social Progress in 2009, also called the "Stiglitz-Sen-Fitoussi" Commission (SSF), the High-Level Expert Group on the Measurement of Economic Performance and Social Progress (HLEG) hosted by The Organization for Economic Co-operation and Development (OECD) has been formed. This establishment has led to the initiation of the *Beyond GDP* program under the co-chairing with OECD and SSF Commission. Since 2009, *Beyond GDP* program has been collecting data on the well-being of societies and using it in policy-making processes (Stiglitz et al., 2018). The importance of looking beyond GDP that the report of this program suggests is that human beings are overusing, wasting, and destroying essential resources that all individuals depend on.

Welfare calculations have had started long before governments realized its importance and impact on economic prosperity. In 1966, Raymond A. Bauer makes a Presidential address to the *American Association for Public Opinion Research* discussing the strengths of statistics and surveys that are based on human values and goals that shape the society. A lot has changed since then, and the world is in a different phase than it was in the last century. Land and Michalos (2018) have studied the social indicators' development for the previous fifty years. According to their research, the development of countries has been affected by globalization, digitalization, and by an era of post-industrialization when the presence of computers and robots have raised many other social challenges. They recommend four implications to be considered while doing further studies on social indicators research. First, they point out the link between the theoretical and technical level of education/skills/degrees with income and social classification. Second, those who are in the upper social classes (usually having a university degree and holding a leading position in their jobs) benefit from the increase of national incomes since they have a larger income share in the distribution. This upper class benefits from the globalization of the economies more than the rest of society in terms of the income distribution. So, this pattern of income distribution should be studied further

to depict its impact on the quality of life of the whole society. Third, they mention that globalization has caused an increase in the international mobility of labor. There is migration (legal and illegal) from developing countries to developed countries. This inter-exchange has certain benefits to the economies of both sides, but it also has political and social disagreements. Hence, this type of international mobility of labor should be surveyed and statistically recorded to see its impact on the quality of life of both the host and source countries. Lastly, they recommend to include the influence of social indicators on globalization, technological advancement, and societal progress. When all the listed suggestions are included in the calculation of the quality of life, it can be beneficial in the development and improvement of well-being statistics. Land and Michalos's (2018) detailed report concludes that social progress measurement is highly related with income distribution; hence, there is an economic insight in the estimation of social welfare. Efforts to move beyond GDP and constructing non-economic statistical indices mostly result in an index that is correlated with GDP (Fehder et al., 2018). There surely are singular dimensions such as environmental attributes that do not incorporate any economic factors; however, these singular dimensions are not sufficient to evaluate social progress.

There are indicators of subjective well-being (SWB), a term used to define happiness and life satisfaction. Psychologists are interested in positive emotions that define the welfare of a person. In the past, they were mainly concerned about negative emotions. Since SWB has been defined explicitly, it was in the interest of many social scientists to understand what promotes well-being and happiness. The data is collected by asking people to evaluate their lives according to the given questions, and these questions may vary according to the targeted area of study. Hence, SWB can be grouped into six categorical factors: economic, demographic, environmental, personality, institutional, and contextual/situational (van Hoorn, 2007). As it is in the concerns of this thesis, it was not until the recent years that the two sciences (economics and psychology) started to encounter. For example, many welfare economists have researched utility measures on the individual level. By utility measures, they consider the tradeoff between work and leisure. They have assumed that the working process is a negative feeling in most cases, and leisure time is considered as pleasure. So, even if there is a debate on whether money brings happiness by making an individual be able to buy his/her wants and needs, leisure time is seen to be welfare improving. This leads the debate to the "Easterlin

Paradox." This paradox, introduced by an American economist Richard A. Easterlin in the mid-1970s, establishes a clear border between happiness and income. The paradox tells that, in a shorter period, happiness depends on income and varies across the countries. However, in the long term, an increase in income does not set an upward trend in happiness (Easterlin, 1974).

Having found that, Easterlin has conducted another research on a macro level. The main aim of the study was to examine whether economic growth results in more happiness (Easterlin, 2013). He investigates time series data for developed, developing, transitional, and Latin American countries. He concludes that there is no clear positive relationship between the two variables, even for a country like China, where economic growth has shown an outstanding acceleration in recent decades. Stevensen and Wolfers (2008) re-evaluate the "Easterlin Paradox" using data for both rich and poor communities and comparing their happiness level with economic growth rates. The results display that, in most of the cases, happiness level in a country rises when economic growth shows upward trends. However, they have an exception; America does not exhibit the hypothesized pattern. Other rich countries, including Japan and European countries, show a rise in happiness levels when economic growth demonstrates positive trends. Stevensen and Wolfers are not the only ones that think that the theory of "Easterlin Paradox" is flawed, and there is a positive relationship between happiness and economic growth. Previously, Veenhoven and Hagerty (2006) have proved using the latest data of the time that happiness has increased slightly in rich countries and by a visible amount in most of the emerging countries for which they were able to obtain full data. They explain this disagreement of two sides by stating that complete data is not always available, and that is why there is a different interpretation between the outcomes of the research. Easterlin (2013), however, concludes that, if studies have a contrary inference to the given relationship, that is because of the confusion between the short-term effect of GDP growth on social well-being and the long-term relationship when there are no positive trends between income and economic growth. Both ideas put a human being into a question. So, how would an individual based on its financial status answer the question of whether money brings him/her happiness, and how the answer changes in the long-term. Kahneman et al. (2006) find that "*Most people believe that they would be happier if they were richer, but survey evidence on subjective well-being is largely inconsistent with that belief*" (Kahneman et al.,2006, p. 1908). They propose another idea for the debate by

stating that personal well-being changes according to how people use their time; there is a trade-off between work and leisure. Even people with high income levels tend to be more stressed. There is an illusion between happiness and income, and this is how, in the long-term, the positive change between happiness and income decreases.

As seen in most of the literature available, SWB is assessed through measuring happiness. Such measurements use the data coming from the Gallup World Poll, the World Value Surveys, and the European Social Survey (Helliwell et al., 2012). These mentioned databases use a collection of questions and answers about general satisfaction of life. Factors that can affect life satisfaction are as follow: social status, income status, income distribution, social factors such as insecurity, social trust, trust in government, and adaptation to the new social level once he/she starts to earn higher income (Helliwell et al., 2012). Helliwell et al. (2012) specifically underline that trust, physical and mental health, and governance quality matter more than household income. Besides, leading countries in the happiness metrics are not only those with high income but also those countries with a higher degree of all social factors listed above.

To conclude the discussion above, income makes people happy up to a certain point. Improving social matters make people more satisfied with their lives. Hence, efficient use of a nation's wealth by directing it into appropriate social problems can help to improve society's well-being. However, it needs to be pointed out that, when measuring subjective well-being, people are mainly asked how they feel about their lives, and their answers may not reflect the true state of their living conditions. Happiness measurement is not an entirely reliable evaluator of social well-being.

The correlation between social progress and economic growth is complex and delicate. Researchers have done and are still making noticeable statistical contributions to precisely reflect social matters, and numerous indices are being developed supporting the "beyond GDP" imperative. Many of the social welfare estimation tools either try underlining the importance of economic prosperity in social welfare or include economic indices such as GDP and income distribution metrics into the calculations of social welfare (Fehder et al., 2018). Either way, there is an inclusion of economic factors into the measurement of society's quality

of life. It must be noted that excluding all economic factors leads to the lack of information and full reliability.

In 2015, the United Nations adopted and launched *The 2030 Agenda for Sustainable Development* program. This program covers 17 Sustainable Development Goals (SDGs) aimed at addressing socially crucial matters including poverty, standards of living, equality, health care and sanitation, environmental concerns, education, and economic growth (UN, 2020). The most recent report of Sustainable Development Goals emphasizes that United Nations members are making positive changes towards a better world for future generations. Poverty is declining, the environment is being enriched with rare species of animals and plants, and, generally speaking, the quality of life is getting better due to changes in policies and UN's support (UN, 2019, p. 22-57). Stiglitz-Sen-Fitoussi Commission has put an emphasis on human well-being more than SGDs; however, SGDs are more relevant to society's problems, and sustainability measures are taken according to these matters.

The launch of SDGs by the United Nations after an evident success of Millennium Development Goals 2001-2015 once more has underlined the importance of economic growth alone is not enough to assess development. Existing social welfare measurements all have a direct or indirect link to economic factors, and that is why Social Progress Imperative has launched the Social Progress Index independent from any economic indicator. Since its launch, the Social Progress Index has been driven with attention and is being used in various analyses. The initiators of this index promise that SPI provides guidance in understating the correlation between economic growth and social development (Porter et al., 2013). SPI is a very recent effort that uses the most recent data available. For that reason, current researches are not broad and are very few. The initiators of Social Progress Imperative have presented preliminary findings. Porter et al. (2013) in their *Social Progress Index 2013* report state that countries at similarly low levels of income have different social progress levels, and the same applies to high income countries. Acemoglu and Robinson (2012) claim that such development differences are mainly due to inclusive institutional establishments, different political systems, and varying degrees of openness. Hence, a country's bad economy is not inherited from its geography or culture, but it is the matter of human-constructed institutions. Yet, there are countries such as China with authoritarian political systems and still

considered as an economic giant. Numerous wealthy countries can be viewed as economic successors with inclusive institutional developments, yet there are inefficient in using their wealth for the benefit of their people's well-being.

Fehder et al. (2018) have tested the effect of including SPI into the measurement of the relationship between SWB and GDP. This correlation has given positive and significant results on subjective well-being. However, when they are separately examined, the results are insignificant. Although, when they have tested the impact of each dimension of SPI while controlling for GDP, Fehder et al. (2018) have seen a significant positive relationship with well-being. Social progress alone positively affects the well-being of people. Whereas this study demonstrates the importance of social progress, it does not show the importance of achieving social development in the first place. In 2019, the same group of researchers have looked at the effect of economic institutions on social progress using time series data (Fehder et al., 2019). They use medium-term changes of GDP per capita and economic institutions to see the effects on SPI over time. The results suggest that GDP growth and progress in economic institutions each contribute to social progress. Social progress, on the other hand, improves the subjective well-being of people.

The most recent studies suggest that there is a significant positive correlation between SPI and economic development, and economic prosperity is essential in being a link to subjective well-being. However, even the most developed countries (e.g. USA) are underperforming in achieving social progress. In contrast, countries with much lower income (e.g. Costa Rica and Rwanda) have a higher level of social progress relative to their GDP per capita level (Kioes and Pfeiffer, 2015). As a result, social and economic progress levels are non-identical across countries. There are external factors such as religion, history, geography and culture that slow down the development of both, the economy and the social well-being. Each country needs to recognize its weaknesses and strengths to have an individual approach in the efficient usage of wealth. Deloitte (2015) in their report together with Social Progress Imperative state that, countries with low social progress show a weak correlation between economic development and societal improvement. As the population in these countries increases, these socially slow-progressing countries will increase the proportion of people living under these conditions (Kioes and Pfeiffer, 2015).

There has been an extensive movement in developing a measurement that can assess countries by their social welfare, while at the same time point out that GDP is no more a tool measuring a country's success. Most of the measurements that exist either way correlate with economical attributes, and those instruments that do not include any economic computations lack reliability and are not enough alone to assess the society's wellbeing.

To conclude, the Social Progress Index is a comparatively new social-well being measurement tool. This paper contributes to the existing literature by using SPI in calculations of the global stochastic frontier. The stochastic frontier model is not usually implied in macroeconomic development studies. For that reason, this thesis work is aimed at using the current model to depict the inefficiencies that are explained by the exogenous variables typically common in comparative economic development literature.

CHAPTER 3

MAIN PATTERNS OF SOCIAL PROGRESS INDEX

3.1 SOCIAL WELL-BEING INDICATORS

Earlier in the chapters, we introduce the Social Progress Index, an initiation of Social Progress Imperative, which is a non-profit organization aimed at promoting and accelerating social progress in the world. For that, SPI promises to assess the quality of life without the inclusion of GDP. Previously, we have considered the differentiating features of SPI from other social well-being measurements. The main aim of this chapter is to recall socio-economic well-being indicators, investigate SPI on a broader perspective, highlight its importance in this research, and demonstrate the main areas of concern and successes of countries in SPI dimensions.

Gross Domestic Product has long been an economic success measurement indicator from which many conclusions about the economic health of a country has been made. Several studies even highlight how economic growth is vital for social development in both rich and emerging countries, but mostly in the least developed countries (Mukherjee and Debashis, 2010; Khodabakhshi, 2011; Clark and Senik, 2011; Deb, 2015; Grubaugh, 2015). Only in the last few decades, economists and researchers have concluded that economic indicators cannot entirely reveal social the well-being of a nation. The Financial Crisis of 2008, the ‘Arab Spring’ in 2011, and the most recent outbreak of the virus COVID-19 are just examples of how economic welfare is a limited proxy to measure success.

In 1990, the United Nations has initiated the Human Development Index, and after several improvements, HDI has been considered as the most common indicator of social well-being. However, there are valid criticisms that question the reliability of this index. The most common critique for HDI is that, even though this index is aimed to show the level of social development, it misleads the users by hiding the limitations of social development in countries with successful economic performances. Other critiques state that HDI is heavily related to economic indicators more than social metrics. On the other hand, HDI has been a helpful

indicator for Millennium Development Goals' efforts to reduce poverty and support emerging countries, while still lacking the ability to lead the established progress further (Porter et al., 2013).

Organization for Economic Cooperation and Development has also been interested in contributing with its own measurement tool, and hence, has developed a Better Life Index in 2011. The distinguishing features of this index OECD identify with being the eleven crucial topics that are necessary when measuring well-being (OECD, 2014). The main differentiating attribute of this index is that it lets the users identify the most crucial well-being topics individually. According to OECD, this feature enables people to be engaged in a debate on what matters the most and create their own index from which they can make comparisons among countries. Despite its benefits and attributes, this index has a mixture of economic and social indicators to measure social welfare. Because of this, the Better Life Index may put heavier weights to economically better performing countries rather than measuring pure social variables.

The Social Progress Imperative team found it necessary to develop an assessment tool that quantifies aspects of human life that are important for their existence, and are independent of any economic evaluation. These aspects include food, shelter, education, safety, etc. (Porter et al., 2014). Thanks to technological advancements that enable comprehensive and broader data collection, developing new reasonable indices have become easier. Besides, it became more approachable for different organizations to collect data and use that data to unify it into a single measurement tool. So, for the calculation of Social Progress Index, experts have used reliable data from different sources such as various branches of the United Nations organization, Gallup World Poll, World Development Indicators, Freedom House, Economist Intelligence Unit, International Energy Agency, and several other organizations, institutions, and NGOs. All of the obtained data has been used to create three dimensions of SPI, each containing four components and indicators to touch every aspect of social well-being without the interaction of any economic attributes. As a result, SPI provides a holistic and a unified outcome of 54 underlying indicators each belonging to one of the three main dimensions: *basic human needs*, *foundations of wellbeing*, and *opportunity* (Table 1). Each component of this index was calculated using a formula that enables comparison and full transparency across other scores. As a result, each component is not higher than 100 and not less

than 0. Finally, to calculate the final version of the index, experts take the unweighted sum of the dimensions so that SPI scores range from 0 to 100 for all countries (Porter et al., 2013). When the final result has been calculated and compared to other existing social well-being indices listed above, Social Progress Imperative team have found correlations with economic variables and other social well-being benchmarks; however, they have also highlighted that there are significant distinctions (Porter et al., 2013).

Overall, the main differentiating features of SPI from other international well-being measurements are the variety of social components, elimination of any economic attributes, and use of outcome indices. Using outcome indicators can reveal and help to evaluate the real stage of social progress rather than concentrating on what has been done to achieve the improvement. Looking directly at what really matters to people of all ages, races, and genders can be appealing to governments and international organizations in implementing right policies and programs to drive social well-being (Porter et al., 2014).

Earlier in the chapter, there was a brief discussion about the content of SPI. Social Progress Imperative experts have done comprehensive research on the elements that identify society's performance. The works of Amartya Sen, Joseph Stiglitz, Douglass North, Daron Acemoglu, and James Robinson have served as the focal points in synthesizing the three dimensions. Each of the three dimensions answers a specific question: does a country meet the basic human needs, is the environment applicable enough to achieve well-being and sustain it, and are there enough opportunities provided by the government for people to use their full potential (Social Progress Imperative, 2018). Each dimension has four components, and each of these components has underlying indicators. In total, all of the 54 indicators are publicly available, and calculations are present for the countries that SPI includes.

The main discussion around SPI dimensions is their primary functions and goals. According to the initiators, the most crucial matter when assessing the social progress of any society is whether basic human needs are being provided. In this dimension, SPI includes the evaluation of primary medical care, access to clean water and sanitation facilities, basic needs in electricity, household air pollution, necessary cooking environment, and personal safety. The second dimension gives weight to personal growth and self improvement. It covers access to basic quality knowledge (primary and secondary school enrollment, gender parity in education),

ability to being able to communicate and collect information, gain access to quality health care, and most importantly, measure of environmental quality. Finally, the third dimension evaluates the opportunities provided for personal choice, freedom, inclusiveness within the society, usage of personal rights, and the opportunities to gain higher and advanced education. Though, for each of the dimensions to be precise and reliable, every country should have no more than one missing data for indicators in each component. Up until 2019, the SPI team was able to collect data for 149 countries, though with missing data (Social Progress Imperative, 2018).

Table 1: Components of Social Progress Index

Social Progress Index		
Basic Human Needs	**Foundations of Wellbeing**	**Opportunity**
Nutrition and Basic Medical Care	***Access to Basic Knowledge***	***Personal Rights***
Undernourishment	Adult literacy rate	Political rights
Depth of food deficit	Primary school enrollment	Freedom of speech
Maternal mortality rate	Lower secondary school enrollment	Freedom of assembly/association
Child mortality rate	Upper secondary school enrollment	Freedom of movement
Deaths from infectious diseases	Gender parity in secondary enrollment	Private property rights
Water and Sanitation	***Access to Information and Communications***	***Personal Freedom and Choice***
Access to piped water	Mobile telephone subscriptions	Freedom over life choices
Rural access to improved water sources	Internet users	Freedom of religion
Access to improved sanitation facilities	Press Freedom Index	Early marriage
Shelter	***Health and Wellness***	Satisfied demand for contraception
Availability of affordable housing	Life expectancy at 60	Corruption
Access to electricity	Premature deaths from non-communicable diseases	***Tolerance and Inclusion***
Quality of electric supply	Obesity rate	Tolerance for immigrants
Household air pollution attributable deaths	Suicide rate	Tolerance for homosexuals
Personal Safety	***Environmental Quality***	Discrimination and violence against minorities
Homicide rate	Outdoor air pollution attributable deaths	Religious tolerance
Level of violent crime	Wastewater treatment	Community safety net
Perceived criminality	Greenhouse gas emissions	***Access to Advanced Education***
Political terror	Biodiversity and habitat	Years of tertiary schooling
Traffic deaths		Women's average years in school
		Inequality in the attainment of education
		Globally ranked universities
		Percentage of tertiary students enrolled in globally ranked universities

Source: Social Progress Index, 2018

Because the data for Social Progress Index indicators is obtained from the databanks of other organizations and NGOs, this index has many similarities with other social well-being indicators alike. Yet, there are some indicators of social

well-being that this index lacks to covers, such as, some of the subjective well-being indicators and infrastructure assessment.

Despite these minor flaws, SPI measures many social aspects of human well-being that Global Goals are trying to achieve. United Nations in its *Sustainable Development Goals 2030* program has set seventeen objectives needed to be tackled and improved by 2030. Because SPI is an outcome orientated and is a noneconomic measurement, it can calculate the progress of SDGs program and guide the global leaders of governments, organizations, and businesses in further actions. However, before introducing SDGs, the UN has been working on *Millennium Development Goals* consisting of eight international development goals targeted to reduce global poverty by almost a halve. By 2015, the numbers have reported that the results of the goals have exceeded the expectations mainly due to spur of economic growth of countries living in extreme poverty (The Millennium Development Goals Report, 2015). 2015 SPI scores show noticeably high scores for the components of *basic human needs* and *foundations of well-being* (Porter et al., 2015). Despite, many social issues, such as basic human needs, environmental protection, and many other building blocks for further human development, need to be tackled. Hence, the UN has adjusted their new SDGs to tackle the issues that the governments are struggling the most with. In that regard, SPI addresses the main challenges of social well-being and provides an extensive evaluation of a country's performance and progresses that SGDs are trying to achieve. In many areas of SDGs, SPI can be used as a monitoring tool that reports the updated and accurate progression (Appendix 2).

When SDGs have been initially implemented, the overall 2015 SPI scores marked 61 points on a population-weighted basis. The highest average score was achieved by the *Basic Human Needs* dimension, 68.33, while the highest average score for *Foundations of Wellbeing* and *Opportunity* dimensions were 66.45 and 48.23 accordingly. In the latest 2019 SPI report, the world average SPI score was recorded as 64.47, and that is an approximately 3.5-point increase in the four years. A very notable increase was recorded for the *Basic Human Needs* dimension, 74.41 points, while the other two dimensions have increased by round 1 and 3 points accordingly. Deloitte has predicted that by 2030 SPI would increase by 2.4%. This prediction has been based on the US Department of Agriculture Economic Research Service's economic growth forecast (Deloitte, 2015). However, the recent numbers suggest

that since 2015 data, overall SPI scores have increased by approximately 5.7%. It means that the forecasts for economic growth are less likely to affect the progress in social well-being by noteworthy numbers. Although, according to the same report by Deloitte, no change in GDP per capita may result in a decline of SPI scores over the next fifteen years. One can conclude, a country's SPI performance is very individual, meaning that, even with the same GDP level, differences in SPI levels may occur.

3.2 SOCIAL PROGRESS INDEX COUNTRY ANALYSIS

GDP figures cannot account for social progress index scores since at similar levels of GDP per capita one can observe different numbers of SPI scores. Figure 1 presented below shows the correlation between 2014 numbers for real GDP per capita at chained PPPs (in mil. 2011US$) and Social Progress Index score. The given graph reveals visible differences in social progress among countries. Qatar, the United Arab Emirates, Saudi Arabia, Oman, and other wealthy countries alike have lower social progress levels compared to countries with moderately less real GDP per capita.

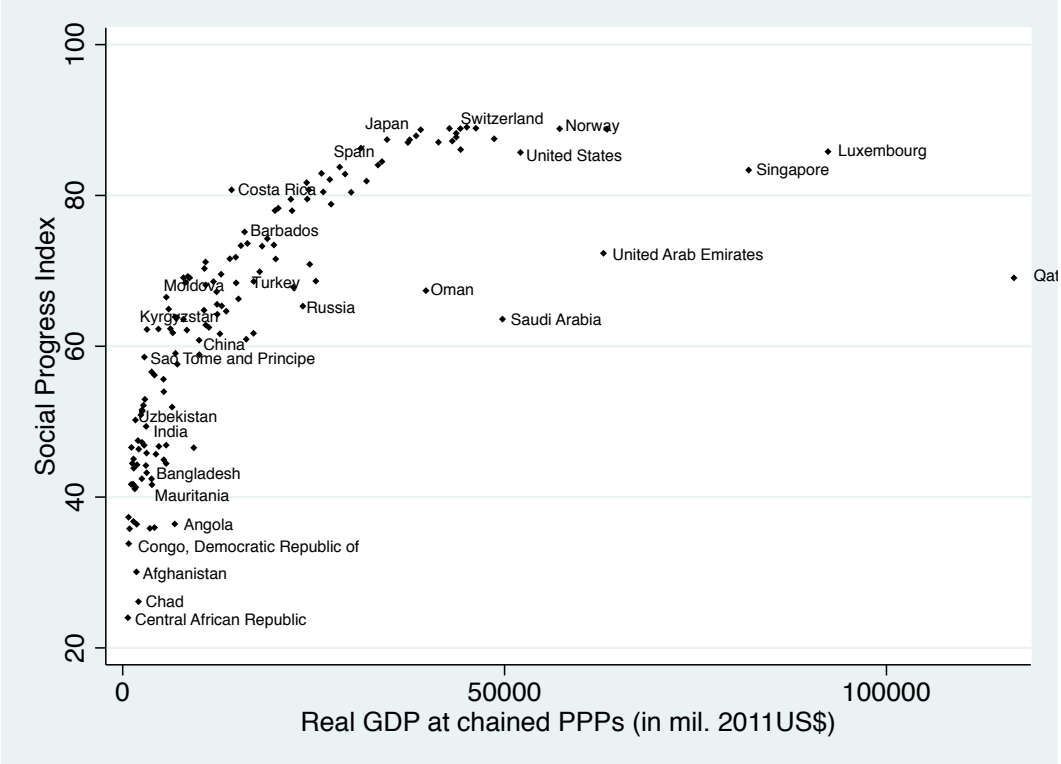

Figure 1: 2014 relationship of SPI and Real GDP at chained PPPs

Countries such as Denmark, Switzerland, New Zealand, Norway and Iceland have SPI scores between 80-90 and were the leading countries in social progress according to 2014 data. Geographically, social progress seems to demonstrate very similar outcomes. That said, most of Europe, North America and Oceania have superior improvement in social well-being. Sub-Saharan Africa, some of the Asian countries are very behind, both in terms of their wealth and social wellness. However, these recordings are accounted for 2014. By 2018, these numbers have slightly changed, and the worst performing countries have made progress.

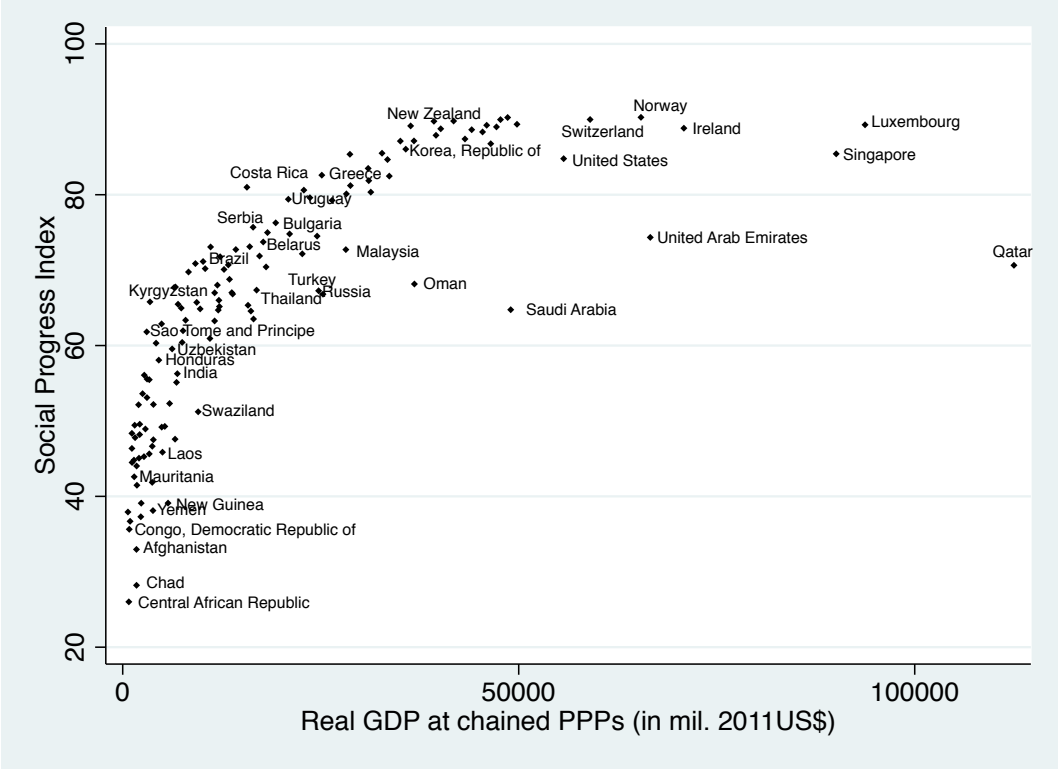

Figure 2: 2018 relationship of SPI and Real GDP at chained PPPs

While in 2014, Denmark was the best performing country in terms of social progress, by 2108, Norway has changed its position on the graph and became the country with the highest SPI score. Another country that made a significant improvement is Uzbekistan. By 2018, Uzbekistan's score has raised to almost 60 points, while in 2014 the score was around 55. The general picture suggests that most of the countries did not make any significant progress, while some even declined in progress. Even though these declines are not visible on the graphs, later in the chapter, the numbers show that countries such as Turkey and the United States have made backward progress. Economically stable Middle Eastern countries, on the other hand, made very insignificant progress despite their wealth.

However, when looked at other wealthy countries on the graph, it is visible that in these four years, richer category of countries has made very little and slow progress. The same pattern of progress is observed in low income and conflicted countries located at the bottom of the graph, excluding few of the exceptional countries that either made progress of higher than 2 points or made a decline around a point. The overall picture of the two graphs suggests that progress is an individual process and is affected by several external factors.

Despite, there are indicators of quality of life that improve as the economy grows. These indicators are basic human needs, quality of primary education and healthcare. Establishment of these basic needs can be observed mainly in countries with a developed economy. From the given Table 2[2], one can see that the top ten leading countries in the SPI scoreboard are mostly developed countries with relatively high scores for *basic human needs* indicators. However, progress is individual, and in most of the cases, high levels of GDP per capita do not improve the social well-being state of the society. According to the table, in 2014, ten leading countries of social progress are mainly European, and the highest SPI for 2014 belongs to Denmark with a score of 89.05. However, by 2018, Denmark has been dropped by three positions and given the leading place to Norway with the highest recorded score of 90.26.

Table 2: 2014 and 2018 SPI Country Rankings

	2014			**2018**		
Rank	**Country**	**Social Progress Index**	**Real GDP per capita**	**Country**	**Social Progress Index**	**Real GDP per capita**
1	Denmark	89.05	45,057	Norway	90.26	65,441
2	Netherlands	88.91	46,238	Iceland	90.24	48,606
3	Iceland	88.88	42,775	Switzerland	89.97	59,019
4	Sweden	88.86	44,214	Denmark	89.96	47,705
5	Switzerland	88.84	57,218	Finland	89.77	41,782
6	Norway	88.76	63,419	Japan	89.74	39,294
7	Finland	88.71	39,018	Netherlands	89.34	49,787
8	Germany	88.24	43,667	Luxembourg	89.27	93,734
9	United Kingdom	87.90	38,419	Germany	89.21	45,959
10	Australia	87.73	43,672	New Zealand	89.12	36,354

[2] Note: All of the rankings (Tables 2-6) have been constructed according to the country list being used in the research paper

…						
70	Suriname	66.28	15,159	Thailand	67.35	16,905
71	Lebanon	65.56	12,349	Kazakhstan	67.26	24,738
72	Dominican R.[3]	65.35	12,963	Suriname	67.01	13,776
73	Kazakhstan	65.32	23,587	Lebanon	66.99	11,607
74	Cabo Verde	64.93	6,022	Turkey	66.81	25,287
…						
134	Ethiopia	36.76	1,414	Guinea	39.09	2,338
135	Angola	36.43	6,813	Sudan	38.85	4,230
136	Guinea	36.39	1,837	Papua N.G.[4]	38.11	3,821
137	Sudan	35.95	4,162	Burundi	37.29	660
138	Papua N.G.	35.85	3,560	Yemen	36.69	2,285
139	Niger	35.80	900	Niger	36.69	932
140	D.R. of Congo[5]	33.82	785	D.R. of Congo	35.63	827
141	Afghanistan	30.08	1,796	Afghanistan	32.96	1,735
142	Chad	26.13	2,062	Chad	28.20	1,746
143	CAR[6]	23.99	677	CAR	26.01	775

Amongst the most advanced and highly industrialized eight (G-8) economies, only three economies have made the top ten best performing countries within social wellness. Even though, by 2018, Germany and the United Kingdom have given their way to other developed economies, including Japan.

The list of countries located in the middle of the scoreboard have been changed. Lebanon and Suriname have not improved their position on the board, but, their SPI scores have increased by insignificant amount. Kazakhstan, on the other hand, made an almost 2-point progress.

The picture has not changed, though, for the countries located at the very bottom. Countries, such as Niger, Congo, the Democratic Republic of, Afghanistan, Chad and the Central African Republic still remain their positions unchanged on the scoreboard. Out of ten countries with the lowest SPI scores, Afghanistan has made almost a three-point improvement, the Central African Republic and Chad have

[3] Dominican Republic
[4] Papua New Guinea
[5] Democratic Republic of Congo
[6] Central African Republic

made more than a two-point improvement. Chad's and Afghanistan's GDP per capita, however, have declined within four years.

Table 3: 2014 SPI Dimensions

Basic Human Needs			**Foundations of Wellbeing**			**Opportunity**		
Ranking	**Country**	**Score**	**Ranking**	**Country**	**Score**	**Ranking**	**Country**	**Score**
1	Switzerland	96.43	*1*	Japan	92.27	*1*	Denmark	82.12
2	Singapore	96.18	*2*	Norway	91.64	*2*	Sweden	81.22
3	Netherlands	96.08	*3*	France	91.63	*3*	Finland	81.00
4	Sweden	96.02	*4*	Netherlands	91.04	*4*	Canada	80.83
5	Denmark	95.96	*5*	UK	90.75	*5*	Iceland	80.80
…								
139	D.R. of Congo	36.46	*139*	Papua N.G.	32.37	*139*	Ethiopia	28.39
140	Afghanistan	35.81	*140*	Niger	30.60	*140*	D.R. of Congo	26.25
141	Papua N.G.	34.06	*141*	Chad	30.52	*141*	CAR	24.38
142	Chad	27.36	*142*	Afghanistan	26.03	*142*	Sudan	21.56
143	CAR	24.04	*143*	CAR	23.55	*143*	Chad	20.53

Tables 3 and 4 demonstrate changes recorded in dimensions over the time period covered in this thesis. In 2014, Switzerland was the country that provided its society with the best conditions for basic human needs. However, by 2018, Singapore improved its condition by two points and took the leading position from Switzerland. Norway, on its turn, with the highest SPI score for 2018, is not a leading country in any of the dimensions, though, is on the list of top five countries of social progress dimensions.

The scoreboard changes, when each dimension is analyzed individually. *Basic Human Needs* dimension has higher scores than the remaining dimension. Even if least progressing countries have low scores for *Basic Human Needs* dimension in comparison with European countries, which at the top of the scoreboard, this dimension covers the most important components for good health, human safety, sanitation, and basic needs such as shelter, electricity and access to clean water.

Table 4: 2018 SPI Dimensions

Basic Human Needs			**Foundations of Wellbeing**			**Opportunity**		
Ranking	**Country**	**Score**	**Ranking**	**Country**	**Score**	**Ranking**	**Country**	**Score**
1	Singapore	98.14	*1*	Japan	94.66	*1*	Ireland	82.29
2	Japan	97.78	*2*	Norway	93.19	*2*	Denmark	81.64
3	Iceland	97.51	*3*	Finland	92.49	*3*	Switzerland	81.59
4	New Zealand	96.81	*4*	France	92.20	*4*	Germany	81.59
5	Norway	96.62	*5*	Denmark	92.06	*5*	Luxembourg	81.43
…								
139	Afghanistan	41.50	*139*	Papua N.G.	34.10	*139*	D.R. of Congo	26.45
140	D.R. of Congo	38.56	*140*	Chad	32.45	*140*	Burundi	26.07
141	Papua N.G.	38.43	*141*	Niger	32.21	*141*	Sudan	23.17
142	Chad	30.76	*142*	Afghanistan	29.45	*142*	Chad	21.39
143	CAR	26.76	*143*	CAR	22.81	*143*	Yemen	20.67

Economically successful economies still have issues with accesses to secondary education, personal rights, freedom, tolerance, and inclusion. Countries such as Russia and Middle Eastern Countries serve as an example. Besides, China and India have many difficulties with environmental quality, though these economies are considered as one of the rapidly growing economies.

The list of least progressing countries is not varied much from SPI scoreboard. The Central African Republic is still one of the countries with the worst circumstances for *basic human needs* and *foundations of wellbeing*. Since 2014, it was able to improve its basic human needs condition by almost three-points. However, its effort to improve environmental quality, access to basic knowledge and information has declined by 0.74 points. Afghanistan is recorded as one of the countries with the best improvement: *basic human needs* have improved by almost six points, and *foundations of well-being* improved by 3.42 points.

The third dimension, *opportunity*, is one of the social progress components with the slowest improvement. Ireland records the highest score for this dimension, 82.29 points. As mentioned above, this dimension covers indicators that include conditions for human self-improvement. For 2018 ratings, Yemen has been recorded as the country with the worst conditions for the *opportunity*. It should be

noted that Yemen is not included in the bottom five countries with the worst progress within other dimensions.

The general analysis suggests that Scandinavian countries can generate and maintain high social progress with decent economic development. These countries do not only provide their citizens with basic human needs, but also offer opportunities to have advanced education, personal freedom, tolerance, and personal rights.

2018 Social Progress Index Executive Summary (2018) has made a list of countries that have demonstrated the most significant improvements and declines since 2014:

Table 5: List of countries with the most improvements and declines

Progresses			**Declines**		
Country	**2014 SPI**	**2018 SPI**	**Country**	**2014 SPI**	**2018 SPI**
Republic of Korea	84.03	87.13	Yemen	41.63	37.29
Bolivia	62.33	65.48	Thailand	68.40	67.35
Timor-Leste	51.93	55.11	Turkey	67.84	66.81
Sri Lanka	64.78	68.01	United States	85.70	84.78
Sao Tome and Principe	58.56	61.81	Brazil	73.34	72.73
Kenya	52.16	55.55	Mauritania	42.41	41.85
Luxembourg	85.81	89.27			
Pakistan	45.69	49.18			
Sierra Leone	41.30	44.80			
Kyrgyzstan	62.23	65.79			
Ghana	56.60	60.31			
Belarus	69.89	73.73			
Uzbekistan	55.62	59.55			
Nepal	50.89	56.07			
Myanmar	46.72	52.31			
The Gambia	43.83	49.43			
Swaziland	46.54	51.21			
Ethiopia	36.76	41.47			
Tanzania	47.25	52.01			

Table 6: Detailed analysis of SPI dimensions

Progresses							**Declines**						
Country	**2014**			**2018**			**Country**	**2014**			**2018**		
	BHN	**FoW**	**Opp.**	**BHN**	**FoW**	**Opp.**		**BHN**	**FoW**	**Opp.**	**BHN**	**FoW**	**Opp.**
Republic of Korea	93.12	87.98	70.98	96.00	89.10	76.28	Yemen	52.82	42.64	29.45	50.36	40.84	20.67
Bolivia	69.09	66.16	51.76	73.49	68.91	54.03	Thailand	79.91	74.47	50.81	80.32	75.80	45.91
Timor-Leste	56.69	54.40	44.72	60.00	59.44	45.90	Turkey	85.01	72.97	45.55	83.65	73.61	43.18
Sri Lanka	75.97	72.31	46.05	78.48	75.27	50.29	United States	92.33	84.50	80.28	90.85	84.33	79.16
Sao Tome and Principe	63.92	58.62	53.16	68.25	62.88	54.30	Brazil	79.66	76.45	63.91	79.88	78.20	60.09
Kenya	53.67	62.21	40.61	57.35	63.71	45.58	Mauritania	52.58	43.09	31.57	53.95	43.66	27.95
Luxembourg	94.74	89.25	73.43	94.97	91.41	81.43							
Pakistan	56.74	44.78	35.54	60.73	48.09	38.72							
Sierra Leone	42.95	42.00	38.94	47.63	47.07	39.70							
Kyrgyzstan	75.31	64.28	47.10	79.79	68.93	48.66							
Ghana	59.81	59.62	50.38	63.61	63.28	54.03							
Belarus	86.91	69.64	53.11	87.96	76.13	57.11							
Uzbekistan	80.16	49.58	37.13	82.18	55.87	40.60							
Nepal	60.25	50.57	41.84	67.88	55.73	44.62							
Myanmar	58.85	44.51	36.78	60.03	55.34	41.54							
The Gambia	57.35	43.18	30.96	63.98	45.92	38.39							
Swaziland	52.94	49.01	37.68	60.54	54.25	38.84							
Ethiopia	42.33	39.55	28.39	45.87	46.56	31.99							
Tanzania	46.37	53.87	41.49	52.12	58.84	45.07							

Table 6 demonstrates a detailed analysis of each dimension where countries have made their progress and decline the most. In Table 5, we observe that Tanzania has made the most development (4.76 points) and Yemen has made the most significant decline (4.34 points) in social progress. Statistics from Table 6 show that most of the improvement Tanzania has devoted to *basic human needs* and *foundations of wellbeing*, around 5-6 points. Countries such as Republic of Korea, Bolivia, Sri Lanka, Kenya, Luxembourg, Belarus, Uzbekistan, Myanmar, and the Gambia have devoted more attention to the improvement of their personal development indicators including personal expression and freedom, societal inclusiveness, and providing opportunities for further advanced education. Pakistan, Sierra Leone and Ghana are countries that have made the most advancements in all three dimensions.

A very noticeable change is observed in countries that have declined in progress over four years. Numbers display that these countries have seen the most decline in Opportunity dimension; the highest decline of 9 points is recorded for Yemen. In countries such as Turkey and the United States, progress in *basic human needs* has been deteriorated. This phenomenon has not been observed for any other countries on the scoreboard. Moreover, the United States, apart from Yemen, is a G-7 country that has made a backward progress on all of its dimensions.

To conclude, SPI has gained acceptance in a very short period of time. Despite its drawbacks, this index has been a guiding measurement tool for the United Nations' Sustainable Development Goals 2030 project as well for the authorities of governments, organizations and businesses. As an example, Paraguay's government is using Social Progress Index for their National Development Plan, while multinational corporations in Brazil are using specific dimensions of SPI to ensure environmental and social sustainability (Social Progress Index Executive Summary, 2018).

Social Progress Index statistics suggest that many Sub-Saharan African, Central Asian, Middle-Eastern, and other economically well performing countries still need to make improvements in the benefit of the society, and should implement necessary policies for efficient usage of their wealth towards social sustainability.

CHAPTER 4

METHODOLOGY

4.1 EMPIRICAL FRAMEWORK

The literature presented for stochastic frontier model usually represents estimations of different firm analyses to calculate their economic progress inefficiencies. In this research, the initially developed model by Aigner, Lovell and Schmidt (1977), and Meeusen and Van den Broeck (1977) is implied in the panel data stochastic frontier model, which allows some of the assumptions to represent more practical visualization of inefficiencies. The initial model is denoted in the following way (4.1-4.4), where y_i is the maximum observed output that can be obtained from x_i vector of inputs with β technology parameters; ε_i is the composed error term that represents the sum of normally distributed disturbance, v_i, and in inefficiency term u_i.

$$y_i = \alpha + x_i'\beta + \varepsilon_i, \text{ where } i = 1, \dots, N \tag{4.1}$$

$$\varepsilon_i = v_i - u_i \tag{4.2}$$

$$v_i \sim \mathcal{N}(0, \sigma_v^2) \tag{4.3}$$

$$u_i \sim \mathcal{F} \tag{4.4}$$

Aigner, Lovell and Schmidt (1977) have assumed that the distribution $\mathcal{F}$ is half normal, $u_i \sim \mathcal{N}^+(0, \sigma_v^2)$, and Meeusen and Van den Broeck (1977) have assumed that the distribution is exponential $u_i \sim \mathcal{E}(\sigma_u)$. Pitt and Lee (1981) propose a Maximum Likelihood (ML) estimation method with a time-variant data by extending the original model in the following manner:

$$y_{i,t} = \alpha + x_{i,t}'\beta + \varepsilon_{i,t}, \text{ where } i = 1, \dots, N \;\; t = 1, \dots, T \tag{4.5}$$

$$\varepsilon_{i,t} = v_{i,t} - u_{i,t} \tag{4.6}$$

$$v_{i,t} \sim \mathcal{N}(0, \sigma_v^2) \tag{4.7}$$

$$u_i \sim \mathcal{E}(\sigma_u^2) \tag{4.8}$$

The inefficiency in our model has an exponential distribution $u_i \sim \mathcal{E}\left(\frac{1}{\sigma_u}\right)$.

The stochastic frontier model used in this work represents the panel data stochastic frontier model based on Cobb-Douglas specifications for panel data. The initial Cobb-Douglas production proposed by Charles Cobb and Paul Douglas (1928) with two inputs, capital and labor, has been used to represent the simplified version of the economy using the following formulation:

$$P(L, K) = bL^{\alpha}K^{\beta} \tag{4.9}$$

where *P* represents the amount of total production, *L* and *K* are labor and capital inputs accordingly, α and β are input elasticity of labor and capital, and *b* is the total factor productivity.

This thesis's model takes the form of Cobb-Douglas production function and is implemented to the panel data stochastic frontier model to depict social progress inefficiencies.

$$SPI_{i,t} = \alpha(y)_{i,t}^{\beta} e^{v_{i,t} - u_i} \quad i = 1, \dots, N \text{ and } t = 1, \dots, T \tag{4.10}$$

where Social Progress Index ($SPI_{i,t}$) represents the maximum social progress output country "*i*" produces in a year "*t*"; α is a composite of exogenous variables that do not change over time; y is the GDP per capita for the country "*i*" in the year "*t*"; β is the input elasticity for y. Next, the natural logarithm of the function is taken, so that the function is in the form of the stochastic frontier model:

$$ln\,(SPI_{i,t}) = ln(\alpha) + \beta ln\left(y_{i,t}\right) + \varepsilon_{i,t} \tag{4.11}$$

from which, $\varepsilon_{i,t}$ can be expressed as:

$$ln\,(SPI_{i,t}) = ln(\alpha) + \beta ln\left(y_{i,t}\right) + v_{i,t} - u_i \tag{4.12}$$

where, $\varepsilon_{i,t} = v_{i,t} - u_i$; $\mathrm{v_{i,t}}$ stands for the stochastic random variables for the country "*i*" and year "*t*"; $u_i \geqq 0$ is the non-negative inefficiency term of the country "*i*" ($|u_i|$). Note that the inefficiency term is time-invariant.

Earlier in the chapters, we have mentioned that Pitt and Lee (1981) have modified the original model by extending the model to be used in panel data cases using the Maximum Likelihood estimation method. Later, Schmidt and Sickles (1984) have made their contributions by performing a fixed-effect estimation method to

stochastic frontier model with time-invariant inefficiency term (u_i). Though, their proposed model with time-invariant inefficiency term is applicable in longitudinal panel data sets. When their proposed model has been tested in the frames of this thesis work, the issue of nontrivial numerical maximization problems has arisen. The regression analysis has shown that the inefficiency and measurement error variability ratio ($\frac{\sigma_u}{\sigma_v}$) is very large. The following model is suitable for panel regressions where $T \geq 10$, while this study uses a panel data regression with $T \leq 10$.

Because the intercept is identical in stochastic frontier models, it produces misspecification bias when time-invariant determinants are present in the regression (Belotti et al., 2013). When u_i depends on time specifications, identification of inefficiencies becomes difficult due to a large number of parameters. To avoid biased results, Greene (2005a) suggests separating time-variant inefficiency terms from time-invariant unobserved heterogeneity. That way, the model will not have to be specified via "true" fixed effects form. Green (2002) and Greene (2005a) demonstrates that a panel data model with $N \gg T$ is computable and feasible using the maximum-likelihood dummy variable approach.

To disentangle the two components of the $\varepsilon_{i,t}$ and obtain $v_{i,t}$ and u_i separately, Jondrow, Lovell, Materov and Schmidt (1982) have proposed an estimation technique, later called as JMLS, that calculates the conditional mean $E(u_i|\varepsilon_{i,t})$ and uses this estimation as the inefficiency level. Hence, the conditional mean of u_i given $\varepsilon_{i,t}$, determines the figures of time-invariant inefficiency estimates. Following the JMLS technique, two-stage estimation procedure is conducted. In the first stage, this thesis estimates the parameters of the stochastic frontier model via maximum likelihood estimation technique. Then, again, by using ML statistical method, inefficiency scores are extracted. In the second stage, this work proceeds to regress the remaining exogenous covariates using OLS regression technique. In order for the results to be symmetric with the efficiency terms, efficiency terms are derived via $\exp\{-E(u_i|\varepsilon_{i,t})\}$. Efficiency terms are regressed in the same OLS regression procedure using the same exogenous covariates.

4.2 DATA ANALYSIS

The earlier assumption of this thesis is based on the fact that countries misuse their material wealth in improving the social well-being of its societies; exogenous factors are causing these inefficiencies. To depict these inefficiencies, this thesis uses the social progress index data of 143 countries for the years 2014-2018. The data for the social progress index is obtained from the Social Progress Imperative databank. The list of countries and time coverage is restricted by full data quality and availability.

The indicators of independent variables are obtained from various reliable databanks. Real GDP per capita in our thesis is represented by mathematical computation of data for the total population and GDP per capita PPP (constant 2011 international $), all gathered from World Banka database. Geographical attributes consist of two variables, namely, latitude and landlockedness, and the information is collected from Google Developers. Landlocked countries are captured as a dummy variable, and take the value 1 if countries are locked by other countries and do not have access to seas and oceans, and 0 if otherwise. Apart from geography, we use other exogenous variables such as colonization, cultural attributes, and ethno-linguistic fractionalization. Colonization is defined by three colonial empires (British, Spanish and French), and the data is represented by the value of 1 if a country has been colonized by any given colonial empires, and 0 if a country has not been colonized at all. The data for colonization is obtained from Marc Ferro's (1997) book *Colonization: A Global History* and Colin Flint and Peter J. Taylor's (2017) book *Political Geography: World-Economy, Nation-State, and Locality*. As a cultural attribute, we have chosen four different religious beliefs (Islam, Judaism, Hinduism, Buddhism), where Christianity is represented as a reference religion. The information regarding religions being practiced in given countries is provided in the book *Encyclopedia of World Religions* (Ellwood and Alles, 2007). Ethno-linguistic fractionalization is taken from Harvard Dataverse; a data set compiled by Lenka Drazanova (2019). This variable captures the ethno-linguistic fractionalization that allows the user to compare the pattern diversity existing within a country. All the variables are included in this study according to the discussion in comparative economic development literature.

4.2.1 Descriptive Statistics

Table 7: Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
Year	715	2016	1.415	2014	2018
Social Progress Index	715	64.813	16.542	23.99	90.26
Real GDP per capita	715	5904.553	18692.75	4.151	166000
Latitude	715	27.50806	17.53396	.023559	64.963
Landlocked Dummy	715	.245	.43	0	1
Asia Dummy	715	.259	.438	0	1
Africa Dummy	715	.028	.165	0	1
Latin America Dummy	715	.126	.332	0	1
British Colony Dummy	715	.238	.426	0	1
French Colony Dummy	715	.133	.34	0	1
Spanish Colony Dummy	715	.112	.315	0	1
Islam Dummy	715	.259	.438	0	1
Buddhism Dummy	715	.056	.23	0	1
Hinduism Dummy	715	.021	.143	0	1
Judaism Dummy	715	.007	.083	0	1
Ethno-linguistic Fractionalization	715	.474	.261	.019	.982

The above presented Table provides descriptive statistics for the key variables of this research thesis. The first column represents the number of observations in total for 143 countries and five years. Two main variables of this work, SPI and real GDP per capita observe some variations in their figures for standard deviation due to the inclusion of various countries with different levels of social progress and national wealth. The lowest SPI score is observed for the Central African Republic in 2014, though, by 2016 they have recorded an improvement.[7] The lowest real GDP per capita score is recorded for India, 4.151, for the year 2014. By 2018, society's income level has improved. The highest and lowest latitude measurements belong to New Zealand and Iceland[8]. Note that, the comparative economic development literature has mentioned that when countries are located closer to the equator, these countries have a higher chance to maintain higher income per capita. Ethno-linguistic fractionalization shows low levels of standard deviation, which shows

[7] More details on SPI scores analysis are provided in Chapter 3.
[8] Latitude values are represented in absolute terms

that most of the figures for ethno-linguistic division are around the mean, and on average, the index is around 0.4 for many countries.

Rest of the exogenous variables are presented as dummy variables. According to the statistics of continental dummies, on average, most of the countries in this study are located in Asia. Europe, North America and Oceania, are the reference categories in this study. Figures for colonies reveal that most of the colonies have belonged to the British, while Spanish had the least number of colonies within the frame of countries used in this thesis work. Religion is also represented as a dummy variable, and according to the figures, among the presented religions, Islam is the most practiced religion. The Christian religion is taken as a reference category.

The descriptive statistics above demonstrate a raw statistical analysis. In the later stage of data collection, the model requires the main variables of the regression (SPI and real GDP per capita) to be logged for the Cobb-Douglas production function to take a linear form.

CHAPTER 5

RESULTS

5.1 BASELINE RESULTS

In Chapter 4, this thesis has talked about the regression methodology used for the model with time-invariant inefficiency. Following the JLMS (1982) estimation technique, the regression has been conducted using a two-stage estimation procedure. By using the ML technique in the first stage of the regression, stochastic frontier panel regression gives the estimates of the positive relationship of real GDP per capita and SPI (Table 8). However, this model does not allow the usage of "true" specifications. Time-invariant unobserved heterogeneity is present in the inefficiency terms along with time-varying specifications.

Table 8: First stage SF Panel regression

Dependent variable:	ln(SPI) (1)
ln(GDP per capita)	0.0644***
	(0.0152)
Constant	3.700***
	(0.103)
σ_u	.22857892
σ_v	.01900099
Number of countries	143

Notes: Robust country- clustered standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The second stage of the estimation procedure is conducted to disentangle the two components of the error term. Inefficiencies, $E(u_i|\varepsilon_{i,t})$, and efficiencies, exp $\{-E(u_i|\varepsilon_{i,t})\}$, are extracted from the stochastic frontier panel regression model. Tables 9 – 13 provide an OLS regression of explanatory variables with the inefficiency and efficiency terms. When variables are regressed with efficiency terms, the results should be symmetric with the results prevailed from the regression with inefficiency terms. Explanatory variables regressed with efficiency terms should display a negative sign.

The new regression on the second-stage of the regression takes the following form:

$$Z_i = E(u_i|\varepsilon_{i,t}) \quad (5.1)$$

$$Z_i = \alpha + X_{i,t}^{Geography}\beta + X_{i,t}^{Colonization}\mu + X_{i,t}^{Culture}\gamma + \omega_i \quad (5.2)$$

$$\text{where } i = 1, \dots, 143 \text{ and } t = 2014, \dots, 2018$$

where, Z_i is the disentangled inefficiency term representing a dependent variable of the OLS regression model; α is the constant; $X_{i,t}^{n}$ represent the exogenous variables that are assumed to affect inefficiency levels; ω_i is the error term. β, μ and γ are the elasticity of given exogenous variables. All the variables have been tested for multicollinearity and we find that there are no linear associations amongst the explanatory variables.

5.2 INEFFICIENCY OUTCOMES

This research study finds that geographical location and cartographic features are important exogenous factors that impact the inefficiency or efficiency levels of a society's effort to improve living standards.

Table 9: Impact of geographical attributes on inefficiency levels

Inefficiency	(1)	(2)	(3)	(4)	(5)
Latitude	-0.00715***		-0.00764***		-0.00557 ***
	(.000385)		(0.000319)		(0.000670)
Landlocked		0.152***	0.185***		0.1432***
		(0.0202)	(0.01586)		(0.0146)
Asia				0.123***	0.0181
				(0.0173)	(0.0200)
Sub-Saharan Africa				0.372***	0.177***
				(0.0170)	(0.028)
Latin America				0.0596***	-0.0811***
				(0.0178)	(0.0254)
Constant	0.384***	0.384***	0.585***	0.283***	0.4971***
	(0. 00909)	(0.00910)	(0. 0142)	(0.0108)	(0.0330)
Number of countries	143	143	143	143	143
R^2	0.082	0.082	0.423	0.425	0.540

Notes: Robust country- clustered standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Reference categories: Europe, N. America, Oceania

The second-stage regression analysis is demonstrated in columns (1) - (5) (Table 9). All the variables show a high correlation with inefficiency levels. The results confirm that the geopolitical location of a country also plays a significant role in a

country's social progress performance. A shift from the equator increases the inefficiency levels of a country to generate social progress by 0.00715. Additionally, we find that being surrounded by land, and being farther away from the equator increases the inefficiency even more, by approximately 0.19. Countries that are located farther from the equator and are surrounded by land have a higher chance to have inefficient utilization of national wealth towards social progress, in comparison with those that are either surrounded by seas and/or oceans or close to the equator.

Continental location is also another crucial geographical feature that was mentioned in the comparative economic development literature. In the 21st century, when globalization is accessible for most of the countries in the world, the estimations still show that inefficiencies are present. Countries located in Asian and Sub-Saharan African continents, unlike those in Latin America are less efficient relative to excluded categorical countries (Europe, North America, Oceania) in establishing social benefits to its society. Most of the inefficiency levels are present in Sub-Saharan African and Asian countries.

Overall, Table 9 demonstrates that geography has a strong correlation with social progress inefficiencies. North America, Oceania and Europe have a higher chance to show progress in social well-being than countries located in the rest of the world. These exogenous features cannot be changed. Though, some European countries, such as Armenia, Belarus, Kosovo, Serbia, Moldova, Macedonia, that are landlocked and/or are further away from the equator show higher levels of inefficiencies indicating that these countries are less efficient in converging material wealth into social progress.

Tables 10 and 11 demonstrate the regression analysis of European colonization and cultural attributes. The literature has shown that European colonizers have left their traces in countries they have colonized, and have impacted the lives of colonizers in various ways. For example, African countries have been experiencing ethnic conflicts, changes of inner institutional structures, from which our results show that these factors have impacted on their social progress levels. In columns (1) - (5) of Table 10 illustrate the impact of colonization on inefficiency levels of countries that have been colonized. According to the results, countries that were under Spanish colonization perform less inefficiently than those countries that have not been colonized by them; however, this relationship is very weak. Countries that have

been under colonization of the British and the French have higher inefficiency levels than those countries that have not been colonized. Overall, countries that have not been colonized and those countries that have been colonized by the Spanish, perform more efficiently in sustaining social progress.

From the geographical mapping of colonization, we see that British and French colonies were mainly located in the African continent. This colonization has resulted in ethnic diversity due to the imposing of borders by the colonizers, and hence, leading to different conflicts within ethnics. Columns (1) and (6) of Table 11 show the effect of ethno-linguistic diversification on inefficiency. According to the results, an increase in ethno-linguistic diversity increases the inefficiency by 0.319, and by 0.307 if all of the cultural factors (including religion) are taken into consideration.

Table 10: Impact of colonization on inefficiency levels

Inefficiency	(1)	(2)	(3)	(4)	(5)
British Colony	0.0811***			0.137***	0.131***
	(0.0205)			(0.0200)	(0.0206)
French Colony		0.282***		0.319***	0.313***
		(0.0255)		(0.0255)	(0.0261)
Spanish Colony			-0.117***		-0.0349*
			(0.0136)		(0.0138)
Constant	0.401***	0.383***	0.434***	0.346***	0.352***
	(0.00949)	(0.00812)	(0.00940)	(0.00817)	(0.00967)
Number of countries	143	143	143	143	143
R^2	0.023	0.176	0.026	0.238	0.240

Notes: Robust country- clustered standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$,
Reference category: countries that are not colonized

Columns (2) - (6) of Table 11 exhibit how inefficiency levels change considering given religions. Countries, where Islam is practiced more often than any other religions seem to demonstrate a positive relationship with inefficiency scores, while in countries where Judaism and Hinduism are practiced, inefficiency levels tend to decrease. Buddhism shows no effect on inefficiency levels. To the fact, cultural factors are mainly time-invariant and can be changed if countries experience disasters such as wars, colonization, reallocations of borders, suppressing individual freedom of choice and practice of religion, etc. As shown, countries practicing Islam as their religion have a negative tendency towards efficient

convergence of national wealth to social well-being. The results are also consistent for societies with high numbers of ethno-linguistic diversity.

Table 11: Impact of culture on inefficiency levels

Inefficiency	(1)	(2)	(3)	(4)	(5)	(6)
ELF[9]	0.319***					0.307***
	(0.0328)					(0.0318)
Islam		0.143***				0.121***
		(0.0183)				(0.0176)
Judaism			-0.179***			-0.118***
			(0.00857)			(0.00974)
Hinduism				-0.0571*		-0.114**
				(0.0283)		(0.0429)
Buddhism					-0.0239	0.0267
					(0.0336)	(0.0261)
Constant	0.270***	0.384***	0.422***	0.422***	0.422***	0.246***
	(0.0159)	(0.00963)	(0.00857)	(0.00869)	(0.00883)	(0.0159)
Numbers of countries	143	143	143	143	143	143
R^2	0.133	0.076	0.004	0.001	0.001	0.197

Notes: Robust country- clustered standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Reference category: Christianity

An OLS regression in Table 12 analyzes the extent to which exogenous factors cause inefficiencies in social progress development. When all the covariates have been regressed in a single OLS regression model, the impact level of all the exogenous variables have decreased, and a few lost their significance levels.

[9] Ethno-linguistic fractionalization

Table 12: Impact of geography, colonization and culture on inefficiency levels

Inefficiency	(1)
Latitude	-0.00459**
	(0.000680)
Landlocked	0.145***
	(0.0133)
Asia	0.0492*
	(0.0205)
Sub-Saharan Africa	0.142***
	(0.0283)
Latin America	0.0127
	(0.0346)
British Colony	0.0454*
	(0.0181)
French Colony	0.122***
	(0.0206)
Spanish Colony	-0.0800**
	(0.0303)
ELF	0.0729**
	(0.0271)
Islam	0.0160
	(0.0161)
Judaism	-0.102***
	(0.0163)
Hinduism	-0.154***
	(0.0271)
Buddhism	-0.0767**
	(0.0295)
Constant	0.411***
	(0.0367)
Number of countries	143
R^2	0.591

Notes: Robust country- clustered standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Reference categories: continents - Europe, N. America, Oceania; countries that are not colonized; religion – Christianity

Latin American continental dummy and Islam dummy have lost their significance levels, while estimations of latitude, British colonial dummy and ethno-linguistic fractionalization have decreased in their statistical meaning. Hinduism dummy and Spanish colony dummy, instead, have gained a strong significance level; however,

it showed very low statistical meaning when was regressed separately along with other religion dummies. Buddhism and Asian dummies have gained significance.

Overall, exogenous variables that affect the inefficiency levels the most, are when a country is landlocked, located in Asia and Sub-Saharan Africa rather than located in Europe, North America, and Oceania, has a broad ethnic and linguistic diversity, colonized by British and French colonizers, and has a society that follows certain religious beliefs (Judaism, Hinduism, Buddhism). From this, it can be concluded that there is a dynamic correlation between exogenous factors, such as religion, geolocation, history, and even sharing different ethnics and languages. The literature already has found strong relationships between these exogenous factors and economic growth. This thesis concludes that there is a direct impact of these exogenous factors on social progress. For example, a country may be having a good geopolitical location, surrounded by water. However, colonization history and a wider ethnic and linguistic diversity negatively impact the social progress factors. This explains why Sub-Saharan African society is struggling with improving subjective and social well-being.

To prove the symmetry of the inefficiency regression analysis, we have conducted a second series of OLS regressions. In this step, we have regressed efficiency levels with exogenous variables. The outcomes are displayed in Table 13. According to the table, the results demonstrate symmetric outcomes with little or no difference. When these results are compared with the regressions using inefficiency terms, it is evident that inefficiency levels display greater changes; however, the signs of the variables verify the symmetry.

5.3 SYMMETRIC EFFICIENCY OUTCOMES

After estimating the impact of exogenous variables on inefficiency levels, we have conducted a symmetric transformation of inefficiencies using the inefficiency scores to produce estimates of efficiencies. Efficiency levels are obtained via

$$\exp\left\{-E(u_i|\varepsilon_{i,t})\right\} \tag{5.3.1}$$

Efficiency terms are regressed in the same OLS regression procedure using the same exogenous covariates. The results of Table 13 suggest that the impact of geography, colonization and culture are symmetric to those outcomes that we have

obtained through our regression with inefficiency levels. Although, we observe a slight difference in our outcome numbers, which suggests us that the relationship of inefficiency and efficiency levels are non-linear. A graphical representation of this relationship is demonstrated in Figure 7.

Table 13: Impact of geography, colonization and culture on efficiency levels

Efficiency	(1)
Latitude	0.00309***
	(0.000424)
Landlocked	-0.0918***
	(0.00768)
Asia	-0.0333*
	(0.0133)
Sub-Saharan Africa	-0.0920***
	(0.0174)
Latin America	-0.0100
	(0.0241)
British Colony	-0.0233*
	(0.0114)
French Colony	-0.0603***
	(0.0112)
Spanish Colony	0.0461*
	(0.0218)
ELF	-0.0332
	(0.0170)
Islam	-0.0186*
	(0.00941)
Judaism	0.0650***
	(0.0110)
Hinduism	0.0821***
	(0.0180)
Buddhism	0.0462**
	(0.0215)
Constant	0.669***
	(0.0223)
Number of countries	143
R^2	0.581

Notes: Robust country- clustered standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Reference categories: continents - Europe, N. America, Oceania; countries that are not colonized; religion – Christianity

5.4 GRAPHICAL ANALYSIS OF INEFFICIENCY

This thesis work has extracted implemented a two-stage estimation technique, where in the first stage, time-invariant inefficiencies were disentangled from the error term. Later, estimates of technical efficiencies have been produced by $e^{\{-E(u_i|\varepsilon_{i,t})\}}$. In the second stage, this thesis has depicted the exogenous factors of inefficiencies. However, the relationship between the main variables and inefficiencies has not been analyzed.

Figures 3 and 4 display the graphical representation of social progress index growth and inefficiency and efficiency levels of studied continents. Scatter plots show that the Sub-Saharan African continent is the most inefficient. Both of the figures show that Sub-Saharan Africa has very low SPI growth statistics and relatively low efficiency levels. Table 8 also shows that Sub-Saharan Africa dummy displays the highest inefficiency levels amongst other continents. Asia's scores also demonstrate similar results. However, due to its size, there are countries in the Asian continent that perform better and are more efficient in transforming their national wealth into social progress than some of the countries located in the European continent.

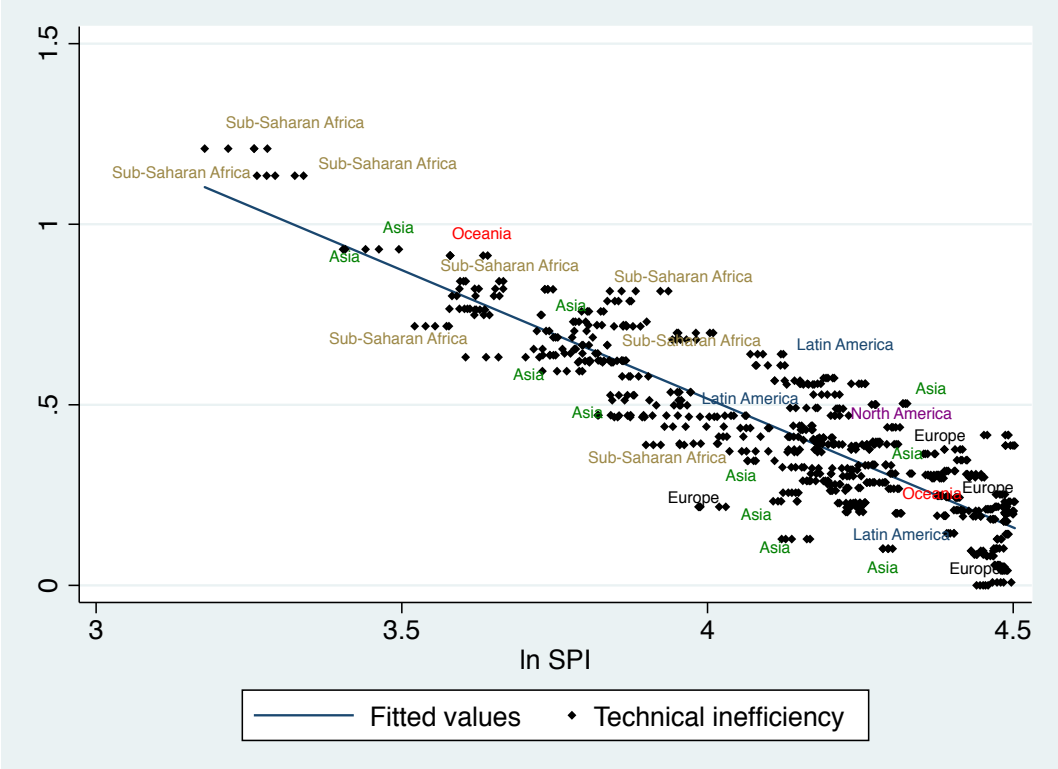

Figure 3: Scatter plot of inefficiencies and SPI

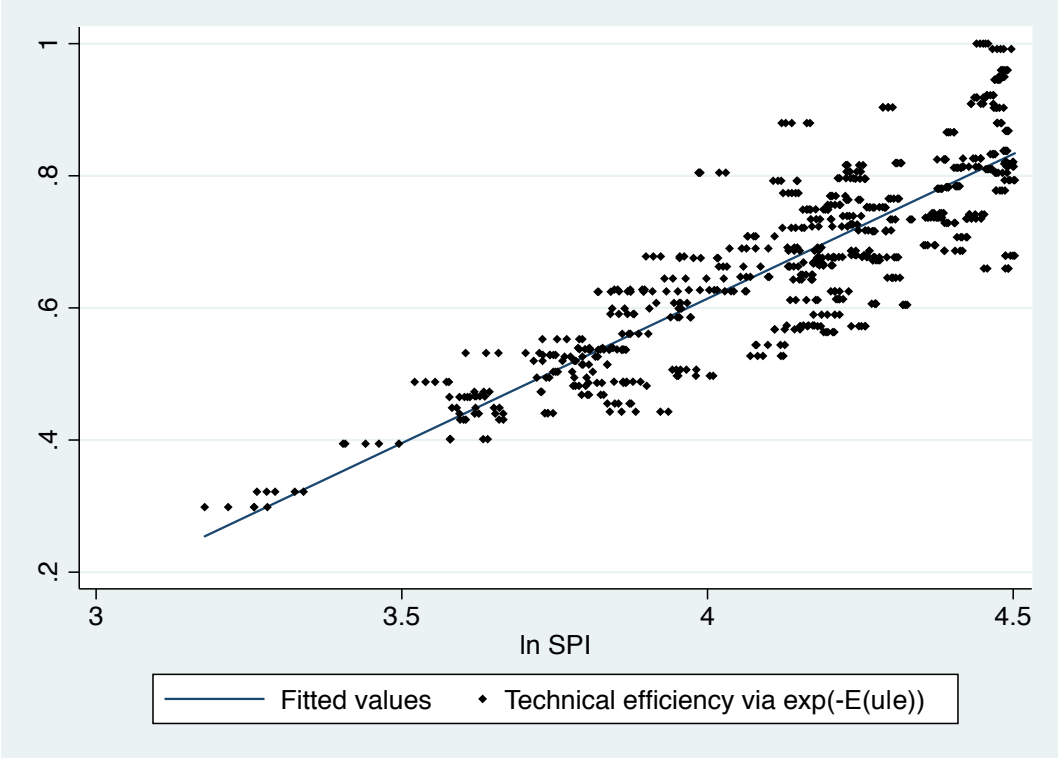

Figure 4: Scatter plot of efficiencies and SPI

Latin America exhibits moderate SPI growth rates and inefficiency levels. The most efficient countries are located mostly in the European and Oceania continents. Efficiency figures demonstrate a reflective causality relationship of the inefficiency with SPI growth graph.

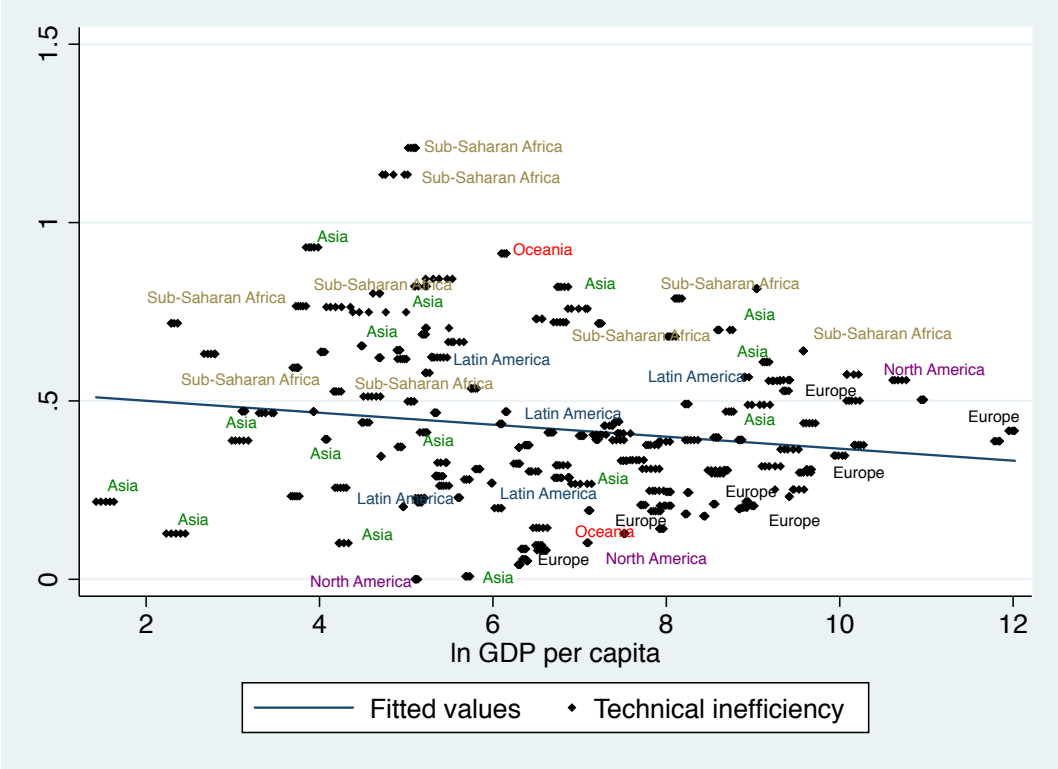

Figure 5: Scatter plot of inefficiencies and ln GDP per capita

Figures 5 and 6 show the level of inefficiency and efficiency that countries have in transforming their GDP per capita to social progress. We observe that countries that are more developed demonstrate lower inefficiencies in transforming their material well-being into social welfare. For example, European continent and some parts of North America and Oceania are more advantageous in generating economic development, which has also been reflected in their SPI scores. Sub-Saharan African countries display the most inefficiency in producing social progress using their material wealth. Asian countries, on the other hand, are spread along the scatter plot. Most of the countries in Central Asia, South Asia and West Asia, have very slow and low economic growths. Countries at the eastern part of Asia, show higher economic growth rates and lower inefficiency levels

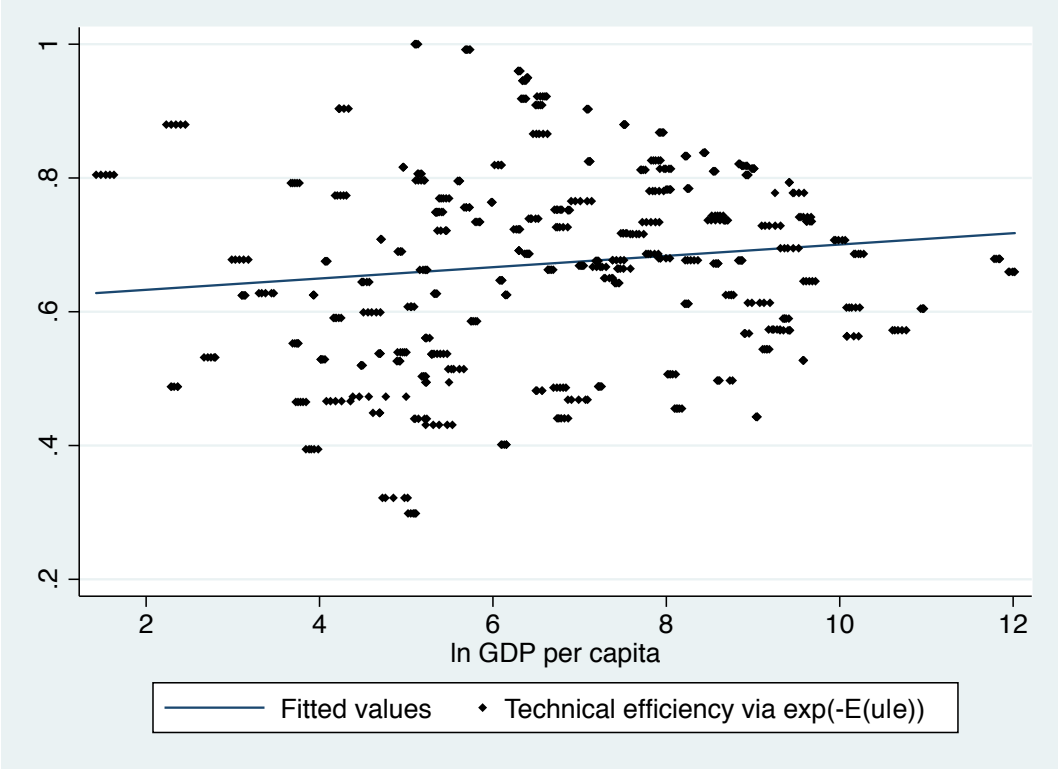

Figure 6: Scatter plot of efficiencies and ln GDP per capita

In general, these graphs show the significant differences in growth rates between the two important factors of a country's well-being: social progress and economic growth. There is a notable variance in (in)efficiencies and the major concerns of the related country groups. Social progress growth inefficiency trends are very steep, and that may be caused due to exogenous factors regressed, and shows how countries are (in)efficient in generating their national wealth towards society's well-being. It indicates that it is in the concern of many governments to stabilize economic growth.

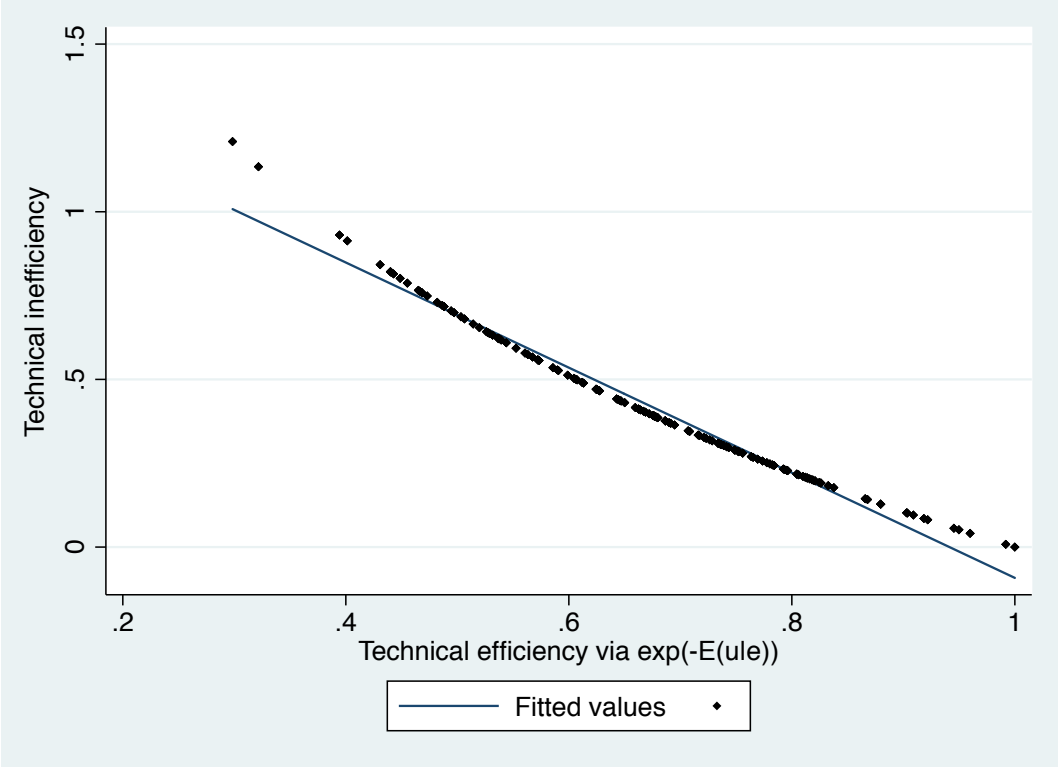

Figure 7: Scatter plot of inefficiencies and efficiencies

Figure 7 represents a non-linear relationship of inefficiency and efficiency terms extracted at the second stage of the estimation method. Since the efficiency terms have been obtained from inefficiency terms, the graph above represents the transformation of inefficiencies to efficiencies via $\{-E(u_i|\varepsilon_{i,t})\}$.

5.5 ADDITIONAL ESTIMATES FOR INEFFICIENCY

From the statistics, we observe that most of the inefficiency figures vary around the mean. The average inefficiency score is recorded as 0.42, while the maximum inefficiency is around 1.2 points. From previous chapters, we know that the maximum inefficiency levels are noted amongst Sub-Saharan African countries.

Table 14: Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
Inefficiency	715	.4206995	.2279377	0	1.209185

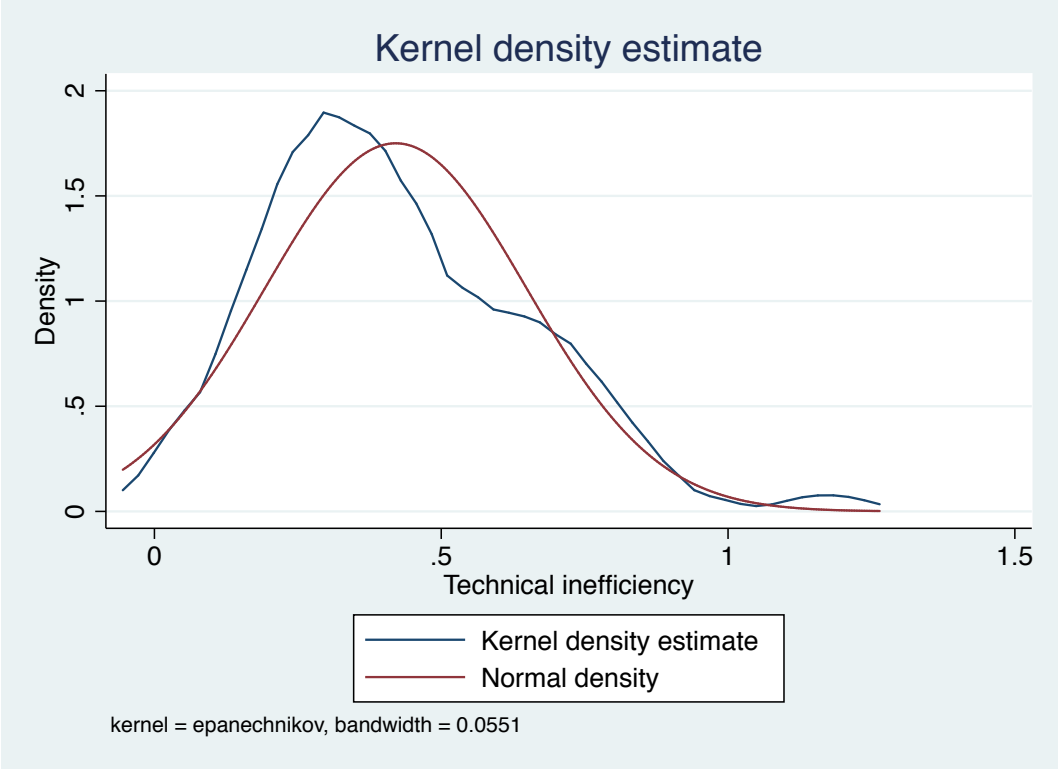

Figure 8: Kernel density estimate of the inefficiency term

Next, we have graphed the kernel density of the inefficiency (Figure 8). Kernel density estimation has produced a smooth distribution of the technical inefficiency term over the given continuous interval. The bandwidth is relatively small indicating that the standard deviation is small and the kernel estimations have placed the probability within the first tall "bump". Most of the inefficiency population is above the threshold. This indicates that countries are inefficient the most at around 0.1 and 0.5, and the rest of the population is spread along the continuous curve. However, there is also a noticeable portion of distribution in the interval between 0.6 and approximately 0.9.

The fact that the inefficiency distribution is denser around the first thick bump indicates that the inefficiency levels are relatively low amongst the countries that thesis work has researched.

In the next stage, we have conducted Skewness/Kurtosis test to analyze the normality of the distribution of the data (Table 15).

Table 15: Skewness/Kurtosis Test for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
Inefficiency	715	0.0000	0.0513	40.31	0.0000

The null hypothesis is that the data is normally distributed. The result of the test suggests us that we can reject the null hypothesis. The *p*-value of Skewness implies that the measure of the asymmetry of the distribution of the inefficiency variable is not normally distributed. On the other hand, Kurtosis's probability value of 0.0513 (*p*-value > 0.05) indicates that kurtosis is asymptotically distributed. Chi (2) is less than 0.05, which indicates that the null hypothesis is rejected, and the residuals are not normally distributed.

CHAPTER 6

DISCUSSIONS AND CONCLUDING REMARKS

6.1 CONCLUSION

The measurement of economic growth has been initiated after the Great Depression when Kuznets (1934) has proposed a worldwide interpretation of economic growth. In a very short time period, GDP became the primary economic success measurement until Robert F. Kennedy questioned the validity of this tool at his speech in 1968.

GDP is not a perfect measure to adequately represent the standards of living or social welfare in a country. For instance, Saudi Arabia, Kuwait, Russia, China, and the United States are a few of wealthy economies; however, their social progress reports show that they are underperforming relative to their GDPs. The quality of life has not reached its full potential, and it is even progressing slower than countries with lower GDP levels.

In the 21st century, economies are being affected by unexpected events, not only economically but socially and politically as well. GDP certainly fails to measure social well-being. Various organizations and specialists have introduced alternative measurements of social and individual well-being. The United Nations Human Development Program initiated the very first measurement of social wellness. This index has aimed to compute social development, including income levels. However, HDI lacks to measure poverty, corruption, happiness, governance, justice, and many other social and political attributes.

In 2014, the Social Progress Imperative team has introduced SPI. It promises to provide data that address only societal issues that matter to people and to merge 54 social development indicators into a single index. According to the SPI score analysis, most of Europe, North America, and Oceania have better social progress index values while Sub-Saharan Africa and some of the Asian countries record low levels of social progress. Chapter 3 provides a detailed analysis of the main SPI patterns.

Within the five years analyzed in this thesis, some countries have made significant improvements. For example, Tanzania, Ethiopia, Swaziland, Nepal, Kyrgyzstan and Uzbekistan have made the most significant progress while Turkey, United States, Thailand and Yemen have experienced declines over the five years (2014-2018). Most of the decline has been recorded in the *opportunity* dimension, capturing the aspects of further human development. Most of the progress is observed within *basic human needs*. Social Progress Imperative's aim is not to track the progress of the implemented policies, but rather evaluate the current situation of social progress, and stimulate further social development by prioritizing specific matters of concern. In order to stimulate progress, countries have to direct their national wealth to necessary social issues. However, not all economies have been able to transform their material wealth into social progress efficiently. The proof of this is that there exists countries with similar GDP levels and very different social progress levels (refer to Figure 1).

Motivated by this question, this research thesis analyzes whether and why societies are (in)efficient in transforming their material wealth into social progress. To do that, this work uses the stochastic frontier modelling proposed by Aigner et al. (1977) and Meeuse and van den Broeck (1977). This model is mainly used in firm-level analyses. However, this paper expands the utilization of this model by implementing it for the study of contemporary economic development. The thesis assumes that there exist barriers for countries to achieve the full efficient outcome of converging to their social progress frontier. These barriers are the exogenous factors mentioned in the contemporary economic development literature. The literature suggests that institutional differences, geography, religion, colonization history, ethno-linguistic fractionalization, and other related factors affect economic development. Hence, inefficiencies are determined *a priori* by these exogenous factors. Before conducting the regression analyses, the econometric model disentangles the time-invariant inefficiencies. After that, these inefficiencies are regressed using the OLS estimation technique.

The results suggest that geographical attributes have a significant impact on inefficiency levels. Landlocked countries are highly inefficient in generating social progress. There are countries in Sub-Saharan Africa that have access to water. Still, countries located in this geographical continent demonstrate the greatest inefficiency levels in comparison to European, Oceanian and North American

countries. The geographical environment affects social advancements such as sanitation, access to clean water, safety, education, personal freedom and many other determinants of SPI. Unfortunately, geographical locations cannot be changed over time.

History has also left its traces, and they are apparent in the inefficiency levels. Many of the African, Latin American and Asian countries have been under the control of more powerful imperialist states. This thesis considers only three of the main European colonial empires: British, Spanish and French. The results show that colonization mostly has a negative influence on the efficiency levels of social progress.

From another cultural perspective, religion is also believed to cause (in)efficiencies because religion is a prime factor that can directly influence the behavior of an individual. For this reason, this thesis uses Islam, Buddhism, Judaism, Hinduism, and Christianity as principal religious beliefs. The results suggest that the impact of religion on inefficiency levels vary according to religious beliefs. Countries that practice Islam as their primary religion have no significant changes in in(efficiency) levels, while other religions cause deviations from the social progress frontier line.

To conclude, this paper gives an insight into why countries are failing to direct their material wealth towards social progress. However, countries are so driven in economic prosperity that inefficiency levels vary noticeably compared to the inefficiency variations in real GDP per capita levels. From the relevant figures, it is apparent that, at similar GDP levels, these countries may experience very different social progress levels. These differences are explained by the exogenous factors of comparative economic development.

6.2 DISCUSSIONS

The notion of improving social well-being is still a topic of debate between people who deny the advantages of social progress and who believe that social progress may help in adjusting society's needs and wants to the modern era. In this thesis, we have studied how countries with distinctions in historical, religious and geographical fields can achieve contrasting social progresses. We have underlined the importance of inclusive growth, where social and economic developments occur at the same time. Our research may be implemented in the analysis of migration

causes. The exogenous factors that are unalterable may cause people to migrate from one country/continent to another. These causes leave a thought for other baseline researches on the impact and causes of migration on inefficiency levels.

Additionally, our research thesis leaves various concerns of this modern world unanswered. Unexpected emergence of COVID-19, a new unknown form of coronavirus has put the entire world, especially many of the developing countries, under economic and social downfall. We assume that this phenomenon has impacted the social development that countries have been trying to achieve in a negative manner. Firstly, the medical institutions are experiencing unprecedented hospitalization numbers of infected people. This situation is already or will cause the deterioration of basic medical care in developing countries. Besides, we assume that the trust of people in their governments has fallen due to the actions (social and economic) taken by the officials (politicians and leaders) during this pandemic. Also, the education system has been experiencing a total transformation from in-class based studies to online format, which negatively impacts those students who do not have basic access to the technological world.

At this time period, measuring the most accurate social progress figures is vital for governments to distribute their wealth efficiently towards the society's welfare. 2020 has shown us how important it is to devote considerable attention to social progress in order to make sure that there is a long term societal success. This includes ensuring that society is provided with basic human needs, education, healthcare, social care, access to technology (internet, telecommunication, electronics,), etc.

In conclusion, due to COVID-19, the progress of social attributes has been drastically impacted, indicating that not all governments have been ready for such a disaster. This thesis does not consider the effect of unexpected natural disasters on inefficiency levels, but rather researches about the effects of exogenous factors that cause inefficient division of a nation's wealth. In the preceding research analyses, we can investigate the impact level of natural disasters on the inefficiency levels. We assume that this investigation may help states to be more prepared and minimalize the impact of the damages cause by unexpected disasters on social welfare and progress of the nation.

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APPENDIX 1.

UNITED NATIONS SOCIAL DEVELOPMENT GOALS 2030

1. No Poverty	2. Zero Hunger	3. Good Health and Wellbeing	4. Quality Education	5. Gender Equality	6. Clean Water and Sanitation
7. Affordable and Clean Energy	8. Decent Work and Economic Growth	9. Industry, Innovation and Infrastructure	10. Reduced Inequalities	11. Sustainable Cities and Communities	12. Responsible Consumption and Production
13. Climate Action	14. Life Below Water	15. Life on Land	16. Peace, Justice and Strong Institutions	17. Partnership for the Goals	

Source: Sustainable Development Goals Knowledge Platform, 2020

APPENDIX 2.

SOCIAL PROGRESS INDEX FORMATIVE APPLICATION IN SDGs 2030

Social Progress Index		
Goal 1: End Poverty		
Goal 8: Decent Work and Economic Growth		
Goal 10: Reduced Inequalities		
Goal 17: Partnership for the Goals		
Basic Human Needs	*Foundations of Wellbeing*	*Opportunity*
Goal 2: End Hunger	Goal 3: Promote Good Health and Wellbeing	Goal 4: Provide Quality Education
Goal 3: Promote Good Health and Wellbeing	Goal 4: Provide Quality Education	Goal 5: Gender Equality
Goal 6: Ensure availability of Clean Water and Sanitation	Goal 5: Gender Equality	Goal 16: Promote Peace, Justice and establish Strong Institutions
Goal 7: Affordable and Clean Energy	Goal 6: Ensure availability of Clean Water and Sanitation	
Goal 9: Industry, Innovation and Infrastructure	Goal 7: Affordable and Clean Energy	
Goal 11: Sustainable Cities and Communities	Goal 9: Industry, Innovation and Infrastructure	
Goal 16: Promote Peace, Justice and establish Strong Institutions	Goal 12: Responsible Consumption and Production	
	Goal 13: Climate Action	
	Goal 14: Life Below Water	
	Goal 15: Life on Land	
	Goal 16: Promote Peace, Justice and establish Strong Institutions	