Optimizing Variability of Approaches to Regulatory Financing of Higher Education Services

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Abstract
The article analyzes the dynamics of admission quotas in Russian higher educational institutions as a basis of modern budget financing; the dynamics of departmental expenditures on the financial support of federal powers; and dynamics of the volume of educational services provided on a paid basis. The analysis showed that the volumes of budget financing were decreasing, the volumes of paid education were growing, and the financial support of federal authorities had differently directed trends depending on the priorities of the state budget policy in the area of higher education. The evaluation of the dynamics of final basic cost standards for higher education programs in three groups showed a steady growth depending on a group and its area (economics, medicine, nuclear physics, etc.). The authors made a hypothesis about the impact of the basic cost standard included in the final standard on the final basic standard of the share. The hypothesis was confirmed in the offered formula for calculating the final basic standard as a weighted average. The evaluation of the dynamics related to the final basic cost standards, taking into account the share of basic cost standards, showed the inadequacy of changes in the final basic standard depending on a group: reduction or minor change, which contradicted the initial results of the study on the growth of final basic standards depending on a group.

Keywords:
Standard financing; Basic cost standard; Final basic cost standard; Admission quotas; Financial support; Federal powers; State task; Paid education; Weighted average.

1. Introduction
The modern methodology for financing educational services in the Russian Federation is the result of a difficult way it has overcome over the recent decades. To a great degree, it does not comply with today’s realities and, accordingly, goals. All these years the education, including higher education, has been financed by individuals and legal entities. However, as a rule, most of all it was financed by the state. Approaches to determining the volume of financing higher education from the federal budget have differed, and included estimated funding; state nominal financial obligations (SNFO); result-oriented budget funding (ROBF); and in recent years – budget funding in accordance with admission quotas of students. The dynamics of admission quotas according to areas of training are shown in Table 1.

| Item               | 2017 – 2018 academic year | 2018 – 2019 academic year |
|--------------------|---------------------------|---------------------------|
| Engineering        | 46.8                      | 46.5                      |
| Social sciences    | 10.8                      | 11.09                     |
| Natural sciences   | 10.0                      | 9.75                      |
| Pedagogical sciences | 9.23                    | 9.25                      |
| Medical sciences   | 8.6                       | 8.8                       |

*Complied by the authors according to the data from (Kratkiy et al., 2016)

Table 1 shows that for two years under analysis the admission quotas have changed inconsiderable – within one percent. The largest admission quotas have been allocated for engineering in accordance with the state needs (46.5 –
46.8%). The least admission quotas have been allocated for pedagogical and medical sciences (8.6 – 8.8%). According to the authors, this situation is not adequate as for the state’s need in educated teachers and doctors. At the same time, the expenses of the Ministry of Education and Science for the financial support to the main federal powers have the different dynamics as shown in Table 2.

| Item                                           | 2014  | 2015  | 2015 as to 2014, % | 2016  | 2016 as to 2015, % | 2017  | 2017 as to 2016, % |
|------------------------------------------------|-------|-------|-------------------|-------|-------------------|-------|-------------------|
| In total                                       | 268.7 | 300.6 | +11.8             | 326.7 | +8.6              | 358.4 | +9.7              |
| Subsidies for fulfilling the state order       | 195.1 | 203.7 | +11.8             | 205.6 | +0.9              | 214.0 | +4.1              |
| Scholarships and social payments               | 23.6  | 24.5  | +3.8              | 25.4  | +3.6              | 26.2  | +3.1              |
| For federal target programs                    | 8.7   | 7.9   | -9.2              | 6.3   | -20.2             | 6.3   | -                 |
| Measures on increasing professors’ salary      | 38.3  | 62.2  | +62.4             | 87.1  | +40.0             | 109.5 | +25.7             |
| Other expenses                                 | 3.0   | 2.3   | -23.3             | 2.3   | -                 | 2.4   | +4.3              |

*Compiled by the authors according to the data from (Kratkiy et al., 2016)

Table 2 shows that the expenditures of the Ministry of Education and Science were constantly growing up to RUB 358.7 bln. in 2017. The subsidies in this period were the maximum of RUB 214.0 bln.

State expenditures for taking measures of the federal-targeted program “Development of Education” had been decreasing, and by 2017 they had amounted down to RUB 6.3 bln. Scholarships and social payments had been inconsiderably increasing up to 4%.

Table 3 shows the dynamics of the volume of services provided on a paid basis.

| Item                                           | 2000  | 2005  | 2005 as to 2000, % | 2010  | 2015  | 2015 as to 2010, % | 2016  | 2016 as to 2015, % |
|------------------------------------------------|-------|-------|-------------------|-------|-------|-------------------|-------|-------------------|
| Volumes of services provided on a paid basis, in total mln. RUB | 41,530 | 152,670 | + 3.67 times | 326,100 | 539,685 | +65.0 | 567,312 | +5.1 |
| Volume of services provided per capita on a paid basis, thous. RUB | 285   | 1,064 | + 3.73 times | 2,283  | 3,686  | +61.4 | 3,868  | +4.9 |

*Compiled by the authors according to the data from (Kratkiy et al., 2016)

The data from Table 3 say about a considerable increase in the volume of paid services for the first five years – from 2000 to 2005 – more than 3.6 times, a considerable increase in the volume of paid services by 65.0% by 2015, and for the next 2016 the increase in such volumes was only 5.1%. The volume of paid services per capita shows a growing but slow trend. In 2016 the increase in such volumes was 4.9%.

In general, budgetary financing of higher education is slower than the increase in the volume of paid services. This situation says that the state does not financially support the state task for higher education.

Now planning of state expenditures for educational services, including higher education, in the Russian Federation, is the state task, the financial support of which is based on standard expenditures for its fulfillment. According to the Decree of the President of the Russian Federation “On Measures to Pursue the State Policy in Education and Science”, regular per capita financing of education, including higher education, was adopted (Ukaz Prezidenta Rossiyskoy Federatsii ot, 2012).

The scientific community has been studying the issues on financing higher education and its regulatory framework for a long time. For example, in her thesis L. Ivanova notes that there is currently a transition from estimated funding to financial support of the state task, “the transition from resource planning to planning the result unit” (Ivanova, 2007). Other researchers, for example, L. Degtyareva, state that budget financing of educational services at higher education institutions is based on a per capita regulatory approach according to program-targeted planning methods, the grant support system, various forms of public and private partnership, and interregional cooperation (Degtyareva, 2015). The dependence of the volume of public funding on the standard of per capita financing is found in the works of some researchers: (Abankina, 2008), (Babko, 2012), (Vasilyeva, 2011), (Verkina, 2008), (Vilelemsky, 2009), (Evstafey, 2014), (Eroshin, 2002), (Klimanov and Babko, 2007), (Klyachko and Sinelnikov-Murylev, 2012), (Musarsky, 2009), (Nikitin, 2007), (Rozina and Zuev, 2017), and (Tarasova, 2007). Foreign models of financing higher educational institutions with a different emphasis of state control or an economically free market have been studied in the work of Spiryukhova (2003).
Foreign researchers who studied problems on financing higher education, including various methods of the normative approach to education costs, are Aaron (1975), Baum (1995), Benson (1987), Blaug (1987), Wiseman (1987), Woodhall (1987), Deaton (1978), Krueger (1968), Levin (1987), Lieberman (1989), McMahon (1987), Mirrlees (1968), Musgrave and Musgrave (1976), Pigou (1947), Friedman (1962), Foster (1987), Fromm and Taubman (1973), Hicks (1987) and Chambers (1978).

The authors have made a scientific hypothesis about the impact of the share of the basic costs’ standard, which is included in the final standard, on the final basic standard for public services on implementing the main programs of higher education.

2. Materials and Methods

When studying and writing this article, the authors read various opinions of researchers and experts, participated in discussions, and came to certain conclusions that have made up a basis of theoretical concepts and practical recommendations for deep and extended understanding of educational programs. These conclusions will be useful for practitioners specializing in the issues on regulatory funding for higher education.

During the study, the authors used general scientific methods of analysis and synthesis, comparison, statistical analysis, grouping, as well as the method of expert estimates, the economic and mathematical method, the balance method, etc.

The issues of regulatory financing of higher education were discussed at round tables, conferences, discussions, in classrooms, and at the Department of Higher Education under the Ministry of Education and Science. This situation contributed to deeper understanding of the standards of financing higher education and obtaining a competent opinion. Expert opinions were processed on a scientific basis by using questionnaires.

The study on regulatory funding of higher educational institutions required the use of laboratory facilities of the university, library stock, and modern computer technologies. It allowed obtaining accurate and reliable results of the study in the issues related to regulatory funding of higher education.

3. Results

At the first stage of the study, the data on the current cost standards for higher education programs were analyzed. The document of the Ministry of Education and Science of the Russian Federation related to the basic cost standards for providing state services on implementing state programs of higher education defines the costs by three groups of disciplines. In the document, the costs are given taking into account the correcting factors that show the right of the leading higher educational institution to independently develop, approve and use educational standards for all levels of higher education, as well as in educational organizations that are unique scientific and educational complexes, and other coefficients (Dokument Ministerstva obrazovaniya i nauki Rossiyiskoy Federatsii “Itogovyye znacheniya i velichina sostavlyayushchikh bazovyh normativov zatrat na okazaniye gosudarstvennyh uslug po realizatsii gosudarstvennyh programm vysshego obrazovaniya, 2017). The first group includes the costs for such sciences as mathematics, computer science, economics, law, and pedagogy. The second group includes the costs for physics, chemistry, biology, electronics, mechanical engineering, applied geology, and clinical medicine. The third group includes the costs for nuclear energy, aviation and rocket technology, physical culture and sports, music and visual arts. The higher the group is, as a rule, the higher the value of the basic standard for the same cost item is. The dynamics of the basic cost standards for state services for implementing the main programs of higher education are shown in Table 4.

Table 4. Dynamics of the Basic Cost Standards for Higher Education Programs

| Costs, thous. RUB | Group I | Share of the cost standard in the final standard for Group I, % | Group II | Share of the cost standard in the final standard for Group II, % | Group III | Share of the cost standard in the final standard for Group III, % |
|-------------------|---------|------------------------------------------------------------|---------|------------------------------------------------------------|---------|------------------------------------------------------------|
| 1. Expenditures for paying professors’ salary | 48.73   | 54.6                                                       | 48.73   | 47.6                                                       | 56.00   | 36.5                                                       |
| 2. Expenditures for purchasing material reserves and movable property | 0.2     | 0.2                                                       | 1.5     | 1.6                                                       | 15.0    | 9.7                                                       |
| 3. Expenditures for the real property reserves | 2.23    | 2.5                                                       | 3.34    | 3.4                                                       | 7.80    | 5.1                                                       |
| 4. Expenditures for course books | 0.63    | 0.7                                                       | 0.63    | 0.7                                                       | 0.63    | 0.4                                                       |
| 5. Expenditures for organizing practice | 2.98    | 3.3                                                       | 8.97    | 8.8                                                       | 18.46   | 12.0                                                      |
| 6. Expenditures for improving qualification | 0.34    | 0.4                                                       | 1.34    | 1.4                                                       | 10.34   | 6.7                                                       |
| 7. Expenditures for medical examinations | 0.74    | 0.8                                                       | 0.74    | 0.8                                                       | 0.74    | 0.5                                                       |
| 8. Expenditures for public | 2.43    | 2.7                                                       | 2.57    | 2.5                                                       | 2.57    | 1.7                                                       |
One hand, of course, the costs for economics and jurisprudence

Data from

...the final basic cost standard, [2x6]

...the share of the basic cost standard for a separate item in the final basic cost standard.

Table 4 shows that the basic standards mainly depend on the group of educational areas. The standards for inventories and movable property, for reserves of movable property, the organization of practice, and the remuneration of teachers considerably differ. On the one hand, of course, the costs for economics and jurisprudence cannot be compared with the costs for nuclear physics, but on the other hand, the costs for literature, utilities and real estate differ slightly or are almost equal, which is confirmed by the data from Table 4. Budget financing is carried out by using the final basic standard that includes various standard cost items. However, there is an interesting situation if the dynamics of the share of each basic standard in the final standard are considered.

In the first group, the largest part of the final standard is used for the basic standard for teachers’ salaries, and is 54.6 %, while the same standard for the third group is only 36.5%.

The costs, for example, for organizing the practice in the first group is almost 3%, and in the third group it is 12 %, i.e. the share of the first group of these costs is four times higher than the same share of the costs in the third group. At the same time, the standard of the costs for the practice in the third group is six times higher rather than four times. This situation is due to the fact that the final basic standard is formed from various basic standards that change at different growth rates, faster or slower than the final standard.

At the next stage, the need and possibility of changing the existing system of standards were identified. Similar issues have already been studied in the scientific literature. Thus, some researchers offered to introduce two cost standards: for educational activities and for the maintenance of property (Klyachko and Sinelnikov-Murylev, 2012). Now the final standard takes into account such standards for certain types of costs. Other researchers offered to calculate the standard based on analyzing the dynamics of statistical indicators of the volumes and structure of expenditures of educational institutions and calculating the unit costs per student or per square meter of buildings. The results of the analysis made it possible to define the average percentage of expenditures for several years, and then the average annual percentage of growth per item for the planned period, taking into account this growth (Varlamov and Avvakumova, 2015).

\[ H_i = P_i \cdot (1 + \frac{n_i \cdot t}{100})^t, \quad (1) \]

where \( H_i \) is the cost standard for a separate item,
\( P_i \) is the average cost of a separate item per student or per 1 sq. m. of the buildings area in the basic year,
\( n_i \) is the average percentage of growth for a separate item for the analyzed period, and
\( t \) is the year in the five-year plan the standard is calculated for.

However, the offered formula (1) makes it possible to define the standard only for a certain item. Thus, it initially includes elements of fragments and does not give a general picture. The authors offer to define the final basic cost standard as a weighted average, taking into account the share of each cost standard for a certain item in the final standard:

\[ \bar{H} = \sum_{i=1}^{n} (H_i \cdot n_i) \]

(2)

where \( \bar{H} \) is the final basic cost standard,
\( H_i \) is the basic cost standard for a separate item, and
\( n_i \) is the share of the basic cost standard for a separate item in the final basic cost standard.

At the third stage, the offered approach was tested. The final basic cost standard for public services related to implementing basic programs of higher education is defined as an example:

- The final basic standard of Group I is 30.94,
- The final basic standard of Group II is 28.36, and
- The final basic standard of Group III is 28.67.

Table 5 shows the dynamics of standards including and excluding the share.

| 9. Expenditures for immovable property | 12.59 | 11.3 | 12.59 | 8.2 |
| 10. Expenditures for paying to employees who do not participate in providing state services | 16.0 | 15.74 | 15.4 | 17.17 | 11.3 |
| 11. Other expenditures | 5.09 | 5.7 | 6.52 | 6.5 | 12.15 | 7.9 |
| Final basic cost standard | 89.28 | 100 | 102.67 | 100 | 153.45 | 100 |

*Complied by the authors according to the data of the Ministry of Education and Science of the Russian Federation (Dokument Ministerstva obrazovaniya i nauki Rossii, 2015).
The conducted study has made it possible to see the dynamics of admission quotas in the areas of training, the expenditures of the Ministry of Education and Science for higher education programs, the final basic standards for certain areas (groups) in the final basic standard. This contributed to developing conclusions related to the standards for the cost of higher education.

The conducted studies and calculations make it possible to conclude that

1. The dynamics of admission quotas by areas of training are inconsiderable and do not show the needs of the state in educated doctors and teachers,
2. The dynamics of expenditures of the Ministry of Education and Science are multidirectional, which points at a different budget policy pursued by the state in the period under study,
3. The dynamics of the volume of educational services provided on a paid basis at higher education institutions show a higher rate as compared to their budget financing, which indicates the refusal of the state to financially support the state task related to higher education, and
4. The dynamics of the basic cost standards for higher education programs show their growth by areas (groups) without taking into account the share of each basic standard in the final cost standard. However, the situation changes considerably if this share is taken into account; for example, for certain groups the dynamics are negative, or the final standards for different groups are almost the same.

Table 5 shows that the final basic cost standard, excluding the share of each basic standard for a certain item, changes inconsiderably. For example, such standard of the second group to the first one changes by 15%, and the third group to the second one – by 49.4%, i.e. it is almost twice higher.

However, these changes look differently if the share of each basic standard for a certain item is included in the final standard; for example, the standard of the second group to the first one not merely increases, but, on the contrary, it decreases by 8.24%, and is only 28.36. The final basic standards of the second and third groups, taking into account the share, are almost the same. The changes are only 1.1%, instead of 49.4%.

Thus, for financing of areas from various groups, for example, economics, clinical medicine and nuclear physics to really comply with the expenditures in these areas, it is reasonable to consider the share of each basic standard for a certain item in the final basic cost standard.

The results of the analysis make it possible to see the dynamics of admission quotas in the areas of training, the expenditures of the Ministry of Education and Science for financial support of basic federal powers, basic cost standards for higher education programs, the final basic standards for certain areas (groups) in the final basic standard. This contributed to developing conclusions related to the improvement of the formula for the final basic cost standard, including the share of the basic cost standards in certain areas.

The conducted studies and calculations make it possible to conclude that

1. It is necessary to use statistical data on the expenditures of the Ministry of Education and Science for higher education, and consider the volume of paid services and other data in the scientific article taking into account the reduction of all statistical data to one type of prices by recalculating them to a single database.
2. It is reasonable to emphasize that the article is not about state financing of higher education, but only about the standards of such financing and improving the formula for calculating the basic cost standard.
3. The article uses a list of costs by items; it was adopted by the former Ministry of Education and Science. In accordance with Decree of the Government of the Russian Federation No. 682 dated 15.05.2018, the Ministry of Education and Science was renamed into the Ministry of Science and Higher Education; it has not yet submitted documents related to the standards for the cost of higher education.
4. The results obtained by the authors do not contradict the main provisions of the theory of normative financing of higher educational institutions. The development of the formula for the final basic cost standard as a weighted average value made it possible to identify the main areas of further research, including the following:
   – To expand the list of expenditures associated with obtaining higher education by levels of education, and to develop a formula for the final basic costs’ standard, taking into account these various costs for obtaining each level of higher education,
   – To develop practical recommendations of regulatory financing for obtaining higher education in the areas needed by the state (doctors, teachers), as well as regional enterprises and institutions, business community, regional and local authorities, and
   – To develop a strategy for adequate financing of higher education areas on the basis of fair final basic cost standards.

5. Conclusion

The conducted study has made it possible to make a number of conclusions and offers based on the results:
1. The objective need in the further development of the theory of normative financing of higher educational institutions on expanding the costs items of higher educational institutions, levels of higher education and regional specifics has been revealed.

2. The current practice of allocating volumes of budget financing on the basis of admission quotas by areas of students training has been evaluated.

3. The expenditures of the Ministry of Education and Science for financial support to the main federal powers have been analyzed. The analysis showed multidirectional trends of changes by areas, which pointed at various priorities of the state in the budget policy pursued in financing higher education.

4. The authors of the article have offered a formula for calculating the final basic cost standard as a weighted average of the basic cost standards by areas (groups) of training students. This will contribute to a more accurate and adequate allocation of financial resources from the budget by areas (groups) of training students at higher education institutions.

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