

## **A Review of the Effect of Social Capital on Human Development in Iran**

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**ABSTRACT:** The present study aims to investigate the effect of social capital on human development in Iran. For this purpose, Iran society in the period 1984 to 2009 by using time series data and Autoregressive Distributed Lags (ARDL) technique has been studied. Due to the quality of social capital variable two variables i.e. the number of judicial cases related to nonsufficient fund checks and embezzlement, bribery and forgery, and elections' participation rate have been used to measure the effect of social capital. The results suggest that there is a negative and significant effect of judicial cases on human development index (HDI) level and elections' participation index statistically has not significant effect on Iran's human development index.

**Keywords:** Social Capital; Human Development; ARDL Technique; Iran; Embezzlement; Forgery; Financial crimes

**JEL Classifications:** O15

### **1. Introduction**

Despite rapid progress in technology and increasing development of communications there are still millions of people in different parts of the world who suffer from poverty and deprivation. Huge populations of people in undeveloped or developing countries are deprived from a minimum of amenities of life such as having enough food, clean water, health and education. Trying to remove these deprivations has made knowledge of development economics. In this branch of economics, researchers are trying to identify effective factors on development of nations and apply these factors in planning for economic development in developing countries.

Usually, possessing capital is considered the means of access to development and commonly capital in economic sciences is divided to four categories i.e. financial capital, physical capital, natural capital and human capital. In recent three decades social science researchers have proposed a concept as "social capital" that has been defined based on public trust among individuals of community and existence of social networks. Recently, extensive and varied studies have been performed to determine the effect of this social concept on economic variables. Since human development approach to development concept led human importance, his needs and capabilities to be considered in development process, this study has selected communities' human development level as a variable that shows a relatively comprehensive picture of nation's development. This article attempts to review the effect of social capital on human development level in Iran.

### **2. Theoretical Foundations**

#### **2.1. Human Development**

As Sen (1992) has expressed the problem of economy's traditional development was not about that tools' selection has been inappropriate for the economic growth or policies have not been appropriate for growth, but the problem is in insufficient attention to the fact that economic growth is not something beyond a means to achieve other goals. So, probably the most important thematic deficiency of traditional development economics has been its focus on national product, total revenue

or supply of a certain commodity without considering "merit" of people and empowering them. Actually, economic development should be focused around the fact that what people can or cannot do. Whether they can avoid death which is inevitable, or have good nutrition and be able to communicate and participate in decision-making processes on issues that affect their lives. By having such idea, economic development can be defined as "the process of extending people's merit and capability" (Yousefi, 2009) that such an approach to development is called "human development". United Nations Development Program (UNDP) that publishes human development annual reports has defined the concept of human development as follows:

"Human development is a kind of development that is far beyond the rise or fall of national incomes. Human development is about creating an environment where all people can develop their latent talents and guided to productive, creative live and consistent with their interests and needs. People are real wealth of nations. Therefore, development is about expanding people's choices that should lead to a kind of life that is valuable to them. Also, development is far beyond economic growth which is only one of the means of expanding human choices (although it is a very important case). The basis of expanding these choices is capabilities of human beings (the range of what humans can be or can do in their lives). The most basic capabilities for human development lead to long-term and healthy lives, being aware, having access to resources needed for an acceptable standard of living and being able for participation in social life. Without these many choices are not simply provided and many opportunities in life remain inaccessible."

Today, human development concept is the most important key concept in United Nations (UN) development reports. Unlike approaches to human welfare, basic needs and human resources development that emphasize respectively on the consumption of goods and services, provide the least material and immaterial needs and capacity training and capabilities training, human development as a holistic approach with emphasis on increasing the scope of human choice, on the one hand instead of emphasis on consumption of goods and services it emphasizes on making capacities, and on the other hand it emphasizes on intellectual talents training beside development of physical capacities, and by targeting a better life, puts a dynamic horizon in front of human choices (Kalantari, 2001).

## **2.2. Human Development Index**

Along with theoretical developments in concept of development, the way of measuring development rate was also developed, although oppositions with initial conceptions of development and progression had old root and focus of classical scholars on income and the issues surrounding it had caused that since past years various scholars from Marx to German historical school theorists and old institutionalists criticized these patterns. All these developments continued until Mahbub ul Haq proposed Human Development Index (HDI) and established Human Development Report (HDR) (Motevasseli et al., 2010).

The first Human Development Report which was published in 1990 presented a new method for measuring human development through incorporation of life expectancy indicators, education and income rate as a composite index of human development. However, in the mentioned report it was acknowledged that no single index is able to fully express such a complex concept (Human Development Report, 1994). Perhaps the reason of such a problem is that in measuring human development although capabilities are development goals, their measurement is difficult because the set of all human functions are invisible (Mahmoudi, 2008).

Human Development Index which is published annually since 1990 onwards is as extension of people selection domain and its importance is that first of all human development is a goal and requires no justification. At the same time, human development is productivity means and higher economic growth because healthy, trained, and skillful workforce is considered a productive asset (Yousefi, 2009).

## **2.3. Social Capital**

### **2.3.1 The Concept of Social Capital**

Woolcock and Narayan (2000) think that there is a long history about the mental history of the term "social capital" in the social sciences but they have acknowledged that the history of the term by meaning which is used today date back to the second decade of the twentieth century AD, and Lyda J. Hanifan, the supervisor of West Virginia schools in America in that time. Hanifan described the concept of social capital in 1916 as follows: "If someone with his neighbor and his neighbor with other neighbors has contact, the volume of social capital will be accumulated which may immediately

satisfy social needs and perhaps carries a potential social capacity that will suffice for basic improving living conditions of the entire community".

Three decades after Hanifan, the concept of social capital has examined by Seely, Sim and Loosely. Also in 1961, Jacobs as a scholar of urban problems and in 1979, Loury as an economist used the concept of social capital to indicate the vitality and importance of social ties. But the definition that presented the concept of social capital in the late 1980s and early 1990s by scholars such as Bourdieu, Coleman, Putnam and so on was the inspiration for most of the current researches (Woolcock and Narayan, 2000).

Presented definitions for social capital are numerous and different. World Bank defined social capital in 1998 as follows:

"Social capital in a given society includes institutions, relationships, views and values that rule in act and interactions among people and have contribution in economic and social development. But, social capital is not a simple total of institutions that include society; instead it is a mortar that links institutions mentioned. At the same time, social capital includes the shared values and norms needed for social behavior that is reflected in personal relationships of people, their confidence to each other and shared sense of civic responsibility, something that makes society more and beyond of total people (Piran et al, 2006).

### **2.3.2 The issue of "Being Capital" of Social Capital**

Some writers have questioned the use of "capital" word for social interactions and trends. The reason of this is perhaps the characteristics of social capital that distinguishes it from other forms of capital. For example, Arrow (2000) and Solow (2000) have doubt about to consider this notion as a capital. Solow, for example, criticizes that the current definition of social capital, like any other capitals, cannot be included in an accounting system. Solow believes that "behavior patterns" are more appropriate term for this concept. (Elmi et al, 2005).

However, Coleman has considered social capital one of the types of capital. He writes about similarity and difference of social capital with other forms of capital as follows:

As physical capital is developed by changes in matters to shape the tools that facilitate production, human capital by changing people to give skills and abilities to them is developed and empower people to behave in new ways. Social capital, in turn, is developed when the relationship between individuals is changed in a way that facilitates their act (Coleman, 1998).

Another view raised in this matter is that the term "capital" that in social capital discussion has been used by interdisciplinary approach in creating a new concept has not necessarily economic essence and therefore may trigger some doubts. Therefore, in social capital discussion it should be noted that the term of 'capital' is a metaphor and it should be discriminated between its application in this discussion and its conventional economic concept. Capital in economy is with ownership and law protects, imposes or limits ownership right. Also, motivation to use capital is to make profit and eventually if capital is used for other areas but investment it will decrease. In contrast, neither individual nor society has legal right to perform the ownership in social capital. In addition, often the benefits of social capital are byproducts of other activities and the main motivation to use social capital is not to make profit and often use of social capital is unintentional. So, it seems that here the term of "capital" has the metaphorical aspect (Tashakor and Moeini, 2002).

### **2.3.3 Levels of Social Capital**

Social capital has been located by Bankston and Zhou (2002), Coleman (1988), Portes (1998) Putnam (1995) at the level of the individual, the informal social group, the formal organization, the community, the ethnic group and even the nation. There are divergent views in the literature; Kilby (2002) stated that social capital exists within levels or scales as one feels belonging to family, community, profession, country, etc, simultaneously. Brewer (2003) stated that although social capital was originally conceived as a community-wide concept, it should be observable at the individual level. Baum and Ziersch (2003) disagreed with this, identifying that Bourdieu identified it at the individual level and that Putnam since at the community level. Coleman argued that social capital is not an attribute of individuals but a context-dependent aspect of social structure (Hogan and Owen, 2000; Robinson, 2000; quoted by Claridge, 2004).

### **2.3.4 Measuring Social Capital**

Measuring social capital is one of the most challenging issues in social concept. By increase of tendency to empirical studies on identification the effects of social capital in various fields,

requirement to measure social capital was intensified. However, as Pontio has expressed apparently no precise way to measure social capital has been identified or more importantly, the ways to measure social capital are so numerous which tests lead to completely different results (Pontio, 2004).

In such circumstances, some researchers have acknowledged that the real measurement of social capital is not possible for various reasons. First, the most comprehensive definition of social capital is multi-dimensional definition which includes multi-unit analysis. Second, to measure the profile of intangible concepts like community, social networks and organizations, there are many problems. In fact, measurement of social capital is a challenging issue because it is not just about a concept and provides a combination of complicated concepts. "Trust", "community", and "networks" which are samples of concept forming social capital can hardly been quantified and the third reason is that there are few scientific methods to measure social capital that are used in long term and this has led modern researchers to consider indicators close to reality, such as confidence, willingness to vote, rate of growth of people's participation in elections, membership in civic institutions, hours that people have done some activities voluntarily etc. Among the studies that have presented a strategy to measure social capital, some of them have considered statistics related to different surveys because of having some accurate and comprehensive studies and surveys. Also, some studies by suggesting alternative indicators have tried to reveal the rise and decline trend of social capital in society in some ways (Elmi et al, 2005, Akhtar Mohagheghi, 2006).

Fukuyama has pointed to two approaches about measurement of social capital. In the first approach a census is carried out on groups and their members are counted in community. In the second approach, data related to levels of trust and commitment and civic involvement are reviewed. Then, Fukuyama by using these two approaches explained a supposed formula to calculate social capital and finally admits that production anything like a census or believable assessment about the volume of a community's social capital is almost impossible because it involves use of figures which are estimated subjectively or do not exist at all. So, he introduces another source of data that used as alternative variable for social capital. According to him survey data about trust and social and civic participation have a number of data sources that can be beneficial about measurement of social capital (Fukuyama, 1999). Also, Collier (2002) identified that social capital is difficult, if not impossible to measure directly and that for empirical purposes the use of proxy indicators is necessary. (Collier, 2002, quoted by Claridge, 2004).

### **3. Literature Review**

As the first study conducted about the effects of social capital we can refer to the research in which Coleman while reviewed the performance of students in Catholic schools showed that these students have lower rates of absenteeism and also their failure rates to pass the courses was less than public school's students. These findings were very interesting for students with the most disadvantaged ethnic and social - economic backgrounds whose families had the least power to help them for their intellectual development. In this regard, Coleman stated that the most important factor in explaining this model was the effect of social norms on parents and students that this factor confirmed teachers' expectations and concluded that communities are source of social capital and can compensate some of family's social and economic backwardness (Hoffer et al, 1985; Coleman and Hoffer, 1987, quoted by Field, 2007).

Aguilera (2002) found that social capital, based on what is measured through friendship networks, has a positive relationship with labor force participation and this matter clarifies that people who have proper relationships not only can find job through it but also the possibility that they would be among the most active class in labor market is more (Field, 2007).

Nock and Kiefer in an article entitled "Does social capital have an economic consequence", have performed one of the most comprehensive studies interstate about the effect of social capital on economy. In this study some evidences are provided that that based on them social capital plays an important role in economic functions. In this study which includes a sample of 29 market economies two measures of trust and civic norms have been used which are obtained from global survey. Findings of this study showed that the criterion which Putnam used to measure social capital i.e. membership in formal groups is not related to trust or economic performance improvement. Moreover, the results indicate that trust and civic norms are stronger in communities that have higher and fairer incomes and people have better education level and are similar in race. According to the study, Nock

and Kiefer found that social capital variables have strong and significant relationship with growth. Change in trust as much as standard deviation, which is equivalent to 14 percent, changes the growth by more than half a standard deviation (0.56). Nock and Kiefer have followed another hypothesis. This hypothesis states that in poorer countries, where there is not developmental financial sector, social capital is more important. Results of studies confirmed this hypothesis. In a country where GDP per capita in 1980 was only \$ 1,000, the confidence coefficient was 0.179, which is twice the average of other sample countries in this study. Among other issues that in this article have been followed is the rate of social capital effect on share of investment in GDP. According to this study, every seven percent increase in confidence is associated with one-tenth increase in share of investment in GDP. Also, civil norms index has high significance and every one tenth of increase in this index has been followed by a percentage increase in investment (Knack and Keefer, 1997, quoted by Elmi et al, 2005).

Beugelsdijk and Van Schaik have performed the difference in social capital has been studied in 54 regions in Europe. This study focused on measuring social capital at regional level and the relationship between social capital and regional economic growth and development. Research results suggest large regional differences which were measured in social capital level. In addition, research findings revealed a positive and significant relationship between social capital and economic performance in regions studied. Correlation in high levels of social capital with high levels of economic development and economic growth in 54 western European regions was confirmed. Results show that there are large regional differences on this social capital index. These preliminary results suggest a positive relationship exists between social capital and economic development and regional economic growth in 54 western European regions (Beugelsdijk and Van Schaik, 2005).

Sabatini has done a research on the role of social capital in economic development in Italy. His research results showed that bridging and linking social capital are positively affected by human development and the economic performance, but only linking social capital exerts a positive reverse effect. On the contrary, bridging social capital negatively influences income and development (Sabatani, 2006).

Subejo (2008) in research on social capital and rural communities' development emphasizes on the positive effect of social capital on human development and writes: "Implementation of participatory planning approach for rural development is impossible without deep understanding and full-use of various features of social capital in the local community." He also adds that: The full use of social resources of community will promote the higher affectivity of rural development program. This not only will boost economic growth, but also will maintain and enhance social solidarity and cohesiveness of community which finally promote sustainable development model for rural people and their environments (Subejo, 2008).

Dearmon and Grier examine linkages between social trust and economic development using a panel of data. They confirm that trust is a significant factor in development and also show for the first time that trust significantly interacts with both investments in physical and human capital (Dearmon and Grier, 2009).

Pelse in a research called "Gains from Social Capital" has confirmed positive effect of social capital on rural farms development. Moreover, he indicates gains of social capital increase also on the regional level. These gains are closely connected with the economic growth in different spatial aspects - on local farm and national level with bigger profit, and on local government and regional level with the potential of human capital and its quality saving possibilities (Pelse, 2010).

Among theoretical researches on the concept of social capital in Iran's economy we can refer to the article " Effects of Social Capital on Economic Growth," written by Elmi et al., (2005) in which the authors have theoretically reviewed concept of social capital and six ways of its effect on economy and also a number of empirical studies and their results.

Chalbi and Mobaraki analyzed the relationship between social capital and crime in two different levels. In the first level the survey was conducted among offenders in prisons in Tehran and in the second level, an international analysis between 1997 and 1999 was carried out. In the first level to calculate the social capital a questionnaire research method was used and in international level the world values survey (WVS) data were used. In micro-level of this study social capital is measured with six indicators "abundant interest to society," "social trust", "interactions with surroundings," "self confidence," "trend towards other people" and "devotion to strangers". The results of this study

suggest that six dimensions of social capital have negative and significant relationship with crime index. The research findings also showed that in international level there is negative, relatively strong and significant relationship between social capital and crime (Chalbi and Mobaraki, 2005).

Fani and Alizadehsani by studying 86 countries reviewed effects of official corruption on communities' human development and also described the relationship between official corruption and human development components include: democracy, economic development and education and health level. For measuring official corruption they used corruption perception index, this index which has focus on corruption in governmental sector has defined as misuse of governmental office for private interests. The results of this research proved significant effect of corruption on decrease of human development and that there is negative association with its components especially in developing countries so that one unit increase in corruption index decreases as 0.1 human development index unit in developing communities, while the amount of this effect for human development index in developed countries was 0.016. In addition, analysis of corruption relationship with levels of democracy, GDP, literacy and the rate of life expectancy in studied communities that was performed through Pearson correlation test showed that in developing communities and in significant level there is 1% negative relationship between official corruption and all of these indexes, while in developed countries no relationship was observed between official corruption rate and literacy level (Fani and Alizadehsani, 2007).

In a case study carried out in 2006, the effect of social capital on economic growth in Iran's provinces during the period 2000 to 2003 was studied by Rahmani et al., (2007). In this study, representative variables of social capital in each province were as follows:

A) Per capita related to each of following groups in each province: 1- non-governmental organizations, 2- religious groups and boards, 3- cultural and artistic groups, 4- scientific and educational groups.

B) The average percent of people membership in each of associations and following groups in each of country's provinces: 1- scientific and cultural associations, 2- parents - teachers association, 3- trade unions, 4- Islamic associations, 5- mobilization, 6- neighborhood council 7- mosque's board of trustees, 8- political organizations, 9- cultural centers, 10- charity associations, 11- interest-free lending fund - 12 sport clubs.

Also, the confidence index in each province was considered as an average of confidence percent in each province to each group and unions. Experimental results of this study in which spatial econometric method was used showed that when other conditions are constant, by increase of one unit index of social capital, economic growth increases 0.18 percent (Rahmani et al, 2007).

Also, Ariyana (2009) in his thesis has performed a comparative study about the effect of social capital and economic freedom on economic growth in Iran. In this study, three variables i.e. the cases of nonsufficient fund check and corruption, embezzlement and bribery, the number of press releases and the number of retirees and pensioners of social security to make a combined index for social capital in Iran have been used. Since each of these variables has had different units of measurement, at first these variables have become normal and values between zero and ten and then their average as indicator of social capital has been introduced. In this study, which has been done for the period 1985-2006 econometrics method of ARDL has been used to assess the effects of social capital on economic growth (Ariyana, 2009)

#### 4. Model Introduction

This research intends to measure the effect of social capital on human development level by following model.

$$HDI = F(I, EDU, H, SC) \quad (1)$$

HDI = Human Development Index

I = Income

EDU = Education

H = Health

SC = Social Capital

This model has been estimated for Iran to assess the effect of social capital on human development. The lack of statistics and required data is limitation of this study. This problem not only has limited the time frame studied but also has caused the use of alternative variables for the study of

social capital variable. Therefore, to study the effect of social capital in Iran variables of distrust indicator and participation rate in elections as social capital representative variables have been used. In this regard, according to social capital measurement method by using alternative variables that have been proposed by Fukuyama instead of a variable that shows the degree of public confidence the statistics of closed cases of embezzlement, bribery, forgery and issuing nonsufficient fund check has been used as a variable representing distrust. The reason for this type of crimes is that the prevalence of such criminal measures naturally will lead to increased feelings of distrust among people. In addition, selected crimes have occurred in financial areas that in such areas the existence of confidence is a fundamental need for both sides of transaction (Elmi et al, 2005). In this regard, it is expected that low levels of trust would damage financial interactions of people and then their social capital.

In addition to levels of generalized trust, one of the components that in represented definitions have been always with social capital concept is levels of civil participation. In fact, it is the civil responsibility that transforms the society to something more than and beyond the sum of its individuals that have formed it (Piran et al, 2005). The significance of partnership networks in this regard is so that in some researchers' view the existence of these networks in society indicates the social capital rate in that society and they emphasize that more spread are these networks in society richer is social capital (Akhtar Mohagheghi, 2006). Furthermore, partnership is a factor that many of the benefits of social capital are arranged by it. Therefore, the current research to study developmental effects of social capital requires an index that indicates civil participation rate in Iran society. Because there are no surveys that in long term provide reliable results for measurement Iranians civic participation rate, this study has to use alternative variables for civic participation variable. One of the indexes that in some studies, among them Putnam's study has been used is public participation measurement through participation in elections (Akhtar Mohagheghi, 2006). Due to the availability of such data for Iran over last three decades this index has been used as an alternative variable in Iran study level. Information related to participation rate of eligible voters in elections in years 1984-2009 has been obtained from website of The Ministry of Foreign Affairs, Islamic Republic of Iran.

Annual statics of closed court cases related to the mentioned crimes has been extracted from statistical yearbooks published by the Statistical Center of Iran. Due to the difference between measurement unit of this variable and other variables, the variable of distrust in time frame studied has been adjusted by technique of normalization.

In the model studied in addition to social capital and human development index three control variables i.e. health, income and education are also used. In the model of Islamic countries these variables include the infant mortality rate per 1000 live births, national per capita income by constant prices year 2000 and educational life expectancy rate. Also, in model of Iran control variables of mortality rate per 1000 live births, per capita national income and the literacy rate have been used.

#### 4.1 Research Model Estimate

The model that in this paper has been estimated for Iran is as follows:

$$HDI = F(NI, M, LI, TRU, P)$$

NI = National per capita income

M = Infant mortality rate per 1000 live births

LI = Literacy rate

TRU = Distrust Index

P = Political Participation Index

In this model, two variables of distrust index and political participation index represent the level of social capital in Iran and national income per capita indicators, infant mortality rates and educational life expectancy rates control income, health and education indexes on human development index, respectively.

##### 4.1.1 Review of Variables' Reliability

In this section all variables used in Iran model are studied due to degree of reliability. It is done for this reason that in situations when there are unstable variables in the model a "spurious regression" may to happen. A spurious regression for having high  $R^2$  and significant t statistics seems significant. But its results are economically insignificant. Table 1 shows unit root test results for variable levels of human development index, infant mortality, literacy and distrust as well as first order differentiation of national income and political participation variables. To perform this test Microfit 4.0 software has been used and the optimal lag has been selected by using Schwarz criterion.

Comparing the values obtained for the Dickey - Fuller statistics with critical values of test at 5% confidence level shows that indexes of human development, distrust, health and education are reliable in their level. But reliability of national income per capita and political participation variables levels is not proved. Due to performance of unit root test for variables and non-being stationary of levels of some of these variables the method of ordinary least squares (OLS) cannot be used for model estimation as there will be probability of spurious regression in estimation. Since the model variables have different degrees of reliability it seems that the best method to estimate this model is Autoregressive Distributed Lags (ARDL) technique.

**Table 1. Review of Reliability of Variables**

Variable's name		Dickey - Fuller test statistics value	Critical value ADF statistics at 5% confidence level	Reliability Status	The number of reviewed lags
HDI		-4.1050**	-3.6592	Reliable	5
NI	first order differentiation	-4.7175**	-3.6746	Reliable	5
M		-7.1550*	-3.0522	Reliable	8
LI		-5.0619*	3.199	Reliable	5
DISTRU		-4.0692**	-3.7119	Reliable	8
P	first order differentiation	-5.2046*	-3.0294	Reliable	5

The mark \* means intercept and the mark \*\* means intercept and trend.

#### 4.1.2 Estimation of Short Term Coefficients

To estimate the model of Iran by using ARDL technique Microfit 4.0 software is used and optimal lag has been also selected based on Schwartz Bayesian criteria. The results of estimation of short-term coefficients in this model with time trend are shown in Table 4 and the result of estimation of these coefficients without considering time trend are shown in Table 5. It should be noted that the number of optimal lags by using Schwarz criterion has been selected and is equal to one. Survey results show that in both cases estimation of human development index level in the previous period has strong and positive effect on human development index that has significant statics at 5% level. In relation to estimates obtained there is a remarkable point that in two cases per capita national income variable has positive effect on human development index but the effect of this variable is statistically insignificant even in 10% confidence level. Furthermore, when the model is estimated considering time trend, infant mortality index has negative effect on the HDI which is expected but this variable is not statistically significant at 10% level, although in estimation without taking into account the time trend this variable has negative and significant effect on human development index. Also, literacy index unlike two previous control variables in both cases of estimate has significant and positive effect on human development Index at 1% confidence level.

Social capital indicator variables have different situation in these estimates. While taking into account the time trend, distrust index in previous period shows negative and significant effect at 5% confidence level, distrust index indicates a weak positive effect that is not also statistically significant. In addition, in this case, political participation index has weak and insignificant effect on human development index. It is observed that the effect direction of distrust index and political participation index is opposed to expectation. Finally, it should be noted that although the model intercept is significant at 5% level, time trend entered into the model has not significant effect.

About the estimate discussed by using the results that are presented in Table 2 Banerjee, Dolado and Mestre statistics value has been estimated -2.933 and since this value considering absolute value is less than critical values in the table at 99%, 95% and 90% confidence intervals, long-term relationship between variables is not proved. Also, by using results presented in Table 3 Banerjee statistics value calculated for this estimate is -3.61026 while critical value of Banerjee, Dolado and Mestre table in 25% level is about -2.99 and at 10% level is approximately -3.82, thus, long-term relationship between model variables is accepted with little confidence degree when time trend variable is deleted.



**Table 2. Results of short-term coefficients estimate by using ARDL (1,0,0,0,1,0) using time trend variable and based on SBC criteria**

HDI: Dependent Variable				
Variable	coefficient	Standard Deviation	t-statistic	probability of t-statistic
HDI(-1)	0.46476	0.18245	2.5474	0.022
NI	0.020669	0.012428	1.6631	0.116
M	-0.14971	0.095543	-1.5670	0.137
EDU	0.18877	0.053570	3.5237	0.003
TRU	0.0046439	0.0056631	0.82003	0.424
TRU(-1)	-0.12517	0.0053670	-2.3322	0.033
P	-0.0036291	0.0058745	-0.61778	0.545
Intercept	0.33314	0.094879	3.5112	0.003
Time trend	-0.0045514	0.0042289	-1.0762	0.298
F(8, 16)= 1133.2		R <sup>2</sup> =0.99824		

**Table 3. Results of short-term coefficients estimate by removing time trend variable using ARDL (1,0,0,0,1,0) based on SBC criteria**

HDI: Dependent Variable				
Variable	coefficient	Standard Deviation	t-statistic	probability of t-statistic
HDI(-1)	0.040261	0.16547	2.4331	0.026
NI	0.010459	0.00847	1.2338	0.234
M	-0.04751	0.01667	-2.8502	0.011
EDU	0.19166	0.051853	3.6962	0.002
TRU	0.00610	0.00558	1.094	0.289
TRU(-1)	-0.01281	0.00537	-2.3853	0.029
P	-0.0045	0.00576	-0.78249	0.445
Intercept	0.26981	0.078355	3.4434	0.003
F(7,17) = 1301.3		R <sup>2</sup> = 0.99814		

To examine more closely and ensuring from long-term relationship between social capital indicator variables and human development index in another estimate all explanatory variables that statistically were not significant were removed. Therefore, a new estimate that has been represented from the model is as follows:

$$HDI = F(HDI(-1), M, EDU, TRU(-1))$$

HDI (-1) = Human Development Index with lag

M = Infant mortality index

EDU = Literacy index

TRU (-1) = distrust lagged variable

The results of estimation of this model are shown in Table 4. Survey results of this estimate in addition to indicate the significance of all variables in this model suggests that the level of human development index in the previous period has the most effect on human development index and after that teaching index has positive and significant effect on HDI. Also, infant mortality index by its negative effect shows the effect of life expectancy on human development. The effect of these two control variables is completely consistent with making method of human development index but apart from control variables, distrust index in the previous period has negative and significant but low effect on human development index. Values more than R<sup>2</sup> and F statistics show high explanation power and significance of the model, and also Durbin–Watson statistic value suggests lack of self-correlation in fitted model. Banerjee, Dolado and Mestre statistic value in this estimation has been calculated -4.667 that due to critical value of the test that at 5% level is about -4.18 long-term relationships between model variables is proved. Results of diagnostic tests for classic hypotheses in this model suggest that because probability values for test statistics about lack of serial correlation hypotheses of residual sentence, normality of disorder sentences distribution and similarity variance are more than 5% level,

zero hypothesis is not rejected in these three tests and therefore this model has not serial correlation, non-normal disorder components as well as dissimilarity variance, but diagnostic tests do not reject lack of affirmation error in the model so except functional form of the function the other classic hypotheses in this model have not been violated.

**Table 4. Results of short-term coefficients estimate by removing variables without statistic significant using ARDL (1,0,0,0) based on SBC criteria**

HDI: Dependent Variable				
variable	Coefficient	Standard Deviation	t-statistic	probability of t-statistic
HDI(-1)	0.4273	0.12269	3.4828	0.002
M	-0.0556	0.01577	-3.524	0.002
EDU	0.18742	0.039446	4.7513	0.000
TRU(-1)	-0.00995	0.00242	-4.106	0.001
Intercept	0.26287	0.64136	0.0987	0.001
<b>F(4, 19) = 2098.4</b>		0.99774	2.0370=Durbin-Watson statistic	
<b>Serial Correlation</b>		F Statistic	0.021157	0.886
		LM Statistic	0.028176	0.867
<b>Functional form</b>		F Statistic	4.448	0.049
		LM Statistic	4.7556	0.029
<b>Normality</b>		LM Statistic	0.62326	0.732
<b>Dissimilarity Variance</b>		F Statistic	1.7883	0.195
		LM Statistic	1.8042	0.179

#### 4.1.3 Long-term Coefficients Estimate

Table 5 shows the results of long-term coefficients estimate in this model. It is observed that all coefficients of the model in long term are significant at 1% confidence level. Also, estimated long-term coefficients suggest negative effect of infant mortality and positive effect of literacy level on human development index. Distrust lagged variable has also negative effect equivalent to -0.01737 on human development index. Comparing coefficients of the model in two tables 4 and 5 represents that long-term coefficients are more than short-term coefficients. This indicates that explanatory variables of the model in long-term have more effective power on dependent variable.

**Table 5. Results of long-term coefficients estimate using ARDL (1,0,0,0) based on SBC criteria**

HDI: Dependent Variable				
Variable	coefficient	Standard Deviation	t-statistic	probability of t-statistic
M	-0.09709	0.01152	-8.4224	0.000
EDU	0.32726	0.039532	8.2782	0.000
TRU(-1)	-0.01737	0.003732	-4.6556	0.000
Intercept	0.459	0.03422	13.4130	0.000

#### 4.1.4 Error Correction Model (ECM) Estimation

To check the speed of adjustment in short term to long term imbalance Error Correction Model (ECM) is used. ECM value according to calculated long-term coefficients is as follows:  
 $ECM = HDI + 0.9709 * M - 0.32726 * EDU + 0.017375 * TRU(-1) - 0.459 * C$

To estimate error correction model coefficients of the first order differentiation of explanatory variables with lagged error correction term is estimated through OLS method.

According to results of this fitting that are presented in Table 6 variable coefficient in error correction has negative and high significant lag and is equivalent to -0.5727 which shows that in case of any doubt and deviation from balance in each period 0.5727 will be adjusted from short time imbalance in one period compared to the previous period to achieve long time balance.

**Table 6. Results of Test of Error Correction Model (ECM)**

d HDI: Dependent Variable				
Variable	coefficient	Standard Deviation	t-statistic	probability of t-statistic
dM	-0.0556	0.1577	-3.524	0.002
dEDU	0.18742	0.039446	4.7513	0.00
dTRU(-1)	-0.00995	0.00242	-4.1060	0.001
Dc	0.26287	0.064136	4.0987	0.001
Ecm(-1)	-0.5727	0.12269	-4.6679	0.00

## 5. Conclusion

The test results for two models in this study suggest that social capital alternative variables have effects on human development index. The results indicate that the variable of election participation which is political participation indicator in society has not significant effect on human development index in Iran. This could be due to that because participation rate of eligible voters in each election period is a function of various factors including time, economic, political and social factors and it also depends on the type of election held, so it seems that participation rate index in elections is not an appropriate alternative index for social capital in Iran society.

Regarding distrust variable the survey results indicate that distrust variable has not significant effect on human development index but distrust rate in previous period has reducing effect on human development index so it can be said that public trust level reduction or in other words social capital level reduction gradually and with delay lead to decline of members' capabilities in society. Also, this delayed effect confirms gradual formation property and therefore gradual effect of existing stock of capital social. Moreover, comparing short and long term coefficients of model indicates that distrust variable on the passage of time has negative and deeper effect on Iran's human development index.

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