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## GOVERNMENT EXPENDITURES ON EDUCATION IN THE XXI CENTURY: QUANTITATIVE EVALUATION AND LIMITS OF RATIONALITY

*The paper assesses the economic role, effectiveness and appropriateness of governmental education funding. Based on the author's methodology a correlation between dynamics of government expenditures on education and key macroeconomic indices in the period 2001–2014 is presented. Drastic decline of public education expenditures cost-effectiveness is revealed, and author's recommendations on the national strategy for labor intellectualization modernization are offered.*

*Keywords:* education; government spending; budget; economic growth; global economy.

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## ДЕРЖАВНІ ВИТРАТИ НА ОСВІТУ У ХХІ СТОЛІТТІ: КІЛЬКІСНЕ ОЦІНЮВАННЯ ЕФЕКТИВНОСТІ ТА МЕЖІ РАЦІОНАЛЬНОСТІ

*У статті оцінено економічну роль, ефективність та доцільність державного фінансування освіти. На основі запропонованої автором методики приведено кореляцію динаміки державних видатків на освіту з основними макроекономічними досягненнями в період 2001–2014 років. Представлено висновки щодо різкого скорочення економічної ефективності державних видатків на освіту, а також рекомендації автора відносно модернізації національної стратегії інтелектуалізації праці.*

*Ключові слова:* освіта; державні видатки; бюджет; економічне зростання; світове господарство.

*Рис. 1. Табл. 7. Літ. 13.*

Денис Ушаков

## ГОСУДАРСТВЕННЫЕ РАСХОДЫ НА ОБРАЗОВАНИЕ В ХХІ ВЕКЕ: КОЛИЧЕСТВЕННАЯ ОЦЕНКА ЭФФЕКТИВНОСТИ И ПРЕДЕЛЫ РАЦИОНАЛЬНОСТИ

*В статье оценены экономическая роль, эффективность и целесообразность государственного финансирования образования. На основании предложенной методики проведена корреляция динамики государственных расходов на образование с основными макроэкономическими достижениями в период 2001–2014 годов. Представлены выводы относительно резкого сокращения экономической эффективности государственных расходов на образование, а также рекомендации относительно модернизации национальной стратегии интеллектуализации труда.*

*Ключевые слова:* образование; государственные расходы; бюджет; экономический рост; мировое хозяйство.

**Introduction.** Global economic transformations, rapid growth of international competition identified an objective need to find new sources of economic growth, apart from natural resource potential exploitation. As one of such sources education can be considered due to its direct affects on:

- level of labor force skills and, therefore, on labor productivity and economic efficiency;
- formation of fundamentally new high-tech industries, that are less dependent on the consumption of limited natural resources, operation of which provides non-

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stop generation and commercialization of innovations, innovations transfer (both domestic and international), improves macroeconomic and social indicators of the country;

- country's repositioning in the system of international labor division in favor of formation a national system for innovations' generation and commercialization and high-tech products production and sales.

As long-term indirect effects of public education development we can consider such national socioeconomic criteria like:

- national investment climate and economic conditions;
- quality of domestic management;
- country's migration attractiveness (especially for talented and highly skilled foreign workers);
- innovative potential of a country;
- demand for innovations (innovative products or new knowledge) at domestic market.

Despite the fact that education can be a highly profitable and effective form of commercial activity, attractive for private investments and sustainable to crisis, the role of state budget in public education development, ensuring its availability for local population majority will always be of decisive importance.

**Purpose of the study:** based on the countries' current macroeconomic indicators analysis, to determine the correlation between dynamics of government expenditure on education and criteria for national economic growth, for transformation of their economic structures and input-output balance.

The following objectives for this study are set as follows:

- Evaluate the role of government expenditures on education in countries' economies' growth today.
- Test the hypotheses on the interdependence between countries' economic growth and national education duration.
- Analyze the correlation between government spending on education and main indices of economic and social development of the contemporary states.
- Offer conclusions on structural and economic impacts of public expenditure on education in the largest countries of the world.

**The main research hypotheses:**

1. In the 21st century, a stimulating country's economic and social development role of public funding for education is sharply reducing. The potential of higher education to form a high-quality consumer demand (which can easily be satisfied, for example, by import's increasing) or to create new industries of national economy reduced. More effective instruments of unique knowledge or skills carriers' attraction and employment have to replace quantitative and long-term projects of public education funding.

2. Increasing public funding of education in the 21st century stimulates the growth of agricultural and industrial production, rather than the service sector (as it was in the last century).

3. Stimulative impact of public education on trade development in the 21st century is reduced to zero. Potential of trade growth (due to restructuring of qualitative demand) has lost its meaning for education.

4. At the beginning of the 21st century government spending on primary education is the most important factor of national economic growth and material prosperity in most countries.

5. Higher education development in the country is an important factor to develop national business environment, stimulate entrepreneurial activity, competition in all the sectors of economy. It indirectly determines investment attractiveness of national economic system at world markets.

**Literature review.** In the 20th century intensification of the studies on interactions between government spending on national educational system formation and dynamics of country's economic development has led to clarification of the human capital theory, its founder T. Schultz (1972) showed that educational level of population determines its ability to use information and technologies for economic development. G. Becker (1985) scientifically proved that major investment in students and workers training is equivalent to major investment in the creation or acquisition of new machinery, equipment or technologies.

A. Maddison (1991) determined that increasing of government spending on education by 1% leads to national GDP increase by 0.35%. And according to (Mincer, 1974) every additional year of education increases personal income (of person employed outside agriculture though) by 7%.

At the turn of the 20th and 21st centuries practical research on interdependence between public expenditure on education and dynamics of macroeconomic indicators in the world in general (Blankenau and Simpson, 2004), and in certain countries (Aziz and Khan, 2008) has been rather active. It is interesting to note that at this time also studies denying the positive relationship between public expenditure on education growth and economic progress have been also presented (Basu, 2010).

Practically proved findings and conclusions made it possible to determine regional models of public educational funding within budgeting (Barro, 1990); tools for public expenditure on education effectivization (Sylwester, 2000); clarification of the factors limiting (stimulating) economic impact of public spending on education (Lindahl and Krueger, 2001).

Our study based on the conceptual approaches of the human capital theory is yet another attempt to determine its economic importance and role in economic progress of today's world.

Many scientists today consider education as the only one prospective solution to overtake problems of countries' dependence on natural resources export and to prove new prospects and platforms for further intensive development (Patlasov, 2015).

**Methodology.** For our study we have analyzed 61 countries. Their classification by geographical location and by the level of material well-being is given in Table 1.

The following indices of government expenditures on education in 2001–2014 (collected by the World Bank) were used in the research:

I1 – expenditure on education as % of the total government expenditure.

I2 – expenditure on secondary education as % of government expenditure on education overall.

I3 – government expenditure on education as % of GDP.

I4 – government expenditure per primary student as % of GDP per capita.

I5 – government expenditure per secondary student as % of GDP per capita.

I6 – government expenditure per tertiary student as % of GDP per capita.

Table 1. Classification of the analyzed countries, author's

Geographical location		Number of analyzed countries		Number of analyzed countries
	North and Central Europe	12	East Europe	6
	South Europe	6	Middle East	6
	Formed USSR	5	Asia Pacific	11
	America	8	Africa	7
Material well-being (in 2014)	Rich countries (GDP/per capita higher than 40,000 USD)	21	Mid-poor countries (GDP/per capita higher than 10,000 USD)	14
	Mid-rich countries (GDP/per capita higher than 20,000 USD)	16	Poor countries (GDP/per capita less than 10,000 USD)	10

Correlation of the selected indices of government expenditures on education with the following national macroeconomic indicators (2001–2014) was calculated:

- J1 – agriculture, value added (% of GDP).
- J2 – exports of goods and services (% of GDP).
- J3 – foreign direct investment, net inflows (% of GDP).
- J4 – GDP at market prices (current USD rate).
- J5 – GDP growth (annual %).
- J6 – GDP per capita (current USD rate).
- J7 – GDP per capita growth (annual %).
- J8 – gross capital formation (% of GDP).
- J9 – gross savings (% of GDP).
- J10 – industry, value added (% of GDP).
- J11 – services, value added (% of GDP).
- J12 – trade (% of GDP).
- J13 – trade in services (% of GDP).

To demonstrate the suggested here methodology we used the example of Australia. Australia's macroeconomic indices are shown in Table 2.

Using these indicators a correlation between changes in Group 1 indices and Group 2 indices was calculated (Table 3).

The resulting correlation between government expenditures and key macroeconomic indices (for 61 countries already) in 2001–2014 is presented in Table 4.

**Findings.** To demonstrate the effect of state budget expenditures on different aspects of national socioeconomic system progress the macroeconomic indicators tested in the study were classified into three groups – indicators characterizing the structure of national economic system, indicators reflecting population well-being and economic growth dynamics and indicators characterizing the level of country's financial institutions development.

The indicators reflecting the structure of national economic system, included:

- J1 – agriculture, value added (% of GDP).
- J10 – industry, value added (% of GDP).
- J11 – services, value added (% of GDP).

J12 – trade (% of GDP).

Table 2. **Macroeconomic indices of Australia,**  
used in the research (World Bank data)

	Years					
	2001	2004	2008	2012	2013	2014
Group 1. Macroeconomic indices						
Agriculture, value added (% of GDP)	3.837365	3.161271	2.466768	2.37823	2.466407	2.446975
Exports of goods and services (% of GDP)	22.1471	18.07439	22.52445	19.44437	21.14151	21.27942
Foreign direct investment, net inflows (% of GDP)	2.182767	-3.62055	3.09566	3.082575	4.716453	3.747493
GDP growth (annual %)	1.929387	3.206642	1.819678	2.018182	2.379561	3.63272
GDP per capita (current USD rate)	19495.15	33982.95	42715.13	51845.65	62216.55	67646.1
GDP per capita growth (annual %)	0.564238	1.853481	-0.25739	0.443578	0.966807	1.86253
GDP per capita, PPP (USD)	27384.12	32559.46	40205.03	39118.69	41763.12	43098.69
Gross capital formation (% of GDP)	23.45024	27.45266	27.92439	27.56808	27.12607	28.36566
Gross fixed capital formation (% of GDP)	23.28462	27.04915	28.20362	27.73588	26.6953	28.01838
Gross savings (% of GDP)	20.83137	20.95496	24.44515	22.57151	23.98936	25.02952
Industry, value added (% of GDP)	25.9685	26.77621	28.9365	27.10786	28.55116	28.28002
Services, value added (% of GDP)	70.18575	70.02119	68.62951	70.60268	68.98243	69.27301
Trade (% of GDP)	44.11794	38.86503	44.94695	39.86036	41.24351	42.6956
Trade in services (% of GDP)	8.882464	8.882464	8.980974	8.582129	8.16951	7.703465
Group 2. Government expenditures on education in Australia						
Expenditure on education as % of the total government expenditure	13.58513	13.1782	13.41502	14.3276	13.50202	13.22041
Expenditure on secondary education as % of the government expenditure on education overall	39.71213	39.60015	37.7816	36.78888	36.59127	35.26151
Government expenditure on education as % of GDP	4.91079	4.74288	5.0942	5.57355	5.10608	4.90641
Government expenditure per primary student as % of GDP per capita	17.92207	17.70497	19.9527	22.43024	20.0936	18.27615
Government expenditure per secondary student as % of GDP per capita	15.92906	17.78134	18.51037	19.79259	17.92667	16.54025
Government expenditure per tertiary student as % of GDP per capita	21.69588	20.74437	20.36503	21.42961	19.98576	19.98576
Gross enrolment ratio, pre-primary, female (%)	102.8266	80.00937	79.84389	77.49936	77.49936	77.49936
Nominal duration of primary education (years)	7	7	7	7	7	7

**Table 3. Correlation between dynamic of government expenditures on education and key macroeconomic indices in Australia, 2001–2014, calculated by the author used (World Bank data)**

	Expenditure on education as % of the total government expenditure	Expenditure on secondary education as % of government expenditure on education	Government expenditure on education as % of GDP	Government expenditure per primary student as % of GDP per capita	Government expenditure per secondary student as % of GDP per capita	Government expenditure per tertiary student as % of GDP per capita
Agriculture, value added (% of GDP)	0.212929	0.683167	-0.17985	-0.42031	-0.6853	0.744399
Exports of goods and services (% of GDP)	-0.11879	-0.41985	0.104461	0.205431	0.255806	-0.41449
Foreign direct investment, net inflows (% of GDP)	-0.25463	-0.21242	-0.11467	0.016328	0.225464	-0.40938
GDP at market prices (current USD rate)	-0.14751	-0.92918	0.263682	0.459589	0.550355	-0.7661
GDP growth (annual %)	-0.4641	0.251521	-0.62224	-0.66277	-0.56475	-0.04041
GDP per capita (current USD rate)	-0.17048	-0.91262	0.241918	0.444815	0.55288	-0.77729
GDP per capita growth (annual %)	-0.31033	0.363898	-0.57518	-0.65884	-0.58532	0.104853
GDP per capita, PPP (current USD rate)	-0.16688	-0.89146	0.274202	0.500858	0.666231	-0.80714
Gross capital formation (% of GDP)	-0.41755	-0.46535	-0.08247	0.142393	0.464759	-0.68457
Gross fixed capital formation (% of GDP)	-0.37542	-0.44326	-0.03922	0.190599	0.550534	-0.6605
Gross savings (% of GDP)	-0.13902	-0.88758	0.269611	0.439677	0.497443	-0.72239
Industry, value added (% of GDP)	-0.38963	-0.65965	0.015916	0.281669	0.612315	-0.87441
Services, value added (% of GDP)	0.489294	0.389563	0.213766	0.006693	-0.30125	0.733337
Trade (% of GDP)	-0.30966	-0.30054	-0.07789	0.052172	0.214575	-0.46536
Trade in services (% of GDP)	-0.17231	0.737739	-0.36671	-0.35271	-0.08128	0.223397

Their correlation with 6 indices of government expenditures on education is presented in Table 5.

Obviously, the total value of government expenditures on education has practically no effect on national economic structure. Meanwhile, rising spending on higher education stimulates the growth of national agriculture, but at the same time limiting the development of service industry (sic!). This finding is in contradiction with rather widely spread ideas on prior growth of service sector in the countries with active financing of education.

**Table 4. Correlation between government expenditures and macroeconomic indices, 61 countries of the world, 2001–2014, calculated by the author**

	Government expenditures on education, 2001–2014					
	I1	I2	I3	I4	I5	I6
J1		+		-	-	
J2	-	-	-			-
J3			-	-	-	-
J4		-	+	+	+	-
J5	+	+	-	-	-	-
J6		-		+	+	-
J7	+	+	-	-	-	-
J8	+	+	-	-	-	-
J9	-	+	-	-	-	-
J10			-	-	-	
J11		-	+	+	+	
J12	-	-	-		-	-
J13		-				

**Table 5. Correlation between government expenditures on education and the indicators of national economic systems' structuring, 2001–2014, author's**

National macroeconomic indicators	Indices of government expenditures on education					
	I1	I2	I3	I4	I5	I6
Agriculture, value added (% of GDP)	-0.671	6.2293	-3.508	-9.611	-8.773	-2.805
Industry, value added (% of GDP)	-2.526	3.9954	-18.3	-12.6	-10.24	-2.395
Services, value added (% of GDP)	-2.608	-7.168	11.072	12.776	9.2563	0.2128
Trade (% of GDP)	-0.20089	-0.19901	-0.22684	-0.15279	-0.13485	-0.21688

At the same time, the growth of education expenditures share in national GDP largely reduces the share of industry in the country's macroeconomic system, thus causing the growth of services. This pattern persists in relation to structural parameters of government expenditures on education: the growth of public spending on primary education is increasingly reducing the share of industry in GDP, and also increasing the services' role. Limiting (for agriculture and industry) and stimulating (for services) role of government spending on secondary education is much more moderate.

Finally, we can note another interesting feature: spending on education is almost not related with the changing role of trade in national economic system.

Macroeconomic indicators, reflecting the general welfare and dynamics of national economic growth included:

J4 – GDP at market prices (current USD rate).

J5 – GDP growth (annual %).

J6 – GDP per capita (current USD rate).

J7 – GDP per capita growth (annual %).

Their correlation with government expenditures on education is shown in Table 6.

**Table 6. Correlation between government expenditures on education and the indicators of national well-being and economic growth, 2001–2014, author's**

National macroeconomic indicators	Indices of government expenditures on education					
	I1	I2	I3	I4	I5	I6
GDP at market prices (current USD rate)	-0.868	-10.53	5.3919	13.865	4.8817	-13.47
GDP growth (annual %)	1.7363	4.3833	-9.933	-7.747	-6.889	-5.214
GDP per capita (current USD rate)	-1.35	-10.11	4.9922	13.812	4.0793	-13.53
GDP per capita growth (annual %)	3.6634	3.4408	-8.987	-8.012	-8.046	-5.158

As can be seen from Table 6, the level of national GDP is more defined by public expenditure on primary education, while the growth of public financing of secondary and tertiary education only limits GDP (both in absolute and in per capita terms). Also, it can be noted that funding of all types of education mostly causes economic growth reduction, does not encourage it (as it has been repeatedly stated in the previous scientific research on the subject).

Finally, the criteria for determining the state of national financial markets are:

J2 – exports of goods and services (% of GDP).

J3 – foreign direct investment, net inflows (% of GDP).

J8 – gross capital formation (% of GDP).

J9 – gross savings (% of GDP).

**Table 7. Correlation between government expenditures on education and the indicators of national financial markets' development, 2001–2014, author's**

National macroeconomic indicators	Indices of government expenditures on education					
	I1	I2	I3	I4	I5	I6
Exports of goods and services (% of GDP)	-8.115	-9.462	-9.911	0.6899	-1.15	-6.255
Foreign direct investment, net inflows (% of GDP)	4.1584	1.5298	-3.245	-5.296	-6.665	-3.167
Gross capital formation (% of GDP)	6.7115	4.7383	-4.94	-7.123	-8.283	-9.231
Gross savings (% of GDP)	4.6999	2.21	-14.73	-10	-7.336	-8.006

As shown in Table 7, rising government expenditures on secondary education in general improves country's investment climate, stimulates growth of payments by enterprises, as well as the level of savings. Meanwhile, "per capita" indicators of government expenditures on primary, secondary and tertiary education are in the inverse relation to financial markets' parameters.

**Conclusion.** The carried out here statistical study of correlation between government expenditures on education and main indicators characterizing national economic system structure, the dynamics of national economy growth, the state of national financial markets, allows making number of conclusions on economic role of education public funding in the 21st century.

As can be seen from Figure 1, there is no relationship in the 21st century between educational process duration in the countries and their economic development (even economic growth). This indirectly confirms the hypothesis that in this century quality indicators of education economic role replace the quantitative ones. Economic



growth can be much more guaranteed by national programs of global scientific potential development, rather than by expensive, durable and often not effective (for example, in controlling public funds distribution) projects.

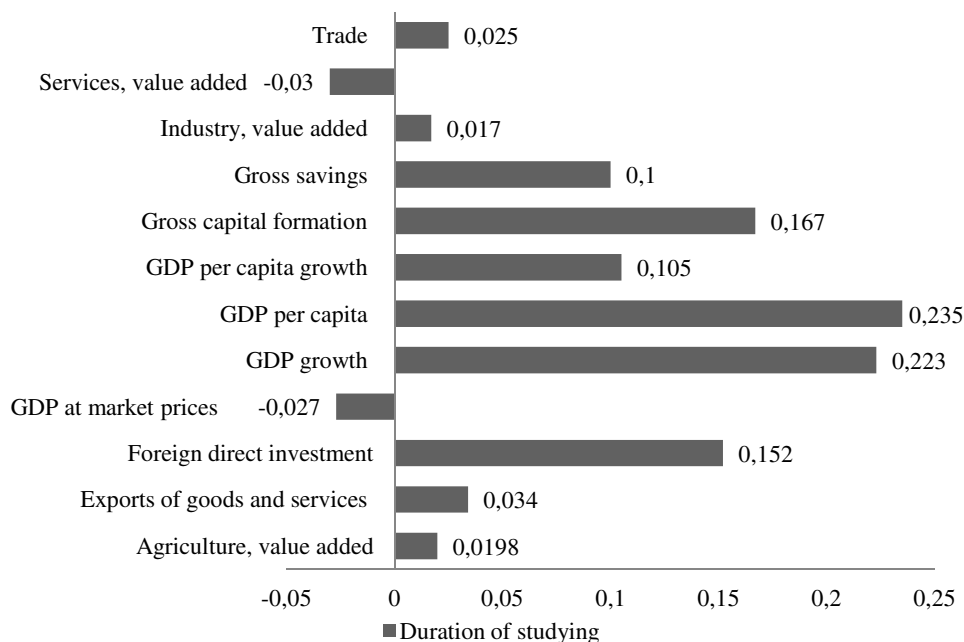


Figure 1. Correlation between usual duration of study and the main macroeconomic indicators, 2001–2014, author’s

The growth of government spending on education does not encourage the development of service industries. Moreover, it causes an increasing economic importance of agriculture and industry in the majority of the analyzed countries.

This conclusion can be easily justified by wider prospects of educated person employment in agricultural or industrial corporations, which, firstly, as well as service spheres can and should be high-tech, super-professional, and secondly, should be able to provide higher wages and labor warranties (as compared to most of service businesses) for employees. National economies’ restructuring with service sectors’ detriment in the 21st century has become a reality everywhere, starting with the collapse of Internet companies in the beginning of the century, series of regional and global financial crises, constant growth of raw materials and food prices (observed until 2014).

Government expenditure on education lost their role of trade development stimulant. On the one hand, education can stimulate consumer demand for goods of higher quality. On the other, growth of education can actually devalue it and reduce the prospects for a diploma holder to get a higher salary. Therefore, consumer demand stimulating the importance of education can also be reduced (which became characteristic for the beginning of the 21st century).

The level of national GDP is largely defined by government expenditures on primary education, while the growth of public financing of secondary and tertiary edu-

education only limits economic development. It is obvious that in our time many states are fully reaping the benefits from generous financing of primary education, which took place 30–40 years ago. The third – fourth generation of educated people (in the countries of Asia, Africa, Latin America) who are able to use sophisticated machines and capable to find relevant information and educate themselves further, and therefore capable to work more effectively and at the same time aware importance of quality education for their own children, provide a resource for further rapid economic growth (which is most dynamic in the 21st century in the countries of Asia and Africa).

It can be also noted that expenditures on all types of secondary education causes a reduction of economic growth in the majority of countries. This can be explained, firstly, by high costs of public secondary and tertiary education, by lowering demand for Masters or Doctors diplomas in many developing countries, by very low level of relationship between education and real labor productivity in most non-innovative industries or in developing countries overall. It is obvious that the potential of higher education to stimulate national economy will be realized in the long term, and only in case of active national, internal usage (not for unregulated export) of intellectual potential of university graduates.

As an important conclusion here we can also define a direct dependence between government expenditures on secondary education and the level of national investment attractiveness. Obviously, people with higher education are more likely to be entrepreneurs and this explains the growth of enterprises' fixed assets, the growth of citizens' savings, indirectly determines the competitiveness of national business environment and its investment attractiveness.

The main limitation of our study has to be also mentioned. It is high heterogeneity of the analyzed countries, their significant differences (both in education expenditures and in the indices of socioeconomic developments).

In the future, it is advisable to analyze the dynamics of the selected indicators correlation within the groups of countries, classified by geographical (neighboring countries), economic (rich, poor and middle-income countries) and territorial (large and small countries) features.

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