INVESTMENTS IN HUMAN CAPITAL AS AN ALTERATIVE TO OFFSET THE DECREASE IN WORKING-AGE POPULATION IN THE REPUBLIC OF BULGARIA

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ABSTRACT

Bulgaria is currently confronting long-term trends of diminishing working-age population and labour force shortage in terms of particular qualifications. We propose that the problem can be efficiently resolved through increasing the size and efficiency of investments in human capital that complement the country's demographic policy measures. Using official labour census data for Bulgaria we examine the extent to which the specific conditions of the Bulgarian labour market provide the necessary incentives for investments in human capital and which of these investments are of greatest benefit to investors. We then extract applicable approaches and methods for measuring human capital and returns on human capital investments that are in line with Bulgaria's specificity.

KEYWORDS: *human capital, human capital investments, internal rate of return, age-net earnings profiles*

Introduction

The demographic and economic developments in Bulgaria have created lasting long-term trends of diminishing working-age population and deficiency in labour force of particular education and qualifications. Despite the country's demographic policy measures, it is our view that the problem can be efficiently resolved through increasing the size and efficiency of investments in human capital.

Following this proposition, the article suggests some applicable approaches and methods for measuring human capital and returns on human capital investments, most of which are popular in the theory of human capital [12], [16], [18], [19]. Using representative data for Bulgaria we have tried to examine to what extent the condition and development of the Bulgarian labour market provide the necessary incentives for investments in human capital and which of these investments are of greatest benefit to investors. Our investigation has also sought to answer the question as to what extent the popular theoretical principles and models are supported by the Bulgarian practice.

Relevancy of the human capital issue for Bulgaria

The issues of human capital and human capital investments in economic theory date as back as the time of Adam Smith. Over the last decades the importance of these problems has not only increased, but has also set a major direction to the key socio-economic strategies and policies [1], [9], [17], [21]. There is hardly a topic more frequently discussed in the European Union and across member states than human capital and its growing role in achieving the major strategic goals.

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The issues of human capital are especially significant for Bulgaria. As a result of the demographical processes observed over the last 50 years, intensive migration movements in particular, the prospects are for further ageing population and declining working-age labour force. A common European trend, in Bulgaria these processes have been developing most dynamically and with worst impact on the labour market and the condition of insurance funds. This conclusion is also supported by the data in Chart 1 showing changes in the working-age population, which are compiled based on the data in the EUROSTAT projections Baseline variant [11].

Chart 1

Changes in the number of working-age population aged between 15 and 64
/2004 = 100%/
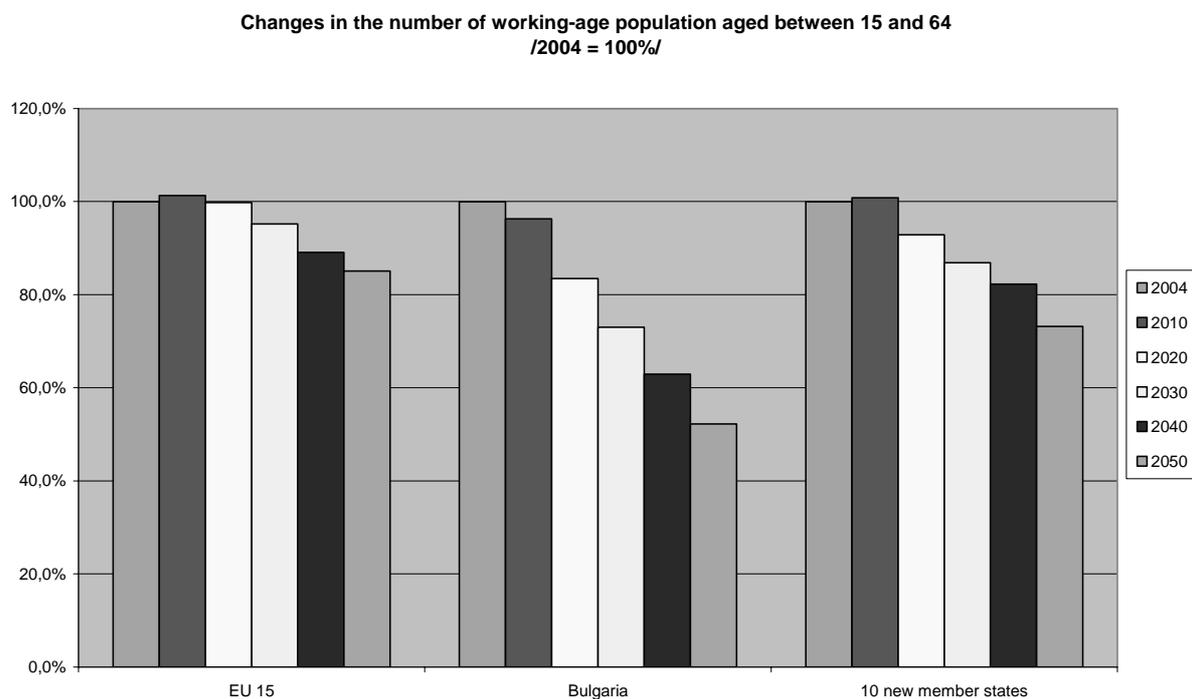
As a result of falling working-age population and growing labour force demand amid high economic growth from early 2006 to mid 2008, labour force shortage was observed in Bulgaria in a number of key economic sectors. This labour market situation forced a large number of employers to raise salaries to levels even higher than labour productivity real growth. In an effort to resolve the situation, the Bulgarian government developed measures to import labour force from third countries. This caused serious reaction from trade unions as imported labour force would further add to the existing proportion of poorly educated, low-skilled unemployed workers and thus to sustained levels of long-term unemployment in the country.

In addition, some measures to boost birth rate were taken; however, no matter how successive these may be, their impact on the labour market will not be felt within the next few decades. Against this prospect of declining working-age population and scarce labour force, the issue of an efficient catch-up strategy for Bulgaria is assuming particular importance. Our view is that the key alternative to offset the expected trends of diminishing working-age population is for Bulgaria to dynamically develop its human capital and increase the volume and efficiency of resources invested in it.

Reaching a certain national level of human capital is however the result of individual decisions, which are based on individual interests. The article builds upon the assumption that a person's basic motivation to increase the level of human capital is higher earnings. Over a lengthy period of their lifetime people develop their abilities and create new ones by constantly incurring a certain amount of costs.

Therefore, the process of human capital formation is of investment nature and should consequently lead to higher productivity and higher earnings for individual investors. If economic efficiency is central for the decisions individuals make choosing one instead of another type of human capital investment, then the next basic question relates to the benefit of or return on such investments in the future. Thus, the issues of estimating the return on investments in human capital are no longer of theoretical relevance only; they have also become of high practical relevance to personal decision making and national policies [2], [10], [15], [17].

Human capital formation and development is a complex process simultaneously taking place in a variety of social and economic areas. The quality of public health care, prophylactic and recreational activities, mass sports, culture, arts, etc., plays an important part in the process. The role of the family as a formative factor of human capital is increasing. A single study however could not possibly cover all aspects of direct and indirect costs related to human capital formation, some of which are very hard to measure empirically.

From the benefit of and return on investment in human capital perspective, our interest is focused on measuring education and professional experience as key elements of this capital. The reason for choosing this approach is not only its extensive use in this kind of studies but also the ample representative statistical data on these two indicators available in Bulgaria.

For the purpose of this study we have used data on the structure of earnings from the two surveys (2002 and 2006), which the National Statistical Institute conducts in Bulgaria every four years in line with EU regulations [20]. We use this database because of its representative and comprehensive character, which is not available in other statistical forms. For 2002 the sample of the survey covers circa 154 thousand employees, while the data for 2006 point to around 187 thousand employees.

Employees are persons under labour contracts with their employers as per the Labour Code or in duty relations as per the Law on the Civil Servant. The study is based on employees' net earnings which are the amount received by an employee after deduction of the tax and compulsory social security contributions levied on the total gross earnings in the reference period. Net earnings are the financial measurement of the returns on a particular type of a person's investments in education.

October is taken as representative month in the two surveys as the month least affected by absences for reasons of paid annual leave or official holidays. In this way, ample representative anonymised individual data on employees have been processed, which allows for more significant estimations and conclusions.

Approaches to investigating and empirical measurement of the efficiency of private investments in education
The most frequently recommended theoretical approaches for estimating the return on investments in human capital involve educational costs. Figure 1 illustrates a theoretical model for measuring the efficiency of private investments in education, using tertiary education as example.
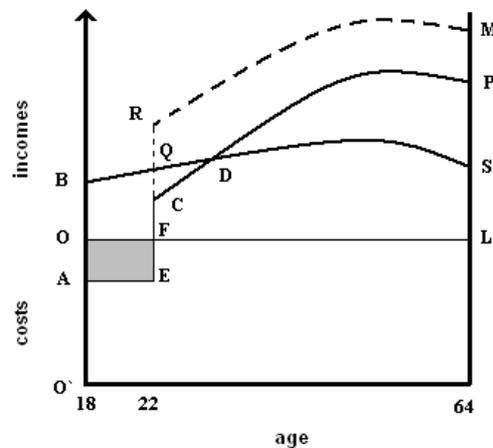
Figure 1. Efficiency of private investments in education

Let us assume that a person is admitted to an institution of tertiary education at the age of 18 and graduates after 4 years at the age of 22. The vertical axis O`B up to line OL reflects the costs for education of the student and his/her family, and above this line the axis indicates the respective earned incomes. The horizontal axis shows age on the assumption that a person retires at 64.

We also assume that if another person does not pursue tertiary education after his/her 18 year, but starts work instead, then his/her earnings until retirement are described with the function BS. In this particular case we will study two possible hypotheses of the hypothetical evolution of the income earned by a university graduate from the start of his working career until his/her retirement, which is illustrated with the functions CP and RM.

Obviously, over the four-year period of tuition the student incurs certain costs, shown in Figure 1 with the rectangle AOFE. Over the same period this person is also characterised by opportunity cost relative to the other working individual represented by the figure OBQF. This can even be higher if after graduating university that person's earnings function is CP. In this case the opportunity cost coincides with Figure OBDCF.

In other words, over the four-year period of his/her studies the person is characterized by direct costs and opportunity cost, the sum total of which we will regard as investments in education.

What conclusions can be drawn about the efficiency and effectiveness of investments in education as regards the situation in Figure 1? Total earnings throughout the working career of a person without tertiary education are illustrated by the area outlined as Figure OBSL. If the person with tertiary education has a CP function of his/her earnings, then his/her total income is the area illustrated by Figure CPLF.

In this case, investments in tertiary education can be considered efficient if the area in Figure CPLF is larger than the area in Figure OBSL, insomuch as it satisfies that person's interest formed in advance. Return on and benefit of investing in tertiary education could even be higher if the earnings of the person who has graduated university are formed with the RM function.
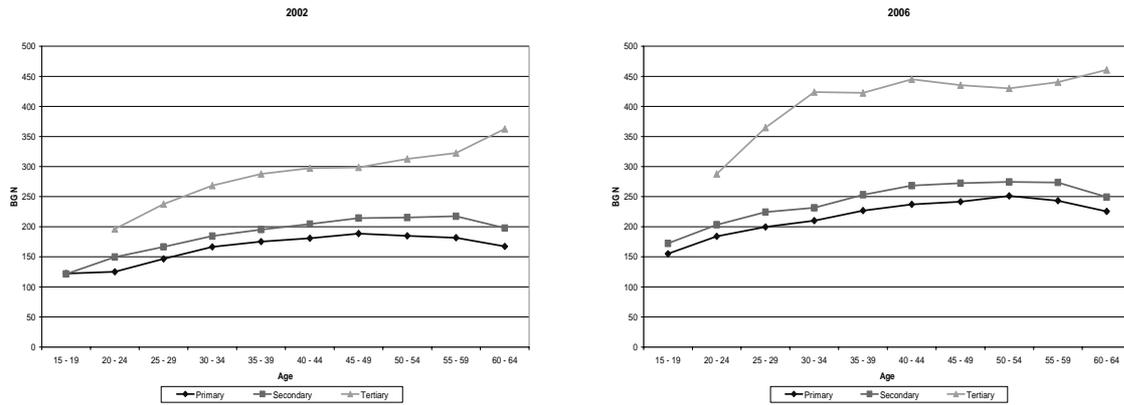
Figure 2. Age – net earnings profiles in Bulgaria by education type – 2002 and 2006 – total
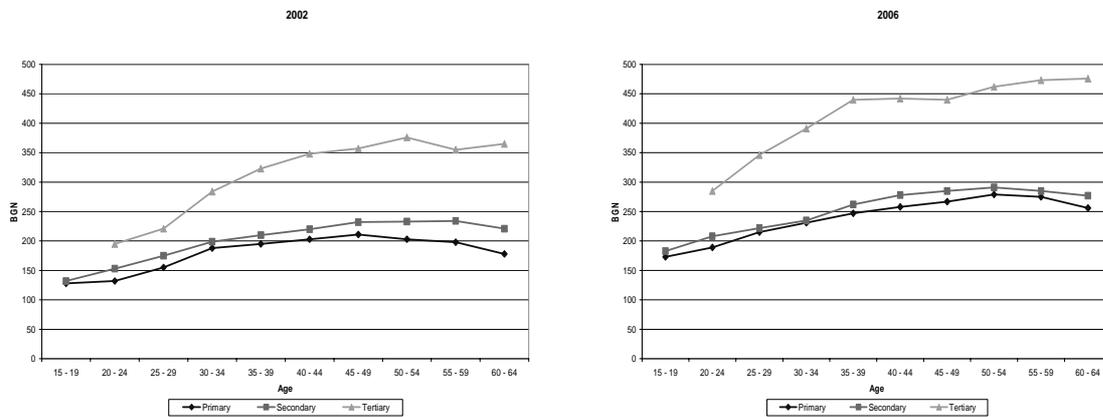

Figure 3. Age – net earnings profiles in industry in Bulgaria by education type – 2002 and 2006
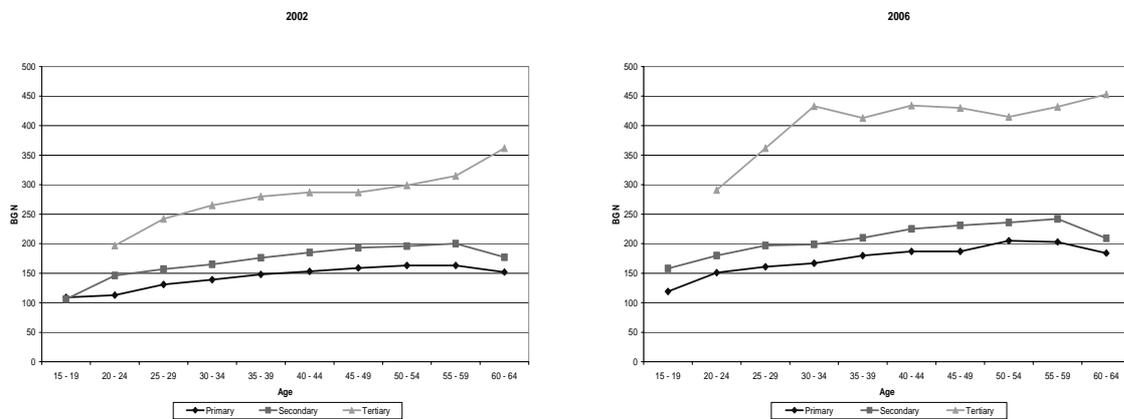

Figure 4. Age – net earnings profiles in the service sector in Bulgaria by education type – 2002 and 2006

Figures 2., 3. and 4. illustrate the estimated age-net earnings profiles by type of education for 2002 and 2006 in different breakdowns. Our assessments confirm the key elements of the theoretical model in Figure 1 and even point to more favourable trends in the oldest age-groups of employees with tertiary education relative to the studied theoretical hypotheses. The declining earnings in the oldest age-groups of employees with secondary and primary education should be regarded as a decline in their rate of growth rather than as an absolute decline of the indicator.

The assessments shown in Figure 2, in total for the country, indicate a growing benefit of investments in tertiary education in 2006 relative to 2002. The basic indications of the theoretical model are also confirmed by the assessments of industry and services for the two reference years. From purely economic perspective, the trends emerging in the labour market in Bulgaria in the period 2002 – 2006 should motivate employees to improve their education, in particular to invest in tertiary education. At the same time, there are apparent differences in the returns on investments in tertiary education relative to the total number of employees in the country, and the number of employees in industry and services.

Table 1 shows our measurements of the areas below the functions of the age-earnings profiles, which represent the average total net earnings for all age-groups of employees of a relevant education. Looking once again at Figure 1, we can estimate the total net earnings for employees with tertiary education if we measure the area in Figure FRML, and the total net earnings for employees with secondary education this would be the area in Figure OBSL. The calculations in Table 1 are built on two provisional assumptions.

First, we have assumed that the estimated age – net earnings profiles across education types at a given point in time can be used in measuring the change in net earnings per employee within an education type throughout his/her working career. Also, the concrete net earnings used in the research relate to October for the two respective reference years, as we do not have any other source of exhaustive data to assess earnings.

Thus, the average annual net earnings of one employee within a particular education are calculated by multiplying the average net earnings of that person in October of the respective year by the number of months in one year. We consider that if take into account the two conventionalities and the related approximations in the final results, this approach allows us to make some basic conclusions about the benefit of and return on investments in a particular education.

Table 1

Area /total net earnings / below the functions of the age-earnings profiles (BGN)

	2002			2006		
	Primary	**Secondary**	**Tertiary**	**Primary**	**Secondary**	**Tertiary**
Bulgaria	96756	109308	150852	127176	141084	215904
Bulgaria – Industry	105528	117888	163296	145944	154584	221484
Bulgaria – Services	82368	98364	148248	105816	126996	214680

Overall, the total net earnings per employee visibly increase with improving one's education. Indisputably higher, however, is the benefit of attaining tertiary education compared to any of the lower educational qualifications. The reasons to reach these conclusions are the direct comparisons between the total net earnings of the respective employees, which we calculated by measuring the areas below the real functions of the age-earnings profiles as illustrated in Figures 2., 3. and 4..

At the same time, these assessments can be used to further develop the approach for studying the benefit of investments in education. So far, we have studied the benefits as total net earnings per employee of specific education over his/her working lifetime. In another aspect, of interest to us are the differences between total net earnings of employees across educational levels.

In this particular case we are trying to answer the question of how efficient it is for a person with secondary education to pursue tertiary education basing our conclusions on the differences between the total net earnings of an employee with a tertiary education and the respective earnings of another person with secondary education.

For this purpose, in Table 2 we have shown the ratios between the total net earnings per employee of a specific education.

Table 2

Ratio between total net earnings per employee, by type of education (%)

		2002			2006	
		secondary to primary	tertiary to secondary		secondary to primary	tertiary to secondary
Bulgaria		113%	138%		111%	153%
Bulgaria – Industry		112%	139%		106%	143%
Bulgaria – Services		119%	151%		120%	169%

In 2002 the total net earnings of employees with tertiary education is by 38 % higher than that of a person with secondary education, while in 2006 the difference increases to 53 %. The findings are that in 2002 and 2006 the benefit of tertiary education is higher in the services sector relative to industry with differences in 2006 reaching 26 %. Also, further analyses could be made of the benefit of secondary education relative to the alternative of a lack of it.

Generally, however, there are reasons to conclude that investment in tertiary education is much more efficient than investment in secondary education, if we take as a basis the ratios between total net earnings per employee across education levels.

Another alternative approach to assessing benefits of and return on investments in education relates to determining the concrete interest rate, where the present value of investment is zero. This is the internal rate of return (IRR), or the amount of interest that makes the present values of earnings and expenses equal.

Table 3

Internal rate of return (%)

	2002	2006
	Tertiary	Tertiary
Bulgaria	9%	12%
Bulgaria – Industry	9%	10%
Bulgaria – Services	11%	14%

The data in Table 3 represent our assessment of the internal rate of return on investments in tertiary education in 2002 and 2006 for Bulgaria. The calculation of this indicator builds upon the assumption that a person is engaged in tertiary education studies for a four-year period and makes investments accordingly. The annual investment in this period is the sum of opportunity cost and direct costs. The opportunity cost for one year in tertiary education then would be the average annual net earnings of one employee with secondary education during that year. We use as measurement of direct costs two average net monthly earnings in the country for the respective year taking into account the amount of education fees and some other related expenses.

Some IRR calculations take into account only the direct costs incurred over the period of tertiary education studies – such as semestrial tuition fees, expenses incurred for educational supplies and other education-related costs. In our assessments we consider opportunity cost an element of investments in tertiary education, which a student could have alternatively earned during that period had he or she been employed with secondary education. Opportunity costs however could be higher than the amount of direct costs, so their inclusion into the relevant IRR calculation definitely lowers the level of the measured indicator vis-à-vis alternative assessments using direct costs only.

We however support the proposition that by taking into account direct costs and opportunity costs over the period of tertiary education studies we get even closer to a more realistic assessment of the benefit and return on investments in tertiary education.

Regardless of the obvious reduction in the IRR indicator vis-à-vis the alternative options of applying the method without allowing for opportunity costs, the indicators calculated and shown in Table 3 point to a high value of return on a similar type of investments. This assessment approach builds upon the assumption that a person's total amount of investment (opportunity costs and direct costs) in tertiary education comes from loans (with related interest payments).

In this particular case, the assessed indicators of internal rate of return on investments in tertiary education confirm the efficiency of this type of investments taking into account the conditions on the credit market, the size of investment and the size of the expected future net earnings of the employee.

IRR indicates the interest rate level, where the present value of investments in tertiary education is equal to the present value of the future net earnings of the employees with that

education. In this case, the investments in tertiary education will be efficient if the internal rate of return is higher than the average market interest rate for the relevant period.

Taking into account all these features of our approach and the concrete final assessments, we can conclude that in the period 2002–2006 the developments in Bulgaria give rise to incentives and spur interests in investing in tertiary education, if individual investors are led entirely by the principles of efficiency.

Overall for the country, in 2002 efficiency of investments in tertiary education is observed with interest rate on loans of up to 9 %, while in 2006 the tolerable interest level rises to 12 %. As an alternative source of financing tertiary education, loans in 2006 appear efficient with market interest rates for loans in that year lower that the estimated IRR for the country as a whole. At the same time, over the period 2002 – 2006 significantly higher return on investment in tertiary education is observed for those employed in the services sector vis-à-vis industry in Bulgaria.

Applying the income-based approach to measuring human capital and rate of return to education and professional experience in Bulgaria

The income-based approach to measuring human capital evolves along a curious trajectory with Mulligan and Xala-I-Martin's set of instruments and indicators [19]. Proceeding from the idea of human capital as a basic production factor in the economy and after elaborating consistently and logically their idea and its formalisation using the relevant mathematical and statistical range of instruments, the two authors work out the output indicator of measuring human capital [19]:

$$h_i(t) = \int_0^w \frac{w_i(t,s)}{w_i(t,0)} \cdot n_i(t,s)ds = \frac{\int_0^w w_i(t,s) \cdot n_i(t,s)ds}{w_i(t,0)}.$$

The integral in the numerator of the equation is in effect the weighted sum total of all earnings (w) of the employees over a period of time (t) with a specified educational level (s) in a given economy (i) with weights – the relative shares of these education groups in total employees. The numerator in the equation stands for the average earnings in the economy. The denominator in the formula denotes the market earnings of employees who are assumed to have neither schooling, nor any work skills. We will once again note that Mulligan and Xala-I-Martin propose as a measure of human capital based on labour income the ratio between the average earnings and the market earnings of employees without any schooling or qualifications.

Using the earnings of persons without any schooling or qualifications as a unit of measuring human capital has an advantage because of the fact that they relate to units homogeneous over time and space. The assumption is that such persons offer only physical abilities and services in the labour market, which are sufficiently independent of investments in the basic systems of acquiring work skills – education, vocational training and qualification, etc.

Obviously, the calculation of the market earnings of persons of zero schooling or work skills is of key importance in measuring human capital using the Mulligan and Xala-I-Martin approach. A very successful solution to this interim step of measuring human capital is applying Mincer's regression, which we have given below and which we also use to measure the rate of return on investment in this capital.

The income-based approach to measuring return on investment in human capital also attaches high importance to an individual's professional experience. In the various studies the

professional experience is usually measured with the years of work, during which the employee acquires specific additional professional knowledge and skills. Thus, earnings as an expression of the market price of labour are presented as a function of two key factors – education and professional experience. Clearly, a number of other factors play a role in the formation of labour income; however, the majority of studies in this area focus on the two mentioned most likely because of their greater significance and the possibility for their concrete metrification through the number of years of education and the respective number of years of professional experience. A popular method for measurements of similar type is based on the regressive equation worked out by Jacob Mincer [16]:

$$\ln Y = a_0 + a_1 \cdot s + a_2 \cdot ex + a_3 \cdot ex^2 + u$$

where:

lnY - natural logarithm of an individual's net monthly earnings;

s – number of years of education;

ex – number of potential years of work (= age – number of years of education –

number of pre-school years, which is assumed to be equal to 6);

ex^2- number of potential years of work of second degree, and

u - random error.

The indicator for rate of return on one-year education, equal for all types of education, is represented by the regression coefficient "a_1" [12]. The rate of return on one potential year of work can be approximated with the formula:

$$\frac{d \ln Y_t}{dex} = a_2 + 2a_3$$

where:

a_2 и a_3 – Mincer's regression equation coefficients [12];

By applying the described approach to measuring human capital and the rate of return on investments in education and professional experience we have made concrete assessment for Bulgaria, as shown in Table 4 and Table 5.

Table 4

Human capital in Bulgaria – 2002 and 2006 – in aggregate and by key sectors of economy

	2002	2006
	Human capital per employee	Human capital per employee

Human capital in Bulgaria – 2002 and 2006 – in aggregate and by key sectors of economy

Bulgaria	3.86	4.2
Bulgaria – Industry	3.62	3.07
Bulgaria – Services	4.46	5.34

The assessments of human capital per employee outline an ascending trend with the exception of industry. The observation points to a higher value of this indicator in services, which to some extent adds to our previous conclusions about the high return on investments in tertiary education in this sector.

Table 5

Rate of return on educational and professional year in Bulgaria – 2002 and 2006 – in aggregate and by key sectors of economy

	2002		2006	
	Rate of return on one educational year	Rate of return on one professional year	Rate of return on one educational year	Rate of return on one professional year
Bulgaria	6.55%	2.70%	7.56%	2.35%
Bulgaria – Industry	5.96%	3.08%	5.63%	2.21%

Table 5 shows the results of our assessments of returns on educational and professional year in Bulgaria in the period 2002 – 2006. Overall for the country, the rate of return on one educational year in the period 2002 – 2006 grows by around 1 % up to 7,6 %. The rate of return on one educational year in industry and that in services differ widely. In 2006, the rate of return on one educational year in services is by 62 % higher than that in industry and exceeds 9 %.

At the same time, over the period 2002 – 2006 the rate of return on one professional year for almost all groups of employees in our research declines, most visibly in industry with nearly 30% lower values in 2006 relative to the comparable values in 2002.

We can observe here a higher rate of return on one educational year vis-à-vis the rate of return on one professional year both for the country in general and in the studied aspects. Our assessments indicate that in 2002 the rate of return on one educational year is 2,4 times higher than the rate of return on one professional year, the difference in 2006 rising to 3,2 times. Obviously, the Bulgarian labour market conditions and the policy of various employers in the period 2002 – 2006 ensure significantly higher returns and benefits of investments in education compared to professional experience, which for the purposes of our investigation we assume to be the potential number of years worked.

Conclusions

Our results and assessments have led us to some basic conclusions on human capital and the benefit of human capital investments in Bulgaria over the period 2002 – 2006. For their most part the conclusions offered here are supported with the results from the approaches and methods we have pursued. To sum up, in terms of the individual investor's interest over the reference period in Bulgaria there is ample evidence in support of further investments, especially in tertiary education. Another interesting observation is, once again, the fact that from an individual investor's perspective the major benefit comes from investing in education, rather than in professional experience. In this particular case, it is neither our purpose, nor is it within our power to present further analyses of this trend. Most probably, this is due to the increasing share of employees with tertiary education of the younger age-groups who have less professional experience and the increasing employers' preference for highly educated younger people. The low rate of return on one professional year is may be the result of the low level of vocational training costs in Bulgaria relative to the average levels in the European Union and a large number of member states.

By way of measurements we have endeavoured to prove our main thesis that over the medium term efficient investments in human capital is the major alternative to offset the declining working-age population and insufficient labour force in some of the sectors in Bulgaria. The main conclusion is that the labour market developments in the country in the period 2002-2006 spurred investments in tertiary education and led to a high rate of return on investments of this type. Also, there is much room for increasing the volume and returns on investments in professional experience, as well as in lower educational levels. We believe that the efficiency and tuning of vocational training and secondary education to the actual needs of the economy and individual employers are issues requiring very serious further attention.

Overall, our research has confirmed the basic elements of the theoretical models and methods used for the assessments. They have also revealed some characteristic features of Bulgaria, which stem from national specifics and local factors. Thus, further research and analyses in the field of human capital and returns on human capital investments could be used for developing more efficient national and individual strategies and policies.

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