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THE EFFICIENCY OF INDIVIDUAL AND PUBLIC SPENDING ON HIGHER EDUCATION IN OECD COUNTRIES AND IN UKRAINE

ABSTRACT

The article is devoted to the analysis of the efficiency of higher education funding from the perspective of higher education applicants (cost of education) and from the perspective of the state (budget expenditures, investments in preparation of specialists).

The article contains the main indicators of socioeconomic development of the OECD countries and Ukraine. The analysis has shown that in Ukraine the amount of higher education expenditures as a percentage of GDP has an average value compared to the OECD countries, while this amount in monetary terms is significantly lower than in other countries.

The efficiency of higher education costs for the individual and expenditures for the state in the OECD countries and in Ukraine have been evaluated. The efficiency of individual costs of higher education is calculated using the discounted cash flow method, applied to the cost of education and the difference in wages between qualified and unqualified personnel. The efficiency of public spending on higher education (investment in the training of specialists) is calculated using the discounted cash flow method applied to the share of public spending on higher education and GDP growth generated by labor with better skills. The results of the calculations have shown that the efficiency of state expenditures on higher education is higher than the efficiency of individual costs.

Keywords: higher education, efficiency, education costs, education expenditures, GDP, OECD countries, Ukraine

JEL Classification: I23, I22, H52

INTRODUCTION

Nowadays, the importance of higher education in the socio-economic development of the country is not in doubt; at the same time, the amount of its contribution to individual and social development remains discussible due to the lack of a unified methodological approach to assess them. In particular, a system of indicators for the impact evaluation of higher education on social and economic processes has not been defined by scientists. Moreover, the existence of a correlation between indicators, that characterize the development of higher education and socio-economic development, does not mean the presence of a cause-and-effect relationship.

Expenditures on education, in whole, and higher education, in particular, are the mandatory items of the state expenditures. Considering educational expenditures as state investments, there is a need for the investment assessment of the higher education development by the state at the macro level. On the other hand, at the micro level, the higher education applicant also invests time and money into educational activities (if the applicant spends his own money, not state funds), and the reasonability of these costs also needs to be evaluated. Efficiency and effectiveness are the parameters, that characterize the investment appraisal.

Under conditions of limited financial resources, the relevance of this study is determined by the need to assess the efficiency of higher education spending both in Ukraine and OECD countries.

LITERATURE REVIEW

A lot of indicators are used to characterize the impact of higher education on socio-economic development, including GDP, unemployment rate, wage rate, human development index, and the ratio of sales of innovative products. Some indicators are used to evaluate the investments in higher education: the amount of funding (in monetary terms, as a percentage of budget expenditures and GDP).

The term 'efficiency' means maximum effect at minimum costs. In education, efficiency can be described as the achievement of the largest educational results using a given invested resources. Educational effectiveness means the ability of the educational system to properly achieve the set educational goals. The term 'sufficiency' is also used - the presence of necessary basic components of the educational environment for providing learning opportunities and organizing the educational process (OECD (2014) [26]).

Therefore, during the analysis of the efficiency of higher education spending, Matiuk T. (2011) [22] emphasizes on the need to consider the efficiency of education on two levels: social and personal life as two components or elements of one system.

Kaleniuk I. (2001) [17] has proposed an approach aimed at evaluating the efficiency of educational activities from an economic and socio-economic point of view, from the point of view of internal and external efficiency and using the criteria of economy, productivity, and effectiveness. Economy characterizes the cost, resource side of efficiency (costs should be as minimal as possible), productivity is the ratio of the volume of products or services to the cost of their production, effectiveness characterizes if costs and achieved results meet the specific goals (Padalka (2012) [27]).

Moiseienko & Hrynkevych (2018) [23] have concluded that the economic efficiency of higher education is the ratio of the economic results of higher education to its tangible and intangible assets / human potential or the costs of their implementation. The authors offer their own method to analyze the economic efficiency of higher education, which is based on indicators of unemployment of graduates; non-professional employment; educational and labor migration. According to the authors' evaluations, the direct irrational use of resources is higher education expenditures for specified categories of persons, and unemployment benefits; indirect irrational use - lost GDP due to unemployment.

Skrypnyk & Oborska (2015) [34] suggest considering the discounted income per unit of education costs over a lifetime as the efficiency of higher education. According to data on the cost of education, the discount rate and the difference between the wages of qualified and unqualified personnel, the authors calculate the efficiency of spending on education for each country and concluded that the worst efficiency indicators (E < 10) are observed in Australia (due to the high cost of education), Hungary (due to the insignificant difference between the payment of qualified and unqualified personnel) and Ukraine (in particular, due to the highest discount rate). The authors consider loans as an instrument to expand access to education, which can increase the present value of education by up to 10%.

Chekina & Vorhach (2020) [5] have made an empirical analysis of European countries and concluded that an increase in the level of personnel qualifications contributes to an increase in GDP per capita, also the amount of higher education funding is increasing. The trend is typical for the countries of Europe as a whole and is not pronounced for each country separately.

Special attention should be paid to the research of Kozarezenko L. (2009) [19] Based on the improved methodology of Strumylyn (1964) [36] for calculating the impact of education on economic growth, the author concluded that during 1996-2008 in Ukraine professional qualification potentials provides about 10% of GDP growth, it is extremely low compared to the USA and the Russian Federation.

Antonyuk et al. (2017) [2] evaluated the efficiency of public spending on higher education and concludes that the high level of quality of higher education and the population with higher education are precisely in countries with a high level of economic development.

Yotova & Stefanova (2017) [42] analyze the efficiency of higher education spending in EU members from Central and Eastern Europe based on the Data Envelopment Analysis method using three models. The output results of higher education showed that Latvia is the most efficient in all three models, Lithuania is efficient in two models, and both countries have different inputs. This means that the efficiency of higher education is provided not by the amount of expenses, but by the effectiveness of their spending. The analysis revealed that public spending is more efficient in view of the level of higher education and the quality of educational services in the CEE countries. Stefanova & Velichkov (2020) [35] ranked Romania as the most efficient country in terms of higher education spending, next countries in the ranking are Czech Republic, Lithuania and Slovenia. Estonia and Bulgaria are classified as the most inefficient countries.

A similar conclusion is reached by Nadoveza O. & Kedzo M. (2018) [24], who analyzed 27 EU countries. The ranking of countries by the level of higher education efficiency and effectiveness showed that often less developed EU countries achieve a higher level of efficiency, but not effectiveness in higher education. For some developed countries, the opposite is true.

In a study of the education system of Croatia by Šonje et al. (2018) [35], the input variables are public education expenditure per student and as a percentage of total education expenditure, and the output variables for higher education are the rate of the unemployed with higher education and the Shanghai ranking of World Universities. In general, it was concluded that it is possible to significantly reduce educational costs (up to 10%) without significant deterioration of educational results. Obadić & Aristovnik (2011) [25] have found that the higher education system in Slovenia has a much higher level of efficiency compared to Croatia, as well as many other new EU member states. The results of their research also show the high level of efficiency in Korea, the USA and Finland.

Another analysis of the efficiency of public spending on education by Brun & Compaore (2019) [4] showed that on average in developing countries inequality in education can be reduced by 29% without changing public spending on education. At the same time, developing countries could reduce their public spending on education by 49% to achieve the same results.

A number of studies on the efficiency of higher education spending are also devoted to Ukraine. In particular, Mahuta (2016) [21] has found the impact of the share of employees with higher education in the economically active population of Ukraine on the real macroeconomic dynamics: changes in the GDP of Ukraine and GDP per capita, the dynamics of the production of new types of products. At the same time, the author reveals a weak positive impact on the dynamics of the share of innovative products and a very weak impact on new technological processes.

Calculations made by Tsyhaniuk & Tsyrulyk (2019) [39] show that higher education has a positive effect on the economy of Ukraine, and state investments in higher education have a key impact on GDP dynamics. At the same time, a person with higher education will more likely have higher income in the EU countries (the experience of Poland, France and Germany is cited), than in Ukraine. It means that higher education in Ukraine does not give such a socio-economic return as in the EU countries, which questions the investment appraisal of expenditures on education.

Based on the analysis of the relationship between the number of education expenditures as a percentage of GDP and indicators of macroeconomic dynamics and innovative development in Ukraine (real GDP, human development index and output of innovative products) Lebeda (2016) [20] concludes that the expenditures of the consolidated budget make a positive impact on the dynamics of real GDP and the human development index; expenditures of the consolidated budget on professional and higher education do not make a positive effect on the development of innovative processes.

Obviously, individual and state investments in higher education in countries require special analysis. This determined the choice of the topic and objective of the research.

AIMS AND OBJECTIVES

The aim of the study is to assess the efficiency of higher education funding from the perspective of higher education applicants and from the perspective of the state.

METHODS

The research is based on the data of the World Bank, the Organization for Economic Co-operation and Development. Taking into account the fact that the latest data on higher education expenditures are available only for 2019, all calculations in the article were made for this period in order to compare the calculations objectively.

Correlation regression analysis was used to analyze the relationship between state investments in higher education and indicators of socioeconomic development.

The methodology described by Skrypnyk & Oborska (2015) [34], based on the calculation of discounted cash flow, was used to evaluate the efficiency of higher education spending at the micro level (cost of education for applicants).

To evaluate the efficiency of higher education spending at the macro level (the state invests in the preparation of specialists), the same methodology of discounted cash flow was used. To calculate the GDP growth caused by the increase in the level of education of employees the methodology described by Strumylyn (1964) [37] and improved by Kozarezenko L. (2009) [19] was used taking into account the availability of comparable statistical information.

Calculating the efficiency of higher education spending at the micro level using this formula has some disadvantages, including the lack of consideration:

▪ the annuity factor for the period of payment for education;

▪ the period of economic activity of the population - the period of using the benefits of higher education.

These factors are not taken into account in calculating the efficiency of higher education spending at the macro level as well.

Statistical data on the cost of education in Germany, Israel and New Zealand are presented at the bachelor's level only (OECD Data [1]), therefore, the authors used it for the master's level as well. The cost of education for a bachelor's degree in Greece is set at the level of a master's degree.

Also, the calculation of the efficiency of the cost of education at the micro level was carried out separately for bachelor's and master's applicants, and at the macro level - in general, for employees with higher education.

RESULTS

The main indicators of the socio-economic development of the OECD countries and partner countries are presented in Table 1.

Table 1. The main indicators of socio-economic development of the OECD countries and Ukraine in 2019. *(Source: compiled by the authors according to the World Bank Data [10, 11, 13]; OECD Data [7]; Schwab (2017) [33]; Human Development Index [15])*

Country	HDI	GDP per capita, thousand USD	Total expenditure on education, % of GDP	Education spending. Tertiary, % of GDP	Total expenditure on educational institutions per full-time equivalent student, thousand USD
Australia	0.943	57.2	5.12	1.88	20.6
Austria	0.921	51.5	5.22	1.74	20.5
Canada	0.928	46.5		2.33	24.5
Chile	0.849	15.8	5.43	2.38	8.8
France	0.898	41.6	5.41	1.47	17.4
Germany	0.946	48.0	4.98	1.24	19.3
Greece	0.881	19.8	3.60	0.86	3.5
Ireland	0.951	79.1	3.39	0.88	17.2
Israel	0.916	42.1	6.11	1.41	12.3
Italy	0.89	34.6	4.26	0.90	12.3
Japan	0.917	39.7	3.08	1.38	19.3
Korea	0.914	33.4	4.46	1.57	11.3
Latvia	0.863	17.9	4.24	1.20	10.3
Netherlands	0.942	53.0	5.36	1.68	20.9
New Zealand	0.928	43.3	6.05	1.71	17.9
Portugal	0.86	23.6	4.68	1.14	11.8
Spain	0.905	30.4	4.18	1.26	13.8
Switzerland	0.955	86.4	4.86	1.26	12.1
United States	0.925	62.8	4.91	2.52	34.0
Ukraine	0.774	3.1	5.32	1.24	1.6

According to analysis of the data in Table 1, it was concluded that the amount of spending on education ranges from 3% in Japan to 6.1% in Israel in the considered countries. In Ukraine, this indicator is 5.3%, which is one of the highest in comparison with considered countries. At the same time, the sufficiency of the value of the indicator is determined by Art. 78 of the Law of Ukraine 'On Education' [40], according to which the state has provided expenditures for education in the amount of not less than 7 percent of the gross domestic product. The reasonableness of this norm is debatable since there are no countries among the considered where the amount of education funding is 7%, even though the GDP per capita is many times higher than Ukrainian.

The simplest way to verify the thesis about the existence of a cause-and-effect relationship between the level of economic development and education funding (Antonyuk (2017) [2]), is to use the correlation coefficient. A weak correlation between GDP per capita and education expenditures in percent to GDP ($R=-0.02$) was found. Accordingly, the share of public funds

spent on education is determined by the budget policy and does not depend on the country's GDP. Also, the relationship between the share of education expenditures and the human development index (R=-0.05) was weak too.

Higher education is a component of the educational system in each country. The analysis of higher education expenditures has shown that in OECD countries, the expenditures on higher education range from 0.861% of GDP in Greece to 2.523% of GDP in the USA. In Ukraine, this indicator is 1.24% of GDP and is the average among the sample of countries. At the same time, in Ukraine, the amount of expenditures in monetary terms is 1.6 thousand USD, which it is two times less than the smallest indicator of 2.5 thousand USD in Greece among the considered countries. The USA has the highest expenditure per student in the sample of countries - 34 thousand USD. That is, having the average value of higher education expenditure as a % of GDP there is an insignificant amount of GDP in USD equivalent and the amount of expenditure per student in USD in Ukraine as well. It reduces the competitiveness of the Ukrainian higher education system compared with foreign countries.

One of the methods to analyze the higher education usefulness for an individual applicant is to compare the benefits of increased wages for qualified and unqualified personnel. The discounted cash flow over an infinite time interval as a result of higher education will be calculated according to the formula:

$$DI_\Delta^i = \frac{\Delta_k^i}{r_d^i} = \frac{(W_k^i - W_{nk}^i)*12}{r_d^i} \qquad (1)$$

where Δ_k^i – wage growth caused by the increase in the level of education of employees in i-country; W_k^i – wage of qualified personnel per month in i-country; W_{nk}^i – wage of unqualified personnel per month in i-country; r_d^i – discount rate in i-country.

$$E_i = \frac{DI_\Delta^i}{S^i} \qquad (2)$$

where DI_Δ^i – discounted cash flow; E_i – efficiency of higher education cost in i-country; S^i – cost of education.

Data for calculating the efficiency of the education costs for higher education applicants are presented in Table 2.

Table 2. Data for calculating the efficiency of the education costs for higher educational applicants (bachelor and master) in 2019.
(Source: compiled by the authors according to the World Salaries Data [41], OECD Data [1; 30]; State Statistics Service of Ukraine [32]; World Bank Data [29])

Country	Wages			Cost of education, thousand USD		Discount rate, %
	Qualified personnel, thousand USD		Unqualified personnel, thousand USD			
	Bachelor	Master		Bachelor	Master	
Australia	38.0	39.5	26.0	5.0	8.8	3.37
Austria	24.5	25.4	16.7	0.9	0.9	4.27
Canada	28.7	29.8	19.6	5.5	5.7	1.93
Chile	7.1	7.4	4.8	7.4	10.2	2.55
France	26.3	27.4	18.0	0.2	0.3	4.27
Germany	26.4	27.5	18.1	0.1	0.1	4.27
Greece	12.0	12.5	8.2	4.2	4.2	4.27
Ireland	24.7	25.7	16.9	8.7	10.4	4.27
Israel	24.7	25.7	16.9	3.1	3.1	2.57
Italy	21.5	22.4	14.7	2.0	2.2	1.59
Japan	23.6	24.5	16.1	5.1	5.1	1.07
Korea	24.8	25.8	17.0	4.8	6.3	3.16
Latvia	7.5	7.8	5.2	4.3	4.5	4.27
Netherlands	30.1	31.3	20.6	2.6	2.6	4.27
New Zealand	33.1	34.4	22.6	4.5	4.5	1.22
Portugal	11.9	12.4	8.1	1.5	1.5	4.27
Spain	15.1	15.7	10.3	1.8	2.9	4.27
Switzerland	45.1	46.9	30.8	1.3	1.3	1.87
United States	22.1	22.9	15.1	8.8	11.6	2.46
Ukraine	4.6	5.9	1.6	0.1	1.3	3.13

To calculate the efficiency of public spending on preparation of specialists with higher education a similar methodology is used. At the same time, the state benefit from higher education is calculated based on the indicator of the impact of higher education on GDP (instead of wage growth), and the amount of public expenditures on the training of specialists with higher education is used (instead of cost of education).

Taking into account the comparable data available in international statistics, the calculation of the impact of higher education on GDP was carried out according to the formula:

$$\Delta YE = \frac{\Delta LE_{(t)}}{\Delta LE_{(t)} + \Delta LP_{(t)} + \Delta MF_{(t)}} * \Delta Y_t \qquad (3)$$

where ΔYE – GDP growth caused by the increase in the level of education, %; $\Delta LE_{(t)}$ – relative growth of the labor force with improvement of qualifications in t-year (the number of employees with higher education), %; $\Delta LP_{(t)}$ – relative growth of the number of the labor force in t-year; $\Delta MF_{(t)}$ – relative growth of capital-labor ratio in t-year, %; $\Delta Y_{(t)}$ – GDP growth in t-year %.

Table 3. Data for calculating the impact of higher education on GDP (change in % to previous year) in 2019. *(Source: compiled by the authors according to the World Bank Data [11], World Salaries Data [41], OECD Data [8])*

Country	GDP, $\Delta Y_{(t)}$	Labor force, $\Delta LP_{(t)}$	Labor force with improvement of qualifications, $\Delta LE_{(t)}$	Capital-labor ratio, $\Delta MF_{(t)}$	GDP growth caused by the increase in the level of education, ΔYE
Australia	7.7	2.7	3.3	6.5	2.01
Austria	9.1	1.4	1.3	9.7	0.93
Canada	4.6	1.6	2.1	2.2	1.67
Chile	6.9	2.2	2.3	8.3	1.25
France	7.5	0.8	1.6	8.6	1.12
Germany	7.8	0.6	0.4	10.5	0.26
Greece	6.1	2.0	5.2	-1.6	5.71
Ireland	14.8	2.9	3.2	-0.3	8.24
Israel	5.2	2.1	2.9	8.3	1.13
Italy	6.6	0.8	1.2	8.0	0.80
Japan	2.2	2.1	2.4	0.9	0.97
Korea	6.2	0.4	0.4	2.0	0.98
Latvia	12.9	1.6	1.9	19.3	1.05
Netherlands	9.6	2.2	3.0	8.7	2.08
New Zealand	2.6	2.5	1.8	2.4	0.69
Portugal	9.5	2.3	11.2	11.7	4.20
Spain	8.3	2.7	3.7	9.8	1.88
Switzerland	4.4	0.8	0.9	2.0	1.12
United States	5.4	1.6	2.4	4.8	1.48
Ukraine	16.8	1.3	2.7	29.0	1.39

The results of calculations of the efficiency of higher education costs for the individual and higher education expenditures for the state are presented in Figure 1.
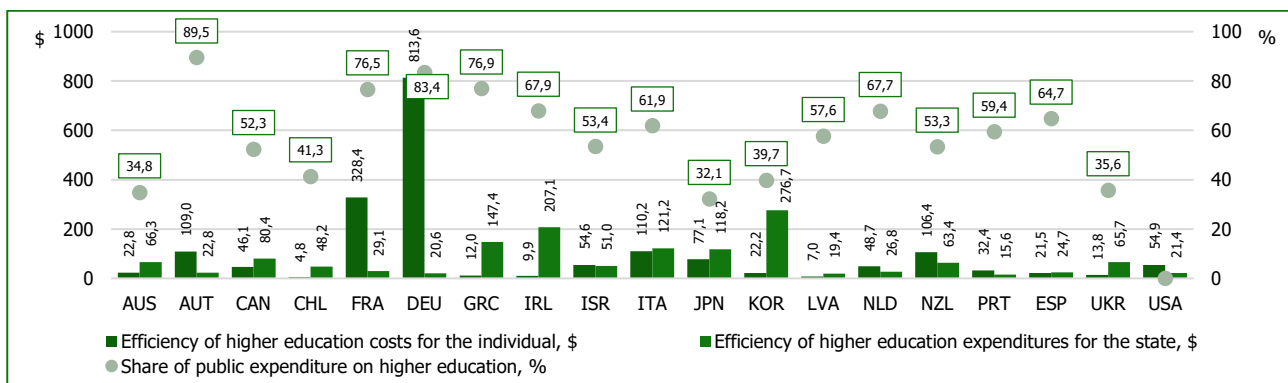
Figure 1. The efficiency of higher education costs for the individual and higher education expenditures for the state in 2019.

According to the data in Figure 1 we conclude that the cost of education and the expenditure of preparation of specialists are significantly different in OECD countries. Thus, the share of public expenditure on higher education in the total amount of expenditure ranges from 32% in Japan (6.2 thousand USD per student) to 89% in Austria (18.3 thousand USD per student). Tuition fees for master's degree students in the countries under review also range from $136 per student in Germany up to 11.6 thousand USD per student in the USA. So the efficiency of the student's investments in education is the highest in Germany - 813.6 USD, due to insignificant costs of education in a public educational institution (for example, the average cost of education in a private higher education institution in Germany is 5.0 thousand USD) and a significant difference in wages between qualified and unqualified personnel ($9.4 thousand). On the same principle, with a high amount of tuition fees in Chile (10.2 thousand USD) and a small number of benefits for qualified personnel (2.5 thousand USD), at a discount rate of 2.55%, the efficiency of costs of education is 3.0 USD.

The efficiency of public spending on higher education also had some peculiarities in the analyzed year. As already mentioned, its value is related not only to the GDP growth caused by the increase in the level of qualifications of personnel and the number of state expenditures on the preparation of specialists as a part of the total expenditure on educational institutions per full-time equivalent student. Due to the high growth of GDP, caused by the increase in the level of qualifications, and the small amount of public spending, Korea has the highest efficiency of public spending on education.

DISCUSSION

According to the obtained results concerning the comparison of outputs and inputs we can confirm that government (state) outputs almost always exceed inputs, that is, the amount of GDP growth per employee with a higher education always exceeds the expenditure on educational institutions per full-time equivalent student, since the state compensates only a part of such expenditures. Comparing outputs and inputs for an individual applicant, it has to be noted a number of disparities. In particular, the costs of education exceed its benefits (higher wages) in Chile, Ireland, Latvia, the United States, and Ukraine. It's related to the high cost of education in Chile, Ireland, and the United States (for the master's level, USD 10.2 thousand, USD 10.4 thousand, and USD 11.6 thousand, respectively). But even with the relatively low cost of education, the difference in wages between qualified and unqualified personnel is not significant (does not exceed the cost of education) in Latvia and Ukraine. The listed countries have a different level of socio-economic development: in countries with a low level (GDP per capita in Chile - 15.8 thousand USD, Latvia - 17.9 thousand USD, Ukraine - 3.1 thousand USD) the level of qualification does not provide significant benefits in terms of wages, and on the contrary, in countries with a high level (GDP per capita in Ireland - 79.1 thousand USD, in the USA - 62.8 thousand USD) investments in higher education guarantee increased wages.

CONCLUSIONS

The efficiency of higher education spending from the perspective of higher education applicants and from the perspective of the state is evaluated in the article.

The analysis revealed that state investments in education are higher than individual ones. This is explained by the fact that the state funds only part of the expenses on educational institutions (from 32% in Japan to 89% in Austria) depending on the state policy of higher education funding. At the same time, the cost of education does not always exceed the difference in wages between qualified and unqualified personnel. The reasons are:

- high cost of education in countries with a high level of economic development;
- slight difference in the wages of qualified and unqualified personnel in countries with a low level of economic development.

Prospects for further research are the evaluation of efficiency of higher education spending for applicants and for the state in dynamics and the investment appraisal depending on the models of higher education funding.

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ЕФЕКТИВНІСТЬ ІНДИВІДУАЛЬНИХ ТА ДЕРЖАВНИХ ВИТРАТ НА ВИЩУ ОСВІТУ В КРАЇНАХ ОЕСР ТА В УКРАЇНІ

Статтю присвячено аналізу ефективності фінансування вищої освіти з позиції здобувача освіти (витрати на оплату навчання) та держави (видатки бюджету, інвестиції в підготовку фахівців).

У статті розглянуто основні показники соціально-економічного розвитку країн ОЕСР та України. Аналіз показав, що в Україні обсяг видатків на вищу освіту у відсотках до ВВП має середнє значення порівняно з аналізованими країнами, при цьому обсяг видатків у грошовому виразі значно поступається іншим країнам.

Проведено оцінку ефективності витрат на вищу освіту для індивіда та для держави в країнах ОЕСР та України. Ефективність індивідуальних витрат на здобуття вищої освіти визначена із застосуванням дисконтного грошового потоку, розрахованого на основі вартості навчання та різниці в оплаті праці між кваліфікованим і некваліфікованим персоналом. Ефективність державних витрат на вищу освіту (інвестицій у підготовку фахівців) визначена із застосуванням дисконтного грошового потоку, розрахованого на основі частки державних видатків на вищу освіту та приросту ВВП внаслідок залучення кваліфікованої праці. Результати розрахунків показали, що в аналізованому році ефективність державних видатків на вищу освіту є вищою, ніж ефективність індивідуальних витрат.

Ключові слова: вища освіта, ефективність, витрати на навчання, витрати на освіту, ВВП, країни ОЕСР, Україна

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