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## ESTIMATES OF THE MOTHERHOOD PENALTY IN RUSSIA

**Abstract.** The paper concerns systematic differences in the wages of women with children and childless women, or «*motherhood penalty*», in modern Russia. The study bases on the 23rd wave of the Russian Longitudinal Monitoring Survey (RLMS HSE). The authors employ a two-step model, the first stage of which uses a binary logistic regression to measure the selectivity of maternity, while the second reveals the effect of maternity status on the average monthly salary of women, adjusting for the observed selectivity. The obtained estimates indicate an average motherhood penalty of approximately 4% with a significant differentiation by women's education level. The authors conclude that high-educated women face 1,5 times higher penalty, and also receive it earlier: the difference in salaries of childless women and mothers with higher education appears after the first birth, and among women without higher education this phenomena is observed only after the second birth. In conclusion, the authors discuss the limitations of the presented analysis and indicate possible directions for future research on this topic.

**Key words:** «motherhood penalty»; selection into motherhood; female employment; RLMS HSE; Russia

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### Introduction

The “motherhood penalty” refers to the worst position of women with children in the labour market compared with childless women, whom may manifest itself

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through reduced access to employment (generally or to jobs at a certain level), deteriorating conditions for career promotion or through lower wages. The observed wage differences are influenced by the selectivity of motherhood and the selectivity of employment, namely the differences in socio-demographic characteristics of women with and without children, working and non-working women (Harkness, Waldfogel 1999; Lundberg, Rose 2000; Vocal, Zorlu 2003 and others). However, as the results of numerous empirical studies show, the unexplained portion of the wage gap remains, and sometimes increases after amending for selectivity (Wetzels, Zorlu 2003; Budig, Misra, Boeckmann 2016; Pal, Waldfogel 2016). In this study, motherhood penalty is operationalized as a systematic difference in wages for working women with children and childless women, which is not due to differences in their educational, qualification or other observed characteristics.

The “motherhood penalty” topic has been given a lot of attention abroad. It is at the same time the focus of economic demography, studies of discriminatory practices in the labour market, and gender studies. Some specific works on this topic are known in Russia, but there is no systematic approach to the issue so far. At the same time, a study of this phenomenon is important in order to understand the welfare factors of Russian families with children who have the greatest risk of monetary poverty (Ovcharova *et al.* 2014). Moreover, information about it is important in an active family and socio-demographic policy environment. The promotion of fertility should be based on a comprehensive understanding of the position of women in the labour market after childbirth. This is necessary in order to make more informed policy decisions and to supplement material support for births with institutional changes, including with regard to employment policy.

The real work begins with a synthesis of theoretical and empirical studies, discussion of mechanisms for the emergence of a “motherhood penalty”. In the empirical part of the work the peculiarities of the Russian model of fertility relevant to the study are disclosed, and an econometric simulation of the size of the “motherhood penalty” on Russian data is conducted. The authors aim to answer the following questions at a first approximation: is there a “motherhood penalty” in the current economic conditions in Russia? Is there any differentiation of the “penalty” based on the level of education of the woman or on number of children born? And finally, do we observe the “penalty” in wages of women with grownup children? After summarizing the results, the work concludes with a discussion of the limitations and prospects of the performed study, which, in the view of the authors, is inherently exploratory.

## **Theoretical framework**

Such areas of knowledge as rational economics, sociology and the institutional economy explained the reasons for “motherhood penalty” in different ways

(Grimshaw, Rubery 2015). As Damian Grimshaw and Jill Rubery pointed out in their meta-review of the empirical studies, rational economics assume three main mechanisms for the emergence of “motherhood penalty”:

- firstly, lower wages for women with children can be related to the lower level of human capital accumulated during the labour biography: interruption of employment in connection with the birth of children result in a reduction in the total length of job tenure and, consequently, in work experience, as well as in the loss and dilution of professional qualifications;
- secondly, the wage differences for mothers and childless women may be due to the lower productivity of women with children because of the more pronounced shift in the work-family balance towards the latter;
- thirdly, the lower earnings of mothers may be caused by the voluntary choice of a workplace with lesser demands, more flexible or shorter working hours to reconcile domestic and work responsibilities and available childcare services.

In Russia, parental leave is very long<sup>1</sup> and thus the loss of human capital is higher than for shorter leave. They generate wage differentials in future periods and the more specific and higher the acquired capital, the more the difference may be. In other words, for highly educated and qualified women, the situation is more acute than that for women of secondary qualifications. At the same time, in the Russian reality, women are practically unable to choose a job with flexible or short working hours, such jobs are virtually unavailable (Bazzhina *et al.* 2014), except for self-employment<sup>2</sup>. Therefore, workplace factors will not have a significant impact on the size of the “penalty”.

In the sociological field, the following explanations of this phenomenon are highlighted (Grimshaw, Rubery 2015):

- firstly, discrimination by the employer in hiring, remuneration and promotion;
- secondly, an underestimation of the cost of work of women with children in view of the lower expectations and social stereotyping of mothers ‘work competence.

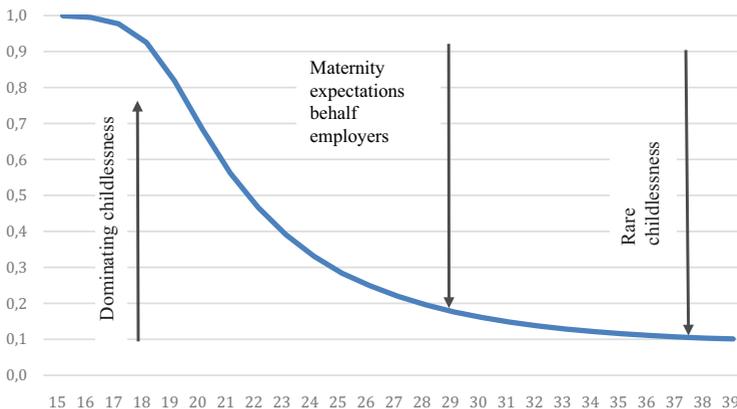
Both of the stated factors are in force in Russia. Discrimination against women in the labour market remains fairly high (15-18% of men’s average wages according to A. Y. Oschepkov’s estimates (Oschepkov 2006), it is supplemented by mass stereotyping of mothers (Kalabikhina *et al.* 2016). Employers, as noted above, almost always expect employees to work full-time, while the government’s childcare system requires the mother to leave the workplace for an hour or two before the end of the working day.

<sup>1</sup> Comparison of vacation durations with other countries see, for instance (Tyndik 2010).

<sup>2</sup> According to Rosstat in 2016, the proportion of self-employed women was 10.2% of all employed women.

However, another hypothesis can be put forward within the sociological field of arguments. The fewer mothers in the female population, the stronger the factors that reinforce the “motherhood penalty” will apply. In a society where everyone would be mothers, that would simply not be the case. In Russia, the level of final childlessness is not higher than 10% which is lower than in many European countries (Biryukova, Tyndik 2015; see schematic figure 1). But the probability to be a mother changes with age and probably the amount of the “penalty” must also change with the age of the woman. The arguments for this are also found in the context of the growing professional qualities of women in the first years after graduation and in the demographic context. The employer, when employing staff members 23 or 33 years of age, has different expectations for both their professional qualities and their family status. In the age groups with low probability of motherhood — in Russia these are women under 25 years, according to the average age of the women at the time of first birth — a higher “motherhood penalty” can be expected.

The existence of a “penalty” for women with children after 35 years of age is also doubtful — in Russia the vast majority of them have children. This may be a choice on the part of the employer of a much younger, childless female staff member, but this only applies to positions that do not have significant requirements for professional experience. —Moreover, childless women of older ages may have lower socio-demographic potential (including the level of health) compared to women with children.



**Figure 1.** Proportion of the childless by age, generation of women born in 1971<sup>1</sup>

**Source:** authors' calculations based on data of the 2010 Russian census

<sup>1</sup> In later generations, the shape of the curve gradually shifts to the right and slightly changes the slope; the figure provided should be seen as a scheme.

Finally, influence on the wage differences for mothers and childless women of factors such as the system of social security and support for working parents (the procedure for granting pre-school childcare leave, access to institutional care for pre-school children, the prevalence of flexible forms of employment), social norms and attitudes in society with regard to motherhood and women's employment, and also the cultural context in the broader meaning are assumed within the institutional approach (Grimshaw, Rubery 2015).

The mechanisms of formation of a "penalty" described in the overview presented outline the field of possible interpretations of the differences observed in Russia. At the same time, the analysis of theoretical preconditions for a "motherhood penalty" imposed on the contemporary demographic context of Russia is expected to be high in size. Differences in the reproductive behaviour of women from different social groups, for example, with different levels of education, should influence their differentiation.

### Experience from previous empirical studies

Estimates of the "motherhood penalty" in the world differ significantly: published works provide estimates of between zero and 30%<sup>1</sup> of the wages of childless women and even higher. Estimates of the Luxembourg Income survey for 2000/2001 on a sample of 22 countries showed high "penalties" in West Germany (20%), the Netherlands and Luxembourg (18% each) and low in Slovakia, Australia and Israel, where they were less than 2% or insignificant (Budig, Misra, Boeckmann 2016). These intercountry differences are explained within the framework of the institutional concept — first of all, they relate to the characteristics of the social support system and the national labour market. As the results of this study show, the reduction of the "motherhood penalty" is facilitated by the development of family care for children aged 0–2 and 3–6 years and by the introduction of paid parental leave of average length (up to two years; Budig, Misra, Boeckmann 2016).

The instability of the estimates received by different authors for the same countries can also be attributed to differences in data sources and, more significantly, to the methods used for statistical analysis<sup>2</sup>. At the same time, strictly speaking, it is not possible to fully distinguish the impact of differences in methodological approaches and actual influence of institutional factors.

There are few published studies of the "motherhood penalty" in terms of wages based on Russian data. The work of L. Nivorozhkina et al. provides an assess-

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<sup>1</sup> For women with three children, the penalty reached 32.1% in the United Kingdom (Harkness, Waldfogel, 1999).

<sup>2</sup> As part of this work, we do not focus on this issue, but an exhaustive review of the methods used to study the "motherhood penalty" is given in D. Grimshaw and D. Rubery's earlier article [Grimshaw, Rubery, 2015].

ment of the wage differences for women with children under 18 years of age and without them in 2003, at about 12% (Nivorozhkina, Nivorozhkin, Arzhenovsky 2008). This result was obtained in the evaluation of the combined model, taking into account selection into motherhood<sup>1</sup>, using data from the National Household Welfare survey and participation in social programs (NOBUS-2003). Similar calculations carried out in the same year on the basis of a panel sample of the Russian Monitoring of the Economic Situation and Public Health (RMEH NRU HSE) for 2003–2005 showed a 8.1% lower wage for women with minor children, as well as rising wage losses with the growth of women’s education (Arzhenovsky, Artamonova 2007; Nivorozhkina, Nivorozhkin, Arzhenovsky 2008). Thus, the latest research assessments are 10 years old and it is a relevant task to obtain fresh and comparable estimates.

## Method and Data

As mentioned above, the objectives of this study are not only to assess the direct size of the “motherhood penalty” but also to answer the following questions:

- (a) does the “motherhood penalty” remain after the child grows up;
- (b) Is there a significant differentiation in the size of the “penalty” by the woman’s education and the number of children born?

The estimates presented in the work are based on a representative sample of the 23 wave of the RLMS NRU HSE survey (2014). Employed women aged 20–44 years were selected from the sample. The size of the target sample is 1 433 observations, but due to the lack of data on some control variables, the analytical volume of the sample was reduced to 1 425 observations during the construction of regression models. The use of spatial sampling and retrospective data enables assessing the penalty for women who have given birth in different years. On the one hand, this makes it difficult to take into account changes in the labour market, on the other hand, it provides more general estimates that are better comparable to the results of previous studies.

The authors use a two-stage model for estimating the size of the “penalty”, at the first stage of which a binary logistic regression is constructed. It enables assessing the relationship of basic socio-demographic parameters, such as the age of the respondent, her place of residence, education and partnership status with the status of motherhood, and to use the resulting estimates of coefficients to forecast the conditional probability of being a mother. The obtained probabilities are then used for the calculation of weights for the control of possible selection into motherhood according to formula (1).

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<sup>1</sup> Selection into motherhood – a phenomenon in which the probability of being a mother to some age and, accordingly, the opposite probability to remain childless are not independently related to the socio-demographic characteristics of women.

$$w = \frac{1}{1 - prob_m} \text{ для бездетных женщин}$$

$$w = \frac{1}{prob_m} \text{ для женщин с детьми} \quad (1)$$

where  $prob_m$  — is the probability of being a mother, obtained for each woman based on the binary logistics model.

Using the weight coefficients described above, it is possible to align the structure of the two subsamples, namely, women with children and childless women, by major differentiating indicators (regressors included in the binary model) and thus clear the resulting estimates of wage differences from the contribution determined by selection into motherhood by the observed characteristics. Methodological difficulties in this case may arise due to the presence of probabilities predicted by the binary model that are close to zero: they may generate ultrahigh weight coefficients. To solve this problem, additional adjustments, such as stabilizing the weight coefficients or manual limitation of the allowable interval for their values (Austin, Stuart 2015) may be used, but in this study, which is the first exploratory analysis, we confine ourselves to direct procedure.

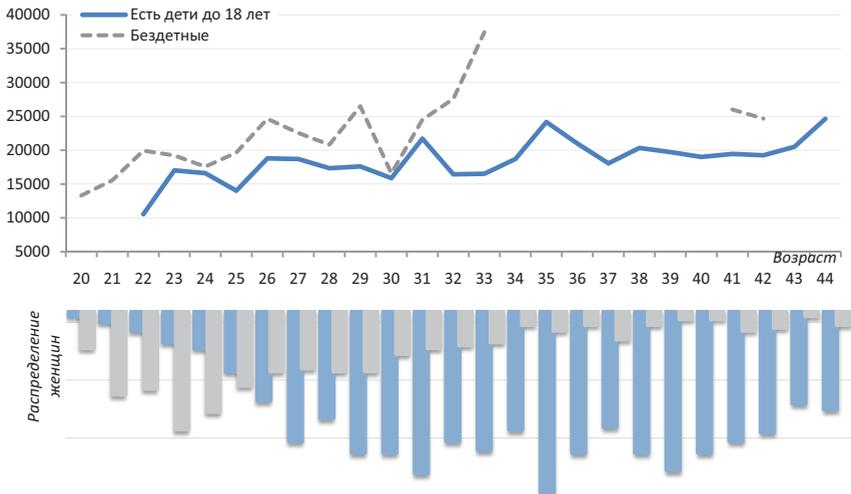
At the second stage of the model, the estimate of the size of the “maternity penalty” is performed based on a weighted log-linear regression, where the dependent variable is the logarithm of the average monthly wage of a woman. When estimating the wage dependency model, in addition to all socio-demographic parameters, the duration of the working week is controlled, but in future the transition to hourly indicators may give greater accuracy to the measurements.

A key independent variable is the presence of children, and a categorical variable is introduced to separate mothers with minor and adult children, or mothers with one child and mothers with two or more children. The list of control variables includes the age of the woman, her place of residence, her partnership status, her health status (by presence of chronic diseases), and also basic parameters of employment — the presence of a formal employment contract, the length of the working week, the area of employment and job status (measured through the presence of subordinates). Thus, the most comprehensive set of sociodemographic and workplace characteristics available in the array of data is chosen. The analytical sample structure for the specified parameters is shown in the Annex to the article.

## Descriptive estimates and regression analysis results

Calculations on the representative sample of the 23 wave of RLMS (2014) show that, on average, the wages of women aged 20–44 without children are higher than those of women with minor children (Figure 2); the differences reach 9.7% on the average of the sample. Moreover, the wages of women without children

were 4.5% higher than those of women with children over 18 years of age. For women aged 20–29 years, the wage gap for those with children under 18 years of age is 13.3%<sup>1</sup>.



Note: Averages are not estimated for groups of 5 observations and less

**Figure 2.** The average wage for women with children under 18 years of age and childless women, rub. Estimates based on RLMS NRU HSE 2014 data, representative sample, employed women aged 20–44 years

The observed differences are differentiated by the women’s education. Thus, among women with a primary vocational education or below, for mothers with a minor child the average wage is 17.1% lower than that of childless women, and 31.1% for those with adult children. Among women with a secondary vocational education, the nominal difference reaches 8.2% for mothers with minor children, while women with adult children receive an average wage of 4.4% higher than childless women (the difference is –4.4%). For women with higher education, the indicated figures are 0.3% and –21.3% respectively. However, it is not possible to interpret the obtained estimates directly because of the impact on the wages of the social and demographic characteristics of women highlighted in the beginning of the study.

In order to monitor their impact on the size of the “motherhood penalty”, we turn to regression analysis. Assuming a different amount of “penalty” in the groups of women with and without higher education (the presence of such differences is indicated by the results of a number of foreign studies — see, for

<sup>1</sup> In Russia childlessness remains relatively rare among women aged 30–35 years and over (Biryukova, Tyndik 2015).

example, Todd 2001, Correll, Benard, Paik 2007, and others), we evaluate not only the general model for the entire sample (column A of Table 1), but also separate models (columns B and C of Table 1). All three models presented in the table are statistically significant.

**Table 1.** Results of the regression analysis. The second stage of the simulation is the logarithmic dependence of the monthly average wage on the socio-demographic characteristics of the woman, a weighted regression. Differentiation by age of the youngest child

Model parameters		Coefficients (stand. error)		
		A	B	C
		General model	Model for women with higher education	Model for women without higher education
Status of motherhood	Childless woman	REF	REF	REF
	Woman with children under 18 years of age	<b>-0.039*** (0.009)</b>	<b>-0.060*** (.016)</b>	<b>-0.028** (.011)</b>
	Woman with children aged 18 and older	-0.005 (0.020)	-0.017 (.038)	.015 (.023)
Education	No higher education	REF	-	-
	Higher education	0.144*** (0.010)	-	-
Age	20-24	.016 (.018)	-.074** (.034)	.064*** (.020)
	25-29	-.033** (.014)	-.122*** (.024)	.048*** (.018)
	30-34	-.011 (.014)	-.018 (.023)	-.006 (.017)
	35-39	.056*** (.013)	-.029 (.025)	.111*** (.016)
	40-44	REF	REF	REF
	Place of residence	Regional Center	.133*** (.013)	.129*** (.025)
	City	.064*** (.013)	.062** (.026)	.080*** (.015)
	Town settlement	.067*** (.024)	.073 (.047)	.059** (.027)
	Rural areas	REF	REF	REF
Partnership status	No partner, never married	-.022* (.013)	-.050** (.021)	-.011 (.016)
	No partner, married before	-.013 (.013)	.022 (.023)	-.032* (.016)
	Partner/married	REF	REF	REF

End of table 1

Model parameters		Coefficients (stand. error)		
		A	B	C
		General model	Model for women with higher education	Model for women without higher education
Health status	High (no more than 1 chronic illness)	REF	REF	REF
	Low (2 and more chronic diseases)	-.018* (.010)	.005 (.018)	-.032*** (.012)
Working contract	None (informal employment)	.004 (0.020)	-.013 (.063)	-.013 (.020)
	Yes (official employment)	REF	REF	REF
Employment sector	Industry, business and commercial services	.070*** (.010)	.031** (.016)	.092*** (.012)
	Social sphere and state service <sup>a</sup>	REF	REF	REF
Length of the Working Week	Full Employment	.420*** (.041)	.446*** (.073)	.411*** (.048)
	Part-time employment — less than 20 hours per week (REF)	REF	REF	REF
Presence of subordinates	Yes	.196*** (.012)	.192*** (.018)	.182*** (.017)
	No	REF	REF	REF
<i>Model significance</i>		***	***	***
<i>R-squared (adj)</i>		.271	.212	.235

<sup>a</sup> Education, public administration, science, culture, social services, housing and communal services and military service

**Note:** A constant is included in the model but omitted from table. The levels of significance of the coefficients are indicated as follows: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$  REF stands for the Reference category

**Source:** authors' estimates based on RLMS NRU HSE-2014 data, representative sample, employed women aged 20-44 years

Analysis of the obtained results reveals that control variables have different effects and significance in groups of women with different levels of education.

For women with higher education, age has a significant effect: we observe a negative impact of the younger age groups, reflecting an increase in the level of skills as education and work experience are gained — the highest wages are found among women aged 40–44 years (senior age group of those included in the subsample), the salaries of women aged 30–34 and 35–39 years are no different from that of this group, whereas women aged 25–29 years, on average, have lower wages by 12.2% and those aged 20–24 years — by 7.4%. In addition, the place of residence (the gradient from the countryside to large cities), the absence of a partner (negative influence), the employment sector, the length of the working week and the presence of subordinates have a significant impact. For women without higher education, age is significant (but there is no increase in the positive effect on age), place of residence (similar gradient), health status, employment sector — with greater positive influence of employment in the non-government sector, — the length of the working week and the presence of subordinates.

Thus, the impact of work experience effect is visible among highly educated women. The lack of a significant effect on the health variable for the same group seems to reflect the specialization of their labour market — employment in jobs that are mostly non-physical and therefore less dependent on the state health.

Finally, as evident from Table 1, a statistically significant “motherhood penalty” is found in all three models, but only for women with children under the age of 18. The general model estimates its size at 3.9%, and the model for the sub-sample of women with higher education is 6.0% (see Figure 3). The obtained estimates of the “motherhood penalty” are below those of 10 years ago.

Higher “penalty” estimates for women with higher education may be related to the fact that they have fewer opportunities in the Russian labour market to successfully combine employment in a highly competitive workplace with high levels of qualifications requirements and parental responsibilities. In particular, this relates to the schedule of work and the possibilities of overtime.

Another explanation for the higher “penalty” in this group of women lies in the concept of human capital. The most educated workers tend to update their professional skills frequently or continuously (especially in rapidly growing industries) and develop new competencies. A 1½- or even a three-year hiatus means not only partial loss of skills already available before childbirth, but also a lag in the development of new ones.

Given the low level of childlessness of Russian women, and therefore the low selectivity to motherhood, we further investigate the size of the fine for two or more children compared to single-child and childless women. To this end, the study evaluates models similar to previous ones, replacing the key independent variable with one differentiated by the number of children; the results are presented in Table 2.

**Table 2.** Results of the regression analysis. The second stage of the simulation is the logarithmic dependence of the monthly average wage on the socio-demographic characteristics of the woman, a weighted regression. Differentiation by number of children

Model parameters		Coefficients (stand. error)		
		A	B	C
		General model	Model for women with higher education	Model for women without higher education
Status of motherhood	Childless woman	REF	REF	REF
	Woman with one child	<b>-0.026** (0.010)</b>	<b>-0.052*** (.017)</b>	<b>-0.009 (.013)</b>
	Woman with two or more children	<b>-0.050*** (0.012)</b>	<b>-0.063*** (.022)</b>	<b>-0.039*** (.015)</b>
Education	No higher education	REF	-	-
	Higher education	0.144*** (0.010)	-	-
Age	20-24	.007 (.017)	-.080** (.034)	.050** (.020)
	25-29	-.042*** (.014)	-.129*** (.024)	.037** (.018)
	30-34	-.017 (.013)	-.024 (.023)	-.015 (.016)
	35-39	.052*** (.013)	-.032 (.025)	.105*** (.015)
	40-44	REF	REF	REF
Place of residence	Regional Center	.132*** (.013)	.128*** (.026)	.149*** (.014)
	City	.063*** (.013)	.061** (.027)	.078*** (.015)
	Town settlement	.068*** (.024)	.076 (.047)	.060** (.027)
	Rural areas	REF	REF	REF
Partnership status	No partner, never married	-.025*** (.013)	-.051** (.021)	-.016 (.016)
	No partner, married before	-.015 (.013)	.022 (.023)	-.034** (.016)
	Partner/married	REF	REF	REF
Health status	High (no more than 1 chronic illness)	REF	REF	REF
	Low (2 and more chronic diseases)	-.019* (.010)	.005 (.018)	-.032*** (.012)
Working contract	None (informal employment)	.002 (0.020)	-.017 (.063)	-.015 (.020)
	Yes (official employment)	REF	REF	REF

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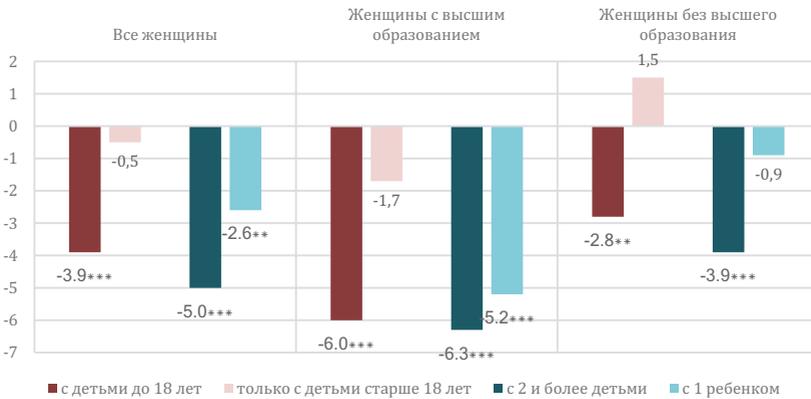
Model parameters		Coefficients (stand. error)		
		A	B	C
		General model	Model for women with higher education	Model for women without higher education
Employment sector	Industry, business and commercial services	0.069*** (.010)	.031** (.016)	.092*** (.012)
	Social sphere and state service <sup>a</sup>	REF	REF	REF
Length of the Working Week	Full Employment	.413*** (.041)	.443*** (.073)	.401*** (.048)
	Part-time employment — less than 20 hours per week (REF)	REF	REF	REF
Presence of subordinates	Yes	.195*** (.012)	.198*** (.018)	.182*** (.017)
	No	REF	REF	REF
<i>Model significance</i>		***	***	***
<i>R-squared</i>		.271	.211	.235

<sup>a</sup> Education, public administration, science, culture, social services, housing and communal services and military service

**Note:** A constant is included in the model but omitted from table. The levels of significance of the coefficients are indicated as follows: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$  REF stands for the Reference category

**Source:** authors' estimates based on RLMS NRU HSE-2014 data, representative sample, employed women aged 20–44 years

The model of this configuration indicates an increase in the “penalty”, with an increase in the total number of children born — an expected relationship in the context of the economic explanation of «motherhood penalty». It follows from the obtained results that women with higher education face a “penalty” for the birth of their first child, whereas women without one — only beginning with the second child (see Figure 3, synthesis of the results of all models). This is well aligned with the explanation already mentioned in the concept of human capital. The segment of high-performance and highly competitive employment is characterized by an earlier and more significant manifestation of the “penalty”.

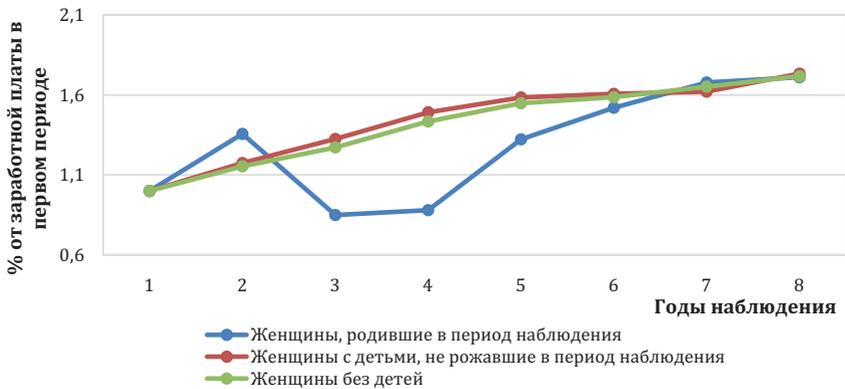


**Figure 3.** The amount of the “motherhood penalty”, as a percentage of the wages of childless women. Estimates based on the log-linear model of wage dependence amended for the selection into motherhood

**Note:** \*\*\* — the differences are significant at the 0.01 level, \*\* — at the 0.05 level

## Discussion and promising directions for future research

The results of the performed analysis show that women with children over the age of 18 are not entitled to a “motherhood fine” in modern Russia. The question arises, how quickly does it disappear? Unfortunately, the size of the sub-sample that is being analyzed does not allow it to be divided into more private groups by age of children. However, a study of this issue parallel to the one presented in this article on panel data of 15 waves of RLMS NRU HSE (see studies published based on it’s results: Ermolina *et al.* 2016, Biryukova *et al.* 2017) brings us closer to the answer. The results have shown that by the end of leave to care for a child under three years, the relative wages, that is, those assessed against the level of remuneration before childbirth, or at the beginning of the monitoring period for researchers, for mothers and childless women align, and the “motherhood penalty” measured in such terms (different from those used in this article) almost disappears (Figure 4). Based on this, we assume that the “penalty” is due to temporary wage losses for several years after the birth of the child rather than systematic discrimination against mothers in the Russian labour market. The fact that the level of earnings is restored after a long leave of childcare absence rather rapidly indicates that women actually start working before its end, whether officially or not. The results obtained in this work, however, should also be taken as preliminary, as the analysis performed is largely a descriptive comparison of differences; econometric modelling, taking into account all socio-demographic characteristics, can significantly adjust the dynamics of the “penalty” even in terms of relative wages.



**Figure 4.** Wage trends of childless women and women with children, including those born in the third year of observation

**Source:** Biryukova *et al.* 2017

At the same time, in the same paper (Biryukova *et al.* 2017), an intangible “penalty” is also recorded: women with small children are less confident in their position in the labour market and in future employment opportunities, especially if they return to work before the child is three years of age, when state child-care services are not yet available.

Thus, the levelling of the “motherhood penalty” as children grow up may indicate that it is linked to the behaviour of women in the labour market, the choice of jobs and working conditions, a trade-off between wages and flexibility of conditions.

In this study, a lower estimate of the “penalty” was obtained than in the early 2000s, at 3.9% on average for all women with children under 18 years of age. The reason for the change could be the development of the labour market and the changing structure of employment. The gradual reorientation of the economy towards intangible production, the development of segments of “intelligent” services — information and education technologies, consulting, design — has led to the expansion of opportunities for remote employment. This may reduce the duration of the interruption of work and contribute to a reduction in the amount of the “maternity penalty”. This hypothesis requires further verification of the relevant data. Is it true that the estimates obtained are systematic shifts in wages or accidental monitoring? New research is required to answer this question.

Returning to the Russian demographic context, one should consider once again the nature of the phenomenon being observed. In Russia, the entry into motherhood remains massive and rather early. Therefore selection into motherhood is, in fact, clearly expressed only up to 25-30 years of age as the average age at first birth. It is very likely that in such a context it is rather

a “gender penalty” that should be referred to. The results of this work show that the “penalty” for one child is almost non-observed and the results of numerous previous works show the lower wages of women as compared to men. This, it must be, includes a “penalty” for waiting for motherhood. The high negative effect of the age of 25–29 years obtained in the models in monitoring the presence of children also testifies in favour of this argument. As we move from the universal model of fertility to the diversity of the trajectories of women’s reproductive behaviour (differentiated by both age at motherhood and by number of children), the size of the “penalty” could also be expected to be differentiated. However, account should be taken of the high inertia of social norms in society and therefore of employers.

This study is the first step in the development of the «motherhood penalty» research in Russia. To conclude the article and build on the discussion above, we would also like now to indicate in a clear way the forward-looking directions for future work in this area.

First of all, possible tasks for future research lie in the area of methodology and clarification of research issues. The method used in this work has its limitations. An important nuance is the degree of completeness of the binary model (the first stage of the simulation). If it covers an incomplete set of significant regressors and results in biased estimates of coefficients with the parameters included, the weighting of the constructed probabilities will be unlawful. In the study of fertility, these concerns are relevant, as the factors of motherhood include many non-observed parameters — individual preferences, inclinations and values. In this regard, one of the ways in which the authors see development of the study is to improve the methodology through the use of an extended model with AIPW, augmented inverse probability weighting, justified for the first time in this area of research by J. Waldfoegel and I. Pal in 2016 (Pal, Waldfoegel 2016). This model, as shown in the literature (Glynn, Quinn 2009) provides sustainable estimates of the treatment effect even in situations where one of the models — binary or primary — is incorrectly specified. The use of this method will provide a robust assessment of the penalty and at the same time assess the quality of the model used in this study.

The methodology for inclusion of selectivity at the first stage of modelling could also be developed. Within this study the selectivity to women’s employment is not measured, but the study focuses on women who are already working and have children. The study of selectivity in employment on the basis of maternity would also be useful. In addition, because of the low selectivity of motherhood, the selection equation may not model the fact of motherhood itself, but rather the birth of children up to a certain age (25 years as the average birth age of the firstborn).

Finally, it is possible to test models with the interaction of independent variables, such as the scope of employment and the working schedule. Another

additional issue is the search for a more precise age limit upon the reaching of which by the child the penalty is gone. This requires the use of panel data (which has its limitations due to the inevitable non-accidental exhaustion of the sample) and the monitoring of the age of the children. It should be noted that this task is different from the comparison of relative wages (as in Figure 4), as they do not give us an idea of absolute differences with childless women. In addition, transition to panel data may enable monitoring the non-observed characteristics of respondents, which may be important in the context of such studies because among the factors causing the “motherhood penalty” there may be parameters such as non-articulated preferences in employment area and motherhood and other values and attitudes. Besides, the inclusion in other waves of the RLMS NRU HSE survey will also further enable assessing the extent of the “penalty” at different stages of the economic cycle or stages of national labour market development, which may be an independent research task.

Finally, another direction for research can be the study of the “penalty” in the combined income of a woman, partners, or an entire household in which children appear. In the case of a woman leaving the labour market, the partner or members of the extended family may take part of the household’s burden of providing for the household and increase their employment to compensate for the loss in total income; these adaptive behaviour strategies are also of great interest.

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**Annex.** Sample structure by the parameters included in the model,% by column

	Variables	All women	Women with higher education	Women without higher education
Status of motherhood	Childless woman	25.2	31.4	20.2
	Woman with children under 18 years of age	64.2	61.6	66.3
	Woman with children aged 18 and older	10.6	7.0	13.5
Number of children born	Childless woman	25.2	31.4	20.2
	Woman with one child	41.0	39.0	42.6
	Woman with two or more children	33.8	29.5	37.2
Education	No higher education	55.6	-	100.0
	Higher education	44.4	100.0	-

## End of Annex

	Variables	All women	Women with higher education	Women without higher education
Age	20-24	12.6	11.4	13.6
	25-29	20.5	23.5	18.1
	30-34	20.9	24.5	18.1
	35-39	21.7	22.7	20.8
	40-44	24.3	17.9	29.4
Place of residence	Regional Center	46.3	53.4	40.7
	City	28.9	29.5	28.4
	Town settlement	5.2	4.6	5.7
	Rural areas	19.6	12.5	25.3
Partnership status	No partner, never married	19.0	21.2	17.3
	No partner, married before	14.0	13.0	14.9
	Partner/married	66.9	65.9	67.8
Health status	High (no more than 1 chronic illness)	74.4	76.0	73.1
	Low (2 and more chronic diseases)	25.6	24.0	26.9
Working contract	None (informal employment)	5.1	2.1	7.6
	Yes (official employment)	94.9	97.9	92.4
Employment sector	Industry, business and commercial services	58.4	53.1	62.6
	Social sphere and state service <sup>a</sup>	41.6	46.9	37.4
Length of the Working Week	Full Employment	98.8	98.9	98.8
	Part-time employment — less than 20 hours per week (REF)	1.2	1.1	1.2
Presence of subordinates	Yes	17.6	23.3	13.1
	No	82.3	76.7	86.9
<i>Total number of observations</i>		<i>1 425</i>	<i>633</i>	<i>792</i>

<sup>a</sup> Education, public administration, science, culture, social services, housing and communal services and military service

**Note:** in some cases the column amount may not be 100.0% due to rounding