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USING COHORT FERTILITY INDICATORS TO ASSESS AND PREDICT THE EFFECTIVENESS OF DEMOGRAPHIC POLICIES[1]

The analysis of fertility indicators for cohort gives an adequate assessment of the effectiveness of demographic policy and measurement of perspective fertility rates for demographic forecasts, eliminating the impact of the shifts in birth timing in their dynamics. Traditionally, the average number of children born in a cohort is delivered in population census results. The assessed values of these indicators can be obtained by using age-specific fertility rates. The practical experience suggests that for Russia on the whole, these calculated estimates are undeniably correct. On the regional level, their accuracy raises doubts, as female groups for which age-specific fertility rates are provided, can markedly differ year after year because of inter-regional migration, and vary from population census data. The authors attempt to consider the applicability of such approach to fertility rate estimations for a cohort in the regions of the Ural Federal District. For some regions, summed age-specific fertility rates produce reasonable results. It is thus expedient to take as a basis the average number of born children for cohort according to the population census and add annual age-specific fertility rates for the post-census period. The analysis of average numbers of children born in a cohort (as for the beginning of 2014) has shown positive shifts both for Russia on the whole and for the Ural Federal District regions. The majority of females, which reproductive behavior may be affected by public support measures provided for families with children and introduced from 2007, have not finished their child-bearing process yet. However, it is already possible to report at least about the stabilization of the average number of the second and third births, starting with the cohorts born in the early 1970s. Thus, the shares of females given birth to the second child among those given birth to the first child, and the shares of mothers given birth to the third child among those given birth to the second, were not simply stabilized but have already increased. At the same time, the available statistical and sociological data do not provide evidence of shifts in birth timing toward earlier births of the second and subsequent children. More likely, it is arguable that the births postponed for a long time wыere fulfilled.

Keywords: fertility rate, cohorts, interval between successive births, demographic policy, demographic forecast

Introduction

Using cohort fertility indicators gives an adequate assessment of the effectiveness of demographic policy excluding the impact of shifts in births calendar (i.e. the shifts in birth timing), which can essentially affect the fertility rate indicators for hypothetical generations, causing biased assessment of the results of implemented demographic policy measures. Without those shifts, the application of cohort fertility rate indicators is more acceptable as well as for hypotheses of perspective fertility rates developed for demographic forecasts, especially for the long-term ones. Besides, using cohort fertility indicators in forecasting takes into account the results of sociological reproductive orientations, which are cohort-related. Thus, it is important to obtain indicators of cohort fertility rate not only at the moment of censuses from which such data are traditionally derived but also for the post-census period. Russia has a fairly successful experience in solving this problem, due to the time series data (at least, from 1959) for annual age-specific fertility, which if they are summed diagonally (that is, for example, for age of 15 in 1959, 16 — in 1960, etc.) it will make possible to indirectly calculate average numbers of born children for cohort. The situation becomes more sophisticated when similar indicators for regions are to be provided. Firstly, available databases of annual age-specific fertility rate contain regional information only since 1989, and, therefore, the fertility rate indicators for cohort obtained on their basis can be provided only for females born in 1974 and younger. Secondly, unlike Russia on the whole, in the regions, the number of female population groups for which age-specific fertility rates are provided, differs in a greater degree every year because of inter-regional migration, and also varies from popu-

[1] V. N. Arhangelsky, N. G. Dzhanaeva. Text. 2015.

lation census data. The question is to what extent these distinctions appear significant for cohort fertility rate indicators. If their impact is insignificant, it seems possible to add the number of born children obtained from population census to annual age-specific fertility rate for the corresponding female cohort. In this case, it appears possible to estimate the post-census fertility rate indicators for the cohort. Therefore, a time period of calculation of fertility rate is reduced, thus, a degree of ill-posedness of such calculation probably is decreasing because of the incomparability of female population groups. The article considers the applicability of such approach, and obtained results with regard to the estimation of cohort fertility rate indicators in the regions of the Ural Federal District.

Theory

In recent years, especially after the introduction of public policy measures addressing families with children and thus the fertility rate, the amount of research devoted to fertility dynamics and its determination on the federal and regional levels using both statistical and sociological information has increased. With this regard, there have been attempts to evaluate the impact of policy measures implemented for families with children on fertility dynamics. However, these works are mainly based on the analysis of fertility indicators for so-called hypothetical generations, which dynamics is affected by both changing numbers of born children in cohort and shifts in birth timing resulted in earlier birth while total birth number does not change.

Practically, nobody denies the fact that the current fertility rate indicators for hypothetical generations have been impacted by the policy measures for families with children implemented since 2007, at least to some extent. However, the effectiveness of these measures is expedient to evaluate, first of all, according to their possible impact on changing fertility rate indicators for the cohort.

The inconsiderable amount of works dedicated to the fertility rate analysis for the cohort in Russia has been published in recent years. First of all, it is necessary to mention T. Frejka and S. Zakharov's article "Fertility Trends in Russia During the Past Half Century: Period and Cohort Perspectives" published in "Demographic Review" [1], as well as some earlier works of these authors translated in English [2, 3]. Besides, the analyzed results of the fertility rate for generational cohorts regularly appear in Annual Demographic Reports "Population of Russia" [4–7]. We also highlight a very interesting and detailed paper "Half a Century of Fertility Changes in Russia" written by D. Zhdanov, E. Andreev and A. Yasilioniene [8]. In J. Goldstein, T. Sobotka and A. Yasilioniene's article "The End of Ultralow Fertility?", the fertility trends in Russia are considered compared to their dynamics in other countries [9].

Using fertility rate indicators for generational cohorts is expedient not only for the evaluation of demographic policy effectiveness but also for hypotheses of perspective fertility trends developed in demographic forecasting.

The trends of these indicators are more stable compared to those for hypothetical generations as do not depend on the shifts in births calendar (that is, on the earlier childbirths, or on the contrary, childbirth postponing). Therefore, their application allows to define the fertility trend more precisely, making more reliable extrapolations (because of smaller fluctuations) compared, for example, to the trend of total fertility rate. However, the forecast development requires age-specific fertility rates for each year of the forecasting period. Consequently, predicted final numbers of born children for female cohorts are to be transformed in annual age-specific fertility rates. For this purpose, total numbers of born children separately for females of each birth year are distributed based on the mother's age at childbirth (in this case, having data on mother's birth year, one can easily obtain a year of childbirth as well). Thus, of course, the occurring changes of age-specific fertility model are to be taken into account (increasing the share of births transferred to older female ages), which have to be anticipated while considering female generations of older birth years.

T. Sobotka, K. Zeman, R. Lestaga and T. Frejka's report can be emphasized among more recent works on the forecasting of cohort fertility rate indicators [10].

The forecast of a total number of born children for the cohort was developed for Russian females in 2007 by the experts of the Institute for Demography of the Higher School of Economics. Simultaneously, they also performed the forecast of fertility rate indicators for a hypothetical generation, for which they were likely to take into account the forecasting results for cohorts. But for the purposes of above research, they did not probably make a direct recalculation of perspective hypothetical fertility rate indicators into cohort ones. At least, that was not mentioned in the publication containing the hypotheses and results of the given forecasting [11].

While developing forecast hypotheses on fertility rate prospects based on trend extrapolation of cohort indicators, it is possible to use the infor-

mation gathered by sociological surveys exploring reproductive intentions of females from different generations. With this purpose, it is expedient to take several different questionnaire questions simultaneously because a complex analysis of their answers will allow determining more precisely the reproductive intentions, which can be carried out with a high degree of probability.

There is an obvious necessity of using fertility rate indicators for female cohorts in order to evaluate the effectiveness of demographic policy and develop hypotheses, calculate perspective dynamics of fertility rate in forecasting. The applicability of such indicators is the issue. The analysis of existing data on fertility rate indicators on the federal and regional levels should provide an answer to this problem.

Data and methods

Fertility rate indicators for female cohorts on the federal and regional levels are calculated based on the population census data. The use of census micro-data allows measuring these indicators separately for each female birth year. However, population censuses are conducted pretty seldom. The last of them took place in October 2010. Demographic forecasting and policy evaluation require fertility rate characteristics for cohorts to be obtained not only according to the population census results but also according to the inter-census period.

Pretty reliable estimations of an average number of children born in female cohorts can be carried out by summing annual age-specific fertility rates. For example, for females born in 1960, one has to sum up an age-specific fertility rate of 15-year-old women in 1975, 16-year-old — in 1976, 17-year-old — in 1977 etc., 49-year-old — in 2009. Herein, we can ignore the births to females younger than 15 years old and older than 50 because they do not practically influence the values as the birth number outside 15–49 age interval is insignificant. Besides, the fact is not taken into account that females given birth at a 20-year-old age in 1980 can be born both in 1960 and 1959. The data on the number of children born to mothers of one age or another divided into smaller groups by females of the adjacent birth year has only recently provided by the Russian state statistics.[1] Thus, when measuring so, it is possible to calculate not only the average quantity of born children (both total and by birth order) but also, unlike population census data, to estimate a mean age at childbearing, including for the first, second, third and etc. births separately. Annual age-specific fertility rates required for calculation are contained, for example, in The Human Fertility Database[2] (for the period 1959–2010), and for the more recent years they can be derived from available data provided by the Russian Federal Statistical Service (Rosstat).

The fertility indicators for female cohorts obtained in this way can be fairly considered as estimates, as their exact correspondence to census data certainly cannot be provided, first of all because female populations for which these indicators are measured are not completely similar. Annual age-specific fertility rates for each year are calculated only for females living in the given year on the territory of Russia or a region for which the figures are provided. It is clear that these female groups have changed every year, first of all, due to migration. Besides, as far as senior female generations are concerned, the differences in their groups, when using age-specific fertility rate and 2010 population census data, are partly caused by mortality.

On the federal level, the comparison of an average number of born children in female cohorts calculated on the basis of annual age-specific fertility rates and obtained from 2010 population census results shows essential distinctions only for females born in 1947–1949 (See Table 1). In female generations born in almost all other years, the difference in indicators does not exceed 0.03 child. Thus, it is possible to state that fertility rate indicators for female cohorts, measured by summing annual age-specific fertility rates, almost match the numbers of children born to females of corresponding birth years according to the 2010 population census, and, hence, they can be used for the cohort fertility rate analysis. However, we have to remind that this refers only to the federal level.

On the regional level, one may assume the essentially larger difference between numbers of born children in cohorts according to the population census results and calculated on the basis of annual age-specific fertility rates. It is related to the fact that due to the essential inter-regional migration (at least, considerably higher compared to external migration), more significant distinctions (than on the federal level) take place in female population living in the given region at the moment of population census, and representing

[1] See more about this in methodical recommendations [12, p.26–27].

[2] Retrieved from: http://www.humanfertility.org/cgi-bin/country.php?country=RUS&tab=asfr&t1=3&t2=4 (date of access: October 12, 2015).

Table 1

Average number of children born in female generations born in 1944–1985 (Russia; at the population census of 2010)

Year of birth	Average number of born children		Year of birth	Average number of born children		Year of birth	Average number of born children	
	According to 2010 population census data*	Calculated on the basis of annual age-specific fertility rates**		According to 2010 population census data	Calculated on the basis of annual age-specific fertility rates		According to 2010 population census data	Calculated on the basis of annual age-specific fertility rates
1944	1.82	1.82	1958	1.86	1.87	1972	1.53	1.53
1945	1.79	1.80	1959	1.85	1.86	1973	1.51	1.49
1946	1.80	1.77	1960	1.82	1.86	1974	1.48	1.48
1947	1.80	1.88	1961	1.81	1.83	1975	1.44	1.44
1948	1.81	1.66	1962	1.78	1.77	1976	1.40	1.39
1949	1.84	1.92	1963	1.75	1.74	1977	1.35	1.34
1950	1.85	1.84	1964	1.73	1.71	1978	1.29	1.29
1951	1.87	1.87	1965	1.70	1.69	1979	1.22	1.23
1952	1.88	1.90	1966	1.68	1.67	1980	1.14	1.14
1953	1.88	1.85	1967	1.66	1.64	1981	1.07	1.06
1954	1.89	1.88	1968	1.64	1.62	1982	0.98	0.97
1955	1.88	1.89	1969	1.61	1.61	1983	0.88	0.86
1956	1.88	1.82	1970	1.58	1.59	1984	0.77	0.76
1957	1.88	1.88	1971	1.56	1.56	1985	0.66	0.66

* Calculation is based upon the 2010 population census micro-data base. Retrieved from: http://std.gmcrosstata.ru/webapi/jsf/tableView/customiseTable.xhtml (date of access: October 12, 2015).

** Calculation is based upon The Human Fertility Database. Retrieved from: http://www.humanfertility.org/cgi-bin/country.php?country=RUS&tab=asfr&t1=3&t2=4 (date of access: October 12, 2015).

part of those females, for whom age-specific fertility rates were obtained in previous years.

Besides, if annual age-specific fertility rates are available for Russia on the whole since 1959 (that is, as a matter of fact, starting from the female generation born in 1944, which were 15 years old in 1959), for the regions — since 1989 (that is, from the female generation born in 1974). The Human Fertility Database does not provide fertility rate indicators for the regions, but they are available in the database of the Center for Demographic Research of the New Economic School.[1]

If for Russia as a whole, in the female generations born in 1974–1985, the difference in an average number of born children according to 2010 census and summed annual age-specific fertility rates does not exceed 0.02, in the Ural Federal District it achieves 0.06, and in Sverdlovsk Region — 0.05 (See Table 2). This difference seems to be significant and appears to prove the impossibility of using annual age-specific fertility rates at the regional level to estimate the cohort fertility rate indicators.

However, it is possible to link census data and fertility rate indicators for cohort by summing annual age-specific fertility rates, that is, adding that summed result for a post-census period to an average number of born children according to the population census. In this case, the estimates are provided for essentially reduced time period, and consequently with smaller accumulated error of estimated average number of born children in the cohort.

We verify the fairness of this assumption and, thus, the possibility of using annual age-specific fertility rates linked to the population census data for cohort fertility rates by comparing 2002 and 2010 censuses data with calculated results received with annual age-specific fertility rates for the inter-census period.

The information available in 2002 and 2010 censuses micro-data bases allows to use a correct back-calculation from an average number of born children according to 2010 census to 2002 census results by subtracting corresponding annual age-specific fertility rates for the inter-census period. At the same time, the officially published data presented by age groups (with some limitation they are considered as groups classified by birth year) are used for 2002 year, while

[1] Retrieved from: http://demogr.nes.ru/index.php/ru/demogr_indicat/data (date of access: October 12, 2015).

Table 2

Average number of born children in female generations born in 1974–1985 (the Ural Federal District and Sverdlovsk Region; at the population census of 2010)

Year of birth	Average number of born children		Year of birth	Average number of born children		Year of birth	Average number of born children	
	According to 2010 population census data*	Calculated on the basis of annual age-specific fertility rates**		According to 2010 population census data	Calculated on the basis of annual age-specific fertility rates		According to 2010 population census data	Calculated on the basis of annual age-specific fertility rates
The Ural Federal District								
1974	1.51	1.52	1978	1.31	1.35	1982	1.00	1.05
1975	1.47	1.49	1979	1.25	1.28	1983	0.90	0.96
1976	1.43	1.44	1980	1.16	1.20	1984	0.79	0.84
1977	1.37	1.39	1981	1.08	1.12	1985	0.67	0.72
Sverdlovsk Region								
1974	1.45	1.45	1978	1.25	1.26	1982	0.96	0.99
1975	1.42	1.43	1979	1.19	1.20	1983	0.86	0.91
1976	1.37	1.37	1980	1.12	1.13	1984	0.75	0.79
1977	1.31	1.33	1981	1.04	1.05	1985	0.65	0.68

* Calculation is based upon the 2010 population census micro-data base. Retrieved from: http://std.gmcrosstata.ru/webapi/jsf/tableView/customiseTable.xhtml (date of access: October 12, 2015).

** Retrieved from: http://demogr.nes.ru/index.php/ru/demogr_indicat/data (date of access: October 12, 2015).

for 2010, the average numbers of born children are grouped by birth year, i.e. in the same way as in the official 2002 census data (female numbers of corresponding birth year according to the 2010 census are used as weights, i.e., it is necessary to take into account that their intra-group numerical relation according to the 2002 census can be a bit different partly affecting the result of comparison). It is clear that annual fertility rates for 2002 and 2010 are not taken for a full year, but only for its part: in the first case, for the period between the census date till the end of 2002, and in the second case — from the beginning of 2010 to the census date.

Contrary to the expectations, combining the current annual age-specific fertility rates to the census data did not provide a better correspondence between calculated average numbers of born children in female cohorts and census data (See Table 3).

In the Ural Federal District as a whole, for the females born in 1980, the difference between an average number of born children according to the 2002 census and this estimated indicator at the moment of the census calculated by the subtracting corresponding annual age-specific fertility rates from an average number of born children according to the 2010 census is 0.05, i.e. as much as in the results presented in Table 2, which are obtained using only annual age-specific fertility rates and without the 2002 census data. For Sverdlovsk Region, the difference, in this case, has appeared even larger than according to the data presented in Table 2.

This difference can be associated not only with the use of estimates calculated on the basis of current annual age-specific fertility rates but also with varying average number of born children in the same generations according to the 2002 and 2010 censuses. This is proved by the fact that for the females born in 1943–1957, whose average number of born children practically did not change between the 2002 and 2010 censuses, the difference in the value of the given indicator according to two mentioned censuses is 0.02–0.03 both for the Ural Federal District as a whole, and for Sverdlovsk Region. For female generations born in 1958–1977, the difference between an average number of born children according to the 2002 census and the calculated indicator is less and does not exceed 0.02. Only for females born in 1978 and younger, this difference can be considered significant as it varies between 0.03 and 0.05.

The difference in census-based and calculated average number of born children significantly varies by the regions within the Ural Federal District. It has a minimum value in Kurgan Region. Among females born in 1958 and younger (for whom this indicator has changed in inter-census period), only for women born in 1985–1987, this difference is 0.02 while it does not exceed 0.01 for the others. In Chelyabinsk Region, this difference is 0.04–0.05 only for females born in 1983–1987 while it does not exceed 0.02 for the rest of them.

Table 3

Average number of born children in female cohorts in the Ural Federal District (2002 and 2010 censuses, calculated results by using annual age-specific fertility rates)*

Data source	Birth year									
	1943–1947	1948–1952	1953–1957	1958–1962	1963–1967	1968–1972	1973–1977	1978–1982	1983–1984	1985–1987
The Ural Federal District										
2010 Census	1.88	1.92	1.96	1.89	1.75	1.61	1.46	1.16	0.84	0.57
2002 Census	1.85	1.90	1.94	1.88	1.71	1.41	1.00	0.45	0.10	0.02
Calculated results for 2002	1.88	1.92	1.96	1.88	1.70	1.40	0.98	0.41	0.05	–0.03
Kurgan Region										
2010 Census	2.03	2.04	2.07	1.99	1.83	1.68	1.54	1.29	0.98	0.69
2002 Census	2.01	2.01	2.07	1.99	1.80	1.50	1.09	0.52	0.11	0.01
Calculated results for 2002	2.03	2.04	2.07	1.99	1.79	1.49	1.08	0.53	0.11	–0.01
Sverdlovsk Region										
2010 Census	1.79	1.86	1.90	1.83	1.68	1.55	1.41	1.11	0.80	0.55
2002 Census	1.76	1.83	1.88	1.82	1.64	1.34	0.96	0.43	0.10	0.03
Calculated results for 2002	1.79	1.86	1.90	1.83	1.63	1.34	0.94	0.40	0.05	–0.02
Tyumen Region										
2010 Census	2.08	2.06	2.05	1.94	1.83	1.71	1.55	1.21	0.87	0.58
2002 Census	2.03	2.00	2.02	1.93	1.77	1.48	1.06	0.49	0.11	0.01
Calculated results for 2002	2.08	2.06	2.05	1.94	1.78	1.47	1.02	0.40	0.03	–0.04
Khanty-Mansiisk Autonomous District — Yugra										
2010 Census	2.06	2.03	2.01	1.91	1.81	1.70	1.54	1.20	0.86	0.56
2002 Census	1.96	1.97	1.98	1.88	1.74	1.47	1.05	0.51	0.13	0.01
Calculated results for 2002	2.06	2.03	2.01	1.91	1.76	1.46	1.01	0.39	–0.02	–0.06
Yamal-Nenets Autonomous District										
2010 Census	2.11	2.03	2.01	1.93	1.87	1.74	1.57	1.22	0.88	0.58
2002 Census	2.08	2.00	2.01	1.94	1.82	1.52	1.10	0.55	0.13	0.01
Calculated results for 2002	2.11	2.03	2.01	1.92	1.80	1.49	1.04	0.41	–0.01	–0.04
Chelyabinsk Region										
2010 Census	1.82	1.88	1.92	1.86	1.72	1.57	1.43	1.13	0.83	0.55
2002 Census	1.81	1.87	1.92	1.86	1.69	1.39	0.99	0.43	0.09	0.01
Calculated results for 2002	1.82	1.88	1.92	1.86	1.67	1.38	0.98	0.41	0.05	–0.04

* Calculation is based on the 2010 census micro data base. Retrieved from: http://std.gmcrosstata.ru/webapi/jsf/tableView/customiseTable.xhtml (date of access: October 12, 2015). 2002 census results. Retrieved from: http://www.perepis2002.ru/index.html?id=30 (date of access: October 12, 2015); Data base of the Center for Demographic Research of New Economic School. Retrieved from: http://demogr.nes.ru/index.php/ru/demogr_indicat/data (date of access: October 12, 2015).

The variation between the census and calculated average number of born children is slightly higher in Sverdlovsk Region. For females born in 1953–1977, it does not exceed 0.02, and for those born in 1978–1982 is 0.03 (but it should be noted, that for females born in 1943–1952, whose average number of born children does not change between censuses, this difference is 0.03). Only for females born in 1983–1987, it equals to 0.05.

In Tyumen Region, the difference between census and calculated average number of born children is also higher for younger females. But it reaches 0.04 in generations born in 1973–1977, and for female population born in 1978–1984, it is 0.08–0.09. It is even higher in Khanty-Mansiisk and Yamal-Nenets Autonomous Districts.

When defining the "significant" difference between an average number of born children, we emphasize that according to the competent S.V. Zakharov's opinion, "the data of 2002 and 2010 censuses are decently coherent between themselves as far as indicators for the second half of 1940–1950 generations are concerned" [6, p.319]. At the same time, he uses this indicator for the whole of Russia, for example, for females born in 1948–1952 it equals to 1.88 according to the

2002 census, and 1.85 — as to 2010 census; for females born in 1953–1957 it makes 1.83 and 1.88, correspondingly. That is, in the first case, the difference is 0.03, and in the second is 0.05. [6, p.321]. S.V. Zakharov also points out that "1994 micro-census data has revealed *not so high* (our italics — *V. A., N. D.*) but regular underestimation of the indicator ranging on average from 0.05 to 0.08 births per one woman compared to the results for the same cohorts derived from other sources" [6, p. 321–322]. It is, therefore, possible to suppose that S.V. Zakharov does not consider the amount of 0.03–0.05 to be very high level of difference of an average number of born children.

Considering this fact as well as the difference noted in Table 3, in an average number of born children according to the 2002 and 2010 censuses for female generations in which this indicator did not change in intercensus period, in our view, to link 2010 census data to the calculated indicators based on annual age-specific fertility rates is certainly possible for the regions in which the variance in census and calculated average number of born children does not exceed 0.03. Kurgan Region is an example within the Ural Federal District. For the regions where this difference does not exceed 0.05, such approach to the measured average number of born children for the cohort can be used with some caution, and it should be taken into account that some casual reasons can cause relatively small changes and distinctions in its value. This is true for Sverdlovsk and Chelyabinsk Regions, and for the whole of Ural Federal District.

Besides, it is necessary to take into consideration that the period since the 2010 census is less than between 2002 and 2010, and, thus, a possible error associated with the use of annual age-specific fertility rates will be less than for intercensus period.

Results

In Russia as a whole, after some increase (probably due to the policy support measures introduced in the 1980s for families with children) in an average number of children born in the female generations mainly of 1950 year of birth, this indicator was steadily reduced up to the generations born in 1972–1973 (it made up 1.55–1.57 by the beginning of 2014 with a possible increase amounted to 0.01–0.02 by the end of reproductive age). A final average number of born children for younger females may not reduce anymore (in comparison with the previous generations).

According to T. Frejka and S. Zakharov, "preliminary assessed total fertility rate in cohorts (CTFR) is likely to have stabilized at a rate of 1.6 births per woman for cohorts born in 1970 and probably in 1980 as well" [1, p. 107]. We note that the stabilization of an average number of born children took place after its essential decrease in older generations. Our estimations of possible average number of second births show that, at least, for the generations born in the 1980s, the increased share of females given birth to the second child (and, probably, to the third) can be higher than the reduced average number of the first child births leading to a some rise of an average number of born children. Though, one should agree with T. Frejka and S. Zakharov's statement that it is unlikely to exceed significantly 1.6, or at least 1.65. However, in our view, it gives grounds to report about the positive influence of the measures that have been implemented since 2007 and provided support to families with children on fertility rate indicators in female cohorts, though in obviously smaller degree, than in hypothetical generations. By the way, in their article, T. Frejka and S. Zakharov have further pointed out to the possibility of some increase in an average number of born children in cohorts: "If to take as a basis the number of children already born by 2013, and to assume that the reproductive behavior results of female older than 25 years in generations born in the 1970s and 1980s will not strongly differ from the results of their predecessors, it is necessary to expect that the total (final) fertility rate for above generations (CTFR) will be equal to 1.6–1.7" [1, p.131]. That is, no more stabilized rate of 1.6 is observed. In his other work also published in 2014, S. Zakharov mentions again the same stabilization rate of total number of born children (1.6–1.7), specifying it "as a minimum": "So, proceeding from observable trends, it is possible to speak, at least, about fertility rate stabilization in cohorts in Russia with a rate of 1.6–1.7" [7, p. 144].

Based on the differences in the change of fertility rate indicators in hypothetical generations and cohorts, T. Frejka and S. Zakharov state that the recent growth of total fertility rate "generally and probably completely resulted from the accelerated rates of family formation, and childbearing with the truncated intervals influenced by fertility stimulation policy" [1, p. 107]. However, they do not provide any data on intervals between child births, while the data given below based on the calculations of mean age of a mother at the first and second childbirth in cohorts and on the "Sample Survey of Reproductive Population Plans" data (Rosstat, 2012) are more likely to demonstrate the opposite results.

The measures of public support for the families with children implemented from 2007 mainly

Table 4

Average number of born children (including by birth order) in female generations born in 1944–1985 (Russia; as for the beginning of 2014; calculated with annual age-specific fertility rates*)

Birth year	Total	Including			Birth year	Total	Including		
		The first	The second	The third			The first	The second	The third
1944	1.82	0.91	0.61	0.17	1965	1.69	0.92	0.57	0.14
1945	1.80	0.92	0.60	0.16	1966	1.67	0.92	0.56	0.13
1946	1.77	0.92	0.59	0.16	1967	1.64	0.92	0.54	0.13
1947	1.88	0.97	0.64	0.17	1968	1.63	0.92	0.53	0.13
1948	1.66	0.85	0.57	0.15	1969	1.63	0.92	0.52	0.13
1949	1.92	0.98	0.66	0.17	1970	1.61	0.92	0.50	0.12
1950	1.84	0.94	0.63	0.17	1971	1.59	0.92	0.50	0.12
1951	1.87	0.94	0.65	0.18	1972	1.57	0.90	0.49	0.12
1952	1.90	0.94	0.66	0.18	1973	1.55	0.89	0.49	0.12
1953	1.85	0.92	0.65	0.18	1974	1.57	0.89	0.50	0.13
1954	1.88	0.93	0.66	0.19	1975	1.55	0.88	0.49	0.13
1955	1.89	0.93	0.67	0.19	1976	1.53	0.87	0.49	0.12
1956	1.82	0.90	0.65	0.18	1977	1.50	0.86	0.48	0.12
1957	1.88	0.93	0.68	0.18	1978	1.48	0.85	0.47	0.11
1958	1.87	0.93	0.67	0.18	1979	1.44	0.85	0.46	0.11
1959	1.86	0.94	0.67	0.17	1980	1.37	0.82	0.43	0.10
1960	1.86	0.95	0.66	0.17	1981	1.31	0.80	0.40	0.08
1961	1.83	0.94	0.65	0.16	1982	1.26	0.79	0.37	0.08
1962	1.77	0.92	0.63	0.15	1983	1.17	0.76	0.34	0.06
1963	1.74	0.92	0.61	0.15	1984	1.09	0.72	0.30	0.05
1964	1.71	0.92	0.59	0.14	1985	0.99	0.68	0.25	0.04

* Calculation is based on The Human Fertility Database and Rosstat data. Retrieved from: http://www.humanfertility.org/cgi-bin/country.php?country=RUS&tab=asfr&t1=3&t2=4 (date of access: October 12, 2015).

seek to promote the second and subsequent births. Therefore, in order to evaluate the demographic effectiveness of above measures, it is expedient to use fertility rate indicators differentiated by birth order, and, first of all, by the second and third births.

An average number of second births was steadily reduced up to generation born in 1970, achieving 0.5 by the beginning of 2014 after reaching its maximum (for considered generations) for females born in 1957–1959 (0.67–0.68). It is possible to consider, at least, the stabilization of this indicator (as an accomplished fact) in subsequent generations, and most likely (taking into account the prospects of the second child births given by some part of females) its increase, at least, starting with generations born in the mid-1970s.

If in the case of an average number of second births it is possible to see its actual stabilization in younger generations, the female share given birth to the second child among those given birth to the first is growing (See Table 5). Having achieved its minimum in the cohort born in 1971 (54.0 %), it gets already slightly higher for younger females (1972 — 54.5 %, 1973 — 55.0 %, 1974 — 55.6 %, 1975 — 55.9 %, 1976 — 56.1 %, 1977 — 55.9 %). Thus, one can possibly expect some growth of this indicator as a birth probability of the second child in the remaining years up to the termination of reproductive period is essentially higher than that of the first child.

Starting with the female generation born in 1967, it is possible to observe a growing share of females given birth to the third child among those given birth to the second. If, for the women born in 1965, this indicator is 23.9 % (the minimum rate among female generations under consideration), for the women born in 1966 it equals to 24.0 %, in 1967 — 24.2 %, in 1970 — 24.8 %, and in 1974 and 1975 — 25.6 %.

This data demonstrate some growth of fertility rate indicators by the second and third births in the female cohorts. It seems that it is largely associated with the launching of additional measures of a family with children support since 2007.

It is possible to check indirectly the availability of shifts in the birth calendar using the data on dynamics of age proportioning at births of a different order in female cohorts (See Table 6).

Table 5

The share of females given birth to the second child among those given birth to the first, and females given birth to the third child among those given birth to the second in female generations born in 1960–1985 (in %; Russia; as for the beginning of 2014)*

Year of birth	The share of females given birth to the second child among those given birth to the first	The share of females given birth to the third child among those given birth to the second	Year of birth	The share of females given birth to the second child among those given birth to the first	The share of females given birth to the third child among those given birth to the second
1960	70.0	25.5	1973	55.0	25.4
1961	68.9	25.0	1974	55.6	25.6
1962	68.0	24.5	1975	55.9	25.6
1963	66.4	24.1	1976	56.1	25.1
1964	64.4	24.3	1977	55.9	24.9
1965	62.4	23.9	1978	55.2	24.2
1966	60.5	24.0	1979	53.8	23.4
1967	58.6	24.2	1980	51.8	22.4
1968	57.2	24.5	1981	49.7	21.3
1969	56.1	24.7	1982	47.3	20.2
1970	54.4	24.8	1983	44.5	18.8
1971	54.0	25.1	1984	41.1	17.9
1972	54.5	25.1	1985	37.2	17.2

* Calculation is based on the Table 4's data.

Table 6

Mean age of mother at the first, second and third childbirth in female generations born in 1950–1985 (years; Russia; as for the beginning of 2014)*

Year of birth	Mean age of mother at:			The difference in mean age of mother at birth:		Year of birth	Mean age of mother at:			The difference in mean age of mother at birth:	
	The first birth	The second birth	The third birth	Of the second and first child	Of the third and second child		The first birth	The second birth	The third birth	Of the second and first child	Of the third and second child
1950	23.42	27.95	30.86	4.53	2.91	1968	22.68	26.99	30.53	4.31	3.54
1951	23.37	27.86	30.85	4.49	2.99	1969	22.68	27.35	30.91	4.67	3.57
1952	23.34	27.79	30.77	4.46	2.97	1970	22.73	27.72	31.32	4.99	3.60
1953	23.28	27.71	30.63	4.43	2.91	1971	22.81	28.09	31.66	5.28	3.56
1954	23.23	27.59	30.43	4.36	2.84	1972	22.92	28.41	31.90	5.49	3.49
1955	23.18	27.46	30.17	4.28	2.71	1973	23.03	28.65	31.96	5.62	3.30
1956	23.15	27.27	29.89	4.13	2.62	1974	23.15	28.81	31.88	5.66	3.07
1957	23.11	27.11	29.65	4.00	2.54	1975	23.27	28.86	31.71	5.59	2.85
1958	23.07	26.94	29.38	3.87	2.44	1976	23.43	28.89	31.50	5.47	2.61
1959	22.99	26.76	29.15	3.76	2.39	1977	23.60	28.82	31.15	5.22	2.33
1960	22.96	26.53	28.95	3.57	2.42	1978	23.70	28.64	30.68	4.94	2.04
1961	22.90	26.33	28.84	3.43	2.51	1979	23.77	28.38	30.13	4.61	1.76
1962	22.89	26.24	28.89	3.35	2.65	1980	23.75	28.06	29.56	4.31	1.50
1963	22.86	26.17	28.96	3.31	2.79	1981	23.72	27.69	28.96	3.97	1.27
1964	22.81	26.16	29.18	3.35	3.02	1982	23.67	27.27	28.33	3.60	1.06
1965	22.76	26.22	29.36	3.46	3.14	1983	23.58	26.79	27.67	3.22	0.88
1966	22.71	26.39	29.74	3.68	3.35	1984	23.40	26.18	26.94	2.78	0.76
1967	22.68	26.65	30.14	3.97	3.49	1985	23.14	25.53	26.20	2.38	0.68

* Calculation is based on The Human Fertility Database and Rosstat data. Retrieved from http://www.humanfertility.org/cgi-bin/country.php?country=RUS&tab=asfr&t1=3&t2=4 (date of access: October 12, 2015).

Affected by the measures for families with children support implemented in the 1980s, the difference in the mean age of mother at the second and first births was steadily reduced starting from the generation born in 1950 (4.53 years) up to generation born in 1967 (3.31 years), demonstrating the shifts in birth timing.

Compared to the situation described above, the mean age of mother at birth of the second child is currently growing fast compared to the mean age at the first birth. As a result, the difference between both indicators is steadily growing up to the generation born in 1974. Some reduction of the indicator for younger women, certainly, does not prove the convergence of ages at the second and first child births. The matter is that child-bearing process in these generations is going on and, therefore, the mean age of mother at childbirth is rising. The birth of the second child for female generations born in the late 1970s — early 1980s is likely to be slightly higher than that of the first child. Therefore, a mean age of mother at birth of the second child can grow to a greater extent, than at birth of the first child, meaning, that the increase in the difference between them is likely to take place.

The difference between a mean age of a mother at birth of the third and second child also lowered significantly in female generations whose childbearing may be affected by the public policy measures of the 1980s (from 2.99 years for females born in 1951 to 2.39 years for generation born in 1959), and steadily has been raised now, so far reaching its maximum for females born in 1970 (3.60 years).

However, it is not quite appropriate to estimate the availability or absence of the shifts in birth timing only based on the difference between a mean age of mother at birth of the second and first child because this difference is not similar to the first interval between successive births of the first and second child. It is necessary to consider not only the mean age of mother at the fist childbirth but also this specific indicator for the females who gave birth to the second child subsequently. The statistical information does not provide that kind of data, therefore, in order to define the interval between successive births, it is necessary to use sociological surveys data.

As to the results of "Sample Survey of Population Reproductive Plans", conducted in 2012 by Federal State Statistics Service (Rosstat) in 30 regions (covering 10,054 respondents), an average interval between the first and second births for females with first marital experience given birth to all children within this marriage practically did not vary for those given birth to the second child in 2000–2006 and 2007–2012, and equaled to 64.9 (N = 574) and 67.1 (N = 727) months accordingly.

As above mentioned, among the regions of the Ural Federal District, the use of estimated average number of children born to female cohorts, calculated on the basis of the combined 2010 census data and annual age-specific fertility rates for the post-census period, is unconditionally feasible for Kurgan region, and — with some limitations — for Sverdlovsk and Chelyabinsk Regions. However, on the regional level, there exists further constraint for applying such approach to fertility rate estimations for a cohort aimed at effectiveness evaluation of implemented fertility-related demographic policy measures. As already mentioned, in many respects these measures are differentiated by birth order and focused, first of all, on promoting the second and subsequent births. Therefore, to evaluate their effectiveness, it is expedient to use fertility rate indicators by birth order. If the 2010 census data contain such information on a female distribution by number of born children, the distributed numbers of born children differentiated by birth order (and, hence, annual age-specific fertility rates by birth order) for the period between 2010 and 2013 are available only for Sverdlovsk and Chelyabinsk Regions within the Ural Federal District (for all of its regions, such information can be found only from 2012). That is, a correct evaluation of demographic policy may be provided only for these regions using cohort fertility rate indicators to assess its efficiency for a later date than the 2010 census.

As for the whole of Russia, in Sverdlovsk and Chelyabinsk Regions, after steady reduction of an average number of born children (by more than 0.3 compared to its value for females born in 1955–1957), an average number was stabilized, approximately starting with the generation born in 1972 (See Table 7). Thus, it is possible to observe the stabilization with a small growth of an average number of born children (at least, for females being 40 years old at the moment of a census, so by early 2014, an average number of born children increased by 0.02 both in Sverdlovsk and Chelyabinsk Regions).

This stabilization becomes even more pronounced for an average number of the second child births. In Sverdlovsk Region, it lowered from 0.70–0.71 for females born in 1955–1958 to 0.50 for those born in 1971, and its further reduction stopped. The total average number of the second births of the women born starting from the first half of the 1970s will almost likely to exceed a rate of 0.50.

Table 7

Average number of born children (including by birth order) in female generations born in 1955–1985 (Sverdlovsk and Chelyabinsk Regions; as of the beginning of 2014; calculated according to 2010 census and annual age-specific fertility rates for 2010–2013[*])

Year of birth	Sverdlovsk Region				Chelyabinsk Region			
	Total	Including			Total	Including		
		The first	The second	The third		The first	The second	The third
1955	1.90	0.95	0.70	0.18	1.93	0.95	0.72	0.19
1956	1.90	0.94	0.71	0.17	1.92	0.94	0.72	0.19
1957	1.89	0.95	0.71	0.17	1.93	0.95	0.72	0.19
1958	1.88	0.94	0.70	0.17	1.90	0.94	0.72	0.18
1959	1.86	0.95	0.69	0.16	1.88	0.94	0.71	0.17
1960	1.83	0.94	0.68	0.15	1.86	0.94	0.69	0.17
1961	1.81	0.94	0.67	0.15	1.85	0.94	0.69	0.16
1962	1.78	0.94	0.65	0.14	1.81	0.94	0.67	0.15
1963	1.73	0.94	0.62	0.12	1.78	0.94	0.65	0.14
1964	1.71	0.94	0.60	0.12	1.75	0.94	0.63	0.13
1965	1.68	0.93	0.58	0.12	1.71	0.93	0.60	0.12
1966	1.64	0.93	0.56	0.11	1.68	0.94	0.59	0.12
1967	1.63	0.93	0.54	0.11	1.66	0.93	0.56	0.12
1968	1.60	0.93	0.52	0.11	1.63	0.93	0.55	0.11
1969	1.58	0.92	0.51	0.10	1.62	0.93	0.54	0.11
1970	1.57	0.92	0.51	0.11	1.59	0.92	0.53	0.11
1971	1.56	0.92	0.50	0.10	1.58	0.91	0.52	0.11
1972	1.56	0.91	0.50	0.11	1.57	0.91	0.51	0.11
1973	1.56	0.90	0.50	0.11	1.57	0.90	0.52	0.11
1974	1.55	0.90	0.50	0.11	1.56	0.89	0.52	0.11
1975	1.54	0.89	0.50	0.11	1.54	0.88	0.51	0.11
1976	1.52	0.88	0.49	0.11	1.54	0.88	0.51	0.11
1977	1.49	0.88	0.48	0.10	1.51	0.87	0.50	0.11
1978	1.46	0.86	0.47	0.10	1.49	0.86	0.49	0.10
1979	1.43	0.85	0.45	0.09	1.44	0.84	0.47	0.10
1980	1.37	0.84	0.42	0.08	1.37	0.82	0.44	0.08
1981	1.32	0.83	0.39	0.08	1.34	0.81	0.42	0.08
1982	1.27	0.81	0.37	0.07	1.28	0.79	0.40	0.07
1983	1.19	0.79	0.33	0.06	1.20	0.77	0.36	0.06
1984	1.10	0.75	0.29	0.05	1.13	0.74	0.32	0.05
1985	1.02	0.71	0.25	0.04	1.01	0.69	0.27	0.04

[*] Calculation is based on the 2010 census micro data base and Rosstat data. Retrieved from: http://std.gmcrosstata.ru/webapi/jsf/tableView/customiseTable.xhtml (date of access: October 12, 2015).

The similar situation takes place in Chelyabinsk Region as well. The average number of the second births given by the women born in 1955–1958 is 0.72. It has decreased to 0.51 up to the generation born in 1972, and for females born in 1973–1974 it already showed a small growth by the beginning of 2014, amounted to 0.52 (though, of course, it is pertinent, at this point, to remind that these estimates have to be used with caution, and more likely, it is possible to observe stabilization of this indicator). Thus, the given variable does not equal to the total number of the second births.

The reduction of the third births has stopped too.

As far as an average number of the second and third births for the female cohort is concerned, its stabilization can be mentioned as an accomplished fact after a long period of decrease, while the female share given birth to the second child among those given birth to the first, and the share of mothers given birth to the third child among those given birth to the second, did not simply stabilized, but also have started to grow.

The female share given birth to the second child among those given birth to the first has been rising in Sverdlovsk area, starting with generation born in 1972, and for females born in 1976 it is 55.9 % exceeding by 1.7 % that for those born in

Table 8

The share of females given birth to the second child among those given birth the first, and females given birth to the third child among those given birth to the second in female generations born in 1955–1985 (in %; Sverdlovsk and Chelyabinsk Regions; as for the beginning of 2014)*

Sverdlovsk Region						Chelyabinsk Region					
Year of birth	The share of females given birth to the second child among those given birth to the first	The share of females given birth to the third child among those given birth to the second	Year of birth	The share of females given birth to the second child among those given birth to the first	The share of females given birth to the third child among those given birth to the second	Year of birth	The share of females given birth to the second child among those given birth to the first	The share of females given birth to the third child among those given birth to the second	Year of birth	The share of females given birth to the second child among those given birth to the first	The share of females given birth to the third child among those given birth to the second
1955	74.4	25.0	1971	54.2	21.0	1955	75.7	26.9	1971	56.9	20.7
1956	75.1	24.6	1972	55.0	21.8	1956	76.5	26.3	1972	56.7	21.1
1957	74.6	24.5	1973	55.6	21.4	1957	76.5	26.0	1973	57.7	21.3
1958	74.5	24.1	1974	55.6	21.4	1958	75.8	25.2	1974	58.1	21.4
1959	73.3	23.2	1975	55.8	22.2	1959	75.5	24.0	1975	58.0	21.9
1960	72.4	22.2	1976	55.9	22.1	1960	73.7	23.9	1976	58.6	21.8
1961	70.7	21.9	1977	54.5	21.2	1961	73.1	23.2	1977	57.7	21.7
1962	68.6	21.3	1978	54.2	20.9	1962	71.0	22.1	1978	56.8	21.3
1963	66.5	19.8	1979	52.3	21.0	1963	68.7	21.7	1979	55.9	20.4
1964	64.2	20.2	1980	50.2	19.0	1964	66.8	21.0	1980	53.4	19.2
1965	62.3	19.8	1981	47.8	19.1	1965	64.6	20.1	1981	51.6	18.8
1966	59.8	19.7	1982	44.9	18.2	1966	62.7	19.8	1982	49.8	18.0
1967	57.8	20.5	1983	42.1	17.2	1967	60.5	20.6	1983	46.6	17.1
1968	56.2	20.9	1984	39.3	16.5	1968	59.3	19.8	1984	43.2	16.0
1969	55.3	20.1	1985	35.5	16.5	1969	58.6	20.4	1985	39.0	15.4
1970	55.2	21.0				1970	57.6	20.6			

* Calculation is based on the Table 7's data.

1971. The situation in Chelyabinsk Region looks similar, where this indicator starts to grow in the female generations born in 1973, and in the 1976 cohorts it exceeds by 1.9 % that for females born in 1972 (See Table 8). This gain is close to total Russian indicators — it is by 2.1 % higher for females born in 1976 compared to those born in 1971.

The share of females given birth to the third child among those given birth to the second in Sverdlovsk Region, as for the whole Russia too (See Table 5), has reached a minimum value for females born in 1965–1966 (19.7–19.8 %). For those 10 years younger (born in 1975–1976), it equals to 22.1–22.2 %. This growth rate (2.4 %) is slightly higher than for the whole of Russia, where the difference between a minimum value (females born in 1965 — 23.9 %) and its current maximum after the increase (1974–1975 generations — 25.6 %) makes 1.7 %. In Chelyabinsk Region, females born in 1966 and 1968 feature a minimum share of those given birth to the third child among those who gave birth to the second (19.8 %), while those born in 1975 feature maximum values after the increase (21.9 %).

Unfortunately, on the regional level, unlike for Russia as a whole, it is impossible to obtain the mean age of mother at childbirth in the cohort, as in above calculated indicators for Sverdlovsk and Chelyabinsk Regions, the required annual age-specific fertility rates are used only for 2010–2013. Even if the 2010 censuses data were not used for estimating fertility rate indicators in female cohort on the regional level, and annual age-specific fertility rates (with regional time series data available from 1989) were applied instead, the mean age of mother at childbirth in cohort could be obtained only starting with a generation born in 1974, that is obviously not enough for the analysis of its dynamics in order to evaluate possible shifts in a births calendar occurred due to the public measures of families with children support. As

it has been mentioned above, in Russia as a whole, neither statistical data nor the results of «Sample Survey of Population Reproductive Plans" (2012) have not shown such shifts in birth timing.

In 2012, Sverdlovsk and Chelyabinsk Regions were among the subjects of the Russian Federation, which participated "Sample Survey of Population Reproductive Plans", surveyed by Rosstat.[1] A total number of surveyed respondents was 982 (525 — in Sverdlovsk Region, and 457 — in Chelyabinsk Region).

For those respondents, whose second child was born in 2007–2012 (that is, after the launching of additional public support measures for families with children), an average interval after first childbirth equaled to 79.7 months (N =.84), and for those whose second child was born in 2000–2006 — 55.9 (N = 49). That is, the interval did not even reduce (serving as an indicator of shifts in birth timing caused by demographic policy measures), but became significantly larger. That has to be so because the births with an interval of 10 and more years after the first childbearing accounted for a considerably higher share of second child births in 2007–2012: 23.8 % against 2.0 % in 2000–2006 (with an interval of 12 and more years — 8.3 % against 2.0 % in 2000–2006).

The increase in an average interval between first and second child births is higher in Sverdlovsk Region: for females with a second child born in 2007–2012, the time interval after first childbirth was, averagely, 87.0 months (N = 38), and for those with a second child born in 2000–2006 — 50.3 months (N = 24). The respondents of Chelyabinsk Region feature the following values of these indicators: 73.7 (N = 46) and 61.2 (N = 25) months, correspondingly.

According to the "Sample Survey of Population Reproductive Plans" data, in Sverdlovsk Region, the share of 2007–2012 second births with interval of 10 years and more after the first childbirth accounted 28.9 %, while among those given birth to the second child in 2000–2006 there were no respondents with such interval between first and second births. In Chelyabinsk Region, the share of second births with such interval after first child births was 19.5 % in 2007–2012 and 4.0 % in 2000–2006.

The data presented here are likely to demonstrate the shifts in births calendar. Though they do not feature the shifts toward the interval reduction between first and second child births, on the contrary, demonstrate the realization of births postponed within a long time with the majority of them unlikely to take place without the measures of families support.

As shown earlier for Russia on the whole, according to the above survey results, the average interval between first and second child births practically did not vary for females given birth to a second child in 2000–2006 and for those — in 2007–2012 (64.9 and 67.1 months, correspondingly).

The analysis of shifts development in the calendar of births is very important both in terms of the measuring demographic policy effectiveness, and defining hypotheses of fertility rate prospects. If the shifts in birth timing take place toward the earlier birth of a second child, and the interval between first and second child births reduces, one should further expect so-called "collapse" due to the birth timing, the reduction of a second birth number. If, as shown above, the present situation is more likely to feature the realization of postponed births, contributing, at least, to the stabilization of cohort fertility rate indicators and their growth in hypothetical generations, no decrease in current fertility rate indicators should be expected. The "collapse" due to the birth timing would not be observed. It was associated with a birth postponing and already took place in the past.

The consideration of sociological survey results concerning reproductive orientations is mentioned in the introduction as a possible option for a demographic forecasting together with the use of cohort fertility rate indicators. Thus, the question arises to what extent characteristics of reproductive orientations traditionally used in national sociological research correspond to the final number of children of respondents, i.e. what kind of forecasting abilities such research may have. First of all, it refers to the expected number of children and the question that is usually used to reveal it: "How many children in total (including available) are you going to have?". The results of already mentioned here "Sample Survey of Population Reproductive Plans" (2012) have demonstrated that in female generations close to completing reproductive period, an average expected number of children was considerably higher than the number of children born at the moment of the survey, and it is possible to suppose with a high degree of probability that it would not be carried out (See Table 9).

The use of an average expected number is coming into question for forecasting cohort fertility rate indicators according to the above results, though, several research conducted earlier have

[1] Some survey results covering Sverdlovsk Region have already been published [13].

shown a fairly exact realization of expected number of children by females (averagely) [14].

Evidently, it is expedient to apply several indicators characterizing reproductive orientations in order to measure more precisely a perspective total average number of born children in female cohorts. The application of this indicator in demographic forecasts makes urgent the existing problem of improving the forecasting research abilities of reproductive orientations. A special attention should be, probably, given to the measurement of reproductive orientations of young women as this category demonstrates essential dynamics of reproductive plans as suggested by Russian [14], and foreign researchers [15].

Conclusion

The analyzed results demonstrate the possibility of adding annual age-specific fertility rates to measure the fertility in cohorts both on the federal and regional levels. Kurgan, Sverdlovsk, and Chelyabinsk Regions are considered among the regions of the Ural Federal District. If the summed results are quite reliable on the federal level to calculate an average number of born children in cohorts (that is proved by values of indicators close to the population census data), on the regional level, it is expedient to add annual age-specific fertility rates for post-census years to an average number of born children in female generations according to the census data.

The estimated average number of born children in female cohorts was obtained both on the federal and regional levels for the beginning of 2014.

In general, the positive shifts in fertility rate indicators were revealed both for hypothetical generations and cohorts in Russia and the Ural Federal District regions in recent years. The reproductive behavior of the majority of women could be affected by the public support measures implemented from 2007 for families with children, and as they have not finished child-bearing process yet, it seems to be premature to consider the degree of change in the number of born children in comparison with the previous generations. However, at least the stabilization of an average number of second and third births in female generations starting with those born in the early 1970s is observed. Thus, the shares of females given birth to the second child among those given birth to the first and of females given birth to the third child among those given birth to the second were not simply stabilized but have already increased. At the same time, there are no grounds proved by available statistical and sociological information to state that essential shifts in birth timing toward the earlier birth of the second and subsequent children took place, and one could expect "collapse" due to a birth timing afterward. More likely, the considerable part of postponed second births seems to have been realized with the big interval after the first childbirth.

Table 9

Average number of born and expected children (Russian Federation*; "Sample Survey of Population Reproductive Plans")

Age (years)	Average number of born children	Average expected number of children
30	1.17 ($N = 226$)	2.04 ($N = 213$)
31	1.37 ($N = 175$)	2.15 ($N = 157$)
32	1.33 ($N = 222$)	1.99 ($N = 203$)
33	1.34 ($N = 177$)	1.90 ($N = 160$)
34	1.50 ($N = 199$)	1.98 ($N = 178$)
35	1.52 ($N = 223$)	1.97 ($N = 206$)
36	1.40 ($N = 239$)	1.85 ($N = 215$)
37	1.47 ($N = 216$)	1.87 ($N = 198$)
38	1.51 ($N = 188$)	1.83 ($N = 173$)
39	1.59 ($N = 182$)	1.85 ($N = 170$)
40	1.45 ($N = 193$)	1.70 ($N = 176$)
41	1.53 ($N = 159$)	1.85 ($N = 150$)
42	1.43 ($N = 219$)	1.64 ($N = 211$)
43	1.54 ($N = 230$)	1.73 ($N = 212$)
44	1.49 ($N = 168$)	1.65 ($N = 160$)

* The data on the regional level are not provided as female numbers for annual age groups in separate regions are too small to be used within the scope of the given research.

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