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THE DETERMINANTS OF FACULTY PAY IN RUSSIAN UNIVERSITIES: INCENTIVE CONTRACTS

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THE DETERMINANTS OF FACULTY PAY IN RUSSIAN UNIVERSITIES: INCENTIVE CONTRACTS³

This paper evaluates the design of current contractual incentive mechanisms in Russian universities depending on the type of higher education institution after recent significant contractual reforms in the national academic sector. We employ the theoretical framework of incentive contracts in order to identify and assess performance measures of university faculty determining the total income received from teaching, research and administrative duties. We estimate returns from academic productivity in Russia to be reflected in the academic salary by an evaluation of empirical models of the determinants of faculty pay depending on their productivity, current academic and administrative position, gender and seniority. We show that for the entire sample, faculty salary is positively associated with publication activity. Teaching is significant only for the entire sample, but not significant for subsamples. Administrative duties (expressed in the position held) are positively related to faculty pay: the largest effect is for rectors and vice-rectors, but for deans and heads of departments or laboratories the effect is also strong. Heads of universities and structural units receive a significant bonus for their administrative position. For research-oriented universities the largest effect in publication activity is for the number of papers in high ranking journals. In universities with no research status we discovered a significant gender gap: the male faculty earn more than their female colleagues. There is a positive linear relationship between salary and seniority for the entire sample and in universities with no special status, which corresponds to human capital theory. Salaries in universities requiring higher entrance exam scores are higher than in less selective higher education institutions. The salary in Moscow universities is higher than in the regional higher education institutions.

JEL Classification: I21, I23, J31

Keywords: academic contracts, faculty pay, merit pay, incentive contract, international rankings, competitiveness of higher education.

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Introduction

In recent years, the academic profession has faced a number of global challenges including the transition to a knowledge economy and globalization (Altbach, Knight 2007; Kogan, Teichler, eds. 2007). Education has become a powerful tool allowing countries to compete in the international arena (Marginson 2010). One of the important elements of the educational system are university faculty, whose academic productivity is the key driver for development of educational systems in general (Arimoto 2009; Brown et al. 2008). State policy related to the promotion of the national educational system on the world stage should create incentives for university faculty in order to increase the attractiveness of the academic profession and to increase academic productivity.

The Russian system of higher education is experiencing the same trends and is involved in institutional transformation related to the global challenges in academia. There are two main directions of reforms which can be considered responses to such challenges. These changes are associated with global trends aimed at modernizing the existing educational system and creating specific conditions that would make it possible to enhance the competitiveness of the Russian system of education and science both at a national level and internationally.

The first direction is the increased role of research at universities. It is clear that without research it would be difficult for domestic higher education institutions (HEIs) to compete in the international academic market. A significant example of this is the diversification of HEIs and the creation of universities with special status; in 2008 National Research Universities (NRUs) were established. The idea of NRUs is to improve the quality of research and teaching. Universities receiving such a status also received additional funding from the state on a competitive basis. In addition, since 2012, the Russian academic excellence program '5-100' has been implemented. According to this program, by 2020 at least 5 Russian universities should be included in the Top 100 world university rankings. The participating universities also receive additional funding from the state (Prakhov 2018).

The second direction is the implementation of a new public management system for higher education, including the introduction of competitive projects, the monitoring of the efficiency of HEIs and university funding reforms. Over the past few years, Russian universities have been transforming contractual relations between faculty and universities, caused by the need for an improvement in the quality of research and teaching. Many universities adopted a model of incentive contract (merit pay) and introduced various remuneration schemes which reflect academic productivity.

The successful increase of research at universities is impossible without increasing individual academic productivity, which is a combination of research and teaching productivity (Arimoto 2009). Academic productivity, in turn, depends on properly-designed academic contracts, which should positively influence faculty motivation. The emergence of universities with a special status led to the differentiation of Russian universities, although universities not participating in government programs have also introduced incentive schemes. Therefore, it is important to study the structure of the academic remuneration at universities with different statuses in order to understand if the current remuneration schemes are properly designed and reflect individual academic efforts.

One of the aims of the reforms is to improve the competitiveness of the higher education sector especially at leading universities. In order to achieve this goal, it is necessary to develop faculty contracts in a way which would create a system of proper incentives for university employees as they represent one of the main sources for the enhancement of university performance both nationally and internationally. One of the main elements of such a contract is the relationship between faculty remuneration and a set of observed indicators which reflect the various activities of the faculty: teaching, research and administrative duties. The specific efforts of university staff (their investments in human capital) depend on the most assessed types of activity. Therefore, it is important to measure the monetary returns from various types of faculty duties in order to estimate the efficiency of the incentive schemes. That is why the main objective of this study is to identify and assess the performance measures of the university faculty which determine the total income received from teaching, research and administrative duties in the context of existing remuneration mechanisms.

Every task university faculty do is significant and should be rewarded because HEIs benefit from each type of academic productivity (Moore et al. 1998). However, the academic labour market is characterized by a high degree of information asymmetry between the faculty and university, and a certain part of faculty work is unobservable for administrators and therefore it is difficult to assess and formalize such activities in a written contract (Katz 1973). Since the university faculty, as a rule, combine several types of activities, their jobs are characterized by multitasking, which can often create disincentive effects. Monetary incentives are important for the faculty but non-monetary mechanisms (related to obtaining satisfaction from work, recognition of colleagues, etc.) are also important. Thus, an adequate definition of the activities of the faculty and their contribution to their monetary compensation is a crucial problem within the framework of the transition to incentive schemes in Russian universities and in the global context.

Empirical studies show that research activity is a significant determinant of faculty remuneration. This study is new and of particular relevance for Russia, as the domestic system of higher education has a number of features that can affect faculty incentives. The purpose of this study is to assess the contribution of various types of academic activity to faculty salary. In addition, the estimates of the determinants of faculty salary for Russian universities with a special status (universities participation in the program ‘5-100’, and NRUs) are obtained and the differences between HEIs with a special status and those without one are analysed. In other words, we try to answer the question: does the academic salary in Russia reflect academic productivity in the era of global challenges?

As mentioned, similar changes are also taking place in other countries, but in Russia the position of faculty has worsened over past decades (Prakhov 2018), therefore the problem of institutional transformation in higher education in Russia is more serious. With the collapse of the Soviet Union, there was a sharp drop in faculty salaries and a decline in the prestige of an academic career (Smolentseva 2003; Yudkevich 2014). The difficult economic situation forced the faculty to leave universities, move abroad (‘brain drain’), or combine work in several universities (‘academic moonlighting’) in order to ensure sufficient income (Androushchak, Yudkevich 2012; Korobkov, Zaionchkovskaia 2012). Undoubtedly, this did not improve the quality of teachers and their academic performance. This unfavourable situation was typical for other post-socialist Central and Eastern European countries (Dobbins, Knill 1999; Kwiek 2001a, 2001b; Scott 2002, 2007).

This paper is organized as follows. Section 1 describes the main theoretical approaches to the analysis of academic salaries: the human capital theory, the structural approach and the concept of incentive contract. Since the incentive contract is used as the main theoretical framework, its structure and implications are presented in more detail. Section 2 describes the institutional features of the Russian academic market, namely, the characteristics of the higher education sector and the academic profession before reforms, the main transformations aimed at achieving global goals, as well as the consequences of these reforms. Section 3 presents the data and methodology of this study. To answer the research questions, data of the Monitoring of education markets and organizations⁴ (MEMO: an annual survey of the university faculty) is employed. Section 4 presents the results of regression analysis. Empirical models reflecting the contribution of the various types of activity to the salaries of university staff are evaluated. The last section concludes by discussing the results and their implications. Directions for further research are also indicated.

⁴ See <https://memo.hse.ru/en/> for more information.

1. Analytical framework of the study

1.1. The general framework of the study: the incentive contract as a response to global challenges

As stated above, recent reforms in the Russian higher education sector were caused by the transition to a knowledge economy and globalization. Thus, higher education has become an important actor in the new circumstances and an improvement in the performance of HEIs will contribute to the successful competition in the global arena. Russian reforms were concerned both with an emphasis on research in domestic universities through HEIs with special status and the introduction of the mechanisms of new public management, including new approaches to the regulation of contractual relations between universities and faculty. These changes include new remuneration schemes, namely, incentive contracts. An incentive contract represents an agreement between the two parties (in our case, between a faculty member and a university), where the salary is dependent on a set of observable indicators which are related to individual academic productivity. Hence, a properly designed scheme creates the right incentives to boost academic productivity because this academic output will be rewarded.

The logic of this element of faculty pay in responding to the global challenges is as follows (see Fig. 1). According to the definition of an incentive contract, a well-designed scheme creates individual incentives which results in the increased academic productivity. For the Russian case and in light of global trends, one of the most important types of academic productivity is research. Hence, higher monetary remuneration for research activities may result in increased output at the micro-level (individual research productivity). This will contribute to the overall improvement in the research function of domestic HEIs, which is consistent with the current global academic challenges. In order to test to what extent the design of incentive contracts in Russia corresponds to global educational trends, an empirical evaluation of the overall contract structure and the contribution of individual research productivity to faculty pay is needed. It is difficult to separate the effect of introducing an incentive contract from the dynamics of the research output, however, we place incentive contracts in the wider context of reforms and try to answer the question of whether this contract, being a crucial part of the recent reforms in Russian higher education, has the appropriate motivational features.

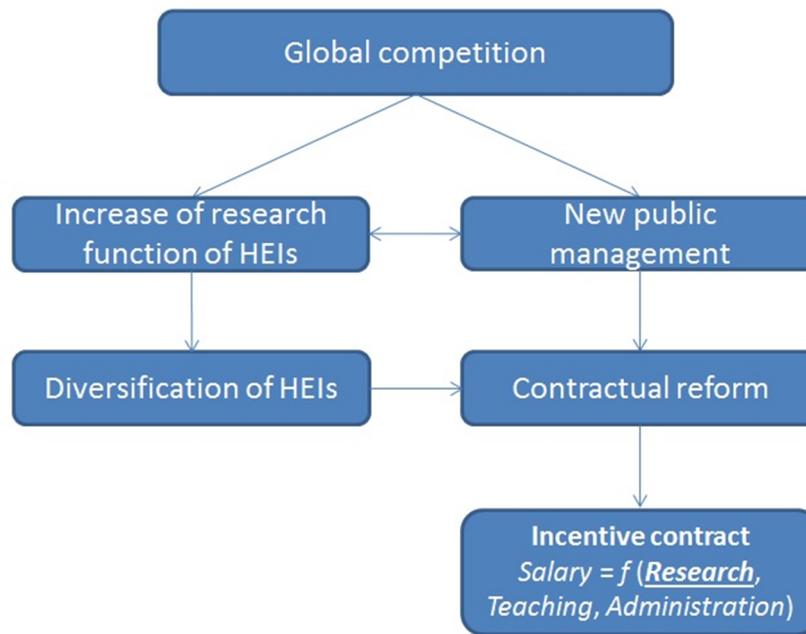


Fig. 1. Analytical framework of the study

This is why we use the institutional concept of an incentive contract as the main framework. From the theoretical point of view, the incentive contract is a widespread mechanism for combating the opportunistic behaviour of an employee (Baker 1992; Weitzman 1980). Merit pay allows for an increase in the employee’s incentives by linking the salary to observed indicators of activity which are amenable to external evaluation and of importance for university administration. As the efforts of university staff should depend on the most valued inputs, it is crucial to evaluate the inputs of different types of activities to the academic salary.

The problem of the monetary evaluation of faculty activity is of particular relevance to the academic labour market due to the extremely high degree of information asymmetry between the university administrators (principals) and faculty (agents). Agency theory offers a number of mechanisms to deal with the opportunistic behaviour of agents. Due to information asymmetry, principals can implement incentive contracts, which are also known in academia as performance pay, because such contracts establish the wage dependence on agent’s observable activities (teaching, research and administration). However, the specifics of the academic profession impose a number of restrictions on the use of this approach. First, multitasking affects faculty incentives. Second, because of non-monetary incentives in the academic profession, as an agent gets satisfaction from the respect of colleagues and enhanced reputation, he or she gets utility from academic work and ‘academic freedom’.

However, as non-monetary incentives require a separate investigation, in this study we concentrate on salaries as the main source of income and well-being.

In this study, the concept of merit pay will be applied to the Russian academic labour market, taking into account its characteristics and recent reforms in contractual relations in HEIs. This is relevant in the light of recent contractual reforms in the Russian academic sector; these transformations were intended to increase the motivation among faculty, in particular, to stimulate research activity. In many Russian universities, incentive contracts have been introduced. According to these schemes faculty salary, at least partially, should depend on their publication activity. In the empirical part of the work, we study the effects of various types of academic activity on the academic salary. The empirical instruments developed within the framework of human capital theory, such as the Mincer wage equation (Mincer 1974), are also used for the empirical part of our study as it can explain a high percentage of the variation in faculty salaries.

1.2. Incentive contracts: their importance and implications

Among contract and salary studies, several research areas can be identified. In theoretical works, salary and incentive mechanisms are modelled in terms of agency theory (Laffont, Tirole 1988; Harris, Raviv 1978, 1979; Demski, Sappington 1984; Baker 1992; Holmstrom, Milgrom 1991). In such studies, various designs of the contracts are proposed. The use of contracts can reduce the risks of opportunistic behaviour of employees. Note that most of the studies related to the application of incentive contracts were conducted in the non-academic labour market. Separately, the researchers emphasized the features of the public sector (which include a higher education market), imposing a number of restrictions on the use of merit pay schemes (Dixit 2002; Burgess, Ratto 2003; Frant 1996). However, motivational programs are also being implemented in the public sector, particularly in education (Adcroft, Willis 2005; Cutler, Waine 1999; Atkinson et al. 2009; Kane et al. 2006; Sanders, Horn 1994; Jacob, Lefgren 2005). The drawbacks of incentive mechanisms can be significant both for faculty and university administration. That is why, in recent decades, the incentive contract has become an important element in contractual relations in the academic market.

Academic contracts are a separate research area because universities are inherently different from private firms and even though universities have a number of features of a non-profit organization, universities (in terms of staff motivation policy) are characterized by difficult and costly monitoring (Podgursky, Springer 2007), collective work (which can

change the incentives of the faculty), and multitasking (which can motivate the employee to focus only on the indicators being measured in the contract).

Research activities and publication have become the main indicator of faculty productivity and the basis of incentive contracts as they are easy to measure, while the measurement of faculty performance in other activities is costly. Publications and research activities are much more visible than teaching, the quality of which is hard to evaluate. As a result, faculty reward systems generally emphasize research performance over other activities (Perna 2003; Bowen, Shuster 1986; Fairweather 1993). This provides powerful incentives for the faculty to focus their main efforts on publication activities, while teaching is less visible, but still significant for university administration. This creates a trade-off between research and teaching activities for the faculty and an overvaluation of research activities in faculty incentive contracts which may lead to a decrease in quality of teaching (Fairweather 2005).

Incentive contracts which are designed to stimulate research activities are mainly based on remuneration for publication. However, incentive contracts which take into consideration simply the quantity of publications may fail to assess the quality of publications which may result in opportunistic behaviour of the faculty. This provides incentives to publish many low-quality papers, while research projects of high quality, implying long-term work, are under threat. That is why contracts should be designed properly and should provide agents with sufficient fixed remuneration and a variable part which depends on performance results (Bloom, Milkovich 1998).

A wide variety of studies also claim that equity in faculty remuneration is positively related to faculty satisfaction (Bowen, Shuster, 1986) while high inequality in faculty salaries and incentive contracts may damage job satisfaction (Hamermesh 1998; Pfeffer, Langton 1993). Non-monetary factors are also of importance for the faculty and incentive contracts based on short-term results may damage academic freedom and autonomy, which is highly valued by scholars (Bowen, Shuster, 1986).

The design of academic contracts in universities is described in research papers which take into account the features of the academic labour market (McPherson, Shapiro 1999; Bess 1998; Brown 1997, Panova, Yudkevich 2011). With regard to the monetary motivation of faculty, researchers conclude that the greatest contribution to salaries comes from research, in particular, the number of publications (Katz 1973; Siegfried, White 1973; Tuckman, Hagemann 1976; Gomez-Mejia, Balkin 1992). Administrative duties also have a positive effect on salary, but in most studies the effect is not statistically significant. Researchers disagree on the significance of teaching activities but in most papers teaching does not have a statistically significant impact on faculty remuneration. Similar conclusions were obtained in

the analysis of Western educational systems, where the faculty combines several different activities and teaching is not a priority. The Russian education system has its own specifics, when faculty are mainly engaged in teaching activities to the detriment of research. Therefore, the study of this issue on Russian data may lead to the opposite result, which makes studying contractual relations in Russian universities a high priority.

2. Institutional features of the Russian higher education sector

Since the consideration of the incentive contract in isolation from the prerequisites for its introduction would be incomplete, this section describes the pre-reform state of the academic profession and specific reforms aimed at increasing academic productivity in more detail.

2.1. Russian higher education before the reforms

Russia is not the only country which is currently conducting reforms in the academic sector. However, the academic profession in Russia, like in many former socialist countries for 20 years after the collapse of the USSR, was in crisis. Hence, the need for reforms was caused by the state of the Russian academic sector after the collapse of the Soviet Union. Economic conditions which existed in the post-socialist period in the last decade of the 20th century had an extremely unfavourable impact on the academic profession. The main changes affecting the Russian academic market were as follows.

First, the changes affected academic salaries and the academic profession. The economic crisis of the early 1990s led to extremely high inflation and resulted in a sharp decline in remuneration in the public sector. This fall in salaries also affected universities. In the Soviet era, the academic profession was one of the most prestigious. After the failure of communism, the situation changed drastically, forcing university employees either to leave universities and seek a new job⁵, or look for part time work in newly-established private universities⁶, or move abroad (Androushchak, Yudkevich 2012)⁷.

⁵ In the 90's, it was not unusual for former professors to trade in a clothing market in order to somehow make some money for themselves and their families.

⁶ This phenomenon is often called 'academic moonlighting' and is typical not only for post-Soviet Russia, but also for other post-socialist countries in Central and Eastern Europe (Kwiek, Szadkowski 2018).

⁷ Unfortunately, at the moment there is no accurate estimate of the extent of the brain drain. Naumova (1996) reports that in 1990 there were 103.9 thousand emigrants from Russia, in 1992 – 102.9 thousand people, in 1994 – 108 thousand emigrants. Ivakhnyuk (2006) reports a figure of 30,000 people having academic degrees who found a job abroad. In other sources, a figure of up to 100,000 scientists is called (*Source:*

As a result, among those who stayed in national universities were those who could not leave for personal reasons and those who could not find a job in the private sector. Such a situation contributed to the emergence of adverse selection (Prakhov 2018), where the most talented professors left universities in Russia, because they were in demand either in universities abroad or in the private sector (consulting), and Russian state universities were forced to employ less productive faculty (Korobkov and Zaionchkovskaia, 2012; Smolentseva, 2003).

Second, the changes in the 1990s also affected the structure of higher education. The 1990s were characterized by the rapid massification of higher education. This process was facilitated by the emergence of private HEIs: usually educational institutions of low quality, offering a simple and not very expensive way of obtaining a higher education degree. However, the transition to a market economy required new fields of study, especially in soft academic areas (Kwiek 2012). The universities also responded to the increased demand for law and economics with the introduction of new programs. The problem was that a sharp increase in the number of students could not be accompanied by a corresponding increase in the number of teachers.

As a result, the two trends of the 1990s – the decline in academic salaries and the massification of higher education with the emergence of new universities – led to university faculty spending almost all their time teaching, trying to earn money. This situation did not contribute to an increase in research productivity. In the 2000s there was no significant change in trends of the 1990s.

The existing salary structure did not contribute to the emergence of additional incentives for research. According to Androushchak & Yudkevich (2012), academic salary consisted of a basic sum, which was almost equal across the faculty holding the same academic rank, and wage surcharges, which were determined by each HEI individually. On average, the ratio of the base part and the wage surcharge was 30–70%. Faculty could be awarded for extra teaching, research, and administrative duties. However, the base part did not exceed 25% of the average salary in the country, so even with wage surcharges, academic remuneration remained extremely low.

The empirical study of wages before the start of current reforms in the Russian academic sector showed that the salaries of professors were largely determined by their

<http://www.spiegel.de/wissenschaft/mensch/marode-forschung-in-russland-exodus-des-wissens-a-721745.html>).

The emigration rate was consistently high for two decades after the collapse of the Soviet Union. It should be noted that this problem is typical for the Russian higher education sector to this day.

administrative position (a high bonus for administrative duties) and seniority, while the contribution of the research component was small (Prakhov 2018). Thus, significant reforms were required both in the field of academic contracts and in Russian higher education as a whole.

2.2. Recent reforms in the Russian academic sector

In order to keep up with the globalization of education and the transition to a knowledge economy, in recent years a number of reforms have taken place in the Russian higher education system. They affected both the structure (with the emergence of research-oriented universities with a special status) and incentives for faculty (with the introduction of incentive contracts).

First, for several years Russia has been implementing the ‘5-100’ project (Presidential Decree No. 599 of 07/05/2012), which aims to include at least five Russian universities in the Top-100 in world university rankings. For this purpose, several HEIs have received increased financial support from the state to become more visible in the world academic arena. In this regard, it is important to assess how incentive contracts are designed and how the incentive mechanisms differ depending on whether the institution participates in this program or not. In addition, the presidential decree provides for ‘an increase in the average salary of doctors, teachers at HEIs and researchers to 200% of the average wage in the relevant region [of Russia] by 2018’, so studying the determinants of wages, which allow for an increase in the monetary remuneration of scientific and pedagogical staff of Russian universities, is of special importance both for the administration of universities and for the state.

Second, one of the elements of the reform mentioned above is the institutional transformation of contractual relations. Although, in many cases it is a question of stimulating research (and, correspondingly, making publication productivity of a greater importance), the faculty are still actively involved in teaching. This phenomenon is a legacy of the Soviet education system, when the universities were mainly focused on teaching, while the scientific work was carried out in the research centres and institutes of the Academy of Sciences. An attempt to stimulate research activity in HEIs under existing teaching practices (i.e. with a large number of teaching hours) can be demotivating, which can lead to dishonest practices, the prevalence of paid publications in ‘junk’ journals in order to get incentive pay or a bonus. Such a result not only neglects the advancement of Russian science in the international arena, but it also causes significant reputational losses.

Third, universities with a special status and a special mission began to appear in Russia in 2006, when the first Federal University (FU) was founded. FUs were to become major

regional centres of higher education and were formed through the merging of smaller regional universities. However, FUs were not research-oriented: at least this goal was not stated explicitly, unlike NRUs, the first of which appeared in 2008 (Prakhov 2018). One of the main goals of the introduction of NRUs to integrate effective teaching practices with scientific research conducted within the university. Thus, programs aimed at stimulating scientific activity in HEIs have existed for at least 10 years. Therefore, based on an analysis of the publication activity of the faculty employed in universities with a special status (NRUs and universities participating in '5-100' program) and by comparing their publication productivity with that of other universities, it is possible to make an empirical assessment of the structure of academic contracts.

Fourth, the study of the structure of faculty salary and the design of merit pay systems in the academic world (taking into account the characteristics of academia) is of interest from the point of view of the institutional features of the academic labour market and its differences from non-academic markets, for example: (1) a high degree of information asymmetry between the employer and the employee, (2) the specifics of the university as an organization that does not maximize profits and the use of peer-effects technology, (3) the specifics of the academic profession and the activity of the faculty associated with a high degree of uncertainty, (4) the existence of non-financial incentives to work.

Finally, the question of proper incentives in the education and science sector is closely connected with the economic development of Russia. Russia has a catching-up type of economic and social development (Polterovich 2007). In this regard, it is competing with developing countries such as China, Turkey, and Brazil. Having moderate labour productivity and high labour costs in the commercial sector, scientific development will give Russia an advantage in its development. In other words, universities can be a driver of economic development, which is consistent with the institutional hypothesis (Glaeser et al. 2004): institutions (including higher education) through the accumulation of human capital contribute to economic growth. Therefore, the modernization of the education and science sector will have a positive impact on the economic development of the whole country. Since an important university resource is the faculty, the issue of creating the right incentives to increase productivity (especially, research productivity) acquires particular urgency. Besides financial incentives, intangible aspects of academic activity are also important, but faculty salary is a central element in rewarding the activities of scientific and pedagogical staff, as noted in a number of polls of the university faculty. Consequently, the study of incentive contracts in Russian higher education and the assessment of the determinants of the faculty salaries are an important scientific and applied problem.

2.3. The general consequences of contract transformation

There are at least two consequences of recent reform. The first one is the increase in the nominal academic salary. Figure 2 represents data on average academic salaries in Russia and the survey data on remuneration from teaching and administrative duties and research (data from MEMO). Academic salary demonstrates stable growth in nominal terms. The increase in the average salary 2012–15 was 45%, however in real terms the change in academic salary was not that significant due to high inflation rates. MEMO data demonstrate similar trends.

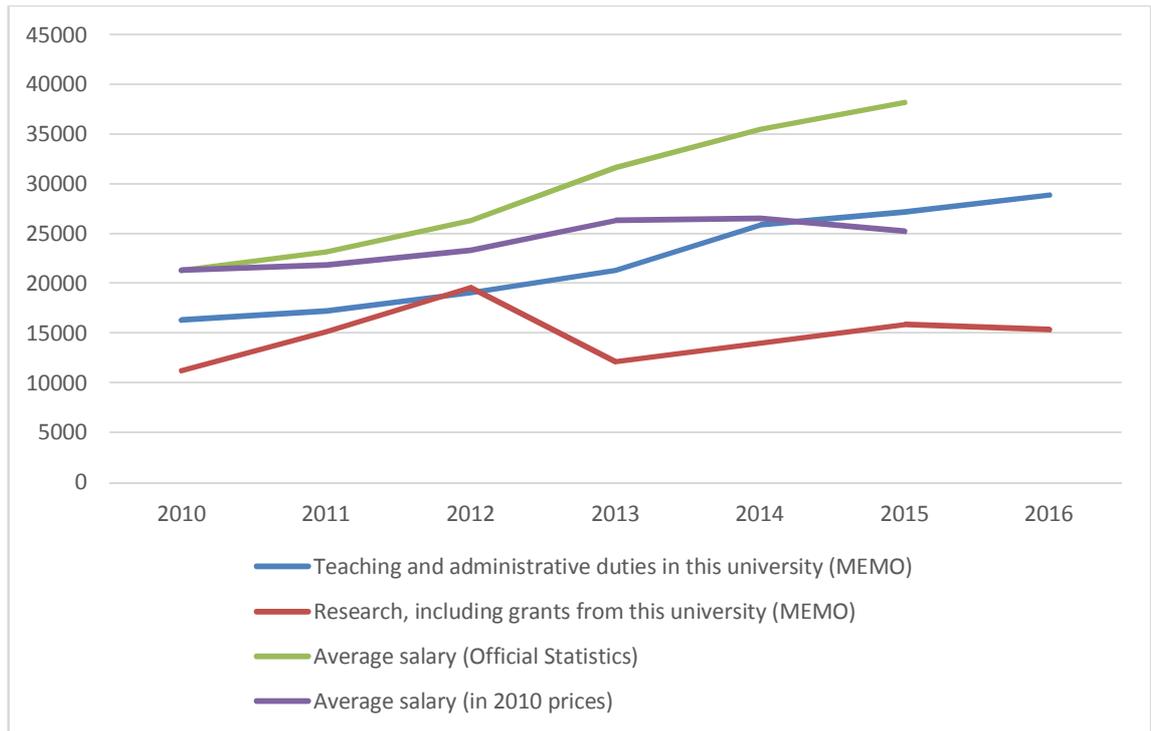


Fig. 2. The dynamics of academic salary (in Russian Rubles) in 2010-2016

Sources: Rosstat, MEMO.

The second consequence of the reform has been the change in research productivity after 2012. Figure 3 shows stable growth in the number of publications indexed in Scopus and Web of Science (WoS): the number of indexed documents almost doubled for this period. According to Scopus country rankings, in 2012 Russia was ranked 15th and 12th by 2017.

In the post-reform period there was an increase in nominal academic salary and a stable increase in research productivity. The question then arises as to how research productivity is reflected in academic contracts. In the following sections, we estimate academic salaries and their structure in the post-reform period. Particular attention is paid to the differences in contract design, depending on the type of university, namely whether or not it is research-oriented.

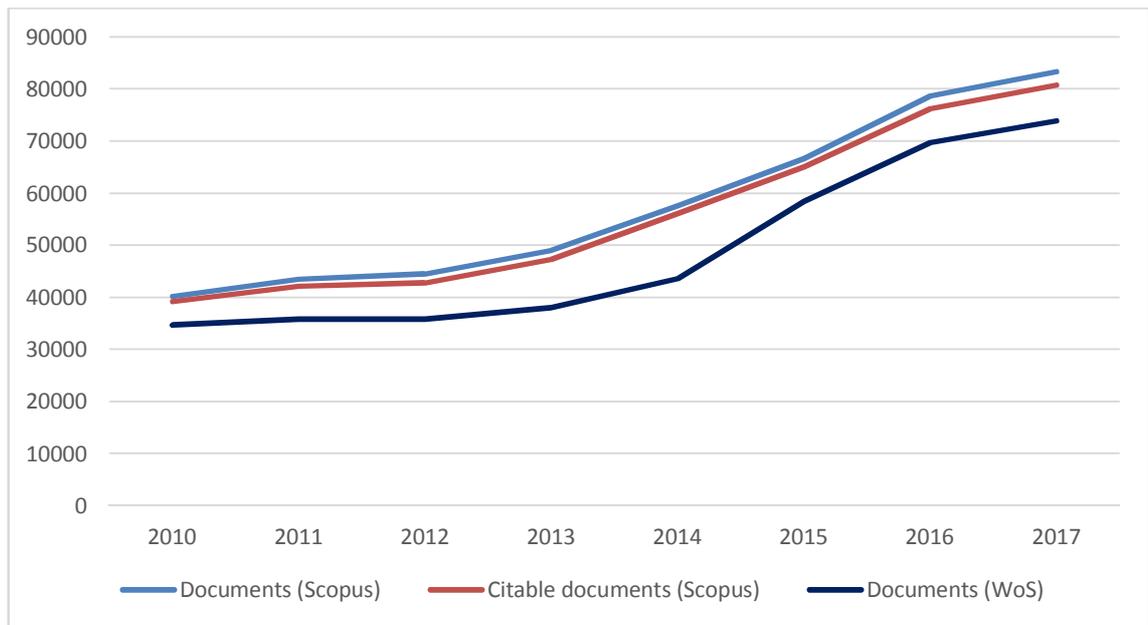


Fig. 3. Number of documents and citable documents from Russia indexed in Scopus and Web of Science databases in 2010-2017

Sources: <https://www.scimagojr.com/countryrank.php>; <http://apps.webofknowledge.com>

3. Data and methodology

To evaluate contracts in the Russian higher education system, empirical data from MEMO 2017 are employed. Survey data from university faculty are used to estimate the determinants of academic salaries. Private universities and HEIs specializing in medicine, agriculture, military disciplines, sport, culture, arts and architecture were excluded from the sample. The reason for the exclusion of private universities is that those higher education institutions are mostly involved in teaching: they do not conduct any research and benefit from students' tuition fees; there is no place for incentive contracts there. The second group of universities were excluded because they do not belong to the Ministry of Education and Science, which is responsible for contract reforms in higher education. For example, medical universities are subordinated to the Ministry of Health, so contractual agreements there might be different from the academic contracts in general.

Descriptive statistics are presented in Table 1. The mean monthly academic salary in Russia is 39,800 RUR (approximately 594 USD). Russian regions are very heterogeneous in salary; faculty wages were corrected to the Moscow level of wages. The mean corrected academic salary is higher than the original one at 66,286 RUR (989 USD).

Table 1. Descriptive statistics

Variables	N	Min	Max	Mean	Std. Dev.
Dependent variables					
Salary (Russian Rubles per month)	677	2,000	500,000	39,800	30,984
Salary corrected to Moscow average level of wages	677	6,210	593,000	66,286	42,807
Independent variables					
<i>Research productivity:</i>					
Publication in Russian scientific journals in 2016 (=1 if yes)	988	0	1	0.58	0.49
Publication in international scientific journals in 2016 (=1 if yes)	988	0	1	0.15	0.36
Publication in journals indexed in Scopus/WoS over the last 3 years (=1 if yes)	988	0	1	0.20	0.40
Number of articles in Russian scientific journals in 2016	955	0	32	1.67	2.78
Number of articles in international scientific journals in 2016	976	0	17	0.25	0.92
Number of publications in journals indexed in Scopus/WoS over the last 3 years	965	0	25	0.58	1.82
<i>Teaching productivity:</i>					
Teaching (=1 if yes)	988	0	1	0.97	0.16
Teaching load (hours per week)	792	0	48	15.96	9.71
<i>Administrative duties:</i>					
Rector, Vice-Rector (=1 if yes)	988	0	1	0.01	0.07
Dean, Vice-Dean (=1 if yes)	988	0	1	0.09	0.29
Head of the Department, laboratory, other unit (=1 if yes)	988	0	1	0.15	0.36
<i>Control variables:</i>					
Male (=1 if yes)	988	0	1	0.38	0.49
Experience (years)	981	0	60	23.62	13.10
Experience in teaching (years)	980	0	55	18.68	11.54
Seniority (years)	974	1	56	16.14	11.40
University status (=1 if '5-100' or NRU)	988	0	1	0.17	0.37

Independent variables are presented by the observable indicators of research and teaching productivity and administrative duties. Research output is measured by publication in Russian scientific journals (around 58% of faculty have such publications), in international scientific journals (15% of faculty), and in journals indexed in such bases as Scopus and/or WoS. Only 20% of the faculty have at least one publication in indexed journals over the last 3 years. Another set of indicators for research productivity is the number of publications in corresponding journals. The mean values per faculty member are very modest: 1.67 publications in Russian scientific journals in 2016, 0.25 publications in international scientific journals in 2016, and 0.58 publications in journals indexed in Scopus/WoS over the last 3 years. Teaching productivity is presented by the fact of teaching (97% of the faculty are

involved in teaching), and teaching load (on average, faculty spend around 16 hours per week teaching). Administrative duties are expressed through dummy-variables indicating administrative position in the university: rector or vice-rector (1%), dean or vice-dean (9%), head of department, laboratory or other university unit (15%).

Control variables include gender, experience, and university status. The faculty is 38% male and 62% female. Experience and seniority are presented by the following measures: total working experience (on average, 24 years), overall teaching experience (19 years), and seniority (working in current higher education institutions, 16 years). 17% of the faculty work in universities with special status.

Table 2 shows the differences between the faculty employed in the universities with different statuses. The faculty employed in the universities with special status earn more than their colleagues from universities with no status. The average monthly salary in special status universities is 51,771 RUR (773 USD), while professors in universities with no status earn on average 37,361 RUR (558 USD) per month. A significant salary gap persists even after adjustment of salaries to the Moscow level of wages; universities with special status offer more favourable conditions in terms of remuneration. Hence, we might expect higher academic productivity, above all higher research productivity, in such HEIs.

The faculty from special status universities demonstrate a higher research output compared to the faculty from universities with no status. Around 65% of the faculty from special status universities had at least one publication in a Russian scientific journal in 2016, while the share of the faculty from universities with no status who had publications in Russian journals is 57%. The average number of such publications per faculty is 2.13 in special status universities and just 1.58 in other HEIs. The difference in publication activity in international scientific journals is smaller and faculty from special status universities are slightly more productive: 16% of them had at least one publication in such a journal in 2016 with an average of 0.27 publications per faculty, while for faculty from HEIs with no status, these figures were 15% and 0.24 respectively. However, these publications vary in quality. A more precise indicator of research productivity is publications in journals indexed in Scopus or WoS databases. 26% of faculty from special status universities have at least one publication in journals indexed in Scopus/WoS 2014–2016, while among faculty from universities with no status this share drops to 19%. The average number of such publications is 0.92 per faculty for special status universities, and only 0.50 in universities with no status.

Table 2. Comparison of means by the university status

Variable	University status		
	'5-100' or NRU	No status	Sample
Salary (Russian Rubles per month)	51,771	37,361	39,809
Salary corrected to Moscow average level of wages	71,799	65,158	66,286
Publication in Russian scientific journals in 2016 (=1 if yes)	65%	57%	58%
Publication in international scientific journals in 2016 (=1 if yes)	16%	15%	15%
Publication in journals indexed in Scopus/WoS over the last 3 years	26%	19%	20%
Number of articles in Russian scientific journals in 2016	2.13	1.58	1.67
Number of articles in international scientific journals in 2016	0.27	0.24	0.25
Number of publications in journals indexed in Scopus/WoS over the last 3 years	0.92	0.50	0.58
Teaching (=1 if yes)	97%	97%	97%
Teaching load (hours per week)	13.46	16.46	15.96
Rector, Vice-Rector (=1 if yes)	0.0000	0.0061	0.0051
Dean, Vice-Dean (=1 if yes)	0.10	0.09	0.09
Head of the Department, laboratory, other unit (=1 if yes)	0.17	0.15	0.15
Male	41%	38%	38%
Experience (years)	21.78	23.99	23.62
Experience in teaching (years)	17.19	18.99	18.68
Seniority (years)	16.77	16.01	16.14

Almost all the faculty are involved in teaching (97% of respondents), and there is no significant statistical difference between those who work in special status universities or not. However, the teaching load is smaller special status universities: 13.46 hours per week, while in universities with no status this indicator is 16.46 hours per week. The distribution of research and teaching performance reflects the fact that faculties in special status universities are more involved in research, and their research productivity is higher, while faculty from universities with no status are more engaged in teaching. This means that the design of academic contracts in these two groups of HEIs is different, which is shown in the next section.

The empirical methodology is based on the Mincer equation, an approach that allows for the estimation of wages (in natural logarithms) as the function of a set of variables that characterizes the employee. The standard approach is to assess the wage regression on the indicators of experience/seniority, the age of the employee, and his achievements. In our study we regress dependent variables (natural logarithms of monthly salary) on the observed indicators of research and teaching productivity, administrative duties, with controls for gender, seniority, and university status.

4. Results

The results of the regression analysis are presented in Table 3. As the dependent variable is the natural logarithm of salary, the regression coefficients may be interpreted as a percentage change in the dependent variable when the independent variable changes by one.⁸ For example, a coefficient 0.187 for the variable ‘publications in Russian scientific journals’ in Model 1 means that faculty who have such publications earn 18.7% more than those who do not have such publications.

Models 1 and 2 represent the results of the regression analysis for the entire sample. The difference is in the dependent variable: in Model 2 the natural logarithm of the corrected (to the Moscow level) salary is used. Publications in Russian scientific journals add up to 19% to the salary, while the effects of the publications in Scopus/WoS indexed journals are smaller: in Model 1 each publication in such a journal may add around 2% to the faculty salary, and in Model 2 the faculty members who have such publications earn 11.5% more than those who do not. Hence, in general for the indicators of research productivity the largest effect is for publications in Russian scientific journals. The analysis of the structure of academic contracts for the entire sample shows a small contribution of publications in peer-reviewed journals to salary. This result is a weakness of the existing system, since indexed publications are one of the main factors of research productivity in the international arena.

Teaching load is statistically significant only in Model 2⁹. In other specifications (including subsamples of faculty working in universities with or without special status) this variable is not significant and is excluded from the analysis. The insignificance of teaching can be explained in two ways. First, most of the faculty surveyed are involved in teaching so the variation in teacher productivity across the sample is quite low. Second, the teaching load may already be included in the contract, i.e. teaching is included in the basic rather than incentive component.

Having an administrative position can bring huge monetary benefits. Rectors and vice-rectors on average earn up to 53% more than those who do not hold this rank. Deans and vice-deans have a 23%-bonus, while a head of the department, laboratory, or other unit may earn

⁸ Indeed, if our basic econometric model can be expressed as $\ln Y_i = \alpha + \beta X_i + \varepsilon_i$, then $\frac{dY}{Y} = \beta dX$. Hence, having $dX = 1$, we get $\beta = \frac{\Delta Y}{Y}$. In other words, a coefficient β represents a corresponding change in Y (in %) when X is changed by 1.

⁹ We should note a large number of missing answers for this question. Inclusion of this variable lowers the number of observations included in regression analysis.

37% more than other faculty. The reasons for the existence of such a bonus for administrative work will be discussed below.

Table 3. The determinants of faculty salaries

(Dependent variable: natural logarithm of faculty salary¹⁰).

Variable \ Model	(1)	(2)C	(3)	(4)C	(5)	(6)C
Publication in Russian scientific journals	0.187*** (0.043)	0.099** (0.041)	0.185* (0.105)		0.189*** (0.048)	0.116*** (0.042)
Publication in journals indexed in Scopus/WoS		0.115** (0.052)	0.040 (0.111)			
Number of articles in Russian scientific journals				-0.022* (0.013)		
Number of publications in journals indexed in Scopus/WoS	0.020* (0.012)			0.216** (0.105)	0.037*** (0.014)	0.021* (0.012)
Teaching load		0.008*** (0.002)				
Rector, Vice-Rector	0.526* (0.274)	0.493* (0.272)			0.554** (0.275)	0.729*** (0.240)
Dean, Vice-Dean	0.231*** (0.070)	0.224*** (0.064)	0.345** (0.148)	0.279** (0.140)	0.205** (0.080)	0.177** (0.070)
Head of the Department, laboratory, other unit	0.372*** (0.063)	0.279*** (0.056)	0.535*** (0.136)	0.383*** (0.134)	0.304*** (0.070)	0.262*** (0.062)
Male	0.117*** (0.045)	0.035 (0.041)	-0.056 (0.111)	-0.124 (0.104)	0.150*** (0.049)	0.085** (0.043)
Seniority (years)	0.004** (0.002)	0.023*** (0.005)	0.007* (0.004)	0.000 (0.004)	0.003* (0.002)	0.006*** (0.002)
Seniority, squared		0.000*** (0.000)				
University status (=1 if '5-100' or NRU)	0.295*** (0.063)	0.104** (0.053)				
Constant	10.042*** (0.047)	10.476*** (0.070)	10.321*** (0.108)	10.979*** (0.090)	10.042*** (0.052)	10.697*** (0.045)
R-squared	0.17	0.15	0.23	0.16	0.13	0.12
Observations	650	579	114	109	536	536
Sample	All	All	Status	Status	No Status	No Status

Standard errors in parentheses. Significance levels: * 10%, ** 5%, *** 1%.

For the control variables, seniority corresponds to an increase in salary (in Model 1 in a linear form, and in Model 2 in a quadratic form). The results for gender are ambiguous. University status is statistically significant: faculty in universities with a special status earn more. That is why it is worth considering the results of regression analysis in subsamples.

For special status universities the number of publications in journals indexed in Scopus/WoS has almost the largest contribution to the salary: each published paper may add

¹⁰ For the models 2, 4, 6 natural logarithms of corrected to Moscow average level of salary (C) is used as a dependent variable.

around 22% to the corrected salary (Model 4). The number of articles in Russian scientific journals has a negative effect on salary. Perhaps, this is due to the inclusion of papers indexed in Scopus/WoS in the incentive schemes and the absence of significant remuneration for articles in Russian journals. Administrative position also positively contributes to salary. Salary mechanisms in universities with a special status reflect gender equality. There are ambiguous results for seniority. The structure of incentive contracts in universities with special status accurately reflects the purpose of the introduction of these universities during the reforms. The research-oriented nature of such HEIs requires incentive contracts with a focus on high quality publications. As the results show, faculty in these universities may benefit from being published in the journals indexed in Scopus/WoS.

The results for universities with no status are quite different. Publication in Russian scientific journals and the number of publications in journals indexed in Scopus/WoS are significant, however the effect is smaller than for special status universities. The results show that in universities with no status existing contracts assume rewards for research, but it seems that the structure of such contracts does not clearly address the quality of these publications.

Administrative duties matter and the effects can be higher than for the entire sample. There is gender inequality in such universities: male faculty earn more than their female colleagues and this issue will be addressed below. Higher salary is associated with higher seniority, which corresponds to human capital theory.

There are two interesting phenomena which need to be addressed. The first is the huge premium for the administrative staff. The nature of this bonus needs to be explained: is this due to the higher research activity and better performance results? Or is it just a feature of the Russian higher education system and existing inequalities between administrative and non-administrative staff. The second issue is about gender inequality in universities with no status. One hypothesis is that women concentrate more on teaching (which is barely rewarded), while men focus on research activities. The next hypothesis is that male faculty may have some administrative duties and be rewarded by having them. The third hypothesis is about a difference in publication strategies and corresponding differences in research productivity.

Table 4 shows a comparison of faculty who hold an administrative position such as head of the department and those who do not. The difference in the average monthly salary is 18,172 RUR (271 USD). After corrections to the Moscow level of wages this difference becomes even higher and increases to 22,586 RUR (337 USD). Heads of departments etc. are more experienced, and they do have more seniority. They are more productive in terms of publications in journals indexed in Scopus/WoS: 29% of heads of the departments have such publications 2014–2016, and the average number of such publications per person for the same

period is 0.68, while for faculty with no administrative duties these figures are 18% and 0.56 respectively. However, in terms of publications in national and international journals the ordinary faculty demonstrates higher research productivity, having on average 1.74 articles in Russian scientific journals in 2016 (1.24 for heads of departments etc.), and 0.25 articles in international scientific journals.

Table 4. Productivity of the administrative staff

Variables	Head of the Department, laboratory, other unit		
	No	Yes	Sample
Salary (Russian Rubles per month)	37,205	55,377	39,809
Salary corrected to Moscow average level of wages	63,050	85,636	66,286
Experience (years)	22.66	29.04	23.62
Experience in teaching (years)	17.85	23.43	18.68
Seniority (years)	15.47	19.92	16.14
Publication in Russian scientific journals in 2016 (=1 if yes)	0.58	0.57	0.58
Publication in international scientific journals in 2016 (=1 if yes)	0.15	0.18	0.15
Publication in journals indexed in Scopus/WoS over the last 3 years	0.18	0.29	0.20
Number of articles in Russian scientific journals in 2016	1.74	1.24	1.67
Number of articles in international scientific journals in 2016	0.25	0.22	0.25
Number of publications in journals indexed in Scopus/WoS over the last 3 years	0.56	0.68	0.58
Teaching (=1 if yes)	0.97	0.98	0.97
Teaching load (hours per week)	16.29	14.16	15.96

What are the gender differences in universities with no status? Why do they exist? Table 5 compares male and female faculty by their salary, experience and productivity factors.

While in special status universities gender inequalities in terms of academic salaries were not found, in those without special status, the gender salary gap exists, as shown in Table 5. The male faculty earns on average 41,939 RUR (626 USD) per month, and their female colleagues earn less: 34,567 RUR (516 USD) per month. Such a salary gap becomes even more significant (8,518 RUR, or 127 USD per month) after salary adjustment to the Moscow level of wages. The male faculty has more experience (28 versus 22 years), and a longer period of seniority (18 versus 15 years). This difference can partially explain the salary gap because from the human capital theory perspective, more experience and seniority are associated with an accumulation of human capital and higher productivity. Consequently, more experience and seniority can be reflected in higher remuneration. However, this is not the only difference between male and female faculty members.

Table 5. Male and female faculty in the universities with no status

Variables	Gender		
	Female	Male	Sample
Salary (Russian Rubles per month)	34,567	41,939	37,361
Salary corrected to Moscow average level of wages	61,930	70,448	65,158
Experience (years)	21.64	27.80	23.99
Experience in teaching (years)	17.36	21.67	18.99
Seniority (years)	14.68	18.16	16.01
Publication in Russian scientific journals in 2016 (=1 if yes)	0.57	0.56	0.57
Publication in international scientific journals in 2016 (=1 if yes)	0.15	0.16	0.15
Publication in journals indexed in Scopus/WoS over the last 3 years	0.16	0.23	0.19
Number of articles in Russian scientific journals in 2016	1.54	1.64	1.58
Number of articles in international scientific journals in 2016	0.21	0.30	0.24
Number of publications in journals indexed in Scopus/WoS over the last 3 years	0.39	0.69	0.50
Teaching (=1 if yes)	0.98	0.97	0.97
Teaching load (hours per week)	16.33	16.67	16.46
Rector, Vice-Rector (=1 if yes)	0.0059	0.0064	0.0061
Dean, Vice-Dean (=1 if yes)	0.0825	0.1026	0.0901
Head of the Department, laboratory, other unit (=1 if yes)	0.1316	0.1699	0.1462

There is no statistical difference between the male and female faculty in terms of being published in Russian and international scientific journals in 2016. However, they differ in the number of such publications. The average number of publications in Russian scientific journals for male faculty is 1.64 per year, while for female faculty it is 1.54. Male faculty also demonstrate higher research productivity by the number of articles in international scientific journals: 0.30 versus 0.21 publications per faculty. The most significant difference in research productivity is for publications in journals indexed in Scopus/WoS 2014–16. Male faculty are more productive: 23% have such publications with an average of 0.69 articles per faculty, while only 16% of female faculty have indexed publications with an average of 0.39 articles per faculty. The difference in teaching productivity is not significant and the teaching load for male faculty is slightly higher than for their female colleagues.

The last difference is in administrative duties. Male faculty hold managerial positions a little more frequently than their female counterparts. Consequently, the existence of the gender wage gap in universities with no status can be explained by variation in experience/seniority, research productivity, and administrative duties. Given the fact that holding an administrative position (see Table 3) has a very high wage premium, female faculty find themselves in an unequal position compared to their male colleagues.

Conclusion

This paper examines the structure of academic remuneration after major reforms in Russian higher education aimed at stimulating research productivity. The reforms were caused by the need to improve the performance of the Russian national academic sector internationally and are related to globalization and transition to a knowledge society. The Russian higher education sector was chosen for analysis as Russia is an example of a post-socialist country in which the position of university faculty worsened with the collapse of the Soviet Union and academic salaries fell to their lowest levels, which did not create sufficient incentives for research.

In general, with the reform of contractual relations in Russian universities and the introduction of research-oriented universities, over the past five years, faculty salaries have increased (on average, by 45% in nominal terms), and research productivity related to publications indexed in the Scopus/WoS databases has almost doubled.

The empirical estimates of the structure of incentive contracts, for the entire sample, show faculty salary is positively associated with publication activity: in different specifications, having publications in Russian journals and in journals indexed in Scopus and/or WoS are significant. Publications in other international journals do not make a significant contribution to faculty salary. Teaching was significant only in one specification for the entire sample and not significant for subsamples; teaching does not have a significant effect on salary. This is a very important result, as in the Russian universities, faculty are more involved in teaching than research. Administrative duties (expressed in position held) are positively related to faculty pay: the largest effect is for rectors and vice-rectors, but for deans and heads of departments or laboratories the effect is also strong. Heads of universities and structural units receive a significant bonus for their administrative position. This is partly due to work experience and higher research productivity in journals indexed in scientific databases.

For the subsample of universities with special status the largest effect in publication activity is for the number of papers in highly ranked journals. This is explained by the fact that this is one of the indicators included in international university rankings. Universities with special status aiming to rise in such rankings are interested in an increase in this indicator. That is why, being included in individual incentive schemes, publication activity contributes greatly to academic salary.

In universities with no status we discovered a significant gender gap: the male faculty earn more than their female colleagues, however this phenomenon is absent in the universities with special status: salary in these institutions reflects total gender equality. The reasons for

the existence of the gender gap in universities with no status are variations in experience/seniority, research activity and administrative duties. Since in such universities the bonus for administrative work is quite large, it is important to pursue a policy of gender equality in university management.

There is a positive linear relationship between salary and seniority for the entire sample and in universities with no status, which corresponds to the assumptions of the human capital theory. Salaries in special status universities are higher than the salary in less selective higher education institutions. The salary in Moscow universities is higher than in the regional higher education institutions.

Compared with the results obtained in the pre-reform period (Prakhov 2018), in this study we assessed more precisely the contribution of particular types of publication to wages. The contribution of an additional publication has increased, which confirms the favourable effect of introducing an incentive contract. However, the effects of administrative duties and seniority are still substantial.

Our results show that incentive contracts work in universities with special status. The structure of academic contracts reflects the nature of such research-oriented HEIs, and the salaries in these universities are higher than in HEIs with no special status. It has been shown that a correctly designed incentive contract can properly motivate faculty. However, we have to note the drawbacks of such contracts. In some cases, the introduction of incentive contracts can force employees to focus only on the fixed indicators. In extreme cases, this can lead to dishonest publication practices in low quality journals or even paid publications. In addition, such contracts are inefficient in terms of risk distribution, since the uncertainty associated with the publication of an article in a top journal (this process is very difficult and time consuming) lies entirely with the risk-averse faculty member. Thus, in addition to a stimulating contract, there should be additional measures of faculty financial support.

Directions for further research include a comparative analysis of the structure of academic salaries in different countries, as in many post-socialist countries in the late 20th century similar processes which negatively affected the academic profession, took place. Today these countries face new global challenges and compete with each other on the global academic market.

Another area for further research is the differentiation between universities in Russia, which has intensified with the introduction of HEIs with a special status. We need to understand what the policy should be for universities without special status, so as not to disadvantage the faculty working in non-status universities.

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