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Analysis on Russian Demographic Trends

Edited by

Kazuhiro Kumo

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The Institute of Economic Research

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Tokyo, Japan

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Preface

A long time has passed since Russian demographic trends first garnered attention. Moreover, a great deal of debate has developed on the factors of de-population in Russia. It is common knowledge that declining birth rates have long been a subject of debate in many countries, and falling birth rates have also been viewed as a serious issue in the former communist countries since the early 1990s, when they began their transition to capitalism, to the 21st century. At the same time, what is unique about Russia and other transitional economies compared with developed nations is that the problem they have faced has been their high mortality rates. Their infant mortality rate, which had been declining since World War II, stopped falling in the 1970s. Moreover, mean life expectancy at birth increased much more slowly during the 1960s, and then actually began to decline. Factors affecting on low fertility and those on high mortality in Russia has been discussed for a long time: the questions, however, remain unsolved.

It is against this background that we organized a workshop on demography in Russia at the Institute of Economic Research, Ural blanch of the Russian Academy of Science on August 12, 2011 and a panel entitled as “Economic Security of Russian Regions” at the 43rd annual convention of the Association for Slavic, East European and Eurasian Studies held in Washington D.C. on November 18, 2011. This book represents one of outcomes from the collaboration between Russian and Japanese scholars. We hope this volume could be beneficial to the researchers on Russian population studies and make a contribution to the further development of in-depth studies on demographic analysis in Russia.

Kazuhiro KUMO

January 2013

Table of Contents

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Self-Regulation of Migration in a Common Market: Methodology, Modeling and a Case Study for Russian Regions[1]

Vasileva Aleksandra Vladimirovna / Tarasyev Aleksandr Aleksandrovich

Abstract

This paper presents a migration self-regulation model within the framework of the neoclassical economics. The model is constructed on the evolutionary game dynamics of migration flows. It is assumed that the central institution of migration self-regulation is the labor market and the equilibrium solution is driven by the wage equating forces of migration. The model can predict the dynamics of migration determined by wage differentials and the labor market situation as well as the dynamics of wage levels determined by migration simultaneously for source and host regions. Employing the model to Russian regions and CIS states data, this paper analyzes the effects of liberalization of the migration policy in Russia. The predicted migration of the labor force from CIS states to Russian regions looks quite realistic and has important policy consequences. In particular, these findings can be used for developing work permit quotas.

JEL classification: F22, J31, J61.

Keywords: migration, self-regulation, common market, labor market, wage effect

[1] The reported study was partially funded by the Russian Humanitarian Scientific Fund, research project No. 12-32-01201a2.

1 Introduction

The latter half of the twentieth century saw liberalization in immigrant intake and citizenship acquisition regulations in many immigrant-receiving countries. More recently, countries such as Denmark, the Netherlands, the UK, and the USA have tightened up citizenship acquisition rules and immigrant intake regulations and have witnessed declines in the employment probabilities for immigrants. In contrast, Sweden has continued to liberalize citizenship acquisition regulations, most recently recognizing dual citizenship (2001), while at the same time seeing declining employment prospects for immigrants. Canada has a longstanding history of fairly liberal citizenship regulations, demanding a relatively short period of residency before citizenship acquisition is possible and recognizing dual citizenship (Bevelander and Pendakur 2011).

A decisive step towards liberalization of the migration policy in Russia was made in 2007. The essence of the liberal measures is presented briefly in Table 1. The changes led to a simplified procedure of registration – especially for migrants from CIS states, who were granted entry without a visa and a notification-based registration.

The procedure of employment for CIS migrants has also undergone major changes. Previously, a permit for employment of foreign labor had to be granted to an employer. This made migrants dependent on the employer and encouraged illegal employment practices. Now, a work card is granted to the worker himself, so that migrants can seek freely for a job and employers are free to hire foreign citizens with work cards. So dependence of the worker on the employer is eliminated and conditions for free movement of foreign labor on the market are in place, although the freedom is limited by the employment profile of the worker and is only valid in the administrative region of the Federation that issued the card.

In the case of liberalization of the immigration policy, the economy of the host country benefits from low-paid labor migrants. But this liberalization lowers the effectiveness of the empowered authorities' control and supervision activities causing growth in the number of illegal immigrants in host countries.

Illegal immigration to Russia has been estimated at 4-5 million persons at the beginning of 2008, about 30% of those had neither registration nor right to work (United Nations Development Programme 2009).

Table 1: Migration regulations in Russia before and after 2007

Old procedure	New procedure
Registration at place of stay /Migration accounting (all immigrants)	
Permission required	Notification required
On issue of a permit by the police	On notification by hosts No permit is required
At a residential address	At a residential address, enterprise or intermediary agency
Registration at a police station	Notification to the Federal Migration Agency, in person or by post
Complex procedure, requiring: — Written consent of all persons, permanently living at the residential address, who must accompany the migrant to the police station; — Observance of norms for living space per person (determined by local legislation in some regions)	Simplified procedure, according to which a migrant need only find host and send notification
Work permit (visa-free migrants)	
Employment permit is granted to an employer	Employment permit (work card) is granted to the migrant personally Employer notifies the migration agency of an employed foreign worker
Long multi-stage procedure	Simple procedure
Quotas	
Only for visa migrants	Separately for visa-free and visa migrants

Source: United Nations Development Programme, 2009

Recent estimates for the United States suggest that in January 2008, 12 million individuals were in the country as undocumented aliens, representing approximately four percent of the total number of residents. Other major immigrant destinations also host large numbers of undocumented foreigners. Recent estimates for a group of them,

reported in Table 2, show that also in Italy and Greece (besides the US) well over twenty percent of the total number of foreigners is represented by illegals, and these figures are likely less than the true size of the phenomenon.

Table 2: Estimates of stock and flows of illegal immigrants in thousands

Country	Stock	% of foreign pop.	Year	Inflow	Year
US	12000	32.4	2008	500	2008
EU (15)				650	2001
Austria	100	10.8	2003	50	2001
Italy	650	22.1	2008	100	2001
Germany	500	7.4	2005	90	2001
Greece	250	43.8	2007	80	2001
Spain	570	10.9	2008	40	2001
UK	725	11.1	2007	95	2001

Source: Fasani, 2009

As immigration has become a main public concern in most developed economies, policy makers seek to manage immigrant populations. To enlarge the evidence base for policy makers we have designed a migration self-regulation model, which aims to forecast effects of liberalization of the immigration policy.

The paper is structured as follows: Section 2 outlines our theoretical framework, whereas section 3 discusses the related literature. The migration self-regulation model is set out in detail in section 4. The data are described in section 5. Section 6 calibrates the model on Russian regions and CIS states data. Section 7 presents forecast trajectories of migration flows and wage levels for the period since 2010 to 2016. The final section offers some concluding remarks.

2 Theoretical Framework

By answering the question of how to study the effects of liberalization of the immigration policy, we have tried to define a theoretical framework of our model.

The liberal development model is focused on all-democratic values. This model is based on a human rights paradigm that supports a priority of human rights over citizen rights. The right to free movement as one of the basic human rights in a democratic society (The Universal Declaration of Human Rights 1948) should prevail over a division of the rights by a nationality / non-nationality principle in a "pure"

liberal model. The liberal development model assumes elimination of all barriers for free movement of the labor force.

At the same time such free movement of labor migrants is considered as moving of production factors in the neoclassical economics of migration in a common market. According to the neoclassical economics, a migration decision is based on the expected income gained from the earning gap between source and host countries (Ghatak et al. 1996; Harris and Todaro 1970).

However, according to the standard theory of equilibrium, wages based on a labor demand and supply framework and inflow of immigrant labor into a certain skill group will reduce the relative wage of native workers belonging to that group, with the size of the wage reduction determined by the degree of substitution between immigrant and native workers with similar skills (Ottaviano and Peri, 2008).

Considered approaches allow studying effects of liberalization of the immigration policy, so we believe a migration self-regulation model should be established within the framework of the neoclassical economics of migration and the standard theory of equilibrium wages.

3 Related Literature

There is a growing body of literature that analyzes the effects of migration on the origin and destination countries and their labor markets (Borjas 2009; Dustmann and Preston 2011; Longhi et al. 2005; 2006; 2008; Ottaviano and Peri 2006; 2008). However, there is only a small set of studies that analyze migration within theoretical frameworks. Most of the dynamic theoretical studies analyze immigration employing the standard neoclassical growth model; examples include, but are not limited to, Hazari and Sgro (2003), Ben-Gad (2004), Moy and Yip (2006) and Ben-Gad (2008). Liu (2010) and Palovos (2010) concentrate on the welfare effects of illegal immigration within dynamic equilibrium models with search frictions. Several neoclassical economic studies of migration, such as Friedberg and Hunt (1995), Card (2001), Borjas (2003), Batishcheva, (2009), Strielkowski and Turnovec (2011), have developed migration models in which immigrant workers respond to cross-region differences in wages, migration costs, and the labor market situation in source and host regions.

The primary objective of this paper is to develop a migration self-regulation model that can be used to predict the dynamics of migration determined by wage differentials and the labor market situation as well as the dynamic of wage levels determined by migration simultaneously for source and host regions. To the best of our knowledge, thus far, no such theoretical model has been developed. More importantly, in models mentioned above, a potential migrant from just one region searches for job in other region, while our model stresses simultaneous searches of potential migrants from more than one region in more than one region. Therefore, the model developed in this paper can predict changes to the origin composition of migration flows, which will be determined by a competition of migrants from different states.

4 The Migration Self-Regulation Model

A migration self-regulation model in continuous time is established within the framework of the neoclassical economics of migration and the standard theory of equilibrium wages. The model is constructed on the evolutionary game dynamics of migration flows. It is assumed that the central institution of migration self-regulation is the labor market. Additionally, as institutions of migration self-regulation we consider migratory networks.

We examine a common market, where migrants are economically rational and they go to work in a region, where wage level is higher, taking into account migration cost. To simplify, migrants are not divided into skilled groups and, therefore, they are considered as workers with similar skills where previous and recent immigrants seem to be perfect substitutes. So new immigrants will reduce the wage level on the migrant labor market in the host region.

The labor migration flow from source country i to host region j at any time t≥0,is defined as

$$\frac{dx_{ij}(t)}{dt} = \alpha \cdot \frac{1}{r_{ij}} \cdot x_{ij}(t) \cdot (M_i - \sum_{j=1}^{n} x_{ij}(t)) \cdot (-w_i(x_i(t)) + w_j(x_j(t))) \ , \qquad (1)$$

where α is the scale coefficient, $x_{ij}(t)$ is the number of labor migrants from source country i in host region j at t time, r_{ij} is a distance between the capitals of source country i and host region j, M_i is the number of potential migrants in source country i,

n is the number of host regions, $x_i(t) = (x_{i1}(t),...,x_{in}(t))$ is a full vector of migration flow from source country i, $x_j(t) = (x_{1j}(t),...,x_{mj}(t))$ is a full vector of migration flow to host region j, $w_i(x_i(t))$ is a wage function in source country i with migrants outflow $x_i(t)$, $w_j(x_j(t))$ is a wage function in host region j with migrants inflow $x_j(t)$.

According to the first multiplier a labor migration flow is inversely proportional to the distance between capitals of source country and host region. Previous research on population migration has already shown that a large distance increases the financial and psychological costs of migrating and gathering information (Greenwood 1997), which is likely to have a negative impact on the scale of population migration.

The second multiplier describes migration inflow support by migrant networks, which act as informal promoters of their compatriots in the labor market. Thereby existing migrant population abroad creates beneficial network effects.

According to the expression in the first brackets, a migration flow is limited by the number of potential migrants, who would like to move to another country for temporary work.

According to the expression in the second brackets, the equilibrium solution in the present model is driven by the wage equating forces of migration. A labor migration flow does not stop until wage levels between source country and host region have equated.

Wages in host region are modeled as a function of the labor migrant inflow:

$$w_j(x_j(t)) = w_{j\_av} \cdot \left(\frac{E_j + V_j}{E_j + U_j + \sum_{i=1}^{m} x_{ij}(t)}\right) \quad , \qquad (2)$$

where w_{j_av} is the average wage per month in host region j, E_j is the number of employed in host region j, V_j is the number of vacancies in host region j, U_j is the number of the unemployed in host region j.

According to this function immigration increases labor supply and reduces probability to get job in host region. This probability counts according to the expression in brackets. As a result the wage in the host region decreases.

It is reasonable to expect that the wage in source country increases with labor migrant outflow according to the function:

$$w_i(x_i(t)) = w_{i\_av} \cdot \left(\frac{E_i + V_i}{E_i + U_i - \sum_{j=1}^{n} x_{ij}(t)}\right) \quad , \tag{3}$$

where w_{i_av} is the average wage per month in source country i, E_i is the number of employed in source country i, V_i is the number of vacancies in source country i, U_i is the number of the unemployed in source country i.

The code of the model was programmed in MatLab. To test whether the model is consistent with empirical regularities, the model was calibrated on Russian regions and CIS states data.

5 Data

Employing a developed model to Russian regions and CIS states requires a large data set. The data on the number of labor migrants as well as the average wage per month, the number of employed and unemployed for Russian regions came from the Federal State Statistics Service (Rosstat 2011). The average wage per month, the number of employed and unemployed data for CIS states is taken from the Interstate Statistical Committee of the Commonwealth of Independent States (CISstat 2011). The number of potential migrants was established on the basis of survey results conducted by Gallup (Gallup 2010).

We include such CIS states as Tajikistan, Uzbekistan, Kyrgyzstan, Kazakhstan, Armenia, Azerbaijan, and Ukraine. Between 2007 and 2010, individuals born in these states constituted 60-70% of the foreign labor force in Russia (see Table 3).

Data sets were examined for Moscow, St. Petersburg and the Sverdlovsk region, where 35-45% of the foreign labor force of Russia is concentrated (see Table 4).

Table 3: Origin Composition of Foreign Labor Force in Russia

	2006		2007		2008		2010	
	1000 persons	*%*	*1000 persons*	*%*	*1000 persons*	*%*	*1000 persons*	*%*
Azerbaijan	28,3	2,8	57,6	3,4	76,3	3,1	40,3	2,5
Armenia	39,8	3,9	73,4	4,3	100,1	4,1	59,8	3,6
Kazakhstan	5,0	0,5	7,6	0,4	10,4	0,4	8,3	0,5
Kyrgyzstan	33,0	3,3	109,6	6,4	184,6	7,6	117,7	7,2
Tajikistan	98,7	9,7	250,2	14,6	391,4	16,1	268,6	16,4
Uzbekistan	105,1	10,4	344,6	20,1	642,7	26,5	511,5	31,2
Ukraine	171,3	16,9	209,3	12,2	245,3	10,1	167,3	10,2
Sum	*481,2*	*47,5*	*1052,3*	*61,4*	*1650,8*	*67,9*	*1173,5*	*71,6*
Total	**1014,0**	**100,0**	**1804,0**	**100,0**	**2425,9**	**100,0**	**1640,8**	**100,0**

Source: Rosstat 2011

Table 4: Foreign Labor Force in Russian regions

	2006		2007		2008		2010	
	persons	*%*	*persons*	*%*	*persons*	*%*	*persons*	*%*
Moscow	355533	35,1	532311	29,5	623160	25,7	345142	21,0
St. Petersburg	34811	3,4	163449	9,1	115398	4,8	120875	7,4
Sverdlovsk region	52845	5,2	11061	0,6	109167	4,5	82969	5,1
Sum	*443189*	*43,7*	*706821*	*39,2*	*847725*	*34,9*	*548986*	*33,5*

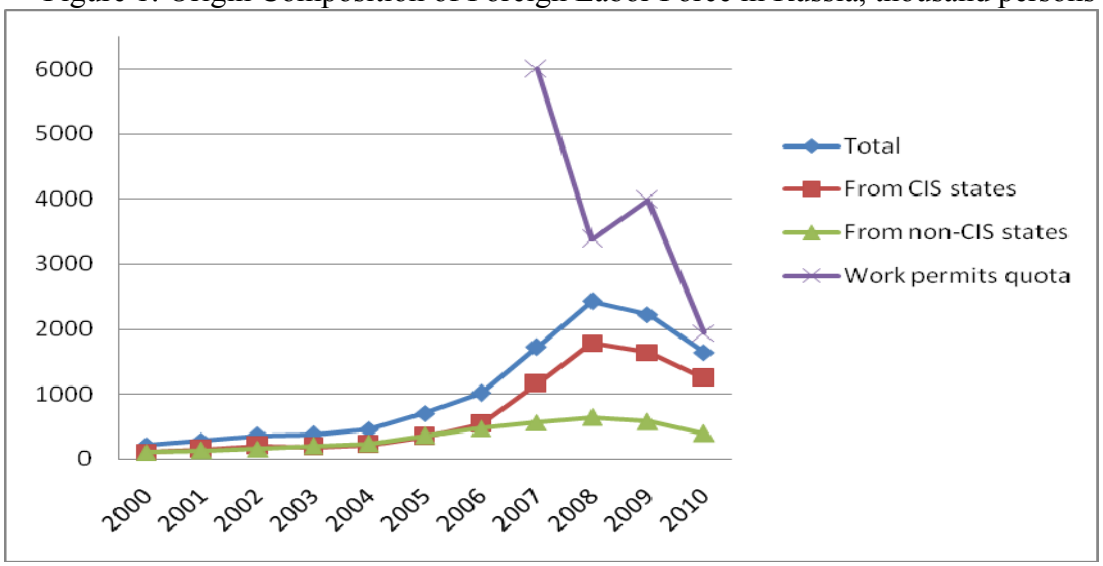
Source: Rosstat 2011

6 Data Calibration

Employing the model to Russian regions and CIS states, we analyzed the effects of liberalization of the migration policy in Russia. The model was calibrated on Russian regions and CIS states data for the period from 2006 to 2008. This period is characterized by a considerable migrant inflow from CIS states (see Figure 1) due to liberalization of the migration policy; thus, we believe this period exactly reflects the effects of this liberalization and could be successfully applied for calibration of the migration self-regulation model. The removal of work permit quotas in 2008-2010 caused a lowering of the number of registered labor migrants with a growth of illegal employment practices in Russia, which is why we did not use recent data for calibration.

Calibrating the model we established means of the scale coefficient for the host regions: 0.0295 (Moscow), 0.0885 (St. Petersburg), and 0.1056 (Sverdlovsk region). The accuracy of the model constitutes 95% of the absolute value of the migration flows.

Figure 1: Origin Composition of Foreign Labor Force in Russia, thousand persons



Source: Rosstat 2011; Minsotsrazvitiye 2011

7 Simulating Results

The forecast trajectories of migration flows to Russian regions from CIS states have been proposed for the period since 2010 to 2016. Predicted situations in Moscow and St. Petersburg are similar (see Figure 2 and Figure 3). The largest migratory inflow from Uzbekistan will remain in both of them at first. Steadily over time, a migratory inflow from Ukraine will exceed it, which will cause the greatest number of potential migrants there (see Table 5), and a geographic contiguity of Ukraine and these cities. At the same time more and more migrants from western CIS states prefer to go to European countries, so future migratory inflow from Ukraine might be lower than predicted.

The foreign labor force in Moscow will reach 700 thousands persons by 2016 (see Figure 2).

In St. Petersburg, the foreign labor force will reach 580 thousands persons by 2016 (see Figure 3).

Because of a geographic contiguity of the Sverdlovsk region and Central Asia the origin composition of the foreign labor force in the Sverdlovsk region will be different (see Figure 4). Uzbekistan, which has the greatest number of potential migrants in Central Asia, will become the leading migrant sending country (see Table 5).

The foreign labor force in the Sverdlovsk region will reach 230 thousands persons by 2016.

Figure 2: Migration Flows to Moscow

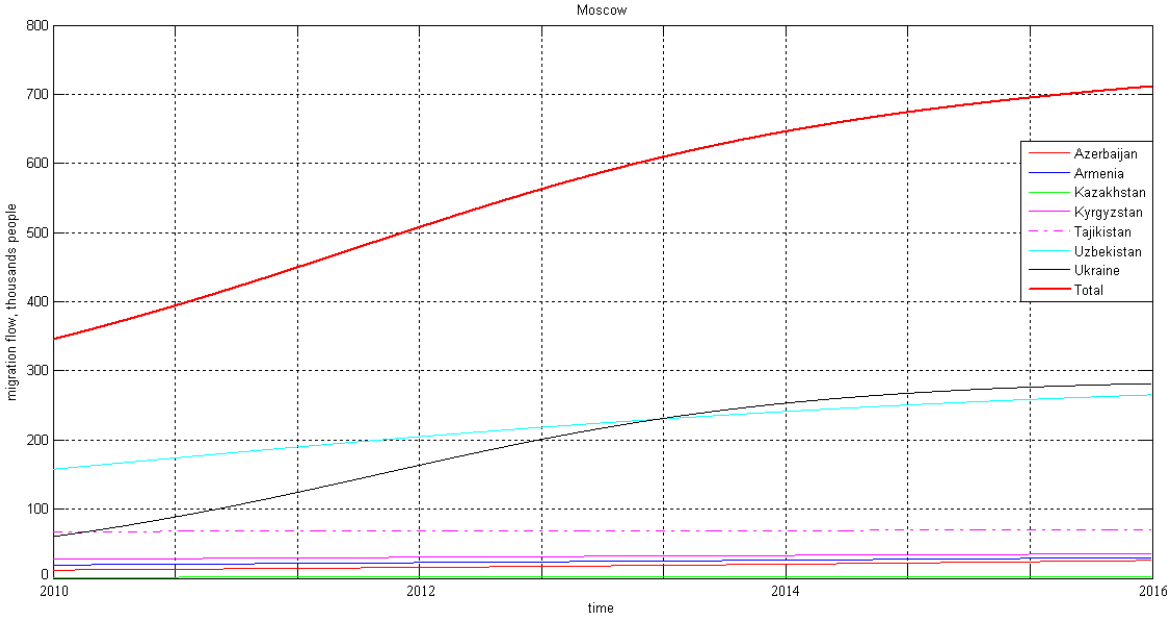


Figure 3: Migration Flows to St. Petersburg

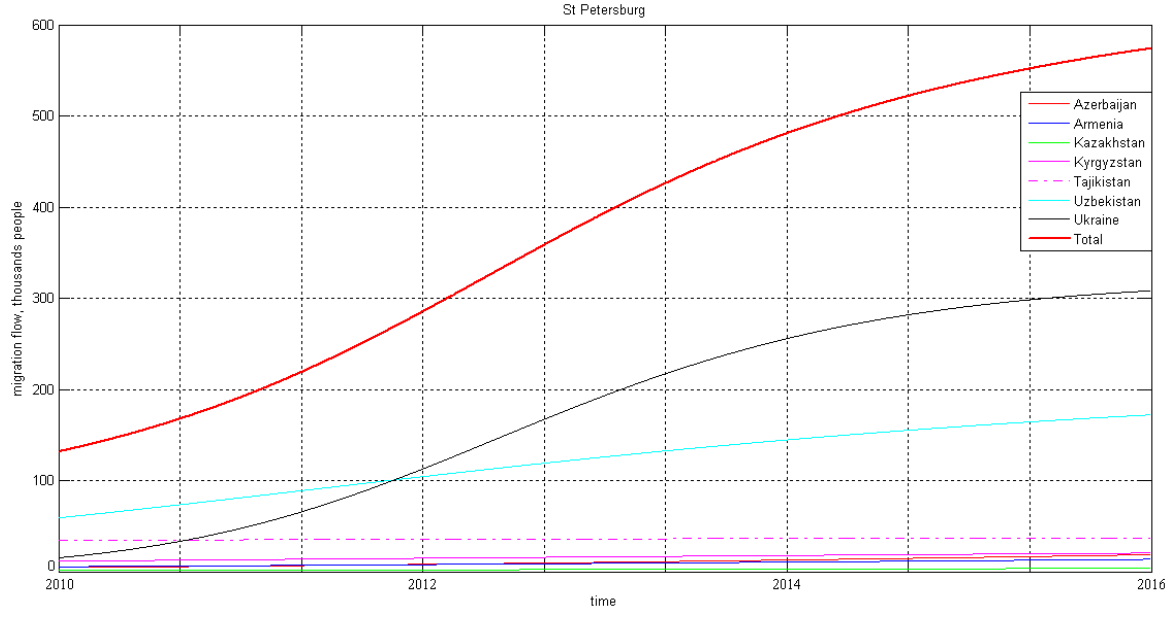


Figure 4: Migration Flows to Sverdlovsk Region

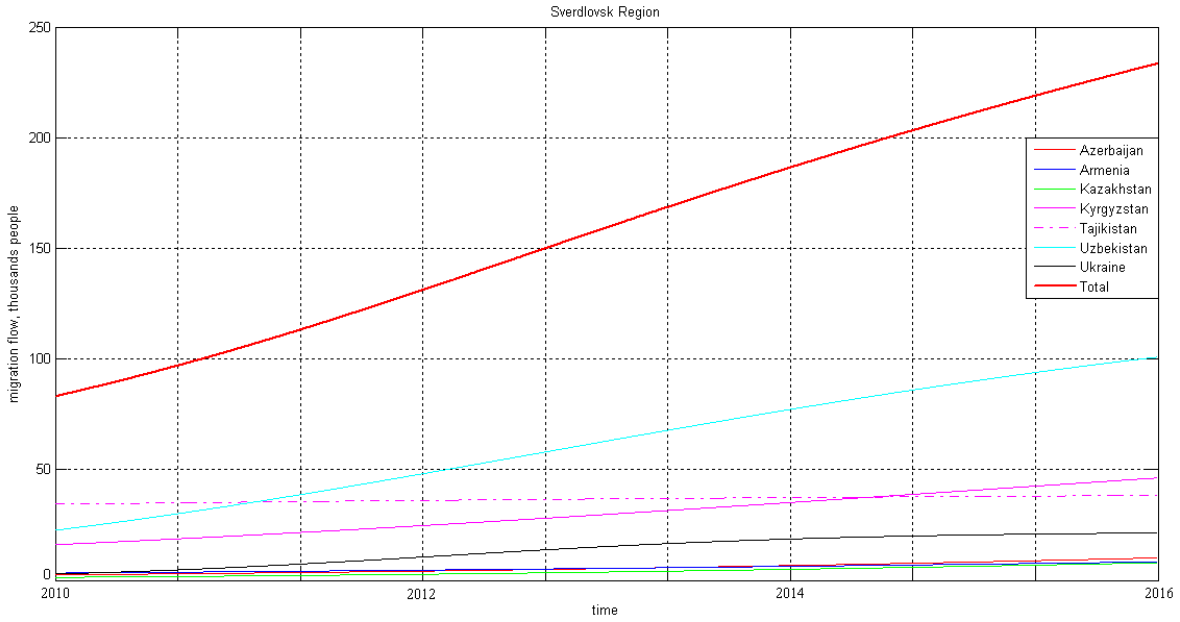
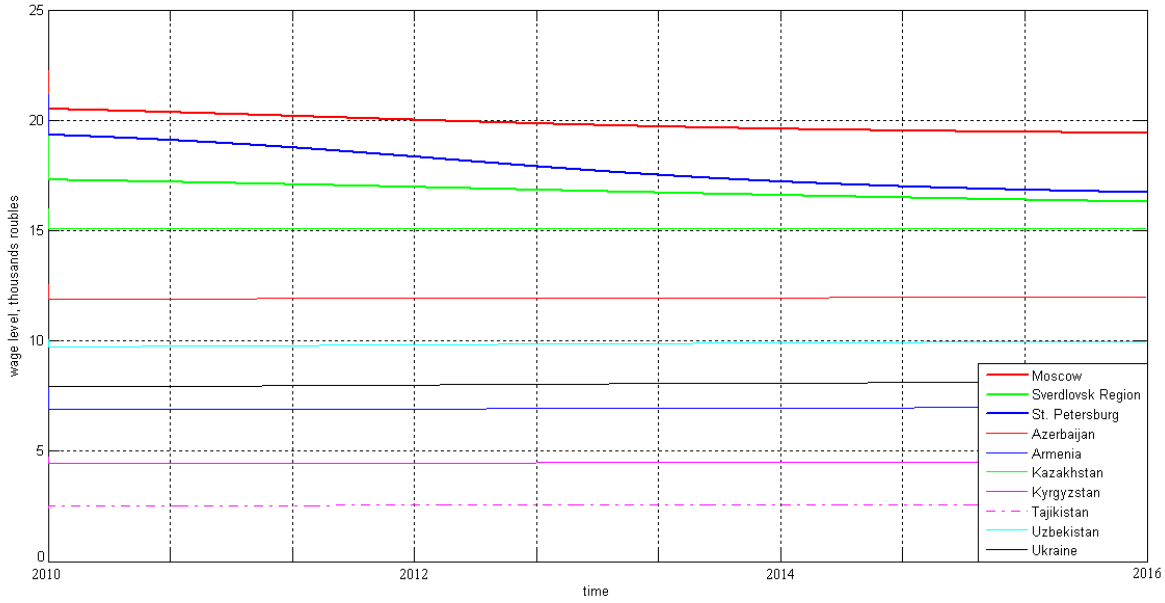


Figure 5: Wage Level



Differences in wages between the source countries and the host regions and the origin composition of the foreign labor force in the host regions are presented in Figure 5. As a result, the effects of migration on wage levels will take place mainly in the host regions.

Economic growth of Azerbaijan and Kazakhstan, where wage levels are the highest among the sources countries (see Figure 5), resulted in lowering of migration to

Russia from these states as well as Kazakhstan becoming a preferred destination for many Central Asian labor migrants (first of all for the Uzbeks).

8 Conclusions

Employing a developed model to Russian regions and CIS states data, this paper analyzes the effects of liberalization of the migration policy in Russia. The predicted migration of the labor force from CIS states to Russian regions looks quite realistic.

These findings have important policy consequences. In particular, because of the lack of reliable methods for calculating the demand of foreign labor, the forecast of migration flows can be used for developing work permit quotas. In reality small work permit quotas for migrants from CIS states with a visa-free regime of entry instead of providing job opportunity for Russians, will provoke a growth of illegal employment practices in Russia.

We can think of at least two lines along which our model could be extended. First, we assume in this study if the number of vacancies is less than the number of unemployed workers represented by natives as well as immigrants, then unemployed workers fill all vacancies. However, empirical evidence documents that the labor market is subject to search-matching frictions (see Romer, 2006). Vacant jobs and unemployed workers are brought together in a pair-wise fashion by a stochastic search-matching process. The search aspect follows from the fact that both domestic workers and immigrants exert an effort in searching for jobs. Meanwhile, firms seek workers to fill vacant job positions. The matching portion of the process is derived from a matching function that pairs the unemployed with vacancies. A successful job match generates a surplus for both unemployed workers and employers. The surplus sharing is a matter of bargaining. The standard search and matching model assumes that by choosing a proper wage rate, this surplus is maximized according to the Nash solution to a bargaining problem. Therefore, the migration flow modeling will reflect the real process better, if a Nash bargaining will determine wage, which is the main driver of labor migration.

Second, migrants in this study are not divided into skilled groups and, therefore, they are considered as workers with similar skills where previous and recent immigrants seem to be perfect substitutes. Therefore, the analysis will become more interesting if

migrants can be classified into skilled groups. However, these possible extensions are left for future research.

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Determinants of Childbirth in Russia: A Micro-Data Approach[*] [**]

Kazuhiro Kumo

Abstract

This paper uses the micro-data from the Russia Longitudinal Monitoring Survey (RLMS) to identify factors that explain fertility between 1995 and 2004.

Previous research on fertility has made it clear, even obvious, that the relationship between women's personal incomes and the likelihood of them having children is not linear. In the case of post-Soviet Russia, however, the macro-level economic recovery and growth and the stabilization of society coincided with an increase in the birth rate, leading people to assume that there was a correlation between the rise in incomes and the recovery in the birth rate.

The analysis based on micro-data supports the experience of other countries that fertility is not solely determined by short-term factors such as rising incomes or by the economic climate. There are questions meanwhile over the sustainability of providing cash payments in return for childbirth on a scale that exceeds average incomes – as is the case with the Mothers' Fund. Even if recent increases in Russia's fertility rate are attributable to the impact of the Mother's Fund, payments are only going to be available to those having children until the end of 2016, after which time the country's fertility rate may well start to decline. The only way to determine if fertility trends since 2006 will be sustained is to monitor trends over the long term.

JEL Classification: J11, J13, P36

Key Words: Russia, Fertility, Micro-Data, Household Survey, RLMS

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1. **Introduction**

It is common knowledge that declining birth rates have long been a subject of debate in many countries (Kohler, Billari and Ortega, 2006), and falling birth rates have also been viewed as a serious issue in the former communist countries since the early 1990s, when they began their transition to capitalism, to the 21st century (Philipov and Dorbritz, 2003). In the 1990 the total fertility rates (TFR) in these countries were generally higher than those in Western European countries. From then on, however, they declined rapidly, such that by 2000 the TFR was less than 1.7 in every region except central Asia, the Caucasus countries, Moldova (backward regions that used to be part of the Soviet Union), Albania, and Montenegro. Moreover, most of these countries actually had birth rates of less than 1.5 (Eurostat, 2002; Council of Europe, 2001; Council of Europe, 2005. See Table 1.)

Table 1: *Total Fertility Rates in Former Communist Countries*

Source: World Bank (2009).

			1965	1970	1975	1980	1985	1990	1992	1995	2000	2005
		Albania	5.4	4.8	4.4	3.7	3.2	2.9	2.8	2.6	2.3	1.8
		Bulgaria	2.1	2.2	2.2	2.1	2.0	1.8	1.5	1.2	1.3	1.3
		Czech Republic	2.2	1.9	2.4	2.1	2.0	1.9	1.7	1.3	1.1	1.3
		Slovakia	2.8	2.4	2.6	2.3	2.2	2.1	2.0	1.5	1.3	1.3
		Hungary	1.8	2.0	2.4	1.9	1.8	1.8	1.8	1.6	1.3	1.3
		Poland	2.5	2.2	2.3	2.3	2.3	2.0	1.9	1.6	1.3	1.2
		Romania	1.9	2.9	2.6	2.4	2.3	1.8	1.5	1.3	1.3	1.3
	Former Yugoslavia	Montenegro	2.5	2.4	2.4	2.3	2.3	2.0	1.8	1.8	1.8	1.6
		Croatia	2.2	2.0	2.0	1.9	1.8	1.6	1.5	1.6	1.4	1.4
		Serbia	2.4	2.3	2.2	2.1	2.0	1.8	1.8	1.7	1.5	1.5
		Bosnia-Herzegovina	3.4	2.8	2.4	2.1	1.9	1.7	1.5	1.5	1.4	1.2
		Macedonia	3.6	3.1	2.8	2.5	2.1	2.0	1.9	1.8	1.6	1.5
		Slovenia	2.3	2.2	2.2	2.1	1.7	1.5	1.3	1.3	1.3	1.3
Former Soviet Union	Baltic	Latvia	1.7	2.0	2.0	1.9	2.1	2.0	1.7	1.3	1.2	1.3
		Lithuania	2.2	2.4	2.2	2.0	2.1	2.0	1.9	1.6	1.4	1.3
		Estonia	1.9	2.2	2.1	2.0	2.1	2.0	1.7	1.3	1.3	1.5
	East Slavic	Russian Federation	2.1	2.0	2.0	1.9	2.1	1.9	1.6	1.3	1.2	1.3
		Belarus	2.3	2.3	2.2	2.0	2.1	1.9	1.8	1.4	1.3	1.2
		Ukraine	2.0	2.1	2.0	2.0	2.1	1.8	1.7	1.4	1.1	1.2
		Moldova	2.9	2.6	2.5	2.5	2.6	2.3	2.1	1.9	1.6	1.7
	Caucasus	Armenia	3.8	3.2	2.7	2.4	2.5	2.5	2.4	2.0	1.7	1.7
		Azerbaijan	5.2	4.7	3.9	3.2	2.9	2.7	2.7	2.3	2.0	2.0
		Georgia	2.8	2.6	2.5	2.3	2.3	2.1	2.0	1.7	1.5	1.4
	Central Asia	Tajikistan	6.6	6.8	6.3	5.7	5.5	5.1	4.9	4.5	4.0	3.5
		Kazakhstan	3.5	3.4	3.3	2.9	3.1	2.7	2.5	2.3	1.8	2.2
		Kyrgyz	4.6	4.9	4.9	4.1	4.2	3.7	3.6	3.3	2.4	2.5
		Turkmenistan	6.5	6.2	5.7	5.0	4.6	4.2	4.0	3.4	2.9	2.6
		Uzbekistan	5.5	5.7	5.7	4.8	4.7	4.1	4.0	3.6	2.6	2.4

Needless to say, the Russian Federation is one of these countries. In 1989 Russia's TFR was 2.01, but it plummeted following the beginning of the transition to capitalism such that in 1999 and 2000 it had fallen below 1.20. A number of potential reasons for this drop spring to mind. The decline in incomes that accompanied the sharp fall in GDP obviously made it more difficult for families to cover the cost of childrearing. In addition, the former Soviet Union was known for having a high proportion of women in work, and with the employment rate for women remaining high, public facilities for assisting with childrearing such as nurseries and kindergartens, which in the past had been free, started charging for their services. At the same time, company-run kindergartens and other facilities began closing one after another[1].

Russia's total population began falling in 1992, and the Russian government has implemented various measures to stem this decline. With the TFR dropping below 1.2 in 1999 and 2000, in 2001 the Russian federal government produced a plan for halting the population decline by 2015[2]. This plan offered guidelines for improving the health of citizens and implementing measures to raise the birth rate. However, like so many other "plans" produced by the Russian government[3], it would be difficult to argue that it had any realistic significance, as no new measures against the declining birth rate and rising death rate were introduced at the time.

The author will not rehash here the overall long-term impact of a declining birth rate, i.e. difficulty in sustaining the pension system, changes in the supply of labour, shrinking markets, and so on. With issues such as problems securing labour being frequently taken up in the media[4], Russia faces the same problems as other countries with low birth rates. Japan and the West are in similar situations, yet when compared with the amount of birth-rate-related research that has been conducted in these countries in recent years, research on the birth rate in Russia remains inadequate. The analysis conducted in Russia and the West has been limited quantitatively.

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[1] *Vechernaya Moskva*, No. 37, Feb. 3, 2007; *Vechernii Peterburg*, Aug. 25, 2009.

[2] Rasporyazhenie pravitel'stva RF ot 24. 09. 2001 No. 1270-r.

[3] An example of such plans is the long-term development program for the Far East and Transbaikal (Postanovlenie pravitel'stva RF ot 15.04. 1996 No. 480). As for the evaluations on the plan for halting the population decline by 2015, see Mironov (2006), Chairman of the Federation Council of Russia.

[4] *Rossiiskaya gazeta-Privolzhe*, Mar. 31, 2007; *Agrmenty i fakty*, Oct. 15, 2008. The decline in Russia's birth rate began at the end of the 1980s (its TFR has been well below 2.0 since 1990), and labour shortages have already emerged as a serious issue. See Figure 2.

In Russia there is no equivalent to Japan's National Fertility Survey, which is conducted by the Ministry of Health, Labour and Welfare, and one reason for the paucity of previous research is that the available data is difficult to use. Having said that, micro-level quantitative analysis using the data from the Russia Longitudinal Monitoring Survey (RLMS), which will be discussed later, has already begun, so studying fertility determinants by looking at the characteristics of individuals is by no means impossible.

Russia's TFR actually bottomed out in 1999 and climbed continuously until 2004. It has also risen continually since, save for a temporary dip in 2005 (Rosstat, 2008). Many commentators have pointed to the sustained rise in economic growth since 1999 as a contributory factor (Antonov, 2008; Rosstat, 2009). However, in-depth analysis contending that economic growth did not lead directly to the recovery in the birth rate has also been conducted (Roshina and Boikov, 2005). Finding out whether fertility is determined by economic factors is essential for forecasting the future fertility trend in Russia, which has achieved sustained economic growth by producing ever increasing amounts of raw materials. However, the most recent fertility data employed in previous research involving quantitative analysis was for 2001, making it impossible to grasp the trend for the years that followed. In light of this situation, this paper relies on micro-data from the RLMS, and identifies factors that can explain the fertility trend between 1995 and 2004.

This paper is structured as follows. The next section provides an overview of fertility dynamics in Russia following the collapse of the Soviet Union, and examines population policies in 2000s in Russia. Section 3 looks at previous research. Although few birth-rate studies employing micro-data have been conducted, it is frequently argued that the shrinking of the economy during the economic transition was the reason for the decline in the birth rate. However, many demographic researchers and sociologists, particularly in Russia itself, hold that the drop in the country's TFR from the 1990s should be attributed to the long-term population trend, a view that has also existed for a long time. Section 4 contains the analysis. While the previous studies all used birth data up to 2001, this paper employs data up to 2004, which is significant as the birth rate showed a sustained rise from 2001 onwards. It was shown that personal incomes did not have a significant impact on fertility-related behaviour at any time during the period subject to the analysis, and this may indicate the possibility that economic growth did not lead directly to the recovery in the birth rate. Finally, the paper examines, from a demographic perspective and taking into account the results of

the research in this paper and findings from previous research, the measures to encourage couples to have children that were introduced in the last days of the Putin Administration, which ended in May 2008.

2. Fertility and Population Policy in Russia in 2000s

Russia's population crisis is well known. In 1998, the journal *World Development* carried a feature article on population dynamics in Russia. The article discussed such phenomena as the increase in the death rate among men of working age, the high level of accidents as a cause of death among such men, and the sharp decline in the birth rate.

The falling birth rate and rising death rate saw Russia's population slip into natural decline (see Figure 1) from 1992. Obviously, a low birth rate is a phenomenon seen in many advanced countries, but what has put Russia and other former communist countries in the spotlight is the sheer speed with which the birth rate has dropped, something that was mentioned at the very beginning of this paper.

1989 was the last year in which Russia's TFR exceeded 2.0, yet only four years later (in 1993) it slipped below 1.50 (Rosstat, 2008). The pace of decline in the birth rate was higher than in any of the European countries in the OECD[5], and the fact that the birth rate has remained low for over 15 years is a characteristic feature of population dynamics in Russia.

The annual state of the nation addresses given by (former) President Putin in 2005 and 2006 also touched on the problem of the slump in the birth rate, and gave increasing it as a policy goal. This led to childrearing allowances and other benefits being raised in December 2006[6], and a childrearing support scheme[7] called the "Mothers' Fund" being established.

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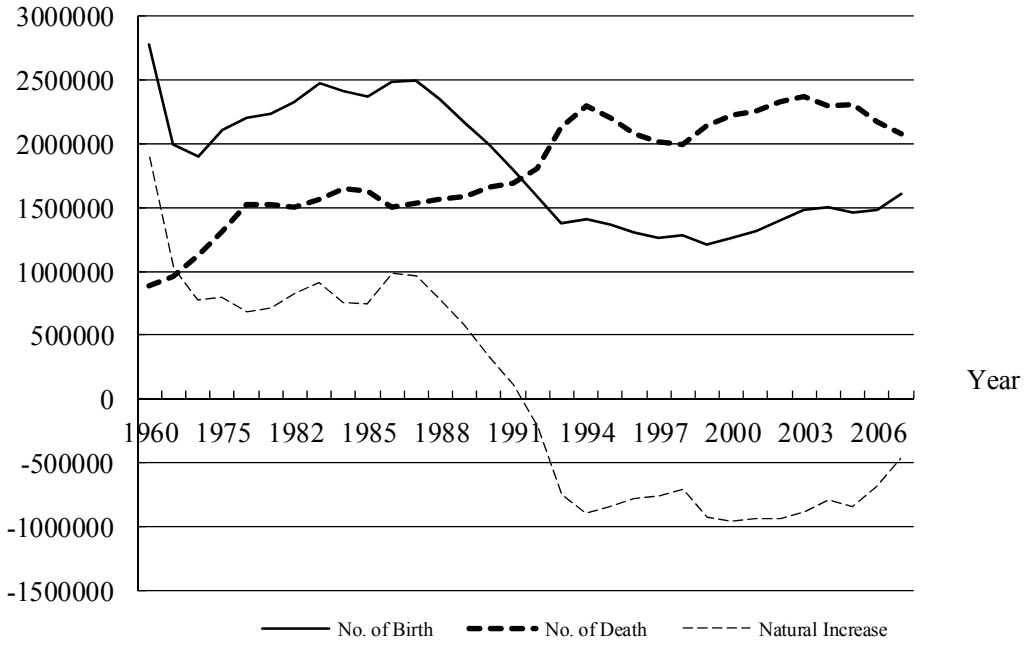
[5] World Bank website, "Key Development Data & Statistics", http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20535285~menuPK:1192694~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html, accessed on September 20, 2009.

[6] Federal'nyi zakon ot 5 dekabrya 2006, No.207-FZ o bnesenii izmenenii v otdel'nye akty Rossiiskoi Federatsii v chasti gosudarstvennoi podderzhki grazhdan, imeyushchikh detei. Childrearing allowances and other benefits went from a flat 700 roubles per child to 1,500 roubles for the first child and 3,000 roubles for the second, third, etc. "Federal'nyi zakon ot 1 marta 2008, No.18-FZ o vnesenii izmenenii v otdel'nye zakonodatel'nye akty Rossiiskoi Federatsii v tselyakh povysheniya razmerov otdel'nykh vidov sotsial'nykh vyplat i stoimosti nabora sotsial'nykh uslug" provides for these amounts to be revised in line with the rate of inflation.

[7] Federal'nyi zakon ot 29 dekabrya 2006, No.256-FZ o dopolnitel'nykh merakh gosudarstvennoi podderzhki semei, imeyushchikh detei.

Figure 1: *Number of Births and Deaths in Russia*

Source: Prepared by the author based on data from Rosstat (2008).



The Mothers' Fund provides parents of two or more children with a total of 250,000 roubles in subsidies for one of housing, education, or pension contributions, and applies to children born or adopted between January 1, 2007 and December 31, 2016. Given that the mean monthly income in Russia in September 2007 was 12,000 roubles, the value of these subsidies is huge[8]. Under this backdrop, a presidential order to halt the population decline by 2025[9], which was dated October 9, 2007, was formulated. Unlike the various "plans" produced in the past, this presidential order was accompanied by actual policies. Of course, it is still too early to judge the extent of the impact these measures will have.

As one can see, the number of births has been rising almost continuously since 1999 (see Figure 1). However, because the number of deaths has also generally remained high, it is difficult to argue that the overall natural decline as been halted. Nevertheless, vital statistics for 2007 and 2008 show that the crude birth rate was at its highest level since the collapse of the Soviet Union in both these years. Meanwhile, the crude death rate has also exhibited a sharp decline in recent years.

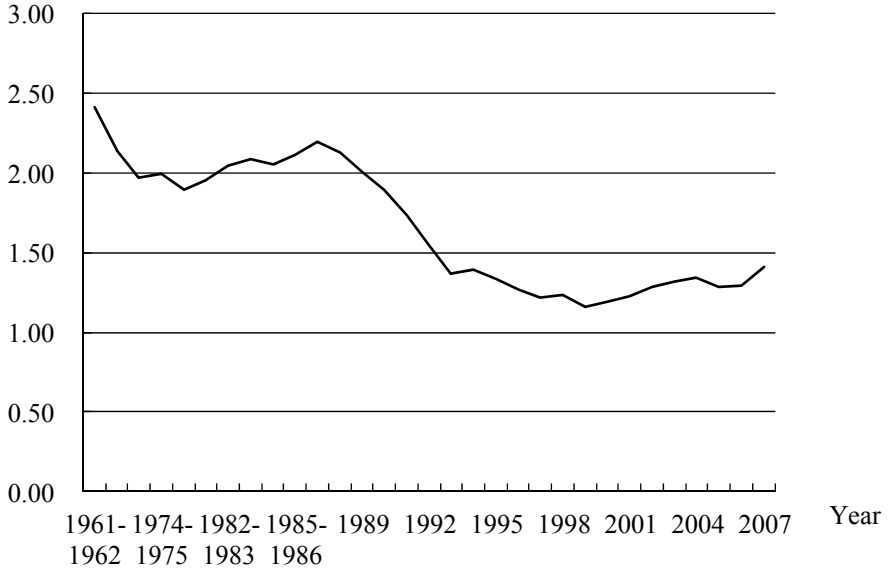
[8] And like childrearing allowances, this amount is revised annually to take account of inflation. *Rossiiskaya gazeta*, Feb. 14, 2008.

[9] Kontseptsiya demograficheskoi politiki RF do 2025 g., 9 oktyabrya 2007 No.1351.

In light of these developments, since the second half of 2007, once the number of births had been seen to be in a steady upward trend, (former) President Putin and cabinet ministers have stated on several occasions that their population policies are already having an effect[10]. Although the view that political measures introduced in January 2007 were already influencing fertility behavior in June of the same year is no more than political spin, not a few articles in the media have presented it as fact.

Figure 2: *Total Fertility Rate in Russia*

Source: Prepared by the author based on data from Rosstat (2008).



As Figure 2 shows, the TFR bottomed out at 1.16 in 1999, since which it has staged a gradual recovery. How can the sharp drop in the birth rate at the beginning of the transition to the market economy and the recovery, albeit gentle, from 1999 onwards be explained? Intuitively, one would expect the massive changes in the social system that immediately followed the collapse of the Soviet Union, i.e. the economic crisis and the economic transition, to have had a negative impact on fertility. Then it is also easy to imagine that the rise in the TFR from 1999 was closely related to the economic recovery.

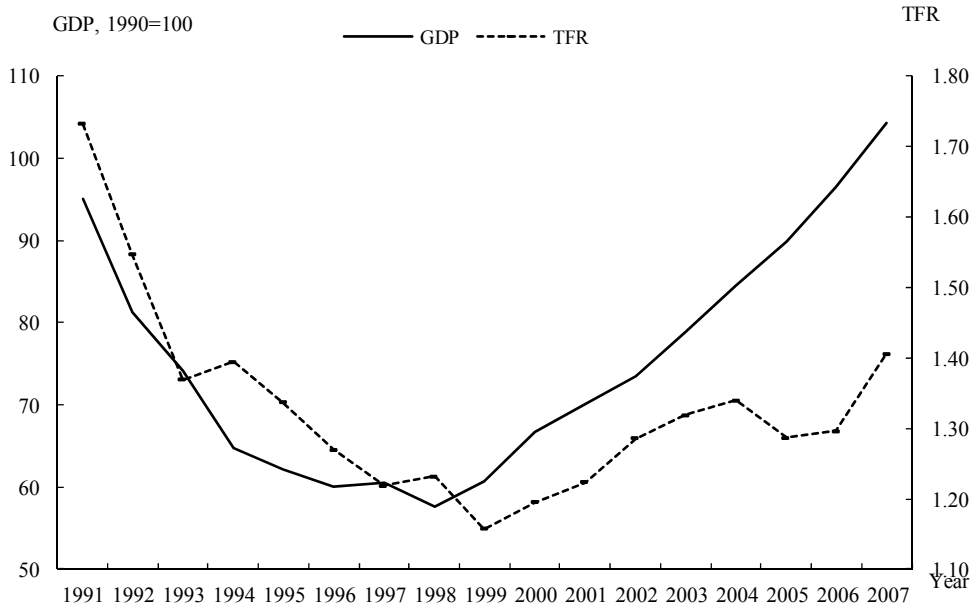
Looking at Figure 3, which illustrates the trends in gross domestic products and the total fertility rates from 1991, one can see that they both followed a similar path. Figure 3 may give the general impression that there is a correlation between the two.

[10] *Izvestiya*, June 1, 2007.; *Rossiiskaya gazeta*, Dec. 25, 2007.

The correlation coefficient for data from 1991 to 2007, however, is only 0.56, which for annual time series data does not imply a strong correlation. It therefore seems fair to say that the correlation between economic growth and the fertility rate is more apparent than real.

Figure 3: *GDP and TFR in Russia (1991-2007)*

Source: Prepared by the author based on data from Rosstat (2008) and *RSE*, 2002, 2003, 2009.



This situation raises a number of questions, as follows:

A) What really does explain the observed rise in the birth rate since 2007?
B) What role do economic developments play?
C) What effect do the cash payments in return for having children have on the number of births and the fertility rate?
D) What are the implications of these factors for the prospects of future fertility trends in Russia?

Thus, it is worth investigating trends in determinants of fertility, to see whether any complementary factors can be identified.

3. Previous Research

From 1992, Russia's total population began to decline and the death rate rose sharply. The birth rate dropped precipitously following the collapse of the Soviet

Union, and this situation soon became an object of inquiry in Russia (Vishnevskii, 1994).

However, it took a fairly long time for work to begin on analyzing the factors behind it, as data obviously needed to be accumulated for a long enough period. Although Vishnevskii (1996) highlighted the coexistence of a decline in the mean age at which women had children and a decline in the birth rate during the early 1990s, a phenomenon that would normally be expected to be self-contradictory, and produced findings emphasising the distinctiveness of Russia in this respect, it should be pointed out that the trend seen since the late 1990s shows that this was ultimately just a short-term phenomenon[11]. In addition, at the beginning of the transition to the market economy, analysis was limited by the fact that it had to rely on macro data. Obviously, though, descriptive research has been conducted continuously not only in Russia itself but also in the West. While many studies have focused on the economic contraction that accompanied the economic transition as a cause (DaVanzo and Grammich, 2001), others have pointed to the timing effect resulting from the fact that policies aimed at encouraging couples to have children, such as increased childrearing allowances, that were introduced at the end of the Soviet era caused the birth rate to rise at the end of the 1980s, which then resulted in it falling back during the early 1990s (Zakharov and Ivanova, 1996). Others, meanwhile, have positioned the decline in the birth rate as being consistent with Russian population dynamics undergoing a long process of modernisation (Vishnevskii, 2006).

Avdeev and Monnier (1995) studied the sharp fall in the birth rate in Russia between the end of the Soviet era and the beginning of the economic transition in the early 1990s by comparing cohort fertility rates over time and among countries. Although their study did not analyze the determinants of birth rates, it provided a fairly straightforward summary of population dynamics in Russia in the second half of the 20th century, a comparatively long period of time. Meanwhile, Kharikova and Andreev (2000), using results from a micro census carried out in Russia in 1994[12], not only pointed to the economic contraction during the transition to capitalism as a cause of the decline in the birth rate, but also offered an interpretation of it as the continuation of a

[11] Though why this phenomenon occurred at the beginning of the transition to capitalism may be worthy of further investigation.

[12] This micro census was carried out between February 14 and 23, 1994. Covering 7.3 million people, or 5% of the total population, it gathered data on dwellings, household income and expenditure, birthplace, domicile, educational attainment, marriage, livelihood, occupation, and fertility. See Goskomstat Rossii (1995).

long-term trend. This interpretation was based on patterns beginning in the Soviet era, trends in the number of births for each cohort, and so on.

Not many studies have analyzed birth rates using the micro-data from the Russia Longitudinal Survey (RLMS), a survey of Russian households. Kohler and Kohler (2002) studied the effect on birth rates later of job market conditions, an initial desire on the part of the woman to have children, and subjective judgements such as perceptions concerning the economic climate and expectations for the future. However, the scope of the control variables used was limited, while the fact that it covered only a short-period (1995–1997) of the economic contraction makes it difficult to draw clear conclusions from the results.

Grogan (2006), using data from the RLMS between 1994 and 2001, found that high levels of income and education among women boosted the birth rate, while advanced age and a high number of existing children reduced it. She also pointed out that because income has a positive, significant effect on the birth rate, the level of economic growth determines a direction for fertility dynamics. The analysis by Grogan (2006) only covered women who had spouses throughout the entire period studied, and the sample contained only 288 individuals. It must also be pointed out that limiting the sample to women with spouses must have had a big impact on the determinants of fertility identified. It also needs to be borne in mind that, as was the case with the study by Kohler and Kohler (2002), the variables used in the analysis were limited.

Roshina and Boikov (2005) can be said to have conducted the most comprehensive fertility study using RLMS data to date, having employed a broad range of variables and subjected their sample to a wide variety of investigations and analyses. They took into account demographic factors such as age and the number of existing children, economic factors such as income and employment, and various other factors such as health, educational attainment, and ethnicity. The significance of the economic factors was unstable, depending on the model defined. They found that demographic factors, on the other hand, were almost always significant, so argued that explanations should focus on these. In other words, they pointed out that economic conditions and birth rates are not directly connected, which is in line with the view presented in this paper.

Like that used by Grogan (2006), however, the data employed by Roshina and Boikov (2005) stops at 2001, and thus covers only a period of decline in terms of fertility and economic activity. Their study therefore does not capture the period, after 2001, when the birth rate climbed. And given the fact that almost all the former

communist countries experienced a decline in the birth rate simultaneously during the early transition period, their conclusion that the birth rate is not influenced by economic factors is questionable. In light of these weaknesses, this paper will attempt to analyse factors that explain childbirth using data obtained from the RLMS carried out between 1994 and 2004.

4. Analysis

Data

The data employed in this paper comes from forms returned from the RLMS. Although detailed information about the RLMS is available on the survey's website, here is a brief overview[13].

The RLMS is a micro survey of households and individuals in Russia that has been conducted continuously since 1992. It is organised and coordinated by the Carolina Population Institute of the University of North Carolina in the United States. The survey possesses representativeness of the nation as a whole, and the sample covers at least 3,700 households and 10,000 individuals[14]. Although the aim of the survey is to monitor changes in levels of consumption and health during the economic transition, it also gathers detailed information on the employment situation, incomes, etc. of individuals.

The questions are revised to some degree with each round, and on occasion the questionnaires are altered radically. Basically, however, information on fertility can be obtained at every round from responses to questions concerning women. These include the question, "Have you given birth to a child during the past 12 months?" Responses to this question were used to compile fertility data[15]. However, there were big

[13] The website URL is http://www.cpc.unc.edu/rlms/.

[14] Although the sample size changes with each round, Phase I, which was conducted in 1992-1993, targeted approximately 6,000 households, while Phase II, which was conducted from 1994, targeted around 4,000. Because of reasons such as the fact that the sample differed in nature, data from Phase I is not normally used, so only Phase II is referred to here.

[15] For Round IX (2000), however, the question was changed to, "Have you given birth to a child during the past 24 months?" Individuals who answered yes to this question and could be determined as being mothers of a child younger than 12 months using household roster variables were deemed to have given birth to a child during the past year. Round XIII (2004), meanwhile, did not even include a question on whether the subject had given birth, so mothers were identified using roster variables for households with a child under the age of 12 months and deemed to have given birth during the past year. Unfortunately, in both these cases the births of children who had died or been fostered out within 12 months of birth were not included. However, this can be tolerated as a secondary proximity because, for other rounds, even when an

differences between rounds in the number and quality of questions concerning women that were asked. For example, questions yielding variables that can be expected to relate closely to the birth rate, such as the number of children the woman has given birth to and whether she has ever had an abortion, were only asked during the first four rounds of Phase II, i.e. Round V to Round VIII. There are therefore limitations in applying to other purposes the results of a survey that was originally intended to yield data on levels of consumption and health situations.

The basic intention was to repeatedly gather cross-sectional data, so the potential for using samples as panel data is limited (Heeringa, S.G., 1997). Grogan (2006), who investigated the attrition of RLMS samples, compared the samples from 1994 and 2001 and showed that the frequency of attrition for individuals with a spouse and households with small children was significantly low. It therefore needs to be borne in mind that these are factors that exert an extremely strong influence on the birth rate.

Methods

Here the author will investigate whether economic conditions, and in particular personal incomes, affect the fertility behaviour of women, or whether other factors have a greater impact. As was seen in section 2, a correlation exists between GDP and the TFR. If this is the result of a direct causal relationship, economic growth in Russia should have contributed to the recovery in the birth rate there. If, on the other hand, researchers like Vishnevskii (2006) and Roshina and Boikov (2005) are right, and Russia's fertility dynamics should be seen as part of a long-term shift in demographic factors, i.e. the modernisation of population dynamics or a second demographic transition, the correlation between GDP and the TFR (see Figure 3) as seen through macro data is coincidental, and it should be assumed that more complex causal relationships exist.

This paper employs micro-data from Round V (1994), the first round of Phase II, to Round XIII (2004), the most recent round for which data was available. It

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analysis was performed with (a) responses by mothers to the question of whether they had given birth and (b) the existence of a child younger than 12 months determined by roster variables both deemed to be explained variables, no marked differences were seen between the results. (Within RLMS samples, there was a 20 per mill difference between the two variables (i.e. whether they answered that they had given birth and whether they had a child younger than 12 months). Incidentally, the infant mortality rate in the whole of Russia between 1994 and 2004 was between 11.6 and 18.6 per mill. See Rosstat, 2008).

investigates the relationship between individual characteristics of women in Round t and whether women with these characteristics gave birth to a child in Round t+1.

The samples of analysis were women between the ages of 15 and 49 years. Whether a woman gave birth to a child in a certain round was the explained variable, while the individual characteristics in the previous round were the explanatory variables[16]. When Roshina and Boikov (2005) performed their analysis and determined their estimation models, there is a possibility that various external shocks and changes in the significance of various different variables were absorbed by the year dummy variables. Attention also needs to be paid to the fact that Russia's birth rate changed course in 1999–2000, so it is necessary to look at whether any changes occurred in the determinants of fertility during the period under analysis. This study therefore begins with a cross-sectional analysis[17]. For this cross-sectional analysis, the problem of a sharp reduction in the size of the sample due to an increase in the number of uncompleted forms, and the resultant failure to obtain significant coefficients, was avoided by limiting the number of variables employed. The following variables are demographic factors: (1) age, (2) whether the woman wants children, (3) the number of children already in the household and its square, and (4) whether the woman has a spouse. (3) is used as a substitute for data on parity, which was not gathered. The following variables are other economic factors: (5) the woman's income, (6) the household's income (real income adjusted using an equivalence scale[18]) and its square, (7) whether the family are owner-occupiers, (8) the woman's subjective judgement on whether she are satisfied with her current life, (9) and whether the woman is in work. The following variables are other explanatory variables: (10) educational attainment (secondary or vocational education, higher education) and (11) whether the woman lives in a rural area. Descriptive statistics for several years are presented in Table 2a.

[16] There were two-year gaps between Round VII (survey performed between October and December 1996) and Round VIII (survey performed between October 1998 and January 1999), and between Round VIII and Round IX (survey performed in 2000), whereas the other surveys were conducted at one-year intervals. From Round IX onwards, the surveys were performed between September and December every year. So although the lag was generally one year, for Round VIII and Round IX it was two years (see the variables in the RLMS form data).

[17] However, only panel data is used for the interval between two rounds. This makes it possible to investigate whether individual characteristics at Round t are determinants of childbirth in Round t+1.

[18] This equivalence scale is based on OECD standards. Although an attempt was made to use real household incomes, real household expenditures, nominal incomes, etc. that had not been adjusted using an equivalence scale, the cross-sectional analysis produced the same results as those presented in this paper for real household incomes and expenditures. Note that because nominal incomes cannot be normalised, a pooled logit analysis cannot be performed.

Table 2a: *Descriptive Statistics: Cross-Sectional Analysis*

Source: Calculated by the author based on forms returned from the RLMS. Percentages of urban dwellers nationwide were calculated by the author based on data from Rosstat (2008).

	Mean	Standard deviation
Births in 1995	0.027	-
Individual characteristics in 1994:		
Age	31.64	10.03
Wants children	0.312	-
No. of children already in the household	0.839	0.995
Presence of a spouse	0.657	-
Wages of the subject	69276.6	155567.9
Household income (equivalence scale)	3879.3	6689.5
Owner-occupier	0.902	-
Satisfaction with life	0.128	-
In work	0.67	-
Completed secondary or vocational education	0.259	-
Completed higher education	0.451	-
Living in a rural area	0.243	-
Percentage of urban dwellers in sample (nationwide figure: 0.73)	0.76	
Age composition (subjects in the age group concerned as a percentage of all subjects between 15 and 34 years)		
15-19 years	23.6	
20-24 years	25.4	
25-29 years	24.6	
30-34 years	26.5	

	Mean	S.D.
Births in 1998	0.027	-
Individual characteristics in 1996:		
Age	31.74	10.35
Wants children	0.218	-
No. of children already in the household	1.203	
Presence of a spouse	0.633	-
Wages of the subject	260399.1	550861.5
Household income (equivalence scale)	2924.8	3676.5
Owner-occupier	0.886	-
Satisfaction with life	0.116	-
In work	0.641	-
Completed secondary or vocational education	0.258	-
Completed higher education	0.423	-
Living in a rural area	0.239	-
Percentage of urban dwellers in sample (nationwide figure: 0.74)	0.80	
Age composition (subjects in the age group concerned as a percentage of all subjects between 15 and 34 years)		
15-19 years	24.3	
20-24 years	26.8	
25-29 years	25.9	
30-34 years	23.0	

	Mean	Standard deviation
Births in 2001	0.028	-
Individual characteristics in 2000:		
Age	31.32	10.55
Wants children	0.282	-
No. of children already in the household	0.784	0.958
Presence of a spouse	0.528	-
Wages of the subject	780.9	2734.9
Household income (equivalence scale)	2559.7	3728.5
Owner-occupier	0.903	-
Satisfaction with life	0.181	-
In work	0.605	-
Completed secondary or vocational education	0.247	-
Completed higher education	0.431	-
Living in a rural area	0.282	-
Percentage of urban dwellers in sample (nationwide figure: 0.73)	0.72	
Age composition (subjects in the age group concerned as a percentage of all subjects between 15 and 34 years)		
15-19 years	26.0	
20-24 years	27.4	
25-29 years	25.7	
30-34 years	20.9	

	Mean	S.D.
Births in 2004	0.0254	-
Individual characteristics in 2003:		
Age	31.29	10.44
Wants children	0.197	-
No. of children already in the household	0.707	0.896
Presence of a spouse	0.477	-
Wages of the subject	1961.1	3214.2
Household income (equivalence scale)	3821.9	6275
Owner-occupier	0.902	-
Satisfaction with life	0.327	-
In work	0.639	-
Completed secondary or vocational education	0.256	-
Completed higher education	0.438	-
Living in a rural area	0.261	-
Percentage of urban dwellers in sample (nationwide figure: 0.73)	0.74	
Age composition (subjects in the age group concerned as a percentage of all subjects between 15 and 34 years)		
15-19 years	23.0	
20-24 years	26.4	
25-29 years	25.9	
30-34 years	24.8	

If it can be inferred from this data that women are having children later in life, (1) would be expected to exhibit changes. As is the case when they are used in analyses of the general level of fertility, a higher value for (3) would be expected to reduce birth probability while an affirmative value for (4) would be expected to increase it. Higher or affirmative values for (5)–(9), on the other hand, which are all economic factors, can, if one adheres to the view that the economic growth from 1999 boosted Russia's birth rate, be assumed to increase birth probability. If an interpretation in the style of Becker (1960) is adopted, it goes without saying that higher values for (5) raise the opportunity cost of childrearing and can be seen as reducing the likelihood of the woman having children. An affirmative value for (10) will often reduce birth probability, while women answering yes to (11) can be assumed to give birth more frequently than those living in cities.

Table 2b: *Descriptive Statistics: Pooled Logit Analysis*

Source: Calculated by the author based on forms returned from the RLMS.

	Observations	Min.	Max.	Mean	Standard deviation
Births	20622	0	1	0.03	-
Age	20622	14	48	31.51	10.20
Wants children	20622	0	1	0.25	-
No. of children already in the household	19770	0	8	1.19	0.98
Presence of a spouse	20554	0	1	0.56	-
Living with a man of an age eligible to receive pension benefits	19770	0	1	0.07	-
Living with a woman of an age eligible to receive pension benefits	19770	0	1	0.18	-
Owner-occupier	20531	0	1	0.89	-
Living area of the dwelling	19650	3	230	35.72	16.08
Total floor area of the dwelling	19013	0	310	53.58	21.98
Satisfaction with life	20408	0	1	0.21	-
Expectations concerning future standard of living	17369	0	1	0.28	-
In work	20622	0	1	0.64	-
Completed secondary or vocational education	20622	0	1	0.26	-
Completed higher education	20622	0	1	0.43	-
Living in a rural area	19770	0	1	0.27	-
Northwest region	20622	0	1	0.07	-
Central region	20622	0	1	0.18	-
Volga-Vyatka	20622	0	1	0.18	-
Caucasus	20622	0	1	0.14	-
Urals	20622	0	1	0.16	-
Western Siberia	20622	0	1	0.09	-
Eastern Siberia/Far East	20622	0	1	0.09	-
Household income (equivalence scale)	19718	0	472915	3148.79	5960.26
Household expenditure (equivalence scale)	19770	0	3E+07	5485.05	209860.12
Real household income	19718	0	1040413	8175.47	15282.57
Real household expenditure	19770	0	8E+07	14213.72	566163.92
Number of samples which gave answers to all the questions	15111				

In addition, to significantly increase the number of explanatory variables that can be compared throughout the entire period and to ensure an adequate sample size, a

pooled logit analysis was performed using pooled data for all the rounds. This involved the introduction of some new variables: (A) living with a man of an age eligible to receive pension benefits, (B) living with a woman of an age eligible to receive pension benefits, (C) living area of the dwelling (not including bathrooms etc.), (D) the total floor area of the dwelling (including bathrooms etc.), (E) expectations concerning future standard of living, (F) regional dummies, (G) various indicators of household income, and (H) year dummies. Previous research indicates that higher or affirmative values for (A)–(E) will increase birth probability[19]. (F) enables information on regional characteristics to be gleaned, but the key variables here are (G). To find out whether or not income levels really do affect the birth rate in Russia, the analysis involved the investigation of one income variable after another. The descriptive statistics used in the pooled logit analysis are as shown in Table 2b.

5. Results

The results of the cross-sectional analysis are presented in Table 3, while those of the pooled logit analysis are shown in Table 4.

It is obvious in Table 3 that age, number of existing children, and presence/absence of a spouse, which are pure demographic variables, had a significant impact on the birth rate in almost every year, and between 1990 and 1999 no other variables exerted any significant influence[20].

No tendency for birth probability to increase with the age of the mother could be observed[21]. As was predicted, however, the likelihood of a child being born declined as the number of existing children increased, while the presence of a spouse raised birth probability.

On the other hand, it can be said that household income itself did not have any significant effect on the results of the analysis, at least during the 1990s. After 2000, however, higher levels of education and overall satisfaction with life (the latter of

[19] None of the variables yielded significant results in the cross-sectional analysis. Given the small sample size for each individual year, they were only used for the pooled logit analysis.

[20] The results for 1995 and 2000 differ in nature from those of the other years. In these years, and these years only, the variables for the number of children in the household and the presence/absence of a spouse were insignificant. This is very different from the findings of previous research. Births in 2000 are assigned a two-year lag stretching back to the Russian financial crisis of 1998. Moreover, 1994–1995 was a period of turmoil in which inflation reached 300% in 1994 and 200% in 1995 (inflation finally fell below 50% in 1996), so perhaps should not treated in the same way as the other periods.

[21] Even when five-year age groups (15–19 years, 20–24 years, 25–29 years, 30–34 years, etc.) were used, there was no major change in the results.

Table 3: *Determinants of Childbirth in Russia (Women Between 15 and 49 Years of Age) (1): Results of Cross-Sectional Logistic Regression*

**: significant at 1% level; *: significant at 5% level; +: significant at 10% level

	1995 (Round 6)			1996 (Round 7)			1998 (Round 8)			2000 (Round 9)		
	Odds ratio	Z-value	P>|z|	Odds ratio	Z-value	P>|z|	Odds ratio	Z-value	P>|z|	Odds ratio	Z-value	P>|z|
Age	0.84 **	-3.95	0.00	0.86 **	-6.71	0.00	0.89 **	-4.27	0.00	0.89 **	-4.21	0.00
Wants children	2.23 +	1.74	0.08	0.77	-0.85	0.40	4.42 **	4.70	0.00	2.45 **	2.88	0.00
No. of children already in the household	0.56	-1.60	0.11	0.32 **	-4.64	0.00	0.52 *	-2.55	0.01	0.90	-0.39	0.70
Square of no. of children already in the household	1.14 *	2.17	0.03	1.22 **	5.09	0.00	1.14 **	3.13	0.00	1.03	0.74	0.46
Presence of a spouse	2.91 *	2.29	0.02	4.15 **	4.32	0.00	3.40 **	3.52	0.00	1.13	0.65	0.52
Wages of the subject	0.99	-0.64	0.52	0.99	-0.69	0.49	0.99 +	-1.82	0.07	1.00	0.13	0.90
Household income (equivalence scale)	0.99	-1.09	0.28	1.00 +	1.67	0.10	1.00	0.26	0.79	0.99	-1.01	0.32
Square of household income (equivalence scale)	1.00	0.42	0.67	1.00	-1.37	0.17	1.00	-0.37	0.71	1.00	0.73	0.47
Owner-occupier	0.45	-1.61	0.11	1.20	0.40	0.69	1.03	0.06	0.95	1.43	0.74	0.46
Satisfaction with life	1.01	0.02	0.98	0.98	-0.06	0.95	0.96	-0.09	0.93	1.79 +	1.33	0.09
(Reference category: other than the top two levels ("completely satisfied" and "generally satisfied") in a five-level scheme)												
In work	1.32	0.55	0.58	1.58	1.28	0.20	0.97	-0.09	0.93	2.60 *	2.36	0.02
Completed secondary or vocational education	1.46	0.63	0.53	0.90	-0.26	0.80	0.94	-0.16	0.87	1.02	0.05	0.96
Completed higher education	2.56 +	1.67	0.09	1.10	0.25	0.81	1.09	0.22	0.83	2.11 +	1.65	0.09
(Reference category for education: Less than completed secondary education)												
Living in a rural area	0.79	-0.44	0.66	1.12	0.35	0.72	0.99	-0.04	0.97	1.34	0.88	0.38
Chi square	54.41 **			96.85 **			107.98 **			65.06 **		
N	1739			2164			2120			2208		
Pseudo R2	0.18			0.17			0.21			0.13		
Log-likelihood	-120.28			-243.44			-208.35			-213.78		

	2001 (Round 10)			2002 (Round 11)			2003 (Round 12)			2004 (Round 13)		
	Odds ratio	Z-value	P>|z|	Odds ratio	Z-value	P>|z|	Odds ratio	Z-value	P>|z|	Odds ratio	Z-value	P>|z|
Age	0.87 **	-7.31	0.00	0.87 **	-7.36	0.00	0.88 **	-7.31	0.00	0.87 **	-7.21	0.00
Wants children	0.38 **	-3.47	0.00	0.54 **	-2.58	0.01	0.53 **	-2.65	0.01	1.05	0.19	0.85
No. of children already in the household	0.22 **	-6.11	0.00	0.31 **	-5.05	0.00	0.22 **	-6.57	0.00	0.38 **	-3.14	0.00
Square of no. of children already in the household	1.22 **	4.32	0.00	1.22 **	3.66	0.00	1.34 **	6.35	0.00	1.11	0.92	0.36
Presence of a spouse	3.38 **	4.25	0.00	3.06 **	4.25	0.00	1.63 **	3.50	0.00	2.95 **	4.09	0.00
Wages of the subject	0.99	-0.13	0.90	0.99	-1.02	0.31	1.00	0.18	0.86	0.99	-1.58	0.11
Household income (equivalence scale)	0.99	-0.26	0.79	1.00	0.10	0.92	1.00	0.59	0.56	1.00	0.85	0.40
Square of household income (equivalence scale)	1.00	-0.10	0.92	1.00	0.75	0.46	1.00	-0.25	0.80	1.00	-0.59	0.55
Owner-occupier	0.62	-1.53	0.13	0.83	-0.62	0.54	0.64	-1.57	0.12	0.66	-1.50	0.13
Satisfaction with life	1.59 +	1.62	0.10	2.67 **	4.30	0.00	1.50 +	1.80	0.07	0.90	-0.43	0.67
(Reference category: other than the top two levels ("completely satisfied" and "generally satisfied") in a five-level scheme)												
In work	1.06	0.20	0.84	2.12 **	2.71	0.01	1.27	0.89	0.37	3.05 **	3.61	0.00
Completed secondary or vocational education	2.53 *	2.56	0.01	2.20 **	2.60	0.01	2.43 **	2.63	0.01	0.95	-0.15	0.88
Completed higher education	2.44 *	2.37	0.02	1.46	1.17	0.24	2.81 **	3.00	0.00	1.33	0.92	0.36
(Reference category for education: Less than completed secondary education)												
Living in a rural area	2.05 **	2.78	0.01	2.40 **	3.70	0.00	1.16	0.57	0.57	1.25	0.88	0.38
Chi square	136.73 **			157.9 **			133.19 **			123.1 **		
N	2530			2776			2902			2959		
Pseudo R2	0.2			0.18			0.16			0.15		
Log-likelihood	-279.8			-348.3			-348.27			-344.88		

Table 4: *Determinants of Childbirth in Russia (2): Results of Pooled Logit Analysis*

**: significant at 1% level; *: significant at 5% level; +: significant at 10% level.

	Specification (1)		Specification (2)		Specification (3)		Specification (4)	
	β	P>|Z|	β	P>|Z|	β	P>|Z|	β	P>|Z|
Age	-0.13 **	0.00	-0.13 **	0.00	-0.13 **	0.00	-0.13 **	0.00
Wants children	-0.07	0.51	-0.09	0.42	-0.07	0.51	-0.09	0.41
No. of children already in the household	-1.04 **	0.00	-1.04 **	0.00	-1.04 **	0.00	-1.05 **	0.00
Square of no. of children already in the household	0.17 **	0.00	0.17 **	0.00	0.17 **	0.00	0.17 **	0.00
Presence of a spouse	0.92 **	0.00	0.93 **	0.00	0.92 **	0.00	0.93 **	0.00
Living with a man of an age eligible to receive pension benefits	0.43 *	0.02	0.43 *	0.02	0.43 *	0.02	0.41 *	0.03
Living with a woman of an age eligible to receive pension benefits	0.14	0.30	0.16	0.24	0.14	0.29	0.14	0.27
Owner-occupier	-0.46 **	0.00	-0.44 **	0.00	-0.46 **	0.00	-0.45 **	0.00
Living area of the dwelling	-0.01	0.15	-0.01	0.18	-0.01	0.15	-0.01	0.16
Total floor area of the dwelling	0.01	0.13	0.01	0.17	0.01	0.14	0.01	0.17
Satisfaction with life	0.37 **	0.00	0.35 **	0.00	0.37 **	0.00	0.36 **	0.00
(Reference category: oher than the top two levels ("completely satisfied" and "generally satisfied") in a five-level scheme)								
Expectations concerning future standard of living	0.17	0.12	0.17	0.13	0.17	0.12	0.16	0.13
(Reference category: other than the top two levels ("will improve" and "will probably improve") in a five-level scheme)								
In work	0.36 **	0.00	0.33 **	0.01	0.36 **	0.00	0.33 **	0.01
Completed secondary or vocational education	0.52 **	0.00	0.52 **	0.00	0.52 **	0.00	0.52 **	0.00
Completed higher education	0.50 **	0.00	0.48 **	0.00	0.49 **	0.00	0.49 **	0.00
(Reference category for education: Less than completed secondary education)								
Living in a rural area	0.19	0.12	0.25 +	0.05	0.20	0.12	0.25 +	0.05
Northwest region	0.68 *	0.01	0.66 *	0.02	0.69 *	0.01	0.67 *	0.01
Central region	0.28	0.22	0.31	0.18	0.29	0.21	0.30	0.19
Volga-Vyatka	0.55 *	0.02	0.60 **	0.01	0.56 *	0.02	0.60 *	0.01
Caucasus	0.95 **	0.00	0.97 **	0.00	0.96 **	0.00	0.96 **	0.00
Urals	0.64 **	0.01	0.67 **	0.01	0.64 **	0.01	0.66 **	0.01
Western Siberia	0.59 *	0.02	0.59 *	0.02	0.60 *	0.02	0.59 *	0.02
Eastern Siberia/Far East	0.69 **	0.01	0.72 **	0.01	0.69 **	0.01	0.72 **	0.01
(Reference category: Moscow and St. Petersburg)								
Household income (equivalence scale)	0.00	0.72	-	-	-	-	-	-
Square of household income (equivalence scale)	0.00	0.48	-	-	-	-	-	-
Household expenditure (equivalence scale)	-	-	0.00	0.15	-	-	-	-
Square of household expenditure (equivalence scale)	-	-	0.00	0.82	-	-	-	-
Real household income	-	-	-	-	0.00	0.92	-	-
Square of real household income	-	-	-	-	0.00	0.52	-	-
Real household expenditure	-	-	-	-	-	-	0.00	0.20
Square of real household expenditure	-	-	-	-	-	-	0.00	0.97
1995 dummy	-0.46 +	0.07	-0.49 +	0.05	-0.46 +	0.07	-0.48 +	0.06
1996 dummy	0.17	0.40	0.17	0.39	0.17	0.40	0.18	0.38
1998 dummy	0.05	0.81	0.08	0.71	0.05	0.80	0.08	0.69
2000 dummy	-0.17	0.46	-0.12	0.59	-0.16	0.47	-0.12	0.59
2001 dummy	0.06	0.76	0.08	0.68	0.06	0.74	0.08	0.67
2002 dummy	0.11	0.56	0.17	0.36	0.11	0.55	0.17	0.35
2003 dummy	-0.01	0.95	0.00	0.99	-0.01	0.96	0.00	0.99
(Reference category: 2004)								
Constant	-0.85 *	0.01	-0.96 **	0.01	-0.87 *	0.01	-0.93 *	0.01
No. of Observation	15111		15151		15111		15151	
Chi square	563.20 **		568.10 **		563.28 **		567.68 **	
Pseudo R2	0.15		0.15		0.14		0.15	
Log-likelihood	-1655.08		-1667.93		1655.04		-1668.14	

which was assessed by the women subjectively) yielded significant results. In addition, being in work sometimes raised birth probability. None of the other variables showed significant results. The wages earned by the woman herself had no impact. The results for educational attainment, meanwhile, revealed that women with relatively high levels of education were more likely to have children than women with very low levels of education, i.e. women who had completed secondary school or had an even lower level of education than that.

So how should these results be interpreted? It would be unnatural to attempt to explain, as Roshina and Boikov (2005) did, the decline in the birth rate that occurred simultaneously in the former communist countries in the early 1990s without any reference to socioeconomic factors.

One possible interpretation is that the economic contraction of the 1990s was so severe, pushing incomes down to a level at which people struggled to survive, that it did not have any significant impact. In other words, the findings may need to be viewed from the perspective that unless incomes are to some degree higher than the above level, any increase in them will not affect people's decisions on whether to have children. After 2000 the economy began to recover, and the results for several years indicate that positive views among individuals about the economic climate raised birth probability. Although it was difficult to see any direct impact from income, there is nothing odd in the notion that a shift in subjective attitudes concerning things like economic growth and adapting to the market economy could have raised the likelihood of women having children.

Now let the author turn his attention to the results of the pooled logit analysis. As expected, factors such as the number of existing children and the age of the woman were significant. In addition, living with people old enough to receive pension benefits, a variable that was not employed in the cross-sectional analysis, raised the likelihood of a woman having children, which is also in line with inferences drawn from previous research. The regional dummies clearly showed that the likelihood of having children was significantly lower in big cities such as Moscow and St. Petersburg than in other regions[22]. Living environments did not have a significant impact. The fact that being an owner-occupier reduces the likelihood of a woman having children may just indicate that a higher percentage of women whose childbearing days are over own their

[22] Although the results are not shown here, it was confirmed that if none of the regional dummies are employed, "living in a rural area" significantly raised birth probability for all specifications.

own homes. In addition, 89% of the entire sample, which is a very high figure, were owner-occupiers, and this probably also had an impact (see Table 4). The reason year dummies did not yield any significant results was probably that the birth rate remained low throughout the period covered[23].

However, attention should be focused on the following findings from this analysis. The degree of life satisfaction, being in work, and educational attainment consistently showed significant results. Income variables, on the other hand, despite being repeatedly redefined and reemployed, did not yield significant results when using formulas (1) to (4) in Table 4. These results can be said to more sharply reinforce the findings from the cross-sectional analysis. The focus of this paper has been on whether childbirth can be determined by economic factors, and income levels in particular. As one can see, however, the conclusions that can be drawn are that if the results of the analysis of the impact of household incomes are interpreted literally, they do not have any overall impact, and that childbirth in Russia is determined to a great extent by demographic factors and factors relating to things like social conditions, such as the presence of a stable living environment.

Further conclusions can be drawn from the fact that after 2001 high levels of educational attainment significantly increased childbirth probability and the fact that the results of the pooled logit analysis indicated that high levels of educational attainment significantly raised the likelihood of women having children. The phenomenon of education boosting the birth rate is unusual given the experiences of other countries, where the completion of higher education has typically reduced the birth rate by delaying marriage and childbirth, increasing levels of knowledge about health and contraception, and so on (Eloundous-Enyegue, 1999; Axinn and Barber, 2001). So how can this phenomenon be explained?

One possible explanation is that it may indicate that in Russia, which experienced social turmoil and plunging incomes during the 1990s, educational attainment has become a proxy variable for permanent income. The fact that permanent income cannot be claimed to have been a key determinant of childbirth in the 1990s should be explained in terms of external shocks that occurred at that time, while it may be possible to conclude that from 2000, when the economy began to grow and incomes started to rise, permanent income had a positive effect on fertility. The

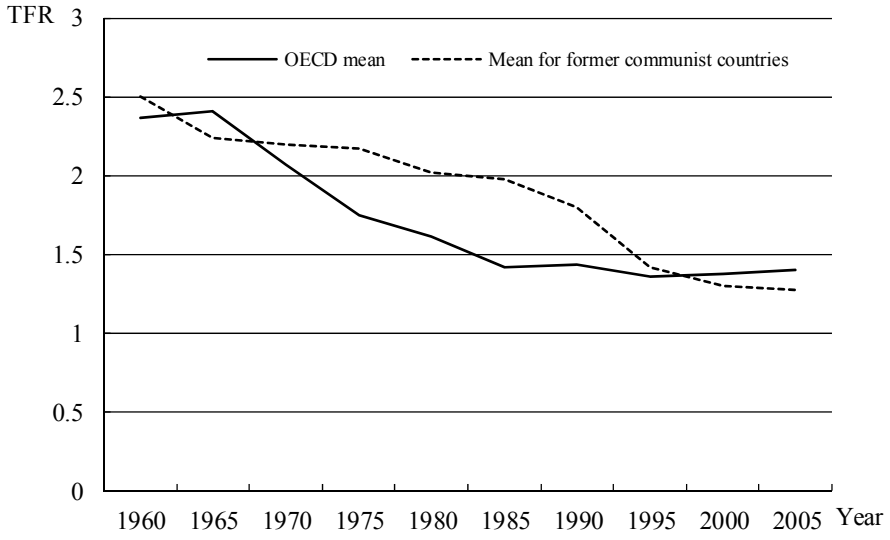
[23] Unfortunately, the period 1992–1994, when external shocks were probably at their peak, could not be analysed because there was no comparable data.

finding that having a job and being on the whole satisfied with life yielded significant results can probably also be interpreted in the same way.

Changing our perspective once again, while birth rates in the transitional, former communist countries were higher than in some low-birth-rate European countries, they were not at the extremely high levels seen in developing countries. Figure 4 compares the simple means of the TFRs of the former communist countries excluding Central Asia and the Caucasus (both in the former Soviet Union) and Albania, which are shown in Table 1, with those of the European OECD countries[24]. In the 1960s there was hardly any difference between them. From the 1970s, however, the TFRs of the OECD countries gradually declined, and by the early 1980s a gap had opened up. However, it can be seen that from the end of the 1980s the TFRs of the former communist countries plummeted to the levels seen in the OECD countries, and then continued to fall further. If the former communist countries were doing no more than "catching up" in the process of demographic transition, this decline in the birth rate can be seen, as it is by Vishnevskii (2006), as being part of a long-term shift in population dynamics[25].

Figure 4: *Mean Birth Rate for the OECD and Former Communist Countries*

Source: Same as with Table 1 and Footnote 5.



[24] Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and Britain.

[25] However, even if it is seen in this way, an explanation is still needed for why the TFRs of the former communist countries dropped so much faster than those of the OECD countries.

Whatever the reason for the plunge, it can be said to be inappropriate to view economic growth and the accompanying rise in incomes as a direct cause of the recovery in childbirth in Russia. In this respect, the results of the analysis conducted in this paper yield the same conclusions as those of Roshina and Boikov (2005). Even so, it needs to be borne in mind that the marriage rate and age at marriage, which are proximate determinants of fertility, as well as age at childbirth may also be influenced by income levels and economic conditions. In this sense, the possibility that economic growth may contribute indirectly to boosting the birth rate should not be ignored. This can also be gleaned from the fact that the results of the cross-sectional analysis of the period after 2000 showed that in some years high levels of educational attainment, overall satisfaction with life, and being in work significantly raised birth probability, and from the fact that the pooled logit analysis showed that all these factors significantly raised the likelihood of women having children.

6. Conclusions

Previous research on fertility has made it clear, even obvious, that the relationship between women's personal incomes and the likelihood of them having children is not linear. In the case of post-Soviet Russia, however, the macro-level economic recovery and growth and the stabilisation of society coincided with an increase in the birth rate, leading people to assume that there was a correlation between the rise in incomes and the recovery in the birth rate.

However, this paper has shown that high personal incomes do not significantly increase the likelihood of women having children. Having said that, it is certainly possible that the birth rate plunged at around the time the economic transition began because of the sharp drop in incomes and extremely unclear outlook for the future that occurred/existed during the transition. Economic growth or social stability therefore probably contributed, to some extent, to the recovery in the birth rate in Russia. However, the impact of these factors was not direct, making it difficult to judge whether they will continue to produce the same results in the future.

Before concluding, the author would like to refer to the other demographic factors affecting childbirth dynamics. In terms of the number of births rather than the birth rate, it goes without saying that demographic factors also need to be taken into consideration. Although the number of births is obviously influenced to a large extent by fluctuations in the number of women of reproductive age, opinion varies as to whether the number of births has increased or decreased once this factor is taken out of

the equation (see for example Antonov 2008, Zakharov 2008, Rosstat 2009, and *the Moscow Times*, July 11, 2008).

Figure 5: *Population Pyramid for Russia in 2004 (1,000 people)*
Source: Internal document supplied by Rosstat

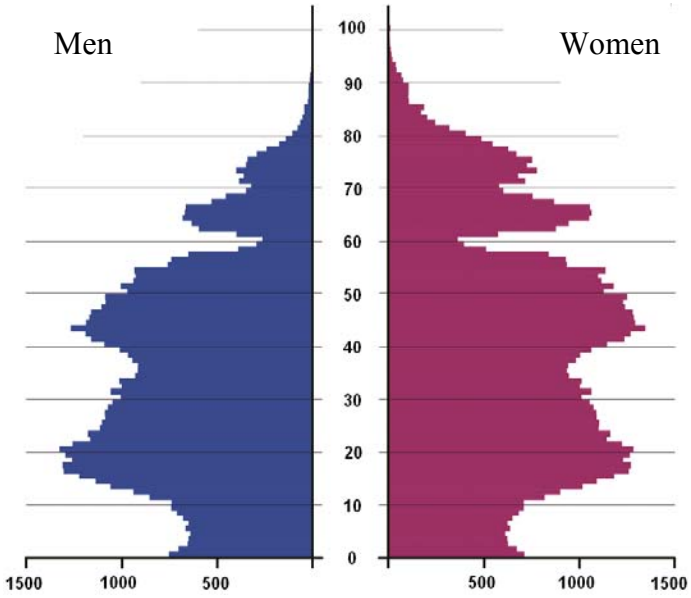


Figure 5 shows the population pyramid for Russia at the start of 2004. The increase in the number of births following the Second World War can be seen in the swelling in the number of people in their 40s, and the size of the population of their offspring can be seen in the swelling in the number of people in their 20s. Figure 9 is the population pyramid for 2004, and those in their 20s at the beginning of the 20th century have still to reach their peak age for fertility. In short, even in the absence of any measures to boost the birth rate, the first 10–20 years of the 21st century would be expected to see high crude birth rates. In fact, Rosstat, the Russian Federal State Statistics Service, had already predicted, in 2004, that the birth rate would climb continuously until 2016[26]. It goes without saying that the number of births is strongly influenced by the number of people of reproductive age, and it is therefore clearly meaningless to criticise the effect of the measures to encourage couples to have children unless the impact of such factors is eliminated. Even if the policy impact of the aforementioned Mothers' Fund did indeed cause the birth rate to rise since 2007,

[26] From internal documents supplied by Rosstat.

all it was actually doing was bringing forward the timing of births that could have happened in the future anyway, so there is also a possibility of the birth rate declining again later. In fact, in 2009 Rosstat revised the forecast it made in 2004, and is now predicting that the birth rate will stop rising in 2011 (as opposed to 2016)[27].

The analysis based on micro-data supports the experience of other countries that fertility is not solely determined by short-term factors such as rising incomes or by the economic climate. Evidence also suggests that childbirth incentive measures may only have a short-term impact. There are questions meanwhile over the sustainability of providing cash payments in return for childbirth on a scale that exceeds average incomes – as is the case with the Mothers' Fund. Even if recent increases in Russia's fertility rate are attributable to the impact of the Mother's Fund, payments are only going to be available to those having children until the end of 2016, after which time the country's fertility rate may well start to decline. The only way to determine if fertility trends since 2006 will be sustained is to monitor trends over the long term.

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Mortality Trends in Russia Revisited: A Systematic Survey

Kazuhiro Kumo

Abstract

The aim of this paper is to use previous research to identify determinants of mortality rates, an economic variable that affects the size of Russia's population. It is impossible to explain mortality solely in terms of socioeconomic factors, so the survey of medical literature conducted here was essential.

It was concluded that factors such as a deterioration in levels of medical care or an increase in environmental pollution could not easily explain the rise in mortality rates throughout the Soviet era and the fluctuating mortality rates seen after the collapse of the Soviet Union. Previous research has explored the relationship between Russians and alcohol, which had been described anecdotally in literary works, the media, and so on, and demonstrated the significance of alcohol consumption as a factor exerting a decisive influence on long-term changes in mortality rates and the probability of death in Russia since the transition to capitalism.

JEL Classification: J11, J19, P36
Key Words: Russia, Mortality, Alcohol Consumption, Meta-Analysis

1. Introduction

The economic growth process in emerging nations described by Wilson and Purushothaman (2003) suggests that we are returning to an era in which the size of a country's population is a strong determinant of the scale of its economy (Maddison, 2007). Russia, however, which is regarded as an emerging nation alongside countries such as China and India is experiencing population decline, which sets it apart from other emerging nations, and it is this that makes Russia's population dynamics so interesting.

It is already well known that Japan and Italy are experiencing natural declines in their total populations due to low fertility rates over a long period of time. The situation with Russia's declining population, however, is different. Unlike developed nations, Russia maintained a total fertility rate (TFR) that was adequate to replenish its population until 1989. It is widely known that since 1992 the number of deaths has exceeded the number of births, leading to a natural decline in population[1] (Figure 1). Russia's natural population decline therefore differs from the normal situation in which fertility dynamics play a major role in population change. In the case of Russia, therefore, it may be better to focus on studying the dynamics of mortality.

The analysis of factors affecting births in Russia began after the collapse of the Soviet Union, and has been based on the analysis of micro data from the Russia Longitudinal Monitoring Survey (RLMS)[2]. Fertility rates are declining in many developed nations, and it is also widely known that not only Russia, but almost all the former Soviet republics experienced similarly sharp drops in their fertility rates following their transition to capitalism (Kumo, 2010).

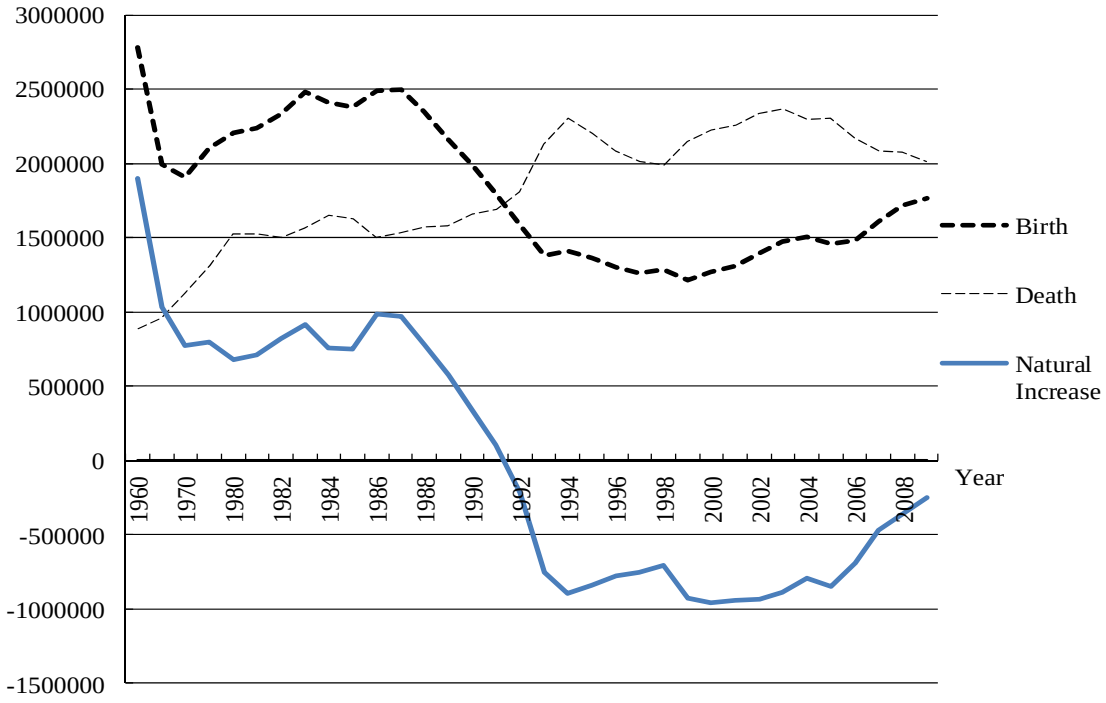
However, what is unique about Russia compared with developed nations, the other transitional economies, and so on is that the main long-term real problem it has faced has been its high mortality rates. Its infant mortality rate, which had been declining since World War II, stopped falling in the 1970s (Davis and Feshbach, 1980; Jones and Grupp, 1983; Anderson and Silver, 1986a). Moreover, mean life expectancy

[1] The last time that Italy's TFR was higher than that required to keep its population stable (population replacement level) was 1976–1977 (2.11/1.98). In the case of Japan, the last time this happened was 1973–1974 (2.14/2.05). In each country, the natural decline in population began at least 15 years and 30 years, respectively, after the TFR fell below the population replacement level.

[2] Detailed information about this survey can be found on the RLMS website: http://www.cpc.unc.edu/rlms/

at birth increased much more slowly during the 1960s, and then actually began to decline (Dutton, 1981; Dinkel, 1985; Borisov, 2009). Furthermore, from the end of the 1980s, during the period of turmoil as Russia made its transition to capitalism, the mortality rate among people in the prime of life climbed rapidly, greatly accelerating the natural decline in the population.

Figure 1. The Number of Birth and Death in Russia



(Prepared by the author from Rosstat, *Demograficheskii ezhegodnik Rossii*, various years)

On the other hand, when analyzing factors affecting mortality, limitations with the data make it difficult to study the factors directly. Micro data for the Soviet era were not accessible, making it hard to examine the background to long-term trends. Moreover, it is also necessary to take into account the likelihood that factors outside the socioeconomic background have also played a role. For this paper, therefore, the author did not limit himself to studying literature in the social science field, of which there is very little. The author also reviewed numerous studies in the field of medicine, selecting a portion of over 200 research papers to also explore factors that determine the mortality

rates in Russia[3].

To begin with, this paper will use descriptive statistics to examine trends in mortality rates by age group, mean life expectancy at birth, and so on in Russia. After that, the author will give an overview of previous research and discuss the key debates. Factors such as levels of medical care and environmental pollution have obviously been dealt with, and their impact is probably undeniable. Statistical distortions and gaps in records have had little impact, so the data can be relied on and regarded as reflecting real conditions. Although various discussions have developed, almost all the previous research strongly suggests that alcohol consumption has been a key reason for the slowing of growth in, subsequent increase in, and current high levels for mortality rates in Russia.

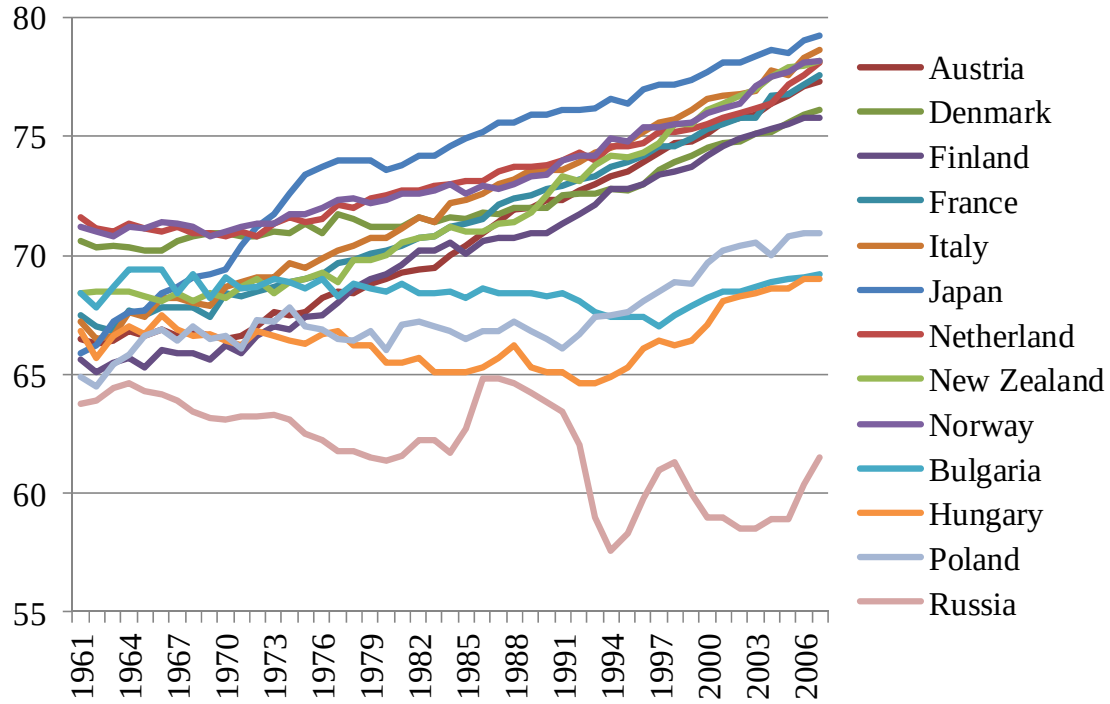
2. Russian Mortality: Descriptive Statistics

The first thing that needs to be pointed out when examining mortality dynamics in Russia is the uniqueness of the long-term trend there. First, the author will look at mean life expectancy at birth, as this is an indicator that is unaffected by a country's age structure. Figure 2 shows data from 1960 to 2009 for mean life expectancy at birth for male in several former communist countries and several Western European countries.

It can be seen that from the mid-1960s the communist countries (Bulgaria, Hungary, Poland, and Russia) began to exhibit a clearly different trend from that of the Western European countries. On the whole, mean life expectancy at birth in the Western countries continued climbing. In the communist countries, however, hardly any increase was seen between the mid-1960s and 1989–1991, when they were making their transition to capitalism. It can also be seen that mean life expectancy at birth in Russia followed an extremely distinctive path. In Russia, the trend could even be said to have been downward (Dutton, 1979; Rapawy and Baldwin, 1982; Feshbach, 1985; Kingkade, 1987; Blum and Monnier, 1989; Anderson and Silver, 1986b, 1989a, 1989b, 1990; Andreev *et al.*, 2006).

[3] A search of the *Web of Knowledge* (Thomson Reuters) online database produced a total of 192 papers with either <"Russia," "Soviet," or "USSR"> and <"mortality"> in their titles, and more than half of them had been published since 2000.

Figure 2. Male Life Expectancy at Birth (Year)



(Prepared by the author from World Bank, *World Development Indicators 2009* and Rosstat, *Demograficheskii ezhegodnik Rossii*, various years)

This was recognized as an issue even within the communist bloc at a comparatively early stage. Normally, the factor with the biggest impact on mean life expectancy at birth is the infant mortality rate (the death rate among children less than 12 months old)[4]. However, in the 1970s the infant mortality rate, which had begun

[4] A serious, yet well-known problem that needs pointing out is that the Soviet and Russian definition of infant mortality rate differs from that employed by the World Health Organization (WHO). If the United Nations and WHO definition was applied, infant mortality rates in the Soviet Union and Russia would be even higher, further emphasizing the graveness of the problem.

The Soviet Union defined live births as cases in which the baby was born after at least 28 weeks gestation, was at least 35cm long, weighed at least 1,000g, and could breathe unaided, and cases in which the baby was born after 28 weeks of less gestation, was 35cm long or less, was 1,000g or less, but lived for at least seven days. This made the number of live births lower than they would have been under the WHO definition (which states that regardless of the period of gestation or the life period of the infant, a birth is considered live if the baby shows signs of life after birth, such as breathing, a heartbeat, or muscular movement, see United Nations, 2001), which in turn made the statistics such as the infant mortality rate lower than in other countries. In other words, if the WHO definition had been applied to the Soviet Union's infant mortality rates, they would definitely have been higher than Soviet government statistics suggested. See Davis and Feshbach (1980) and Goskomstat Rossii (2000), pp.51–54. Although the Russian Federation declared that they adopted the WHO definition on January 1, 1993, Russian Federation Ministry of Health Ordinance No.490 (December 4, 1992) instructed birth registry organizations to define live births using the same weight criteria as in the Soviet era (in principle, live births would be cases in which the baby

increasing, completely disappeared from the *Narodnoe Khozyaystvo SSSR* [Soviet National Economies], an official collection of statistics that the Soviet Union published annually, making it impossible to track the trend from that period onwards.

It can also be seen that mean life expectancy at birth increased temporarily in the mid-1980s. Many researchers have attributed this to the positive effects of anti-alcohol campaign run by the Gorbachev administration at the time (Heleniak, 1995; Bloom and Malaney, 1998; Shkolnikov et al., 2001; Andreev *et al.*, 2006; Stuckler *et al.*, 2009; Carlson and Hoffmann, 2010). In just three years, between 1985 and 1987, mean life expectancy at birth for males rose by over three years, reaching a record high level for the Soviet Union. In 1987, however, the anti-alcohol campaign was cancelled, and from then until the collapse of the Soviet Union mean life expectancy at birth declined once again. It also continued to decline after the collapse, and at an even faster rate than before. Although it climbed briefly from 1995, it dipped again in 1998, the year of the Russian financial crisis. Since the mid-2000s, when proactive population policies began to be implemented, it has risen a little (Figure 2).

The most striking trend seen following the collapse of the Soviet Union is the sharp rise in mortality rates in men 30 years or over. Such a phenomenon has not been seen in developed countries in recent years, so it has to be said to be unique to Russia and the former Soviet Union (Shkolnikov *et al.*, 1998; Brainerd, 1998; Anderson, 2002; Khalturina and Korotaev, 2006; Osipov and Ryazantsev, 2009). Table 1 shows changes over time in mortality rates for Russian men in different age groups. Figures for Japan in 2000 are also provided for reference. A key point is that mortality rates for Russian men between the ages of 30 and 59, i.e. men in the prime of their lives, have almost doubled. Obviously, rates are far higher than those in Japan for every year and every age group. However, given the fact that the infant mortality rate has dropped steadily despite showing signs of rising at one point, the rise in mortality rates among people in the prime of their lives from the collapse of the Soviet Union until the mid-2000s is striking (Da Vanzo and Grammich, 2001; Vishnevskiy, 2009).

With rising mortality rates, mean life expectancy at birth for males has fallen since the collapse of the Soviet Union. As Figure 2 shows, in 1990 the mean lifespan of

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weighed at least 1,000 g (or less than 1,000 g in the case of multiple births), the same weight limit employed by the Soviet Union, or less than 1,000 g if the infant survived for seven days or longer), which was obviously at odds with the WHO definition.

men was around 65 years. In 1993, however, it dropped below 60 years, and has remained at a low level since then. It is worth pointing out that the last time the mean lifespan of men in Japan was below 60 years was in 1950–1951 (Ministry of Health, Labor and Welfare of Japan, 2007).

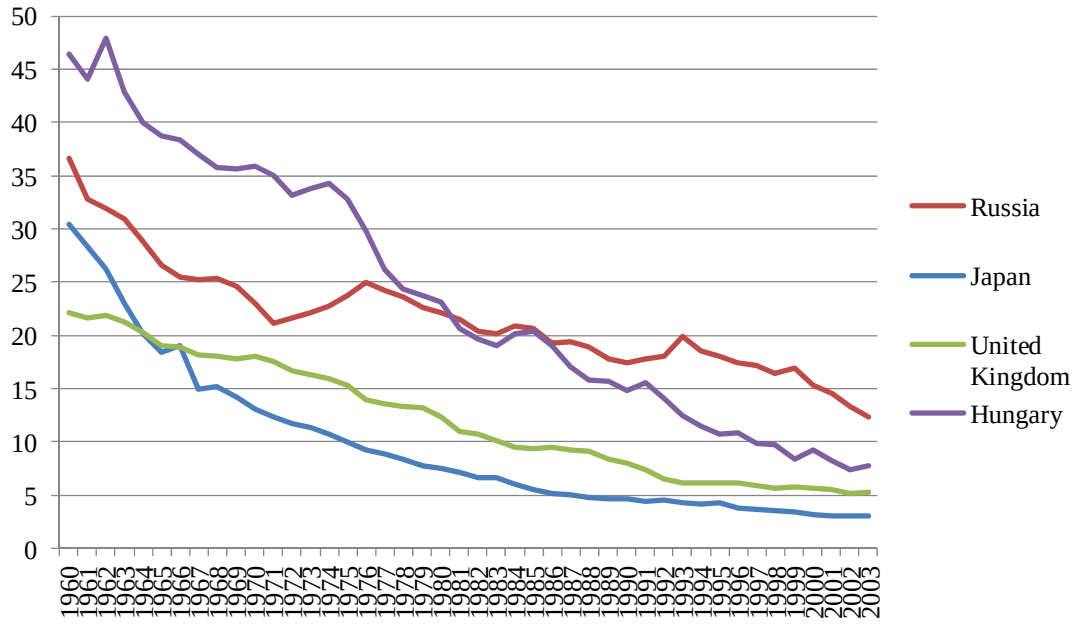
What also needs to be emphasized, however, is the trend with the infant mortality rate. At the beginning of the 1970s, when infant mortality rates disappeared from the Soviet Union's official statistics, the infant mortality rate increased (Figure 3). After that, however, despite short-lived rises in 1993–1994 and 1998, the overall trend seems to have been downward (Webster, 2003; UN Russia, 2008). The trends in mean life expectancy at birth and the infant mortality rate do not match each other. In other words, it can probably be concluded that the decline in mean life expectancy at birth following the collapse of the Soviet Union was not due to an increase in the infant mortality rate. It could even be said that this provides strong supporting evidence for refuting the commonly accepted hypothesis that the deterioration in levels of medical care following the collapse of the Soviet Union caused mortality rates in Russia to rise (Kontorovich, 2001; Khalturina and Korotaev, 2006).

Table 1. Age-Specific Mortality in Russia

y.o/Year	1990		1995		2000		2005		2009		Ref.: Japan 2000	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0	20.0	14.7	20.5	15.5	13.9	13.2	12.5	9.4	9.1	7.1	3.4	3.0
5-9	0.7	0.4	0.7	0.4	0.5	0.4	0.5	0.3	0.4	0.3	0.1	0.1
10-14	0.6	0.3	0.7	0.4	0.6	0.3	0.5	0.3	0.4	0.3	0.1	0.1
15-19	1.6	0.6	2.4	0.9	1.7	0.8	1.6	0.7	1.3	0.6	0.5	0.2
20-24	2.6	0.7	4.4	1.0	3.9	1.1	3.8	1.0	2.7	0.8	0.7	0.3
25-29	3.3	0.8	5.6	1.3	5.9	1.3	6.5	1.6	4.6	1.3	0.7	0.3
30-34	4.3	1.1	7.4	1.8	7.5	1.7	8.2	2.2	6.8	1.9	0.9	0.4
35-39	5.6	1.6	10.2	2.5	10.2	2.3	10.3	2.9	7.7	2.4	1.1	0.6
40-44	7.7	2.4	14.3	3.9	14.4	3.4	14.3	4.3	9.8	3.2	1.8	1.0
45-49	11.7	3.8	19.5	5.8	20.1	5.1	19.4	5.6	13.5	4.3	3.0	1.5
50-54	16.1	5.4	27.5	8.5	27.9	7.6	26.9	8.1	19.4	6.2	4.6	2.3
55-59	23.5	8.6	34.3	11.5	35.0	11.4	34.4	11.8	27.1	6.4	7.5	3.2
60-64	34.2	13.5	46.4	17.2	49.8	15.8	47.0	16.5	38.5	13.2	11.3	4.6
65-69	46.6	22.0	60.6	26.0	60.6	25.6	58.8	12.8	51.9	20.5	18.2	7.5
70-74	67.7	37.1	77.6	41.2	84.1	41.2	80.5	39.4	70.6	32.8	28.7	12.4
75-79	100.2	62.3	109.7	68.5	111.9	67.5	109.8	66.0	99.8	58.3	45.6	22.7
80-84	146.6	105.9	156.6	115.0	149.0	114.9	139.2	107.3	136.3	98.9	80.5	43.3

(Prepared by the author from Rosstat, *Demograficheskii ezhegodnik Rossii*, various years, and Ministry of Health, Labor and Welfare of Japan, 2007)

Figure 3. Infant Mortality Rate, 1960-2003, 1/1000.



(Prepared by the author from World Bank, *World Development Indicators 2009* and Rosstat, *Demograficheskii ezhegodnik Rossii*, various years)

3. Perspectives from Previous Research

As mentioned at the beginning of this paper, it was difficult to study the factors that affected mortality in Russia during the Soviet era. Not only was micro data unobtainable, data on causes of death and mortality rates was extremely limited. However, this situation changed after the collapse of the Soviet Union, when vast amounts of information became available. National and regional statistics such as numbers of deaths began to be published regularly, and it became possible to examine micro data. Furthermore, it is no longer impossible to access mortality statistics from the Soviet era.

With these changes taking place, the number of papers being published increased suddenly from around 2000, and a huge body of knowledge has already been accumulated. Of course, one reason for this is probably that the range of publishing media has also increased in recent years. A search for research on causes of death in Japan, whether it relates to Russia or not, reveals that the number of papers increased

sharply from the 1990s[5] also, making it difficult to deny the impact of the expansion in the range of publishing media.

At the same time, however, micro data began to be accumulated in Russia after the collapse of the Soviet Union, and it also became far more accessible, and this probably also made a huge contribution. During the Soviet era (i.e. until 1991), no micro-data-based analysis of causes of death seems to have been conducted. Since the collapse, however, researchers at medical institutions have been conducting analyses using data determining causes of death through autopsy. A lot of this research has appeared in journals with fairly long histories, such as *Addiction* (2011, No. 106), *Alcohol and Alcoholism* (2011, No. 46), *Social Science and Medicine* (2011, No. 73), *Public Health* (2011, No. 125), and *Lancet* (published since 1823), suggesting that the increase in such research can probably not be attributed solely to the expansion in the range of publishing media.

The debate on factors affecting mortality in Russia has generally focused on factors that are intuitively easy to understand, such as low levels of medical care, environmental pollution, and alcohol consumption. Furthermore, not just during the Soviet era but also since the emergence of the new Russia, the credibility of a lot of statistics has been doubtful. Nevertheless, among the various factors that could be considered to have played a role, it is the impact of the volume, frequency and the way of alcohol consumption on the mortality rate among men in the prime of their lives that is being studied most extensively, as it is consistent with an observed phenomenon[6].

3.1 Levels of Medical Care

In the Soviet Union medical services were provided for free, and in terms of quantitative indicators such as the number of doctors, nurses, and hospital beds, the level of medical care was superior to that of developed nations. This much is widely known, and can also be seen in official statistics from the Soviet era (Levin, 1979; Kotryarskaya, 1990; Cromley and Craumer, 1990, 1992). From the Soviet era to the present day, the number of doctors and nurses has been high compared with developed

[5] The search was conducted using the *Web of Knowledge* online database.
[6] Micro data reveals that mean alcohol consumption among women is about 1/5 (estimate based on forms from the RLMS) that of men, and its impact on mean life expectancy at birth for females also differs greatly from that for men.

nations. In 1985, during the Soviet era, there were 3.9 doctors for every 1,000 people[7]. In the same year in the U.S., there were 1.7, while in Japan the figure was 1.5. Even in 2000, Russia had 4.2 doctors for every 1,000 people, a figure that was only surpassed by Greece (with 4.3) among the OECD nations[8].

It goes without saying, however, that the key issue with medical care is quality rather than quantity. Balabanova *et al.* (2004) conducted an analysis using micro data from 2,000–4,000 people, and they found that Russia, even after the collapse of the Soviet Union, performed well in terms of accessibility to medical institutions. However, in terms of the key issue, the quality of medical care, McKee (2006), who used anecdotal evidence to discuss problems with medical care in the Soviet Union, and Gil *et al.* (2010), who conducted interviews concerning the handling of alcohol issues by the government and medical institutions, and Tkatchenko *et al.* (2000), who stated the need for legal-system reform after conducting interviews with people from government medical care organizations concerning the problems facing them, pointed out policy problems with medical care in Russia. These included the lack of a route for relaying problems recognized by frontline organizations to organizations higher up the chain of control. In addition, the views of Dubikaytis *et al.* (2010), who highlighted disparities among individuals in St. Petersburg, Russia's second largest city, in terms of the medical services they were able to receive should not be ignored.

If levels of medical care were low for a long period of time, could it be that this contributed to the long-term decline in mean life expectancy at birth in Russia (and the Soviet Union)? If the situation just remained the same, it would be difficult to argue that it explained the *decline* in mean life expectancy during the Soviet era. However, if the level of medical care *deteriorated*, that could be expected to have caused a *decline* in mean life expectancy.

However, given that the Soviet Union achieved sustained economic growth until the 1980s, it is difficult to argue that the level of medical care declined. It is known that in 1961, when faced with an epidemic of polio, Japan imported enough live oral polio vaccines for 10 million people from the Soviet Union, and succeeded in getting

[7] In 1985 the only countries with more than 3.3 doctors per 1,000 people were Soviet republics and Mongolia.
[8] The figures were 2.2 people in the U.S. and 1.9 people in Japan. See World Bank, *World Development Indicators*.

the outbreak under control (Ministry of Health and Welfare of Japan, 1962). This suggests that even in the Soviet Union, which was noted for the gap between its advanced technology and its technology for the masses, a certain level of medical care was accessible to ordinary people. In the first half of the 1970s, the infant mortality rate increased (Figure 3), and although more research needs to be conducted on the causes, it returned to a sustained downward trend thereafter. The conclusion therefore must be that if medical care in the Soviet Union and Russia had been deteriorating continuously, the infant mortality rate could not have trended downward[9].

3.2 Environmental Pollution

Needless to say, focusing heavily on economic growth frequently results in the destruction of natural environments, and this was identified as occurring in Russia at an early stage. A famous work by Goldman (1972) highlighted inadequacies in government environmental regulation in the Soviet Union. Laws and regulations existed, and the national government was responsible for their implementation, yet the same national government also owned and controlled the companies that produced the pollutants in the course of their production activities. These companies had to meet production targets and were punished if they failed to meet them. Under such circumstances, it is reasonable to assume that local governments would tend to focus more on production issues than the environment.

Since the collapse of the Soviet Union, research has been conducted, for example, on differences in lifespans among regions using figures such as the amount of pollutants in the air or water as explanatory variables. For example, Larson *et al.* (1999) found that mortality rates in areas around pollutant-emitting companies in Volgograd, a city of one million people in southern European Russia, , were significantly higher than in other areas. However, it is probably unusual for individuals to reside next to a polluter. Kozlov (2004), for example, compared two cities in northwestern Russia with extremely high levels of harmful substances in the air with two cities with extremely low levels of air pollution. However, he reported that he was unable to find a clear relationship between mortality rates and the quantity of pollutants such as sulfur dioxide for the

[9] However, Ivaschenko (2005), using data such as mortality rates in different regions of Russia following the collapse of the Soviet Union found that healthcare investment had a significant, positive impact on lifespans, so needless to say, medical care can still be improved.

cities as a whole.

If environmental pollution had been deteriorating continuously, it would possibly have resulted in a long-term decline in mean life expectancy at birth. Moreover, it would be reasonable to assume that as the economy of the Soviet Union grew, emissions of waste and pollutants increased. That may explain the downward trend in mean life expectancy at birth from the 1960s to the 1980s.

Nevertheless, it needs to be pointed out that the trend in industrial output after the collapse of the Soviet Union makes it difficult to explain mortality rates in terms of environmental factors. Following the collapse of the Soviet Union, Russian industrial output decreased sharply. At the same time, pollutant emissions per capita have fallen steadily for over 20 years since peaking at the end of the Soviet era[10] (Cherp *et al.*, 2003). Environmental pollution cannot therefore explain the rise in mortality rates among people in the prime of their lives during the 20 years since the collapse of the Soviet Union. During the period of rapid economic growth after the World War II, for example, Japan showed increases in pollutant emission (Center for Global & Regional Environmental Research, *STEM II*, University of Iowa) and faced with diseases caused by environmental pollution, but it needs no mention that in Japan mean life expectancy at birth increased almost continuously and the infant mortality rate declined fairly steadily during the same period (Figures 2 and 3). Although there were several other factors that could have offset the effects of a worsening environment, the data can at least be said to show that localized environmental deterioration could not have been a decisive factor behind the decline in mean life expectancy at birth or the rise in mortality rates at the macro/national level.

3.3 Statistical Inaccuracies

One issue with statistics from the Soviet Union that has been widely pointed out is their lack of credibility. Treml and Hardt (1972) addressed this issue many years ago, and Chinn (1977), Clem (1986), Anderson and Silver (1985a; 1985b; 1986a), Jones and Grupp (1983; 1984) also need to be mentioned because they examined the quality of population statistics.

Jones and Grupp (1983) cast doubt on the credibility of Soviet fertility and

[10] Also see Rosstat, *Rossiiskii statisticheskii ezhegodnik*, various years（in Russian）.

mortality statistics relating to a period of over a decade after World War II. They found that with the Soviet Union's infant mortality rate in a clear downward trend between 1958 and 1968, infant mortality rates in central Asian Islamic SSRs such as Kyrgystan were exhibiting the completely opposite trend. In other words, at the beginning of the period their figures were lower than for the Russian SSR, while at the end of the period they were higher than for the Soviet Union as a whole and the Russian SSR. They argued that there were therefore problems with the collection and recording of statistics for central Asia[11].

This argument is extremely clear-cut and persuasive. However, it needs to be kept in mind that this seems to show that the Soviet statistical authorities may not actually have been attempting to deliberately distort statistics. In fact, Kumo (2004), which examined internal documents from the Soviet cabinet, compared officially published Soviet statistics with confidential data from the Soviet cabinet, yet found no disparities. This shows, for example, that official statistics were the simple result of compiling internal figures relating to regional economic growth processes, which were completely at odds with the Soviet Union's policy goal of evening out levels of economic development among regions. Using internal data relating to population census results from the Soviet central statistical bureau, Andreev, Darskii, and Kharikova (1998) identified clear inconsistencies in figures for the population of males in each age group in different regions. They pointed out, however, that this might not have been the result of an attempt to idealize population distribution in the Soviet Union. Rather, it may just have been due to unintentional errors made during the statistical compilation

[11] ZAGS is an organization that registers matters such as births, deaths, marriages, and divorces. It retains the same name in modern Russia that it had during the Soviet era, and is under the supervision of the Ministry of Justice. See <Kodeks o brake i seme RSFSR ot iunia 1969 goda>. The decision to establish ZAGS was made between 1917 and 1918, with the organisation intended to replace the parish registers that had been used until then. Apparently, however, because of factors such as the turmoil of the civil war, it was not until the end of 1919 that the cities of European Russia introduced the new system, and even in 1923 the system still only covered urban areas, albeit throughout the entire nation (TsSU SSSR, 1928a). By 1926 the system seems to have been functioning throughout the whole of the Russian Soviet Socialist Republic, given that the number of infants under one year old recorded in the 1926 census nearly matched the number of births minus infant mortalities derived from the ZAGS records. However, it is posited that the ZAGS system remained inadequate in Central Asia and the Caucasus (TsSU SSSR, 1928b, TsSU RSFSR, 1928). For the period after the World War II there is a note that around 100 ZAGS branches were not functioning properly in official documents even in the current Russian territory (See, for example, RGAE, F.1562, O.20, D.841, L.2). It is very natural to assume that the situation must have been worse in Central Asia than in European parts of Russia.

process.

Chinn (1977), Anderson and Silver (1985a, 1985b, 1986a), Leon and Chenet (1997), and more recently Tolts (2008) and Gavrilova *et al.* (2008), while casting doubts over the quality of data[12], did not reject it as unusable. One problem was that causes of death were being inappropriately classified based on specific patterns[13], but fertility and mortality statistics for the 1960s, 1970s, and thereafter were probably adequate for gauging overall trends, though the same could perhaps not be said for the period of turmoil immediately following World War II.

Regarding matters such as the identification of causes of death, another perspective also needs to be taken into account. It has been pointed out, for example, deaths stemming from long-term alcohol addiction are often classified as "acute alcohol poisoning" (Blum and Monnier, 1989; Pridemore, 2004), while deaths caused by external factors such as homicide and accidents were sometimes classified otherwise due to ethical problems in the police force (Kim and Pridemore, 2005). These issues are, however, insufficient for rejecting the usability of the data, and they could perhaps be said to present some problems.

3.4 Alcohol

Research on the subject of Russians and alcohol consumption has a very long history[14] (Blum and Monnier, 1989; Stickley *et al.*, 2009), but recently a huge number of medical papers have been published. As was pointed out earlier, key reasons for this have probably been the fact that micro-level analysis became possible after the collapse of the Soviet Union and the fact that statistics going back to the Soviet era have come to be compiled and made public.

Treml (1982) wrote a well-known book highlighting the problem of alcohol consumption in the Soviet Union. The fact that it was inappropriate to investigate Russians' alcohol consumption using data from official statistics in the quantity of

[12] See Footnote 4. Issues relating to infant mortality have still not been resolved.

[13] For example, Gavrilova *et al.* (2008) studied autopsy results between 1991 and 2005 for two cities in European Russia, Kirov, and Smolensk, and found that at least 89% of inaccurate classifications were the result of decomposition of the corpse.

[14] Stickley *et al.* (2009) compared deaths due to alcohol poisoning in Russia (the Soviet Union) in the 1860s and 1920s. The phenomenon has also been described frequently in recent years, for example in *The Times* (January 5, 2010), *New York Times* (April 16, 2011), and *Moskovskie novosti* (October 07, 2011) (in Russian).

alcohol produced and sold made it difficult to debate the relationship between alcohol consumption and the deaths of Russians. This was because it was often pointed out that Russians frequently consumed illegally-produced alcohol or alcohol produced for purposes other than drinking (cologne, antifreeze, etc.)[15] (Leon, Shkolnikov and McKee, 2009; Perlman, 2010).

Treml (1982) made estimates of alcohol consumption in Russia by assuming, for example, that the maximum amount of sugar that could be consumed per person was the amount consumed by North Americans, and that the difference between that figure and the amount of sugar produced and imported in the Soviet Union at the time represented the amount of sugar used for illicit alcohol (i.e. moonshine) production. According to these estimates, total consumption of government-produced and illegally-produced alcoholic beverages, i.e. total alcohol consumption, increased more or less continuously from 1955 until 1979, with per-capita consumption of alcohol among citizens 15 years or older estimated at 14.58 liters in 1978 (Treml, 1982, p.68). If this figure is correct, Russians consumed a lot more than the amount of pure alcohol consumed by Japanese citizens of 15 years or older in 2003–2005 (8.03 liters, WHO, 2011).

If Treml's (1982) estimate that alcohol consumption continued to increase during the latter part of the Soviet era was accurate, it may have caused the decline in the mean lifespans of Russians seen from the 1960s. The level of alcohol consumption was extremely high relative to other countries, and a great deal of the alcohol consumed was in the form of liquor. Research arguing that this, and the sustained increase in consumption, could explain the rise in mortality rates during the Soviet era has existed since this era (Blum and Monnier, 1989), but conducting a detailed investigation required the collapse of the Soviet Union and an increase in the accessibility of data.

Following the collapse of the Soviet Union, remarkable progress was made in research. In particular, researchers working the medical field in the former Soviet Union,

[15] Other factors that make this problem even more serious are the fact that the percentage of alcohol by volume in liquids such as cologne is far higher than that of alcoholic beverages (with a percentage of alcohol by volume of 90%, it is much purer than alcoholic beverages, which makes it far more dangerous to consume) and the fact that the price per unit of pure ethanol with such liquids is lower than with alcoholic beverages.

Note that according to returned-form data from the RLMS, at least 15% of men of working age consumed illegally-producted liquor (*samagon*) in 2004.

such as Nemtsov (2002, 2003) and Razvodovsky (2009a, 2009b) conducted analyses based on macro data from the Soviet era that they had uncovered, while research was also performed by quantitative sociology researchers such as Pridemore (2002, 2004, 2005, 2006). Moreover, the results of micro-level analyses based on autopsy data conducted jointly with researchers from Russian medical institutions[16] have been published in rapid succession.

Although problems with making judgments about cause-and-effect relationships based on time-series data for just two variables are well known, per-capita alcohol consumption and mortality rates (mean life expectancy at birth) in Russia have somehow exhibited the same trend, and there is more than just a correlation between the increase in per-capita alcohol consumption during the Soviet era and mortality rates. When the anti-alcohol campaign was being conducted, alcohol consumption declined and lifespans lengthened, while at the time of the transition to capitalism alcohol consumption increased and lifespans decreased sharply, and all this is consistent with the understanding that alcohol consumption has caused higher mortality. Moreover, there is no variance between studies conducted using macro data and analysis of personal alcohol consumption and mortality rates based on micro data following the collapse of the Soviet Union. On the contrary, an extremely consistent relationship can be identified. In other words, alcohol consumption may be able to explain mortality dynamics for both the end of the Soviet era and the initial period of the transition to capitalism, and this is a debate that needs to be pursued further.

4. Alcohol Consumption and Mortality Rates in Russia

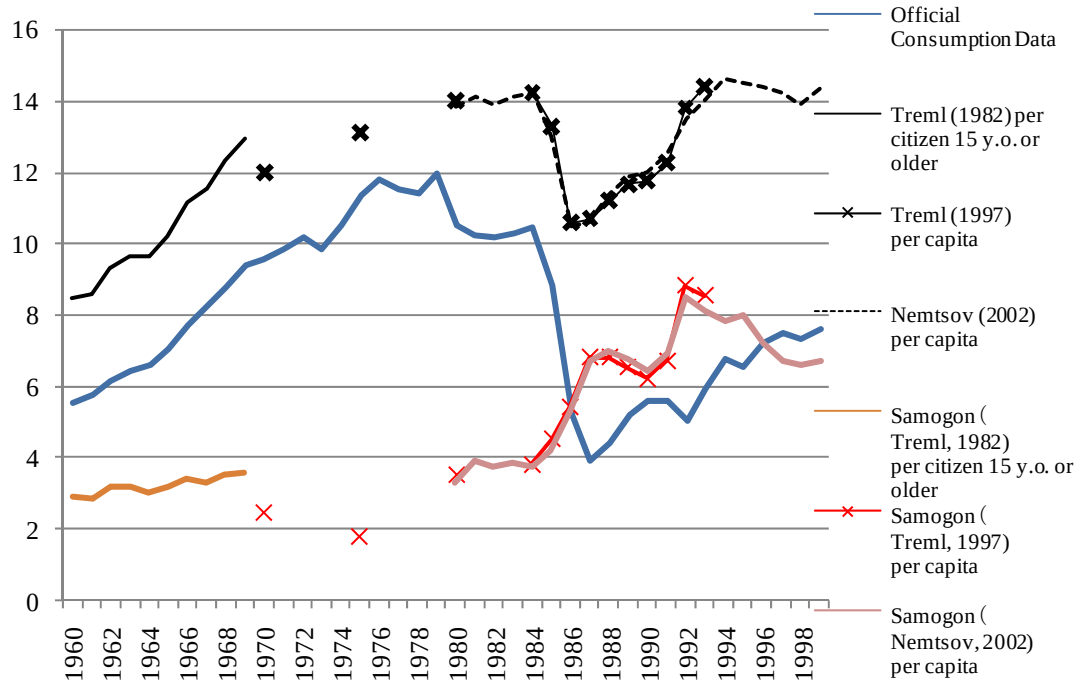
As the sections above have seen, there seems to be a strong relationship between alcohol and mortality rates, and in this section the author will explore this further by examining researches conducted since the second half of the 1990s to find out whether this discussion stands up to scrutiny.

[16] A lot of this research links alcohol consumption to deaths due to external factors, such as homicide and suicide. The reason such data can be used is that an autopsy is always performed in cases such as homicide, meaning that blood alcohol levels can be obtained.

4.1 Estimates of Alcohol Consumption from Previous Research

Table 2 and Figure 4 give statistics for alcohol consumption. All estimates from previous research are for pure alcohol volume, extrapolated from the percentage of alcohol assumed to be contained in each type of alcoholic beverage. Treml (1997) and Nemtsov's (2002) estimates for illicitly-produced liquor, meanwhile, are based on the method employed by Treml (1982). As a result, estimates for years included by both Treml (1997) and Nemtsov (2002) are more or less the same.

Figure 4. Alcohol Consumption per capita/per citizen 15 year old or older seen in Previous Studies (in Pure Alcohol, Liters)



(Prepared by the author from Table 2)

Trends seen in official statistics match those from previous research that includes estimates of illicitly-produced alcohol consumption. In other words, from 1960 to around 1980, per-capital consumption of pure alcohol increased, before falling sharply in the mid-1980s. However, at the end of the 1980s, just before the transition to capitalism began, consumption began rising again. Both official statistics and estimates that include illicitly-produced alcohol consumption show that this trend continued until the beginning of the 1990s. In the mid-1990s consumption briefly showed signs of falling, but at the end of the 1990s it climbed once again. However, there are big quantitative differences between the estimates based on official statistics and those that

Table 2. Alcohol Consumption per capita/per citizen 15 year old or older seen in Previous Studies (in Pure Alcohol, Liters)

	Official Consumption Data	Treml (1982) per citizen 15 y.o. or older	Treml (1997) per capita	Nemtsov (2002) per capita	Estimation of Underground Alcohol Beverage Production (Treml, 1982) per citizen 15 y.o. or older	Estimation of Underground Alcohol Beverage Production (Treml, 1997) per capita	Estimation of Underground Alcohol Beverage Production (Nemtsov, 2002) per capita
1960	5.52 [1]	8.45			2.93		
1961	5.72 [1]	8.59			2.87		
1962	6.14 [1]	9.32			3.18		
1963	6.41 [1]	9.62			3.21		
1964	6.6 [1]	9.65			3.05		
1965	7.02 [1]	10.21			3.19		
1966	7.7 [1]	11.15			3.45		
1967	8.18 [1]	11.52			3.34		
1968	8.78 [1]	12.31			3.53		
1969	9.36 [1]	12.95			3.59		
1970	9.54 [1]		12			2.46	
1971	9.8 [1]						
1972	10.13 [1]						
1973	9.84 [1]						
1974	10.51 [1]						
1975	11.31 [1]		13.1			1.79	
1976	11.78 [1]						
1977	11.5 [1]						
1978	11.4 [1]						
1979	11.94 [1]						
1980	10.5 [2]		14	13.8		3.50	3.3
1981	10.2 [2]			14.1			3.9
1982	10.13 [2]			13.9			3.77
1983	10.26 [2]			14.1			3.84
1984	10.45 [2]		14.25	14.2		3.8	3.75
1985	8.8 [2]		13.3	13		4.5	4.2
1986	5.17 [2]		10.57	10.5		5.4	5.33
1987	3.9 [2]		10.7	10.6		6.8	6.7
1988	4.4 [2]		11.2	11.4		6.8	7
1989	5.16 [2]		11.66	11.9		6.5	6.74
1990	5.56 [2]		11.76	12		6.2	6.44
1991	5.57 [2]		12.27	12.5		6.7	6.93
1992	5.01 [2]		13.81	13.5		8.8	8.49
1993	5.92 [2]		14.42	14		8.5	8.08
1994	6.76 [2]			14.6			7.84
1995	6.5 [2]			14.5			8
1996	7.2 [2]			14.4			7.2
1997	7.5 [2]			14.2			6.7
1998	7.3 [2]			13.9			6.6
1999	7.6 [2]			14.3			6.7

1: Treml (1982), p.68; 2: Nemtsov (2002), p.1414.

(Prepared by the author)

include consumption of illicitly-produced alcohol, and it ought to be borne in mind that these differences expanded following the collapse of the Soviet Union[17].

However, if one turns once again to the trend in mean life expectancy at birth of Russian men (Figure 2), one will find that it declined continuously from the mid-1960s until around 1980. Although it increased significantly in the mid-1980s, when the anti-alcohol campaign was implemented, it had already started falling again by the late 1980s, and in 1993, following the transition to capitalism that began in 1991, it dropped to its lowest level, 57.6 years, since the Soviet era. Although it quickly began rebounding, between 1998, when the financial crisis occurred, and 1999 it declined by 2.3 years. As this shows, trends in the volume of alcohol consumption and mean life expectancy at birth, which serves as a general indicator of the mortality rate, match each other.

A problem with this graph is that it does not enable a comparison to be made of the findings of Treml (1982) on the one hand and Treml (1997) and Nemtsov (2002) on the other. Treml (1987) employed per-capita figures for citizens 15 years or older, while Treml (1997) and Nemtsov (2002) calculated the volume of alcohol consumption for each citizen. Therefore, to compare these figures with those of Treml (1982), the figures for the 1980s onwards need to be revised upwards. It is only because of the disability to capture true figures that the figures for the early 1990s are lower than those for the 1970s in the official statistics. On the other hand, the reason why the estimates for the end of the 1970s and the 1990s do not appear to be all that different is the different definitions used by Treml (1982) and Nemtsov (2002). For people aged 15–59, the figures for the first half of the 1990s are higher than for 1970 and 1975, and are quantitatively much higher, as over 18 litres per citizen 15 years or older (Treml, 1982; Nemtsov, 2002). There is therefore probably no inconsistency between the decline in mean life expectancy at birth during the early phase of the transition to capitalism and the trend in alcohol consumption.

One point to be mentioned is the following. Although it is true that the quantity of alcohol consumption in Russia is comparatively large, Russia is not the only country

[17] During the Soviet era, the government had a monopoly on the sale of vodka, and this was lifted in 1992. See <The Decree on the Abolition of the State Monopoly on Vodka in the Russian Federation>, June 7 1992. At the very least, it is well known that official statistics failed to adequately reflect actual alcohol consumption.

which shows a large amount of per capita alcohol consumption in the world. Average annual consumption of alcohol per adult in the United Kingdom and that in France also exceed 15 liters (WHO, 2011). What differs among them is, however, drinking patterns and the variety of alcohol beverage consumed. Beer is most favorite among UK adults, and so is wine in France. On the contrary, more than fifty per cent of pure alcohol is taken in the form of liquors (vodka) in Russia. When one discusses about drinking patterns, a clear contrast emerges that UK or French people drink alcohol beverage of certain, not extreme, amount almost daily, while Russian people show binge drinking patterns in the weekend (WHO, 2011; Pridemore, 2004). In both aspects, patterns of alcohol drinking of Russian people involve severer problems than those of others.

4.2 Cause-and-Effect Relationship between Alcohol and Mortality Rates: Meta-Analysis

It is fair to say that quantitative, cause-and-effect analysis only really began to be conducted at the end of the 1990s and during the 2000s. Nevertheless, it has already produced numerous findings. Table 3 describes over 20 papers published since 2000 that examined the direct relationship between alcohol consumption and mortality. Papers that did not employ descriptive statistics all found that alcohol consumption significantly increased mortality rates[18]. Moreover, even when descriptive statistics were used, it is easy to show that significant results can be obtained when testing ratios in the case of case-control studies (author's own calculation). Looking at these findings in conjunction with the macro data trends described in the previous subsection, it can be said that in Russia alcohol consumption and mortality rates are closely related.

To confirm the critical effects of alcohol consumption on mortality of Russians, the author conducts simple meta-analyses of previous studies on the relationship between mortality and alcohol in Russia in this section[19]. The steps taken are as follows:

1) Papers with both <"Russia" or "Soviet" or "USSR"> and <"mortality"> in their titles are searched by the Web of Knowledge (Thomson Reuters) online database, and this produced a total of 192 papers;
2) Analytical results, which used exactly the same explaining and explained

[18] Although some use the rate of death due to alcohol poisoning as the explanatory variable, this is used as a proxy variable for binge drinking.
[19] For details of the analytical methods, see Borenstein et al. (2009).

Table 3. Previous Studies on Alcohol Consumption and Mortality in Russia

Macro-Level Data				
	Approach	Data, Years etc.	Dependent Variable	Explaining Variable
Nemtsov (2002)	OLS	1970-75, 80-91	Mortality	Alcohol Consumption per capita
Pridemore (2002)	2SOLS	1995, 78 regions	Homicide Rate by Region	Death from Alcohol Poisoning
Nemtsov (2003)	ARIMA	1965-1999	Suicide Rate	Alcohol Consumption per capita
Kim *et al.* (2005)	2SOLS	2000, 79 regions	Homicide Rate by Region	Alcohol Sales per capita
Pridemore (2005)	Poisson	1995, 78 regions	Homicide Rate by Region	Death from Alcohol Poisoning
Pridemore (2006)	OLS	2000, 78 regions	Suicide Rate by Region	Death from Alcohol Poisoning
Pridemore *et al.* (2006)	ARIMA	1956-02	Suicide/Homicide Rate	Death from Alcohol Poisoning
Razdovsky (2009a)	ARIMA	1956-05	Suicide Rate	Death from Alcohol Poisoning
Razdovsky (2009b)	ARIMA	1970-05	Suicide Rate	Sales of Vodla (Vodka affects more critically than other beverages)
Ramstedt (2009)	ARIMA	1959-98	Death from Ischemic Heart Disease	Alcohol Sales per capita
Razdovsky (2010)	ARIMA	1980-05	External Causes of Death	Sales of Vodla (Vodka affects more critically than other beverages)
Razvodovsky (2011)	ARIMA	1980-05	Suicide Rate	Sales of Vodla (Vodka affects more critically than other beverages)

Micro-Data				
	Approach	Data, Years etc.	Explained Variable	Explaining Variable, or Main Results
Brainerd *et al.* (2005)	Logistic Regression	1994-2002, RLMS, 17,092 cases.	Death	Amount of Alcohol taken
Leon *et al.* (2007)	Descriptive (Case-Control Study)	2003-2005, Survey in Izhevsk, 1,468 cases; 1,496 controls.	Death	37 % of cases took non-beverage alcohol; Only 7% among controls. Cases took alcohol more frequently than controls.
Perlman *et al.* (2008)	Cox Hazard	1994-2001, RLMS, 11,359 cases.	Death	Frequency of Taking Alcohol
Pomerleau *et al.* (2008)	Descriptive	2001, Armenia, Belorus, Georgeam Kazakhstan, Kyrgyzia, Moldova, Ukraine and Russia, 18,428 respondents	—	Frequency of binge drinking (2 liters or more beer/750 g. or more wine/ 250 g. or more vodka once) is significantly higher in Russia than in others.
Zaridze *et al.* (2009a)	Descriptive	1991-2006, Barnaul city, Autopsy Data, 24,836 cases	Death from Circulatory Disease	During the period of 1991-1994 and 1998-2000, when Russia faced sever circumstances, blood concentration of alcohol among cases who died from circulatory diseases was critically high.
Zaridze *et al.* (2009b)	Descriptive (Case-Control Study)	1990-2001, Tomsk, Barnaul and Vysk cities, Mortality by Causes of Death, 43,082 caes; 5,475 controls.	Mortality by Causes of Death	Mortality for people who took large amount of alcohol is significantly high.
Leon *et al.* (2010)	Descriptive	2003-2005, Survey in Izhevsk, 1,750 cases.	Death from Circulatory Disease	Blood concentration of alcohol is critically high for cases dead from circulatory diseases.
Denisova (2010)	Cox Hazard	1994-2007, RLMS, 27,723 cases	Death	Amount of Alcohol taken
Pridemore *et al.* (2010)	Descriptive (Case-Control Study)	2003-2005, Survey in Izhevsk, 1,559 cases; 1,635 controls.	Death	34 % of cases took non-beverage alcohol; Only 4% for controls.

Note: Results for other explaining variables are omitted and only those concerning alcohol consumption are described.
(Prepared by the author)

3) variables, are chosen and grouped;
4) Correlation coefficients or risk ratio are combined by each group of the research results.

As a result, 8 papers are selected. Of them three calculated correlation coefficient between alcohol consumption and suicide ratio by country-level data and the other three examined correlation between alcohol poisoning death ratio[20] and suicide ratio. The remaining two investigated relationship between inappropriate drinking patterns[21] and mortality by using micro-data and this enable the author to compile two-by-two matrix and calculate risk ratio.

The results of combined correlation and combined risk ratio are presented in Tables 4 (A)-4 (C). All the combined indicators, especially those for macro-data based analyses, show narrower 95 % confidence intervals than the original researches, which mean that statistical significance of the effects of alcohol consumption on Russian mortality is confirmed more strongly than the original studies. Data used in these studies involved long-term time series data, cross-sectional data by region (federal subject) and micro-data of more than 2,500 individuals. The combined indicators clearly show the robustness of the analytical results of previous researches on the relationship between alcohol and mortality in Russia.

[20] This is treated as a roxy for the frequency of binge drinking.
[21] Binge drinking, too much consumption volume and so on are taken into consideration.

Table 4 (A)

Meta-Analysis Result (1)
Macro-data Based Studies: Alcohol Poisoning Rate v.s. Suicide Rate

	Correlation				Z-value			
			95% confidence				95% confidence-	
Studies	**Samples**	**R**	Min	Max	Z-value	variance	Min	Max
Pridemore and Chamlin (2006)	50	0.79	0.66	0.88	1.07	0.0213	0.79	1.36
Razvodovsky (2009)	47	0.64	0.43	0.78	0.76	0.0227	0.46	1.05
Pridemore (2006)	78	0.42	0.22	0.59	0.45	0.0133	0.22	0.67

			95% confidence interval	
Combining methods	No	Combined Correlation	min	max
general variance-based method	3	0.6085	0.5039	0.6956
DerSimonian-Laird method	4	0.6358	0.3640	0.8078
restricted maximum likelihood method	5	0.6355	0.3728	0.8039

Graphical View of 95 % Confidence Intervals: Combined and Original Correlation

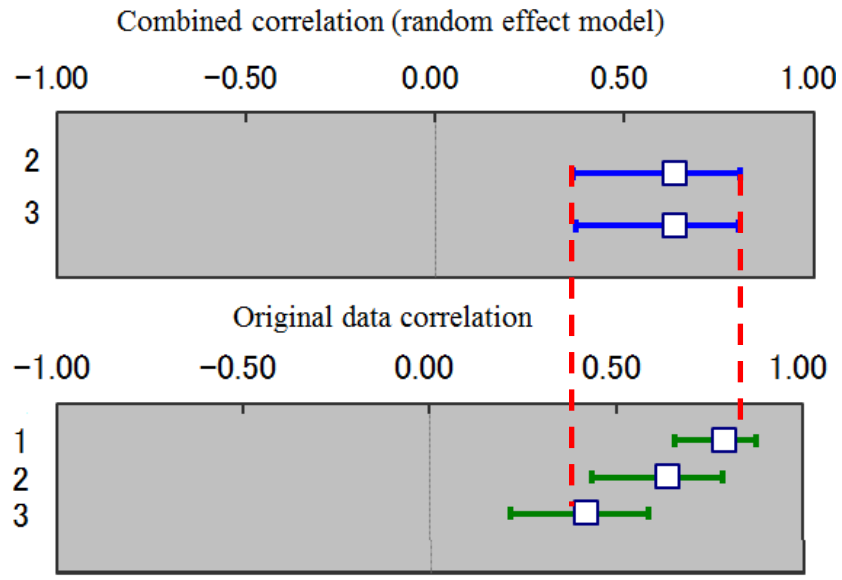


Table 4 (B)

Meta-Analysis Result (2)
Macro-data Based Studies: Volume of Alcohol Consumption v.s. Suicide Rate

			95% confidence interval				95% confidence interval	
	Samples	R	min	max	Z-value	variance	min	max
Razvodovsky (2010)	26	0.53	0.18	0.76	0.59	0.0435	0.18	1.00
Nemtsov (2002)	35	0.83	0.69	0.91	1.19	0.0313	0.84	1.53
Razvodovsky (2009)	36	0.61	0.35	0.78	0.71	0.0303	0.37	1.05

			95% confidence interval	
Combining methods	No	Combined Correlation	min	max
general variance-based method	3	0.6922	0.5671	0.7861
DerSimonian-Laird method	4	0.6846	0.4442	0.8331
restricted maximum likelihood method	5	0.6847	0.4452	0.8328

Graphical View of 95 % Confidence Intervals: Combined and Original Correlation

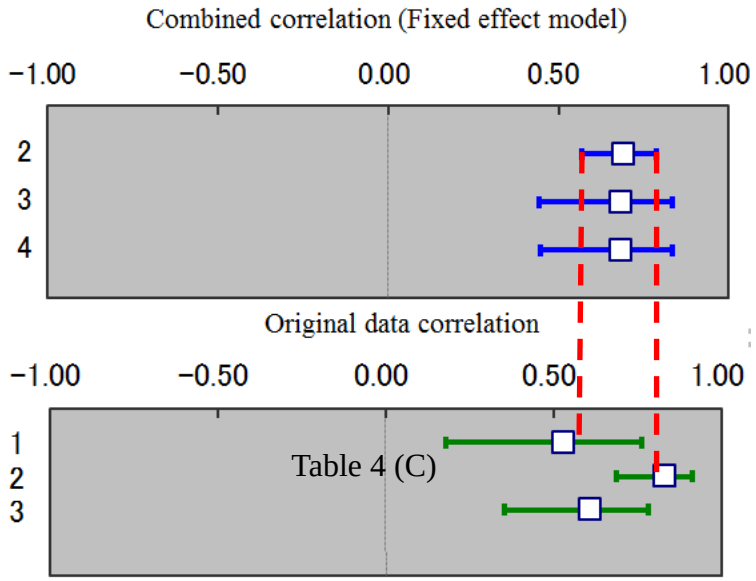


Table 4 (C)

Meta-Analysis Result (3)
Micro-data Based Studies: Inappropriate Drinking Patterns v.s. Probability of Death

2 * 2 Table		
	Effective（＋）	Not Effective（－）
Case（＋）	a	b
Control（－）	c	d

	2 * 2 Table					Risk Ratio			
								95% confidence	
Studies	a	b	c	d	n	RiskRatio	LogRisk	Min	Max
Pridmore et al (2010)	690	192	732	1237	2851	2.10	0.00	1.97	2.25
Leon et al (2007)	652	167	684	1143	2646	2.13	0.00	1.99	2.28

			95% confidence interval	
Combining methods	No	Combined risk ratio	min	max
general variance-based method	3	2.1151	2.0160	2.2191
DerSimonian-Laird method	4	2.1151	2.0160	2.2191
restricted maximum likelihood method	5	2.1153	0.6957	6.4319

4.3 Possible Factors Affecting on Mortality

It cannot be concluded, however, that other factors than alcohol consumption do not need to be considered. Twigg (2008) pointed out how smoking became widespread after the breakup of the Soviet Union, and researchers such as Perlman (2008) and Denisova (2010) showed that smoking significantly raised the probability of death. Meanwhile, Leon *et al.* (2007) found that deceased people with inappropriate histories of alcohol consumption[22] had very low educational backgrounds. Similarly, Malyutina *et al.* (2004) studied social surveys conducted between the mid-1980s and the mid-1990s, and found that the higher a person's level of education, the less alcohol they consumed. Andreev *et al.* (2009) unearthed mortality statistics from 1970–1989, which showed that manual laborers had relatively higher mortality rates. Pridomore *et al.* (2010), who pointed out that a higher proportion of people whose death was caused by alcohol had lost their spouses or partners through death or estrangement than people who had died of other causes, suggested that mortality probability may be related not only to psychological factors but also diet and other aspects of lifestyle. If lifestyles are

[22] Deceased persons who frequently engaged in binge drinking or drank alternative forms of alcohol, i.e. alcohol that is not meant for drinking.

to be considered, it will be necessary to take into account a wide range of factors, such as a high-fat diet, the increase in obesity that stems from such a diet, and Russia's cold climate. Huffman and Rivoz (2010), using data from the RLMS, demonstrated a significant relationship between fat consumption and obesity among Russians[23]. Revich and Shaposhnikov (2008) used macro data from different regions to investigate the impact of air temperatures on lifespan, and they found that low temperatures significantly reduce mean lifespan.

However, it cannot have been the case, for example, that the Soviet Union was getting continuously colder, or that air temperatures dropped during the transitional period[24]. During the Soviet era, levels of education, seen in terms of figures such as the percentage of people graduating from university, increased continuously. Moreover, the proportion of workers engaged in manual labor is also believed to have been on a downward trend. From the 1960s to the 1980s, when the economy was growing continuously, it is hard to imagine that the nutrition of people living in the Soviet Union deteriorated. It is difficult to conclude that such factors can explain (1) the downward trend in mean life expectancy at birth from the 1960s to the 1980s, (2) its increase in the late 1980s, and (3) its sharp fall in the early 1990s following the collapse of the Soviet Union throughly. Obviously, a single factor, alcohol consumption, cannot explain the entire dynamics of mortality in Russia, and the above mentioned factors have probably also played a role. It seems to be, however, difficult to deny that alcohol consumption is a more persuasive factor for explaining the trends in mean life expectancy at birth in Russia than these other factors.

4.4 Clues from Statistics on the Causes of Death

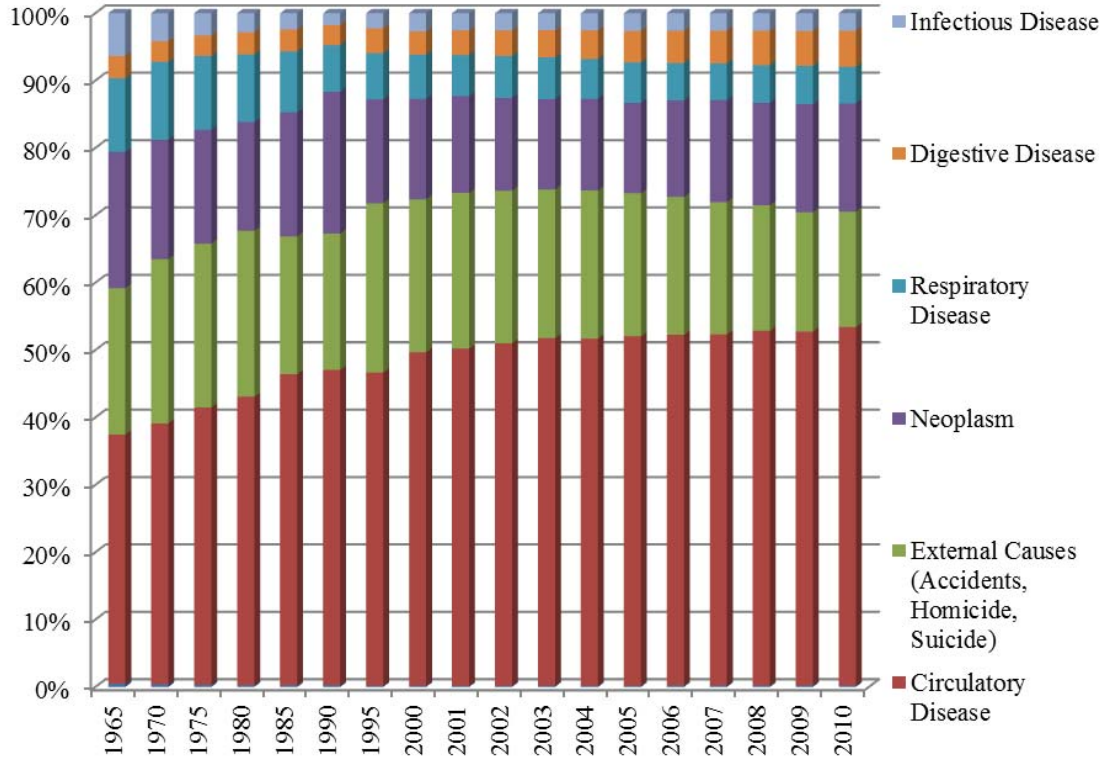
To assess whether the above interpretation is reasonable, let the author confirm one more thing from descriptive statistics. Among the causes of death, those that are closely connected to alcohol consumption are "diseases of the circulatory system" and

[23] However, mean BMI (Body-Mass Index) among Russians did not increase between 1995 and 2004.

[24] As Hill and Gaddy (2003) have pointed out, during the Soviet era the population was heavily concentrated in the north, though it is difficult to conclude that this factor could have been powerful enough to reduce mean life expectancy at birth. Moreover, between 1960 and 1970 and then again following the collapse of the Soviet Union, their "temperature per capita" indicator increased a little, which is inconsistent with trends in mean life expectancy at birth.

"external causes" (Pridemore, 2002; Nemtsov, 2002; Brainerd and Cutler, 2005; Zaridze *et al.*, 2009a). Figure 5 shows the long-term trends in the proportion of deaths caused by various factors in Russia (the current territory of Russia). It is clear that between 1965 and 1990 the proportion of deaths attributable to diseases of the circulatory system increased continuously, and that between 1965 and 1980 the proportion of deaths due to external factors was high. This is consistent with the possibility that high mortality rates and low mean life expectancy at birth in the Soviet Union and were related to alcohol consumption.

Figure 5. Death by Causes of Death for Male in Russia



(Prepared by the author from Rosstat, *Demograficheskii ezhegodnik Rossii*, various years)

It is also clear that following the collapse of the Soviet Union at the end of 1991, the proportion of deaths resulting from external factors, which had declined between 1985 and 1990, shot up, and remained at a high level until the beginning of the 2000s, and that from 1995 onwards the proportion of deaths due to diseases of the circulatory system increased sharply and thereafter stayed at a high level.

If, during the transition to capitalism, levels of medical care and hygiene had

deteriorated, the number of deaths due to contagious and infectious diseases would have increased. Moreover, such diseases would have affected mortality rates among those with weak immune systems, i.e. babies and infants, rather than adults. However, the proportion of deaths due to infectious diseases did not exhibit any marked increase, and the infant mortality rate was not seen to rise sharply or remain at a high level[25]. As a result, the view that the increase in psychological stress accompanying the transition to capitalism, the resultant rise in alcohol consumption, and the subsequent increase in deaths due to diseases of the circulatory system and external factors contributed to the rise in mortality rates is consistent with the facts.

5. Conclusion

Through a survey of the literature and explanations of descriptive statistics, this paper has focused on the dynamics of mortality rates, which is one of the population issues facing Russia. It was concluded that factors such as deterioration in levels of medical care or an increase in environmental pollution could not easily explain the rise in mortality rates throughout the Soviet era and the fluctuating mortality rates seen after the collapse of the Soviet Union. Previous research has explored the relationship between Russians and alcohol, which had been described anecdotally in literary works, the media, and so on, and demonstrated the significance of alcohol consumption as a factor exerting a decisive influence on long-term changes in mortality rates and the probability of death in Russia since the transition to capitalism[26].

The aim of this paper was to use previous research to identify determinants of mortality rates, an economic variable that affects the size of Russia's population. It is

[25] For example, in Russia in the decade following the collapse of the Soviet Union, during which more than two million people died each year, the number of people to die from infectious diseases was only 36,214 in 2000, the year for which this figure was the highest. In that year the total number of deaths was 2.22 million. See Goskomstat Rossii, 2001. In the ten years from 1991, the annual fluctuation in the number of deaths was over 300,000 people, and figures of less than 40,000 deaths annually from infectious diseases even during peak years mean that such deaths cannot have been behind rising mortality rates in Russia during the 1990s.

[26] It should be added, however, that it is not the case that alcohol consumption has only negative effects. Using data from the RLMS, Tekin (2004) found that people who consumed a moderate amount of alcohol (once per week) were significantly more likely to be in employment and more likely to earn higher wages than those who consumed no alcohol at all. This may be because alcohol increases opportunities for human interaction. Moreover, Perlman *et al.* (2008) also found that people who consumed a moderate amount of alcohol (once per week) were significantly more likely to be in employment had lower mortality rates than those who consumed no alcohol at all.

impossible to explain mortality solely in terms of socioeconomic factors, so the survey of medical literature conducted here was essential. Nevertheless, when thinking about the background to the problem, i.e. why Russians consume so much alcohol in an inappropriate way, it is not enough to consider, for example, only cultural or ethnic aspects. Rather, it is more natural to assume that the turmoil of Russia's transition to capitalism had an impact on the socioeconomic situation. This is the next issue to be explored and the relationship between (1) socio-economic environment of individuals and their alcohol consumption and (2) alcohol consumption and mortality should be examined by using micro-data.

The Russian federal government is looking for ways to tackle this situation. In 2005, when Vladimir Putin was president, a series of projects, called "Priority National Projects,"[27] were launched. One of them was a health-focused project, aimed at improving levels of medical care, and it led to a massive increase in federal government spending on medical care. The project focused on improving advanced medical care by enhancing frontline standards of treatment and investing in medical equipment. Later, the list of issues it was charged with addressing was expanded to encompass better treatment in the case of accidents and diseases of the circulatory system, medical system reform, the advocating of lifestyle improvements, a focus on preventative medicine, and so on[28].

In the second half of the 2000s tougher and more direct restrictions were placed on alcohol. In 2006 the law was changed to require degenerative ingredients to be added to alcohol that was not for drinking purposes[29], which demonstrates that there was a will to put a stop to the consumption of alternative forms of alcohol. Later, in January 2010, a minimum price was set for vodka[30], with the aim of curbing alcohol consumption. Although more time will be needed to assess whether these policies have been effective, Figure 7 shows that the proportion of deaths resulting from external factors has been

[27] Details can be found on the website of the Council for Implementation of the Priority National Projects attached to the President of the Russian Federation (<http://www.rost.ru>, accessed on January 5, 2012).

[28] This information is also contained in the descriptions of individual projects found on the website of the Council for Implementation of the Priority National Projects attached to the President of the Russian Federation.

[29] Revised version of N171-F3, a federal law governing the production and sale of ethanol, liquor, alcohol, and foods containing liquor, as well as the consumption of alcoholic beverages.

[30] *RIA Novosti*, January 13, 2010. (in Russian). In this article, Prime Minister Putin stated an objective of halving per-capita alcohol consumption by 2020.

falling continuously since 2005. Moreover, the "advocating of lifestyle improvements," one of the measures included in the project, is clearly important given the behavior of Russians with respect to alcohol that one has seen in this paper. The direction the Russian government is moving in is therefore probably the right one.

A key issue with this paper is that almost all the literature examined is in English. The papers reviewed have not only been from the fields of economics and sociology. The main reasons for this are that a huge number of the ones dealing with alcohol and the mortality rates of Russians were published in medical journals and that Russian-language medical papers have not been compiled and accessibility to them is limited. The Russian-language papers dealt with in this paper have mainly been from the fields of demographics or sociology, and most of them were published in books rather than academic journals. However, medical researchers such as Nemstov and Razvodovsky, who are the main debaters concerning analysis of causes of death in the Soviet Union (in Russia, the Belarus etc.) and have written numerous papers, and Andreev and Vishnevskii[31], who are the leading researchers on demographics in Russia, have presented their findings both within Russia and overseas and published a lot of English-language papers in journals. This implies that the problems with the scope of the literature available are diminishing somewhat. Nevertheless, there is no doubt that further exploration of the Russian-language literature with analytical approaches remains a challenge.

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[31] Professor Nemtsov works at the Russian Federation Ministry of Health and Social Affairs' Moscow Research Institute of Psychiatry, while Professor Razvodovsky is a researcher at the Hrodna State Medical University in Belarus. Professor Andreev works at the Max Planck Institute (in Germany), while Professor Vishnevslii, who spent many years at the Russian Academy of Science's Central Economic Mathematical Institute, moved in the second half of the 2000s to the Higher School of Economics.

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Methodology for social and demographic process management efficiency assessment (based on the Ural Federal District case study)

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Abstract

This paper presents methodology for assessment of efficiency of the social and demographic processes management on a regional level. The methodology is based on indicative analysis techniques and procedures. Since the development of any management techniques recommendations should be based on a clear understanding of the nature of social and demographic processes in the region, this methodology also addresses the task of identification of social and demographic processes following the global reproduction of population trends, as well as any variations from these trends. In addition, for the purposes of assessing efficiency of management of social and demographic processes in the region, the authors recommend monitoring the amounts of financing of the socially significant budget items, which would provide a tool for rationalizing the investment requirements for the specific social and demographic projects. This paper presents the results of the methodology approbation in the Ural Federal District.

JEL Classification: J11, J18

Key words: social and demographic processes, management efficiency, region, social and demographic transformations and anomalies, socially significant budget items, indicative analysis, methodology

I. Introduction

Over the past twenty years Russia has suffered significant changes both in its social and political system, and in economic management, which has first and foremost affected the state of society. The ongoing and the expected changes in the next few decades of social and demographic systems impose demands on all aspects of the social sphere, which currently is incapable of fully meeting such change requirements. The long-term accumulation of unfavorable changes in the social health of the population and the unsatisfactory rate of social sphere development hinder the positive solution of social and demographic problems (increase of the demographic burden on the working-age population, decrease in potential mothers number and the general population decrease). Potential options for further social and demographic growth depend on the underlying reasons of the ongoing processes. The current situation must be taken into account in the process of developing the tools for managing the social and demographic processes in a region. The regions of Russia differ significantly in their social and demographic dynamics. This reality creates a problem of the need for regional differentiation for the purposes of developing specific management tools. Scientifically substantiated management tools, closely related to the specifics of the social and economic development and conditions in each particular region may be developed only on the basis of a full understanding and incorporation of the prevailing social and demographic processes and the specifics of their manifestation on a regional level.

In a global context the ***regional, social, and demographic trends*** on the one hand closely follow the patterns in other European countries, demonstrating lots of characteristics in common with such countries, and on the other hand have their own specific features. The common pattern can be seen in the sequence of the demographic and epidemiological transition stages and their determinants. Social and demographic development takes place within the context of the global development patterns, under the influence of the changing system of values and the way of life, as well as the attitude towards education, health care and other aspects of the social sphere. E. Tishuk noted that the process of a certain territory approaching modern population reproduction patterns correlated directly with the rate of technological progress in that territory. One of the factors of such dependence was, for instance, the average level of women's education, which was inversely proportional to their reproductive activity. In the same

way the study established a relationship between the birth rate changes and the rate of urbanization (Tishuk, 2003) According to A. Vishnevsky the modern type of reproductive behavior was characterized in addition to the number of births also by the value-rational motivation of a married couple, primarily of a woman (Vishnevsky, 2005). V. Boiko in his approach looked at the reproduction process from the point of view of the individual's adaptation to the social environment focusing on individualization of life, career and personality growth (Boiko, 1985).

The **specifics of the regional, social, and demographic trends** consists in the delay of the main transition stages, which reflects the effect of unsolved problems of the previous transition stages overlapping with the following ones, as well as the trends and specifics of the social and economic development of the Russian regions. **Modern social and demographic trends in Russia are conditional to the social and economic changes.** The literature dealing with the problems of the local, social, and economic development has even coined a special term "glocalization", which is a merger of the two terms – globalization and localization – and means strengthening of the effect of the local factors in the global processes (Animitsa, 2010). To a certain degree this is a more optimistic description of the regional development compared to globalization per se, which views the development of a region as in a certain sense a fatal process.

Within the global trends context the problem of manageability of the regional, social and demographic processes gains a particular importance. The natural reproduction of population trend is predetermined by a higher life expectancy rate (objective ageing of the population) and the decrease of the rate of reproduction (small number of children in a nuclear family). This population reproduction level is an irreversible consequence of the urbanization processes and entrance into the phase of postindustrial development. The irreversible nature of this change is more or less typical for all regions; however, it should not be reduced to a single direction of social and demographic change in the regions. The social and demographic processes in a region depend, primarily on a certain sum of factors that are significant specifically on the regional level. The specifics of these factors' manifestation can be seen in the first place in the fact that in different social and economic conditions there is a variation from the regular social and demographic processes, i.e. their regional manifestation is determined by the conditions of the region's functioning.

Therefore the potential for social and demographic development is restricted by the global regular population reproduction patterns, as well as the regional specifics that develop under the influence of the economic, social, natural-climatic, geographical and ecological conditions of a region. The regional specifics may obscure or slow down the manifestation of the global trends, but never override them.

This understanding of the social and demographic processes presuming the irreversibility of global trends is incorporated in the description of the processes as transformation. According to V. Yadov, the freedom from "vector burden" makes "transformation" the most adequate concept for the study of contemporary Russian society (Yadov, 2001). For this reason the notion of social and demographic transformations was proposed for describing the social and demographic processes reflecting the characteristics of the regularities of reproduction of population. The ***social and demographic transformations* mean *qualitative changes in the social and demographic processes under the influence of changes in the system of values and the way of life of the population, manifesting themselves in the transformation of:***

– *birth rate pattern – via the shift of the age of marriage and motherhood towards the older age periods with the simultaneous birth rate drop;*

– *mortality pattern – via the gradual disappearance of exogenous factors and better fulfillment of endogenous population's health potential with the simultaneous decrease of mortality rate and the life expectancy growth.*

Deviation from transformations under the effect of external factors and the manifestation of the regional specifics (financial difficulties, uncertainty about future economic stability, low quality of social services, unacceptable living conditions, etc.) represent the *social and demographic anomalies* (significant social differentiation of the population, high mortality rates, particularly of males and from avoidable causes, etc.).

Spatial differentiation and extremely unbalanced social and economic development of the Russian regions have a significant effect both on the social and demographic situation, and on the development of the respective management tools. The specifics of managing the social and demographic processes in the territory of a region are first of all conditional to the specifics of the regional processes themselves. Moreover, the regional specifics are formed under the definitive influence of the social and economic factors, first of all the difference in the economic potential levels. In order to achieve

optimization of the social and demographic processes in a region the managing strategy must take into account the nature of the exiting social and demographic trends and provide, first, for ensuring the least painful transition to a new state within the transformation framework, and second, for neutralizing the anomalies based on examination of the combination of conditions for the region's functioning, the study of which would help rationalizing its social and demographic development perspectives. The process of implementation of this task may be broken into three methodological positions:

1) acknowledging the historical and social-economic dependence between the population and the social and economic development of a region;

2) the need for a differentiated approach in implementing social and demographic processes management model, which follows from the previous position;

3) the use of a comprehensive approach to problems of managing the social and demographic processes in a region.

At present the development of management solutions is difficult, since they are oriented towards the quantitative improvement of the population reproduction indices, ignoring at the same time the structural transformations, with the inevitable decrease in the efficiency of the social and demographic processes management in a region. Therefore assessment of the efficiency of social and demographic processes management in a region requires defining the nature and the reasons of the social and demographic processes in such region.

Review of the literature on the subject leads to a conclusion that mostly traditional economic analysis methods are used for the assessment of management efficiency, which are often reduced to the calculation of the individual performance indicators of the technical and economic efficiency of the available resources used. Such calculations are quite simple; however, they are useless for the purposes of strategic management, since they cover only individual aspects of the economic activity. The official methodology for efficiency assessment of the work of executive authorities of the subjects of the RF was approved in 2007[1]. It is rather difficult to obtain correct

[1] On assessment of efficiency of the work of executive authorities in the subjects of the RF: Decree of the President of the RF of June 28 2007 № 825.

integrated conclusions about the comparative efficiency of different territorial systems using this methodology, because it is based on analysis of a significant number of specific performance indicators and lacks the tools for consolidating them into the integrated assessment models. This methodology is industry oriented reflecting the sector-centered interests of the governing bodies. From this point of view this methodological approach may be characterized as resource oriented.

II. Methodology

In order to shift the emphasis from "managing budget resources (expenses)" to "managing results" the authors have developed the **methodology for assessment of social and demographic processes management in a region**. The methodology is based on indicative analysis techniques and procedures. The purpose of the indicative analysis is obtaining the integrated assessment based on a combination of indices. The algorithm of the methodology consists of 4 stages.

Stage 1. Developing of a list of indices reflecting the social and demographic transformations (characteristics of the second demographic transition and the epidemiologic transition) and anomalies, as well as the level of financing of the socially significant budget items of the RF subjects (Table 1).

Stage 2. Defining threshold values of indices based on expert assessments. Taking into account the characteristics of the second demographic transition and the epidemiologic transition (Lesthaege, 1999; Van de Kaa, 1988; Omran, 1977) the threshold values of individual indices were obtained. These values were used for the qualitative differentiation of social and demographic processes into the transformations and the anomalies (Table 2).

Table 1. List of social and demographic processes and financing of the socially significant regional budget items indices

Name of modules and indices	Unit
Social and demographic processes	
1. Aggregated birth rate	unit
2. Number of interruptions of pregnancy (abortions) per 100 births	occ. / 100 births
3. Average mother's age	years
4. Extramarital birth percentage in the total number of births	%
5. Synthetic indicative population mortality rate factor (by causes of death)	-
5.1. Population mortality rate ratio from endogenous causes	per./ 100000 per. population
5.2. Population mortality rate ratio from exogenous causes	
6. Synthetic indicative population mortality rate factor (by age groups)	-
6.1. Infant mortality rate	per./ 1000 births
6.2. Working age population mortality rate	per./ 1000 per. of rel. age
7. Synthetic indicative life expectancy factor	-
7.1. Life expectancy at birth, men	years
7.2. Life expectancy at birth, women	
Financing of socially significant budget items	
1. Financing of healthcare, physical culture and sport	
1.1. Ratio of consolidated budget and the territorial public non-budgetary fund expenses for public health care, physical culture and sports to the GRP	%
1.2. Per capita expenses of consolidated budget of the RF subject and the territorial public non-budgetary fund for public health care, physical culture and sport	Rub. thou./per.
2. Financing of social policy	
2.1. Ratio of consolidated budget and the territorial public non-budgetary fund expenses for social policy to the GRP	%
2.2. Per capita expenses of consolidated budget and the territorial public non-budgetary fund for social policy	Rub. thou./per.
3. Financing of education	
3.1. Ratio of consolidated budget and the territorial public non-budgetary fund expenses for education to the GRP	%
3.2. Per capita expenses of consolidated budget and the territorial public non-budgetary fund for education	Rub. thou./per.
4. Environmental protection financing	
4.1. Ratio of consolidated budget and the territorial public non-budgetary fund expenses for environmental protection to the GRP	%
4.2. Per capita expenses of consolidated budget and the territorial public non-budgetary fund for environmental protection	Rub. thou./per.
5. Housing and utilities financing	
5.1. Ratio of consolidated budget and the territorial public non-budgetary fund expenses for housing and utilities to the GRP	%
5.2. Per capita expenses of consolidated budget and the territorial public non-budgetary fund for housing and utilities	Rub. thou./per.

Table 2. Threshold values for the region's social and demographic processes indices

Indices	Completed social and demographic transformations stage	Social and demographic transformations	Social and demographic anomalies
Aggregated birth rate, unit*	2,0 – 2,5	1,7 – 2,0	≤ 1,7
		2,5 – 3,0	≥ 3,0
Number of interruptions of pregnancy (abortions) per 100 births, occ. / 100 births	≤ 30,0	30,0 – 66,3	≥ 66,0
Average mother's age, years*	28,0 – 33,0	20,9 – 28,0	≤ 20,9
		33,0 – 40,1	≥ 40,1
Extramarital birth percentage in the total number of births, %*	35,0 – 40,0	8,0 – 35,0	≤ 8,0
		40,0 – 49,0	≥ 49,0
Population mortality rate ratio from endogenous causes, per./ 100000 per. population	≤ 300	300,0 – 840,0	≥ 840,0
Population mortality rate ratio from exogenous causes, per./ 100000 per. population	≤ 100,0	100,0 – 190,0	≥ 190,0
Infant mortality rate, per./ 1000	≤ 4,0	4,0 – 11,0	≥ 11,2
Working age population mortality rate, per./ 1000 per. of rel. age	≤ 150,0	150,0 – 600,0	≥ 600,0
Life expectancy at birth, men, years	≥ 72,0	63,0 – 72,0	≤ 63,0
Life expectancy at birth, women,	≥ 80,0	71,0 – 80,0	≤ 71,0

* the "dual-threshold" indices

The threshold values by indices of financing the socially significant budget items are scaled for the Federal Districts and the RF subjects (Table 3). Based on the classification parameters all territories are grouped into uniform comparable groups by the threshold values of indices. The algorithm of the territories grouping by classification parameters for individual indices of financing the socially significant budget items is represented in Fig.1, The grouping of the Federal Districts and the subjects of the RF by these indices is shown in Table 4.

Stage 3. Creation of an electronic database based on statistical reports of the Russian Federal Statistics Service, the Ministry of Healthcare and Social Development of the RF, the Federal Treasury.

Stage 4. Assessment of results for each index was obtained by comparing the actual index values with the respective threshold values. For the purposes of the qualitative assessment of the ***social and demographic processes*** in a region the following ***states***

have been identified depending on the manifestation of characteristics of the second demographic transition and the epidemiologic transition, as well as the regional specifics:

Table 3. Threshold values for the region's socially significant budget items financing indices

Indices	Group number	Average financing level	Low financing level
Ratio of consolidated budget and the territorial public non-budgetary fund expenses for public health care, physical culture and sports to the GRP	Group 1	4,0	2,5
	Group2	5,5	4,0
	Group 3	9,0	5,2
Per capita expenses of consolidated budget of the RF subject and the territorial public non-budgetary fund for public health care, physical culture and sport	Group 1	9,0	4,2
Ratio of consolidated budget and the territorial public non-budgetary fund expenses for social policy to the GRP	Group 1	10,0	5,0
	Group 2	12,0	7,0
	Group 3	15,0	10,0
Per capita expenses of consolidated budget and the territorial public non-budgetary fund for social policy	Group 1	4,0	2,5
Ratio of consolidated budget and the territorial public non-budgetary fund expenses for education to the GRP	Group 1	4,0	3,0
	Group 2	5,5	4,5
	Group 3	7,0	6,0
Per capita expenses of consolidated budget and the territorial public non-budgetary fund for education	Group 1	8,0	4,0
Ratio of consolidated budget and the territorial public non-budgetary fund expenses for environmental protection to the GRP	Group 1	0,06	0,02
	Group 2	0,08	0,04
	Group 3	0,1	0,06
Per capita expenses of consolidated budget and the territorial public non-budgetary fund for environmental protection	Group 1	1,2	1,0
	Group 2	1,0	0,8
	Group 3	0,8	0,6
	Group 4	0,6	0,4
	Group 5	0,4	0,2
	Group 6	0,2	0,03
Ratio of consolidated budget and the territorial public non-budgetary fund expenses for housing and utilities to the GRP	Group 1	3,0	1,5
	Group 2	4,0	2,5
	Group 3	5,0	3,5
capita expenses of consolidated budget and the territorial public non-budgetary fund for housing and utilities	Group 1	3,0	1,5
	Group 2	4,0	2,5
	Group 3	5,0	3,5
	Group 4	6,0	4,5

Figure 1. Regional grouping algorithm by classification factors for the individual socially significant budget items financing indices

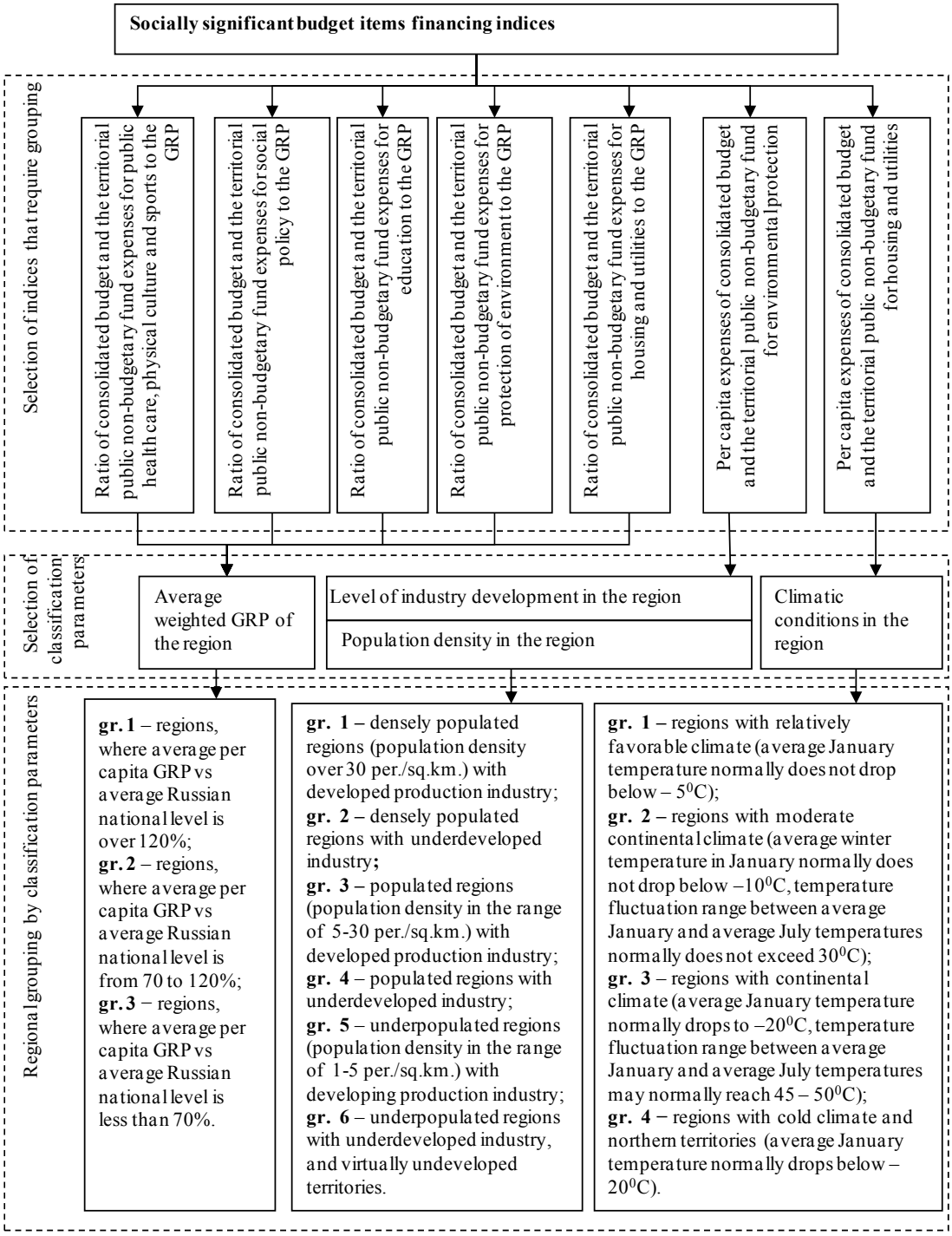


Table 4. Grouping of the Federal Districts and subjects of the RF by threshold values of indices of financing of the socially significant regional budget items

Федеральные округа и субъекты РФ	Group number						
	1.1. Ratio of consolidated budget and the territorial public non-budgetary fund expenses for public health care, physical culture and sports to the GRP	2.1. Ratio of consolidated budget and the territorial public non-budgetary fund expenses for social policy to the GRP	3.1. Ratio of consolidated budget and the territorial public non-budgetary fund expenses for education to the GRP	4.1. Ratio of consolidated budget and the territorial public non-budgetary fund expenses for environmental protection to the GRP	4.2. Per capita expenses of consolidated budget and the territorial public non-budgetary fund for environmental protection	5.1. Ratio of consolidated budget and the territorial public non-budgetary fund expenses for housing and utilities to the GRP	5.2. Per capita expenses of consolidated budget and the territorial public non-budgetary fund for housing and utilities
The Central Federal District	**2**	**2**	**2**	**2**	**1**	**2**	**2**
Belgorod region	2	2	2	2	2	2	1
Bryansk region	3	3	3	3	2	3	2
Vladimir region	3	3	3	3	1	3	2
Voronezh region	3	3	3	3	2	3	1
Ivanovo region	3	3	3	3	2	3	2
Kaluga region	3	3	3	3	2	3	2
Kostroma region	3	3	3	3	4	3	2
Kursk region	3	3	3	3	1	3	1
Lipetzk region	2	2	2	2	1	2	2
Moscow region	2	2	2	2	1	2	2
Oryol region	3	3	3	3	2	3	2
Ryazan region	3	3	3	3	1	3	2
Smolensk region	3	3	3	3	3	3	2
Tambov region	3	3	3	3	2	3	2
Tver region	3	3	3	3	3	3	2
Tula region	3	3	3	3	1	3	2
Yaroslavl region	2	2	2	2	1	2	2
The City of Moscow	1	1	1	1	1	1	2
The North West Federal	**2**	**2**	**2**	**2**	**3**	**2**	**2**
Republic of Karelia	2	2	2	2	5	2	3
Republic of Komi	1	1	1	1	5	1	4
Arkhangelsk region	2	2	2	2	5	2	4
Nenets autonomous district	2	2	2	2	6	2	4
Vologda region	1	1	1	1	3	1	3
Kaliningrad region	3	3	3	3	2	3	2
Leningrad region	2	2	2	2	1	2	2
Murmansk region	1	1	1	1	3	1	4
Novgorod region	3	3	3	3	4	3	2
Pskov region	3	3	3	3	4	3	2
The City of Sankt-Petersburg	2	2	2	2	1	2	2
The South Federal District	**3**	**3**	**3**	**3**	**3**	**3**	**1**
Republic of Adygeya	3	3	3	3	2	3	1
Kabardino-Balkarian Republic	3	3	3	3	5	3	1
Krasnodar territory	3	3	3	3	2	3	1
Astrakhan region	3	3	3	3	4	3	1
Volgograd region	3	3	3	3	3	3	2
Rostov region	3	3	3	3	1	3	1

Table 4 continuation

Территория	Group number						
	1.1	2.1	3.1	4.1	4.2	5.1	5.2
The North Caucasian Federal District	**3**	**3**	**3**	**3**	**2**	**3**	**1**
Republic of Dagestan	3	3	3	3	2	3	1
Republic of Ingushetia	3	3	3	3	2	3	1
Kabardino-Balkarian Republic	3	3	3	3	2	3	1
Karachaevo-Chercessian	3	3	3	3	2	3	1
Republic of North Ossetia –	3	3	3	3	2	3	1
Chechen Republic	3	3	3	3	2	3	1
Stavropol territory	3	3	3	3	2	3	1
The Privolzhsky (Volga) Federal District	**2**	**2**	**2**	**2**	**1**	**2**	**2**
Republic of Bashkortostan	2	2	2	2	3	2	2
Republic of Marij El	3	3	3	3	2	3	2
Republic of Mordovia	3	3	3	3	2	3	2
Republic of Tatarstan	2	2	2	2	1	2	2
Udmurtian Republic	3	3	3	3	1	3	3
Chuvashi Republic	3	3	3	3	2	3	2
Perm territory	3	3	3	3	6	3	3
Kirov region	2	2	2	2	3	2	3
Nizhni Novgorod region	3	3	3	3	1	3	2
Nizhni Novgorod region	2	2	2	2	3	2	2
Penza region	2	2	2	2	3	2	2
Samara region	2	2	2	2	1	2	2
Saratov region	3	3	3	3	3	3	2
Ulyanovsk region	3	3	3	3	2	3	2
The Urals Federal District	**1**	**1**	**1**	**1**	**3**	**1**	**3**
Kurgan region	3	3	3	3	4	3	3
Sverdlovsk region	2	2	2	2	3	2	3
Tyumen region	1	1	1	1	5	1	4
Khanty-Mansijsk autonomous district	1	1	1	1	5	1	4
Yamalo-Nenets autonomous	1	1	1	1	6	1	4
Chelyabinsk region	2	2	2	2	1	2	3
The Siberian Federal District	**2**	**2**	**2**	**2**	**5**	**2**	**3**
Republic of Altai	3	3	3	3	5	3	3
Republic of Buryatia	3	3	3	3	5	3	3
Republic of Tuva	3	3	3	3	5	3	3
Republic of Khakasia	3	3	3	3	4	3	3
Altai territory	3	3	3	3	4	3	3
Zabaikalsk territoty	3	3	3	3	5	3	3
Krasnoyarsk territory	1	1	1	1	5	1	3
Irkutsk region	2	2	2	2	5	2	3
Kemerovo region	2	2	2	2	1	2	3
Novosibirsk region	2	2	2	2	3	2	3
Omsk region	2	2	2	2	3	2	3
Tomsk region	1	1	1	1	5	1	3
The Far East Federal District	**2**	**2**	**2**	**2**	**5**	**2**	**2**
Republic of Sakha (Yakutia)	1	1	1	1	6	1	4
Kamchatka territory	2	2	2	2	6	2	3
Primorsky territory	2	2	2	2	3	2	2
Khabarovsk territory	2	2	2	2	5	2	2
Amur region	2	2	2	2	5	2	2
Magadan region	1	1	1	1	6	1	4
Sakhalin region	1	1	1	1	4	1	2
Jewish autonomous region	3	3	3	3	4	3	2
Chukotka autonomous district	1	1	1	1	6	1	4
Note. Numbers of indices correspond to the indices numbering in Table 1.							

– *Social and demographic anomalies* characterize processes subject to the effect of the regional specifics. The anomalies include such reproductive performance and mortality rate structure, which have a negative effect on the dynamics of the number and the structure of the region's population, creating a threat to the economic growth and the social stability of the region.

– *Social and demographic transformations* determine the type of processes occurring during the second demographic transition and the epidemiologic transition. Under unfavorable conditions the processes may change from this state into the state of anomalies, this fact requires continuity of actions on the part of the public authorities aimed at maintaining the favorable social-economic and demographic environment in the region.

– *Completed social and demographic transformations* describe the characteristics of the completed second demographic transition and the epidemiologic transition resulting in fundamental qualitative changes in the reproductive performance and the mortality rate structure. At this stage the main responsibility for the social and demographic development lies on the population itself, whereas the state performs only those functions that are required for maintaining favorable social and economic conditions in the region.

Levels of financing the socially significant budget items are broken into above average, average and low groups depending on the average Russian and the generally accepted foreign financing values and the recommendations of the international non-profit organizations.

The methodology is used for solving the problem of obtaining both assessment of the current state by the individual social and demographic process indices, and the overall state of the processes. In order to obtain such assessments it is necessary ***to convert values of the social and demographic process indices*** expressed in various units into normalized values following certain conversion rules. Such conversion is performed with the use of the following rules:

1. If in the source (denominated) system of units the decrease of an indicative factor value results in deterioration of a state (conventional name of such index

is “diminishing”) then its normalized value shall be determined by the following equation:

$$(1)\qquad \begin{cases} if\ X_{ji}^{t} \geq X_{T,ji}, then\ X_{ji}^{H} = 0; \\ if\ X_{ji}^{t} < X_{T,ji}, then\ X_{ji}^{H} = \dfrac{X_{T,ji} - X_{ji}^{t}}{X_{T,ji} - X_{A,ji}}, \end{cases}$$

where X_{ji}^{H} – is the normalized value of index *i* for region *j* in the analyzed period, rel. unit;

X_{ji}^{t} – actual value of index *i* (index *i*, value expressed in denominated units system) for region *j* in the analyzed period;

$X_{T,ji}$ – threshold value of social and demographic transformations for index *i* of region *j* in the source (denominated) units system;

$X_{A,ji}$ – threshold value of social and demographic anomalies for index *i* of region *j* in the source (denominated) units system.

2. If in the source (denominated) system of units the increase of an indicative factor value results in deterioration of a state (conventional name of such index is “incremental”) then its normalized value shall be determined by the following equation:

$$(2)\qquad \begin{cases} if\ X_{ji}^{t} \leq X_{T,ji}, then\ X_{ji}^{H} = 0; \\ if\ X_{ji}^{t} > X_{T,ji}, then\ X_{ji}^{H} = \dfrac{X_{ji}^{t} - X_{T,ji}}{X_{A,ji} - X_{T,ji}}, \end{cases}$$

It should be noted that for the normalized values the deterioration of a state by indices is always accompanied by the increase of their normalized values, regardless of whether the indices belonged to the “diminishing” or the “incremental” type.

3. Alongside the aforementioned indicative factor types there is also a third type – the “dual-threshold” indices. The completed transformation processes stage for these indices would have the top and the bottom threshold values. In this case, when the value of an index falls to a zone lying below the stage of completed transformation processes (the “diminishing” zone), the calculation of its

normalized value shall be performed in the same way as for the "diminishing" indicative factors. Whereas, when the value of an index falls to a zone lying above the stage of completed transformations (the "incremental" zone), calculation of its normalized value shall be performed in the same way as for the "incremental" indicative factors.

The rules for classification of states by indices based on normalized values are shown in Table 5.

Table 5. Classification of situations by indices and numerical score of the current situation

Stages of social and demographic processes	Ratio of normalized values of indices to threshold values	Numerical score of the current state
Completed social and demographic transformations stage	$X_{ji}^{H} = 0\ AND\ X_{ji}^{t} \neq X_{T,ji}$	1
Social and demographic transformations	$0 < X_{ji}^{H} < 1$	2
Social and demographic anomalies	$1 \leq X_{ji}^{H} < 2{,}5$	5

After obtaining the state assessments by individual indices it is necessary to perform the general assessment by the current social and demographic processes occurring in the region. Results of calculations of the economic, energy and social, and demographic security and the drug addiction situation by the Federal Districts and the subjects of the RF (Tatarkin et al., 1999; Tatarkin and Makarov, 2004) demonstrated that the most suitable rule for the purposes of such assessment would be the *average weighted normalized assessment* rule, where numeric scores by indices are used as the applicable weights. The normalized value by the state of the social and demographic processes C_{kj} is determined by the formula:

(3)
$$C_{kj} = \frac{\sum_{i=1}^{N_{kj}} b_{ji} X_{ji}^{H}}{\sum_{i=1}^{N_{kj}} b_{ji}},$$

where X_{ji}^{H} – is the normalized value of index *i* for region *j* in the analyzed period, rel. units;

b_{ji} – numeric score of a state (Table 5).

All normalized assessments by indices with values over 2.5 are assumed to equal 2.5.

Assessment by the level of financing of the socially significant budget items of the RF subjects is performed on the basis of the same mathematical tools and rules, as the assessment of the state of social and demographic processes.

Assessment of the efficiency of management of social and demographic processes in the region is performed by comparing the calculated normalized values of social and demographic processes indices with the calculated normalized values of the level of financing of the socially significant budget items:

(4) $$\beta_u^t = \frac{X_{ji}^H}{X_{jk}^H},$$

where β_u^t – is the assessment of the efficiency of the social and demographic processes management, rel. units;

X_{ji}^H – is the normalized value of the social and demographic process index *i* for territory *j* in the analyzed period, rel. units;

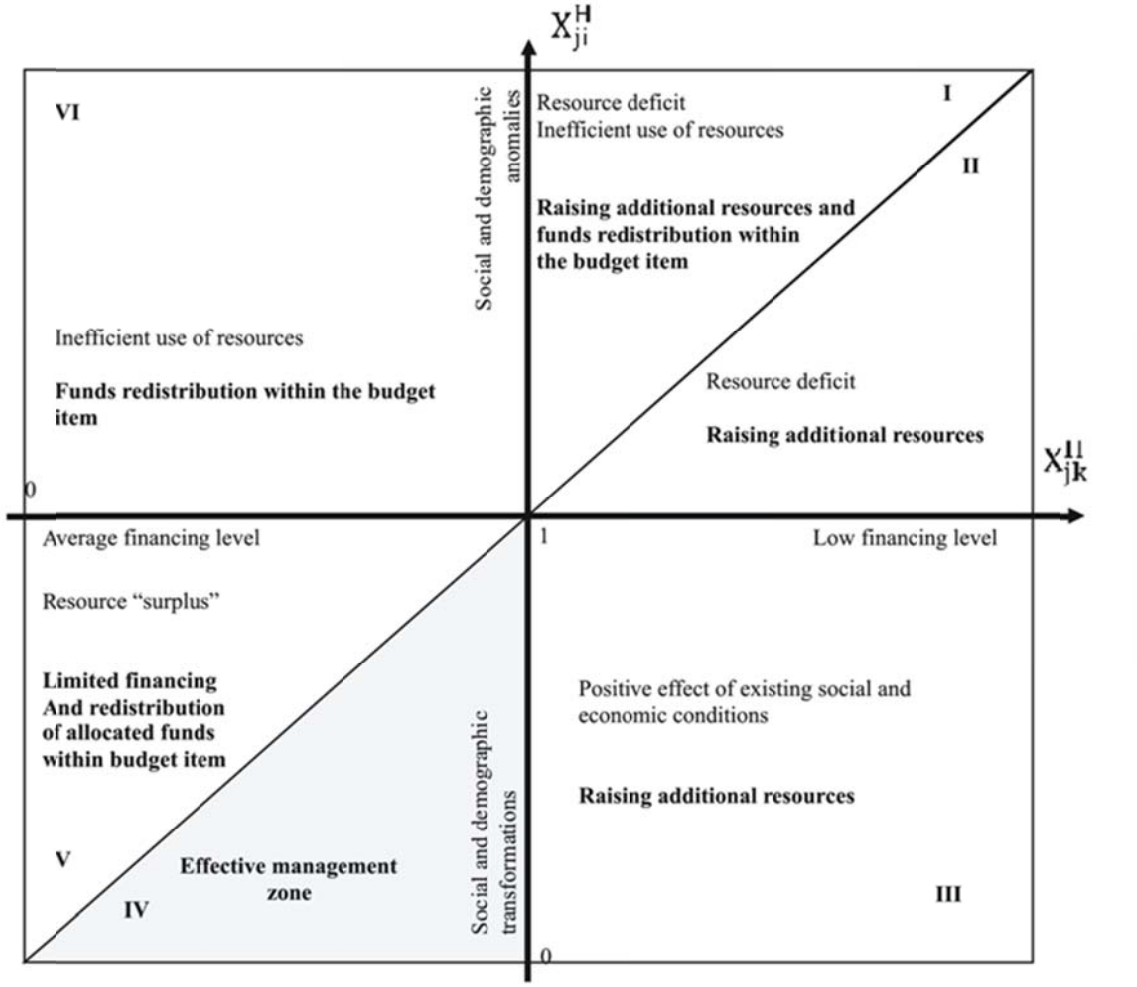
X_{jk}^H – is the normalized value of financing of the socially significant budget item index *i* for territory *j* in the analyzed period, rel. units;

Depending on this ratio it is possible to determine the efficiency of managing the social and demographic processes by 6 zones with the varying degree of efficiency, which is graphically represented in Fig. 2.

Managing the social and demographic processes is considered efficient provided the following ***three conditions*** are met:

1) The state according to the social and demographic process index is characterized as the transformation stage, i.e. X_{ji}^H <1;

Figure 2. Efficiency zones of the social and demographic processes management in a region



2) Financing of the socially significant budget item is at the average level, i.e. $X^{H}_{jk}<1$;

3) normalized social and demographic process index value is lower than the normalized value of the level of financing of the socially significant budget item, i.e. $X^{H}_{ji}<X^{H}_{jk}$.

Zone IV meets the set conditions and is the efficient social and demographic processes management zone – all other zones are considered inefficient.

Zone I – social and demographic anomalies and a low level of financing of the socially significant budget items. Exit from this zone requires a combination of the rational redistribution of financial resources inside the given budget item and the increase of financing volume.

Zone II is characterized by the social and demographic anomalies at a low level of financial expenses, which dictates the need for raising additional funds for financing of a particular budget item that will result in the best performance.

Zone III, describing a region where at the low level of financing there are certain social and demographic transformations owing to the positive effect of the existing social and economic conditions in the region. Raising additional funds for financing of the socially significant budget item will improve the efficiency of management.

Zone V embraces the regions with the social and demographic processes at the stage of transformation and an average level of financing, in order to stimulate the more efficient management of the available resources, the existing "surplus" in the financing level of a particular budget item must be rationally redistributed inside the item, with the simultaneous limiting of financing volume for this item.

Zone VI describes a region with the social and demographic anomalies and average financial expenses, which is considered an inefficient use of the socially significant budget item resources, and requires a review of the available resources distribution within the given budget item.

III. Results

The methodology was tested on the RF subjects of the Ural Federal District (UrFD). The UrFD may serve as an example of a closer relationship between the level of the economic and the social and demographic development, where the purely resource oriented regions have the highest economic development level; the territories with competitive industries - the average; and the predominantly agrarian RF subjects have a relatively low level of economic development. This fact results in different financial capabilities of the District's territories: from the subsidized region (the Kurgan region) to the regions generating a significant portion of the national budget income (the Khanty-Mansiysk AD, the Yamal-Nenets AD). In view of such differences in financial resources the capabilities for managing the social and demographic transformations and anomalies in the region also differ.

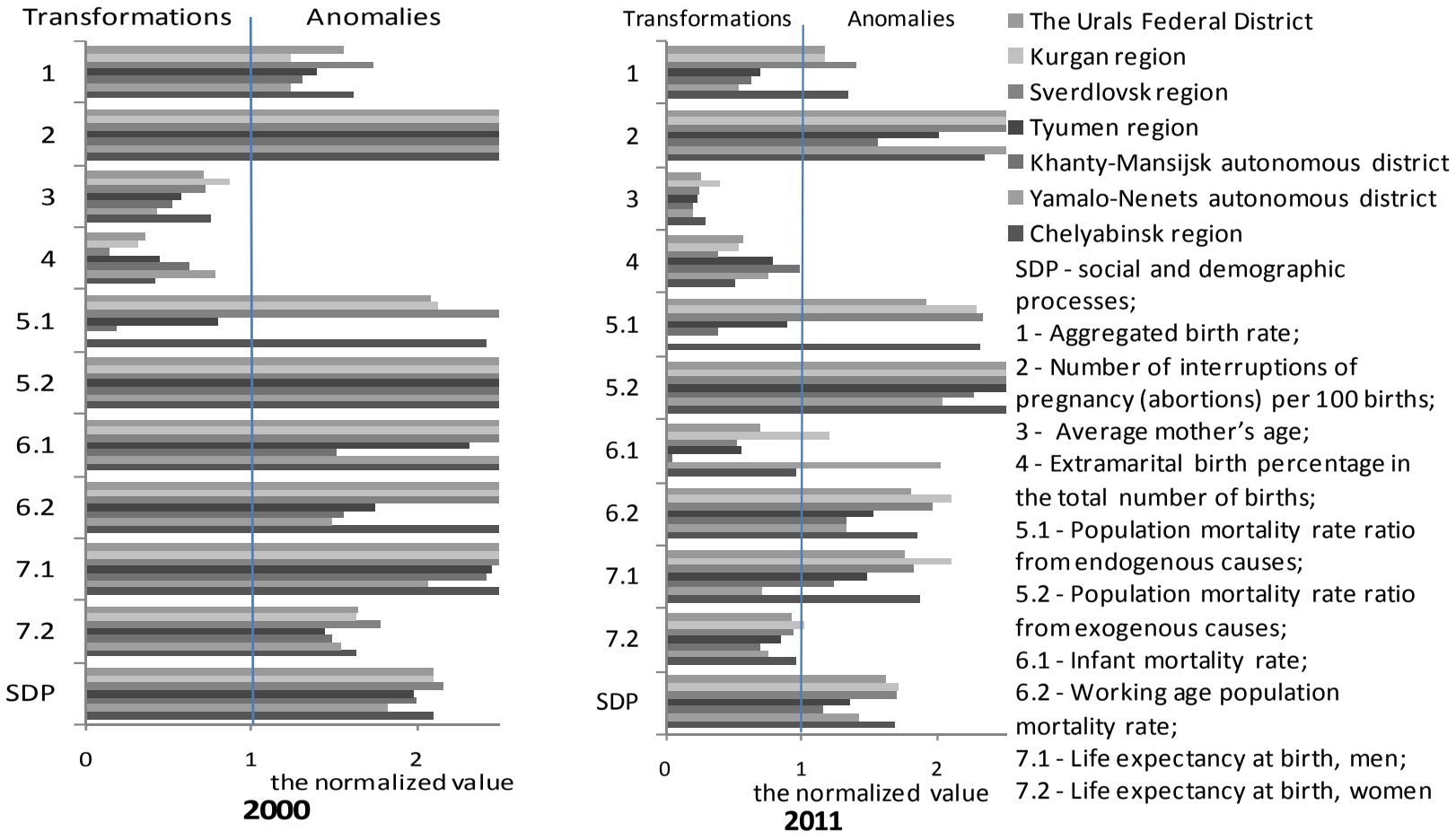
Results of assessment of the state of the social and demographic processes in the UrFD for 2000-2011: According to the achieved results of the territories of the UrFD by the social and demographic processes despite the overall favorable trend

demonstrated anomalies throughout the analyzed period, particularly with regard to the population mortality rate processes (Figure 3).

It should be noted that the low birth rate was definitely the main reason for the population reduction. However unlike the extremely high mortality rate it was not an exceptional phenomenon. A similar birth rate level could be observed in many developed economies during the second demographic transition period. In all RF subjects of the District the final birth rate numbers correlated with a significantly more mature age. Pregnancy interruption still carries a significant weight in the birth rate regulation methods despite the general positive trend towards the reduction of the number of abortions. Mortality rate of the UrFD population may be best characterized as abnormal, the degree of acuteness and continuity of this problem is strongly dependent on the social and economic development of the region (level of poverty, conditions of life, accessibility of social services, etc.). In this sense the Kurgan region was the most backward territory of the UrFD, the Sverdlovsk and the Chelyabinsk regions demonstrated better performance. In the Tyumen region and the Autonomous Districts the generally younger population structure affected the mortality rate structure: there was a higher rate of mortality from exogenous causes and in the working age group.

Results of assessment of the level of financing of the socially significant budget items in the UrFD in 2011: In 2011 the level of financing of the socially significant budget items of the RF subjects in the UrFD was classified as low, though the dynamics of the main financing indices indicated an overall increase of financing. Thus the financing volume growth was rather a result of the higher level of social and economic development approaching the level of developed economies, than of the effect of the social and demographic processes. Because of their higher incomes the Khanty-Mansiysk and the Yamal-Nenets Autonomous Districts had greater financial leverage for solving their social and demographic problems.

Figure 3. Results of assessment of the social and demographic processes by regions of the Ural Federal District for 2000 and 2011



Results of assessment of the efficiency of social and demographic processes management in the UrFD in 2011: According to the assessment results the social and demographic processes management in the region has been classified as inefficient: the Chelyabinsk region and the Khanty-Mansiysk AD corresponded to Zone I parameters, the Sverdlovsk and the Kurgan regions were classified as Zone II regions, the Tyumen regions and the Yamal-Nenets Autonomous District – Zone VI regions. It is necessary to pay closer attention to the management decision making process in all the RF subjects of the UrFD, as the insufficient financing problems there were aggravated by the presence of social and demographic anomalies.

Figure 4. Results of assessment of the level of financing of the socially significant budget items in the UrFD in 2011

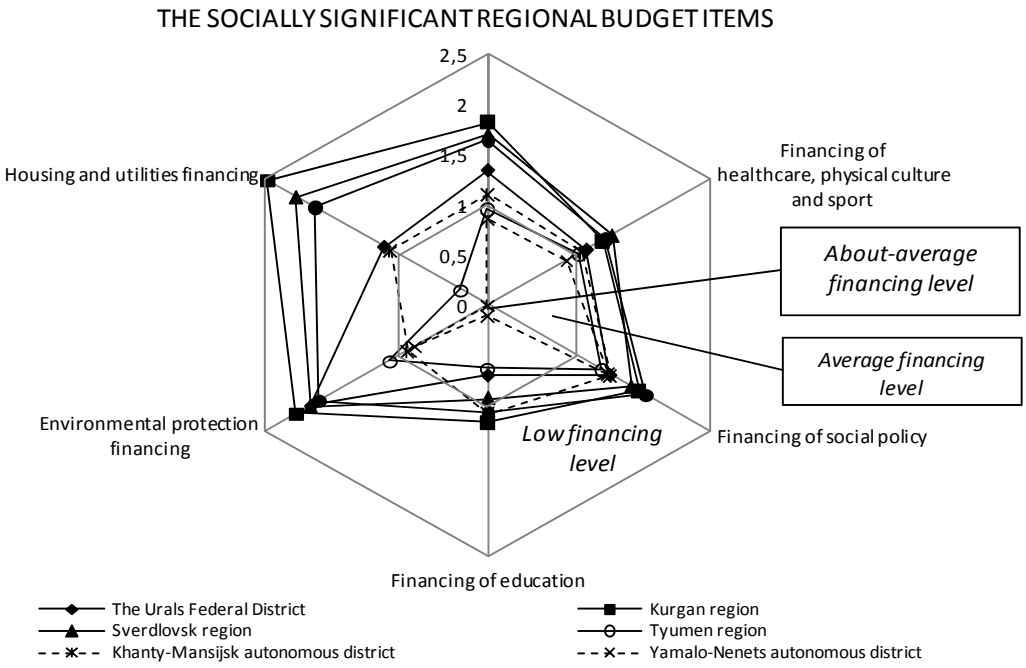
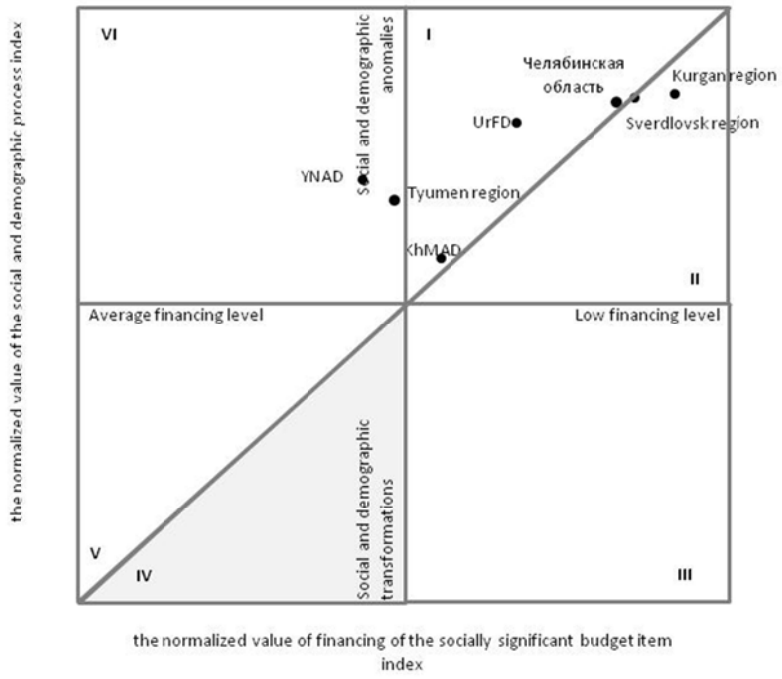


Figure 5. Results of assessment of the efficiency of social and demographic processes management in the UrFD in



According to the assessment results the social and demographic processes management in the Kurgan region was the least efficient of all the UrFD territories with regard to all the socially significant budget items. In addition to the need to raise additional resources for the reduction of the rate of abortions, population mortality rate and increase of the birth rate and life expectancy, there is also the need of resource redistribution inside the socially significant budget items with regard to improvement of abortions rate, population mortality rate from exogenous causes, the working age population mortality rate, and the male population life expectancy indices.

Management efficiency in the Sverdlovsk and the Chelyabinsk regions may be improved by means of raising additional funds for the healthcare and social policy for the purposes of improving birth rates, life expectancy, reduction of abortions rates, mortality from endogenous and exogenous causes, and the working age population mortality rates. In addition it is necessary to redistribute financial resources in the expense budget lines of the healthcare system and the social policy with regard to abortions rate, mortality rate and life expectancy, as well as review the healthcare

system expense budget for the improvement of birth rate situation. In addition, improvement of management efficiency in the Chelyabinsk region requires additional financing of the healthcare system and the social policy with regard to the reduction of infant mortality rate.

According to the assessment results in the Tyumen region efficiency of managing such social and demographic processes as the number of abortions, mortality rate from exogenous causes, working age population mortality rate, and male population life expectancy may be improved by means of a more rational use of the available funds for financing the healthcare system and the social policy, as well as raising additional resources for the social policy.

According to the assessment results in the Khanty-Mansiysk AD the combination of low financing and inefficient use of available financial resources in the healthcare system resulted in anomalies in such social and demographic processes as abortions, mortality rate from exogenous causes, working age population mortality rate, and life expectancy. In addition the same negative combination was identified in the social policy of KhMAD particularly with regard to reduction of abortions rate and mortality rate from exogenous causes, as well as insufficient financing of social policy – with regard to working age population mortality rate, and male population life expectancy.

According to the performed assessment results the social and demographic processes management in the Yamal-Nenets AD was classified as inefficient, since the social and demographic transformations in the regions occurred only owing to the existing favorable social and economic conditions. Managing such social and demographic processes as the number of abortions, mortality rate from exogenous causes, infant mortality and working age population mortality rate was classified as inefficient. In addition to the requirement of increasing the volume of financing for the healthcare system and social policy in the aforementioned areas, the first three indices values may be improved by means of reviewing of the existing expense items for the healthcare system and the social policy. It is also necessary to ensure further stable development of the remaining processes under study.

IV. Conclusion

Overall none of the territories of the UrFD demonstrated efficient social and demographic processes management pattern, this was particularly true for the population mortality rate index. The reason for this was primarily the existing low level of financing of the socially significant budget items of the RF subjects within the UrFD, which was insufficient for the stable and high quality population development and its natural growth. In addition the volume of resources allocated to the social sphere financing can not by itself generate improvement of the social and demographic processes performance, it is very important to maintain correct distribution of the available funds. Analysis of the obtained results lead to the conclusion that the Kurgan region suffered from severe need of additional resources, it was also necessary to redistribute the available funds for improvement of both the reproduction of population and the population's health. Greater financial capability for funding the social sphere in the Khanty-Mansiysk and the Yamal-Nenets Autonomous Districts did not guarantee the efficient management of the social and demographic processes. In the absence of competent management the emerging positive trend in the social and demographic development of the region may be interrupted.

Thus the proposed methodology may be used for adjustment and strengthening of the regional, social and demographic development management, as well as for the rationalization of financing priorities within a particular area of the social sphere, and for identifying the optimal scenarios for investment in the efficiency of management of social and demographic processes in the region.

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