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Short- and Long-Term Correlation of Social Security Expenditure and Human Development: Turkish Model

Summary: The aim of this study is to analyse the relationship between social security expenditures (SSE) and human development in Turkey between 1990 and 2014. The main variables of the analysis include the proportion of social security expenditures in gross domestic product (GDP) for social security expenditures and the re-calculated real Human Development Index (HDI) values, with data from the Turkish Statistical Institute (TUIK) for human development. In doing so, the auto-regressive distributed lag (ARDL) bounds test for co-integration is employed. It has been seen upon conclusion of the analysis that social security expenditures are positively affecting human development on a significant level, in both the short- and long-term.

Key words: Social security, Human development, Social welfare.

JEL: H55, I31, O15.

When we regard official State facts as instruments that are required to develop its efforts in terms of improving social welfare, examining the State's approach in relation to social security will significantly contribute to literature. In this context, human development has the characteristics of being a major factor with which to support the correlation between social security and the State.

Arguing how the State, at this point, can contribute to the improvement of the welfare level of society is important and necessary. In a resolution of this matter, should the State be perceived as a monster, as in Leviathan? Should it be placed in a paternalistic structure? Should we act, according to the Liberal scale, which upholds individual freedoms and free markets, or according to a Socialist system, where the State is the dominant factor? To what degree of Social State Approach or Regulatory State Ecole, would we see an improvement of the level of social welfare? Of course, we may reproduce such questions. However, what shouldn't be forgotten is that financial effectiveness and social justice should be sealed within the layers of such arguments.

In this context, it can be said that social security is fairer and is an important instrument in ensuring financial effectiveness. In this study, it is emphasised that the State should have a role which equalises and regulates the social security market. The basis of opinions which uphold intervention of the State in the economy has certain drawbacks. The market mechanism is not able to reform this situation, which is also

referred to as "market failures". Therefore, the State is required to intervene in the social security market with its various instruments. Social security expenditure (SSE) is also seen as an opportunity by the State to remove malfunctions in the market. If this opportunity is utilised in an efficient way, improvements in human development may emerge. Furthermore, this study is established on the base hypothesis of "increasing SSE allows the community to look to the future with confidence and the performance of a people-oriented development".

The aim of this study is to test the short- and long-term relationship between the SSE data and the Human Development Index (HDI) data, which is re-calculation through the use of real data. To understand the topic better, three items need to be explained: (i) social security and human development concepts; (ii) how analysis data has been obtained; and (iii) methodology in econometric analyses and analysis findings. Finally, the conclusion section where the findings have been evaluated and various suggestions have been offered, has been included.

1. A Content Study for Social Security

The principal obligations of the State with regards to social security have been set forth in the Social Security and General Health Insurance Law in Turkey (Grand National Assembly of Turkey 2006). In its content, the State is obliged to secure individuals with social insurance, in terms of general health insurance, to identify people who will benefit from such insurance, and provide rights, the terms of utilising these rights, the methods of financing and compensation, and to regulate procedures and principles, with regards to the operation of social and general health insurance.

We may express social security, generally, as ensuring individuals and families who have become dependent by being exposed to harm, no matter what the reason, have a minimum life standard. This should correspond with basic human dignity, without being in need of help from others in the community they live in, by removing them from the hardships they have suffered. With this aspect, social security is one of the fundamental human needs, which should be primarily met, and embraces food and accommodation (Yusuf Alper 2003).

As it is stated in the United Nations Universal Declaration of Human Rights (United Nations General Assembly 1948) Article 25: "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing, medical care, and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age, or any other lack of livelihood, in circumstances beyond his control". With this expression, social security rights have also been considered among basic human rights, and been secured with an international text. Meanwhile, this text makes it clear that the most fundamental human need of an individual is to develop himself.

The Social Security (Minimum Standards) Convention (International Labour Organization (ILO) 1952), is the best of all ILO social security conventions, as it is the only international instrument, based on basic social security principles, establishing worldwide-agreed minimum standards for all the nine branches of social security. These branches are: medical care, sickness benefit, unemployment benefit, old-age benefit, employment injury benefit, family benefit, maternity benefit, invalidity benefit

and survivors' benefit. Need of care in the case of senility was also later added to these factors.

Social security expresses all methods employed by individuals, to regulate their lives in the largest meaning. However, in the strictest sense, social security includes all kinds of financial support, other than those supplied by the market (Stephen McKay and Karen Rowlingson 2011). Within this framework, it can be said that basic resources which create a basis for social security are family and the State's supports.

Turan Yazgan (1992) has defined social security as taking various precautions against possible harm for all individuals in society. If individuals encounter real dangers, they need to be rescued from the harm caused by this danger, by putting these precautions into action. In such a case, social security is a guarantee of rescue for these individuals from the harm and dangers they will suffer. It is a sense of satisfaction that this guarantee is ensured.

Kenan Tunçomağ (1990), however, has defined as an institution or an institutional community, which has the duty of providing economic warranty to individuals against certain risks, regardless of their incomes. In this context, Tunçomağ (1990) has linked social security aids to the fulfillment of three basic conditions. The first is that the purpose of the aid should be providing means of support, in case of reluctantly losing the whole or a portion of remedial or protective treatment, the work income, or providing a side income for individuals who have lost their relatives. Secondly, the payment should be ordered by law. Lastly, the organisation making the payment should be official, semi-official, or independent.

The basic objectives which social security tries to reach, supplies resources for the people related to the development of a country. These basic objectives are: providing protection against various risks such as retirement, unemployment and sickness; easing poverty and low incomes; re-distributing various opportunities during the life cycles of people, especially in transition to retirement from working age; re-distributing resources between the rich and the poor; recovering certain situations which require additional cost; and providing financial support, in case of the traditional family structure breaking down (McKay and Rowlingson 2011).

Peoples' social security needs are met by a social security system. The social security system provides that a worker makes agreed-upon contributions to the employer's defined benefit pension plan and obtains agreed-upon benefits upon retirement (Shiyu Li and Shuanglin Lin 2016). Namely, social security also ensures guaranteed retirement benefits to those who contribute to the system during their working years (Javed Ahmed, Brad M. Barber, and Terrance Odean 2018).

Social security is a social need which must be absolutely compensated for each individual and society. The reasons determining this need are universal, and cover everybody. Compensating these, however, may vary from one society to another, and according to the compensating sector (Yazgan 1992). Hence, we are required to differentiate between social insurances and private ones.

It should be mentioned that the basic characteristics which discriminate social insurances from private insurances are social equalisation, insurance obligation, the State's support, and the principle of self-management. In social equalisation, the extent of insurance premiums is identified, according to the insured's ability to pay, and as a

certain percentage of the manufacturer, rather than the insured risk in principle. The insurance obligation indicates that it is mandatory by public law. The financing of social insurances mainly depends on premiums paid by the insured and the employer. However, it is generally accepted that the State should provide support when needed (which varies, according to the qualification of the social-state). In democratic societies, social insurances are not managed by means of persons, or the State, but by means of independent public law institutions (Tumçomağ 1990).

On the other hand, social security is a sense of satisfaction which social politics would like to ensure. It is based on the ideal of rescuing people against harm. It is a social political warranty given to people in the matter of not being "prisoners of their needs" (Yazgan 1992). Social politics is also an important factor for social security in this perspective.

In the scope of the ideals behind social security, any, and all people, are required to reach the national extent without remaining uncovered, be suitable for the national economic development level, and their welfare level should increase, provided that it does not fall under a minimal level, which corresponds to human dignity. This increase should never be linked to earnings on a level which will sabotage the functioning of the system, and make savings that individuals forget. However, it should be linked to earnings on a level which will discriminate between the worker and non-worker (Yazgan 1992). Ensuring this equalisation will support the increase of the welfare levels of people.

2. From Development to Human Development

Development problems are one of the basic focal areas of a development economy, and have a quite different content from an economic growth concept, and these should not be mixed.

One of the key elements in measuring economic development is economic growth, which is considered in many researches. The economic growth which is measured, generally, through gross domestic product (GDP) *per capita*, has been found to be related with economic development. In fact, development in different countries is the matter of a change process encountered with several methods. Since measures on information with regards to the progress of such a development are needed, components such as human development, integration of information within homes, industrial framework, the quality of life, or the environment cannot be found in GDP (José-Luis A. Navarro, Victor-Raúl L. Ruiz, and Domingo N. Peña 2014).

However, development expresses a concept which is larger than growth. Sami Taban and Muhsin Kar (2014), define this concept as the development of economic structure of an underdeveloped society, changing and renewing the cultural and political structures of it. In other words, as well as an increase of *per capita* income, structural changes, such as changes in efficiency and amounts of manufacturing factors, percentage increase of the industry sector in national income, and exportation comprise the basic factors of development (Taban and Kar 2014).

The move to gain a new perspective by putting the human into focus, triggered the emergence of the human development concept, and various researches have, subsequently, been conducted on this topic. It should be said that the foundations of human

development have been laid for the present times by Amartya Sen's (1997) able to do-capability approach. This approach has the potential and ability to do something, or to gain function. The increase of a person's achievements during his life expresses a people-oriented development. Sen (1997) has stated that it shouldn't be disregarded that for an individual to do something, he should have values such as personal characteristics, social background, and economic conditions – and the value which comes true, may occur directly (related with enriching one's life such as being well fed or healthy) or indirectly (contributing to manufacturing or making price controls in the market), whilst increasing human abilities, welfare and freedom is closely related with economic production and social change (Sen 1997).

The relationship between development and human rights should be mentioned here, as development is an approach, which tries to put into practice, an understanding and implementation of performance and protection of human rights centre-stage. Published by the United Nations (UN) Declaration on the Right to Development (UN 1986), it was expressed as: "The right to development is an inalienable human right, by virtue of which, every human person and all peoples are entitled to participate in, contribute to, and enjoy economic, social, cultural and political development, in which all human rights and fundamental freedoms can be fully realised".

As is seen from this point, for realisation of a people-oriented development, only improving income level is not sufficient, and it is required to increase freedoms, which will contribute to economic, social, and cultural development. Sen (1999), who has interpreted human development as the process for the extension of freedoms, has stated that national income increases the freedoms of people. However, this is not sufficient, as it is also linked to other factors, such as civil and political rights (for example, freedom to participate in inspections, and democracy), as well as economic and social arrangements (such as education and health services) (Sen 1999).

Increasing human development has a close correlation with popularising welfare state understanding. We can say that welfare states have a regulatory and supervisory impact on market economies. Asa Briggs (1961) explains the welfare state as a utilisation of public power in the market, in an organised manner, aiming to reduce the efficiency of powers in the market. According to Briggs, it is necessary to emphasise three fundamental areas in using this power. The first one is assuring a minimum income for individuals and their families, independently of economic conditions in the market. The second one limits the scope of precarity against social risks, which may lead them to fall into a crisis (sickness, senility, unemployment, etc.) unless precautions are taken. The third one ensures that social services are applied in society with good standards, without making any class or statutory discrimination (Briggs 1961).

Moving forward with these explanations, it can be said that a more suitable background is prepared for the improvement of human development in social welfare states, in which economic and social transformations are improved between the State and society. This is due to a significant proximity observed between the objectives and targets of welfare states, and topics covered by human development.

3. Literature Review

Generally, in social welfare states and countries where SSE is high, this the most important images of these States is promoted. It is suggested that labour productivity is

high amongst those people whose moral force is also high, whilst the labour force and level of education increases, the integration of the labour force into the formal economy becomes easier. Political stability and harmonisation, which have been created by ensuring social confidence and social welfare, make economic politics gain in stability. All of these together, provide a suitable environment for rapid and stable economic growth. Within this scenario, there are some studies in literature which support these matters. When the literature is investigated, it can be observed that studies are moreover established on economic growth and human capital relations of the SSE.

According to Alexander Kemnitz and Berthold U. Wigger (2000), social security certainly has a positive impact on human capital. Growth is not a result of the increase on physical capital, but of an increase on human capital. Therefore, social security affects growth with the increase on human capital stock.

Jie Zhang (1995) has determined in a conducted study that social security supports growth by reducing productivity and increasing human capital investments, without amending the savings ratio.

Jorge Alonso-Ortiz (2014), analyses the differences in social security features to explain many differences in employment to population ratios at older age levels. He finds that differences in social security account for a significant amount of the variation in employment to population for such groups.

Pierre Pestieau and Maria Racionero (2016) have examined whether special pension provisions, such as early retirement, should be offered to workers in occupations characterised by lower average life expectancies. They determined that there was a case for differentiating the pension policy by occupation, when longevity is correlated with occupation.

Leran Wang (2015) has analysed how fertility and unemployment are affected by a social security system in an overlapping generations model. She detected that, for any given minimum wage, the pension may improve fertility and decrease unemployment.

Some studies have noted a positive relationship between health expenditures and economic growth, with panel data analyses (Santiago Lago-Peñas, David Cantarero-Prieto, and Carla Blázquez-Fernández 2013; Habib N. Khan et al. 2016).

Chien-Chiang Lee and Chun-Ping Chang (2006) have examined the correlation between the SSE and GDP, by using panel data belonging to the 1980-2001 period of 25 Organization for Economic Co-operation and Development (OECD) countries. As a result of the conducted analysis, it has been identified that there is a powerful cointegration correlation between both variables in the long-term, and there is a bi-directional causality correlation between the SSE and GDP.

As a result of a study conducted by Patricia Peinado and Felipe Serrano (2014), regarding the reforms implemented in the Spanish pension system, they have had a positive effect on the poverty rate of the retired population. It was found that reforms designed to re-establish the financial equilibrium of pension systems, may put one of the most important objectives of these systems at risk: to reduce the poverty rate among the elderly.

Noraina M. Sapuan and Nur A. Sanusi (2013) have predicted short- and long-term correlations between economic growth, social service spending, and human

capital in Malaysia, by means of a limited test method for the period between 1975 and 2011.

In the conducted analysis, it has been determined that social service spending by the government is significant in terms of the development of human capital and economic growth. Likewise, they have determined that an increase of health and education capital may support the occurrence of human capital and an improvement of economic sustainability.

In the study conducted by Emanuele Baldacci et al. (2008), by using panel data of 112 developing countries from the years 1971-2000, they determined that health and education spending have positive and important effects on human capital saving, health, and economic growth.

Gerald I. Chukwunonso (2014) has examined the impact of social spending on human development in 20 selected Sub-Saharan African countries. In the study, health and education spending's impact on the Human Development Index was investigated. Analysis showed that health and education spending have a significant impact on human development in these countries.

When we look at literature studies, it can be observed that there isn't a direct analysis of the correlation between SSE and development, or HDI, which are the main themes of this study. Moreover, it seems that it is not sufficiently focused on the real values of the Human Development Index. Nonetheless, there are limited similar studies, such as SSE and gross national product (GNP); social expenditure and human development; social security and human capital; social service expenditure and growth; and human capital. In addition, this study contributes to the lack of evidence towards the relationship between SSE and human development in the literature. Moreover, it is foreseen that this conducted study will contribute to the area of the economy's development, significantly.

4. Material and Method

It is required to give explanations regarding these two data sets which have been used to measure the correlation between SSE and human development in Turkey. Short- and long-term correlations amongst the analysis data have been investigated using the auto-regressive distributed lag (ARDL) method. Within this framework, explanations with regards to the content of data used, how they have been collected, their developments spanning years, and analysis methods are made in this section.

4.1 Study Data

While the correlation between SSE and human development is investigated in this study, data calculated in the 1990-2014 period has been taken into account. Consequently, the proportion of social security expenditures to GDP was taken into consideration, for the social security expenditures in Turkey, whilst the real HDI values, calculated using the data from the Turkish Statistical Institute (TUIK), according to the HDI's basic components, were considered for human development. Below, more extensive information is given regarding the details of this data, and the calculation methods used.

Information on data belonging to variables used in the study and descriptive statistics are presented in Table 1.

Table 1 Variables and Their Descriptions

Variable	Description	Reference
HDI_Real	Real Human Development Index in Turkey	Data has been obtained from the Turkish Statistical Institute and has been calculated, according to the HDI formula.
SSE	Proportion of social security expenditure in Turkey to GDP	Data has been collected from the Social Security Institution (SSI) and Turkish Statistical Institute database.

	Mean	Standard deviation	Median	Max.	Min.
HDI_Real	0.790	0.055	0.788	0.866	0.693
SSE	7.430	3.190	7.980	11.720	2.700

Source: Authors' calculation based on data from the Turkish Statistical Institute (2015)[1] and Social Security Institution (2015a)[2].

In Figure 1, the time series of variables used in the study are shown.

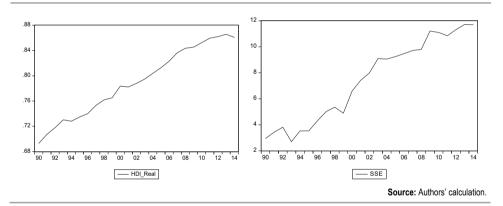**Source:** Authors' calculation.

Figure 1 Time Series of Variables Used in the Study (1990-2014)

As seen in Figure 1, *HDI_Real* and *SSE* data, generally, tend to increase by showing cyclical fluctuations over the years. However, the correlation between these two pieces of data cannot be determined from the figures and the correlation of this data, when each component can separately be seen more clearly from analyses. Within this scope, it will be beneficial to provide the information below on the aforementioned analysis data contents and analyses.

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[1] **Turkish Statistical Institute.** 2015. http://www.tuik.gov.tr/Start.do (accessed May 22, 2015).
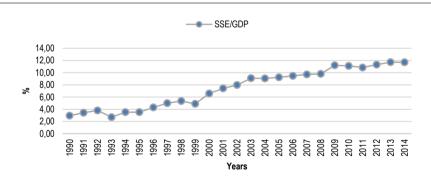[2] **Social Security Institution (SSI).** 2015a. Annual Reports. http://www.sgk.gov.tr (accessed May 20, 2015).

4.2 Social Security Expenditure in Turkey: 1990-2014

Before social security reform – in other words, before Social Security Law 5510 ran into effect on 1.10.2008 – three different social security institutions were operating in our country. These institutions were the SSI, Social Security Organisation for Artisans and the Self-Employed and Retirement Fund of Civil Servants.

The SSI established in 1946, ensures the social security of employees (private sector) who are dependent on an employer by contract, and are financed with premiums from labour and managements. The Social Security Organisation for Artisans and the Self-Employed, which has been established since 1971, ensures the social security of self-employed persons, and is financed with premiums from these employees. The State offers some exceptions and exemptions, and provides premium support for individuals with low incomes in both of these social security systems. The Retirement Fund of Civil Servants, established in 1954, ensures the social security of public servants, and its finance is completely supported by the State. In addition to these systems, which are with premiums, the Green Card system is non-premium and came about at the beginning of the 1990s. This system aims to provide health security for poor people, and is compensated from the State budget.

Since 2008, with Law 5510 coming into effect, the whole social security system in Turkey has started to empower total expenditure from one hand.

In this study, the ratio of SSE to GDP has been taken into account as one of the variables, and Green Card payments have not been included in these figures. Data belonging to SSE has been obtained from the web page of the Social Security Institution, and reports have been obtained, *via* correspondence with the institution. GDP data has been compiled by comparing the Ministry of Finance and Turkish Statistical Institute data. In Figure 2, social security expenditures/GDP ratios are seen from 1990 to 2014.

Source: Data were obtained by means of correspondence made with the Social Security
Institution (2015a, b)[3] and compilation of Turkish Statistical Institute (2015) data.

Figure 2 Ratio of Social Security Expenditure to GDP in Turkey (1990-2014)

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[3] **Social Security Institution (SSI).** 2015b. Monthly Statistical Information.
http://www.sgk.gov.tr/wps/portal/tr/kurumsal/istatistikler/aylik_istatistik_bilgileri/
(accessed September 30, 2015).

It is seen in Figure 2, that SSE tends to significantly increase over the years, as a result of social security reforms started in the 2000s in Turkey. Whilst the rate of SSE to GDP in Turkey in 1990, is approximately 2.95%, this number has shown cyclical fluctuations over the years, and increased to approximately 11.72% in 2014.

The content of the SSE used in the analysis section of the study – in other words, distribution, is based on sub-items, which are in Table 2.

Table 2 Distribution of Social Security Expenditure Based on Sub-Items (Million TL)

	2010	2011	2012	2013	2014
Sum of expenditure	121.997	140.715	160.223	182.689	204.400
Retirement pay	78.957	91.615	105.294	119.162	134.392
Insurance payments	692	914	1.124	1.235	2.162
Additional payment	3.347	3.863	4.432	5.004	5.675
Health expenditure (travel pay is included)	32.556	36.542	44.151	49.938	54.603
Payments with invoice	4.258	5.116	2.030	2.372	2.829
Management	618	682	776	826	902
Investment	70	65	121	176	206
Other expenses	1.500	1.917	2.295	3.976	3.633

Source: Authors' calculation based on data from Social Security Institution (2015b).

According to Table 2, it is seen that the item where the most payments have been made in the Turkish social security system, is retirement pay; health expenditure is second.

4.3 Real Human Development Index in Turkey: 1990-2014

With the Human Development Report (HDR) published in 1990, United Nations Development Programme (UNDP) has publicised the index measuring human development, and has included it in the development economy literature, as HDI for the first time, by means of an official institution.

It is known that the focal point of human development is the human. It is required that the human should progress with economic, social, and cultural aspects and significantly, contribute to increase the social welfare levels of people. Within this framework, human development can become measurable, depending on concrete data such as HDI. This has ensured that the matter is understood better and has created a significant resource for scientific studies, thus, the importance of human development has increased. By means of this index, countries have remarkable opinions on which direction they shall progress in their social welfare levels. Besides, it is also seen that the matter has become an important discussion topic amongst recent economic events.

The concept of human development is not explained solely by economic performance, but rather by increasing welfare levels of people and the sustainability of them. Within this scope, the benefits created by economic growth can be transformed to the living quality of the human (Selim Jahan 2002). It is seen that three main parameters are used in the generation of HDI, which is one of the developed indexes to measure this. The first one is health and having a long life, which is measured by average life expectancy; the second one is education and information levels, measured by

literacy and schooling rates; and the third one is life standards measured by using GDP *per capita*, which is calculated, according to purchasing power parity (in other words, with foreign exchange rates which reflect trans-national relative price differences) (UNDP 2010).

The value of HDI varies between 0 and 1. As the index value approaches 1, it shows that human development performance improves, and to approach 0, shows that it gets worse. In its report, the UNDP has separated countries in three categories as having low, medium, and high human development, according to its calculations (Taban and Kar 2006; Abdullah Keskin 2011). After adding countries with very high human development in recent years, there have been four categories.

In this report, by making a formulation amendment in HDI calculations from time to time, human development has been reflected as more correct. However, due to formulation amendments, the comparability of country data by years degenerates. To remove this deficiency, the UNDP re-calculates and publishes at 5 years intervals, calculating the data belonging to the previous period, by using the last determined formula. This situation leads to changes in previous years' grading of countries, or in HDI scores (Sırma Demir 2006). Besides, since new calculations are made in 5 year intervals, changing the new index values of the intermediate years cannot be fulfilled.

It is possible for countries to have changes in the previous years' values, or country grading, as a result of these amendments. When taking into account calculation amendments made in the index, in the years of 1990, 1991, 1994, 1995, 1999, and 2010, it is seen that 6 different calculation methods have already been utilised.
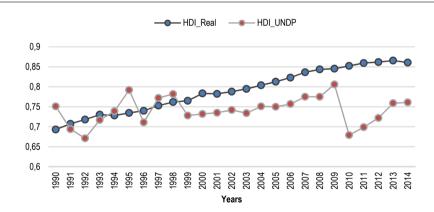
In this study, HDI values of the UNDP were not directly used, and index values for the 1990-2014 period, were re-calculated, based on real values. The rationale of this calculation is to be re-performed and differences between the two calculations are listed below:

- When calculating the index values of the UNDP, 6 different calculation methods have been utilised. For this reason, the data value of each year is not equivalent and measurable. However, index values used in this study have been calculated by using the formula, which has been most used by the UNDP, according to year (between 1999-2010 years).
- When calculating index values, the UNDP has used data of various institutions, such as the United Nations Population Department (UNPD), UNESCO Statistics Institute, and the World Bank. In this study, values indicated in HDRs have not been taken into account, and the entire data has been re-calculated by obtaining data from the Turkish Statistical Institute. Thus, it is intended to achieve real index values.
- Data taken into consideration from the index calculations of each year before 2010, in the UNDP reports, are from 2 years ago. For these reasons, it is not possible to conduct exact desired analyses by means of UNDP data. Index values calculated for each year in this study, have been calculated as current and real, by using the data of the corresponding year.

Common directions of the two calculations are as follows:

- Fundamental components used by the UNDP in index calculation, and fundamental components used in this study, have the same qualification. These are "health" for a long and healthy life, "education" to access the information, and "income" for a humane life.
- Sub-variables of these fundamental components are the same as the ones used between 1990 and 2010. Of these, what is taken into account for the sub-variable of the health fundamental component is "average life expectancy at birth", for education it is the "literacy rate in adults" and "gross schooling rate", and for income is "GDP *per capita*".
- Formulas used by the UNDP for index calculation between 1999 and 2010, and formulas used in this study are the same. The used formulas are as below:

HDI = (life expectancy in sub-index + education sub-index + GDP per capita in sub-indices) / 3 (1)

Health sub-index = (real value – minimum value) / (maximum value – minimum value) (2)

Education sub-index = (real value – minimum value) / (maximum value – minimum value) (3)

GDP per capita in sub-indices = [log(y) – log(ymin)] / [log(ymax) – log(ymin)]. (4)

Real index values for Turkey's years, 1990-2014, are calculated by using these formulas, and index values are calculated based on different formulas in the UNDP's report. They are shown in the figure below, more clearly and comparatively.

Source: *HDI_UNDP* data has been compiled from HDRs and *HDI_Real* has been generated by authors, according to the HDI formula (1999-2010), by taking into account data from the Turkish Statistical Institute (2015).

Figure 3 *HDI_Real* and *HDI_UNDP* Values (1990-2014)

When we look at Figure 3, it is seen that there are rapid and sudden fractures in index values of the UNDP, especially in certain years. The basic reason for these fractures is formulation amendment, made in the index calculations in these years. When we have a look at the real HDI values, which have been calculated without formulation amendment, rapid fractures are not observed, and there are only relative fluctuations occurring in some periods.

4.4 Method of Analysis

Primarily, the stationarity of the series has been tested by means of the Augmented Dickey-Fuller (ADF) method in the study. Later, existence of co-integration between series, short- and long-term analyses, have been conducted by means of the ARDL-bounds test method.

Long-term correlations between economic variables are examined by means of a common Robert F. Engle and Clive W. J. Granger (1987) residual-based test and maximum likelihood, based on tests by Søren Johansen (1988) and Johansen and Katarina Juselius (1990). To be able to conduct these tests, all variables taking place in the established model should not be stationary on the first level I(0) and should become stationary when first differences are taken (M. Hashem Pesaran, Yongcheol Shin, and Richard J. Smith 2001). The Bound Testing Approach, which is used in the case that variables are I(0) or I(1), is not used when variables are integrated from a level of I(2) or more, has been frequently used in econometric literature in recent years. This method named as the ARDL approach has been developed by Pesaran and Bahram Pesaran (1997), Pesaran and Ron P. Smith (1998), Pesaran and Shin (1999), and Pesaran, Shin, and Smith (2001). Various advantages of the ARDL analysis method are referred to in the literature. These advantages are expressed as providing robust and efficient results, even in small samples, and thanks to an error correction model, a long-term balance with short-term dynamics, it becomes integrated, without losing long-term information (Paresh K. Narayan and Seema Narayan 2004).

5. Findings

In this part of the study, first unit root results of the used series are given and later results of co-integration and the ARLD-bounds test method are presented.

5.1 ADF Unit Root Test Findings

The ARDL method, which is used to determine short- and long-term correlations between the dependent variable, HDI_Real, and the independent variable, SSE, can be used when the series belonging to variables are I(0) or I(1). However, in case variables are integrated from I(2) or a higher level, this method cannot be utilised. For this, to examine whether or not variables are integrated from I(2) or a higher level, the Dickey-Fuller (David A. Dickey and Wayne A. Fuller 1979, 1981) test and Unit Root Analysis have been conducted, and results are given in Table 3.

Table 3   Unit Root Test Results

Variables	Level	First differences	Result
HDI_Real (with cutting and without trend)	-1.355	-6.197*	I(1)
HDI_Real (with cutting and trend)	-2.875	-5.447*	I(1)
SSE (with cutting and without trend)	-0.133	-5.605*	I(1)
SSE (with cutting and trend)	-0.094	-5.011*	I(1)

Notes: * significant on 1% level.

Source: Authors' calculation.

As is seen in Table 3, the first difference of all the series has been found to be stationary. This result shows that study data can be analysed by means of the ARDL approach.

5.2 Co-integration and ARDL-Bounds Test

In accordance with the ARDL approach, first of all it is required to test whether or not there is a long-term correlation between variables in the model. For this, the Unconstrained Error Correction Model (UECM) is established first. Since co-integration analysis is sensitive to the number of lags, in the process of selecting a lag number, a systematic process must be followed (Osman Uluyol, Fuat Lebe, and Yusuf E. Akbaş 2014). According to this, the maximum number of lags has been determined as four since data is annual. The form of this test depending on the UECM, which has been adapted to the study, is as follows:

$$\Delta HDI\_Real_t = \beta_0 + \sum_{i=1}^{m} \beta_{1,i} \Delta HDI\_Real_{t-i} + \sum_{i=0}^{m} \beta_{2,i} \Delta SSE_{t-i} + \beta_3 HDI\_Real_{t-1} + \beta_4 SSE_{t-1} + \varepsilon_t. \quad (5)$$

Null hypothesis and alternative hypothesis of the model without trend established to test co-integration correlation between the variables in the Equation (5) can be established, respectively, as H_0: $\beta_3 = \beta_4 = 0$, H_1: $\beta_3 \neq \beta_4 \neq 0$. Co-integration correlation between variables is determined by collectively testing the significance of β_3 and β_4 coefficients by the F-test (Wald test). Whether or not there is a co-integration correlation between the variables is decided as a result of comparing critical bound values in Pesaran, Shin, and Smith (2001), by the calculated F-statistic. Since annual data is used in this study, the model in Equation (5) has been estimated to have a maximum two lags, and be without trend. F-statistic results with regards to testing co-integration correlation take place in Table 4.

Table 4 Co-integration Test Results

Model	m	k	F-statistic	I(0) and I(1) critical values
ARDL (1,0)	1	1	18.65	4.94-5.52* 3.62-4.16** 3.02-3.51***

Notes: *, **, and *** express respectively 1%, 5%, and 10% significance levels. m is the number of maximum lags, and k is the number of independent variables in the model. Critical values belong to the $k = 1$ situation, presented in Table CI(iii) in the studies of Pesaran, Shin, and Smith (2001, p. 300). The value in brackets expresses the p-value of the F-statistic.

Source: Authors' calculation.

It is seen that the F-statistic calculated in Table 4, is greater than the upper critical value in all significance levels. Therefore, null hypothesis which foresees that there isn't a long-term co-integration correlation between human development and SSE is rejected. Correspondingly, it can be said that there is a long-term correlation between the aforementioned variables in the 1990-2014 period in Turkey.

After determining the long-term correlation between variables, the second step of the ARDL model should be to predict the short- and long-term correlation between variables. The form of the ARDL model established to analyse the correlation between variables, which has been adapted for this study, is in Equation (6):

$$HDI\_Real_t = \beta_0 + \sum_{i=1}^{p} \beta_{1,i} HDI\_Real_{t-i} + \sum_{i=0}^{q} \beta_{2,i} SSE_{t-i} + \omega_t. \tag{6}$$

To determine the most suitable ARDL model by means of E-views software, first the Equation (6) is predicted by means of the ordinary least square (OLS) approach for all possible values of p and q = 1, 2, …, m and i =1, 2,…, k. In this prediction, the maximum length of the lag (m) has been taken into account as 4. Later, model selection is performed among predicted models, according to one of R^2, Akaike Information Criterion (AIC), Schwartz Bayesian Criterion (SBC), or Hannan-Quinn Criterion (HQC) which are model selection criteria. The most suitable ARDL (1,0) model for the Equation (6) has been predicted, according to SBC. In case HDI is the dependent variable, short- and long-term coefficient estimation results of the ARDL (1,0) model take place in Table 5.

Table 5   Short- and Long-Term Coefficients

Independent variables	Short-term coefficients		Long-term coefficients
HDI_Real(-1)	0.814 (9.525)*		
SSE	0.003 (1.763)***		0.014 (6.348)*
C	0.133 (2.368)*		0.718 (23.254)*
ECM$_{t-1}$	-0.202 (-6.800)*		
	Diagnostic tests		
R^2 = 0.992	AIC = -7.764	$\chi^2_{BG}(1)$	0.616[0.735]
$\overline{R}^2$ = 0.991	SC = -7.517	$\chi^2_{RAMSEY}(1)$	0.394[0.697]
DW = 2.159	*F*-statistic = 1258.908	$\chi^2_{NORM}(2)$	0.057[0.972]
RSS = 0.0005	Standard error = 0.0049	$\chi^2_{WHITE}(1)$	2.811[0.729]

Notes: Values within brackets are *t*-statistic values, and are tests used, respectively, for Breusch-Godfrey serial dependence, the Ramsey model establishment error in regression, Jarque-Bera normality, and White heteroscedasticity testing. *RSS* defines the error sum of the squares. Values in square brackets represent *p*-values, and belong to diagnostic tests. *, **, and *** respectively, with express significance on 1%, 5%, and 10% significance levels.

Source: Authors' calculation.

When we look at the diagnostic test results of the ARDL (1,0) model in Table 5; *p* (probability) values belong to serial dependence, heteroscedasticity, model establishment error and normal distribution tests, which are greater than whole *α* significance levels (1%, 5%, and 10%) (please see Table 5). Therefore, it can be said that for the established ARDL (1,0) model, that diagnostic test problems are beside the point.

When approaching long-term estimation results in Table 5, coefficients have the expected sign from an economic perspective, and all coefficients are statistically significant on 1%, 5%, and 10% significance levels. In other words, it has been detected that SSE in Turkey positively affects human development, and this effect is significant. When the magnitude of coefficients is considered, it is seen that long-term SSE in Turkey has a more important effect on human development (0.014).

When we take into account short-term coefficients; it is seen that all coefficients are statistically significant. More clearly, it has been detected that SSE in Turkey

positively affects human development in the short-term, and these effects are significant. When considering the magnitude of coefficients, it is seen that the short-term impact of SSE (0.003) is less than its long-term impact (0.014).

On the other hand, the error correction term of the model has been estimated as -0.202, and its sign is negative, and statistically influential on all significance levels, as expected. Therefore, it can be explained that a deviation which will occur on human development in the short-term, may achieve a long-term balance, by removing a portion of 20.2% in the next period. This also means that the established model is significant and that the model works.

Finally, to investigate structural fracture with regards to variables, *CUSUM* and *CUSUMQ* figures use recurrent residual squares and investigate structural fracture with regards to variables in the system. Respectively, *CUSUM* and *CUSUMQ* figures take place in Figure 4. When Figure 4 is examined, it is observed that the residuals of both the *CUSUM* test and *CUSUMQ* test model (which is more sensitive), remain within the boundaries – parameters are stable, and there isn't a structural change in the model.
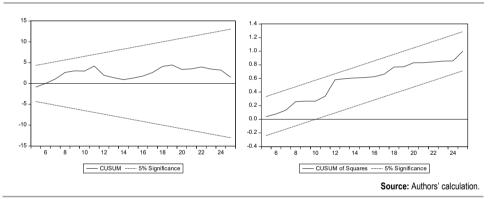

Source: Authors' calculation.

Figure 4 *CUSUM* and *CUSUMQ* Figures (1990-2014)

If *CUSUM* and *CUSUMQ* figures, which have been developed by R. L. Brown, J. Durbin, and J. M. Evans (1975), to test the stability of ARDL long-term coefficients, are within critical limits on a 5% significance level, it means that estimated parameters are stable (or consistent). Therefore, when *CUSUM* and *CUSUMQ* figures in Figure 4 are considered, it can be explained that the long-term coefficients obtained, as a result of estimation of the ARDL model, are consistent.

6. Conclusion and Assessment

This research analysed annual data for the period from 1990 to 2014, to reveal the relationship between SSE and human development, in Turkey. The data was taken from the TUIK reports, and meticulously calculated. This analysis was tested through the ARDL-bounds test methodology that was developed by Pesaran, Shin, and Smith (2001).

In result of the conducted analysis, in the short- and long-term, it has been determined that SSE positively affects human development, and this effect is remarkably significant. When coefficients of both periods are considered in terms of magnitude, it has been detected that the short-term impact of SSE on human development is less than its long-term impact. Another important result of the analysis is efficiency in the short-term will adapt itself on the level of 20.2%, and create more effective results in the following year.

As a conclusion, SSE needs to be increased, in order to increase the value of Turkey's human development and to be sustainable. This is because SSE is directly related to the level of health, education, and the social and economic welfare of individuals. If the community feels that their future is safe, they will be in expectation of better education opportunities, health conditions, and income levels. This is an important factor that will contribute to the increase of human development in the country.

The empirical results of this paper provide policy makers with a more informed understanding of the role SSE and human development nexus play in policy decisions. Policy makers are encouraged to focus on increasing SSE for higher human development rates. These policies should improve health, education, and income factors, which are the basic components of human development. On the other hand, these policies must be regulatory, compensatory, and fair, in order to affirmatively impact on human development. In doing so, the State should be effective, not only in the public sector, but also in the private sector. Social security is carried out by public institutions, as well as private enterprises. Therefore, the State should contribute to social security expenditures of citizens, when they buy social security services from private enterprises. In other words, a share should be allocated for private social security expenditures from the State's budget. Thus, the State's regulatory and balancing role in the private market, is also being activated through public expenditures.

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