Parenthood Penalty in Russia: Evidence from Exogenous Variation in Family Size

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Abstract

The present study aimed to improve upon the existing correlational literature on the parenthood penalty in Russia. An instrumental variables approach based on sibling sex composition and multiple births was employed to analyze rich census datasets. To the best of the authors' knowledge, this is the first study to provide causal estimates of the effect of fertility decisions on subsequent labor market outcomes for mothers and fathers in contemporary Russia. The study's primary finding is that, in contrast to the approximately 10 percent long-term motherhood penalty observed in developed countries, the causal impact of childbearing on women's employment in Russia is most significant in the first year after birth, reducing employment by around 15 percent. This penalty then rapidly declines to a modest 3 percent once children reach school age. The analysis indicates an absence of a systematic fatherhood penalty in terms of employment, although a modest increase in labor supply is observed.

Keywords: Parenthood penalty; Motherhood penalty; Fatherhood premia; Instrumental variables; Russian labor market.

JEL: J13, J22

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Introduction

"A child is for the absolute majority of Russian citizens a one-way ticket to poverty, a second child is a one-way ticket to destitution," said Michael Delyagin, deputy chairman of the Russian Parliament Committee on Economic Policy (Gazeta.ru, 2023). One might continue with this analogy saying a third child is a ticket to the baggage compartment of a train headed for bankruptcy. Indeed, a significant body of research in academic literature has consistently demonstrated that the birth of a child has a substantial negative impact on maternal employment and income levels in different cultural settings (e.g. Cukrowska-Torzewska & Matysiak, 2020; Kalabikhina et al., 2024), the phenomenon commonly referred to as the "motherhood penalty". Conversely, paternal employment and income levels are sometimes found to increase in response to childbearing (Oshchepkov, 2020; Wang, 2023). In turn, "parenthood penalty" has been studied in the Russian context too, while not frequently and focusing on "maternal" one. A small amount of extant research demonstrates an indisputable association between childbirth and a decline in employment and earnings (Arzhenovsky & Artamonova, 2007; Biryukova & Makarentseva, 2017; Karabchuk et al., 2021; Lebedinski et al., 2023; Nivorozhkina et al., 2008), both in the immediate postpartum period and on an average comparing women with and without children. For instance, Arzhenovsky and Artamonova (2007), who were among the first researchers to analyze Russian data from the early 2000s, found a permanent motherhood penalty of approximately 8-11% on monthly earnings. Later research support this results: Biryukova and Makarentseva (2017) showed a 4% constant reduction in earnings, explaining smaller amount of penalty by recent Russian pronatalist policy, while Karabchuk et al. (2021) found even higher penalty of 17%.

Thus, fertility has been demonstrated to exert a detrimental influence on the labor market, resulting in the constant exclusion of a substantial proportion of labor resources from the economy. Moreover, a reduction of employment as well as income of women due to childbearing is a common explanation for gender gap, which not only increases inequality, but also leads to ineffective of women's human capital use in the economy, thereby turning the problem from micro- to macro-level.

However, while the correlation between childbearing and labor market outcomes appears robust, the causal interpretation of these findings warrants careful consideration. A substantial proportion of extant research in the Russian context is predicated on methodologies that may be susceptible to endogeneity, thereby resulting in an exaggerated negative impact of childbearing. The primary issue is the selection bias. This phenomenon may be intertwined with pre-existing career aspirations, earning potential, or unobserved characteristics that independently influence labor market performance as well as desire for children (eg Lundberg & Rose, 2000). For instance, women who anticipate or prefer less intensive labor market participation might be more inclined to have more children and vice versa. Consequently, a simple comparison between mothers and childless women may overstate the negative impact of children themselves. The second problem pertains to reverse causality. Indeed, researchers in Russia have shown that, on the one hand, the number of children is negatively affected by mother's employment and earnings (Filimonova et

al., 2023; Zhuravleva & Gavrilova, 2017),[1] but on the other hand, number of children decreases mother's employment and earnings (Karabchuk & Nagernyak, 2013). In other words, fertility and economic decisions are co-determined and "since fertility variables cannot be both dependent and exogenous at the same time, it seems unlikely that either sort of regression has a causal interpretation." (Angrist & Evans, 1998, p. 451)

Furthermore, the direct application of findings from other countries and cultural settings to the Russian context may be misleading for several reasons. Firstly, the presence of a substantial public sector has been demonstrated to engender distinct employment dynamics and disparate levels of job security (Jin & Pyle, 2023; Nielsen et al., 2004) in comparison with predominantly market-driven developed economies, from which the majority of causal research on fertility and labor market outcomes comes. Secondly, the implementation of active pronatalist policies in recent years may interact with labor market outcomes in specific ways not observed elsewhere (Slonimczyk & Yurko, 2014; Validova, 2021). The situation is further complicated by the enduring soviet legacy, which promoted high female labor force participation alongside state-supported childcare (Frejka & Gietel-Basten, 2016; Zakharov, 2023). However, this legacy also embedded traditional gender roles that continue to influence contemporary family and work dynamics (Budig et al., 2012; Rebrey, 2023). These distinct features demand a focused analysis on Russia in order to comprehend the specific mechanisms and magnitudes of the parenthood penalty since results from other parts of the world might be invalid in Russian context.

The present study aims to address these critical gaps by focusing on the establishment of the causal effect of childbearing on labor market participation in Russia for both fathers and mothers. The research contributes to the field in two ways. From a theoretical point of view, the novelty lies in extension of the causal literature on fertility and labor supply to a major post-socialist economy using an instrumental variables design with nationally representative census data. From a practical point of view, the study serves to refine existing estimates of the effects of fertility on the labor market outcomes in Russia, thereby providing causal estimates of the impact of childbearing on economic behavior of parents.

The rest of the paper is organized as follows. Section 1 presents universal theoretical explanations of the negative effect of childbearing on labor market outcomes. Consequently, Section 2 examines prior research about Russia, with a particular focus on endogeneity concerns and potential inconsistencies. In Section 3, hypotheses of the study are formulated in accordance with the theoretical background and Russian context. Next, Section 4 details the empirical strategy addressing endogeneity concerns by introduction of instrumental variables design. Subsequently, the choice of data and estimators is described. Section 5 presents the results of the study. Section 6 discusses the findings and limitations as well as compares Russia with other developing and developed countries in terms of parenthood penalty. Finally, Section 7 concludes the paper.

[1] Interestingly, the results regarding the effect of employment on fertility in Russia remain controversial. While Zhuravleva and Gavrilova (2017) found positive effect of employment on the decision to have a child, Filimonova et al. (2023) presented negative effect using the same data.

1 Universal Mechanisms Linking Fertility to Labor Supply

The negative impact of childbearing on women's employment and earnings is a well-established phenomenon that has been extensively researched from both theoretical and empirical standpoints (Becker, 1985; Budig & England, 2001; Correll et al., 2007; Cukrowska-Torzewska & Matysiak, 2020; Grimshaw & Rubery, 2015; Kalabikhina et al., 2024; Lundberg & Rose, 2000). The parenthood penalty can be defined more formally as the systemic disadvantages that parents face in the labor market in comparison to those who do not have children. It is also possible to incorporate additional penalties, encompassing various aspects of well-being, such as health, life satisfaction, and social life; while these components have received less attention within academic literature. This section is predominantly focused on the economic impact of childbearing, while also addressing other effects occasionally. In many respects, the theoretical justifications for the penalties can be divided into two non-contradictory theories, namely *rational choice theory* and *status-based discrimination theory*.

The rational choice explanation is based on the classical economic idea that individual's earnings are a function of accumulated skills, education, and work experience, which can be concisely called "human capital". An increase in accumulated human capital is associated with better employment opportunities and higher wages. In turn, childbearing is hypothesized to decrease both women's human capital and further investments to it due to several reasons. Firstly, mothers tend to disrupt their career trajectories with periods of pregnancy and few years after childbearing, that leads to less work experience and training compared with childless women, who choose career (Lundberg & Rose, 2000). Moreover, because of anticipation of childbearing future mothers tend to invest less in education and training due to perceived lower returns on these investments given potential work interruptions and reduced working time (Staff & Mortimer, 2012). Additionally, labor-market interruptions can make skills outdated and less effective, thereby decreasing productivity in general, though it should be actual foremost for mothers who already have huge investments to skills – tertiary education (Anderson et al., 2002). Secondly, mothers choose "family-friendly" employment, which is less financially rewarding, but provides greater security and the opportunity for a more balanced work-family trade-off (Kleven et al., 2019). The public sector is often recognized as a such "family-friendly" employer, and mothers are frequently overrepresented in it, because of their preferences for security and stability over financial incentives (Budig & England, 2001; Nielsen et al., 2004).[2] For the same reasons mothers or further mothers might refrain from pursuing promotions that entail extended working hours or increased responsibility.[3] Thirdly, some authors hypothesized that motherhood should lower women's productivity. This is possibly due to mothers redistributing their labor supply and effort from professional activities to housework and childcare, which in turn leads to reduced investment in human capital

[2] An excellent example of this phenomenon is provided by an in-depth interview with a Russian mother who explains the preference toward public sector employment, as documented in an excellent paper by Isupova (2015, p. 202): "A steady paycheck... availability of this big vacation, which with children is very convenient ... sick leave, that is, I can go on sick leave at any time, even if the child has a little cough, and completely sit it out, which, I know, is not welcome in commercial organizations".

[3] This may be especially applicable in the context of Russia, where further mothers may prioritize lower-paid roles, whereas employers are bound by a strict yet advantageous labor protection laws designed to support mothers, offering substantial paid leave and guaranteed job security. More on this, as well as examples from Russian labor code, see Section 3.

and less career orientation (Becker, 1985).[4] Thus, the motherhood penalty can be interpreted as a consequence of rational choice for relatively more compatible with raising children occupation as well as lower human capital accumulation.

However, there is a critique of such straight economic explanation that can be called a status-based discrimination explanation. It was shown that mothers might be punished both in terms of wage and employment because of employers' aspirations about lower productivity of mothers compared to childless women (Correll et al., 2007). In that case, children play a role of a signal for employers that woman might be less prone toward career and would ask for lower hours, more flexible schedule etc.[5] Explanations for this phenomenon may be attributed to the fact that childbearing changes the status of women, who are now primarily assigned "social" role and responsibilities for raising and caring for children (Ridgeway & Correll, 2004; Valiquette-Tessier et al., 2019), as opposed to achieving self-realization through career advancement. In this regard, other potential statuses of women in society (e.g. graduated, young, specific nationalities etc.) may be in the background, while maternity completely shapes the perception of women by others (Ridgeway & Correll, 2004). This results in biased expectations of women in the workplace and underestimation of their abilities and motivation as workers. Moreover, mothers are usually associated with "warmth and caring" (Valiquette-Tessier et al., 2019) and may be discriminated against when being considered for leadership roles or simply being a responsible worker because of the masculinising attributes of leadership and hard work (Torres et al., 2024).[6] Interestingly, even if mothers are proved to be successful and efficient in their positions, they may still encounter discrimination on the basis of their being perceived as "less warm, less likable, and more interpersonally hostile than otherwise similar workers who are not mothers" (Benard & Correll, 2010, p. 616). Consequently, status of "mother" leads to lower employment and earnings, a pattern that should be particularly evident in roles characterized by intensive work schedules and significant responsibility.

For fathers (and partners of women with children), the literature is more likely to report on either the absence of a penalty or the presence of a "premia" when men with children have a higher level of employment and earnings (Killewald, 2013; Petersen et al., 2007, 2014). There are several explanations for this phenomenon, some of which are related to theories that posit a penalty for women in relation to childbearing. Firstly, it is argued that the stereotype that men are less efficient and will devote their working time to caring for a child is not valid in contrast to mothers. Conversely, society may associate the social role of the father with greater motivation to work in order to support the family – wife and children (see Pasley et al., 2014, for a comprehensive

[4]However, children themselves can be considered as economic agents, who would in turn take part of housework, which leads to increased mother's labor supply. Although this explanation may be applicable to traditional societies, in an industrialized world, children are not regarded as workers, but rather as a form of investment and economic good (speaking economically) that is not expected to generate direct economic returns (for a discussion see, for ex., Becker, 1960).

[5]To illustrate, I again refer to the interview by Isupova (2015, p. 201): "I went to so many of these interviews... Everyone was happy with my age, education, knowledge of computers. As soon as you announce that you have a child of two or three years old, their gaze immediately dims...".

[6]It should be noted that it is not only mothers who are discriminated against in this way, but all women as outlined by the role congruity theory developed by Eagly and Karau (2002). However, in line with previous discussion, one might expect mothers to experience more discrimination than childless women.

review on the perceived status/role of fathers).[7] Indeed, the "father" role is frequently perceived not as a "caregiver" and "housekeeper", but rather as a "breadwinner" or "provider", who must work hard and, therefore, will be more productive and responsible than childless man (Percheski & Wildeman, 2008). Secondly, rational choice theory posits that if the investment of time in child care is necessary, this should be undertaken by the less productive parent, who is usually mother; while father, on the contrary, increases the supply of labor to compensate for the losses of the household.

Thus, status-based discrimination explanation and rational choice theory concur with the same conclusion: women will be employed in more family-oriented but lower-paying occupations, or will be excluded from the work force at all. This effect is quite persistent across different cultures and was shown to work in Russia too (Isupova, 2015), that is further supported by strict Russian labor protection laws, which are very supportive of mothers as outlined below in Section 3. In turn, both theories also concur with the same expectation about effect for fathers: it should be positive, because fathers are treated as "breadwinners" who should respond to childbearing by increasing labor supply to support the family (both wife and children) and to compensate the decrease of wife's labor supply.

2 Previous research and potential problems

The issue of the paper's opening section, which concerns the extent to which the findings of studies conducted in other countries can be considered valid for Russia, remains unresolved. This is due to the limited number of studies that have been conducted using russian data. However, the extant literature has demonstrated that there is a significant negative effect of fertility on women's employment and income (Arzhenovsky & Artamonova, 2007; Biryukova & Makarentseva, 2017; Karabchuk et al., 2021; Lebedinski et al., 2023; Nivorozhkina et al., 2008), while the "premium" for fatherhood being either minimal or non-existent (Oshchepkov, 2020).

However, previous studies that aimed to identify the constant effect of childbearing – that is, not during the initial years following birth, but until the child attains adulthood – may be subject to severe bias, resulting in an exaggeration of the negative impact due to self-selection issues and reverse causality. The following discussion will address this issue in more detail.

Consider the following Direct Acyclic Graph (DAG)[8] in Figure 1 (for simplicity, employment is chosen as a dependent variable). Fertility affects employment that is depicted by arrow, which is under study (it is effect τ). However, there are two main problems. Firstly, there is a vector of unobserved factors U that affects both fertility and employment. This includes (but is not limited to) career ambition and preferences: individuals highly focused on career advancement might choose to have fewer children and to concentrate on professional life, while others might choose the opposite – to work less and to have more children. Thus, mothers with a relatively large number of children would have worked less anyway and vice versa. Unfortunately, it is almost impossible to control for such a factor, while education may be considered as a proxy for it. Nevertheless,

[7] It is important to note the paucity of research on the potential division between biological fathers and stepfathers (or so-called residential fathers). Later group, however, constitute a significant share of the population of interest both in the world and in Russia.

[8] See Cinelli et al. (2024) as an introduction to DAGs for causal identification.

this variable can be not confounder, but a collider that is endogenous and is highly affected by the fertility choice, thereby bringing us to initial problem of omitted unobserved factors. As was shortly summarized by Grimshaw and Rubery (2015, p. 23), classical econometric approaches as OLS fail to address these problems "because motherhood has been held to influence both women's own initial education investments and labor market entry choices and employers' attitudes and practices with respect not only to recruitment but also to pay and promotion practices and even work organization and job design." Thus, there is no option to consistently estimate the causal effect of fertility τ since there is a huge set of unobserved covariates. Moreover, there is a problem of reverse causality that is depicted by the arrow from employment to fertility. Since the sign of the arrow is known to be negative as well as the sign of opposite arrow, the $\hat{\tau}_{OLS}$ should be negatively inflated due to self-reinforcing cycle, meaning production of highly pessimistic results.

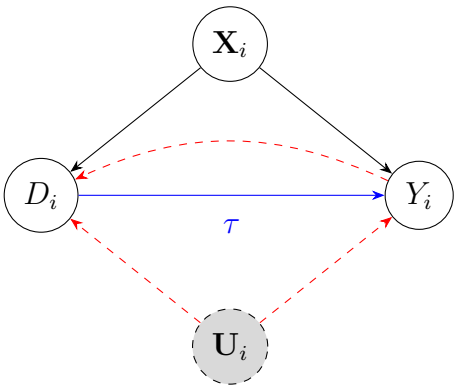


Fig. 1. DAG for 'classical' model.
Note: U denotes unobserved characteristics, X denotes observed (and controlled) characteristics; τ denotes the effect of interest; arrows show causal paths; dashed lines represent biasing paths.

Based on the discussion above, I suggest that the estimates of motherhood penalty in Russia, ranging from 4% to 17%, is an example of such pessimistic results that stem from fail to address reverse causality and self-selection problems. The following discussion will address the findings and methodological pitfalls of each of the previous studies (for a compact summary, see Table 1 below)[9].

The first attempt to quantify the size of the motherhood penalty was made by Arzhenovsky and Artamonova (2007). They estimated OLS model with the dependent variable being the wage per month and the independent variable being a categorical variable for the number of children. The found penalty for one child is 11%, for two it is 7% (interestingly, this estimate is insignificant), and for more than three it is approximately 33% to 40%. In line with previous discussion, these estimates might be considerably biased by self-selection problem, since there is no control for selection procedure. Additionally, occupation type (public/private sector) and education level that were introduced as control variables probably are colliders since they depend on fertility choices.

The next study by Nivorozhkina et al. (2008) almost replicates the result by Arzhenovsky and Artamonova (2007). However, authors additionally did instrumental variables' estimation, using

[9]It is essential to emphasize that my intention is not to demonstrate the inherent inferiority of the works under discussion and so forth. The objective is to highlight the limitations of past studies in interpreting results as causal, despite the notable quality of that papers. I therefore ask readers to excuse the somewhat arid tone of the narrative and the failure to emphasize the merits of the papers during the description thereof.

the presence of a non-working woman over 49 years old (grandmother) in the household and income of other household members. The final estimate by instrumental variables is about 11%, while OLS shows about 8% penalty. Nevertheless, in the case of instrumental variables selected by Nivorozhkina et al. (2008), the assumptions are likely to be violated, which leads to even more bias than unadjusted OLS estimation. The instrumental variables are presumed to affect independent variable – childbearing, – yet it is further assumed that they do not affect the outcome – wage. Do income of other households and the presence of grandmother affect mother's behavior on labor market? I state that the answer is positive: in cases where the income of other household members is sufficiently high, it is probable that women will opt for reduced or even non-participation in the workforce; conversely, in households with the presence of a grandmother, it is conceivable that women may choose to increase their labor force participation, as the grandmother may undertake the housework in their stead. Consequently, the selected variables cannot be treated as instruments and their application does not resolve the issue, but possibly exacerbates it.[10]

The study by Biryukova and Makarentseva (2017) was presented almost 10 years after the publication of the two preceding studies. In order to address the selection bias, the researchers employed inverse probability weighting (IPW) to achieve a balance between mothers and childless women according to observed characteristics. The application of weighting serves to minimize the disparity between the treated (mothers) and control (childless women) groups, thereby ensuring the recreation of a quasi-randomness of childbearing assignment. However, this approach might exclude observed confounding, while it is possible that confounding may be unaltered. The set of covariates includes the following: age, place of residence, marital status, health, and some occupation parameters. Regrettably, these factors alone are probably inadequate for the control of selection into mothers, as all of them may be regarded as already influenced by underlying women's anticipation. It therefore follows that while the IPW will reduce bias due to observed imbalances, it will not solve the problem of unobserved imbalance between groups (see Imai et al., 2008).

A noteworthy study by Budig et al. (2016) examines 22 industrialized countries and found no significant effect of childbearing on wages. The research design in this study is analogous to Biryukova and Makarentseva (2017) and Nivorozhkina et al. (2008), but the resulting model is for all countries, with country effects being modelled through random slope of the number of children. Additionally, a series of macro-level control variables are incorporated, the majority of which pertain to government policies designed to support motherhood such as the length of job-protected leave due to childbearing, publicly supported infrastructure for childcare etc.

The study by Karabchuk et al. (2021) is, to the best of my knowledge, the first attempt to examine the motherhood penalty using panel data from 2000 to 2015. In line with previous papers, authors used OLS model, though also introducing individual fixed effects (FE) to control for time-variant factors. The research found that, on average, the wage penalty ranges from 4% to 17%, depending on the model specification and dependent variable – monthly or hourly wages. Whilst

[10]Even if these instruments are exogenous and restriction criteria are satisfied, they appear to be weak: the presence of grandmother has no effect on the number of children and only household income is significant. The utilization of weak instruments has the potential to result in severe bias (e.g. Lal et al., 2024, see also Section 4 of the presented paper).

the utilization of panel data provides opportunity to control for time-invariant factors using FE, this is not a panacea. The timing of childbirth itself may be endogenous and correlated with transient shocks to an individual's earnings trajectory or employment prospects. This suggests the presence of a set of unobserved factors that changes during the life-course. For instance, a woman might choose to have a child when she perceives her career to be stagnating or if she anticipates a period of lower earnings for other reasons. In such a scenario, the observed decline in post-childbirth earnings might be attributed to these pre-existing negative career dynamics rather than to the impact of motherhood. Conversely, women may schedule births after attaining specific career milestones, a factor which may also complicate the identification of causal inferences. Thus, the presence of unobserved time-varying factors, including changes in motivation, health status, life-satisfaction etc. that differentially affect women around the transition to motherhood, might also lead to inconsistent estimates even within a FE framework. Moreover, the usage of FE OLS in panel data settings implicitly assumes that there past outcomes (labor market outcome) do not directly affect current outcome; past outcomes do not directly affect current treatment (the presence of child); and past treatments do not directly affect current outcome (Imai & Kim, 2019). In case of childbearing, all that assumptions are likely to be violated, which leads to biased estimates.[11]

The research by Lebedinski et al. (2023) differs dramatically from the others, exploiting event-analysis with RLMS data from 1994 to 2018. Additionally, authors used not only wage, but also employment as well as monthly worked hours as dependent variables, expanding the analysis of parenthood penalty.[12] The paper uses an event-analysis research design, which is an OLS model with FE, as well as dummies for the periods before and after the treatment (childbearing), to recreate the difference-in-difference design, which might effectively address selection bias and produce average effect on treated (ATT) effect. However, it assumes that there are parallel trends between the control and treated groups before treatment adoption. In the case of OLS with period dummies, some support for the PTA might be shown if the dummies for the pre-treatment periods (which show the difference between the treated and control groups in the dependent variable) are insignificant. Unfortunately, this is not the case in the study by Lebedinski et al. (2023), where in the majority of the models the pre-treatment dummies are negative and significant (see Tables A3-A9). This might indicate the imbalance between control and treated group and selection bias.[13] However, this study provides the most reliable estimates of the motherhood penalty in terms of the number of dependent variables and the research design. Nevertheless, it only focuses on the period

[11] Also, recently De Chaisemartin and d'Haultfoeuille (2020) highlight one more problem with FE OLS for causal inference in panel data setting. In that case, the ATE is the weighted sum of individual's ATE. If there is treatment effect heterogeneity (i.e., effect of childbearing is not constant for units, years, etc.), FE OLS may reverse the sign of the true effect due to "negative weighting".

[12] However, authors claimed to find no effect of fatherhood penalty, and throughout the paper they analyzed only motherhood penalty.

[13] While authors did not discuss that issue, the significant coefficients of $t-1$ dummy might be the product of pregnancy since $t=0$ is a birth. However, in that case there is no possibility to assess PTA, because $t-1$ is a part of treatment, $t-2$ is a reference category, and only $t-3$ remains that is not sufficient to assess PTA. Also, it should be noted that even if there were a few more pre-treatment periods with insignificant dummies, it is just weak support for PTA in case of FE OLS (see Freyaldenhoven et al., 2019). In turn, there are models where $t-1$ dummy is insignificant that, on the one hand, might show the zero effect of pregnancy on worked hours and wage, but on the other may indicate the lack of statistical power of the tests. Interestingly, in the models where $t-1$ dummy is insignificant, all other effects ($t+1$, $t+2$, etc.) are also insignificant, meaning no parenthood penalty. Thus, the problem with statistical power is highly possible.

immediately after childbirth — five years. Therefore, results cannot demonstrate the long-term effects of childbearing.

Research by Oshchepkov (2020) is the only one to my best knowledge example of the study that focuses on fatherhood penalty in Russia.[14] In the study RLMS data for 2000-2018 period is used, from which only residential fathers (who live with children) in partnership were selected. Exploiting FE OLS approach as in (Karabchuk et al., 2021), author found small, but positive effect on earnings for fathers who have one child under the age of 3. Since potential issues with the FE OLS estimator for estimating the parenthood penalty have already been discussed, I do not elaborate the point with selection bias concerns, though author effectively addressed possible "anticipation" problems that violates PTA as well as did not include colliders into the model.

3 Hypotheses and Russian context

The preceding Sections provided a review of extant published studies on the problem of quantifying the parenthood penalty in Russia, focusing on maternal penalty. The majority of these studies attempted to identify a permanent (or at least long-term) effect of childbirth on the wages of mothers in comparison to non-mothers. Almost all papers, except one (Budig et al., 2016), have identified a negative relationship between motherhood and wages (Arzhenovsky & Artamonova, 2007; Biryukova & Makarentseva, 2017; Karabchuk et al., 2021; Nivorozhkina et al., 2008), with the magnitude of this effect ranging from 4% to 17%. This is a considerable effect, given that such an impact is assumed to be constant throughout the greater part of a woman's professional life. Nevertheless, the authors note that this is largely explained by a considerable decline in the first years following childbirth, although a negative effect of motherhood is also observed later in life. Furthermore, the authors demonstrated that the effect can be heterogeneous by educational status, with women who have received a higher education being more susceptible to the penalty (Biryukova & Makarentseva, 2017). This finding is consistent with the results obtained by researchers in other countries (Anderson et al., 2002; Angrist & Evans, 1998). However, it should be noted that each of the studies may be subject to a selection problem that is quite difficult to address using classical econometric approaches exploited by previous studies. Meanwhile, an exception is study by Lebedinski et al. (2023), where event analysis is employed, but it only focuses on the period immediately after childbirth, so results cannot demonstrate the long-term effects of childbearing in contrast to aforementioned. Furthermore, the extant literature has exclusively focused on the wages of employed women,[15] thereby excluding a subset of mothers who did not re-enter the workforce following childbirth, and also excluding the unemployed from the control group. Consequently, it is uncertain whether the birth of a child leads to a reduction in the labor supply of women and fathers.

[14] However, there is one more research by Abazieva (2010) that merits a footnote. It focused on fatherhood premia with usage panel microdata from 2004 to 2007. Whilst author efficiently summarized the "selection-into-fathers" problem and even exploited difference-in-difference design, it is unfortunate that it is impossible to identify the treated and control groups from the text, since the author did not describe them. In the absence of the aforementioned elements, as well as no diagnostics for PTA, any discussion of this research is unfeasible.

[15] Studies by Lebedinski et al. (2023) and Gasiukova et al. (2024) are exceptions, though they show only the immediate effect of childbearing.

Tab. 1. Summary of previous research findings and identification of potential problems.

Reference	Data & sample	Estimator/correction	Dep. var	Effect	Possible problems
Arzhenovsky and Artamonova (2007)	RLMS, 2003-2005 (treated as CS); Employed women aged 18-49	OLS / –	Monthly wage, ln	-0.08	Selection bias; Inclusion of colliders: education, occupation status; Reverse causality
Nivorozhkina et al. (2008)	RLMS, 2003-2005 (treated as CS) + NOBUS 2003; Employed women aged 18-49	Switching OLS / instrumental variables	Monthly wage, ln	-0.113	Weak instruments; Violation of exogeneity and exclusion restriction; Inclusion of colliders: education, occupation status
Budig et al. (2016)	RLMS, 2000/2001 (CS); Employed women aged 25-45 (russian data as part of cross-cultural dataset)	RE OLS / Heckman model	Monthly wage, ln	Insignificant effect	Selection bias due to unobserved factors in Heckman model; Inclusion of colliders: education; Reverse causality
Biryukova and Makarentseva (2017)	RLMS, 2014 (CS); Employed women aged 20-44	OLS / IPW	Monthly wage, ln	-0.039	Selection bias due to unobserved factors in IPW model; Inclusion of colliders: education, occupation status, health; Reverse causality
Karabchuk et al. (2021)	RLMS, 2000-2015 (panel data); Employed women aged 18-45	OLS / FE	Monthly / hourly wage, ln	-0.104/-0.039	FE OLS problems for difference-in-difference strategy as outlined in the text; Inclusion of colliders: education, occupation status; Reverse causality
Lebedinski et al. (2023)	RLMS, 1994-2018 (panel data); Any women	OLS / Event analysis design	Employment; monthly wage, ln; hours worked	–	Violation of PTA
Oshchepkov (2020)	RLMS, 2000-2018 (panel data); Residential fathers in partnership aged 25-59	OLS / FE and anticipation tests	Monthly wage, ln	0.03	FE OLS problems for difference-in-difference design as outlined in the text

Note: OLS – Ordinary Least Squares; CS – cross-sectional data; FE – fixed-effects; RE – random effects; IPW – inverse probability weighting; PTA – parallel trends assumption. For a detailed discussion of each of the papers, see Section 2.

The theoretical arguments previously outlined provide compelling evidence that childbirth has a significant impact on women's employment, both in the immediate period following childbirth and over the course of their lifetimes. In comparison with other developed countries, however, I expect that the magnitude of employment penalty to be less pronounced in Russia due to the distinct characteristics of its labor market. These include high labor mobility and "downward" flexibility, which result in a relatively low rate of firings during periods recession, because of the prevalence of wage and hours reduction measures as well as large public sector (Gimpelson et al., 2010; Kapelyushnikov, 2001; Kapelyushnikov et al., 2012). Figure 2 shows the correlation between fertility and female labor force participation with control for level of economic development across European and post-Soviet countries. One can see that Russia as well as other post-Soviet countries lie in the left-high quadrant, so they have higher female participation in labor than other countries with the same fertility level.

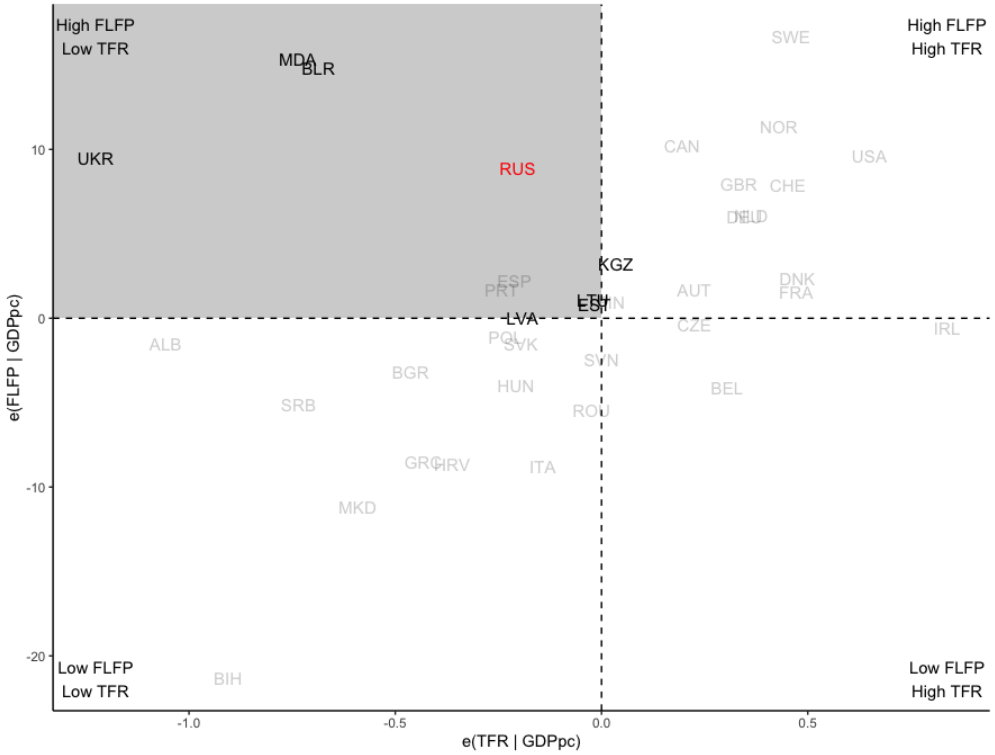


Fig. 2. Partial correlation between total fertility rate (TFR) and female labor force participation (FLFP) in Europe and post-Soviet countries in 2019.

Note: The plot depicts partial correlation between total fertility rate from and female labor force participation (national estimates in %, 15+) where variables are residuals from OLS models with the log of GDP per capita (2021 international $, PPP) as covariate. All variables are sourced from the World Bank (2025).

However, this expectation is too complicated to be tested there, since the paper focuses on identifying the causal impact of childbearing in Russia, but it will be addressed in the discussion section. In turn, in line with other research, I do not expect any effect on father's employment. These are the core hypotheses of the study that tests the causal effect of the childbearing:

Hypothesis 1. *Childbearing has a negative effect on maternal employment.*

Hypothesis 2. *Childbearing has no effect on employment of mother's husband.*

In addition to the primary hypotheses, I expect the effect to be heterogeneous by level of education. However, while other authors have noted that the negative effect of having a child should be predominantly for women with higher education, I am more inclined to believe that in Russia, on the contrary, the effect will be more negative for women without higher education, that is, who are more likely to be employed in less skilled sectors. This can be attributed to a several underlying factors. Firstly, women who have received a higher education are more likely to be employed within the public sector, which is a "family-friendly" employer and will not require mothers to resign in order to avoid the relatively stringent requirements of Russian legislation on paid leave. Whilst Russian labor laws are formally strict and protecting, their enforcement is low, especially in private sector (Gimpelson et al., 2010). This situation is especially pronounced in case of maternity leave and other benefits for mothers (and some for single fathers) in labor market. To illustrate, pregnant woman, mother with child under age of 3 as well as single mother with child under age of 16 cannot be fired (Articles 261, 298);[16] the employer is obliged to reduce the production rate of a pregnant woman while maintaining her salary, and in the case of "unfavorable factors", completely release her from work while maintaining her salary (Article 254); Additional feeding breaks for the child(ren) at least every 3 hours for at least 30 minutes each for women with child(ren) under age of 1.5 (Article 258); lower job responsibilities upon application with save of previous salary for women with child(ren) under age of 1.5 (Article 254); Additional annual leave "at a convenient time" of up to 14 calendar days upon request for mothers with at least 2 children under age of 14; "maternity leave" (Article 255) and "child care leave" (Article 256) are in total of 140 days (these leaves follow one another); after their end woman can immediately go on paid "parental leave" to care for her children until they are three years old, which means that total length of leave is about 1175 days (note, employer must retain mother's position and not fire her during the whole time).

Furthermore, women who have received tertiary education are more likely to be able to defend their rights before their employers and not face illegal schemes to terminate the employment of women with children, in circumvention of the law. Finally, studies discussed in Section 1 provided compelling evidence to support the claim that employers with intensive labor usage are more likely to exhibit bias against hiring mothers, and indeed, to dismiss them. This bias should be higher in unskilled roles characterized by strict working schedules. Because of that, I expect women without a tertiary education will face a greater penalty for motherhood compared to women who have received a tertiary education in terms of employment:

Hypothesis 3. *Negative effect of childbearing is more pronounced among mothers without tertiary education.*

The hypotheses described above relate to the permanent effect of parenthood. Nevertheless, this research fails to identify the effect of childbearing on wages, which have been a focal point of preceding studies, because of the data limitations (see Section 4.3). In defense, it seems to be the only opportunity to examine the causal effect of motherhood on women's economic status, and

[16] All information here and below is sourced from the latest edition (07.04.2025) of the Russian labor code with the indicated particular articles.

to move away from correlations that almost certainly greatly overestimate the negative effect of having a child as outlined in Section 2.

4 Data & Methods

In this section the empirical design of research is presented. Firstly, the general analytical strategy is described in Section 4.1 introducing the instrumental variables approach to address endogeneity problem. Secondly, Section 4.2 describes the model choice and operationalizations. Finally, in Section 4.3 data sources are presented, namely random samples from Russian censuses of 2002 and 2010.

4.1 Empirical Strategy

A possible research design that gives a chance to consistently estimate the effect of fertility on economic activity that is not suffering from omitted variables problem as well as reverse causality is an instrumental variables approach. Consider the new version of DAG from Figure 1 in Figure 3, where a variable Z is added. It has a causal effect on fertility, while does not depend on other factors in the model and affects employment only via fertility. Such a variable is called an instrument. In other words, it is a source of exogenous variance in the fertility that does not depend on U – vector of unobserved confounders – and enables to estimate the causal effect τ under some regular assumptions, which are discussed further.

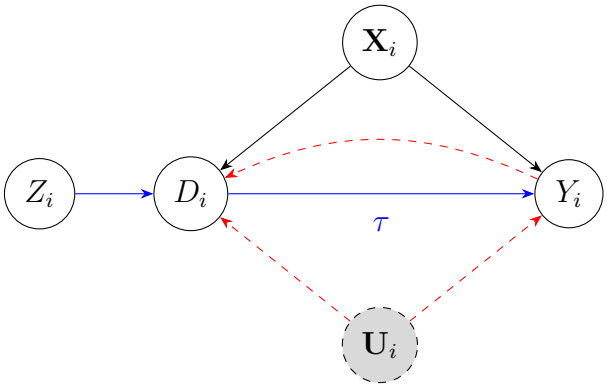


Fig. 3. DAG for instrumental variables approach.
Note: U denotes unobserved characteristics, X denotes observed (and controlled) characteristics; τ denotes the effect of interest; Z is an instrumental variable; arrows show causal paths; dashed lines represent biasing paths.

As candidates for instruments for fertility, two variables are used that were already exploited by other authors in Western context. The first is the sibling sex mix in families of the fist two children in families with at least two children. This instrument was originally proposed by Angrist and Evans (1998). Underlying idea is straightforward: parents with two children have a slightly higher probability to have a third child if the sex of the first two children are same-sex. For instance, if a couple have two boys (girls), the probability to have one more child is higher than if a couple have boy and girl. This finding is quite persistent across different countries and years, suggesting it works for Russia too: Adsera (2011) found its significant effect using sample of 13 EU countries from 1994 to 2000; Cruces and Galiani (2007) found the same significant results for Argentina and Mexico, using censuses' data; while Zhuravleva and Gavrilova (2017) found positive association

for Russia using RLMS data. Since the sex of a child is independent of any mothers characteristics (no arrows from U to Z in Figure 3), it therefore is as good as randomly assigned. Hence, the exogeneity assumption is hold.[17]

The next assumption is exclusion restriction – the instrument should affect dependent variable only through independent (no arrows from Z to employment). In the case of same-sex instrument, it is highly probable since there is no evidence to expect the effect of children's sex on economic activity of parents not through fertility itself, but by other channels. However, I should note that some authors consider possible violations of this discussing some possible paths – intra-household bargaining, marital stability, and social norms about sons versus daughters (Bedard & Deschênes, 2005, e.g.). I believe that in the fertility context these direct effects are small relative to the parity channel, but they cannot be ruled out in principle. I partially address this concern by including, in some specifications, partners' characteristics (marital status, partner's labor status and education).

The second candidate for instrument is multiple births, which was first used as a source of exogenous variance by Rosenzweig and Wolpin (1980), while they used its specific version – twins occurrence. Since the birth of one or two children at once is completely random and does not dependent on any mothers characteristics, it is exogenous.[18] The exclusion restriction also holds, as the birth of an additional child cannot affect economic activity through channels other than fertility. Meanwhile, twinning may entail short-run health or time shocks that affect parental employment beyond the mechanical increase in family size, while it is still an effect of childbearing.

The last, but not least, clarification that should be done is that estimation via instrumental variables can be interpreted not as average treatment effect (ATE), but as local average treatment effect (LATE). Given that there are no "defiers" in the sample (monotonicity assumption), who choose not to have children ($D_i = 0$) because of instrument ($Z_i = 1$);[19] instruments are (conditionally) exogenous and are strong enough; and exclusion restriction holds, the estimated $\hat{\tau}_{IV}$ shows the effect of childbearing on those whose treatment status D_i can be changed by the instrument Z_i, so for "compliers" subpopulation (more on LATE, see Angrist et al., 1996; Imbens & Angrist, 1994).[20] However, LATE is equal to ATE if the effect of childbearing is homogenous across population. In the presented setting, I believe that LATE is plausibly close to the ATE for two reasons. Firstly, for the sex-composition instrument, compliers are drawn broadly from the population of two-child families because the sex of the first two children is (conditionally) as good as randomly assigned and its effect on the probability of a third birth does not appear to be concentrated in narrow covariate cells (see Appendix A for descriptive statistic of control variables by instruments values). Secondly, the mechanisms linking an additional birth to parental employment are not expected to

[17] I do not consider extreme cases, where sex of a child might be a function of some parents characteristics, while it might be plausible in some circumstances. For example, in China during one-child policy the sex ratio rose from classical 105 boys per 100 girls to 150 boys per 100 girls in some regions due to sex-selective abortions (e.g. Cai & Feng, 2021). In case of Russia such a scenario is unrealistic, and the sex ratio at birth is stable.

[18] However, it is known that multiple births are more likely for older women (e.g. Bortolus et al., 1999) which can be controlled by inclusion of age in the model, thus not violating the assumption of (conditional) exogeneity of the instrument.

[19] More formally, $D_i^{Z=1} - D_i^{Z=0} \geq 0 \; \forall \; i$, which means that population is affected by the instrument in the same way (see Imbens & Angrist, 1994). Thus, LATE shows $\mathbb{E}[Y_i(1) - Y_i(0) | D_i^{Z=1} - D_i^{Z=0} \geq 0]$.

[20] The share of "compliers" in the population for the siblings' sex composition and the multiple births instruments under assumption of no "defiers" are presented below in Section 5, Table 2.

vary sharply with the instrument itself, so the compliers effect is informative about the average effect among at least parity-two families.

4.2 Estimators

The usual strategy to estimate the effect of endogenous variable of interest D_i using instrument Z_i is to run Two-Stage Least Squares (2SLS) model as well as to provide Wald-estimates. Since both D_i and Z_i are binary variables, the effect τ can be estimated via Wald-estimator. It should be noted that while it is an asymptotically unbiased estimate of τ, its variance is too large in case of not strong enough instruments which complicates the assessment of the significance of the effect. To provide more efficient estimates as well as to control for potential confounding, I also run a set of 2SLS models. Without loss of generality, each model is presented as a system of two linear models:

$$D_i = \alpha_0 + \mathbf{Z}_i'\nu + \mathbf{X}_i'\gamma + \xi_i \tag{1}$$

$$Y_i = \beta_0 + \tau\hat{D}_i + \mathbf{X}_i'\theta + \varepsilon_i \tag{2}$$

where $\mathbf{Z}_i$ is a vector of instrumental variables, $\mathbf{X}_i$ is a vector of control variables and $\hat{D}_i$ is a prediction from (1) that is a "cleaned" from endogenous variation version of observed treatment D_i. Therefore, given exogeneity of $\mathbf{Z}_i$ and $\mathbf{X}_i$, as well as $\nu \neq \mathbf{0}$, $\hat{D}_i$ is exogenous and $Cov(\hat{D}_i, \varepsilon_i) = 0$, meaning it is as good as randomly assign. Thus, $\hat{\tau}_{2SLS}$ from (2) is consistent estimate of τ.

As a first instrument for (1), I use a binary variable for same-sex: $Z_i^{samesex} = 1$ if $s_{1i} = s_{2i}$, where s_{1i} and s_{2i} is a sex of a first and a second child respectively. However, as was shown by Angrist and Evans (1998), same sex instrument is associated with sexes of children, which might affect economic behavior for reasons other than family size. Because of that sexes of children are included in the model as control variables:

$$D_i = \alpha_0 + \alpha_1 z_i^{smsx} + \alpha_2 s_{1i} + \alpha_3 s_{2i} + \mathbf{X}_i'\gamma + \xi_i \tag{3}$$

$$Y_i = \beta_0 + \tau\hat{D}_i + \beta_1 s_{1i} + \beta_2 s_{2i} + \mathbf{X}_i'\theta + \varepsilon_i \tag{4}$$

where s_1 and s_2 are binary variables for sex of the first and the second child respectively.

The second set of instruments decompose same sex instrument into two: two boys and two girls. In that case, the first-stage model can be formulated as follows:

$$D_i = \nu_0 + \nu_1 z_i^{boys} + \nu_2 z_i^{girls} + \nu_3 s_{2i} + \mathbf{X}_i'\pi + \epsilon_i \tag{5}$$

the second-stage equation remains the same as in (4), but one of the children sex variables – s_{1i} and s_{2i} – should be omitted since instruments are just products of them.

The third instrument is a multiple births occurrence, and the first-stage model is:

$$D_i = \lambda_0 + \lambda_1 z_i^{mltbrth} + \lambda_2 s_{1i} + \lambda_3 s_{2i} + \mathbf{X}_i'\eta + \varsigma_i \tag{6}$$

Finally, I estimate the over-identified 2SLS model, using same sex and multiple births to reach more precise estimates. However, such a strategy may lead to some sort of aggregation bias since two instrumental variables – siblings sex composition and multiple births – show different sides of fertility effects on economic activity. In case of multiple births, it is a "fertility shock", since instead of one child parents obtain two at once. Obviously, the effect of such an event should be stronger than the birth of a third child after some lag from the second one.

While Hypotheses 1-2 are straightforward and can be tested by usage of different specifications of 2SLS models, Hypothesis 3 expects heterogeneity in the effect of fertility by education of mothers. The introduction of interaction terms is a common and effective strategy; however, it is not feasible with the 2SLS model described above due to the limited number of instrumental variables. Since the effect of childbearing varies across education levels (and not necessarily in a linear fashion), one should use categorical variable for education with at least several levels. In that case the number of endogenous variables in $\mathbf{D}_i$ equals the number of levels plus 1, which requires at least the same number of instruments in $\mathbf{Z}_i$ (see (1)). Therefore, I employ identical models on subsamples of mothers (and fathers) with different levels of education. This approach effectively addresses the issue of an excessive number of exogenous variables while still enabling the between-groups comparisons.

To test the relevance assumption – the significant and strong enough link between instrument(s) and endogenous variable – I use robust F-statistic to control for possible heterogeneity applying HC1 correction for variance-covariance matrix (the same is done for the second stage variance estimates), because F-statistic under homogeneity assumption might be inflated. Additionally, for the 2SLS model with one instrument – same sex or multiple births – I report Anderson-Rubin 95% CI (also known as weak-instrument interval) that is robust to possible weakness of the instrument (Chernozhukov & Hansen, 2008). All that concerns on the weakness tests stems from the fact that 2SLS with weak instruments might be more biased than usual OLS estimates if exogeneity or exclusion restriction assumptions only partially hold (e.g. Lal et al., 2024).

The final point to be made is the effect estimation of childbearing on employment that is a binary dependent variable. I follow standard practice and estimate completely linear 2SLS. This identifies a LATE on the probability scale under the usual IV assumptions and does not depend on correct specification of a logit/probit first stage. Nonlinear alternatives (control-function/2SRI, probit, etc.) can be more efficient if their distributional assumptions hold but risk bias if misspecified (Angrist & Pischke, 2009, p. 147-152). Moreover, Angrist (2001) demonstrates that linear 2SLS does not differ significantly from estimators that assume nonlinearity replicating the paper by Angrist and Evans (1998) – exactly the same research design on the effect of fertility on labor market outcomes that is used in the presented paper. Hence, I choose to exploit linear 2SLS estimator as a model with simpler properties.

4.3 Data & Variables

As a main source of data for analysis I use 10% random samples from Russian Censuses of 2002 and 2010 (Rosstat, 2021a, 2021b) that is similar to strategy by Angrist and Evans (1998). Since

census is an example of cross-sectional data, I do not study possible temporal variation of the parenthood penalty explicitly, but do independent analysis on each sample to get more robust results. Unfortunately, in censuses there is only a modest set of variables that might reveal the parenthood penalty in Russia. Hence, as main dependent variables I consider employment and the presence of a second job (the last variable is available only for 2010 census)[21] since there are no indicators for income, wage and working hours.

The specific sub-sample of mothers from censuses is used. The samples are limited exclusively to mothers with a minimum of two children, as the instruments employed – namely, siblings, sex composition and multiple birth – are only able to demonstrate the effect of childbearing through the comparison of mothers with a two or more children. Secondly, the anonymity of census data ensures that it is not possible to identify separated children. Consequently, the sample is limited to mothers aged 18-55 whose eldest child is under the age of 18, what ensures that probability of moving to another household is small. To estimate the effect of childbearing on husbands, only one additional restriction to the previous sub-samples is needed – by marital status. In other words, the husbands' analysis exploits sample of married mothers to whom husbands characteristics were matched, whereby it restricts husbands' sample only to cohabit couples. Concurrently, there is no restriction on formal marriage and couples can be unregistered.

As control variables from the censuses following personal characteristics are collected: age, type of place of living (rural/urban), region of living and education. To the model specifications in (3)-(6) as controls (matrix $\mathbf{X}_i'$) the following variables are included: mother's age (categorical variable with 5-year age groups where "<25" and "45+" are lowest and highest categories respectively), children's age (treated as continuous variable), marital status (binary variable, identifying whether there is a spouse) and rural dummy as well as region FE. Education is excluded from this list since it might be endogenous: level of education is affected by fertility. However, further I present results on sub-samples by mother's education to find potential heterogeneity in the parenthood penalty.

The main limitation with census' data is its quality. In academic community Russian censuses are considered at best as moderately acceptable (Andreev, 2012; Mkrtchyan, 2011).[22] Furthermore, the issue of underestimation of the population is especially pronounced for children under age 5, who partially form the sample of mothers in the presented study. Thus, the results might be not representative; and, secondly, biased due to "death souls" – fictitious individuals who emerged to fulfill census enumerators' quotas, – undercounting of individuals in specific age groups, and double counting, when one individual might be enumerated twice (though the latter problem is primarily common for internal migrants). The first limitation is not severe since the sample is large enough to consider it as an interesting population of Russians who appears in 2002 or 2010 censuses. The second limitation, in turn, might lead to selection bias because the sample may have

[21] Precisely, "employment" variable is a response to the question asking whether the respondent had a paid job in the time of census. Concurrently, "second job" is a response to the question asking whether the respondent had a second paid job in the time of census

[22] According to the results of a survey conducted by Russian Public Opinion Research Center (VCIOM, 2010), in 2010 census 11% of respondents were not enumerated in the census, while 22% were enumerated by relatives. In turn, in 2002 census 5% and 19% were not enumerated at all or were enumerated by relatives respectively.

excluded a significant proportion of mothers with the youngest children.

In summary, the final census samples comprise mothers aged between 20 and 55 with a minimum of two children, with the eldest child being under the age of 18. The descriptive statistics for the dependent, independent and control variables by instruments' levels are presented in Appendix A. The final samples are comprised of 553,394 and 482,260 mothers for the 2002 and 2010 censuses respectively, and 458,359 and 396,460 fathers for the same years respectively.[23] The selection procedure is summarized in Figure 4.

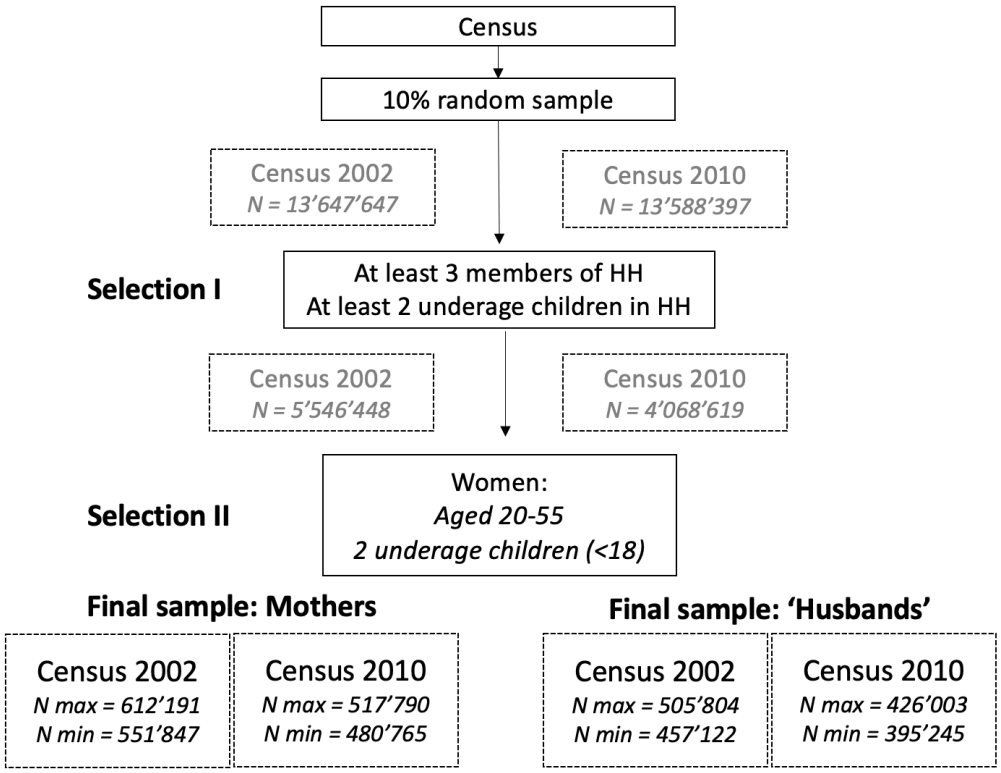


Fig. 4. Description of the construction of final datasets from the original censuses of 2002 and 2010.

Note: N max indicates the maximum number of observations without taking into account missing values in the control variables, while N min indicates the number of observations when removing missing values for all variables used.

5 Results

In Table 2, the Wald estimates are presented. The first three columns report the instrument name, share of women with 3 children (treated group) and share of women with the value of instrument equal to "1". Subsequent three columns are devoted for calculation of compliers populations. It is seen that in case of sibling's instruments, the share of compliers is relatively small: only around 3% of individuals with the same sex of children opted for a subsequent child. Interestingly, but these shares do not differ 2002 and 2010 censuses, suggesting the independence of instruments from temporal effects. In contrast, in case of multiple births the share of compliers is approaching 100 percent, though the share of women who experienced multiple births is small – just 1 percent for both 2002 and 2010 data. The Wald estimates for the 2002 data are controversial and insignificant,

[23]These numbers correspond to samples after listwise deletion. I assume that missing observations are distributed at random conditional on observed covariates.

suggesting the absence of childbearing effect on mother's employment. In contrast, the Wald estimates for the 2010 data depicts strong and negative effect of childbearing on labor market outcome. Same sex instrument suggests that permanent effect of childbearing on employment is about 10%, while multiple birth shows 6% decrease. As was outlined in Section 4.2, Wald estimate, firstly, fail to adjust for individual's characteristics, and secondly, are usually uncertain that is, indeed, the case in Table 2. Looking ahead, the remaining results with 2SLS models are very similar across the two censuses; accordingly, in the main text I focus on the 2010 census (the most recent), while the 2002 results are reported in the appendix.

Tab. 2. Wald estimates of the effect of chilbearing on mother's employment and complience probabilities, census data 2002 and 2010.

IV	$\mathbb{P}(D)$	$\mathbb{P}(Z)$	1st stage (compliers)	Compliers $D=1$	Compliers $D=0$	$\hat{\tau}_{Wald}$	$SE(\hat{\tau}_{Wald})$
Census 2002							
Same sex	0.16	0.51	0.03	0.08	0.02	0.01	0.11
Both boys	0.16	0.26	0.01	0.02	0.01	-0.08	0.41
Both girls	0.16	0.24	0.02	0.04	0.02	0.05	0.14
Multiple births	0.16	0.01	0.85	0.05	1.00	0.00	0.02
Census 2010							
Same sex	0.17	0.50	0.03	0.08	0.02	-0.10	0.05
Both boys	0.17	0.27	0.01	0.01	0.01	-0.46	0.19
Both girls	0.17	0.24	0.03	0.04	0.03	0.02	0.06
Multiple births	0.16	0.01	0.84	0.04	1.00	-0.06	0.01

Note: $\hat{\tau}_{Wald}$ shows Wald estimates calculated as in (**??**); $SE(\hat{\tau}_{Wald})$ is standard error calculated by nonparametric bootstrap with 500 samples. The first stage is the denominator of (**??**) which shows the total compliers' share in the population; the share of compliers in the treated population is $\mathbb{P}(D^{Z=1} > D^{Z=0}|D=1)$, while the share of compliers in the untreated population is $\mathbb{P}(D^{Z=1} > D^{Z=0}|D=0)$.

In Table 3 the analysis of the effect of childbearing on mother's employment is presented with the usage of 2010 censuses respectively, while in Appendix Table B1 reports results for 2002 census. In Table below the first model corresponds to OLS estimation that shows highly negative and significant effect of fertility on labor supply: the presence of the third child, ceteris paribus, reduces employment by about 20 percentage points. In contrast, 2SLS estimates of the effect differ dramatically from OLS results, with only the model with multiple births displaying a negative effect of approximately 3 percentage points. Conversely, models employing same-sex instruments

fail to identify any significant effects associated with the third child. Given the sufficient strength of the instruments (all tests on weakness are rejected at any reasonable significance level), the analysis suggests that OLS estimates are considerably inflated, while the causal effect is modest. However, as was previously stated, the multiple births instrument demonstrates the impact of fertility shock. Conversely, the same-sex instruments identify the general effect of fertility, which, as proposed by the analysis, is negligible.

Tab. 3. OLS and 2SLS estimates of the effect of childbearing on mother's employment, 2010 census.

	OLS	2SLS	2SLS	2SLS
Intercept	0.34^{***}	0.35^{***}	0.35^{***}	0.36^{***}
	(0.02)	(0.02)	(0.02)	(0.02)
More than 2 children	-0.20^{***}	-0.08	-0.05	-0.03^{***}
	(0.00)	(0.05)	(0.05)	(0.01)
1st child sex	-0.00^{**}	-0.00^{*}		-0.00^{*}
	(0.00)	(0.00)		(0.00)
2nd child sex	-0.01^{***}	-0.01^{***}	-0.01^{***}	-0.01^{***}
	(0.00)	(0.00)	(0.00)	(0.00)
IV	–	Same sex	Both boys/girls	Multiple births
Weak Instr.	–	655.97 ***	343.46 ***	29707.43 ***
AR	–	(-0.18) - 0.02	–	(-0.05) - (-0.02)
Wu-Hausman	–	5.16 *	8.33 **	448.37 ***
Sargan	–	–	6.6 *	–
Num. obs.	482260	482260	482260	480765

Note: $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$. As control variables in all models are included mother's age (categorical variable with 5-year age groups), children's age, marital status and rural dummy as well as region FE; heteroskedasticity consistent standard errors (HC1) are in parentheses; test on weak instruments shows robust F-statistic from the first-stage; AR - Anderson-Rubin 95-CI.

In Table 4 the analysis of the effect of childbearing on husband's employment is presented with the usage of 2010 censuses, while in Appendix Table B2 reports results for 2002 census. All models are analogous to aforementioned in Table 3 for mother's employment. Similar to motherhood analysis, OLS estimates report significantly negative results: the presence of the third child reduces employment by around 2 percentage points. Meanwhile, all 2SLS models identify no significant negative effect of parenthood as well as any "premia" that is in line with Hypothesis 2.

Tab. 4. OLS and 2SLS estimates of the effect of childbearing on husband's employment, 2010 census.

	OLS	2SLS	2SLS	2SLS
Intercept	0.74^{***}	0.74^{***}	0.74^{***}	0.74^{***}
	(0.04)	(0.04)	(0.04)	(0.04)
More than 2 children	-0.02^{***}	-0.01	-0.01	-0.00
	(0.00)	(0.03)	(0.03)	(0.01)
1st child sex	-0.00	-0.00		-0.00
	(0.00)	(0.00)		(0.00)
2nd child sex	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
IV	–	Same sex	Both boys/girls	Multiple births
Weak Instr.	–	658.61 ***	346.29 ***	23965.06 ***
AR	–	(-0.08) - 0.05	–	(-0.01) - 0.01
Wu-Hausman	–	0.07	0.23	14.54 ***
Sargan	–	–	0.83	–
Num. obs.	396460	396460	396460	395245

Note: $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$. As control variables in all models are included mother's and husband's ages (categorical variables with 5-year age groups), children's age and rural dummy as well as region FE; heteroskedasticity consistent standard errors (HC1) are in parentheses; test on weak instruments shows robust F-statistic from the first-stage; AR - Anderson-Rubin 95-CI.

Next, in Figure 5 the LATE estimates with usage of same sex and multiple birth instruments, that are employed simultaneously for distinct subsamples of mothers from various age groups. An analysis reveals significant heterogeneity by age. The most substantial penalty is observed among the 25-39 age group of mothers, while the impact on the 40+ age group remains negligible and less pronounced. Conversely, the graph demonstrates an absence of effect on the youngest group of mothers, defined as those under the age of 25. It can be explained by the fact that a proportion of women who already have at least two children at such a young age is small that do not allow for the identification of the effect. Meanwhile, the point estimates remain lower than for other age groups, except those aged 45 and over. This could be a consequence that such women are strongly predisposed to prioritize family over career, thus resulting in a less pronounced distinction between them.

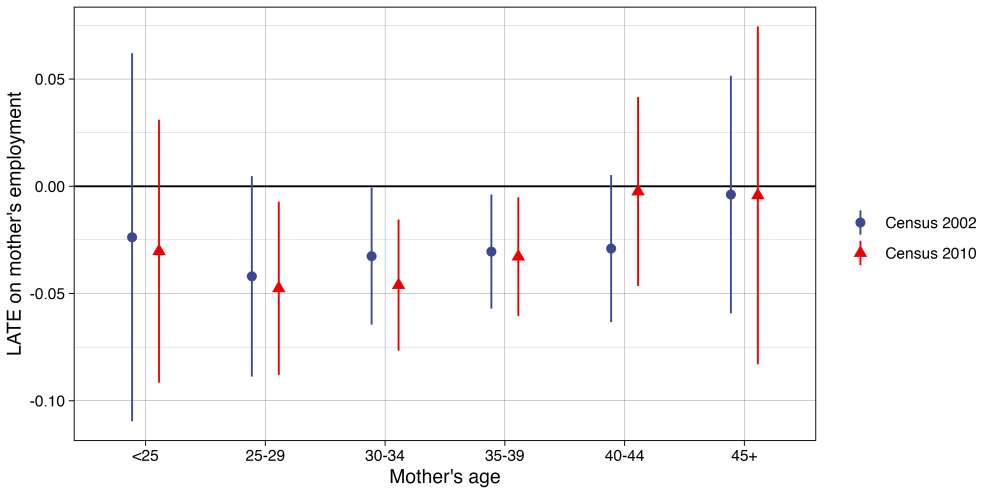


Fig. 5. LATE of childbearing on mother's and husband's employment by level of education, census data.

Note: Estimates are based on 2SLS models by sub-samples of the level of mother's (on the right) or husband's (on the left) education with same sex and multiple births as instruments; covariates are mother's and father's ages (categorical variable with 5-year age groups), children's age and children's sex; lines depict 95% confidence interval constructed using heteroskedasticity consistent standard errors (HC1).

In Figure 7 the same analysis as in Figure 5 is presented. In this instance, however, the data is divided into subsamples according to educational attainment, categorized as secondary or lower, secondary professional, and tertiary or higher. Furthermore, the left and the right panel of the graph illustrate the impact of parenthood on father and husbands respectively. In accordance with Hypothesis 3, the motherhood penalty is most pronounced among women with low levels of education, while in the group of graduated women, the effect is indistinct from zero. Intriguingly, the analysis of the 2002 censuses also suggests the absence of the effect in the group with the lowest level of education, a phenomenon that the present study fails to explain, since it is unlikely to be a product of lack of statistical power. Nevertheless, Hypothesis 3 is supported as it is evident that there is a less pronounced penalty imposed on graduate mothers in comparison to other groups. Despite the absence of rationale to anticipate variations in the impact of fatherhood by educational levels, it remains a substantive robustness check to demonstrate that the zero effect is not attributable to the presence of heterogeneity. Indeed, the results indicate an absence of an effect of fatherhood on labor supply by education levels.

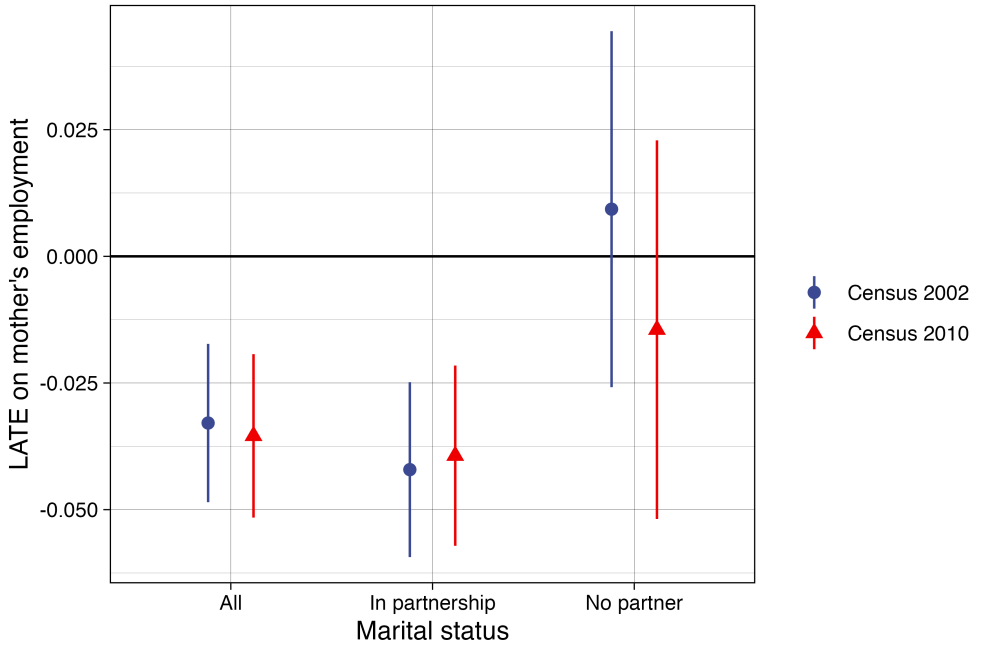


Fig. 6. LATE of childbearing on mother's employment by partnership status, census data.
Note: Estimates are based on 2SLS models by sub-samples of the partner status with same sex and multiple births as instruments; covariates are mother's ages (categorical variable with 5-year age groups), children's age and children's sex; lines depict 95% confidence interval constructed using heteroskedasticity consistent standard errors (HC1).

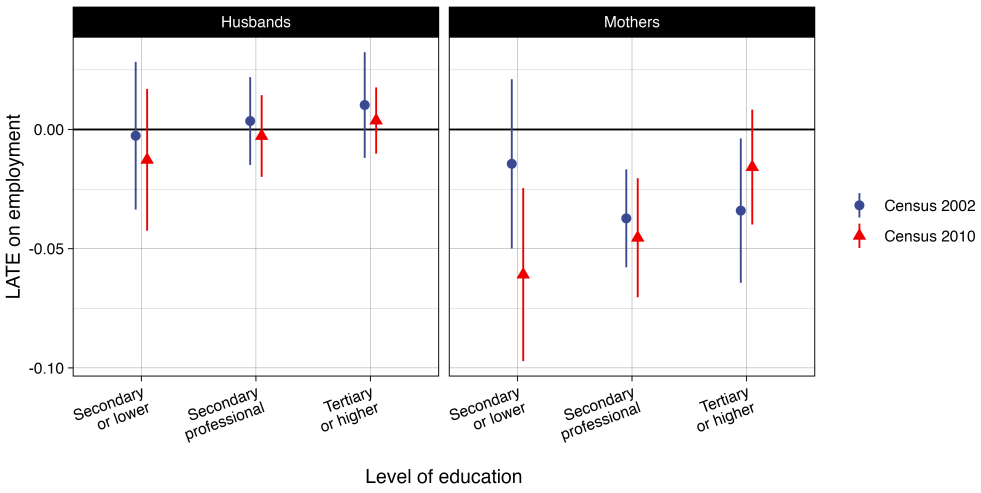


Fig. 7. LATE of childbearing on mother's and husband's employment by level of education, census data.
Note: Estimates are based on 2SLS models by sub-samples of the level of mother's (on the right) or husband's (on the left) education with same sex and multiple births as instruments; covariates are mother's and father's ages (categorical variable with 5-year age groups), children's age and children's sex; lines depict 95% confidence interval constructed using heteroskedasticity consistent standard errors (HC1).

Figure 8 examines the heterogeneity of the motherhood penalty by the age of the third child. Subfigures a and b show this effect for mother and fathers respectively. Previous studies have demonstrated that the effect of motherhood should be strongest in the first years following childbirth, and then becomes weak. It is evident that, despite the relatively modest magnitude of the effect previously presented, women with young children encounter a dramatic decline in employment until approximately the age of 3. This phenomenon is well explained by the Russian legislation that enables parental leave up to the child's age of 3. As displayed in the graph, this impact

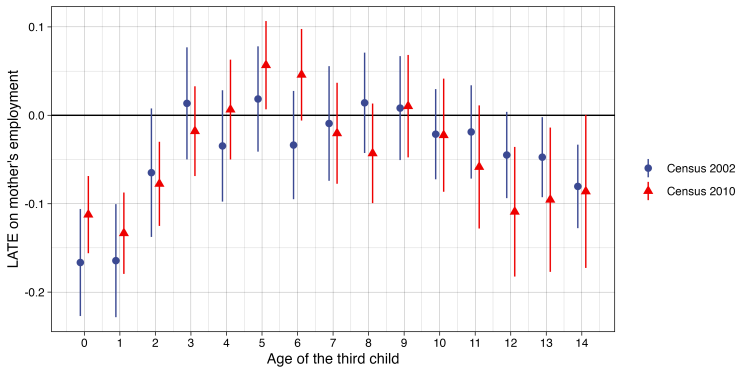
of childbirth on employment is fully extinguished after child reaches the age of 4. In other words, the average mother does not resign from her job after giving birth, but she takes legally established leave. However, it is worth noting that, apparently, not everyone takes advantage of this, since the effect is about 15%, when child is 0-1 years old, while after that the effect is diminishing quickly. It is interesting to note that after the child starts going to school, the effect gradually moves again in the direction of decreasing female employment. The analysis of the two censuses yielded analogous results, indicating that after the child reaches the age of 12, a stable yet relatively modest effect of 5% emerges. It is plausible that this is the long-term impact of motherhood on female employment. One potential explanation for the prolonged null effect of motherhood, which is evident when the child is aged between 3 and 11 years, may be that during this period, mothers are still predominantly attached to the labor market and are unwilling to make significant sacrifices, such as leaving their jobs. Importantly, returning to work thereafter preserves length-of-service ("stazh"), position protection, and pension/bonus trajectories; many mothers therefore re-enter employment around age 3 to avoid losing tenure. A complementary mechanism that reinforces this age profile is Russia's high and persistent fear of unemployment: in cross-country comparisons, workers in Russia report elevated job-loss anxiety even outside deep recessions. Under weak de facto enforcement and limited insurance, this perceived risk makes mothers strongly attached to their jobs; rather than severing employment relationships, they preserve the match during leave and are quick to return once childcare constraints ease (around the third birthday) to avoid losing a position and firm-specific rents (Gimpelson & Monusova, 2010). Another possible explanation of such "pause in motherhood penalty" is that this period is characterised by substantial expenses related to the child's upbringing, including kindergarten, primary education, and other related costs.[24] After children reach secondary school, the effect turns modestly negative again.

In turn, Figure 8b demonstrates the absence of heterogeneity of the effect depending on the age of the child for fathers, which once again supports Hypothesis 2 that fathers do not reduce their supply in the labor market.

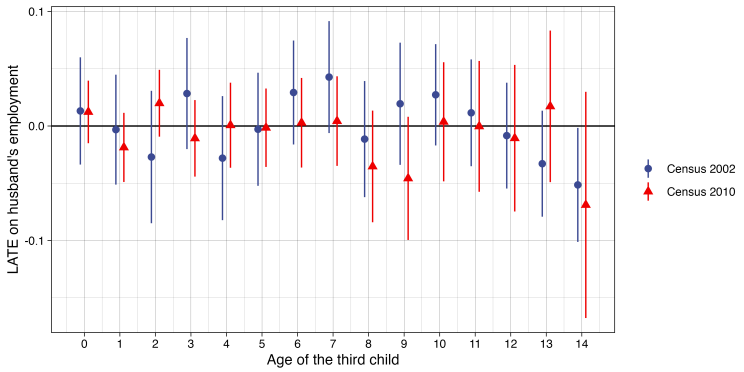
In Figure 9 two additional plots for analyzing the heterogeneity of the effect of the child's age on mother's employment is demonstrated. The top graph shows the effect by the type of partnership, while the plot at the bottom split samples by level of education. In figure 9a, for both groups the LATE on employment is found to be strongly negative in the child's first year, followed by a steady recovery through preschool/early school ages. Among mothers with no partner, the rebound is quicker — consistent with previous results. For mothers in partnership, the picture is similar but more persistent, with small negative effects re-emerging in later ages. In turn, in Figure 9b it is seen that the overall shape is similar across groups: a sizable employment drop in the child's first year, followed by recovery through preschool and early school ages, and a gradual fade thereafter. Consistent with H3, the initial penalty is smaller for tertiary-educated mothers, and their mid-childhood rebound is slightly stronger.

While the aforementioned analysis clearly demonstrates that the fatherhood does not result in a negative impact on employment outcomes, the question of the existence of a "fatherhood pre-

[24] However, the financial obligations associated with an older child must also be substantial, given the considerable costs associated with their education.



(a) LATE of childbearing on mother's employment by age of the third child, census data.



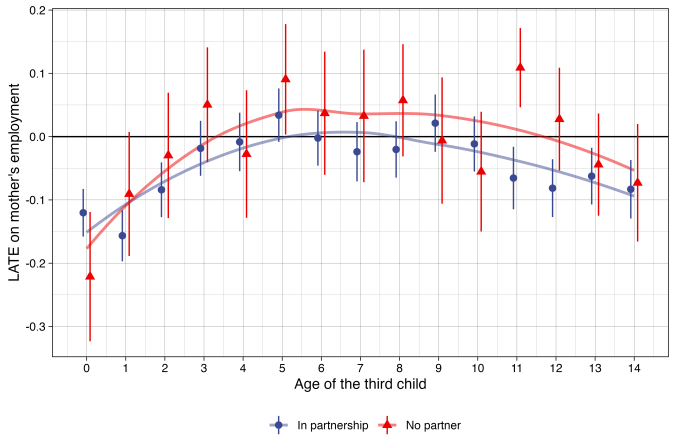
(b) LATE of childbearing on husband's employment by age of the third child, census data.

Fig. 8. LATE of childbearing on mother's (a) and husband's (b) employment by age of the third child, census data.

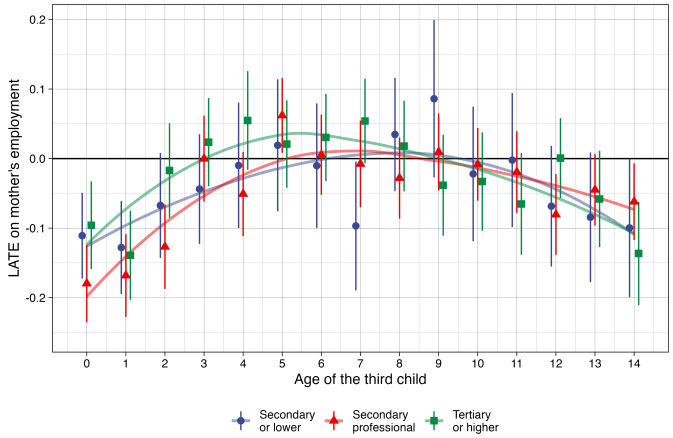
Note: Estimates are based on 2SLS models by sub-samples of the third child age with same sex and multiple births as instruments; covariates are mother's and husband's ages (categorical variable with 5-year age groups), children's age and children's sex; lines depict 95% confidence interval constructed using heteroskedasticity consistent standard errors (HC1).

mia" remains a subject of debate. It is evident that the vast majority of the male participants in the present study are employed, thereby hindering the possibility of investigating the hypothetical enhancement in labour supply. For this reason, Appendix B, Table B3 contains an additional analysis for women and men, which is similar to the analysis previously considered, but the presence of a second job is used as the dependent variable, and the sample is limited to working mothers and their partners.[25] It is interesting to note that the 2SLS model with multiple birth as instruments supports the OLS finding, while the model with the same-sex instrument shows no effect. As previously stated, the multiple birth instrument is indicative of the fertility shock, thereby amplifying the impact of all factors. Notwithstanding, the robustness of this finding is apparent. Consequently, it can be tentatively proposed that in Russia, there is a negligible permanent fatherhood premia, evidenced by an increase in employment in the form of second jobs. Thus, H1 is supported: IV estimates show a negative short-run effect on mothers' employment, with limited long-run penalties. H2 is also supported: I find no systematic fatherhood penalty on employment. And finally, the pattern outlined in H3 is consistent with larger penalties outside tertiary-educated/public-sector jobs, though precision varies.

[25] Unfortunately, there is no question about second job in the 2002 census, so only analysis with usage of 2010 data is presented.



(a) LATE of childbearing on mother's employment by age of the third child and partnership, census data.



(b) LATE of childbearing on mother's employment by age of the third child by level if education, census data.

Fig. 9. LATE of childbearing on mother's employment by age of the third child and by (a) partnership and (b) level of education, census data.
Note: Estimates are based on 2SLS models by sub-samples of the third child age with same sex and multiple births as instruments; covariates are mother's age (categorical variable with 5-year age groups), children's age and children's sex; lines depict 95% confidence interval constructed using heteroskedasticity consistent standard errors (HC1); lines are calculated via local polynomial regression by LATE point estimates.

6 Discussion

The study's initial inquiry concerned the extent to which the findings of studies conducted in other countries can be applied to Russia. In other words, does Russia have specific features in the parental penalty? A review of earlier research conducted on Russian data indicates that the financial penalty for motherhood in Russia is only marginally lower than in developed countries. However, the findings of this study suggest an alternative response to this question: in Russia, the financial penalties associated with motherhood, at least in terms of employment, vary significantly compared to those observed in developed countries and in those few developing countries for which studies are available. Consequently, the impact of childbirth, as evidenced by studies employing analogous methodologies, is estimated to be approximately 10% (Angrist & Evans, 1998; Cukrowska-Torzewska & Matysiak, 2020; Kalabikhina et al., 2024), with this effect persisting until the child attains adulthood. In contrast, for the Russian context, it is argued that the effect is no more than 5%, with the predominant reduction in employment occurring in the first

three years following the birth of the child. Furthermore, the investigation revealed the absence of a significant fatherhood premium in terms of employment in Russia, although a modest increase in labor supply was observed in instances of secondary employment.

Moreover, the study demonstrates that, in contrast to the findings of preceding research, in Russia the greater penalty for motherhood is more likely to be associated with women employed in low-skilled labor sectors, as evidenced by a comparison of the effect of motherhood with educational attainment. However, empirical studies conducted in developed countries have yielded contrasting results, findings that are corroborated by a comprehensive theory of human capital. I propose explanations that are based on unique Russian institutional context. Namely, women who have received a higher education are more likely to be employed within the public sector, which is a "family-friendly" employer. Secondly, due its strict Russian labor law, employers are likely to fire women with children, but mothers who have received tertiary education are more likely to be able to defend their rights before their employers.

Finally, it is important to reemphasize the limitations of this study once again. The primary source of data is Russian census data; however, a number of authors have raised valid concerns regarding its reliability. Moreover, the data comes from 2002 and 2010, which also decreases the study's external validity. One point to consider is the pension reform launched in 2019 that possibly increases penalties and extends the period of them. This is a significant factor that the study failed to account for. Before the reform, parents were more likely to rely on their parents (grandparents) for childcare. Following the launch of the reform, the retirement age began to shift. By the time the reform was completed, the retirement age had increased by five years. As older parents are forced to remain in the labor force, they no longer have the same opportunities to help with childcare. Consequently, parents are unable to distribute the burden among other family members, which could increase the penalties. The second limitation that merits mention is the effect found using instrumental variables, which is a local average treatment effect, as opposed to the average treatment effect. The study examines the impact of childbearing on individuals whose treatment status (decision to have one more child) can be influenced by the instrument (siblings sex composition or the occurrence of multiple births). Therefore, the study focuses on a subpopulation of individuals who are known as "compliers". As outlined above, the proportion of such compliers is not large. However, in line with the contributions of preceding researchers, there is no compelling evidence to suggest that the "compliers" exhibit significant disparities when compared to the broader population, thereby rendering the findings pertinent to the general case.

The subsequent constraint of the present study is its design. On the one hand, instrumental variables enable the formulation of causal and sufficiently reliable inferences, thus facilitating a transition from correlations. Conversely, this approach entails a number of costs, primarily the necessity for a specific sample. In the theoretical section, the general effect of having a child was considered, which includes the first, second, and subsequent births. However, in the main analysis, comparison is drawn between women with two and three children. Given the current fertility trends in Russia, the number of women with three children is decreasing, which calls into question the interpretation of the results as a general penalty for motherhood, and suggests that the estimated

effect may be associated specifically with the third child. However, under the assumption that the motherhood penalty is at least somewhat linear in relation to the number of children, the identified effect can be regarded as its most precise estimation.

Another issue I would like to highlight is the established terminology where loss of employment after childbirth is considered a penalty. The above analysis shows that the penalty for mothers without partners is low and quickly reduces to zero. However, is the absence of such a penalty really a positive thing? When a male partner is present, the couple can reallocate labor market participation towards the partner and home production towards the mother. In this case, the mother's exit from employment is a reallocation, not necessarily a loss of welfare; therefore, what is labeled a "penalty" at the individual level may be closer to a household-level premium – efficient specialisation. Conversely, single mothers face tighter constraints and cannot easily replace their own earnings with those of a partner. Therefore, maintaining employment on the extensive margin is a necessity driven by constraints, rather than evidence of the negligible impact of childbearing. Interpreted in this way, the presented estimates capture the different ways in which households adjust: partnered mothers adjust in terms of employment, while single mothers must remain in work and sacrifice their free time.

7 Conclusion

The present study aims to improve upon the existing research using correlational analysis as their sole method to investigate the parenthood penalty in Russia. In contrast, I employ instrumental variables approach based on sibling sex composition and multiple births to analyze rich census data. To the best of my knowledge, this is the first study to provide causal estimates of the effect of fertility decisions on subsequent labor market outcomes for mothers and fathers in contemporary Russia. The study's primary finding is that, in contrast to the approximately 10 percent long-term motherhood penalty observed in developed countries, the causal impact of childbearing on women's employment in Russia is most significant in the first year after birth, reducing maternal employment by around 15 percent. This penalty then rapidly declines to a modest 3 percent once children reach school age, suggesting that – conditional on Russia's job-protected parental leave and guaranteed return to the same job and the same position after it – childbearing need not entail a persistent extensive-margin employment cost. In line with the first hypothesis, the effect of motherhood on employment is negative. Let me emphasize here that the paper studies employment (not wages/hours), and recover a LATE for parity-two-plus mothers. Policy-wise, this pattern is consistent with payoffs from strict job protection and accessible childcare; strengthening enforcement in the private sector and improving childcare availability are natural levers. In sharp contrast with my estimates of the motherhood penalty, my analysis indicates an absence of a systematic fatherhood penalty in terms of employment, although a modest increase in labor supply is observed, which is in line with the second hypothesis and supports results by Oshchepkov (2020).

It is important to note that the "motherhood penalty" varies across different occupational groups. Evidence suggests that women in low-skilled roles experience a substantially greater decline in employment, while those with a tertiary education encounter a comparatively minor

impact that is in line with the third hypothesis of the study. This phenomenon can be attributed to their comparatively higher tendency to occupy secure, family-friendly positions within the public sector. Also, women with tertiary education can better uphold their employee rights granted by strict protective laws in Russia, which is especially important given their low enforcement.

Finally, a distinctive contribution of this study is to document a "pause in the motherhood penalty": a sharp, short-run drop in mothers' employment around childbearing that largely disappears when child is 3–11 years old, with a modest negative effect re-emerging in child's adolescence. I interpret this pattern as an institutional response to Russia's job-protected 3-year-long parental leave combined with women's strong incentives to preserve "stazh" (length of employment that strongly influences the size of pension and various financial and non-financial bonuses). The Russian Labor Code guarantees retention of the job during parental leave and explicitly counts it in overall work record, which encourages mothers to re-enter employment after their child's third birthday to maintain tenure and not lose future benefits. Complementing this, Russian workers exhibit persistently high perceptions of job insecurity (Gimpelson & Monusova, 2010), which helps explain strong attachment to employment and the rapid post-birth return to the workplace. This institutional context helps reconcile relatively small long-run effects with the large short-run drops in employment of mothers found in the paper.

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Appendix

A Descriptive statistics

Tab. A1. Descriptive statistic by instruments' values

	Whole sample	Same sex		
Variable	Mean (sd)	Z = 1	Z = 0	Diff. (t-stat)
Census 2002				
Mother's age	35.19 (5.92)	35.19 (5.94)	35.19 (5.91)	0.005 (0.33)
Age at 1st birth	22.66 (3.91)	22.67 (3.92)	22.65 (3.9)	0.0265 (2.65)
Graduated	0.22 (0.41)	0.22 (0.41)	0.22 (0.41)	-3e-04 (-0.28)
Married	0.83 (0.38)	0.82 (0.38)	0.83 (0.38)	-0.0037 (-3.77)
Husband's age	37.44 (6.07)	37.45 (6.09)	37.44 (6.06)	0.0132 (0.77)
Number of children	2.19 (0.49)	2.21 (0.51)	2.17 (0.47)	0.0353 (28.01)
More than 2 children	0.15 (0.36)	0.17 (0.37)	0.14 (0.35)	0.0286 (31.16)
1st child's sex	0.52 (0.5)	0.53 (0.5)	0.51 (0.5)	0.0212 (16.6)
2nd child's sex	0.51 (0.5)	0.53 (0.5)	0.49 (0.5)	0.0349 (27.31)
1sr child's age	12.53 (4.14)	12.52 (4.16)	12.54 (4.13)	-0.0215 (-2.03)
2nd child's age	8.35 (4.82)	8.38 (4.83)	8.33 (4.81)	0.049 (3.97)
Census 2010				
Mother's age	33.72 (5.51)	33.72 (5.53)	33.72 (5.49)	0.0038 (0.25)
Age at 1st birth	22.59 (3.84)	22.61 (3.86)	22.57 (3.82)	0.0436 (4.09)
Graduated	0.33 (0.47)	0.34 (0.47)	0.33 (0.47)	3e-04 (0.23)
Married	0.82 (0.38)	0.82 (0.38)	0.83 (0.38)	-0.0049 (-4.61)
Husband's age	36.54 (6.34)	36.53 (6.34)	36.55 (6.35)	-0.0249 (-1.28)
Number of children	2.2 (0.5)	2.22 (0.52)	2.19 (0.48)	0.0337 (24.27)
More than 2 children	0.17 (0.37)	0.18 (0.38)	0.15 (0.36)	0.0272 (26.32)
1st child's sex	0.52 (0.5)	0.53 (0.5)	0.51 (0.5)	0.0176 (12.71)
2nd child's sex	0.51 (0.5)	0.53 (0.5)	0.49 (0.5)	0.041 (29.51)
1sr child's age	11.13 (4.53)	11.11 (4.55)	11.15 (4.52)	-0.0398 (-3.16)
2nd child's age	5.98 (4.51)	6 (4.53)	5.96 (4.5)	0.0394 (3.14)

Tab. A2. Descriptive statistic by instruments' values

	Whole sample	Multiple births		
Variable	Mean (sd)	Z = 1	Z = 0	Diff. (t-stat)
Census 2002				
Mother's age	35.19 (5.92)	35.81 (5.95)	35.18 (5.92)	0.632 (7.33)
Age at 1st birth	22.66 (3.91)	23.02 (4.06)	22.66 (3.91)	0.3601 (6.12)
Graduated	0.22 (0.41)	0.2 (0.4)	0.22 (0.41)	-0.013 (-2.22)
Married	0.83 (0.38)	0.82 (0.38)	0.83 (0.38)	-0.0064 (-1.15)
Husband's age	37.44 (6.07)	37.9 (6.23)	37.44 (6.07)	0.468 (4.7)
Number of children	2.19 (0.49)	3.14 (0.41)	2.18 (0.48)	0.957 (162.39)
More than 2 children	0.15 (0.36)	1 (0)	0.14 (0.35)	0.8571 (1905.67)
1st child's sex	0.52 (0.5)	0.52 (0.5)	0.52 (0.5)	0.002 (0.28)
2nd child's sex	0.51 (0.5)	0.49 (0.5)	0.51 (0.5)	-0.0193 (-2.67)
1sr child's age	12.53 (4.14)	12.8 (4.05)	12.53 (4.15)	0.2719 (4.63)
2nd child's age	8.35 (4.82)	8.52 (4.79)	8.34 (4.81)	0.1897 (2.74)
Census 2010				
Mother's age	33.72 (5.51)	34.12 (5.81)	33.72 (5.51)	0.3991 (4.55)
Age at 1st birth	22.59 (3.84)	23.1 (4.25)	22.58 (3.83)	0.5125 (7.99)
Graduated	0.33 (0.47)	0.35 (0.48)	0.33 (0.47)	0.019 (2.62)
Married	0.82 (0.38)	0.83 (0.37)	0.82 (0.38)	0.0114 (2.03)
Husband's age	36.54 (6.34)	36.95 (6.59)	36.53 (6.34)	0.4164 (3.82)
Number of children	2.2 (0.5)	3.12 (0.38)	2.19 (0.49)	0.9294 (160.61)
More than 2 children	0.17 (0.37)	1 (0)	0.16 (0.36)	0.8442 (1664.98)
1st child's sex	0.52 (0.5)	0.52 (0.5)	0.52 (0.5)	-3e-04 (-0.03)
2nd child's sex	0.51 (0.5)	0.5 (0.5)	0.51 (0.5)	-0.013 (-1.73)
1sr child's age	11.13 (4.53)	11.02 (4.65)	11.13 (4.53)	-0.1134 (-1.61)
2nd child's age	5.98 (4.51)	5.7 (4.43)	5.96 (4.5)	-0.2654 (-3.97)

B Additional results with census data

Tab. B1. OLS and 2SLS estimates of the effect of childbearing on mother's employment, 2002 census.

	OLS	2SLS	2SLS	2SLS
Intercept	0.26^{***}	0.27^{***}	0.26^{***}	0.27^{***}
	(0.01)	(0.01)	(0.01)	(0.01)
More than 2 children	-0.17^{***}	-0.04	-0.02	-0.03^{***}
	(0.00)	(0.05)	(0.04)	(0.01)
1st child sex	-0.00^{***}	-0.00^{***}		-0.00^{***}
	(0.00)	(0.00)		(0.00)
2nd child sex	-0.01^{***}	-0.01^{***}	-0.01^{***}	-0.01^{***}
	(0.00)	(0.00)	(0.00)	(0.00)
IV	–	Same sex	Both boys/girls	Multiple births
Weak Instr.	–	939.34 ***	479.79 ***	33059.26 ***
AR	–	(-0.13) - 0.05	–	(-0.05) - (-0.02)
Wu-Hausman	–	8.04 **	11.31 ***	325.44 ***
Sargan	–	–	11.4 ***	–
Num. obs.	553394	553394	553394	551847

Note: $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$. As control variables in all models are included mother's age (categorical variable with 5-year age groups), children's age, marital status and rural dummy as well as region FE; heteroskedasticity consistent standard errors (HC1) are in parentheses; test on weak instruments shows robust F-statistic from the first-stage; AR - Anderson-Rubin 95-CI.

Tab. B2. OLS and 2SLS estimates of the effect of childbearing on husband's employment, 2002 census.

	OLS	2SLS	2SLS	2SLS
Intercept	0.76^{***}	0.76^{***}	0.76^{***}	0.76^{***}
	(0.04)	(0.04)	(0.04)	(0.04)
More than 2 children	-0.03^{***}	0.02	0.02	0.00
	(0.00)	(0.04)	(0.04)	(0.01)
1st child sex	0.00	0.00		0.00
	(0.00)	(0.00)		(0.00)
2nd child sex	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
IV	–	Same sex	Both boys/girls	Multiple births
Weak Instr.	–	959.78 ***	489.14 ***	26866.29 ***
AR	–	(-0.05) - 0.09	–	(-0.01) - 0.02
Wu-Hausman	–	2.36	2.26	26.66 ***
Sargan	–	–	0.11	–
Num. obs.	458359	458359	458359	457122

Note: $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$. As control variables in all models are included mother's and husband's ages (categorical variables with 5-year age groups), children's age and rural dummy as well as region FE; heteroskedasticity consistent standard errors (HC1) are in parentheses; test on weak instruments shows robust F-statistic from the first-stage; AR - Anderson-Rubin 95-CI.

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Tab. B3. OLS and 2SLS estimates of the effect of childbearing on mother's and husband's second job, 2010 census.

	Mothers				Husbands			
	OLS	2SLS	2SLS	2SLS	OLS	2SLS	2SLS	2SLS
Intercept	0.06 (0.04)	0.06 (0.04)	0.06 (0.04)	0.06 (0.04)	0.07 (0.02)***	0.08 (0.02)***	0.07 (0.02)***	0.07 (0.02)***
3 children	0.01 (0.00)***	0.03 (0.03)	0.03 (0.03)	0.01 (0.01)	0.01 (0.00)***	0.03 (0.02)	0.03 (0.02)	0.01 (0.00)***
1st child sex	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)
2nd child sex	−0.00 (0.00)	−0.00 (0.00)		−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)		−0.00 (0.00)
IV	–	Same sex	Both boys/girls	Multiple births	–	Same sex	Both boys/girls	Multiple births
Weak Instr.	–	354.27 ***	177.8 ***	18017.21 ***	–	569.34 ***	286.45 ***	22977.7 ***
AR	–	(-0.03) - 0.1	–	0 - 0.02	–	(-0.01) - 0.08	–	0.01 - 0.02
Wu-Hausman	–	0.72	0.64	0.11	–	1.27	1.1	4.85 *
Sargan	–	–	0.56	–	–	–	1.06	–
Num. obs.	232107	232107	232107	231487	347970	347970	347970	346956

Note: $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$. The analysis is conducted on sub-samples of working mothers or husbands; as control variables in all models are included mother's and husband's ages (categorical variables with 5-year age groups), children's age and rural dummy as well as region FE; heteroskedasticity consistent standard errors (HC1) are in parentheses; test on weak instruments shows robust F-statistic from the first-stage; AR - Anderson-Rubin 95-CI.