

Return on Education Using the Concept of Opportunity Cost

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Abstract. Education is an important part of individual life. Everyone is learning whether realizing it or not. There is pressure for a longer period of formal education due to the growing volume of knowledge and the need to use it in working life nowadays. In connection with new technologies, there is a need for growing population with tertiary education, but there is also a need for a skilled workforce with appropriate vocational training achieved by upper-secondary education. Formal education takes place mainly in the full-time form, which makes it necessary to give up the possibility of earning income from classic employment relationship. Improving employability at labour market and possibility to get higher net income, forces individuals to stay at education for longer time and to sacrifice possible incomes during the time. Therefore, education is analysed as opportunity costs and the payback period of education is assessed with respect to the increase in the net mean income. The results of the analysis carried out according to data from the Member States of European Union show significant differences in the opportunity cost and in the return on education as investment, both, for tertiary education and for upper-secondary education.

1 Introduction

Education is important activity influencing everyone, influencing ability of perceive the environment adequately to the stimuli from the environment, to make decisions in everyday situations, but also to create long-term plans, achieve work and personal success. It also shapes the society. Education is a prerequisite for development of society, whether in the field of innovation, technology, production of wide variety of products or services, thus educational society, but also in the development of civil society, due to creating preconditions for development of democratic institutions, freedom, environment protection, social responsibility, solidarity and belonging [1, 2].

As the amount of knowledge increases during the time, there is also need to ensure the transmission of ever-increasing amount of curriculum in teaching process. This creates pressure on the intensity of educational process at each educational level, but also increases demands on the length of the educational process. This tendency pushes to differentiate and specialize education, education institutions and the education system, and creates wide range of different types of schools, especially at upper secondary and tertiary level.

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The changes in the educational structure of active population, thus people from 15 to 64 years of age, according to the completed educational level is in figure 1. There is proportion of primary, upper-secondary, and tertiary education displayed for analysed countries, mostly the Member States of European Union. The educational structure of countries differs, but there is clear tendency of increasing proportion of people with completed higher than primary education when comparing the situation in 2008 to 2018.

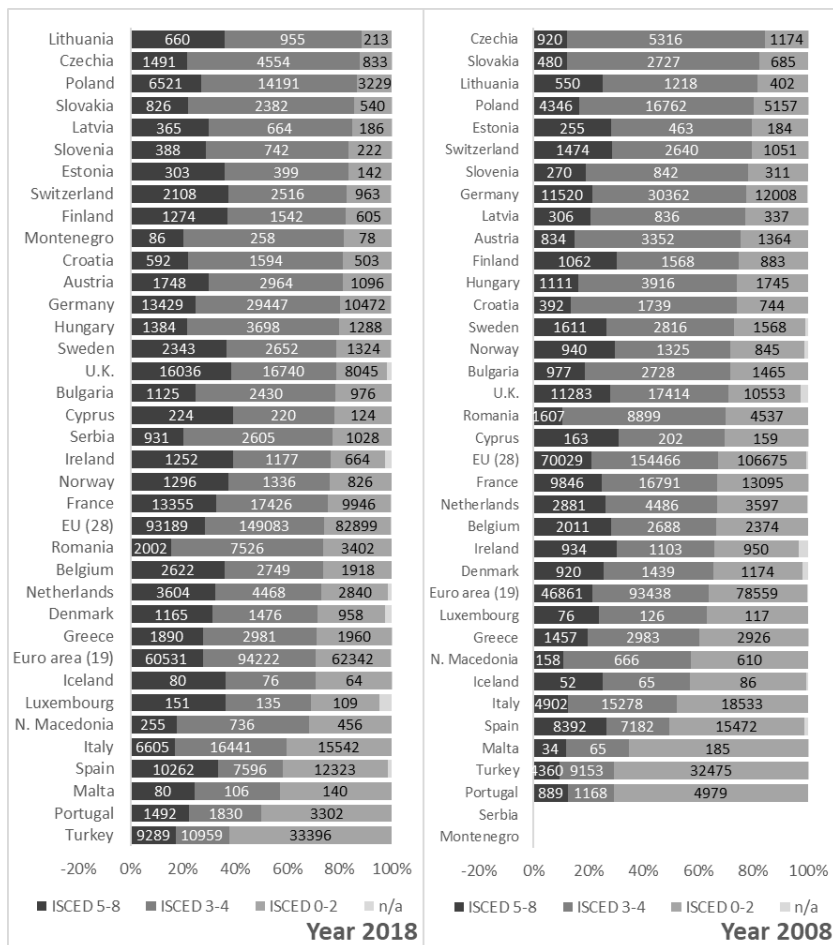


Fig. 1. Structure of the population (15-64 years) according to completed education level.

2 Methodology

All these aspects are considered by individuals when choosing their educational paths. This choice usually takes place at the end of primary education level, when choosing the next upper secondary education level. However, it is not uncommon for future direction of educational path to be decided in early childhood, or, conversely, that even at the end of primary education level or even at the end of upper secondary education level, in case of choosing the general education orientation, it is not definitely decided.

Many variables affect the decision-making process about educational path. It could be family traditions and preferences of certain professions, the possibility of achieving social status associated with certain professions, or perspective of promising earnings associated

with the chosen profession. The analysis of the justification of the last-mentioned motive is the aim of the paper [3].

There are several approaches to the analysis of the economic effects of the education. The classical approach to assessing the impact of education on individual's economic situation typically focuses on the completion of tertiary education level. The approach to these impacts has been developing for several decades and there are studies from international organizations as well [4-10]. The consider particularly the effect of education on the potential of higher earnings and lower unemployment, respectively higher employability, of graduates of tertiary education, in various lengths of evaluations. Thus, there is a certain volume of educational benefits expressed by money. The studies also consider the need to devote certain time to the education process, considered as costs associated with education, even in relation to the loss of earnings from employment in the labour market due to devoting to education.

The paper uses this approach of opportunity costs in a simple way, but analysis not only the tertiary education but also the upper-secondary education is provided. The time spend in the upper-secondary and tertiary education is taken as the loss of opportunity to earn mean net income from the employment with adequate educational level. Thus, for the upper-secondary education the net mean income of the primary educated employee is considered for the 4 years period assumed as the proper time for upper-secondary education process. And for the tertiary education the net mean income of upper-secondary educated employee for the 5 years period was assumed.

The opportunity costs were then compared to the difference of net mean incomes of the appropriate educated employees, thus the difference between the primary educated and upper-secondary educated employee and the difference between the tertiary and upper-secondary educated employee. The return rate is the result of this approach which can be marked as the return on investment in education.

3 Economic effects of education – Data and its analysis

In the analysis the net mean income according to completed education level is used. The first part of table 1 presents the results of this variables in the year 2008 and 2018. The typical structure of the net mean incomes is increasing with the increase of completed education level, which is understandable. Interestingly, although net mean income is rising in many countries, it is possible to identify EU Member States where the net mean incomes has fallen. The impact of economic crisis after 2008 has probably manifested itself, and it has affected some EU countries quite significantly.

Second part of the table 1 shows the results of the analysis of opportunity costs and return rate for upper-secondary education. It shows that there is higher net mean income of the upper-secondary educated employee that that with the completed primary education. The opportunity costs of upper-secondary education vary in the unit tens of thousands and the return rate in units of per cent. The average opportunity costs of upper-secondary education for European union are €61,048 with the return rate 4.99 % in 2018. The highest return rate is for Bulgaria (20.85 % with OC €10,028) and Romania (16.73 % with OC €9,312), the lowest return rate is for Iceland (1.41 % with OC €164.444) or Finland (1.77 % with OC €97,460).

The third part of the table shows the results for tertiary education using the same approach. There is also positive difference in net mean income for all countries. The average opportunity costs in European Union are €91,545 with the return rate 9.25 % in 2018. The highest return rate is in Romania (17.07 % with OC €19,430) and Bulgaria (15.8 % with OC €22,990), the lowest for Sweden (2.17 % with OC €239,655).

Table 1. Mean net income and chosen indicators of economic effects of education for upper secondary education and tertiary education.

	Mean Net Income						Upper Secondary Education						Tertiary Education					
	2018			2008			2018			2008			2018			2008		
	ISCED 0-2	ISCED 3-4	ISCED 5-8	ISCED 0-2	ISCED 3-4	ISCED 5-8	Mean Difference	Opportunity Costs	Return Rate	Mean Difference	Opportunity Costs	Return Rate	Mean Difference	Opportunity Costs	Return Rate	Mean Difference	Opportunity Costs	Return Rate
EU (28)	15,262	18,309	26,778	n/a	n/a	n/a	3,047	61,048	4.99%	n/a	n/a	n/a	8,469	91,545	9.25%	n/a	n/a	n/a
EA (19)	16,149	21,228	28,404	15,568	19,381	25,820	5,079	64,596	7.86%	3,813	62,272	6.12%	7,176	106,140	6.76%	6,439	96,905	6.64%
Belgium	19,418	24,855	32,448	16,849	20,138	26,832	5,437	77,672	7.00%	3,289	67,396	4.88%	7,593	124,275	6.11%	6,694	100,690	6.65%
Bulgaria	2,507	4,598	8,230	2,023	2,995	4,083	2,091	10,028	20.85%	972	8,092	12.01%	3,632	22,990	15.80%	1,088	14,975	7.27%
Czechia	7,924	10,400	13,429	5,577	7,082	9,637	2,476	31,696	7.81%	1,505	22,308	6.75%	3,029	52,000	5.83%	2,555	35,410	7.22%
Denmark	30,684	33,095	39,862	24,660	26,871	31,664	2,411	122,736	1.96%	2,211	98,640	2.24%	6,767	165,475	4.09%	4,793	134,355	3.57%
Germany	19,276	23,869	32,485	17,556	20,661	27,087	4,593	77,104	5.96%	3,105	70,224	4.42%	8,616	119,345	7.22%	6,426	103,305	6.22%
Estonia	9,370	11,164	15,515	5,396	6,240	8,762	1,794	37,480	4.79%	844	21,584	3.91%	4,351	55,820	7.79%	2,522	31,200	8.08%
Ireland	21,948	27,719	32,320	21,817	26,932	37,783	5,771	87,792	6.97%	5,115	87,268	5.86%	7,586	138,595	5.47%	10,851	134,660	8.06%
Greece	6,896	8,524	12,305	9,971	12,787	19,278	1,628	27,584	5.90%	2,816	39,884	7.06%	3,796	42,620	8.91%	6,491	63,935	10.15%
Spain	12,833	16,233	22,886	13,862	17,221	22,653	3,400	51,332	6.02%	3,359	55,448	6.06%	6,653	81,165	8.20%	5,432	86,105	6.31%
France	21,580	23,399	31,144	19,382	22,108	28,607	1,819	86,320	2.11%	2,726	77,238	3.52%	7,745	116,995	6.62%	6,499	110,540	5.88%
Croatia	5,433	7,381	11,008	n/a	n/a	n/a	1,948	21,732	9.96%	n/a	n/a	n/a	3,627	36,905	9.83%	n/a	n/a	n/a
Italy	15,184	20,040	27,117	15,354	19,534	26,500	4,856	60,736	8.00%	4,180	61,416	6.81%	7,077	100,200	7.06%	6,966	97,670	7.13%
Cyprus	13,279	16,305	22,894	15,294	18,803	25,859	3,026	53,116	5.70%	3,509	61,176	5.74%	6,589	81,525	8.08%	7,056	94,015	7.51%
Latvia	6,022	8,077	13,032	4,473	5,910	9,229	2,055	24,088	8.53%	1,437	17,992	8.03%	4,955	40,385	12.27%	3,319	29,550	11.23%
Lithuania	5,903	7,602	12,242	3,461	4,714	7,376	1,699	23,612	7.20%	1,253	13,844	9.05%	4,640	38,010	12.21%	2,662	23,570	11.29%
Luxembourg	31,028	39,447	50,352	28,534	34,475	51,107	8,419	124,112	6.78%	5,941	114,136	5.21%	10,905	197,235	5.53%	16,632	172,375	9.65%
Hungary	4,329	6,166	8,360	3,763	4,817	7,086	1,837	17,316	10.61%	1,054	15,052	7.00%	2,194	30,830	7.12%	2,269	24,085	9.42%
Malta	14,248	18,351	25,238	10,573	13,672	17,281	4,103	56,992	7.20%	3,099	42,922	7.33%	6,887	91,755	7.51%	3,609	68,360	5.28%
Netherlands	23,271	25,597	33,107	19,721	21,827	28,837	2,326	93,084	2.50%	2,106	78,884	2.67%	7,510	127,985	5.87%	7,010	109,135	6.42%
Austria	22,412	27,750	34,051	18,002	22,793	28,108	5,338	89,648	5.95%	4,791	72,008	6.65%	6,301	138,750	4.54%	5,315	113,965	4.66%
Poland	5,333	6,776	10,193	3,535	4,692	8,127	1,443	21,332	6.76%	1,157	14,140	8.18%	3,417	33,880	10.09%	3,435	23,460	14.64%
Portugal	8,843	11,276	16,399	8,897	12,259	20,149	2,433	35,372	6.88%	3,362	35,588	9.45%	5,123	56,380	9.09%	7,890	61,295	12.87%
Romania	2,328	3,886	7,202	1,624	2,490	5,117	1,558	9,312	16.73%	866	6,496	13.33%	3,316	19,430	17.07%	2,627	12,450	21.10%
Slovenia	11,455	13,455	17,911	9,652	11,584	16,665	2,000	45,820	4.36%	1,932	38,608	5.00%	4,586	67,275	6.62%	5,081	57,920	8.77%
Slovakia	5,647	8,212	9,414	4,227	5,508	7,003	2,665	22,588	11.36%	1,081	16,908	6.39%	1,202	41,060	2.93%	1,695	26,540	6.39%
Finland	24,365	26,089	35,161	20,349	21,125	29,490	1,724	97,460	1.77%	776	81,396	0.95%	9,072	130,445	6.95%	8,365	105,625	7.92%
Sweden	23,182	29,730	32,959	20,351	22,300	26,310	6,548	92,728	7.06%	1,949	81,404	2.39%	3,229	148,650	2.17%	4,010	111,500	3.60%
Iceland	41,111	43,431	49,559	35,464	37,380	46,735	2,320	164,444	1.41%	1,916	141,856	1.35%	6,128	217,155	2.82%	9,355	186,900	5.01%
Norway	36,117	42,608	49,769	31,284	35,055	42,387	6,491	144,468	4.49%	3,771	125,136	3.01%	7,161	213,040	3.36%	7,332	175,275	4.18%
Switzerland	38,207	47,931	61,333	26,364	31,451	43,105	9,724	152,828	6.36%	5,087	105,456	4.82%	13,402	239,655	5.59%	11,654	157,255	7.41%
U.K.	20,007	23,837	32,406	16,885	21,988	31,994	3,830	80,028	4.79%	5,103	67,540	7.56%	8,569	119,185	7.19%	10,006	109,940	9.10%
Montenegro	2,632	4,147	6,300	n/a	n/a	n/a	1,515	10,528	14.39%	n/a	n/a	n/a	2,153	20,735	10.38%	n/a	n/a	n/a
Macedonia	2,076	3,003	4,072	n/a	n/a	n/a	927	8,304	11.16%	n/a	n/a	n/a	1,069	15,015	7.12%	n/a	n/a	n/a
Serbia	1,941	2,950	4,502	n/a	n/a	n/a	1,009	7,764	13.00%	n/a	n/a	n/a	1,552	14,750	10.52%	n/a	n/a	n/a
Turkey	3,985	5,475	9,392	3,575	5,495	9,470	1,490	15,940	9.35%	1,920	14,300	13.43%	3,917	27,375	14.31%	3,975	27,475	14.47%

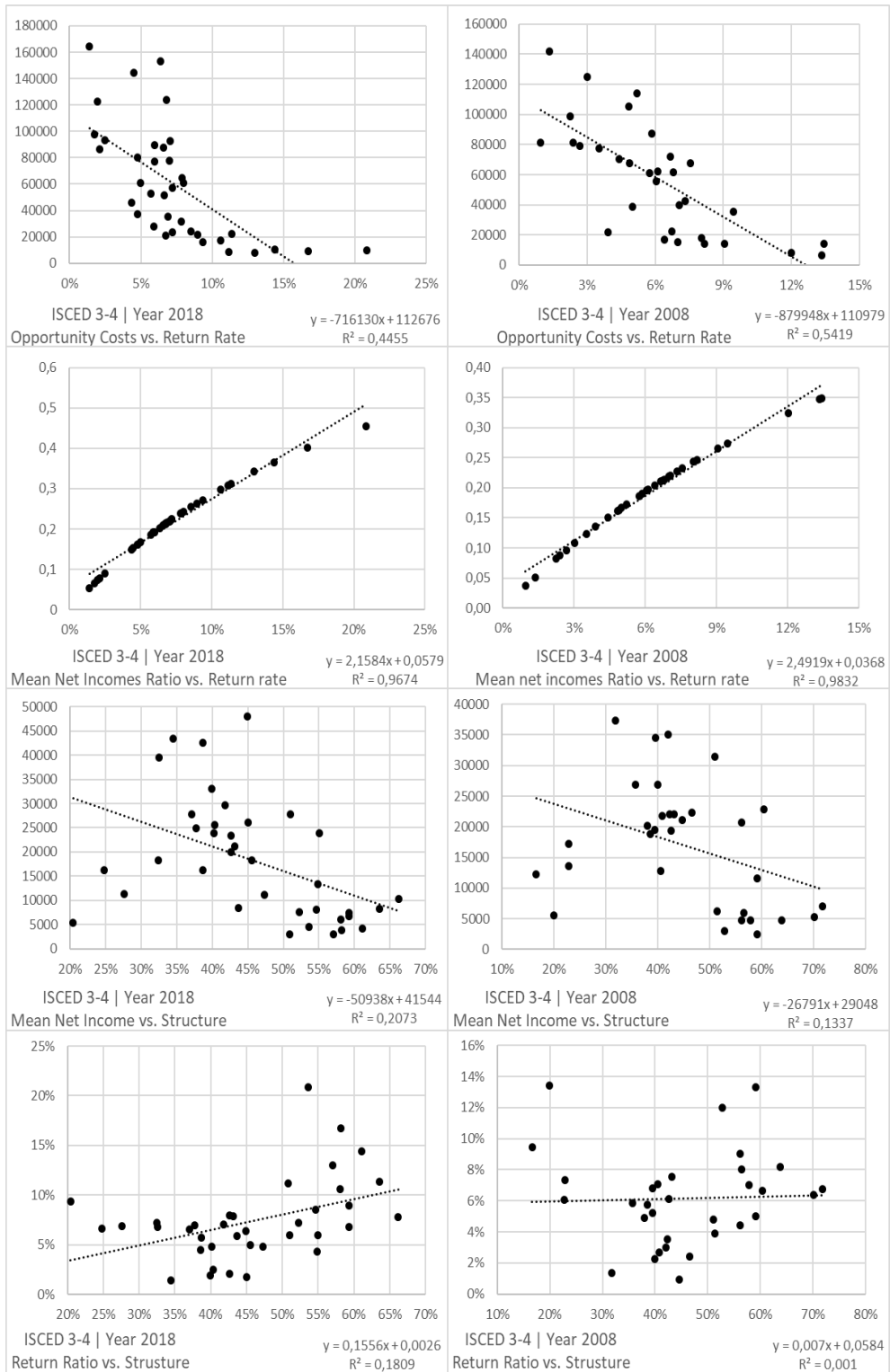


Fig. 2. Relationship between indicators of economic effectiveness of upper secondary education.

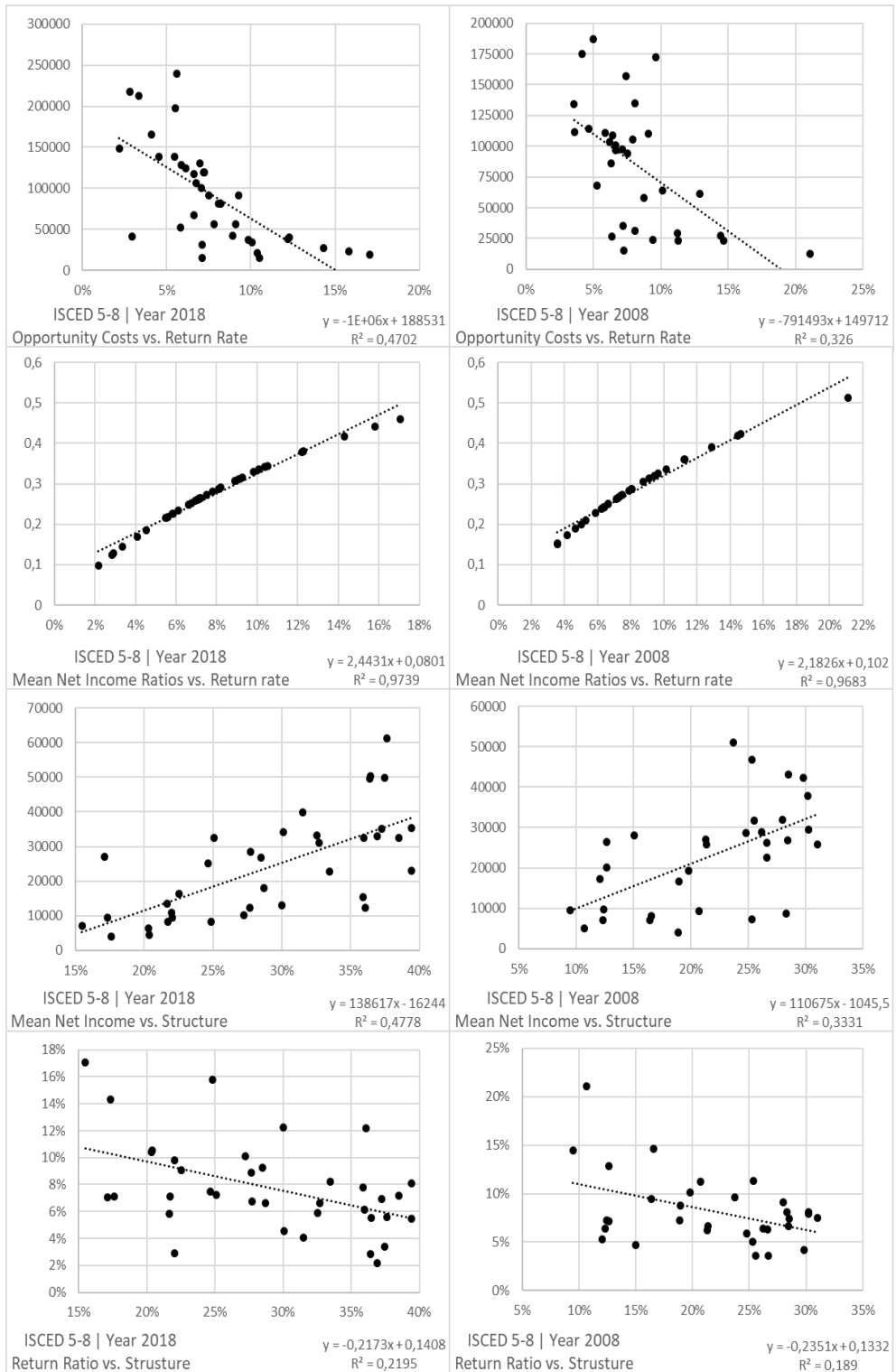


Fig. 3. Relationship between indicators of economic effectiveness of tertiary education.

Since the return rate is related to opportunity costs and net mean income difference by its construction, figures 2 and 3 provide a closer analysis of this relationship. In addition to the above relations, the relation to the educational structure and the volume of net mean income of the examined group is also assessed. The relation between return rate and opportunity costs, both for upper-secondary education and for tertiary education, is inversely proportional, where logically the lower the opportunity costs the higher the return rate and vice versa. There seems to be no relationship between the return rate and the educational structure in terms of the share of the educational level group and the total active population in both educational levels.

Quite interesting could be the relationship between the net mean income and the education structure. Although no direct causality can be deduced from the analysis, it can be assumed, that the higher net mean income attracts the individuals to tertiary education and as the proportion of tertiary educated employees rise, the proportion of the upper-secondary educated employees stagnates or decreases, it pushes up the net mean income.

4 Discussion of results – limitations and implications

The analysis is based on some simplifications. The time needed for obtaining a certain level of education has not been differentiated between countries and has not considered the wide range of options for passing through the education system. The whole period of education was taken as opportunity costs, although the study load of individual education fields and levels differ, and thus the possibilities of performing paid employment during studies, which were not considered at all, differ. It was also abstracted from inflation and the changes in the net mean income structure over time, as some other analysis consider [4-9].

However, the aim of the analysis was to point out the possibility of a simple assessment of the economic effectiveness of education. The benefit is in the effort to implement not only tertiary education analysis but also upper-secondary education approach. Given the initiative Industry 4.0, which often mentions the need for highly educated employees, the importance of tertiary education is emphasized, but the need for skilled workers with upper-secondary education is unfortunately neglected [11-14].

5 Conclusion

Education is an important part of each of our lives. Its importance is in the transfer of information, knowledge, and skills from generation to generation, in developing innovation and creativity, or the formation of civil society. Education also contributes to the development of individuals, to the creation and maintenance of social status and to the increase of potential future earnings.

Education is also connected with the need to make efforts to achieve and increase a certain level of education. Thus, it is associated with certain costs that must be expended. These costs can be understood either as direct costs associated with education, such as school fees or the need to purchase of school supplies, or as indirect costs for sacrificed opportunities, such as transformation of leisure time into learning time, or sacrifice of job opportunities.

Analysis of the economic effectiveness of education used in the paper is based on such opportunity costs of education. The net mean income of primary educated employees represents the opportunity costs of upper-secondary education and the net mean income of upper-secondary educated employees represents the opportunity costs of tertiary education. On the other hand, the increase in earnings due to higher education, thus the net mean income difference between education levels, should replace those opportunity costs.

The analysis shows big differences in opportunity costs of education in Member States of European Union and in return rate as well. The values vary from 1.77 % for Finland with opportunity costs €97,460 to 20.85 % with opportunity costs €10,028 for Bulgaria in the case of upper-secondary education. In the case of tertiary education values vary from 2.17 % for Sweden with opportunity costs €239,655 to 17.07 % with opportunity costs €19,430. These values imply the payback period of less than 5 years to more than 50 years.

The relationship of the return rate to other variables was also analysed. The results show, besides directly proportional relationship between return rate and net mean income ratio, ratio between two considered education levels, also the inversely proportional relationship between the opportunity costs and return rate. Relationship between return rate and educational structure has not been demonstrated. Last relationship analysed did not include the opportunity costs or return rate, the relationship between the net mean income and the educational structure has been examined instead. Different proportional relationship has been identified for upper-secondary education and for tertiary education.

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