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GLOBAL COMPETITIVENESS IN A TIME OF ECONOMIC UNCERTAINTY AND SOCIAL CHANGE: CURRENT ISSUES AND FUTURE EXPECTATIONS

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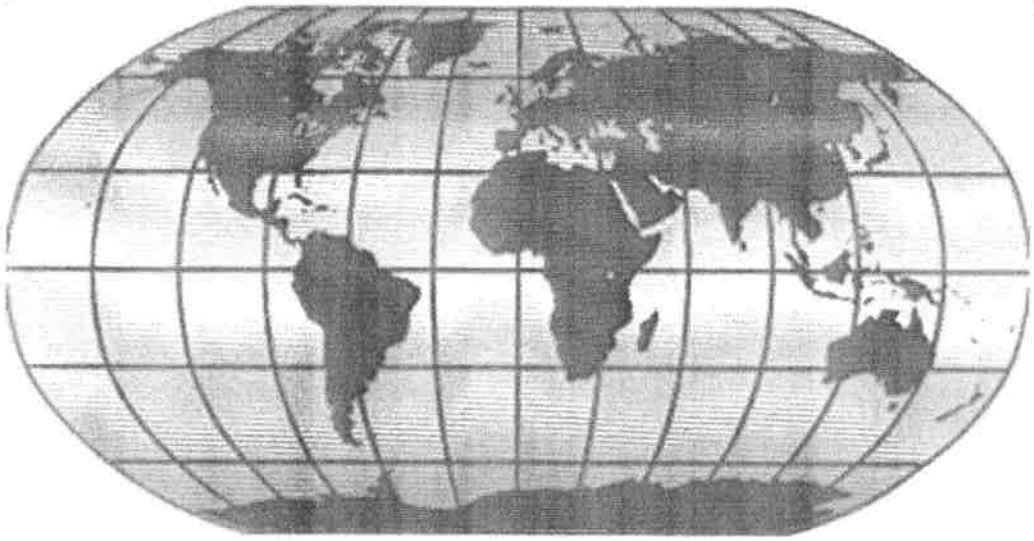

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Analysis of the Relationship between Human Capital and Economic Growth in Turkey

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One of the indicators which provide the development of a country is capital accumulation and technological innovation. Except for physical capital, human capital, in which human factor is important, is one of the factors that demonstrate the level of development of a country. Human capital shall ensure the effective and efficient use of physical capital. Human capital becomes more qualified with education. For this reason, in this study, the casuality correlation between GDP variables and tertiary schooling rates in education as one of the components of human capital was examined by using monthly data covering the period of 1982-2009 for the purpose of analyzing the effect of human capital in Turkey on economic growth.

Introduction

Natural resources, physical capital and labor force are included in the production process of a product in an economy. The more developed the physical capital is, the faster the production process is and the higher quality the products have. In production process, physical capital is necessary but not enough on its own. For using it efficiently, skilled labor force that has improved itself is required. In the literature of economics, the development of a country is measured by the increase in its capital stock. Recently, it has been accepted that also human capital plays an important role in countries' development levels.

Due to the fact that education is one of the significant factors that determine human capital accumulation, human capital should be first well-educated so as to be productive in production and service. So, education indirectly becomes one of the significant factors in a country's development. Capital stock increase and labor force productivity are regarded as criteria in the development of a country. For the realization of growth, human power capable of using physical capital in the best way and creating innovations should exist.

Human Capital in Growth Models

Human resources obviously have both quantitative and qualitative dimensions. The number of people, the proportion who enter upon useful work, and hours worked are essentially quantitative characteristics. Quality components consist skill, knowledge and similar attributes that affect particular human capabilities to do productive work (Shultz, 1961: 8). Shultz (1961) classified skills and knowledge that people acquire as a form of human capital, and in so doing revived interest in the notion of human capital. Recently, however, the concept of human capital has been extended to incorporate non-market activities, and a broader definition of human capital is 'the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being' further extend the notion to also include 'innate abilities'. As defined, human capital is a complex concept; it has many dimensions and can be acquired in various ways, including at home, at school, at work, and so on (Gibson and Oxley, 2003: 273). In the literature of economics, although labor factor takes place in the early classical economics, the concept of human capital gained importance with the neo-classical economics and then the importance of human capital was further emphasized with endogenous growth theories. Although he did not specifically define the term "capital," Adam Smith included in his category of fixed capital the skills and useful abilities of human beings. The skill of a man, he said, may be regarded as a machine that has a genuine cost and returns a profit (Kiker, 1966: 485). The greatest improvements in the productive powers of labour, and the greater part of the skill, dexterity, and judgment, with which it is anywhere directed, or applied, seem to have been the effects of the division of labour (Smith, 1937: 10). Mill explicitly recognised the economic contribution made by women through domestic childrearing. He considered that the wife's responsibility for childbearing, for the care and education of children and for the management of the family budget constituted 'not only her fair share, but usually the larger share, of the bodily and mental exertion required' of married couples. Mill was aware that efficiency did not necessarily require narrow specialisation and that there was a difference between men's and women's experience in this respect. The following perception of Mill's contributes to an understanding of possible gender differences in human capital (Gardiner, 1998 : 213-14). Becker et al. (1990) write that the neo-classical model of growth responded to the failure of the Malthusian model by essentially ignoring any link between population and the economy. Adjustments in

this model take place not in the population growth rate, but in the rate of investment in physical capital. The standard production function employed in neo-classical growth models is $Y = Ae^{\mu t}K^{\alpha}L^{1-\alpha}$, where Y is gross domestic product, K is the stock of human and physical capital, L is unskilled labor, A is a constant reflecting the technological starting position of society, and e^{μ} represents the exogenous rate at which that technology evolves (Solow, 1956). In this formula, α indicates the percentage increase in gross domestic product resulting from a 1 percent increase in capital (Pack, 1994: 55). In the basic neo-classical model, Solow (1956, 1957, 1970), it is assumed that technological change is exogenous to the economic process. Recently, the interest in technological change as an endogenous economic phenomenon has increased drastically (Verspagen, 1992: 631). Technological change is accepted as exogenous in the neo-classical model but endogenous in endogenous growth models. Technological change is the most important factor of growth. Technological change provides the incentive for continued capital accumulation, and together, capital accumulation and technological change account for much of the increase in output per hour worked (Romer, 1990: 72). Mankiw, Romer and Weil (1992) estimate a simple model in which human capital is accumulated in the same way as physical capital. An interesting feature of this model is the way in which the presence of physical capital raises the overall impact of education. The rate of investment in physical capital is assumed to be a fixed proportion of output, and so anything which raises output, including extra investments in education, will raise the steady-state stock of physical capital per worker. This means that, in calculating the effect of education on growth, we also need to take into account its indirect effect via physical capital. MRW's specification of a complete growth model, simple though it is, allows us to gauge the magnitude of the total effect. The aggregate production function is assumed to be: $Y = K^{\alpha}H^{\beta}(AL)^{1-\alpha-\beta}$, where Y is output, K is physical capital, H is human capital, A is an index representing technical efficiency, and L is the labour force (Temple: 2002, 51).

In literature, some of the studies conducted in this regard: Lucas (1988), Mankiw et al. (1992), Sjögren (1998), Bassanini and Scarpetta (2002) found that human capital had a significant effect on growth. In their studies, Bils and Klenow (2000) and Monteils (2004) could not find a statistically significant correlation between human capital and economic growth. Jaoul (2004) suggested that there was a significant correlation between human capital and economic growth for France but not for Germany in the study he performed for Germany and France. Barro (2001), Bloom et al. (2001), Jorgenson and Fraumeni (1992), Dickens et al. (2006), Cohen and Soto (2007), Hanushek, E.A and Woessmann (2007), Aghion et al. (2009), Chaudhary (2009), Pradhan (2009), Dauda (2010), Chandra (2011) demonstrated that education was effective on growth because educational investments increased schooling rate and individuals were equipped with better skills and abilities.

When we look at the studies carried out relating to Turkey, Sarı and Soytas (2006) examine the relationship between Gross Domestic Product (GDP) and enrollments in primary, secondary, and high schools, as well as universities in Turkey for 1937–1996, in a multivariate framework. They find that real GDP and educational variables are cointegrated. Ogunleye and Eriş (2010) employing both OLS and granger causality techniques in the context of the endogenous growth theory, it is found that while health human capital is an important determinant of growth in Turkey. Yildirim et all's (2011) article maps out a framework for thinking about the issue in the context of the causal relationship between public educational expenditures and economic growth in Turkey over the period 1973-2009. The empirical results based on Toda and Yamamoto (1995) causality analysis show that the relationship between government expenditures and growth is not in the form of bidirectional causation as causality runs only from economic growth to educational spending but not expenditures on education to economic growth.

An Outlook on Education in Turkey and Other European Countries

It is known that education contributes to the increase in product and service quality and consequently to economic growth. For this reason, countries want to enable a majority of the population to receive a good education by increasing educational expenditures and quality because, in a sense, level of education appears as an indicator of development. For the purpose of increasing the quality of education and ensuring the participation of a majority of the population in education, Turkey switched to 8-year compulsory primary education in 1997. Given the percentage of the population between the ages of 25 and 64 having higher education, it is seen that Turkey is at a very low level compared to other European countries. Moreover, it is seen that the country having the highest percentage is Finland. Table 1 gives the indicators in this regard.

The Human Development Index (HDI)

The HDI is a summary measure of human development. It measures the average achievements in a country in three basic dimensions of human development (HDR, 2006: 394):

•A long and healthy life, as measured by life expectancy at birth.

•Knowledge, as measured by the adult literacy rate (with two-thirds weight) and the combined primary, secondary and tertiary gross enrollment ratio (with one-third weight).
•A decent standard of living, as measured by GDP per capita in purchasing power parity (PPP) terms in US dollars.

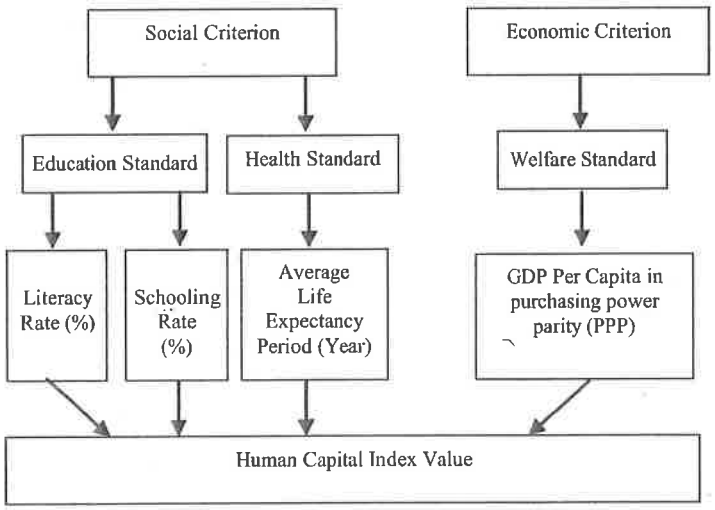
Figure-1 It shows the determination of the human capital index value which is formed based on each of the above-stated criteria more clearly.

Table 1. Tertiary Level Educational Attainment for Age Group 25-64.

Countries	1999	2000	2001	2002	2003	2004	2005	2006
Finland	31.3	32.0	32.3	32.6	33.3	34.2	34.6	35.1
France	21.5	22.0	23.0	24.0	23.9	24.5	25.4	26.2
Germany	22.9	23.5	23.2	23.4	24.0	24.9	24.6	23.9
Norway	27.5	28.4	30.2	31.0	31.0	31.8	32.7	32.9
Spain	21.0	22.6	23.6	24.4	25.2	26.4	28.2	28.5
Sweden	28.7	30.1	31.6	32.6	33.4	34.5	29.6	30.5
Turkey	8.1	8.3	8.4	9.1	9.7	9.1	9.7	10.4
United Kingdom	24.8	25.7	26.1	26.9	28.0	29.2	29.6	30.5

OECD, 2009.

Figure1. Human Capital Index Value



Taban & Kar. (2006). Human Capital and Economic Growth: Causality Analysis, 1969-2001. *Anadolu Üniversitesi Sosyal Bilimler Dergisi*, 1, 165.

Countries are divided into four groups as the countries with los, medium, high and very high human developments based on the human capital index calculations in the United Nations Development Reports.
•Index Point 0.889: Very high human development countries
•Index Point 0.741: High human development countries
•Index Point 0.630: Medium human development countries
•Index Point 0.456: Low human development countries.

Human development index of Turkey and its sections belonging to the year 2011 are shown in the Table-2. As it is seen in the Table-2, Turkey is among the countries having high level of human development.

The human capital index values of some European countries between the years 1980-2011 are given in the Table-3. When we look at the HDI value in the Table 3, it is seen that Turkey has a lower value in comparison with the other European countries. Turkey realized the increase in the HDI values beginning from the 2000's in particular. As of the year 2011, Turkey takes part at the 92nd line in the HDI rank listing according to the UNDP reports in the world with its value 0.699.

Data and Methodology

In this study, relationship between schooling rate and growth is examined in Turkey for the periods of 1982-2009. In this context, we employ test procedure that is proposed

by Toda-Yamamoto to determine the presence (or lack) of causal relation between the variables in question. Although Granger causality test is widely employed in the empirical literature to determine causal relation between variables, the testing procedure has some limitations. Firstly, the Granger causality test is very sensitive model specification and choice of lag lengths. Secondly, when variables in the VAR system are stationary or cointegrated, standard F test procedure to determine direction of causality is valid. However, many macroeconomic and financial variables that are considered in the empirical analysis may be different integrated level (first or second difference) or may not be cointegrated and this lead to complexity problem in the Granger causality test. In order to avoid integration and complexity problem in the Granger causality test, we employ the Toda-Yamamoto test procedure in this study.

Table 2. 2011 Year Human Development Index and its Components for Turkey

HDI Components	Value
HDI	0.699
Life Expectancy at Birth (Years)	74.0
Mean Years of Schooling (Years)	6.5
Expected Years of Schooling (Years)	11.8
GNI per capita (constant 2005 PPP $)	12.246

UNDP, 2011

Table 3. Human Development Index for Some European Countries 1980-2011

Countries	Finland	France	Germany	Norway	Spain	Sweden	Turkey
1980	0.759	0.722	0.730	0.796	0.691	0.785	0.463
1985	0.775	0.742	0.745	0.819	0.717	0.796	0.528
1990	0.794	0.777	0.795	0.844	0.749	0.816	0.558
1995	0.822	0.819	0.835	0.876	0.801	0.855	0.588
2000	0.837	0.846	0.864	0.913	0.839	0.894	0.634
2005	0.875	0.869	0.895	0.938	0.857	0.896	0.671
2006	0.878	0.873	0.898	0.940	0.862	0.898	0.681
2007	0.881	0.877	0.901	0.942	0.866	0.899	0.688
2008	0.883	0.879	0.902	0.941	0.871	0.900	0.691
2009	0.877	0.880	0.900	0.941	0.874	0.898	0.690
2010	0.880	0.883	0.903	0.941	0.876	0.901	0.696
2011	0.882	0.884	0.905	0.943	0.878	0.904	0.699

UNDP, 2011.

Toda and Yamamoto (1995) proposed a robust test procedure to determine causal link even if variables are not stationary or cointegrated. Toda-Yamamoto test procedure consists of three steps. In the first step, maximum order of integration of variables (d_{max}) should be determined by using unit root tests. In the second step, optimal lag length of the VAR system (k) should be determined via model information criteria's and then the VAR system with $(k+d_{max})^{th}$ order should be estimated with Seemingly Unrelated Regression (SUR) methodology. In the final step, a standard Wald test with an asymptotic χ^2 distribution is employed for testing the presence causal link between the variables.

The following equations can be considered in order to determine whether or not there is a causal relation between economic growth and schooling rate as one of the indicators of human capital.

$$GDP_t = \sum_{i=1}^{k+d_{max}} \alpha_i SET_{t-i} + \sum_{i=1}^{k+d_{max}} \beta_i GDP_{t-i} + u_{1t} \quad (1)$$

$$SET_t = \sum_{i=1}^{k+d_{max}} \lambda_i GDP_{t-i} + \sum_{i=1}^{k+d_{max}} \delta_i SET_{t-i} + u_{2t} \quad (2)$$

where,

GDP: Gross domestic product expenditure approach (National currency, constant prices, national base year). This data is taken from the website of the OECD.

SET: School enrollment, tertiary (% gross). It is one of the human capital indicators. It indicates the presence of high-

level skill. This data is taken from the website of the World Bank.

In order to determine maximum order of integration of variables, we first employ ADF unit root test and results are given in Table 4. As seen in Table 4, GDP and SET is not found to be stationary at level. The GDP variable became stationary at the first difference while the SET variable became stationary at the second difference. Therefore, it can be said that d_{max} in the VAR systems is 2. Then, we determine optimal lag lengths to be 1 in the VAR system according to Schwarz Information Criterion. Hence, the VAR model with 3 lags is estimated and the presence of causal link between the GDP and SET is examined by using Wald restriction test. The causality test results are given in Table 5. As seen in Table 5, we cannot determine the presence of causal link between school enrollment rate and economic growth since the schooling rate in Turkey was very low especially in previous years.

Conclusion

In the history of economics, economic growth has always maintained its importance in terms of countries. One of the factors that realize growth is ensuring capital accumulation. Of course, capital is not enough on its own. Human capital is needed so as to use it efficiently enough. The better-educated the human capital is and the more developed skills and abilities the human capital has and consequently the higher productivity the human capital has, the more contribution it makes to production process. Labor factor was first emphasized by Smith in the classical economics. Smith underlined that the only factor that created value was labor. He stated that, regardless of the amount of capital, it would not be effective unless there was labor to use it. In the neo-classical outlook, the source of growth rate differences between countries was not explained exactly. The intrinsic growth models that emerged later on emphasized that human capital was effective on growth.

Table 4. ADF Test Results for Unit Root

Variable	t value for ADF	Test Result (*)	Constant, Trend	Lag length
GDP	-2.661 p=0.258	There is a unit root	Constant, Trend	0
ΔGDP	-5.93 p=0.000	There is no unit root	Constant	0
SET	1.775 p=0.978	There is a unit root	None	3
ΔSET	-0.822 0.949	There is a unit root	Constant, Trend	2
ΔΔSET	-14.014 0.000	There is no unit root	Constant, Trend	1

*As a result of the ADF test, it was decided that there was a unit root when the p value was found to be above 5%. In other case, it was decided that there was no unit root. The number of lags was determined according to Schwarz Information Criterion.

Table 5. Causality Test Results

Direction of Causality	χ^2 statistic	Probability	Decision
GDP is not cause of SET	1.599	0.449	Yes
SET is not cause of GDP	0.928	0.628	Yes

Today, Turkey is among developing countries. Turkey increased the number of infrastructure and communication investments especially after 1990s. The country became the top growing economy of the Europe with a growth of 9.2% especially in the last quarter of 2010. It is possible to say that the recent increase in her human capital's skills and abilities has an effect on it. Many policies were pursued so as to realize it. For the purpose of increasing schooling rate, Turkey switched to 8-year compulsory primary education in the academic year of 1997/1998 (which had been 5-year). She offered overseas education opportunities by means of scholarships. It is seen that there has been an increase in recent years in Turkey's human capital's knowledge and skills. The reason why no casuality was found between school enrollment rate and economic growth in the casuality test I conducted for Turkey using the data of 1982-2009 is that tertiary schooling rates were very low in previous years. Educational contributions and schooling rate increase have increased growth rates in recent times.

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