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Investment in human capital education under the digital economy

Abstract. The authors consider the main trends in the dynamics and structure of education funding in the leading Western countries within the concept of cost sharing. The authors analyze the ratio of private and public expenditures on education, students' expenses for tuition, and the main forms of state support for students and their families. There has been conducted the analysis of demand for private education loans among the students and households.

The paper compares the dynamics of funding and the number of students, which makes it possible to determine positive and negative trends in the development of higher education. The analysis has shown that in the period under review the differentiation of higher education systems into two groups (with growing and declining state funding) has increased. The analysis has also shown that the system of higher education financing in developed countries differs significantly. At present, investment in education is seen as the most important factor in increasing competitiveness, which leads to more sustainable economic growth.

Keywords: Human Capital; Investment in Education; Education Loans; Public Funding; Digital Economy

JEL Classifications: I25

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Contribution: *Olga Belyaeva* has carried out the analysis of the main trends in the dynamics and structure of education financing in the leading Western countries; *Anna Obukhova* has analyzed the ratio of private and public expenditures on education; *Irina Ershova* has considered public financing of higher education in developed countries and Russia.

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Інвестиції в освіту людського капіталу в умовах цифрової економіки

Анотація. У статті розглядаються основні тенденції в динаміці та структурі фінансування освіти в провідних країнах Заходу в рамках концепції поділу витрат. Проаналізовано співвідношення приватних і державних витрат на освіту, витрати студентів на оплату навчання, основні форми державної підтримки студентів та їхніх родин. Проведено аналіз затребуваності приватного освітнього кредитування серед студентів і домогосподарств.

Авторами в роботі проводиться порівняння динаміки фінансування та чисельності студентів, що дає можливість визначити позитивні й негативні тенденції в розвитку вищої освіти. Здійснений аналіз свідчить, що в розглянутий період посилилася диференціація систем вищої освіти на дві групи – в залежності від того, зростають чи скорочуються державні видатки на фінансування освіти. Автори дійшли висновку, що система фінансування вищої освіти в розвинених країнах відрізняється має істотні відмінності. Сьогодні інвестиції в освіту розглядаються як найважливіший фактор підвищення конкурентоспроможності країн, що дозволить забезпечити зростання економіки в сучасних умовах.

Ключові слова: людський капітал; інвестиції в освіту; фінансування освіти; кредит на навчання; цифрова економіка.

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Инвестиции в образование человеческого капитала в условиях цифровой экономики

Аннотация. В статье рассматриваются основные тенденции в динамике и структуре финансирования образования в ведущих странах Запада в рамках концепции разделения затрат. Проанализированы соотношения частных и государственных расходов на образование, затраты студентов на оплату обучения, основные формы государственной поддержки студентов и их семей. Проведен анализ востребованности частного образовательного кредитования студентов и домохозяйств.

Авторами в работе проводится сравнение динамики финансирования и численности студентов, что дает возможность определить позитивные и негативные тенденции в развитии высшего образования. Осуществленный анализ свидетельствует, что в рассматриваемый период усилилась дифференциация систем высшего образования на две группы – с растущим и с сокращающимся государственным финансированием. Анализ показал, что система финансирования высшего образования в развитых странах существенно отличается. Сегодня инвестиции в образование рассматриваются как важнейший фактор повышения конкурентоспособности, который позволяет обеспечить рост экономики в современных условиях.

Ключевые слова: человеческий капитал; инвестиции в образование; финансирование образования; кредит на обучение; цифровая экономика.

1. Introduction

There is no doubt that the better the quality and accessibility of higher education for the population of a country, the more qualified specialists carry out economic activities within its borders and the more effectively the state itself develops. Consequently, the functioning of higher educational system is the most important direction of socio-economic development of countries. The educational system is creating a new generation of people who will soon make up the national human capital. Higher education plays an important role in this process, as it affects the level of specialists' qualification. These specialists will be tasked with solving strategic issues of socio-economic development in the digital economy. Hence, the higher education funding is an investment in a country's human capital and future competitive advantage in the Industry 4.0.

Outlining the current situation regarding new needs and priorities in higher education, it is important to mention main conditions which shape it up. Such a condition is digitalization of the economy which has a huge influence on all socio-economic processes. With globalization and the active development of innovative technologies such as blockchain technology, artificial intelligence and cloud services, digital economy has become an integral characteristic of the world and national economic systems. The scale of digital economy development all over the world is difficult to assess accurately. UNCTAD (2019) states that «depending on the definition, estimates of the size of

the digital economy range from 4.5 to 15.5 per cent of world GDP». The Boston Consulting Group (2019) estimates that in 2019 «digitally enabled trade will be worth about USD 800 billion (the bottom-up estimate) to \$1.5 trillion (the top-down estimate)».

Digitalization growth rate in Russia is much lower than in the United States, Japan, and China. An indirect confirmation of this is that the Russian Federation accounted for 1.8% of global GDP in 2018, while its share in the world performance of supercomputers was only 0.32% (Abramov, 2018). The share of digital economy in GDP of Russia amounted 2% in 2016 (BCG, 2017). For the development of digital economy, it is necessary to develop the national IT sector, encourage the creation and introduction of innovative technologies in all social and economic spheres of activity, both on a national scale and at the regional level.

The key idea of the development strategy focused on digital economy implementation is to form essential industries of the new technological mode with outstripping rate and bring the Russian economy to a new long wave of progress in this area as soon as possible (BCG, 2017).

To develop digital economy, it is necessary to form the national IT sector and stimulate the creation and introduction of innovative technologies in all production, economic and social sectors of the country.

In this regard, public authorities in different countries are paying increasing attention to national education systems, including higher education. Everyone understands that the higher the level of society's education, the more effectively the economic sector develops, and, hence, the higher is the income and the quality of life in the country. The system of higher education funding in different countries has common and distinctive features.

2. Brief Literature Review

Issues, prospects of development and education financing in the world's leading countries is presented in the works of D. B. Johnstone (2015), N. Barr (2009), R. Borck and M. Wimberly (2014), S. Grobon (2018), J. Dumay and J. Guthrie (2019), B. M. Fraumeni, J. He, H. Li and Q. Liu (2019), K. Higa, R. Nonaka, T. Tsurumi and S. Managi (2019), C. Huang and Y. Li (2019), K. A. Francisco and M. Tanako (2019), S. A. H. Zaidi et al. (2019).

Household investment in education is the subject of research for such Russian authors as V. V. Antonenko, G. V. Antonov and E. G. Laktyukhina (2015), as well as G. V. Semeko (2018). The works of I. S. Minina (2017), Yu. V. Vertakova et al. (2013), O. P. Ovchinnikova and N. E. Ovchinnikova (2017), and A. I. Gazizova (2009) are devoted to international and Russian experience of applying the forms of public-private partnership in higher education. International experience of interaction between business structures and universities is considered in the studies of V. S. Bazhenova (2015). However, in our opinion, insufficient attention has been paid to the tasks of ensuring a balanced interaction between the educational system and employer organizations with the use of state regulation mechanisms in the context of economy's digitalization.

3. The Purpose of the paper is to study the structure and dynamics of educational system funding in different countries; to identify the ratio of government and private spending on education; to present current trends in financial support of the educational system; to study the main and individual elements of financial support for higher education.

4. Results

The issue of financing higher education remains a major problem in many countries. Under present-day conditions, sources of funding for higher education are divided into the government (public) and private (commercial) ones. Proportions in the distribution of these sources are different and the optimal ratio has not yet been determined. And each country solves this problem in its own way.

We will conduct a comparative analysis of higher education funding sources in different countries and in Russia. For this purpose, we will employ the annual analytical reports of OECD «View on education: OECD indicators» (Education at a Glance). They give a significant array of indicators that allows assessing the state of education at the international level and the main directions of educational policies of countries related to the formation of human capital.

One should note that the demand for higher education is globally growing. Spending on education as a percentage of GDP at average equals to 5.2% across OECD countries, including government and private investment as of early 2019 (OECD, 2019). Since the state is interested in training specialists in various fields, it allocates funds to finance higher education and provides training for highly qualified personnel.

As of 2017, government spending on higher education in the Russian Federation amounted to 2.2% of total public spending (see Table 1), which was not higher than the average for OECD countries (2.9%). The highest share of government spending in relation to total public expenditures was observed in Chile (5.4%), Turkey was in the second place with a value of 4.6% and Norway was in the top three - the share of government spending on higher education there was 4.2% of all public expenditures (OECD, 2019).

In terms of government spending share on higher education in relation to GDP in 2016 (in OECD database: «C2.1: Total expenditure on educational institutions as a percentage of GDP»), Chile lead with a value of 2.7, while Norway and Turkey had 1.9% each, and Austria - 1.8%. In Russia, this indicator was at the level of 1.1% of GDP (the same value is held by Lithuania and Hungary) (OECD, 2019).

The lowest levels of government funding from total expenditures on higher educational institutions (percentage of GDP) as of 2016 (in OECD database: «C2.2: Total expenditure on educational institutions as a percentage of GDP, by final source of funds») were seen in Luxembourg and Japan (0.4%), Italy and The UK (0.5%), as well as Ireland and Greece (0.6%). Despite that, in 2016, Luxembourg lead as to the total expenditure on higher education institutions per full-time equivalent student with a value of USD 48,407. In terms of purchasing power parity, the USA was in the second place with USD 30,165, Sweden was in the third place with USD 24,341. The average value for all countries for which statistics were available was USD 14,904. In Russia, the value of this indicator was at the level of USD 8,479. (This is the 31st place out of 36 countries participating in statistical monitoring for this criterion). Chile followed Russia in this ranking with a value of USD 8,317. Colombia had the lowest figure of the countries analyzed - USD 6,427. In the USA and Japan, most universities are private, so government support is minimal, and a high level of spending per student is provided by private funding (Table 2).

We shall turn to the results of a study on the structure and dynamics of higher education public funding by experts of the European University Association (EUA), who analyzed the relevant data for the period 2008-2016 and 2017-2019 (Privot, Estermann, & Lisi, 2018) and the latest data available for today in the database of OECD (2019). Population size affects both the number of students entering universities and the amount of higher education funding. The bigger the population, the higher the potential demand for educational services.

Comparing the dynamics of funding and the number of students makes it possible to determine positive and negative trends in the development of higher education. Simultaneous growth of both public funding and the number of students was observed in 14 countries in 2008-2019. In six countries (Austria, Norway, Sweden, Poland, Luxembourg, Switzerland) funding increase moved ahead of

Table 1:
Public expenditure on higher education as a percentage of total government expenditure (including R&D), %, 2017

Place in the ranking (where data available)	Country	Total tertiary education (ISCED2011 levels 5 to 8)
1.	Chile	5.4
2.	Turkey	4.6
3.	Norway	4.2
4.	The Netherlands; Mexico	4.0
5.	Switzerland	3.9
6.	Canada	3.8
13.	Non-OECD Economies: Brazil	3.5
28.	Non-OECD Economies: Russia	2.2
37.	Japan	1.6
38.	Italy	1.5
39.	Luxembourg	1.1

Source: Compiled by the authors using data by OECD (2019)

Table 2:
Total expenditure on educational institutions per full-time equivalent student, USD PPP, 2016

No.	Country	Total tertiary education (ISCED2011 levels 5 to 8)
1.	Luxembourg	48,407
2.	United States	30,165
3.	Sweden	24,341
8.	Japan	19,191
31.	Non-OECD Economies Russia	8,479
32.	Chile	8,317
36.	Non-OECD Economies Colombia	6,427

Source: Compiled by the authors using data by OECD (2019)

growth in the number of students, and in five countries (Turkey, Germany, Denmark, The Netherlands, Portugal) due to demographic processes was slower than increase in the number of students.

Significant reduction in state funding and growth in the number of students was registered in Croatia and Ireland, which may negatively affect the quality of education. In Croatia, the reduction of budget funding for higher education is happening in the face of GDP reduction. One should say that growth rate of investment in higher education is faster than economic expansion rate in Germany, Luxembourg, Norway, Poland, Portugal, Turkey, Austria, and Denmark.

Economic expansion rate exceeds growth rate of investment in higher education in France, The Netherlands, and Sweden.

The reduction of higher education funding in the face of economic growth was revealed in the Czech Republic, Finland, Hungary, Italy, Latvia, Lithuania, Serbia, Slovenia, Slovakia, and the United Kingdom.

Greece, Cyprus, and Spain show a stronger reduction in higher education funding than in GDP decrease (OECD, 2019).

During the period mentioned above, Russia was experiencing decline both in the pace of economic growth and in higher education government funding. The number of students was also decreasing.

The conducted analysis shows that in the period under review, the differentiation of higher education systems into two groups (with growing and declining government funding) has increased. Many countries have begun to enhance investment in education after the 2008 financial crisis, but this trend remains very unstable: most countries in 2016 still did not reach the level of public funding that would exceed the level of 2008 (Table 3). It is appropriate to assume that part of government funding of higher education will be replaced by private funding, since there are all the prerequisites for that.

The analysis has also shown that the system of higher education funding significantly differs in developed countries. In most European countries, public finance accounts for a significant share of universities' funding, but in the United States, Great Britain, South Korea, and Japan, private funding is predominant (OECD, 2019). However, most countries spend no more than 1.5% of GDP to support higher education. The majority of OECD members, as well as Russia, support higher education with public funding, but in the future private funding will expand due to transition to new training formats.

Currently, investment in education is considered as the most important factor in increasing competitiveness, which leads to steady economic growth. The main thing in human capital is individuals' accumulated knowledge, skills and abilities - this is the «product» of the system of basic and professional education, training, refresher courses and advanced professional training of personnel. Under the conditions of constant underfunding of educational system and tuition costs increase, the income and disposable resources of parents become a significant factor affecting the availability of quality education for children from different social strata of the population.

In OECD countries, public spending on education accounts for an average of 4.1% of GDP, while private spending accounts for 0.7% of GDP. However, the share of private spending varies widely across the countries. The largest ratio to GDP is observed in the United States and the United Kingdom. For instance in 2018, the UK spent 6.6% of GDP on education. Spending per pupil in the UK primary school was USD 11.4 thousand, in OECD members - USD 8.7 thousand, in secondary school - USD 12.5 and USD 10.1 thousand, respectively, and in higher school - USD 24.5 and 16.1 thousand. As a result, the UK has high rates of access to education, measured by the average expected length of schooling for school-age children and the average duration of adult education.

Foreign countries use a variety of approaches to teaching foreign students. For example, they are charged a higher tuition fee as compared to that of a citizen of the country who is doing the same

Table 3:

Changes in the relative share of public expenditure on higher educational institutions in the structure of total expenditures on educational institutions in the developed countries and Russia, %, 2005, 2010, 2016

Country	2005	2010	2016
Denmark	97	92	-
Australia	45	46	40
Germany	85	85	83
Japan	34	34	31
The Netherlands	72	70	67
Sweden	85	87	84
USA	42	40	35
Russia	-	62	64

Source: Compiled by the authors using data by OECD (2019)

program. Thus, applicants and graduates in the UK accounted for 8% and 9.2%, while in OECD countries the corresponding share was 16% and 13.9%, in France - 14.8%, in Germany - 22.3%.

Higher efficiency of private investment in comparison with public one creates conditions for replacing government funding of higher educational system by private financing. Russia has developed a strategy for socio-economic development until 2035. Currently, the expenditures on education amount to 3.5% of GDP. Various options for financing education have been proposed in Russia. This is due to increased investment in education through the development of public-private partnerships, budget and extra-budgetary funding. At the same time, the willingness of citizens to invest in their own education and in the education of their children, i.e. to invest additional funds in higher education, is growing significantly. To improve the quality of education, it is necessary to develop a system of paid educational services.

The goals and objectives of investment policy are subject to the logic of strategic planning of universities' activities. Its development should take into account the following principles: the orientation of investment policy to address the strategic objectives of higher education institutions; consideration of risk factors and a clear economic rationale for investment; and the formation and selection of an optimal investment structure. The investment policy of a higher education institution is based on the implementation of an investment strategy, which is developed on the basis of goals set by an educational institution. The nature and direction of the investment policy of a higher educational institution is determined by the choice of marketing strategy type: differentiation strategy, leadership in the field of costs, concentration on a certain segment of consumers of educational services.

Investment in education is one of the main types of investment in individuals' human capital. Consequently, the problem of forms and volumes of return on this investment, as well as the period of payback, becomes particularly relevant. The investment of money by students in educational services for themselves can be considered as an investment, given the fact that motivation for making a decision to invest funds is the expectation of income and improvement of welfare in the future. The employer or consumer of services provided to students does not have obligations to return the funds invested in higher education only on the basis that the former student received a paid education, though in a prestigious educational institution. Depending on the level of education, an employee receives remuneration that corresponds to the quality and quantity of employment duties' performance or to the efficiency of doing business. Income is not directly determined by the amount of funds once invested in education, but depends on many factors: work experience, availability of paid work, etc.

As states in his research A. V. Kazansky (2017), «the methodology for calculating the economic effect received by a citizen with higher education assumes that the private costs of higher education are composed of direct costs and lost income, in addition to this, the need to pay increased income tax and social benefits are taken into account.» Based on initial calculations of A. V. Kazansky (2017), Figure 1 has been compiled which shows that private costs of higher education are higher in the countries with lower state budget share in financing of higher educational institutions, however, such costs give higher economic effects to the person once he enters the labour market. Direct costs and lost income are presented in Figure 2, and payment of increased income tax and social transfers - in Figure 3.

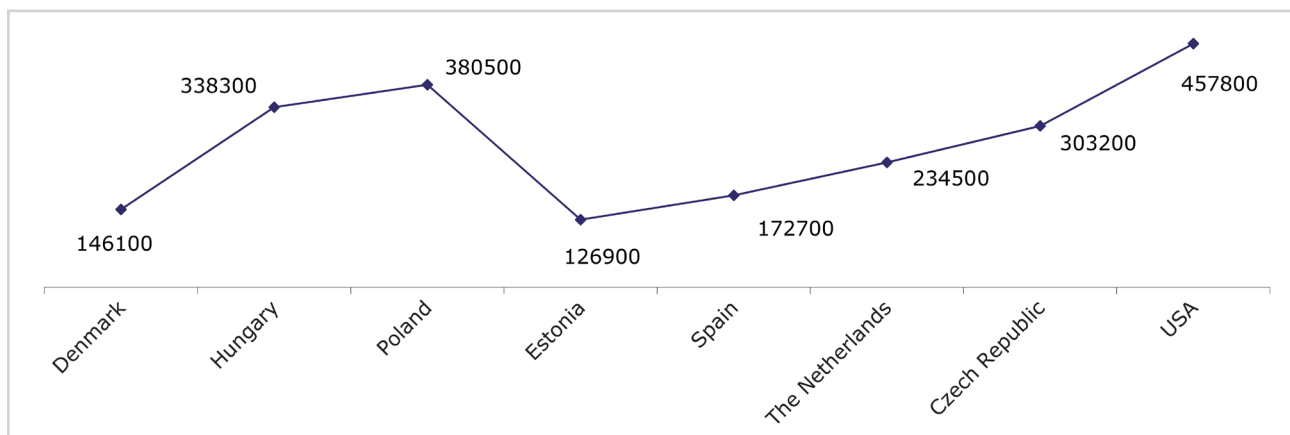


Figure 1:

The economic effect received by the citizen with higher education (private source of investment in own education), USD, 2013

Source: Compiled by the authors based on initial calculations by A. V. Kazansky (2017)

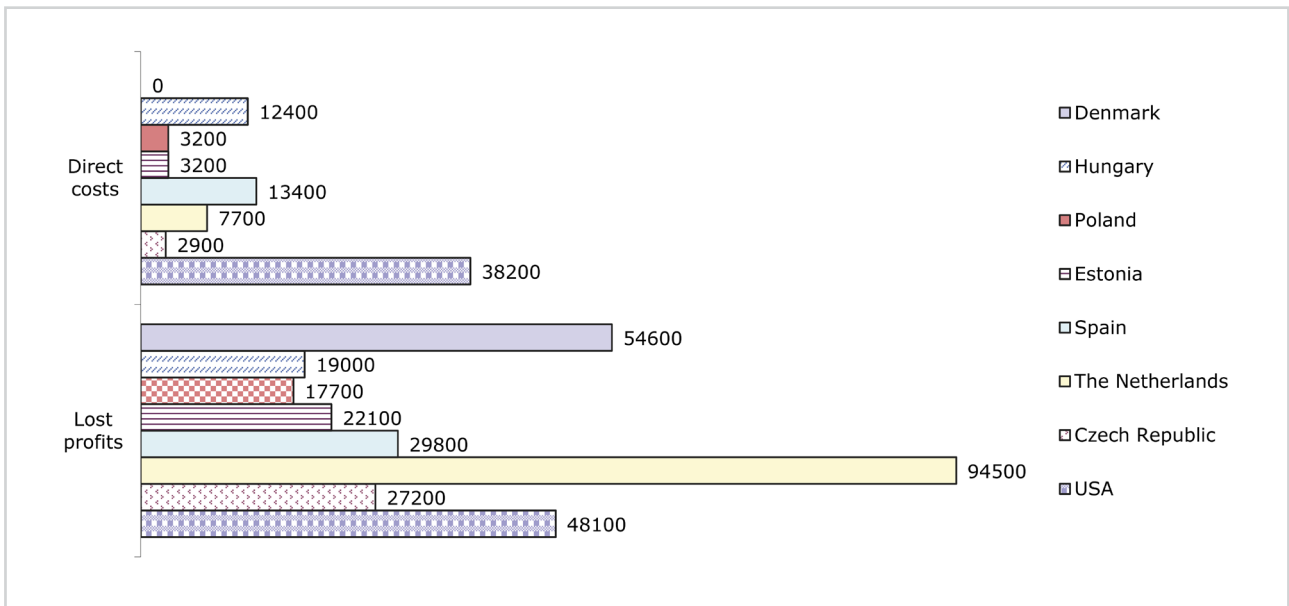


Figure 2:
**Direct costs and lost income of higher education for the citizen
(private source of investment in own education), USD, 2013**

Source: Compiled by the authors based on initial calculations by A. V. Kazansky (2017)

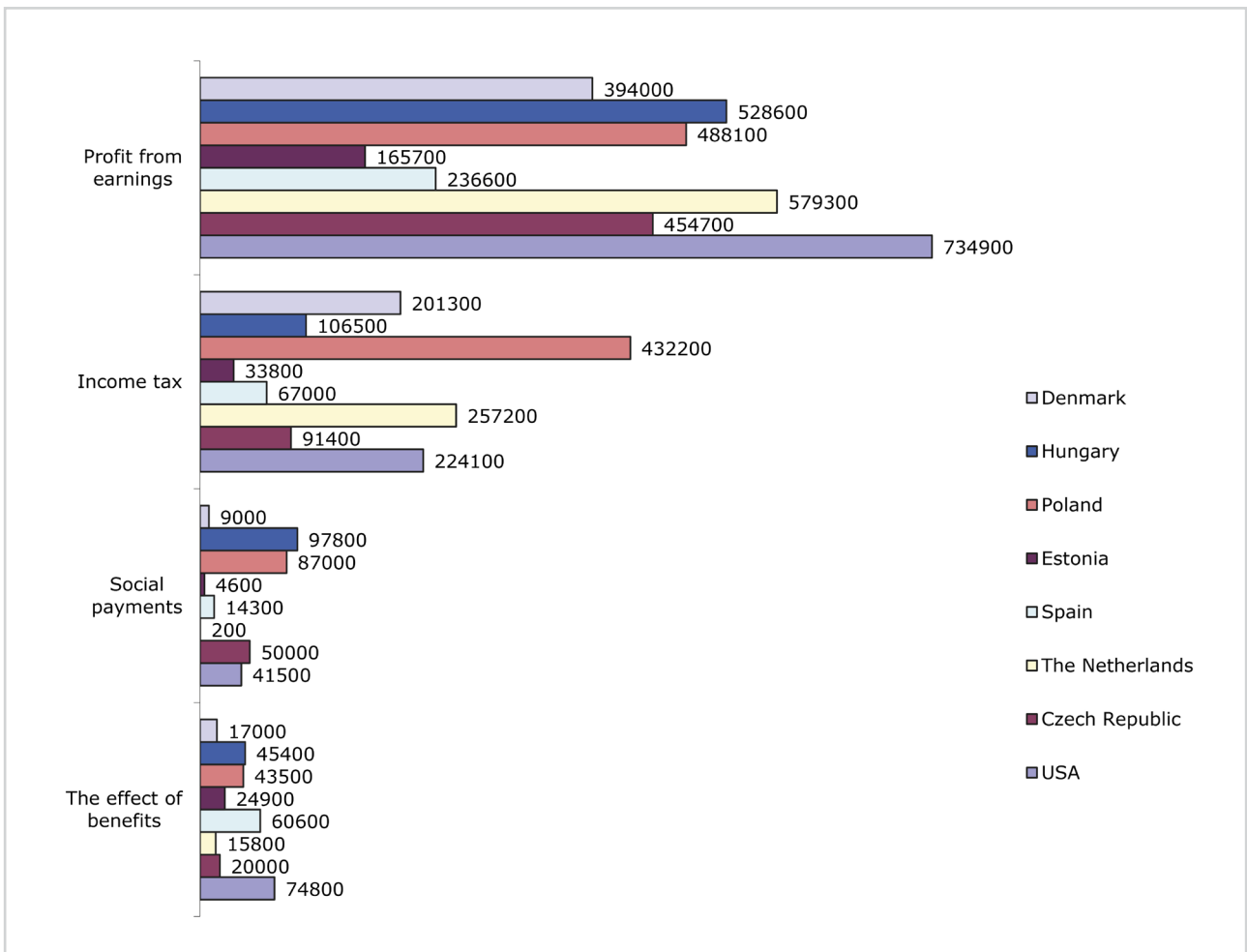


Figure 3:
**Main areas of expenditures of the person who acquires higher education
(private source of investment in own education), USD, 2013**

Source: Compiled by the authors based on initial calculations by A. V. Kazansky (2017)

The volume and structure of Russian family investment in youth education as an element of human capital is mainly applicable to higher education. This type of investment in youth education is the most expensive for a modern family. On the average, 32% of education spending comes from private sources, with two-thirds of this funding provided by families, mainly in the form of tuition fees.

This is a reality that needs to be recognized at the national level and at the same time requires improving the system to help all people who want to invest in their future through education. The main feature of private investment is that this investment is intended for subsequent profit, which involves the transfer of funds to the recipient on the basis of a contract.

Undertaken analysis of the structure of public and private expenditures for higher education, as well as findings by Kazansky (2017) prove that the average value of the internal rate of return for a private investor, in our case, a consumer of educational services, in the OECD countries is on average higher, than for the public investment.

Private investment in education implies the presence of entities that provide appropriate paid educational services. Those entities include non-governmental educational organizations, as well as individuals who provide paid educational services.

5. Conclusions

Good education and professional skills are important prerequisites for getting a well-paid job. Recently, there has been witnessed a correlation between the level of education, income received and employment at manufacturing site or in another field of activity. According to the various estimates, the income gap between people who have obtained a higher education and who do not have it is on average 20-30%.

Many developed countries allocate at least 1.7% of their gross domestic product to support higher education. However, at present, there are differences across countries concerning the amount of private funding, which is linked to national traditions in the higher education systems. All countries pay significant attention to the development of higher educational institutions and the recruitment of international students, both in order to train talented young people, and to export the national system of values through the education of foreign citizens.

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