THE MARKET VALUE OF HUMAN CAPITAL: AN EMPIRICAL ANALYSIS

Neagu Olimpia
"Vasile Goldis"Western University" of Arad, Romania

There is a general consensus that human capital is a major determinant of economic growth. Reflections on how human capital is related to growth can be extended by viewing on the market value of the human capital.
The concept of the market value of human capital reflects the efficiency of allocation and utilisation of the human capital in the economy. To measure this efficiency the concept of the market value of human capital is explained and developed in the present paper.
The aim of the paper is to introduce the concept of market value of human capital and the specific objectives are targeted to define his content, to propose a method for estimating it and to provide calculations of it for OECD countries.
The concept of human capital is complex and multifaceted one, consisting of: native human capital (biological), educational capital, health capital and social skills (Neagu, 2010). Clearly, human capital is intangible, a stock that is not directly observable as physical capital. Therefore, the estimation of human capital must be constructed indirectly. The stock of human capital in economy creates economic value, expressed through the economic output per capita. In order to estimate this economic value we have to find an appropriate proxy for the human capital stock producing that value.
In the purpose of our paper, we consider that the economic value of human capital can be estimated by calculating the aggregate value created by the active human capital in the economy. In this view, GDP per person employed is a relevant estimation of value created by the employed labour force. The aggregate value is created by the employed persons with different educational level.
The market value of human capital is calculated by dividing the GDP per person employed to the human capital stocks active in the economy. The human capital stock depends on educational costs (on primary, seconadry, tertiary education) as a the share of GDP per capita weighted by the employment rates. For OECD countries, the market value of their human capital was calculated for 1999-2008, showing their efficiency on utilisation of the human capital stock. The most efficient OECD countries are Australia Austria and USA and the less efficient are Mexico, Czech Republic and Hungary.The market value of human capital has a ascending trend in all OECD countries, reflecting the results of their efforts to valorise their human capital in employment.
The originality of the paper consists on introduction the concept of the market value of the human capital, defining his content and providing estimates for OECD countries.As a concept, the market value of human capital of a country shows the ability of the economy to use the existent human capital to produce economic output. The market value of human capital reflects an aspect of the economic efficiency, by relating the economic output per person employed to the human capital per capita employed in the economy. It expresses the economic output per one unit of human capital, reflecting the aggregate perfomance of that economy.

KEY WORDS: human capital, market value of human capital, employment, education costs
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Introduction

There is a general consensus that human capital is a major determinant of economic growth. Reflections on how human capital is related to growth can be extended by viewing on the market value of the human capital. The concept of the market value of human capital reflects the efficiency of allocation and valorization of the human capital in the economy. To estimate this efficiency, a measure of the market value of human capital was developed in the present paper, by weighting the national output per worker employed by the employment rate and the investment costs in education. The issue of efficiency in allocation and utilization of human capital in economy is important for policy makers, in designing policy measures, under the pressure of the public resources decreasing.

The aim of the paper is to introduce the concept of market value of human capital and the specific objectives are targeted to define his content, to propose a method for estimating it and to provide calculations of it for OECD countries.

The paper is organized as follows: section 1 provides some definitions of human capital, section 2 describe the concept of the market value of human capital, in the section 3 is described the methodology of the study and the section 4 presents the main finding. The final section is dedicated to conclusions and further directions of research.

1.Definitions of human capital

The concept of human capital was first introduced and estimated by Petty (1690). Cantillon (1755) discussed the concept of human capital and estimated the cost of rearing a child until working age. Adam Smith (1776) presented a clear analysis of the concept of HC and included it as a part of the 'general stock (human and non-human capital) of any country or society', where this general stock is composed of the following resources, (i) of all useful machines and instruments of trade which facilitate and abridge labor; (ii) of all those profitable buildings which are the means of procuring a revenue; (iii) of the improvements of land; and (iv) of the acquired and useful abilities of all the inhabitants or members of the society. Afterwards, he added, the ''acquisition of such talents, by the maintenance of the acquirer during his education, study, or apprenticeship, always cost a real expense, which is a *capital* fixed and realized, as it were, in his person''.

According to Schultz(1961), skills and knowledge that people acquire during their formal schooling represent a form of human capital. Schultz invented the term to reflect the value of our human capacities. He believed human capital was like any other type of capital; it could be invested in through education, training and enhanced benefits that will lead to an improvement in the quality and level of production.

The concept of human capital was largely forgotten by economists until its re-birth in the early 1960s with the writings of Becker (1962, 1964) and Mincer (1958, 1962, 1974). These economists rekindled this old concept by reaffirming its links with economic growth and by emphasizing its importance in explaining earnings differentials.

Human capital is represented by the aggregation of investments in activities, such as education, health, on-the-job training, and migration that enhance an individual's productivity in the labour market (see e.g., Kiker 1966; Becker 1997; Schultz 1961, 1962). More recently, this concept has been extended to include non-market activities (see e.g., OECD 1996; Jorgenson and Fraumeni 1989; Schultz 1994).

The Penguin Dictionary of Economics defines human capital as "the skills, capacities and abilities possessed by an individual which permit him to earn income."

According to another definition, human capital represents "the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being" (OECD, 2001, p18).

Laroche et al(1999) defined human capital as the aggregation of the innate abilities and the knowledge and skills that individuals acquire and develop throughout their lifetime. Innate abilities represent an individual's intrinsic potential to acquire skills. They can be defined as all physical, intellectual, and psychological capacities that individuals possess at their time of birth. They are received as gifts by individuals without any action or choice of their own, and they differ greatly across individuals because of heredity, parental decisions, and purely random factors. Acquired skills represent the actualization of this potential mostly through individual efforts involving a cost. These skills are acquired over one's lifetime through intergenerational transfers of knowledge, personal contacts, work experience, on-the-job-training, education and socialization. Since the number of skills individuals acquire through their lifetime depends partly on their initial abilities, this potential is an important aspect of the human capital concept.

The concept of human capital is complex and multifaceted one. Laroche et al(1999) proposed five main aspects to be considered: (i) human capital is a non-tradable good, it is embodied in human beings; (i) individuals do not always control the channels and pace they acquire human capital: as young, human capital decisions are made by parents, governments, society(educational institutions), as individuals able to make independent decisions, they internalize the decision process on human capital investments; (iii) human capital has quantitative and qualitative aspects: human capital investments are not qualitatively homogeneous; (iv) human capital can be general (possibly to use in variety of activities and transferable from one employer to another) and specific(can be used in a limited number of activities).

The definition of human capital also contains the notion of external effects. The influence that individuals have on the productivity of others and of physical capital, as well as the fact that individuals will be more productive, for any given level of skills, in an environment containing a high level of human capital are demonstrating this effect. Human capital also generates what can be referred to as social externalities. These externalities, which include, among other things, increased utility from living in a society with democratic institutions, freedom of thought and speech, and more varied literary expressions and means of communication, enable individuals to live effectively in a society whose members share common goals. The pursuit of common goals, in turn, enhances mutual trust among individuals and strengthens social institutions. The collection of all these externalities has been termed as *social capital*.

Summarizing, the concept of human capital consists of: native human capital (biological), educational capital, health capital and social skills (Neagu, 2010).

Clearly, human capital is intangible, a stock that is not directly observable as physical capital. Therefore, the estimation of human capital must be constructed indirectly. Common approach to human capital measurement include the cost based approach, the income-based approach and education-based approach. We will use further the education-based approach.

2.Conceptual aspects

A country's human capital stock is the value of the productive capacity of its workers. Human capital is important as research generally supports a relationship between high levels of capital and economic growth. Individuals' labour market outcomes are linked to their human capital, although the precise mechanisms by which this happens is unclear. Jones and Chiripanhura (2010) set out an experimental approach to measuring human capital that estimates the economic value to individuals of their highest level of attainment gained in the formal education system.

This paper focuses on human capital acquired through participation in the formal education system, i.e. excluding the human capital gained in the years before primary education and in adult life. For the purposes of this paper, the term human capital is restricted to people's knowledge, skills and competencies, which means excluding other attributes such as the health of the population. Thus, any activity that adds to these can be thought of as investment in human

capital. These activities can take place throughout an individual's life and in a range of environments.

In this paper, we understand the market value of human capital as a valorization of national education investment on the labour market. The market value of human capital depends on how efficiently human capital is allocated and employed in the economy, therefore it depends in a very large scale on the efficiency of institutions.

In the present paper, we take into consideration that the market value of the human capital for a given educational level is expressed by the national output per worker employed, the employment rate and the expenditures for that educational level.

The stock of human capital in economy creates economic value, expressed through the economic output per capita. In order to estimate this economic value we have to find an appropriate proxy for the human capital stock producing that value. In the human capital literature, there are several methods to estimate human capital stock in the economy. For example, there have been used are literacy rates, enrolment rates, and estimates of the average number of years of education attained by workers. These proxies give an idea of how much human capital a country has, but any power they have depends on the assumption that the proxy is collinear with the country's whole human capital stock.

Another approach is to estimate the human capital stock as average years of education of the labour force developed by Kyriacou (1991), Barro and Lee (1993, 2000), Nehru et al (1995). Building on their work, Judson (2002) brought an innovation: to calculate the cost of education and then to weight primary, secondary, and higher education stocks according to their costs.

Based on the findings of Judson(2002), the average human capital per worker, *h,* is:

$$h = \sum_i d_i \cdot a_i \qquad (1)$$

where:

d_i is educational expenditures for the *i* level of education, as share of GDP;

a_i is the educational attainement of the labour force

In the purpose of our paper, we consider that the economic value of human capital can be estimated by calculating the aggregate value created by the active human capital in the economy. In this view, GDP per person employed is a relevant estimation of value created by the employed labour force. The aggregate value is created by the employed persons with different educational level. The employed population can be divided in three main groups: with primary, secondary and tertiary education. Each group contributes differently at the macroeconomic results, according to the human capital they embodied.

In the purpose of our paper we consider that we can estimate the active human capital stock per worker, following the reasoning of Judson(2002) and using the formula (1).

In this view, the human capital stock in the economy can be calculated by weighting the costs per student in primary, secondary and tertiary education by the employment rate by educational attainment:

$$h = \sum_i ED_i \cdot ER_i \quad (2)$$

h - human capital stock per capita

ED_i -educational costs per student in primary, secondary, tertiary education, as share of GDP per capita;

ER_i - employment rate for population with *i*-educational level.

The monetary value created by human capital, HCV , is given by:

$$HCV = \frac{GDP / employed}{\sum_i ED_i \cdot ER_i} \quad (3)$$

where:

i - the educational level: 1-primary, 2-secondary, 3-tertiary

ER_i is the employment rate by the *i*-educational level;

ED_i is the educational investment, expressed by the expenditure per student for the *i* educational level, as % of GDP per capita.

We assume that the governement expenditure are a good measure of the value of education provided. But there are shortcomings of this assumption. First, education expenditures measure the price of producing human capital at a given time, so is not an accurate indicator of the value of older human capital. Second, educational data provided by UNESCO are not including private spending.Third, the method does not include the foregone earnings during education, that could be quite substantial. Fourth, the quality of education output is not always a direct function of expenditures.

3.Methodology of the study

In the present study, educational and economic data regarding OECD countries are used. The following sources of data were explored: OECD Data Base for employment rates of 25-64 years olds by educational attainement, UNESCO for expenditures per student, in primary, secondary, tertiary education, as % GDP per capita and WORLD BANK for GDP per person employed in PPS, international dollars.

Using the formula (3) it was calculated HCV, in each year, between 1999-2008, for primary, secondary and tertiary education in 28 OECD countries. The results of calculations are presented in Table 1.

A higher value of HCV means a higher efficiency in utilisation of the human capital stock existent in the economy. But, we have to mention that in our formula of HCV, calculation of the human capital stock is based on the shares of educational costs in GDP per capita weighted by the employment rates of the educational levels. As these shares and employment rates are higher as the human capital stock is higher and, finally, the HCV is lower, at a fixed level of GDP per person employed. It is possible that countries with a high level of GDP per person employed and with a high level of human capital stock to have a low HCV. HCV measures the efficiency of the utilisation of the existent human capital to produce economic output.

4.Main findings

As we can see in the Table 1, the countries with the highest human capital value are: USA, Australia and Austria. In these countries, the active human capital is the best valorized on the labour market, the level of employment rates by all educational levels being the highest. The loweste levels of HCV are registered in Eastern European countries as Czech Republic, Poland, Hungary, in Turkey, Mexico and Portugal. Their values are at a half of those registered in USA, Austria and Australia.

We can divide the OECD countries in three main groups by the average level of HCV during 1999-2008: (1) with HCV values between 11-13 $: USA, Australia, Austria, Ireland, Korea, Sweden, Slovenia ; (2) with HCV values between 8-11 $: Belgium, Estonia, France, Israel, Italy, Japan, Spain, United Kingdom; (3) with HCV values between 3,9-8 $: Czech Republic, Denmark, Hungary, Iceland, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Switzerland, Turkey.

The countries from the first group are the most effectively in their efforts to use on employment the stock of human capital produced by the education process. In these countries, the economic

output per person employed is double as in countries from the third group and the employment levels for highly skilled people are between 82-85%.
The countries from the second group are well developed countries, with a level of GDP per capita between 39.000-56.000 $. The rates of employment for the secondary and tertiary education are between 72-87% and shares of education costs of GDP per capita are 25-35%.

Table 1
The market value of human capital in OECD countries, 1999-2008

HCV (constant 1990 PPP $)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	**Average**
Australia	10,72	11,13	10,83	11,86	11,92	11,82	11,85	12,39	12,63	12,92	11,81
Austria	10,00	10,78	10,23	11,32	11,20	11,47	11,61	12,05	12,24	12,53	11,34
Belgium			8,77	8,99	9,37	8,57	8,59	8,69	8,60	7,98	8,69
Czech Republic	3,58	3,98	4,01	3,98	3,95	4,43	4,94	4,32	5,04	5,49	4,37
Denmark	4,20	4,14	4,00	4,10	4,48	4,79	5,18	5,35	5,34	5,22	4,68
Estonia					7,83	9,09	9,62		9,21	7,40	8,63
France	9,16	9,37	9,36	9,24	8,54	8,75	9,30	9,44	9,29	9,18	9,16
Greece	8,01	8,25	8,33	8,38	8,58	8,28	7,99				8,26
Hungary	3,67	3,75	3,87	4,06	4,20	3,96	4,87	5,00	5,21	5,35	4,39
Iceland		5,92	5,77	5,56	6,06	6,61	6,70	6,79	6,71	6,80	6,33
Ireland	10,52	10,86	10,66	11,28	12,09	12,64	12,36	11,98	11,58	11,55	11,55
Israel				8,82	8,60	9,84	10,42	10,59	10,76	10,64	9,95
Italy	8,72	9,10	8,76	8,70	8,73	9,05	9,39	8,75	9,61	8,69	8,95
Japan	9,45	9,24	9,23								9,31
Korea	10,56		13,11	11,13	9,96	10,25	10,97	11,14	11,70	10,86	11,08
Mexico			3,86	3,15	3,63	3,80	3,87	4,06	5,02		3,91
Netherlands	6,26	6,57	6,64	6,59	6,46	6,67	6,85	6,92	7,15	6,93	6,70
New Zealand	5,29	11,05	5,61	5,98	6,29	6,68	6,88	7,00	6,93		6,86
Norway				6,17	6,14	6,42	6,73	7,19	6,77	6,89	6,62
Poland				5,41	5,92	5,81	5,75	6,20	6,36		5,91
Portugal	4,67	4,67	4,49	4,61	4,52	4,59	4,46	4,46		4,76	4,58
Slovak Republic	4,66	5,58	5,41	5,49	5,91	6,12	7,73	7,97	9,75	10,05	6,87
Slovenia			5,23	5,61	5,61	15,27	17,64	19,12			11,41
Spain	9,72	9,43	9,21	8,98	8,59	8,45	8,19	7,84	7,57	7,28	8,53
Sweden	11,39	11,33	11,39	11,36	11,83	10,43	10,97	11,38	11,42	11,07	11,26
Switzerland	4,52	4,77	4,47	4,23	4,11	4,33	4,73	5,00	5,47	5,39	4,70
Turkey		5,27	4,76	6,77	5,72	6,33					5,77
United Kingdom	8,60	9,10	9,16	8,19	8,06	8,54	7,98	8,07	8,62	8,80	8,51
United States	11,36	20,37	10,34	11,63	11,52	12,69	13,25	12,38	13,08	13,62	13,02

Source: author's calculations

The countries from the third group are, mostly, former communist countries (Poland, Hungary, Czech Republic, Slovak Republic) or developing countries(Mexico, Turkey), where the stock of

human capital is about half of that the countries from the first group and the economic output per capita is the third of well developed countries. In a separate situation are Denmark, New Zealand, Norway and Switzerland, well developed countries, with a higher level of GDP per capita. In these countries, the costs of higher educated employees are at very high level and the employment rate for these individuals, as well (i.e.90, 15% as average for 1999-2008, in Switzerland).

In all OECD countries the market value of human capital increased during 1999-2008 and the trend is ascending. Spain is an exception, the values are decreasing last years, due to the impact of the economic crisis on the labour market. In the rest of the OECD countries the economic crisis has no significant effects on the valorization of human capital stock on employment, the trends are ascendent or stables. A possible explanation could be the fact that in 2008, the financial and economic crisis was not yet turned into a jobs or employment crisis. A possible evolution of HCV for 2009-2011 could be a downward trend, due to the contraction of economic output in all countries.

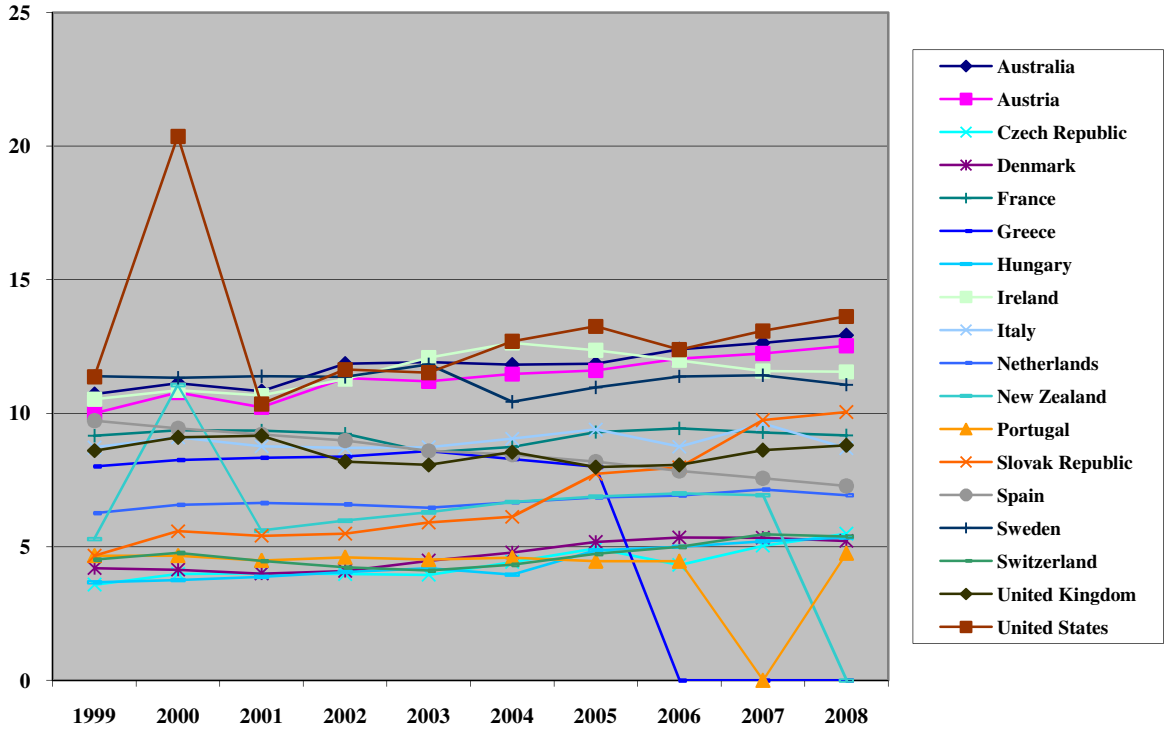

Fig. 1 The dynamics of HCV in OECD countries, 1999-2008
Source: Author's interpretation based on OECD data

Conclusions and further directions of research

The originality of the paper consists on introduction the concept of the market value of the human capital, defining his content, proposing a method to estimate it and providing calculations for OECD countries.

The market value of human capital in OECD countries was calculated for 1999-2008, showing their efficiency on utilisation of the human capital stock. The most efficient OECD countries are Australia Austria and USA and the less efficient are Mexico, Czech Republic and Hungary.The market value of human capital has a ascending trend in all OECD countries, reflecting the results of their efforts to valorise their human capital in employment.

The market value of human capital per worker, as average, evolves between 3,91 $ in Mexico and 13,02 $ in USA.
The market value of human capital has a ascending trend in all OECD countries, reflecting the results of their efforts to valorise their human capital in employment.
As a concept, the market value of human capital of a country shows the ability of the economy to use the existent human capital to produce economic output. The market value of human capital reflects an aspect of the economic efficiency, by relating the economic output per person employed to the human capital per capita employed in the economy. It expresses the economic output per one unit of human capital, reflecting the aggregate perfomance of that economy.
An added value of the paper constitutes the fact that countries can adapt, design or re-design their employment policies on the basis of the present empirical evidences on the market value of human capital. The idea is to raise the valorisation in employment of the active human capital stock in the economy.
A direction of further research could be to investigate how the allocation of human capital through the sectors of the economy influences the market value of the human capital.
It will be useful, as well, to investigate how the efficiency of institutions influence this value.
In this view, it is necessary to find a method to calculate the contribution of the different groups of labour force by educational attainment to the aggregate economic output per capita or per person employed. In this way, we could estimate more accurately the contribution of human capital stock by different educational levels to the value creation in the economy. An analysis of these estimates could be useful in orienting governamental policies in education and employment, to stimulate the accumulation of human capital generating more value for the economy.

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BIBLIOGRAPHY
1.Barro, R. and Lee, J-W. "International comparisons of educational attainment", *Journal of Monetary Economics,* 32:3,(1993): 363–94.
2.Barro, R. and Lee, J-W. "International measures of schooling years and schooling quality", American Economic Review, 86:2, (1996): 218–23.
3.Barro, R. and Lee, J-W."International data on educational attainment: updates and implications, NBER Working Paper 7911, Cambridge, MA, 2000. Accessed 18.04.2012. http://www.nber.org/papers/w7911.
4.Becker, G.S. "Investment in Human Capital: A Theoretical Analysis," *Journal of Political Economy* 70(5, Part 2, Supplement)(1962): 9-49.
5.Becker, G.S. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education,* Bucureşti: Editura All, 1997.
6.Cantillon, R..*Essay sur la nature du commerce en general*. Reprinted for Harvard University, Boston, (1755)
7.Jones, R. and Chiripanhura, B. "Measuring the UK's human capital stock", *Economic and Labour Market Review*, 4(11)(2010):36-63.
8.Jorgenson, D.W. and B.M. Fraumeni (1989). "The Accumulation of Human and Nonhuman Capital, 1948-1984," in *The Measurement of Saving, Investment, and Wealth,* ed. R.E. Lipsey and H.S. Tice (Chicago: University of Chicago Press), 1989 Accessed 10.04.2012. http://www.nber.org/chapters/c8121.pdf

8.Judson, R. ”Measuring human capital like physical capital”, Bulletin of Economic Research 54 (3)(2002):209-231.
9.Kiker, B.F. “The Historical Roots of the Concept of Human Capital,” *Journal of Political Economy* 74(5)(1966): 481-99.
10.Kyriacou, G. ”Level and growth effects of human capital”, Working paper 91–26, C. V. Starr Center, New York University, New York, 1991.
(http://econ.as.nyu.edu/docs/IO/9392/RR91-26.pdf)
11.Laroche, M., M´erette, M., and Ruggeri, G. C. ”On the concept and dimensions of human capital in a knowledge-based economy context”. *Canadian Public Policy - Analyse de Politiques,* 25(1)(1999):87–100.
12.Mincer, J.“Investment in Human Capital and Personal Income Distribution,” *Journal of Political Economy* 66(4)(1958): 281-302.
13.Mincer, J. “On-the-Job Training: Costs, Returns, and Some Implications,” *Journal of Political Economy* 70(5, Part 2, Supplement)(1962): 50-79.
14.Mincer, J. ”Schooling, Experience, and Earnings”, New York: National Bureau of Economic Research, 1974, Acessed 12.04.2012. http://www.nber.org/books/minc74-1.
15.Neagu, O.*Capitalul uman şi dezvoltarea economică*, Cluj Napoca: Editura Risoprint, 2010.
16.Nehru, V., Swanson, E. and Dubey, A.”A new database on human capital stock in developing and industrial countries: sources, methodology and results”, *Journal of Development Economics,* 46 (1995): 379–401.
17.OECD .*”Measuring What People Know: Human Capital Accounting for the Knowledge Economy”,* OECD, Paris, 1996.
18.OECD.”The well-being of nations: the role of human and social capital”. OECD, Paris, 2001.
19.Petty, W.*Political Arithmetic*, reprinted in C.H. Hull, The Economic Writings of Sir William Petty, 1690.
20.Schultz, T. W. ”Investment in human capital”, *American Economic Review*, 51 (1)(1961): 1–17.
21Schultz, T.P. “Human Capital, Family Planning, and their Effects on Population Growth,” *The American Economic Review* 84(2)(1994): 255-60.
22.Smith, A. *Avuţia Naţiunilor.Cercetarea asupra naturii şi cauzelor ei,* Bucureşti: Editura Academiei, 1962, 1965.
www.unesco.org
www.oecd.org
www.worldbank.org