

Patterns of Regional Differentiation
in Post-Soviet Russia

Maria Giulia Silvagni

Dottorato di Ricerca in Economia – XXIV ciclo
Alma Mater Studiorum – Università di Bologna

Relatore: professoressa Vera Negri Zamagni

Coordinatore: professor Giacomo Calzolari

Settore concorsuale di afferenza 13/A1

Settore scientifico disciplinare SECS-P/01

Contents

Overview

1. Regions and Institutions

1	Introduction	9
2	An overview of Soviet economic performance	10
3	Literature review	14
4	Russian regions	19
4.1	Institutional design of the regions	19
4.2	Federal Districts	22
4.2.1	Climate and population	22
4.2.2	Labor force	24
4.2.3	Measures of inequality	24
4.2.4	Composition of Gross Regional Product	26
5	Concluding remarks	29
6	References	30
7	Appendix	32

2. Spatial Aspects of Convergence. Evidence from Russian Regions

1	Introduction	36
2	Methods	38
2.1	Exploratory spatial data analysis	38
2.2	Theoretical framework. The Solow Growth Model	41
3	Empirical analysis	44
3.1	Data	44
3.2	Spatial patterns of Gross Regional Product	45
3.3	Convergence and growth factors across Russian regions	50
4	Concluding remarks	54
5	References	56
6	Appendix	60

3. Russian Demographic Patterns Before and After the Dissolution of the Soviet Union

1	Introduction	63
2	General vital statistics	63
2.1	Population	64
2.2	Life expectancy at birth	66
2.3	Mortality rate	67
2.4	Migration patterns	68
3	Fertility patterns	70
3.1	Total and age-specific fertility rates	70
3.2	Maternal age at childbirth	72
3.3	Mean age at first marriage	73
3.4	Abortion rate	74
4	Pro-fertility policy measures	75
5	International comparisons	77
6	Concluding remarks	81
7	References	83

4. The Only-Child Decades. Fertility Behavior in Russia, 1965-2009

1	Introduction	84
2	Theoretical framework	85
3	Data sources and methods	88
4	Empirical analysis	88
4.1	National data	89
4.2	Regional data	91
4.2.1	Regional trends	92
4.2.2	Results	97
4.3	Individual data	99
4.3.1	Method and data	100
4.3.2	Results	101
5	Concluding remarks	103
6	References	105
7	Appendix	107

5. Why Not a Second Child? An Economic Analysis of Fertility

Behavior of Russian Parents

1	Introduction	112
2	Russian fertility trends	113
3	Theoretical framework of fertility intentions	117
4	Data and method	118
4.1	Data	118
4.2	Method	124
5	Empirical analysis	126
5.1	Intention to have a first child	126
5.2	Mean maternal age at first birth	127
5.3	Intention to have a second child	128
6	Robustness checks	130
7	Concluding remarks	131
8	References	133
9	Appendix	135

Conclusions

Overview

In the last two decades much effort has been devoted to the study of transition economies. All the countries of the ex Soviet Bloc had to deal with profound changes in every aspect of their structure such as the design of their institutions, the labor market and the standards of living of the population. The contributions to alleviate the burden of the overall reconstructions came from numerous sources like international institutions - the International Monetary Fund and the World bank, politicians and a growing number of academics.

This doctoral thesis aims at contributing to the literature on transition economies focusing on the Russian Federation and in particular on its internal regional division. Two broad themes are studied: income differentials and fertility patterns. Each chapter covers a specific topic and is self-contained.

In particular, the first two chapters deal with the issue of income differentials and measures of inequality across Russian regions. Chapter one provides an historical-institutional analysis of the period between the late years of the Soviet Union, its collapse and recovery, and finally the last decade of economic growth when regional differentials acquired more importance. From a theoretical point of view, transition countries in the early Nineties could adopt one of two models to deal with the reconstruction: a gradual approach or a *shock therapy* approach. The former called for a step-by-step path for the construction of a fully democratic market economy, the latter instead proposed simultaneous interventions to stabilize the economic and financial situation of the country, liberalize prices and privatize State-owned firms. Russia followed the path of the *shock therapy* liberalizing prices in 1992 and starting firms' privatizations soon after the dissolution of the Soviet Union. The process did not proceed as expected and by 1994 output had almost halved, more than 30 percent of the Russian population was living in poverty according to international standards and even statistics as mortality rates had a sharp increase.

Although the failure of the application of this strategy up to the financial crisis of 1998 has been generally recognized, *why* it failed was one of the main discussion of the literature in the Nineties as I will review in depth in the first chapter. For instance, while

Stiglitz (1999) criticized the “*excessive reliance on textbook model of economics*”, Aslund (1999) defined the reforms adopted as “*slow and partial*”.

The Russian economy eventually started a new phase of economic growth in the late Nineties which has been interrupted only in the recent years by the crisis of 2008. Economic growth has been driven by oil production at first and this is one of the reasons behind the regional differentials which are the focus of my work.

In chapter one first I review the literature on transition and Russian transition in particular, then I analyze the internal division of Russia and different measures of inequality such as income dispersion and regional composition of Gross Regional Product at the national and regional levels. Given its geographical extension, Russia is composed of regions which differ for climate, population density, the agrarian or industrial vocation of the region itself, the availability of natural resources among other factors.

In chapter 2 I extend the descriptive analysis applying spatial econometrics techniques for an empirical examination of the Solow growth model in a sample of 77 Russian regions. The contributions of this chapter to the literature are twofold. First, I perform a detailed exploratory spatial data analysis (ESDA) of per capita gross regional product at the global and local level using the spatial analysis softwares GeoDa and R to determine whether Russia is characterized by clusters, which regions contribute to their formation and what types of policy measures could be adopted to reduce, for instance, the full industrial specialization of the oil-productive regions. Second, I extend the traditional setting of the Solow model and construct a matrix to design the spatial correlation between regions in order to determine whether the proximity to a rich region has positive effects on economic growth and whether the clusters’ structure is an obstacle to income convergence.

The second part of this thesis is composed of three chapters which deal with the demographic situation of Russia. The motivation behind this section is the severe decline in population faced by the country since the beginning of transition. In fact, in one decade, 1998-2008, total population dropped from 147 millions to 141 millions people and two causes have been identified so far: first, the increase in male mortality in the first phase of transition – which is attributed to the increase in alcohol consumption and the decline in standards of living in that critical phase – and the decline in birth rates. Although the decline in birth rates is not a specific feature of Russian

demographic patterns but a widespread phenomenon – as recalled by the theory of the Second Demographic Transition – the Russian case is unique for the combination of low birth rates, high mortality rates and low life expectancy which is a pattern not found in other countries.

In chapter three I analyze the national demographic patterns of some vital statistics such as population growth, life expectancy and fertility rates since 1965 and I provide a review of the policies on maternity leave and family benefits since Soviet times. This chapter is self-contained and also instrumental to chapter four and chapter five. The contribution of this study and the next one stands in the richness of the data that are discussed which do not have wide circulation, in fact data sources are the series of the Statistical Yearbooks of USSR, the Statistical Yearbooks of the Russian Soviet Federative Socialist Republic and the Demographic Yearbooks of Russia. Data collection has highly benefited from a visiting period that I spent at the Higher School of Economics in Moscow during the third year of my PhD and I am indebted to all the researchers who helped me.

Although the literature of Russian fertility patterns is rich and growing, the issue of the pro-cyclical or counter-cyclical direction of fertility with respect to the business cycle remains unsolved, in fact the sample and the period of analysis play a major role on results. For this reason, in chapter four I analyze the Russian demographic patterns in light of the theoretical framework of the model of fertility behavior designed by Becker (1960), the Second Demographic Transition and the economic-crisis argument employing a top-down strategy which is data-specific to the national, regional and individual levels data that I collected. With national data from 1960, the theoretically issue of the pro or countercyclical relation between income and fertility is graphically analyzed and discussed, as are the trends of female employment and education. Given the structural break of 1991 which prevents long-term econometric estimations, this strategy appeared to me as the most suitable one. On the other hand, with regional data available since 1995 I apply different panel data models which allow to determine what affects fertility rates *within* region controlling for specific regional characteristics such as population density, regional urban and rural population and life expectancy. To my knowledge, the only study using regional level data is Brainerd (2007) who focuses on the first decade of transition. Finally, individual level data from the Russia Longitudinal

Monitoring Survey are employed using the logit model to study fertility intentions in 1994, 2002 and 2008 following the whole phase of recovery and economic growth.

The use of survey data on intentions is indeed the most promising technique for the study of behavior and it proved to be very useful in the literature on the perceptions of the Russian population on several issues such as labor, consumption and fertility behavior. In chapter five I use data from the Generations and Gender Survey (GGS) provided by the United Nations Economic Commission for Europe (UNECE) to analyze fertility intentions of Russian women in order to understand whether the relation between income and the business cycle is pro-cyclical or counter-cyclical at the individual level. In 2007 the Russian government launched a new policy measure called the Maternity Capital Program to give incentives towards the decision to have a second child because of the important decline of the Nineties. It assigns a grant of about 12,000 euro to the applicant when the child is three years old and it can be used for specific purposes such as home reconstruction or it can be assigned to the mother's pension fund. With this dataset I will use the ordered logit model to shed light on the expected effectiveness of the Maternity Capital program and the study of birth intentions and fertility postponement.

Chapter 1

Regions and Institutions

1. Introduction

The Soviet Union and its socio-economic principles have ruled the lives of hundred millions of people during most of the XX century. The Soviet Union became in few decades in between the Second World War the second world largest economy after the United States. The State was designed as a complex system of collectivization of agriculture, state-owned enterprises and five years plans issued by the State Planning Commission Gosplan to fix targets and sustain the development of heavy industry. The extensive growth model worked until the Sixties, when the slowdown in economic growth started to deteriorate the stability of the system. After years of struggles and the implementation of new policies like *glasnost* and *perestroika* shaped to give more freedom to the citizens and to economic activity, the Soviet Union ceased to exist in December 1991 and the course of transition started.

After a first phase of crisis, the Russian economy started a new pattern of positive growth rates of income, however high inequalities at the regional level remained in fact differences in investments, per capita income, quality and availability of services, industrial specialization of the region depend mostly on the exploitation of natural resources, which is a crucial growth factor.

In this chapter I will introduce the institutional setting of the Russian Federation and in particular its internal division in Federal Districts and regions, which are the reference units of the empirical analysis. Paragraph 2 provides a review of the economic performance of the Soviet Union from the Thirties up to the slowdown of the Seventies and the events that led to the dissolution of the Soviet Union. Stuart and Gregory (1995), Davies (1997), Riasanovsky (2010 – eighth edition) and Graziosi (2008, in Italian) among others present a comprehensive and detailed history of Russia and the Soviet Union. In paragraph 3 I will discuss the literature on transition economies and the debate on *shock therapy versus gradualism* focusing on Russia and Russian regions. Paragraph 4 will illustrate the institutional setting of the regions according to the Constitution of the Russian Federation and the legal jurisdiction of the federal and the local level. Then I will describe the Federal Districts, a sub-national structure established in 2000 in order to ensure compliance of the regional laws with the federal

legislation and will analyze the differences in population and climate, labor force, income inequality and in the structure of Gross Regional Product for the Federal Districts and selected regions.

2. An overview of Soviet economic performance

In the XIX century Russia was still a peasant agricultural country¹ but soon after in 1957 succeeded in the launch of the Sputnik satellite. This quick modernization was realized through the central planning system which, nevertheless, started to show signs of a slowdown in the Seventies, when Brèžnev was General Secretary of the Soviet Communist Party.

In the Thirties, when the New Economic Policy (NEP) was abandoned by Stalin in favor of the five-year plans and the collectivization of agriculture, the role of central planning in the economy was reduced compared to the years of war communism, prices were liberalized and private trade was made legal (Fischer 1992). The aim of the plans since the first one issued in 1928 was to sustain the extensive growth model through capital accumulation (Allen 2001 p.863) focusing on the creation of heavy industry sectors as steel and machinery. The Soviet Union succeeded in becoming the second world power, with 6 percent annual growth rates of national income (GNP), but the inner cost paid by the Soviet population has been huge. The years of the Stalin terror have been the worse period for the citizens of the Soviet Union. In fact, the collectivization of agriculture and the requisition by the state of almost half of the crop led to a severe famine and the death of millions of peasants, also the Great Purge of 1936-1938 and the Second World War killed more than 25 million people.

After the death of Stalin in 1953 and a period of struggle for leadership of the Party, Chruščëv served as First Secretary of the Communist Party and started a program of de-Stalinization of the Soviet Union aiming at improving the living conditions of the population, condemning the crimes committed by his predecessor and the damages of forced collectivization. Although the effects of his policies were limited and his consensus in the Party never unanimous, he started a housing program in Moscow and proposed reforms for agriculture so that prices paid to collective farms increased, new crop cultivations started – with limited results - and specialized vocational institutions were established to improve the quality and productivity of agriculture.

¹ At the end of the century, 12.8 percent of the Russian population lived in urban areas, against over 40 percent in France and Germany and 70 percent in the UK (Baykov 1954, p. 138).

Taking the prices in 1952 as 100, in 1954 the state paid peasants 739 for grain, 369 for potatoes and 289 for dairy products (Graziosi 2008, p.158). Living conditions of the population improved much in the Fifties, though improvements must be read in light of the extremely low initial conditions, as stressed by Graziosi (2008, p. 168). Real wages in 1954 were finally higher than in 1928, meat and dairy consumption increased by 40 percent and the production of consumer goods as radios, motorcycles and bicycles almost doubled.

Chruščëv and his authoritative methods never reached full consensus inside the Party and by the Sixties attempts to reduce the central bureaucracy and decentralize the administration of industrial policies had failed, industrial production was declining, agricultural production had increased less than expected and relations were troubled with both the United States and China.

In 1964 Chruščëv was removed by his office and from then up to 1982, Brèžnev served as General Secretary of the Communist Party with a leadership strictly related to the so-called Era of Stagnation. The annual growth rate of GNP was 5.7 percent between 1950 and 1960 and declined to 5.2 in the Sixties and 3.2 in the Seventies (Ofer 1987, table 1 p. 1778), so actually it was not properly a phase of stagnation, but a slowdown in growth. Between 1960 and 1970, the annual growth rate of GNP was 5.2 percent, 2.1 percent for employment and 8 for capital accumulation, and by the time of the tenth plan (1976-1980), the annual growth rate of GNP declined to 2.6 percent, employment growth rate to 1.2 and capital accumulation to 6.8 percent (Ofer 1987).

The cause of the slowdown can not be identified only in the argument that the extensive growth model had reached its limit in accumulation of inputs and diminishing returns to capital were in place otherwise we would be just looking at raw data. More factors have contributed to the decline in growth rates of the Seventies² such as the excessive expenditures for the military; the increasing foreign debt and inflation in consumer market (Kim 2002); low incentives to innovate firms and the inability to introduce forms of intensive growth in the economy; the lack of flexibility of the plans, whose targets were not adequate to the economic conditions at that time; wrong investments, which were mainly concentrated on restructuring rather than on new activities; and the weakening of the centralized power *per se*, unable to recognize the

² See Allen (2001), Fischer (1992), Harrison (1998) and Ofer (1987)

increasing demand of consumer goods, higher wages and most of all freedom and reforms.

After his death in 1982, Brèžnev was briefly succeeded by Andropov who died after two years and was replaced by Černenko. Both of them served as General Secretary for very limited periods of time because of their bad health conditions and age, and therefore unable to alter the declining path of the Soviet economy.

From 1985 to 1991, Gorbačëv served as the last General Secretary of the Communist Party. At that point the economic decline of the Soviet Union was severe with shortages of basic foodstuff and the introduction of a system of monthly quotas typical of war times, meanwhile dissent and opposition against the lack of reforms and democracy started to spread. Gorbačëv was aware of the deep crisis and believed in the possibility of a recovery for the Soviet Union through reforms and new policies as *uskorenje* (acceleration of economic change), *glasnost* (openness i.e. freedom of expression and criticism, freedom of conscience and religion) and *perestroika* (restructuring). In 1987, the Law on Cooperatives allowed citizens to run private economic activities, while the Law on State Enterprises prescribed that enterprises were free to decide output levels, prices within a certain interval but had to self-finance themselves. In 1988 he declared the countries of the Eastern Bloc free to auto-determine their internal policies. In 1991, Gorbačëv was elected President of the Soviet Union and in the same year El'cin was elected President of the Russian Soviet Federative Socialist Republic and declared the prevalence of Russian laws to those of the Soviet Union.

Gorbačëv struggled to create a new voluntary federation with the Republics, but his idea failed. In 1990-1991, a multiparty system had been created and the free elections and declarations of sovereignty from the Baltic and other Republics were eventually recognized. Soon after the failed coup of August 1991, it became clear that the dissolution of the Soviet Union was unavoidable, while political conflicts between Gorbačëv and El'cin – whose openness towards a faster process of creation of a market economy was gaining consensus – grew more and more. In 1991, the Commonwealth of Independent States (CIS) was created and on December 25th Gorbačëv, who had resigned as Party Secretary in August, resigned as President of the Soviet Union. Since 1992, the heritage of the Soviet Union was taken by Russia and transition started. The

measures adopted by Gorbačëv to avoid the collapse of the Soviet Union failed for various reasons. While he stressed his strong beliefs in communism and the possibility to avoid the dissolution of the Soviet Union introducing reforms, the new policies he adopted – *glasnost* in particular – had the counter-effect of showing to the Russian population the inefficiencies of the system on the long run and that other political systems were able to provide more freedom and wellbeing to their citizens³. Gorbačëv recognized it in his final speech of December 25th saying “*We had a lot of everything (...) yet we were living much worse than people in the industrialized countries were living*”. Other measures, like the anti-alcohol campaign of 1985 which involved a rise in prices and cuts in production, aroused the opposition of the population – with the creation of a black market and fewer controls on the quality of products – and led to a decline in budget revenues which exacerbated the financial crisis. Conflicts with El'cin on which path was more adequate to avoid collapse also played a major role.

The process of transition from the centrally planned economy to a market economy in Russia can be divided in two periods: a phase of crisis from 1992 to 1998 and a phase of growth from 1999 onwards. In 1992 the government liberalized prices – with the exception of some foodstuff, energy sector and transport – and started the process of firms' privatizations but, having to deal with a dramatic situation, policies and reforms were not designed with a long-term view. The main problem to sort out was the urgency to create new institutions simultaneously and convert Russia to a market economy based country. The reduction in price controls generated a pattern of hyperinflation - prices increased by a factor of 8 in few months, with a consistent reduction in private savings - aggravated by currency emissions and the depreciation of the ruble. On the basis of the Washington Consensus, in 1995 the Central Bank interrupted the openness of credit lines to the government and a proper public debt was issued, while a market-based banking system was established. Subsidies to firms were cancelled. Both the banking system and firms were not prepared to adapt immediately to the new model and the increasing amount of private and public debt led to wage erosion and the inability of the state to provide adequate public services which were traditionally given to workers by the firms in the Soviet economy. The crisis exacerbated in 1996 due to the erosion in public resources, to the aggravation of deficit

³ Romano (in Riasanovsky 2008 p. 596 Chapter XLII, XII Italian edition) recalls that when Gorbačëv became General Secretary, in Russia there were 36 cars and 9.8 telephones per 1,000 people. In the US the numbers were 540 and 76, in Italy 359 and 42.

and the difficulties in the implementation of fiscal reforms and in tax collection. In 1998 the government declared its inability to repay the public debt and the currency was devaluated. In 1999 the Russian economy entered a new course of positive growth rates of Gross Domestic Product (GDP) mainly thanks to the increase in oil-prices. After about 10 years of transition, the institutions, the banking system and the entrepreneurs were also more prepared and adapted to the market economy and its rules than the previous generation of managers grown in the Soviet planned economy. Since 1999 the Russian economy has been on a stable growth path with average annual growth rate of GDP of 5/6 percent – much influenced by the variation of oil prices – up to the recent crisis of 2008 and has been able to control inflation, to open to international trade and to attract both foreign and domestic investors.

Several issues remain at the social level like the remarkable differences in quality and availability of public services across the country, with the Asian part being the most critical one. Isolated areas in Siberia and the Far East suffered consistent depopulation in the first phase of transition when economic activities were dismantled. Also, income inequalities are increasing through time because investments are concentrating in oil-rich regions and an adequate system of regional re-distribution has not been established yet, though new rules were introduced in 2004 to sustain poorer areas. Corruption remains a crucial issue which affects chances to start free economic activities and politics is still far from being a complete democratic system as open as the United States or Western European countries. Finally, demographic patterns are critical, as the Russian population has been decreasing in the past twenty years despite the positive net migration rate and the decrease in infant mortality. Alcohol consumption and the low life-expectancy of Russian men were problems recognized also by Gorbačëv, whose measures to reduce alcohol consumption failed.

3. Literature review

Since the beginning of transition in 1992, the recovery path has not been homogeneous across the numerous countries involved in the process and similar policies have produced different macroeconomic results (Sachs 1996). As expected from the dissolution of the centrally planned economy and state-owned enterprises, all the countries of the former Soviet Union suffered severe declines in output and increases in unemployment owing to the reconstructions. On the other hand, something unexpected was the magnitude of these phenomena in Russia, given that both the Russian

government and part of the international community believed in fast adaptation to market principles⁴. The output decline reached 35 percent in Russia in 1994/1995; unemployment, decrease in consumption and even in life expectancy and fertility have been much more severe and long lasting than estimated.

The speed of recovery varied across countries. For instance, the crisis has been severe but recovery relatively fast in Poland and the Baltic States, which created strong connections with Western European countries and were already on positive growth path after five years, but slower in Russia. In fact, it is worth noticing the Baltic States, which were annexed to the Soviet Union after the Second World War, and other satellite states like Poland recovered faster than Russia, which had been the leader country. The main cause of this slow recovery has to be found in the fact that the application of the policies of the *shock therapy* in Russia in 1992, when nor a strong government nor adequate institutions were in place, failed.

The dominant influence of the central planner in the Soviet Union was reflected in the so called *soft budget constraint* (Kornai 1986). The State acted as the final source for the financial resources through the coverage of firms' expenditures with credit lines, subsidies and administrative low prices, softening the incentives to form correct expectations on the basis of demand. Soviet managers were in the total control of the central government, ignoring the risks of losses or bankruptcy and while plans came from above, consumers suffered of a widespread excess demand and shortages. Moreover, incentives towards efficiency in production and investments in new technologies were weak because what mattered to them was to comply with the target of production of the plan. In late Eighties, food shortages were so severe that a war-type system of ticket with monthly quotas was introduced.

The debate on which path was to be followed for transition between a gradual approach (Aghion and Blanchard 1994; Roland 2002; Stiglitz 1999) and a *shock therapy* of reconstruction with contextual price liberalization, stabilization and privatization (Lipton et al. 1990, Aslund 1999) first started in Poland after the elections in 1989, even though its case is actually a peculiar one (Shleifer 1997). Poland had adopted economic reforms at least since the Eighties and, as Shleifer stresses (1997, p. 404), "*the private sector was well established when radical reforms began*", so that when constitutional protection of private property came in 1989, a large share of the economy was already privatized and entrepreneurs adapted to market principles.

⁴ See Harrison (2001) for an illustration of the production possibilities during the transition and the main Western illusions on recovery path

Moreover, Solidarność and the Catholic Church were active in the civil society, whereas Russia did not have any civil movement of this kind. At the beginning of the Nineties, Poland adopted the Balcerowicz Plan. Through the elimination of price controls and the regulations and subsidies to State-owned firms, the country started a great economic recovery. The literature highlights the effectiveness of the reforms at the macro level⁵ while a survey analysis (Rovelli and Zaiceva 2009) registered a low popular support and general discontent for the new economic phase in a broad sample of countries, mainly in the early years of transition when output decline and unemployment were higher than in previous years.

A fundamental feature of Russia with respect to the other transition countries is that Russia somehow *was* the Soviet Union, being the leader country, and in 1992 it had to create itself on its own, not re-gain independence like the other countries. Moreover, Russia was not a small homogeneous nation, but a widespread territory with many ethnical groups. The length and magnitude of the Russian crisis came as a shock and in 1996 it appeared clearly that the country was not on a consistent growth path. According to Stiglitz (1999), a reason for the sharp output decline in Russia has probably been the blind implementation of policies suggested by international institutions, hence the idea of transplantation, i.e. applying the same policies to countries whose economic and political histories were not homogeneous, led some of them to crisis as much as the “*excessive reliance on textbook model of economics*” (Stiglitz 1999, p.130). Monetary policy was focused only on the short term, so that controlling inflation became almost impossible. At the same time, the banking system was not ready to operate because of the absence of legitimate credit lines for new firms and to the inexperience of managers with Western-type institutions.

Privatization of State-owned assets has been another crucial problem for Russia, generally recognized as one of the bigger failures of the first phase of transition. It was realized through a voucher system, but a combination of non transparent rules, corruption and weak institutions created a group of powerful oligarchs and the weak central government had neither power nor interest to avoid this strategy of privatization. The *grabbing hand* of the socialist government (Shleifer and Vishny 2002) had been replaced by a myopic view of the market as an institution able to ensure economic development and improvement in living conditions regardless of any agency problem and entrepreneurial tradition. This combination of output decline, unemployment,

⁵ Lipton, Sachs, Fischer, Kornai (1990); Dabrowski, Gomulka and Rostowski (2000)

instability in money supply, wages and prices revealed already in 1995/1996 that recovery was not proceeding in the right direction. Eventually, with the financial crisis in August 1998, the turning point in macroeconomic policies design, the situation collapsed.

As seen so far, there is not any consensus on the inner causes of the failure of the recovery in the first phase of Russian transition. Ahrend and Tompson (2005) focus on price liberalization showing that the process was slow and not applied to basic food consumption, the energy sector and transports, because the government feared negative reactions from the population and the energy industry. They also find that the protection of property rights, transparency and accountability – the same principles called by Gorbačëv in the Eighties - were not fully reached at the time. Aslund (1999) analyzes the multi-level collapse of Soviet Union, a political and macroeconomic failure which left no space for a gradual approach to capitalism as in China. It was not the failure of a government which needed to be replaced, but the failure of a system which had ruled for decades. Given political instability and unemployment, the risk of a re-appearance of the old communist party appeared too high to try a gradual way of reform. He identifies the causes of the failure in limited reforms which were “*slow and partial*” (Aslund 1999 p.4) and wrong interventions on money supply, which trapped the country in hyperinflation and high public debt.

Comparisons with the Chinese transition have been frequent in the literature⁶ attempting to find a successful example to follow and the main point often neglected by policy-makers was that China and the Soviet Union were completely different from each other. Their economic and social development has in fact been opposite for essential features such as, for example, private property and labor. Almost 90 percent of the Chinese land was private before nationalization whereas, in Russia, long after the formal abolition of serfdom in 1861, most people were not allowed to carry on free economic activities as land was given to peasants in communal ownership and by 1913 less than 1/3 of land was private (Fischer 1992). The Chinese transition to market economy was gradual because the institutional component was stable, therefore the Chinese Party had the time and power to test new measures in selected regions and discuss the results, while Soviet Union was facing a collapse of its structure. The federal

⁶ McMillan and Naughton (1992), Oi (1995), Popov (2007)

division of the two countries was also different. In China, the provincial structure of villages and firms allowed for a strict local supervision on economic activities; the Soviet Bloc instead was formed by a high number of occupied countries and many ethnic groups and regional divisions inside Russia.

Recovery started in 1999/2000 with the rise in oil prices, which nowadays are still one of the main economic forces of the Russian economy, but the process of transition is not completed on the institutional side. The main challenges for the next future are to increase transparency and decrease corruption of both central and local institutions and to ensure a complete protection of property rights and the freedom for entrepreneurial activity.

After the first decade of transition with the availability of new data, the interest of the literature concentrated on the recovery of Russia as a whole and, among others, on its internal subdivisions and disparities across Russian regions⁷. According to the Constitution of 1993, the country is divided in 89 federal units with different degrees of autonomy from the central government as for local elections and provision of laws. With the increase in oil and gas exports in the last decade, geographical conditions (oil extraction, shared-borders with rich regions and good transport lines) play a pivotal role in both growth and disparities. Recovery has concentrated in the areas around Moscow and Saint Petersburg, which were the most industrialized and developed regions also in the previous decades and are now attracting most of foreign direct investment (FDI), and in the ones with abundance of natural resources like oil and gas whose abundance has indeed been essential, contributing, on the other hand, to the disparities in economic growth and in the living conditions of the population (Fedorov 2002). A recent research line focuses on explaining the variation in economic performance across regions which can be due to fiscal federalism and determine the influence of fiscal arrangements on this performance. Using data from the period 1996-1999, Desai et al. (2003; 2009) suggest an asymmetrical federalism across the regions according to their economic condition. The consequences of fiscal federalism depend upon the extent to which regional rent seeking and strong relationships between government and firms persist. Increased federal control may limit the local economy, but it will also limit rent seeking behavior. Results suggest that an increase in the retention rate is generally accompanied

⁷ Ahrend (2008); Berkowitz and DeJong (2003, 2005); Popov (2001)

by a stronger economic growth, although data show that for the regions with a high share of revenues deriving from natural resources and for the poorest ones, a deeper central control is recommended to regulate local governments and avoid excessive competition and corruption in order to get rents. Freinkman and Plekhanov (2009) stress the high costs required to create such a system and the limited ability of the central government to put it in practice, opting for an intraregional fiscal decentralization from regions to municipalities.

4. Russian regions

Social and economic differences at a sub-national level such as the different lifestyle and life quality of inhabitants due to climate conditions, agrarian or industrial vocation, ethnical groups, availability and quality of the social services, characterize the Russian Federation. The aim of this paragraph is to illustrate the institutional design of Russian regions, which are the reference unit for the following chapters and to analyze the differences in climate, population, labor force, income inequality and the structure of Gross Regional Product (GRP) between the Federal Districts, which are the new administrative division of the country established in 2000 to ensure compliance of regional laws with the federal legislation.

4.1 Institutional design of the regions

The institutional design of the Russian Federation as established in the Constitution of 1993 is composed of a federal level and a local self-government level. The Constitution recognizes as constituent units the regions, called *Subjects of the Federation*, further divided in provinces and municipalities. The regions were 89 when the Constitution was approved and became 83 in 2008 because of mergers between regions, usually between a main region and the smaller regions in the surroundings areas. The mergers were not active from the administrative point of view in 2008, so that the structure of 1993 has not dramatically changed.

Each subject can take one of four designs: *Republic*, *Kray* (territory), *Oblast* (region) and *Autonomous Okrug*. Nowadays there are 21 Republics, 9 Krai, 46 Oblasts, 2 Federal Cities (Moscow and Saint Petersburg), 1 Autonomous Oblast and 4 Autonomous Okrugs⁸.

⁸ See the Appendix for a list of regions

These subjects have equal federal rights being represented by two delegates in the Federation Council, the Upper House of the Parliament, but they differ in the degree of autonomy. For example the Republics have the right to write their own Constitution, have a Parliament and a President and hold the right to choose a state language to be used together with the Russian language (Chapter 3, Article 68 of the Constitution). Most of the Republics have a high degree of autonomy because during the process of the formation of the country were composed of ethnic minorities and were guaranteed with higher independence than other areas. Oblasts and Krai are administrative subjects with a Governor appointed by federal power and have local elections. Each autonomous okrug (with the exception of Chukotka) is under the jurisdiction of its main oblast and this is the reason why they are rarely considered explicitly in empirical studies.

The Constitution provides the baseline for the separation between federal and local government. In 1992 the Federation Treaties were signed by most of the regions with the exception of the Republics of Chechnya and Tatarstan and incorporated in the Russian Constitution. Chapter 3, titled “Russian Federation”, provides the official list of the subjects and the legal jurisdiction of the Russian Federation itself, i.e. the federal level. Below are listed the topics of national jurisdiction:

- a) the adoption and amendment of the Constitution and federal laws and supervision over compliance with them;
- b) the federal structure and territory of the Russian Federation;
- c) regulation and protection of the rights and liberties of the human being and citizen; citizenship of the Russian Federation; regulation and protection of the rights of national minorities;
- d) establishment of the system of federal bodies of legislative, executive and judiciary power, procedure for the organization and activities thereof; formation of federal bodies of state power;
- e) federal and state property and management thereof;
- f) determining the basic principles of federal policy and federal programs in the field of state structure, the economy, the environment, and the social, cultural and national development of the Russian Federation;
- g) establishment of the legal framework for a single market; financial, monetary, credit and customs regulation, emission of money and guidelines for price policy; federal economic services, including federal banks;

- h) the federal budget; federal taxes and levies; federal funds of regional development;
- i) federal power grids, nuclear energy, fissionable materials; federal transport, railways, information and communications; space activities;
- j) foreign policy and international relations of the Russian Federation, international treaties of the Russian questions of war and peace;
- k) foreign trade relations of the Russian Federation;
- l) defense and security; defense production; determining procedures for the sale and purchase of arms, ammunition, military hardware and other equipment; production of fissionable materials, toxic substances, narcotics and procedure for the use thereof;
- m) defining the status and protection of the state border, territorial waters, the air space, the exclusive economic zone and the continental shelf of the Russian Federation;
- n) law courts; Prosecutor's Office; criminal, criminal-procedural and criminal-executive legislation; amnesty and pardon; civil, civil-procedural and arbitration-procedural legislation; legal regulation of intellectual property;
- o) federal conflict of laws;
- p) meteorological service; standards, models, the metric system and time measurement; geodesy and cartography; names of geographical objects; official statistics and accounting;
- q) State decorations and honorary titles of the Russian Federation;
- r) federal state service

The division of competencies is not clearly arranged, so the legal authority on the same topic is often attributed to different levels and in Hanson words (1994, p.6) *“the division of powers and responsibilities is as clear as an old-fashioned London fog”*.

Article 72 lists the topic of the joint jurisdiction between federal and local level:

- a) providing for the correspondence of the constitutions and laws of the Republics, the charters and other normative legal acts of the territories, regions, cities of federal importance, autonomous regions or autonomous areas to the Constitution of the Russian Federation and the federal laws;
- b) protection of the rights and freedoms of man and citizen; protection of the rights of national minorities; ensuring the rule of law, law and order, public security, border zone regime;

- c) issues of possession, use and disposal of land, subsoil, water and other natural resources;
- d) delimitation of state property;
- e) nature utilization, protection of the environment and ensuring ecological safety; specially protected natural territories, protection of historical and cultural monuments;
- f) general issues of upbringing, education, science, culture, physical culture and sports;
- g) coordination of issues of health care; protection of the family, maternity, paternity and childhood; social protection, including social security;
- h) carrying out measures against catastrophes, natural calamities, epidemics, elimination of their aftermath;
- i) establishment of common principles of taxation and dues in the Russian Federation;
- j) administrative procedure, labor, family, housing, land, water, and forest legislation; legislation on subsoil and environmental protection;
- k) personnel of the judicial and law enforcement agencies; the Bar, notaryship;
- l) protection of traditional living habitat and of traditional way of life of small ethnic communities;
- m) establishment of common principles of organization of the system of bodies of state authority and local self-government;
- n) coordination of international and foreign economic relations of the subjects of the Russian Federation, fulfillment of international treaties and agreements of the Russian Federation.

Topics which were under the joint jurisdiction according to Article 72 are now *de facto* under the federal power; these are mainly the subjects described in point c) “*possession, use and management of the land, mineral resources, water and other natural resources*”, which the Treaties attributed jointly to the regions and exclusively to the Republics “*but the use must be compatible with federal legislation*” (Hanson 1994, p.8). Taxes and State-transfers are also controlled by the federal level, but *ad hoc* agreements on budgets prevent a complete control and knowledge of rules and amounts.

4.2 Federal Districts

In order to re-centralize control over regional laws and ensure compliance with federal laws, in 2000, President Putin established the creation of seven units called Federal

Districts named Central, North-Western, Southern (divided in Southern District and District of the North Caucasus in 2010), Volga, Urals, Siberian and Far Eastern. This sub-national level of division is useful for the empirical analysis because it collects regions in few homogeneous areas⁹. Each district has a Governor appointed by the Kremlin upon approval of local legislatures who guarantees that local laws comply with federal laws. The economic development of the regions is strictly related to their characteristics such as climate, temperatures and soil fertility. In a country as wide as Russia, the variation on these characteristics has been crucial for the agrarian or industrial vocation of certain regions, for the type of industry to be established, and also in demographic and social characteristics as population density and the design of the labor market.

4.2.1 Climate and population

With a surface of more than 17 millions km², Russia is the largest country in the world and its climate and topography vary with the zones. European Russia, whose eastern boarder is identified in the Urals Mountains, and Asian Russia occupy respectively about 25 percent and 75 percent of the territory.

Nowadays the population of Russia reach 143 million people with a density of 8.4 people per km². Due to the harshness of most of the Asian territory and climate, 80 percent of Russian population lives in the European region where the weather is continental and milder in the Southern Districts than in the North-Western District. Arctic weather in Asian Russia, Siberia and in the north region of the Far Eastern District, in fact, is characterized by unfavorable climate conditions that do not encourage people to live there. In the South of the Far Eastern District the temperature is milder during the summer and the weather is similar to the one in the North of China.

Economic activities in the area between the Urals and the Far East are mostly related to natural resources such as oil and gas while milder weather and longer summers help the diffusion of the agriculture in the South of Siberia and in the South of the Far East.

More than half of the Russian Gross Domestic Product comes from heavy and light manufacturing and service sector diffused in the European Russia where the activities are more differentiated and include mining and quarrying in the Central District.

⁹ See table 1 in the Appendix

4.2.2 Labor force

Characteristics of the labor market and participation rates depend upon the types of industries which can be found at the regional level. Data are published on a yearly basis by Rosstat. Total labor force in 2010 was 75 millions people; 20 millions in the Central Federal District, with 6 millions being concentrated in Moscow City, 10 millions in the Volga District, concentrated in the most industrialized regions of Bashkortostan, Nizhny-Novgorod, Perm and Tatarstan and 2 millions in the Tyumen region of the Urals District. The role played by Tyumen in the Russian economic growth is very important as the region accounts for 90 percent of total Russian production of natural gas, more than 60 percent of the oil production and 10 percent of the production of electricity.

In industrial sectors, 6 millions people work in agriculture, in the Southern, Volga and Siberian Districts, 10 millions are employed in manufacturing, with higher shares in European Russia than in Asian Russia and 12 millions are employed in wholesale retail trade and small businesses.

Participation rate at the national level is 74 percent for men and 62 for women. Female participation rate is higher in areas specialized in services and light industry such as Moscow and the North-Western District, while it is lower in agricultural areas like the Southern District or the Kurgan region of the Urals, which is not specialized in oil extraction and has male and female participation rates 5 to 6 percentage points lower than its neighbor region Tyumen and the national average. Unemployed people were 5.5 millions in 2010 and the unemployment rate 7.5 percent at the national level, with the majority being men aged 20-29 with vocational or secondary completed education. Unemployment rate is higher in the Southern, Siberian and Far Eastern Districts than in European Russia.

4.2.3 Measures of inequality

Measuring disparities is very important to understand how wealth is distributed across regions. Here I illustrate two inequality indexes of per capita GRP computed at the level of the Federal Districts which are the coefficient of variation (CV) and the Gini coefficient reported in table 1. The coefficient of variation is a measure of the dispersion of a distribution and it is computed as the ratio of the standard deviation to the mean. When comparing groups – Federal Districts in this exercise – with different means, the

coefficient of variation is more precise than the standard deviation from the mean. The Gini coefficient is a measure of dispersion which measures inequality in a frequency distribution and it ranges from 0 (perfect equality) to one (maximum inequality).

<i>District</i>	Central		North-W		Southern		Volga		Urals		Siberian		Far Eastern	
	CV	Gini	CV	Gini	CV	Gini	CV	Gini	CV	Gini	CV	Gini	CV	Gini
1995	.42	.19	.43	.23	.39	.20	.27	.15	.91	.37	.36	.19	.37	.19
1996	.53	.20	.35	.18	.36	.19	.30	.16	1.05	.42	.36	.19	.44	.23
1997	.82	.29	.28	.15	.33	.18	.36	.19	1.23	.49	.41	.21	.97	.39
1998	.57	.21	.39	.20	.35	.19	.31	.17	1.10	.43	.36	.19	.40	.21
1999	.58	.21	.33	.18	.38	.20	.32	.17	1.08	.43	.36	.19	.39	.21
2000	.62	.22	.33	.18	.34	.18	.33	.18	1.08	.43	.35	.19	.39	.21
2001	.62	.22	.33	.17	.33	.17	.45	.19	1.11	.44	.33	.18	.39	.21
2002	.66	.23	.29	.15	.33	.17	.34	.18	1.13	.45	.35	.18	.46	.24
2003	.70	.24	.26	.14	.33	.17	.33	.18	1.14	.45	.37	.19	.60	.29
2004	.71	.25	.26	.14	.32	.17	.33	.18	1.14	.45	.37	.19	.54	.27
2005	.76	.26	.27	.14	.32	.17	.33	.18	1.15	.46	.36	.19	.47	.25
2006	.78	.27	.28	.14	.31	.16	.33	.18	1.13	.45	.35	.19	.47	.25
2007	.77	.26	.28	.14	.31	.17	.33	.18	1.09	.44	.35	.19	.50	.26
2008	.78	.27	.29	.15	.32	.17	.33	.18	1.09	.44	.34	.19	.54	.27

Table 1 Gross Regional Product inequality metrics – Federal Districts
Author's calculations on Rosstat data

The Urals District is the most unequal one, a result which is attributed to the limited number of regions which belong to the District and to the role of the Tyumen region. The Central District shows an increasing degree of inequality in the GRP distribution which likely reflects the difference between Moscow and surrounding regions with respect to other poorer regions in the same District. Inequality is decreasing over time in the North-Western and Southern Districts and it is stable in Siberia. Looking at per capita GRP in table 2, the Districts with the highest increases in per capita income between 1998 and 2008 were the Central District, the Urals District and the North-Western District. As for the distribution, while inequality has been decreasing in the North-Western District it increased in the Central and the Urals District providing preliminary evidence of a detrimental effect of the concentration of investment and economic activities in Moscow (for the Central District) and in oil productive regions (for the Urals District) on within-District equality.

4.2.4 Composition of Gross Regional Product

In this section the structure of Gross Regional Product (GRP) for the years 1998 and 2008 has been analyzed, taking the Federal Districts as reference unit. The structure of GRP allows to detect how the Russian economy has changed through time from the end of the first critical phase of transition (1992-1999) to a second phase characterized by positive growth rates of GRP. The structure of GRP published by Rosstat was enriched between 1998 and 2008, as shown in table 2 in the Appendix. In 1998 the two broad categories used were physical goods and intangible services. Physical goods were divided in GRP deriving from industry, agriculture and construction, while intangible services were divided in transport, communications, trade and catering. In 2008, instead, the three broad sections used were industry and agriculture, services and social service (public administration, defense, education etc), divided in further levels.

Data for natural resources and the share of GRP deriving from these industries are published in different forms. For both years, the quantities of extracted oil and condensate gas are available at regional and District levels so that it is possible to see what the most oil-productive regions are and how they perform. For 2008 the GRP structure for industry is disaggregated in mining and quarrying, production of electricity, gas and water.

In 2008 at the national level, 5 percent of Gross Domestic Product is given by agriculture, 35 percent by industry and 60 percent by services.

In 1998, at the threshold of the financial crisis that changed the path of Russian transition, per capita GRP in purchasing power parity was 5,400 US dollars (15,400 rubles in current prices) while in 2008, before the recent financial crisis, it reached 13,200 (240,000 rubles in current prices) with very high regional disparities. Through time, the poorest District is the Southern one which suffers by ethnical conflicts, political instability in fact does not allow a consistent growth path despite its fertile soil and the availability of oil in some areas. As a consequence, in 1998 and in 2008 per capita GRP in the Southern District was below the national value and the disparity was increasing; in 1998, per capita GRP was 5,400 US dollars at the national level and 3,000 in the Southern District, while in 2008 it was 13,200 at the national level and 5,400 in the Southern District. On average the Districts and regions with the best economic performance in the decade 1998-2008 have been the ones with better initial conditions, i.e. higher initial levels of GRP and oil extraction. These are in particular the Central

District and Moscow City, the Urals District and Tyumen region, and other regions as Sakhalin in the Far Eastern District.

- **Physical goods**

In 1998 the shares of GRP deriving from physical goods and intangible services were around 50-50. Physical goods were disaggregated in industry, agriculture and construction and industry was not disaggregated in heavy and light industry, while in 2008 industrial production will report also mining and quarrying, manufacturing, production of electricity, gas and water and wholesale retail trade.

In the same year the average share of GRP deriving from industrial activities was 30 percent at the national level and above this value in the North-Western, Volga and Urals Districts. As already mentioned, in the Urals District the activities are concentrated in Tyumen region where 60 percent of total national oil-extraction is done. Indeed the majority of oil and gas condensate activities is done in the Urals District, with 210,000 thousand tons, followed by Bashkortostan in the Volga District (specialized also in mining activities and chemical products) and Tatarstan with 75,000 thousand tons while the North-western District is active in mining activities, in particular coal and iron.

In 2008, the share of GRP deriving from industry was still around 35 percent at the national level with a 13 percent share deriving from mining and quarrying and still concentrated in the Volga, Urals and North-Western Districts. Tyumen remained the first oil-producer with 324,000 thousand tons, followed by the Volga District. In the Central District aside Moscow City which derives 50 percent of its GRP from light industry, wholesale retail trade and real-estate activities, manufacturing produces almost 20 percent of GRP in heavy industries like manufacture of coal, chemical and plastic industries and machinery whereas mining activities are limited. In the Far Eastern District, positive results are driven by the performance of Chukotka and Sakhalin Island; even though the oil extraction in Sakhalin decreased owing to a lack of investments in new technologies during the Eighties and early Nineties, in the second phase of transition this area attracted both national and foreign investors in the oil industry, the oil extraction went from 1,700 thousand tons in 1995 to 3,300 in 2000 and 15,000 thousand tons in 2007.

In 1998 the share of GRP from construction was on average 7 percent at the national level and in all Districts with the exception of the Siberian one, which indeed suffered

by a consistent de-population in the north during the first phase of transition. In 2008 the share decreased by a percentage point, mainly because of the fall in residential construction and the recent financial crisis.

The average share of GRP deriving from agriculture at national level was about 6 percent in 1998 and it was mainly concentrated in the Southern and Volga Districts and the regions of central and south Siberia like Kemerovo and Tomsk which benefit from continental weather and fertile soil. The share deriving from agriculture was stable through time and it was still around 6 percent in 2008. With respect to 1998, agricultural production increased in both quantity and technological efficiency in those regions with availability of natural resources and a differentiated economy (Volga District) while it remained stable in those almost totally specialized in oil production like Tyumen. In the Volga District, the share of GRP deriving from agriculture increased by a percentage point between 1998 and 2008 (from 6.2 to 7.2 percent) while in the Urals District it remained stable at 2.5 percent despite the increase in region of Kurgan. The same dynamic is found for other industrial sectors as manufacturing and wholesale retail trade which are below the national average in the areas specialized in oil-extraction.

- **Services**

In 1998 intangible services were disaggregated in transport, communications, trade and catering while in 2008 are disaggregated in transport and communications, financial activities, real estate and business activities, which account all together for 1/3 of the total share of services on GRP. Data are published also for public administration and defense, education, health and social services.

On average, services contribute to more than half of Russian GDP and the share is increasing through time. Transport and communications account for 11 percent of GRP while trade and catering and real estate contribute for more than 10 percent of the total share. In Moscow City and in Saint Petersburg they account for almost 20 percent and 16 percent of GRP respectively. The share of financial services is limited and concentrated only in the Central District and in particular in Moscow City.

In 2008 the shares of social services for public administration, compulsory social security and defense, education, health and related social services and other social services are reported. Each of these sectors accounts for 3 percent of GRP at the national level and they were rather homogeneous across the Districts with the exception of public administration, defense and compulsory social security which contributed to 7

percent and more of GRP in the Southern, Siberian and Far Eastern Districts, which are also the ones with the highest shares of people employed in public administration.

5. Concluding remarks

After a long and difficult process of transition, Russia is today the 6th world economy and the first oil producer, with 12 percent of world oil. Living standards of the Russian population had a noticeable increment after the dissolution of the Soviet Union and the critical first phase of transition, however social differences remain and even rose in the last decade. Differentiated business activities, light industry and services now play a key role in the Russian economy and are influenced by the geography of the territories. For instance, most of the Gross Regional Product from the service sector is produced in European Russia, while agriculture remains the main activity in the southern areas and most of the Asian Russia.

Income differentials at the regional level are increasing through time and a process of convergence has still not taken place despite the recent effort of federal policies to reduce the gap between richer and poorer regions. As it will be empirically analyzed in the next chapter, the leading role of oil in economic growth and the industrial specialization created a pattern of regional clusters where most of the investments are concentrated in few areas.

References

Aghion P. and Blanchard O. (1994) On the Speed of Transition in Central Europe. *NBER Macroeconomic Annual*, 283-319

Ahrend R. (2008) Understanding Russian Regions Economic Performance During Periods of Decline and Growth – An Extreme-Bound Analysis Approach. *OECD Economics Department Working Papers*, No. 644

Ahrend R. and Thompson W. (2005) Fifteen Years of Economic Reform in Russia: What has been Achieved? What remains to be Done? *OECD Economics Department Working Papers*, No.430, *OECD Publishing*

Allen R.C. (2001) The Rise and Decline of the Soviet Economy. *The Canadian Journal of Economics*, Vol.34, No.4 (Nov. 2001), pp. 859-881

Baykov A. (1954) The Economic Development of Russia. *The Economic History Review*, New Series, Vol.7, No. 2 (1954), pp. 137-149

Berkowitz D. and DeJong D. (2003) Policy reform and growth in post-Soviet Russia. *European Economic Review* 47 (2003) pp. 337-352

Berkowitz D. and DeJong D. (2005) Entrepreneurship and Post-socialist Growth. *Oxford Bulletin of Economic and Statistics*, 67, 1 (2005) 0305-9049

Dabrowski M., Gomulka S. and Rostowski J. (2000) Whence Reform? A Critique of the Stiglitz Perspective. *Centre for Economic Performance, London School of Economics, Discussion Paper dp 0471, 2000*

Davies R.W. (1997) Soviet History in the Yeltsin Era. *St. Martin's Press, in association with Centre for Russian and East European Studies, University of Birmingham, 1997*

Desai R.M., Freinkman L.M. and Goldberg I. (2003) Fiscal Federalism and Regional Growth. Evidence from the Russian Federation in the 1990s. *World Bank Policy Research Working Paper 3138, September 2003*

Fedorov L. (2002) Regional Inequality and Regional Polarization in Russia, 1990-99. *World Development Vol. 30, No. 3, pp. 443-456*

Fischer S. (1992) Russia and the Soviet Union Then and Now. *NBER Working Paper No. 4077*

Freinkman L. and Plekhanov A. (2009) Fiscal Decentralization in Rentier Regions: Evidence from Russia. *World Development Vol.37, No. 2, pp. 503-512*

- Graziosi A. (2008) L'Urss dal trionfo al degrado. Storia dell'Unione Sovietica 1945-1991. *Società editrice il Mulino*
- Hanson P. (1994) Regions, Local Power and Economic Change in Russia. *Russia and CIS Program, The Royal Institute of International Affairs, 1994*
- Harrison M. (1998) Trends in Soviet Labour Productivity, 1928-1985: War, Postwar Recovery, and Slowdown. *European Review of Economic History, 1998, 2(2), pp. 171-200*
- Harrison M. (2001) Are command economies unstable? Why did the Soviet economy collapse? *Warwick Economic Research Papers No. 604*
- Kim B. (2002) Causes of Repressed Inflation in the Soviet Consumer Market 1965-1989: Retail Price Subsidies, the Siphoning Effect, and the Budget Deficit. *The Economic History Review, New Series, Vol.55, No. 1 (Feb. 2002), pp. 105-127*
- Kornai J. (1986) The Soft Budget Constraint, *Kyklos (Vol.39, No. 1, 1986)*
- Lipton D., Sachs J., Fischer S. and Kornai J. (1990) Creating a Market Economy in Eastern Europe: The Case of Poland. *Brookings Papers on Economic Activity, Volume 1990, Issue 1 (1990), 75-147*
- McMillan J. and Naughton B. (1992) How to Reform a Planned Economy: lessons from China. *Oxford Review of Economic Policy, 8(1): 130-43*
- Ofer G. (1987) Soviet Economic Growth: 1928-1985. *Journal of Economic Literature, Vol.25, No.4 (Dec. 1987), pp. 1767-1833*
- Oi J.C. (1995) The Role of the Local State in China's Transitional Economy. *The China Quarterly, No. 144, Special Issue: China's Transitional Economy (Dec. 1995), pp. 1132-1149*
- Popov V. (2001) Reform Strategies and Economic Performance of Russia's Regions. *World Development Vol. 29, No. 5, pp. 865-886, 2001*
- Popov V. (2007) China's Rise, Russia's Fall: Medium Term Perspective. *TIGER Working Paper No. 99*
- Riasanovsky N.V. (2010) A History of Russia. *Eighth Edition, Oxford University Press, USA*
- Roland G. (2002) The Political Economy of Transition. *The Journal of Economic Perspectives, Vol. 16, No. 1 (Winter, 2002), 29-50*
- Rovelli R. and Zaiceva A. (2009) Transition Fatigue? Evidence from Micro Data. *IZA Discussion Paper No. 4224*

Sachs J.D. (1996) The Transition at Mid Decade. *The American Economic Review*, Vol.86, No.2, *Papers and Proceedings of the Hundredth and Eighth Annual Meeting of the American Economic Association San Francisco, CA, January 5-7, 1996 (May, 1996)*, pp.128-133

Shleifer A. (1997) Government in Transition. *European Economic Review*, 41 (1997) 385-410

Shleifer A. and Vishny R.W. (2002) *The Grabbing Hand: Government Pathologies and Their Cures*. Harvard University Press 2002

Stiglitz J.E. (1999) Whither Reform? Ten Years of Transition. *Paper prepared for the Annual Bank Conference on Development Economics, Washington D.C., April 28-30, 1999*

Stuart R. and Gregory P. (1995) *The Russian Economy*. New York: Harper Collins, 1995

Appendix

List of Russian regions and Federal Districts

Central Federal District

Belgorod Oblast, Bryansk Oblast, Vladimir Oblast, Voronezh Oblast, Ivanovo Oblast, Kaluga Oblast, Kostroma Oblast, Kursk Oblast, Lipetsk Oblast, Moscow Federal City, Moscow Oblast, Orel Oblast, Ryazan Oblast, Smolensk Oblast, Tambov Oblast, Tver Oblast, Tula Oblast, Yaroslav Oblast

North-Western Federal District

Arkhangelsk Oblast, Vologda Oblast, Kaliningrad Oblast, Republic of Karelia, Komi Republic, Leningrad Oblast, Murmansk Oblast, Novgorod Oblast, Pskov Oblast, Saint Petersburg Federal City

Southern Federal District

Republic of Adygea, Republic of Dagestan, Republic of Ingushetia, Kabardino-Balkaria Republic, Karachay-Cherkessia Republic, Republic of North Ossetia-Alania, Republic of Chechnya, Stavropol Krai, Astrakhan Oblast, Volgograd Oblast, Republic of Kalmykia, Krasnodar Krai, Rostov Oblast

In 2010 the Southern Federal District was divided in two Districts. The regions of Dagestan, Ingushetia, Kabardino-Balkaria, Karachay-Cherkessia, North Ossetia-Alania, Chechnya and Stavropol now form the North Caucasian Federal District

Volga Federal District

Republic of Bashkortostan, Republic of Tatarstan, Republic of Udmurtia, Chuvash Republic, Mari El Republic, Kirov Oblast, Republic of Mordovia, Nizhny Novgorod Oblast, Orenburg Oblast, Penza Oblast, Perm Krai, Samara Oblast, Saratov Oblast, Ulyanovsk Oblast

Urals Federal District

Kurgan Oblast, Sverdlovsk Oblast, Tyumen Oblast, Chelyabinsk Oblast

Siberian Federal District

Republic of Altai, Altai Krai, Republic of Buryatia, Irkutsk Oblast, Kemerovo Oblast, Tuva Republic, Republic of Khakassia, Krasnoyarsk Krai, Novosibirsk Oblast, Omsk Oblast, Tomsk Oblast, Zabaykalsky Krai

Far Eastern Federal District

Sakha-Yakutia Republic, Primorsky Krai, Khabarovsk Krai, Kamchatka Krai, Magadan Oblast, Amur Oblast, Jewish Autonomous Okrug, Sakhalin Oblast, Chukotka Autonomous Okrug

Table 2 - Structure of Gross Regional Product by industry in current prices

Table 2A year 1998

Federal Districts	GRP per capita PPP US dollars	Total GRP	Physical goods, of which	1/Industry	2/Agriculture	3/Construction	Intangible services, of which	1/Transport	2/Communication	3/Trade and catering
<i>National</i>	5,400	100	44	30.3	5.7	7.3	48.9	9.3	2	14
Central	5,800	100	33.1	20.3	4.5	7.2	56	6.7	3	21.4
Moscow	12,000	100	22.1	13	0	7.7	66.5	5.7	4.2	30.4
NorthW	5,800	100	44.2	33.6	3.5	6.3	52	11.5	2.3	13.4
Southern	3,000	100	44.3	22.2	13.4	8.1	50.3	10.3	1.8	13.2
Volga	4,700	100	49.5	35.7	6.2	7	42.7	8.5	1.4	10.8
Urals	8,800	100	52.6	40.1	2.5	9.4	40.6	11.9	1.1	7.5
Kurgan	3,000	100	44.1	31.7	6	5.5	51.8	9.3	1.9	12.8
Tyumen	20,600	100	53.1	40.2	1.2	11.4	39.4	13.7	0.9	5.2
Siberian	5,100	100	49.7	35.2	8.1	5.8	45.7	10.1	1.5	11.6
Far East	7,000	100	46.4	33.7	5	7.1	53.1	12.3	2.2	9.7

Notes: values are percentage of total GRP of each sector in current prices. In cases where subsidies exceed taxes, the sum could be higher than 100

Source: Rosstat data, volume "Russian Regions" 2001

Table 2B - year 2008**Physical goods**

Federal Districts	GRP per capita PPP US dollars	Total GRP	Agriculture	Mining, quarrying	Manufacturing	Electricity, gas, water	Construction	Wholesale retail trade, repair of motorvehicles and personal goods
<i>National</i>	13,200	100	5.2	12.8	18.5	3.8	5.7	21.8
Central	19,000	100	2.3	0.8	18.7	3.3	4.8	32.9
Moscow	43,000	100	0	0	15.3	2.6	3.5	39.5
NorthW	14,000	100	2.4	6.9	22.1	3.9	8.2	16.8
Southern	5,400	100	13.6	1.8	16.9	3.3	10.4	17.7
Volga	9,700	100	7.2	12.5	24.7	3.7	7.8	14
Urals	21,700	100	2.5	35.1	13.6	2.4	7.1	14.8
Kurgan	6,100	100	14.1	0.6	18.1	2.9	8.5	13.6
Tyumen	51,000	100	1.1	52.9	2.4	2.1	7.5	13
Siberian	9,700	100	6.8	9.2	22.5	4	6.2	14.1
Far East	13,000	100	3.7	20.6	6.1	4.2	10.7	12.7

Services

Federal Districts	Transport and communication	Financial activities	Real estate	P.a. and defense, compulsory social security	Education	Health	Other social and personal services
<i>National</i>	10.6	1.1	9	2.9	2.8	3.1	1.5
Central	8.6	1.5	14.9	3.7	2.3	2.8	2.4
Moscow	8.2	2	18.6	2.6	1.7	2.2	2.9
NorthW	12	0.3	10.5	5.3	3.3	4.5	2
Southern	11.2	0.2	6.9	6.7	3.7	4.5	1.2
Volga	9.9	0.2	7.3	4.3	3.1	3.3	1
Urals	7.9	0.3	7.2	3	1.9	2.7	0.7
Kurgan	16.2	0	5.6	8.4	4.7	5.2	0.9
Tyumen	7.1	0.4	7.1	2.1	1.3	1.8	0.5
Siberian	12.5	0.2	7.7	6.2	3.9	4.5	1.2
Far East	12.9	0.2	6.6	8.4	4	4.9	1.2

Notes: values are percentage of total GRP of each sector in current prices. In cases where subsidies exceed taxes, the sum could be higher than 100

Source: Rosstat data, volume "Russian Regions" 2010

Chapter 2

Spatial Aspects of Convergence

Evidence from Russian Regions

1995 – 2008

1. Introduction

Soon after the Soviet Union was formally dissolved in December 1991, the Russian economy had to deal with a period of hyperinflation and severe crisis, with a consistent decline of income and worsening life conditions to such an extent that unemployment rate rose from 4 percent of total labor force in 1992 to 10 percent in 1997¹⁰ so that by 1994 a share of 35 percent of the Russian population was living in poverty, according to World Bank and IMF studies. Thereby, State-owned enterprises were privatized and trade together with prices liberalized with the exception of primary food, energy and transportations. The phase of recovery¹¹ ended in 1999 and since then, up to the recent international crisis of 2008, the Russian Federation had a 5-6 percent positive trend within the annual gross domestic product (GDP) growth rate, mainly obtained by exporting oil, natural gas and other natural resources.

Thank to the export market strategy based on natural resources, for the first time after years of severe decline the Russian Federation achieved positive growth rates, but on the other hand the risks connected to oil prices fluctuations and weak diversification are high and weaker sectors of the economy have not received the resources they need to improve.

Natural resources represent a fundamental growth factor for Russia and oil-productive regions are concentrated in few areas, in fact in the year 2000, almost 60 percent of the total oil and gas production of the Russian Federation was concentrated in Tyumen, in the Urals, however the regions in the North West can rely on industrial activity linked to oil production and other businesses. Moreover, they have stronger relationships with European countries and a milder climate. As a matter of fact, in the Far East District and in Siberia, population density and business activities are limited

¹⁰ International Monetary Fund IMF – 2011 World Economic Outlook

¹¹ I thank the researchers at the Centre for Labour Market Studies HSE (Moscow) for the suggestion to consider *recovery* the time span 1992-1998, when the country was indeed recovering from the crisis, and *economic growth* the years after.

because of mountainous regions, permafrost and difficult transports. Currently a limited 8 percent of the Russian population lives in the Urals, whereas more than 10 percent lives in Moscow City and surrounding areas.

Only recently, policies have recognized disparities being arisen by export-driven growth between western regions and eastern regions due to oil business. The system of budget transfer, for example, has been modified to give more resources to the poorest areas. Other solutions work in the direction of new activities so that areas in the Far East or near Mongolia like Vladivostok are creating networks with Chinese enterprises and attracting tourism.

The factors which could explain regional differences are to be searched with initial conditions, the exploitation of natural resources and the effectiveness of institutions. Berkowitz and DeJong (2003) stress the importance of reform policies and find price liberalization to be beneficial on growth and large-scale privatization to have a positive effect on the formation of new enterprises on a subset of 40 regions. Equally they point out (2005) how entrepreneurial activity can improve the growth of the Russian economy depending on initial conditions and policy reforms. Ledyeva and Linden (2008) using data for the period 1996-2004 suggest that initial conditions, domestic investments and exports are the main determinants of economic growth. They do not find evidence of absolute convergence, but conditional converge can be found by splitting the sample in high-income and low-income regions. Another recent study conducted by Ahrend (2008) analyzes the determinants of economic growth before and after the financial crisis of 1998. Before this threshold, initial conditions, exports and natural resources played a major role in recovery; after 1998, natural resources remain significant and also political reforms have an impact on economic activity. Two recent papers focus on the geography of the country: on the one hand Buccellato (2007) studies the issue of convergence at a regional level after the recovery phase, on the other hand Kholodilin et al (2009) test different cross-section specifications.

This paper contributes to the literature on spatial analysis with an empirical analysis of growth factors across Russian regions. Using regional based data in the period between 1995 and 2008, the aim is to assess which factors have contributed to the economic growth after the Soviet collapse. The contributions to the literature are twofold, providing a detailed explanatory spatial data analysis (ESDA) of per capita gross regional product (GRP) at a global and local level and employing fixed-effect

spatial panel techniques applied to the neoclassical Solow model of economic growth, compared with the traditional benchmark fixed-effect panel model.

Results from the ESDA show that the regions are characterized by positive spatial autocorrelation, forming homogeneous clusters which preclude convergence. Panel data models confirm the absence of convergence using both the benchmark specification and the spatial fixed-effects models, but the diverging path is weakening over the period.

The structure of the paper is as follows. In section 2, I will describe methods and data. As for the methods, I will analyze ESDA techniques at the global and local level, the theoretical framework of the neoclassical Solow model and the empirical models proposed by the literature for empirical convergence studies, whereas spatial autoregressive model (SAR) and spatial error model (SEM) are tested. With regard to the sample, it is composed of 77 Russian regions and employs data from Rosstat for the period 1995-2008. In section 3, I will focus on the spatial analysis and the panel data models. Besides confirming the pattern of positive spatial autocorrelation and divergence from the ESDA, as a robustness check I chose to follow the suggestion offered by Solanko (2003) and will analyze separately the two sub-periods at the threshold of 1999. Section 4 provides concluding remarks and policy advices.

2. Methods

2.1 Exploratory Spatial Data Analysis (ESDA)

Exploratory Spatial Data Analysis (ESDA) is a set of techniques, graphs and statistics used in the analysis of spatial patterns of data (Anselin 1998a, b; Le Gallo, Ertur 2003). GeoDa, Quantum GIS and Stata¹² are the softwares used to conduct this study. Several statistics and graphs have been designed to analyze spatial autocorrelation at all levels. Finally the R splm package has been used for the estimation of spatial panel models.

Spatial autocorrelation is defined by Cliff and Ord (1981) as the phenomenon that occurs when the spatial distribution of the variable of interest shows a systemic pattern.

¹² “Tools for spatial data analysis” by Maurizio Pisati

The statistic employed to measure global spatial autocorrelation is Moran's I, developed by Patrick Moran (1950), which takes, for each year t , the form

$$I_t = \frac{\sum_{i=1}^N \sum_{j=1}^N w_{ij} Z_i Z_j}{S_0 m_2}$$

where w_{ij} are the elements of the $N \times N$ spatial weight matrix corresponding to the observations (i, j) . The elements of the diagonal w_{ii} are set equal to zero, that is to say that each region is not considered as sharing a border with itself, instead the elements w_{ij} identify the contiguity or distance between each pair of regions according to the established criterion.

$Z_i = (X_i - \bar{X})/N$ is the vector of the $n=77$ observations in year t in deviation from the mean. X identifies the variable of interest, which in this study is per capita gross regional product (GRP) in the first and in the last year of analysis.

$S_0 = \sum_i \sum_j w_{ij}$ is a scaling factor equal to the sum of the elements of the weight matrix and $m_2 = \sum_i (Z_i^2 / N)$.

Various types of weight matrices can be constructed, based on contiguity or distance. I use a queen-criterion binary contiguity weight matrix which assigns value one to the element w_{ij} if region i and region j share a point or border, zero if they do not.

Under the null hypothesis of absence of global spatial autocorrelation, the expected value of Moran's I is

$$E(I) = \frac{-1}{N-1}$$

If Moran's I in each year is higher than the expected value, one can consider the distribution of X as being characterized by positive spatial autocorrelation: the value of X in each region i tends to be similar to the values taken by X in spatially contiguous locations. The opposite is true for $I < E(I)$.

Inference is based on z values

$$z = \frac{I - E(I)}{sd(I)}$$

Moran's I statistic is global in the sense that it indicates if, in each year t and through time, there is a positive or negative spatial relationship in the whole sample, but it does not identify the presence of clusters, outliers, nor it identifies which regions are significant for spatial autocorrelation.

To analyze local spatial autocorrelation, four techniques usually are combined: Moran scatterplot, the statistic Getis and Ord's G (Getis and Ord 1992, Ord and Getis 1995), Local Indicators of Spatial Association (LISA) (Le Gallo, Ertur 2003) and Geary's C (Roy Geary 1954).

Getis and Ord's G measures spatial clustering. If $G_{i,t} > E(G)$, the distribution of X shows positive spatial autocorrelation with a prevalence of high-valued clusters around region i . If the value of the G 's is negative, then around region i there is a clustering of low-valued regions. Geary's C represents local spatial autocorrelation and its values lie between 0 and 2. If $C=1$ there is no local spatial autocorrelation, but if $C < 1$ there is evidence of positive spatial autocorrelation.

The Moran scatterplot shows the distribution of the regions in the four quadrant space according to the values taken by variable X . The x -axis reports the original values z of the variable of interest, while the y -axis reports the spatial lag Wz . Quadrants are named clockwise, from top left: low-high (LH), high-high (HH), high-low (HL), low-low (LL). Regions in the top right and bottom left quadrants are characterized by positive spatial autocorrelation: high value regions nearby high value regions (HH) and low value regions nearby low value regions (LL) respectively. Regions located in the other two quadrants, top left and bottom right, are characterized by negative spatial autocorrelation: low value regions nearby high regions (LH) and high value regions nearby low value regions (HL) respectively.

The Moran scatterplot highlights how the data are distributed, but not which ones significantly contribute to the identified patterns, therefore LISA techniques are employed to provide a clear visualization of patterns. A LISA is any statistics, proportional to a global one (Anselin 1995; Le Gallo, Ertur 2003), showing which observations are significant and takes generally the form of a local Moran's I. As a consequence, the combination of Moran's I, Moran scatterplot and LISA maps provides complete visual evidence about spatial patterns, clusters and significant regions.

2.2 Theoretical framework – the Solow Growth Model

The benchmark theoretical framework for convergence and growth is the neoclassical Solow-Swan exogenous growth model (Solow 1956; Swan, 1956). In this paragraph I will briefly summarize the results of the Solow model and then discuss the issue of non-independent observations to introduce the spatial econometrics models. This brief explanation is based on Anderson and Thiesse (2004, Part III) and Romer (2006).

Consider an economy where aggregate physical capital K_t and labor L_t are used to produce an homogenous good.

A_t denotes labor-augmenting technical change or the effectiveness of labor which grows at an exogenous rate g . Capital depreciates at an exogenous rate δ . The saving rate s is exogenously defined as the fraction of output to be used as an input in $t+1$ and the rest is used for consumption c . The production function takes the form

$$Y_t = F(K_t, L_t A_t) \quad (1)$$

with constant returns to scale and diminishing marginal products for K and L, which depends only on the K/L ratio.

Defining quantities per unit of effective labor, with $y^* = Y/(L_t A_t)$ and $k^* = K/(L_t A_t)$, the production function simplifies to

$$y^* = f(k^*) \quad (2)$$

The fundamental difference equation of the Solow model is given by

$$k_{t+1}^* - k_t^* \leq sf(k_t^*) - (\delta + n + g)k_t^* \quad (3)$$

where n is the growth rate of population and $c_t^* = (1-s)f(k_t^*)$.

From (3) we can see that the rate of change of the capital stock per unit of effective labor is the difference between two terms: $sf(k_t^*)$, which is the actual investment per unit of effective labor, and $(\delta + n + g)k_t^*$, which is the breakeven investment, i.e. the amount of investment necessary to keep k at its existing level.

The steady-state is the point where physical capital per effective unit of labour k^* is constant.

It corresponds to a stationary point of equation (3) so that the equation becomes

$$0 = sf(k_t^*) - (\delta + n + g)k_t^* \quad (4)$$

The amount of investment, $sf(k)$, is employed to replenish the K/L ratio given depreciation δ population growth rate n and technological progress g .

At k^* , investments $sf(k_t^*)$ equal effective depreciation $(\delta + n + g)k_t^*$ and k remains constant over time.

The behavior of aggregate variables in steady-state can be summed up as follows:

- effective labor AL grows at rate $g+n$
- capital grows at $g+n$ because when k is constant, $K=ALk^*=AL$
- the assumption of constant returns to scale implies that the aggregate output grows at rate $g+n$.

In steady-state, all variables grow at constant rates and the rate of growth of output per capita is determined only by the rate of growth of technological progress g .

The Solow model proves that given any initial level k_0 , the economy will converge to the steady-state with a monotonic transition:

- if $k_0 < k^*$, the growth rate of capital per unit of effective labor is positive and decreases gradually
- if $k_0 > k^*$, the growth rate is negative and increases gradually.

The model implies conditional convergence: countries which are far from the steady-state will grow faster than those which are close to the steady-state.

Steady-state capital, productivity and income are determined by A , δ , g , s and n . Assuming that countries have the same technology, differences in income and productivity should be explained by cross-country differences in s and n .

The first study to provide an empirical specification for the Solow model was Baumol (1986) with the cross-section regression

$$\log(y_t) - \log(y_0) = a + b^* \log(y_0) \quad (5)$$

If the coefficient b is negative, there is proof of convergence. Barro (1991) and Barro and Sala-i-Martin (1992) define the concepts of absolute β convergence and conditional β convergence founded on the results of the Solow model. Poor countries

could grow faster than rich countries only if they shared the same steady-states, that is a situation of absolute convergence. If countries instead are characterized by different steady-states, then the concept of conditional convergence applies as it is necessary to condition the different steady-states themselves.

The empirical approach received two main critics through the years: first, the problem of omitted variables which is typical of cross-sectional studies; second, a critics specific to application in regional studies, where observations may not be considered as independent from each other. The use of panel data methods helps to solve, at least partially, these issues (Islam 1995; Arbia, Basile, Piras 2005) as, with regards to differences across regions, they allow to control for unobserved heterogeneity through regional fixed effects α_i , constant over time, and time effects c_t

$$\ln[y_{t+k,i}/y_{t,i}] = \alpha_i + \beta \ln y_{t,i} + c_t + \varepsilon_{t,i} \quad (6)$$

where i ($i=1 \dots N$) denotes the observations, and t ($t=1 \dots T$) denotes time periods.

The dependent variable is the log of the annual growth rate of per-capita GRP and α_i are the time-invariant regional fixed effects.

The literature on spatial econometrics explicitly relaxes the assumption of independent observations i , ($i=1 \dots N$), which is a strong one when dealing with regions of the same country, and controls for spatial dependence (spatial autocorrelation) and/or spatial heterogeneity in the same panel-data environment. Applications are numerous, both with cross-sectional and panel data. See for example Elhorst (2001, 2003), Ertur, Le Gallo, Baumont (2006), Buccellato (2007), Ledyeva (2009) and Kholodilin, Oshepkov, Siliverstov (2009) for applications to the Russian Federation.

The model for spatial dependence with panel data dates back to Anselin (1988) and Arbia (1989). Spatial dependence can be incorporated in the panel regression model seen above in two ways, either creating a spatial autoregressive model SAR or a spatial error model SEM.

In the SAR model, spatial dependence enters the model as an additional regressor in the form of a spatially lagged dependent variable Wy where W is the weight matrix as defined in section 2.1. This specification is used to verify the presence of spatial interactions between the regions when it is likely that y_i is influenced by y from the

neighbouring regions. The panel regression model (6) becomes a fixed-effect spatial lag model with the form

$$\ln[y_{t+k,i}/y_{t,i}] = \alpha_i + \rho \sum_{j=1}^N w_{ij} \ln[y_{t+k,i}/y_{t,i}] + \beta^* \ln y_{t,i} + c_t + \varepsilon_{t,i} \quad (7)$$

where ρ is the spatial autocorrelation coefficient which provides evidence of positive spatial autocorrelation if positive and significant.

In the SEM model, spatial dependence enters the model in the error term $\varepsilon_{t,i}$. This specification is used to correct the influence of spatial dependence which takes the form of a nuisance. It simply assumes that the errors are spatially correlated and controls for it.

Therefore the model (6) takes the following form

$$\ln[y_{t+k,i}/y_{t,i}] = \alpha_i + \beta^* \ln y_{t,i} + c_t + \varepsilon_{t,i} \quad (8)$$

$$\text{with } \varepsilon_{t,i} = \lambda \sum_{j=1}^N w_{ij} \varepsilon_{t,i} + \eta_t$$

where λ is the spatial correlation coefficient and η_t are assumed to be normally distributed with zero mean and known variance.

Both models are estimated by using maximum likelihood with the R package splm.

3. Empirical analysis

3.1 Data

The dataset used in the empirical analysis is composed of 77 Russian regions. It covers the period 1995-2008 and employs data from the yearly collections Regions of Russia published by Rosstat (Goskomstat). The Russian Constitution recognizes the regions as constituent units, called Subjects of the Federation which are defined as Republic, Kray (territory), Oblast (region) or Autonomous Okrug. Constituent units were 89 when the Constitution was approved and became 83 by 2008 because of some mergers which so far have occurred especially between the main region and the smaller areas in the surroundings, so that the structure of 1993 has not dramatically changed. By now, there are 21 Republics, 9 Krai, 46 Oblasts, 2 Federal Cities (Moscow and Saint Petersburg), 1 Autonomous Oblast and 4 Autonomous Okrugs. The republics of Chechnya and

Ingushetia are excluded from the sample because data are incomplete. The oblast of Kaliningrad is also excluded as it is under the jurisdiction of Russia but located between Poland and Lithuania. Data for the autonomous districts¹³ are not explicitly shown for each one of these areas is under the jurisdiction of its main oblast so they are already counted in the main reference region.

The spatial weight matrix is a queen-criterion binary contiguity matrix which assigns value 1 to the w_{ij} cell if region i and region j share a point/border, 0 if they do not. Three modifications were applied to the matrix with respect to the administrative regional division: one for Moscow City, one for Saint Petersburg and the last one for Sakhalin Island.

According to the Constitution and from an administrative point of view Moscow City is a region *per se* and being completely located inside Moscow Oblast, within a binary contiguity matrix would seem as having no other neighbours but Moscow Oblast, a figure that does not correspond to reality. For this reason, I modified the matrix so that Moscow City has the same borders as Moscow Oblast besides Moscow Oblast itself. The same has been done for Saint Petersburg, in Leningrad Oblast. Sakhalin Island instead is located in the Far East of Russia in the North Pacific Ocean and because of its position would be automatically excluded from the matrix, but given that it is still an oil and coal productive region and recipients of foreign investments (though not the main one as in the past decades), I chose to set Sakhalin Island as boarding with its nearby region.

3.2 Spatial patterns of Gross Regional Product (GRP)

Table 1 shows annual values of Moran's I and Geary's C for real per-capita gross regional product (GRP) over the period 1995-2008. Per-capita gross regional product is defined by Rosstat as the gross value added of goods and services created by the residents of the region, i.e. the difference between output and intermediate consumption net of the value added by non-market collective services provided by public institutions. Values for the Moran's I are positive and significant at one percent level for each year, providing evidence of positive global spatial autocorrelation: regions with per-capita GRP higher (lower) than the mean tend to be located nearby regions of the same type.

¹³ Nenets, Khanty-Mansi, Yamalia, Ust-Ordynsky and Aginsky

Year	Moran's I	Geary's C
1995	0.33	0.60 ***
1996	0.34	0.60 ***
1997	0.14	0.88
1998	0.30	0.66 ***
1999	0.30	0.67 ***
2000	0.28	0.73 ***
2001	0.27	0.74 ***
2002	0.26	0.75 **
2003	0.24	0.76 **
2004	0.24	0.77 **
2005	0.23	0.81 *
2006	0.22	0.83 *
2007	0.21	0.82 *
2008	0.20	0.83 *

Table 1 - Global Moran's I and Geary's C on per capita GRP – Author's calculation

Notes: The expected value of the Moran's I is constant in each year and equal to $E(I) = -0.013$.

All Moran's I are significant at 1 percent level

*** 1% significance, ** 5% significance, * 10% significance

Though significance level remains at one percent with positive values, the value of the statistic itself is decreasing through time in particular after the year 2000, showing that the high-high and low-low clusters have not been stable between 1995 and 2008 but they are indeed reducing both in the number of regions and in the absolute value. The statistics Geary's C assumes values lower than one if the sample is characterized by positive spatial autocorrelation. As for the Moran's I, Geary's C provides evidence of positive spatial correlation which is decreasing through time, in fact the statistic increases from the lowest value 0.60 in 1995 to 0.83 in 2003.

To detect how regions are distributed across clusters and which ones contribute significantly, figures 1 and 2 show the Moran scatterplot for per-capita GRP in the first and in the last year of analysis. For this analysis I use the software Geoda.

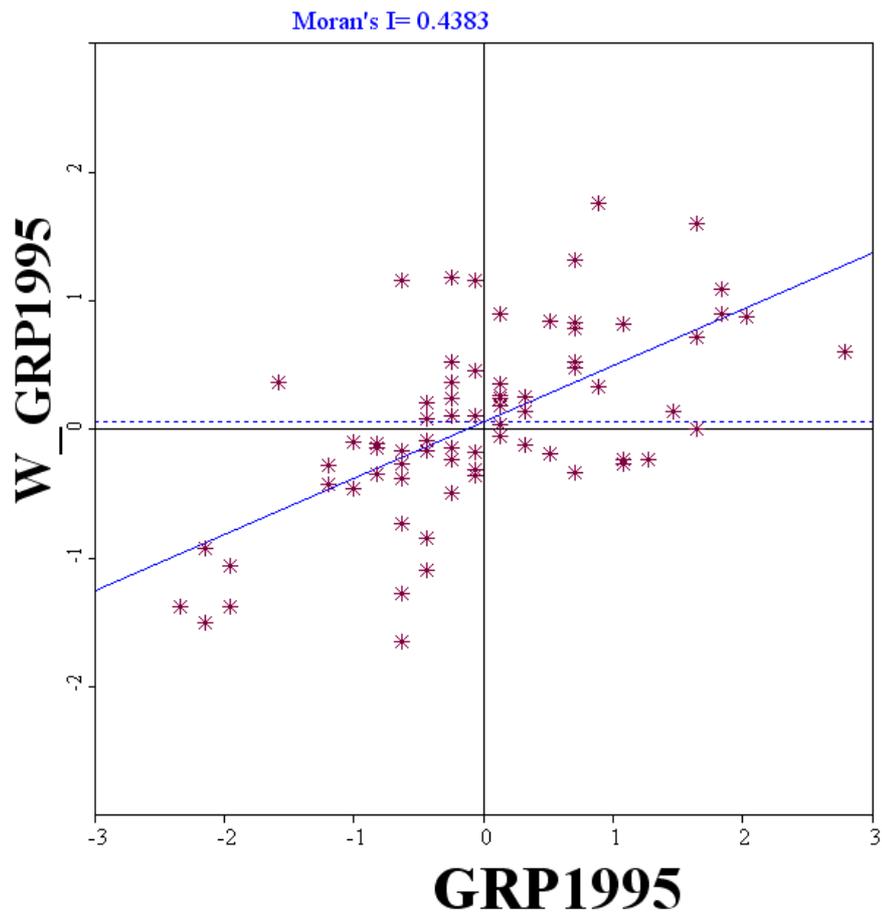


Figure 1 Moran scatterplot - per capita GRP 1995

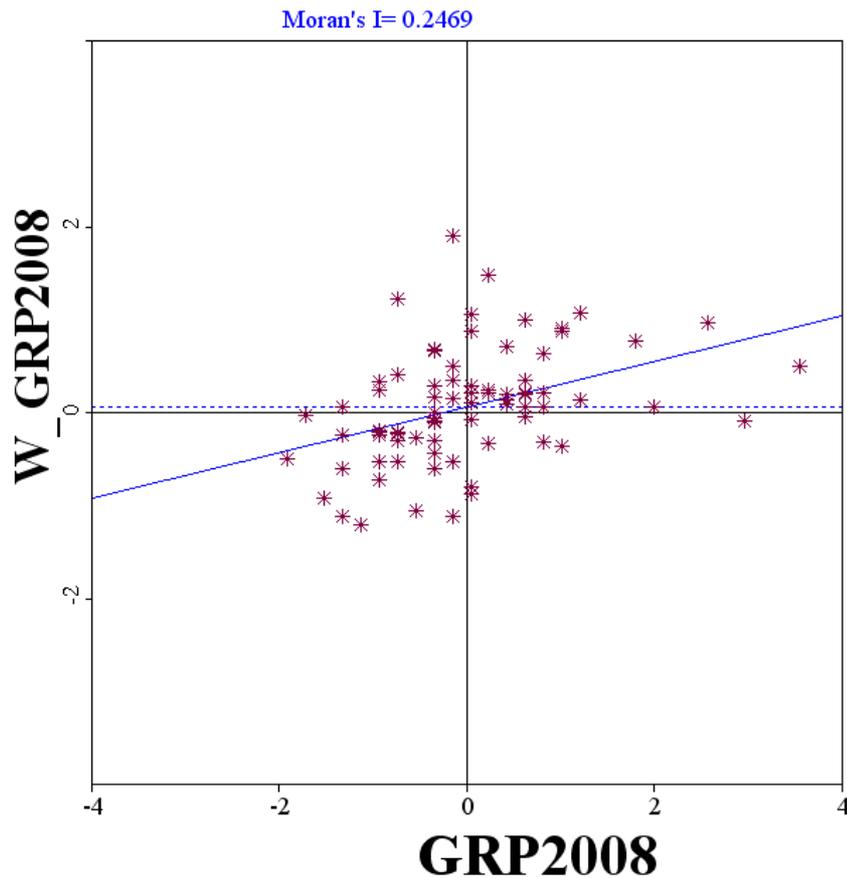


Figure 2 Moran scatterplot - per capita GRP 2008

Table 2 reports the distribution of significant regions in the four quadrants in 1995 and in 2008 according to the LISA maps in figures 3 and 4.

	LH (purple)	HH (red)	HL (pink)	LL (blue)
1995	Kurgan, Kirov, Omsk, Khabarovsk	Arkhangelsk, Chukotka, Magadan, Komi, Kamchatka Krasnoyarsk, Sakha-Yakutia, Sverdlovsk, Tomsk, Tyumen, Buryatia, Karelia	-	Dagestan, Rostov, Volgograd, Kalmykia, Krasnodar, Stavropol, Astrakhan
2008	Kurgan, Kamchatka	Arkhangelsk, Chukotka, Magadan, Komi, Sakha- Yakutia, Sverdlovsk, Tomsk, Karelia, Omsk, Khabarovsk	Nizhny- Novgorod, Krasnodar	Dagestan, Stavropol, Astrakhan, Altai Republic

Table 2 Distribution of Russian regions in the four quadrants

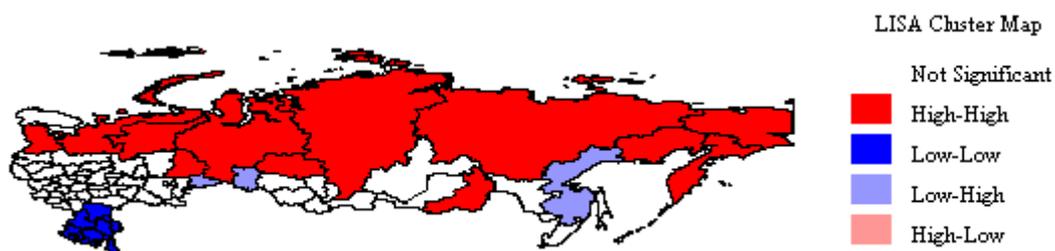


Figure 3 LISA Cluster Map - per capita GRP 1995

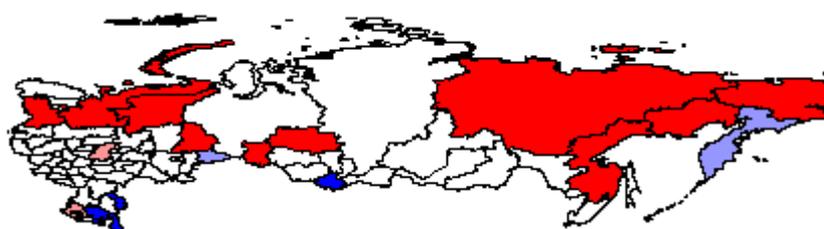


Figure 4 LISA Cluster Map - per capita GRP 2008

In 1995, 23 regions out of 77 significantly contribute to local spatial autocorrelation and most of them are in the high-high and low-low groups, the ones characterized by positive spatial autocorrelation as detected at global level. The high-high cluster is composed mostly by oil-productive regions in the Urals District and the richest and less populated regions in Siberia and the Far East, whereas there are no regions which belong to the Central District. The low-low cluster comprehends almost entirely the Southern District in the Caucasus but it is worth noting that the economic-political situation was highly critical in 1995 during the First Chechen War. The high-low cluster is empty, meaning that there are not high-income regions located near low-income regions. In 2008, fewer regions were still significant, with a lower Moran's I. Few regions form the low-high cluster and the most interesting case is Kurgan, which is located in the Urals District but it is not an oil-productive region like Sverdlovsk and Tyumen. Per-capita GRP in Kurgan is much lower than those of its surrounding areas, in fact it is nine times lower than the one of Tyumen (111,000 rubles in Kurgan and 900,000 in Tyumen in 2008) and half the amount in Sverdlovsk (220,000 rubles in 2008).

Patterns in 2008 are more diversified than in 1995: the high-high cluster is now composed of a lower number of regions, in particular Tyumen region is not significant anymore, and the high-low cluster emerged in Nizhny-Novgorod and Krasnodar, which succeeded in leaving the low-low cluster. Also Kalmykia, Volgograd and Rostov eventually succeeded in leaving the poorer low-low cluster.

To summarize the spatial analysis, two results seem to be clear. First, the Russian Federation is characterized at national and the local regional level by positive spatial autocorrelation, a pattern where high (low) value regions are located near high (low) value regions, forming homogeneous groups. Second, as shown by the local spatial analysis, political and social instability had a consistent detrimental effect on the economic performance of the Caucasus and the composition of the low-low cluster, whereas the availability of oil and natural gas at regional level appears as the significant factor for high-high type regions, though it appears to be weakening through time.

3.3 Convergence and growth factors across Russian regions

In this paragraph I will firstly comment the results on convergence obtained with the fixed effects panel data model in table 4 in the Appendix and then will discuss the results of the two spatial fixed effects models, SAR and SEM, in tables 5.1 and 5.2 in the Appendix¹⁴.

Following the suggestion made by Solanko (2003), as a robustness check the analysis is divided in three periods: 1995-2008 and two sub-periods. The threshold is the year 1999, when the Russian economy started to have average annual growth rates of GDP of approximately 5-6 percent. Indeed the assumptions that the period 1995-2008 is a continuous one and that the Russian economy was in steady-state in 1995 are strong ones, as major reconstruction in all economic and institutional sectors was in place. Though the length of the first period is limited, the years 1995-1999 had a peculiar unstable pattern which deserves specific inspection.

Column 1 tests the hypothesis of absolute β convergence of equation (6). In column (2) I extend the analysis to control for the growth factors of the Solow model:

¹⁴ The estimation of a dynamic panel model is prevented by the limited temporal length of the time period of this study (14 years) given that the precision of dynamic model's estimates depends upon the length of the time span, therefore I use the fixed-effects model. Moreover, with a dynamic specification one would not be allowed to perform the analysis for the two periods 1995-1999 and 2000-2008 separately.

population growth rate n , and technological progress g . Population growth is the determining factor of labor supply together with migration. Since migration is not significant in any specification and it is likely to be endogenous with respect to regional income, I am taking in consideration just the regional population growth rate. It is worth stressing that for the period of analysis, Russia mostly had negative growth rates of population. As a proxy for the growth rate of labor-augmenting technical change, I will use researchers with scientific degree on employed population at regional level, but any control related to education or employment could suffer from endogeneity. On the other hand, researchers who now already hold a scientific degree enrolled in graduate studies at least five years earlier. As a consequence, it is then plausible to assume that it does not depend on current business cycle, but on the economic situation at the time of enrolment.

Different Barro-type regressions have been tested in previous growth studies applied to Russian regions. Buccellato (2007) focuses on the period of recovery 1999-2004 and finds little evidence of convergence controlling for oil and gas production, people employed in R&D and FDI. Hydrocarbon supply appears as the main diverging factor. Regions that produce oil and gas are few in the country and 70 percent of extraction is concentrated in the Tyumen and Sverdlovsk areas. Controlling for oil-productive regions with a set of regional dummies is feasible, but then it would not be possible to control for regional fixed-effects. Russian regions are characterized by numerous peculiar time-invariant phenomena which play a major role in economic growth. Aside oil production, climate, religion, agrarian or industrial vocation of each area are leading factors in shaping Russian economy. For this reason, I pursue a full fixed-effects model and do not control explicitly for oil productions. Another possible strategy could be controlling for the physical amount of hydrocarbons, but most of the sample would have zero values for the whole period as the regions which are oil and gas producers did not change over time. Indeed researches in unexplored areas to build new plaintiffs started only in recent years. For this reason, I do not explicitly control for oil and gas production, considering the effect of hydrocarbons already controlled by the time-invariant fixed effects. Both FDI and people employed in R&D surely play a role in economic growth, but they are likely to be endogenous as any type of investment. FDI's are mainly attracted by oil-productive regions themselves. Ledyeva (2007) performs a spatial analysis of FDI at regional level to find out which factors are

attractors of foreign investment and the results are significant for market size, the presence of big cities and ports and indeed hydrocarbons extraction in the region. As said before, the issue of climate and climatic zones is a critical one for Russia, as climate determines population density and also the attractiveness of investments in the area, therefore using a fixed-effect approach, the model controls for time-invariant characteristics at regional level and the biases due to climate are eliminated.

Summary statistics are shown in table 3 in the Appendix. The dependent variable in the empirical analysis is the average annual growth rate of per-capita GRP whose mean is positive for the total period and the second one, whereas it is negative in the recovery phase. To detect any different pattern between the early phase with negative trend and the second phase of economic growth, the sample will be divided in two sub-periods. Also, because the average annual growth rate of Gross Domestic Product at national level after 2000 has been about 5-6 percent up to the crisis of 2008, the analysis stops at year 2008. Researchers with scientific degree on 10,000 employed population is used as a proxy for technological progress. Variation in the absolute numbers over time and between regions is high, as the geographical localization of these workers is strictly connected to the vocation of the region, agrarian or industrial.

Results in table 4 show that the hypothesis of convergence is not confirmed. The coefficient for the initial level of per-capita GRP is positive and significant in all specifications, indicating that richer regions grow faster hence this result strengthens the evidence of the spatial analysis. Russian regions are characterized by positive spatial autocorrelation, forming homogeneous clusters, as a consequence if this spatial setting is not taken into account it is unlikely that a phenomenon like convergence can arise *per se*. The sign of the proxy for technological progress is in line with the Solow model and technological progress has a significant positive effect on economic growth which is however small, probably because of the magnitude of the variable.

The coefficient for the initial level of per-capita GRP is higher in the total period and in the first period (1995-1999) than in the second one, confirming that the diverging path of the regions was stronger in the early phase of transition and so it is advisable to analyze the patterns of the two periods separately. This result is a positive sign towards the chance of a process of convergence in the future together with the decrease in the Moran's I and the LISA maps which show the recent formation of the high-low cluster in 2008. It is indeed the presence of the high-low and the low-high clusters the type of

spatial pattern which is favourable to convergence, while homogeneous clusters as high-high and low-low impede income convergence.

Finally, population change is a crucial issue for Russia. Since the late Eighties, the demographic crisis is one of the major concerns of Russian government as the population has been decreasing since 1986 and only in recent years the trend seems to be reversing. Different explanations have been proposed for the sharp decline in fertility rate and population growth, motivated by economic crisis arguments or by the second demographic transition (Zakharov 2008). The Solow model outlines how an increase in population can have a negative short-run effect on growth, because - due to diminishing returns - it lowers steady-state output per effective worker. The effect of population growth on the economic one is a critical theoretical and empirical issue, in fact findings mainly depend upon the time period, the sample of countries and their stage of development (see Headey and Hodge 2009). In the sample of analysis, the average growth rate of population is negative, with difference between regions and time periods. Unobserved heterogeneity has been controlled for with fixed-effects, on the contrary the dynamic of employed population is taken into account in the proxy for technological change. Fixed-effects control for unobserved heterogeneity and time-invariant characteristics which can be related to population growth such as religion, climate, share of urban population. For these reasons, the significant negative sign of the negative growth rate of population - following the Solow assumption that it is exogenous - can be interpreted as the negative effect of the severe decreasing trend of population on regional GRP growth rate.

The spatial analysis and the fixed-effects panel model provide consistent evidence of income divergence. Regions tend to form homogeneous clusters, which preclude findings of convergence at the aggregate level. Table 5.1 and 5.2 show results for the spatial regression models. The SAR model controls for spatial dependence through the ρ coefficient, whereas the SEM model controls for spatial heterogeneity in error term through the λ coefficient but both models control for fixed and time effects. The motivation behind this analysis is to see if - explicitly controlling for the positive spatial autocorrelation found in the ESDA - there is an effect on the long term path of economic growth.

Spatial fixed effects are significant for Moscow, Tyumen, Karachay-Cherkessia Republic, Adygea, Chukotka, Dagestan, Kabardino-Balkaria Republic, Kalmykia,

Magadan, North-Ossetia, Sakha-Yakutia and Tuva. Signs and magnitude of the coefficients are not affected by controlling for spatial patterns in the whole period 1995-2008, as the spatial coefficient is small and Russian regions remain on the diverging path detected through the spatial analysis and the benchmark fixed effects model. The inclusion of the spatial term has a higher effect on the magnitude of the GRP coefficient in the recovery phase 1995-1999 which is now lower than in the benchmark specification: the process of divergence decreases by controlling for spatial patterns, in fact in the specification for conditional convergence the GRP coefficient is .71 in the benchmark model and .64 in the spatial one. In the second period 2000-2008 the proxy for technological progress acquires a limited more positive effect on economic growth but it remains not significant as expected by the Russian growth patterns and the spatial analysis. On the one hand, the main growth factor after 1999 has indeed been the performance of the oil-sector which is already controlled for and acts through the regional fixed effect. On the other hand, the spatial analysis through the Moran's I statistic and the LISA maps showed that the spatial correlation is decreasing and that the high-high cluster is smaller in the second phase of economic growth with respect to the first one. The combination of these two effects explains why the proxy for technological change is significant in the whole sample and in the first phase of recovery, but not in the second phase *per se*.

4. Concluding remarks

The aim of this study was to analyze the patterns of convergence in per-capita gross regional product and growth rates in the Russian Federation from 1995 to 2008. The results of the exploratory spatial data analysis and different specification of panel models highlight the presence of a diverging path across Russian regions, characterized by clusters of homogenous type.

The ESDA conducted at a global and local level shows that – computing spatial statistics techniques as the Moran's I and visual analysis as LISA – positive spatial correlation is decreasing over the period as some poor regions in the Caucasus succeeded in leaving the low-low cluster and the presence of the high-low cluster emerged. The composition of the high-high cluster is also changing over time, in particular the effect of Tyumen regions is decreasing over the period. At the same time, the low-low type cluster in the Caucasus is persistent for Dagestan, showing that political instability is a major obstacle to economic growth.

The benchmark specification for the fixed-effects model confirms that the regions are diverging, though the magnitude of the effect is affected by the period of analysis and in particular by the recovery phase 1995-1999. Results for the spatial econometrics models demonstrate that both positive spatial autocorrelation ρ in the SAR model and spatial heterogeneity λ in the SEM characterize Russian regions, confirming the results of the LISA analysis. The magnitude of the Gross Regional Product coefficients is not deeply affected by the introduction of the two spatial specifications in the whole period, whereas it decreases the diverging path in the recovery phase.

Two policy indications can be drawn by this study. First, to break the diverging path of Russian regions, the policy advise is to differentiate on economic activities. A major diverging factor is the fundamental role of the oil and gas industry in the Russian economy. Because oil and gas extractions are exogenous geographical factors, growth will remain concentrated in oil-productive regions and surrounding areas if other sectors of the economy are not sustained. As shown by Kurgan region, still in 2008 being located within the rich oil-productive Urals District does not enhance economic growth. The second policy direction is related to political instability. The Caucasus area remains a critical point for social and economic reasons, as the cluster of low income regions shows. Though Russian intra-national ethnical conflict is a topic that goes much beyond this study and the pattern of per-capita income, it is advisable to put more effort on the economic development of the area, for example attracting investment and sustaining numerous industries as the case of Krasnodar, Volgograd and Rostov regions – which succeeded in leaving the poor cluster.

References

Ahrend R. (2008) Understanding Russian Regions' Economic Performance During Periods of Decline and Growth – An Extreme Bound Analysis Approach. *Economics Department, Working Paper 52, OECD*

Ahrend R., Tompson W. (2005) Fifteen Years of Economic Reform in Russia: What Has Been Achieved? What Remains To Be Done? *OECD Economics Department, Working Paper No. 430*

Anderson J.V., Thiesse J.F. (2004) Handbook of Regional and Urban Economics. *Elsevier, edition 1, Vol 4, No.4., February*

Anselin L. (1988) Spatial Econometrics: Methods and Models. *Kluwer Academic Publishers, Dordrecht*

Anselin L. (1998a) Interactive Techniques and Exploratory Spatial Data Analysis. *In: Longley PA, Goodchild MF, Maguire DJ, Wind DW(eds) Geographical information systems: principles, techniques, management and applications. Wiley, NewYork*

Anselin L. (1998b) Exploratory Spatial Data Analysis in a Geocomputational Environment. *In: Longley PA, Brooks SM, McDonnell R, Macmillan B (eds) Geocomputation, a primer. Wiley, NewYork*

Arbia G. (1989) Spatial Data Configuration in Statistical Analysis of Regional Economics and Related Problems. *Kluwer Academic Publishers, Dordrecht*

Arbia G., Basile R., Salvatore M. (2002) Regional Convergence in Italy 1951-1999: A Spatial Econometric Perspective. *ISAE Working Paper No. 29*

Arbia G., Basile R., Piras G. (2005) Using Spatial Panel Data in Modelling Regional Growth and Convergence. *ISAE Working Paper No. 55*

Aslund A. (1999) Why Has Russia's Economic Transformation Been So Arduous? *Annual World Bank Conference on Development Economics*

Bardhan P., Roemer J. (1992) Market Socialism: A Case for Rejuvenation. *The Journal of Economic Perspectives, Volume 6, No. 3, pp. 101-116*

Bardhan P., Roemer J. (1994) On the Workability of Market Socialism. *The Journal of Economic Perspectives, Volume 8, No. 2, pp. 177-181*

Barro R.J. (1991) Economic Growth in a Cross-section of Countries. *Quarterly Journal of Economics, 106, 407-443*

Barro R.J., Sala-i-Martin X. (1992) Convergence Across States and Regions. *Brooking Papers on Economic Activity 2: 107–182*

Barro R.J., Sala-i-Martin X. (1995) Economic Growth. *McGraw Hill*

Baumol W.J. (1986) Productivity Growth, Convergence, and Welfare: What the Long-run Data Show. *American Economic Review, American Economic Association, vol. 76(5), pages 1072-85, December*

Baumont C., Ertur C., Le Gallo J. (2006) The European Regional Convergence Process : Do Spatial Regimes and Spatial Dependence Matter? *International Regional Science Review 29, January 2006*

Berkowitz D., DeJong D. N. (2003) Policy Reform and Growth in Post-Soviet Russia. *European Economic Review 47, pp. 337-352*

Berkowitz D., DeJong D. N. (2005) Entrepreneurship and Post-socialist Growth. *Oxford Bulletin of Economics and Statistics, 67, I, pp. 25-46*

Braguinsky S., Yavlinsky G. (2000) Incentives and Institutions. The Transition to a Market Economy in Russia. *Princeton University Press*

Brown J. D., Earle J. S., Gehlbach S. (2009) Helping hand or Grabbing Hand? State Bureaucracy and Privatization Effectiveness. *IZA Discussion Paper No.3958*

Buccellato T. (2007) Convergence Across Russian Regions: A Spatial Econometrics Approach. *Research Paper 053_DP70 University of London, the Centre for Financial and Management Studies*

Chand C., Moene K. (1999) Rent Grabbing and Russia's Economic Collapse. *Department of Economics, University of Oslo*

Cliff A.D., Ord J.K. (1981) Spatial processes: models and applications. *Taylor & Francis*

Dabrowski M., Gomulka S., Rostowski J. (2000) Whence Reform? A Critique of the Stiglitz Perspective. *Centre for Economic Performance, LSE*

De Melo M., Denizer C., Gelb A., Tenev S. (2001) Circumstance and Choice: The Role of Initial Conditions and Policies in Transition Economies. *The World Bank Economic Review, Volume 15, No. 1*

Desai R., Freinkman L., Goldberg I. (2003) Fiscal Federalism and Regional Growth. Evidence from the Russian Federation in the 1990s. *World Bank Policy Research Working Paper 3138*

Desai et al. (2005) Fiscal Federalism in Rentier Regions: Evidence from Russia. *Journal of Comparative Economics*, 33(4), pp. 814-834

Elhorst P.J (2001) Dynamic Models in Space and Time. *Geographical Analysis*, 33, 2:119-140

Elhorst P.J. (2003) Specification and Estimation of Spatial Panel Data Models. *International Regional Sciences Review*, 26, 3:244-268

Enikolopov R., Petrova M., Zhuravskaya E. V. (2009) Media and Political Persuasion: Evidence from Russia (March 23, 2009). <http://ssrn.com/abstract=1367046>

Fedorov L. (2002) Regional Inequality and Regional Polarization in Russia, 1990-1999. *World Development Volume 30, No. 3*, pp. 443–456

Freinkman L., Plekhanov A. (2009) Fiscal Decentralization in Rentier Regions: Evidence from Russia. *World Development Volume 37, No. 2*, pp. 503-512

Geary R.C. (1954) The Contiguity Ratio and Statistical Mapping. *The Incorporated Statistician* 5 (3) pp115-145

Getis A, Ord J.K. (1992) The Analysis of Spatial Association by Use of Distance Statistics. *Geographical Analysis* 24: 189–206

Granville B., Leonard C. S. (2006) Do Institutions Matter for Technological Change in Transition Economies? *Centre for Globalisation Research, University of London*

Gregory P.G., Lazarev V. (2004) Structural Change in Russian Transition. *Economic Growth Centre, Discussion Paper No. 896, Yale University*

Headey D.D., Hodge A. (2009) The Effect of Population Growth on Economic Growth: A Meta-Regression Analysis of the Macroeconomic Literature. *Population and Development Review*, Vol.35, No.2 (June 2009), pp 221-248

Hanson P. (1994) Regions, Local Power and Economic Change in Russia. *The Royal Institute of International*

Islam N. (1995) Growth Empirics: A Panel Data Approach. *Quarterly Journal of Economics*, 4, 1127-1170

International Monetary Fund IMF – 2011 World Economic Outlook

Kholodilin K.A., Oshchepkov A., Siliverstovs B. (2009) Russian Regional Convergence Process: Where Does It Go? *KOF WP 216*

- Kočenda E. (2001) Macroeconomic Convergence in Transition Countries. *Journal of Comparative Economics* 29, 1-23 (2001)
- Kornai J. (1986) The Soft Budget Constraint. *Kyklos*, Volume 39, No. 1
- Kornai J. (2008) From Socialism to Capitalism: Eight Essays. *CEU Press*
- Lange O. (1937) On the Economic Theory of Socialism, Part One and Part Two. *The Review of Economic Studies*, Volume 4, No. 1, (1936) and No.2 (1937)
- Le Gallo J., Ertur C. (2003) Exploratory Spatial Data Analysis of the Distribution of Regional per-capita GDP in Europe, 1980-1995. *Papers in Regional Science* 82, 175-201 (2003)
- Ledyeva S. (2009) Spatial Econometric Analysis of FDI Determinants in Russian Regions. *The World Economy*, Volume 32, Issue 4, pp. 643-666, April 2009
- Ledyeva S., Linden M. (2008) Determinants of Economic Growth: Empirical Evidence from Russian Regions. *The European Journal of Comparative Economics*, Volume 5, No.1, pp.87-105
- Lipton D., Sachs J., Fischer S., Kornai J. (1990) Creating a Market Economy in Eastern Europe: The Case of Poland. *Brookings Papers on Economic Activity*, Volume 21, issue 1, pp. 75-147
- Moran P.A.P. (1950) Notes on Continuous Stochastic Phenomena. *Biometrika* 37(1): 17-23
- Ord J.K., Getis A. (1995) Local Spatial Autocorrelation Statistics: Distributional Issues and an Application. *Geographical Analysis* 27: 286-305
- Pisati M. (2001) Tools for Spatial Data Analysis. *Stata Technical Bulletin*, no. 60, pp 21-37
- Popov V. (2006) Shock Therapy versus Gradualism Reconsidered: Lessons from Transition Economies after 15 Years of Reforms" *Comparative Economic Studies*, Palgrave Macmillan Journals, vol. 49(1), pp. 1-31, March 2006
- Przeworski A. (1991) Democracy and the Market; Political and Economic Reforms in Eastern Europe and Latin America. *Cambridge University Press*
- Rodrik D. (1996) Understanding Economic Policy Reform. *Journal of Economic Literature*, March 1996
- Roland G. (2002) The Political Economy of Transition. *Journal of Economic Perspectives*, Volume 16
- Romer D. (2006) Advanced Macroeconomics. *McGraw Hill*

Rosstat – Statistics of Russia
Statistical Yearbooks of Russia and Regions of Russia, various issues 1996-2010

Shleifer A. (1997) Government in Transition. *European Economic Review* 41, pp. 385-410

Shleifer A., Vishny R. (1994) The Politics of Market Socialism. *Journal of Economic Perspectives*, Volume 8, No.2

Solanko L. (2003) An Empirical Note on Growth And Convergence Across Russian Regions. *Bank of Finland, Institute for Economies in Transition, Discussion Paper 9/2003*

Solow R.M. (1956) A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics*, 70, 65-94

Stiglitz J. (1999) Whither Reform? Ten Years of the Transition. *Voprosy Ekonomiki* 1999, Vol 7

Swan T.W. (1956) Economic Growth and Capital Accumulation. *Economic Record*, 32, 334-361

Zakharov S.V. (2008) Russian Federation: From the first to the second demographic transition. *Demographic Research*, Volume 19, Article 24, Pages 907-972

Appendix

Table 3 Summary statistics

	Mean and standard deviation		
	Total period	1995-1999	2000-2008
Per-capita gross regional product (natural log)	10.9 (.54)	8.87 (.48)	10.98 (.52)
Average annual growth rate of pc GRP (natural log)	.034 (.22)	-.02 (.09)	.06 (.05)
Average annual population change	-5.09 (4.7)	-4.8 (4.4)	-5.2 (4.9)
Researchers with scientific degree on 10,000 employed population	7.8 (12.6)	8.1 (14.4)	7.5 (11.5)

Table 4 Fixed-effect panel model

Fixed-effects panel data model						
	Total		1995-1999		2000-2008	
	(1)	(2)	(1)	(2)	(1)	(2)
Per capita GRP	.76 (.03) ***	.79 (.03) ***	.74 (.10) ***	.71 (.09) ***	.14 (.04) ***	.14 (.03) ***
Population change	-	-.004 (.007)	-	-.02 (.01) **	-	-.007 (.004) *
Technological progress	-	.007 (.001) ***	-	.008 (.006) *	-	.0009 (.0009)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1001	1001	308	308	693	693
Groups	77	77	77	77	77	77
R ²	.78	.79	.49	.51	.17	.18

Notes: Dependent variable is average annual growth rate of real per-capita gross regional product
Robust clustered standard errors in parenthesis

* 10 percent significance; ** 5 percent significance; *** 1 percent significance

Table 5.1 Fixed-effect spatial autoregressive model (SAR)

Fixed-effects SAR model						
	Total		1995-1999		2000-2008	
	(1)	(2)	(1)	(2)	(1)	(2)
Per capita GRP	.76*** (.03)	.79*** (.03)	.66*** (.07)	.64*** (.07)	.14*** (.02)	.14*** (.02)
Population change	-	-.004 (.004)	-	-.02*** (.007)	-	-.007*** (.002)
Technological progress	-	.007** (.001)	-	.01*** (.003)	-	.001 (.001)
ρ	.06* (.03)	.06* (.03)	.24*** (.06)	.24*** (.06)	.09** (.05)	.09** (.05)
Spatial Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1001	1001	308	308	693	693
Groups	77	77	77	77	77	77

Notes: Coefficient ρ is the spatial autocorrelation coefficient.

* 10 percent significance; ** 5 percent; *** 1 percent

Table 5.2 Fixed-effect spatial error model (SEM)

Fixed-effects SEM model						
	Total		1995-1999		2000-2008	
	(1)	(2)	(1)	(2)	(1)	(2)
Per capita GRP	.76*** (.03)	.79*** (.03)	.68*** (.08)	.65*** (.07)	.14*** (.05)	.15*** (.02)
Population change	-	-.005 (.004)	-	-.02*** (.008)	-	-.008*** (.002)
Technological progress	-	.007 (.002) ***	-	.009*** (.003)	-	.001 (.001)
λ	.09** (.04)	.10*** (.04)	.23*** (.07)	.24*** (.07)	.10** (.05)	.11** (.05)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1078	1078	385	385	693	693
Groups	77	77	77	77	77	77

Notes: Coefficient λ is the spatial error term.

* 10 percent significance; ** 5 percent; *** 1 percent

Chapter 3

Russian Demographic Patterns

Before and After the Dissolution of the Soviet Union

1. Introduction

This chapter describes the national demographic patterns in Russia since 1960. Data have been collected mainly from the Statistical Yearbooks of the USSR and Statistical Yearbooks of the Russian Soviet Federative Socialist Republic for the years before the dissolution of the Soviet Union¹⁵. Other sources are the Demographic Yearbooks of Russia and the Generations and Gender Program Contextual Database¹⁶. The second paragraph is devoted to general vital statistics such as population, life expectancy at birth, mortality rates for men and women and infant mortality rate. Migration patterns are also analyzed as after the dissolution of the Soviet Union great migration flows have influenced the composition of the Russian population. The third paragraph describes fertility patterns, analyzing specific demographic indicators such as total and age-specific fertility rates, maternal age at birth and abortions. The Russian federal government has established since early Nineties a system of maternity grants and benefits to substitute for the Soviet system and try to increase fertility rates: paragraph four provides a complete insight of the policy measures adopted in recent years.

In paragraph five, international comparisons are shown, to highlight how the Russian patterns reconcile with other industrialized countries over time. The main vital and demographic patterns of Russia are compared with the ones of the United States, Poland and Belarus. The last section provides concluding remarks.

2. General vital statistics

Serious concerns about the dynamics of Russian population started in mid-Eighties¹⁷. At the time, after decades of continuing increasing or stable population, the country started to show a decreasing pattern with no signs of reversal and indeed in one decade, 1998-

¹⁵ НАРОДНОЕ ХОЗЯЙСТВО СССР and НАРОДНОЕ ХОЗЯЙСТВО РСФСР. The books are available at the Russian State Library in Moscow. I am grateful to the researchers of the Center for Labour Market Studies (HSE Moscow), professor Andrei Markevich (NSE Moscow) and the staff of the Library for their suggestions and help in data collection.

¹⁶ Available online at www.ggp-i.org

¹⁷ See Pugh and Lewin (1991)

2008, total population dropped from 147 millions to 141 millions people. Two causes are identified by the literature and policymakers for the decline which will be analyzed in this study: the decrease in fertility rates and the increase in male mortality rate registered in the early years of transition.

2.1 Population

Figure 1 shows the dynamic of Russian population since 1960. In 1960, the population was 120 millions people and it remained on an increasing path until mid-Nineties. In the year 1996/1997, the declining path that we still see today started and in 2008, with 140 millions, the numbers were back to the levels in 1980.

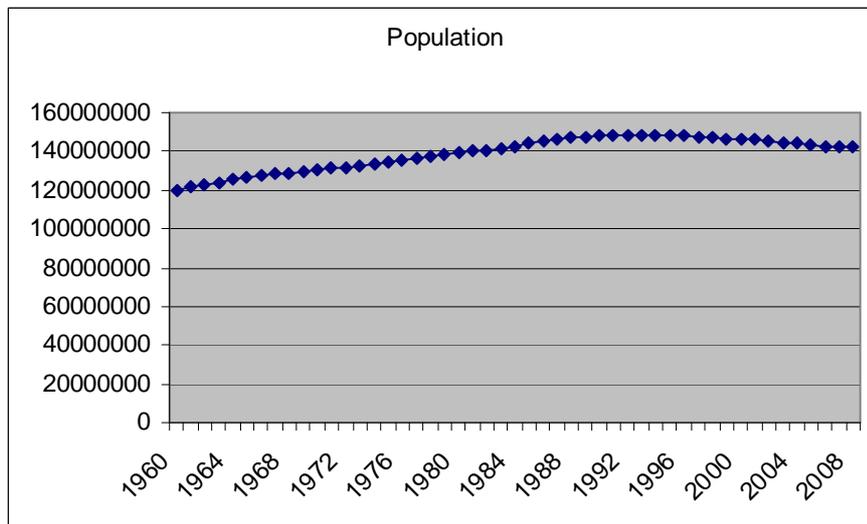


Figure 1 – Population of Russia

The age composition of the Russian society in figure 2 is changing too. The shares of younger cohorts in particular display the most evident decline: in 1960, 30 percent of the population was below 15 years of age, while 50 years later the share is around 10 percent.

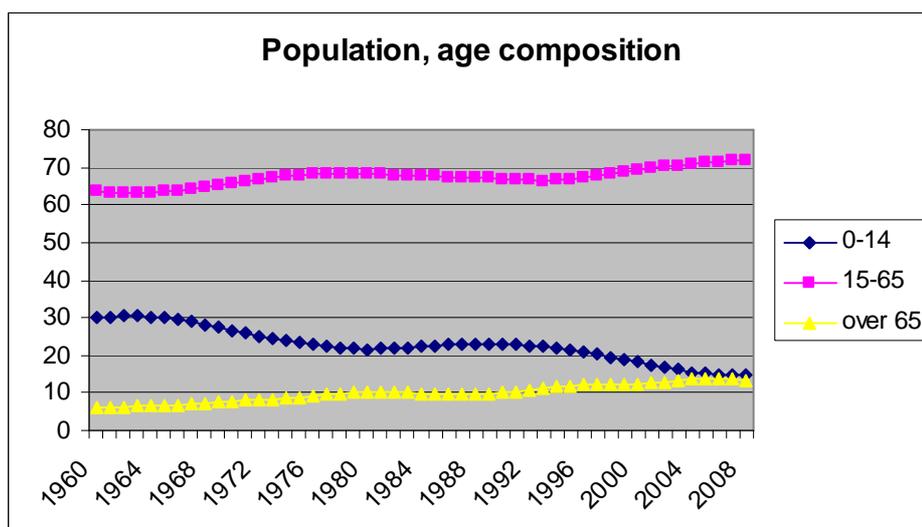


Figure 2 – Age composition of the population

This is the dynamic which motivates the concerns of the Russian government towards the size of the labor force from the next decade. This same decline motivates also the concerns towards fertility rates¹⁸. Infant mortality rate¹⁹ is now much lower than in Soviet times (it was 17.4 in 1990, 7.5 in 2010) and lower than Eastern European countries as Latvia (8.4 in 2009) and Ukraine (9.1 in 2010) and also abortions are much less than in Soviet times, though still higher than in Western Europe: the decline in the youngest cohorts is therefore not due to increased infant mortality (health conditions and services improved in the Nineties) or an increase in abortions, which are now evolving towards Western trends and the choice of less invasive and dangerous techniques.

Table 1 shows the age composition by sex for selected years, 1959 – 1989 – 2002 and 2009.

	1959		1989		2002		2009	
	M	F	M	F	M	F	M	F
Pop	52,424,832 44%	65,109,474 56%	68,713,869 46%	78,308,000 54%	67,605,133 46%	77,561,598 54%	65,641,634 46%	76,262,345 54%
0-14	0.33	0.26	0.25	0.21	0.18	0.15	0.16	0.13
15-64	0.63	0.66	0.69	0.65	0.73	0.68	0.74	0.69
65 -	0.04	0.08	0.06	0.14	0.09	0.17	0.1	0.18

¹⁸ In the annual State of the Nation speech, on November 30, 2010, the main focus has been devoted to children and the country's future. President Medvedev called for increasing social support to help solve the demographic crisis, proposing higher support to families with more than two children and also calling for a reform of the orphanage system

¹⁹ Defined as the number of deaths of children under 1 year of age per 1,000 live births

Table 1 – Age composition of the population by sex
 Author’s elaborations on Rosstat data, Demographic Yearbook of Russia

Through time, the shares of males and female on total population remained stable with the majority of the population being composed of women. Looking at the age composition of each sex group, in 1959, 33 percent of the male population was composed of children and 26 percent for the female population. After four decades, both shares halved, 16 and 13 percent respectively. The relative higher share in the male group is standard and due to the human sex ratio at birth²⁰ and not to any practice of sex-selection as in China. The most evident change across time is the phenomenon of aging population, for both men and women: in 1959, 63 percent of the male population was between 15 and 64 years old, while in 2009 in the same range one finds more than 70 percent of the male population. The same trend is found for people over 65 years, who are now 14 percent of the total population and were 5 percent in 1959.

2.2 Life expectancy at birth

For Russian women the patter is homogeneous, without jumps over time: life expectancy at birth was 72 years in the Sixties and 75 years in 2010, as shown in figure 3. It is also in line with other Eastern European countries as Estonia and Latvia (77 years) and higher than Bulgaria or Ukraine.

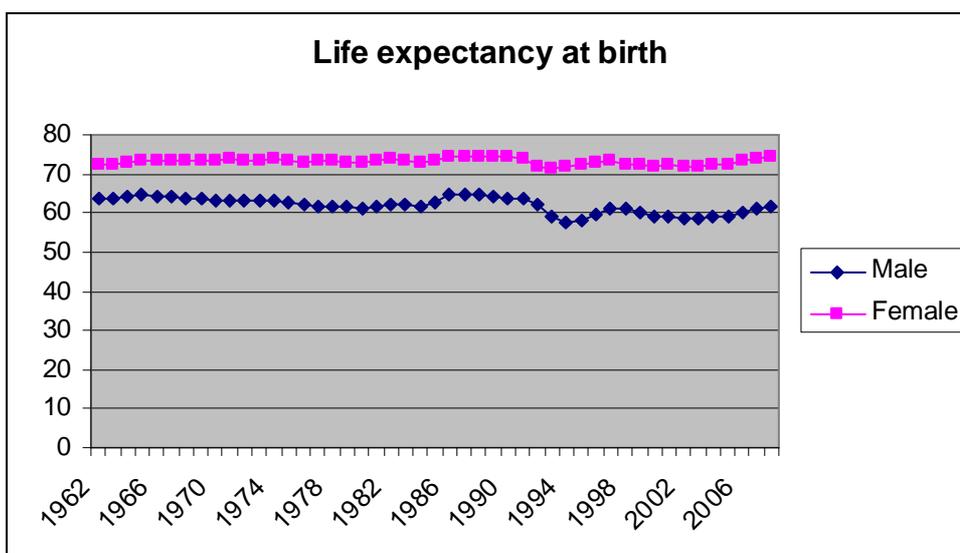


Figure 3 – Life expectancy at birth

²⁰ Also called secondary sex ratio, it is assumed to be 105 newborn boys per 100 newborn girls

Male life expectancy has generally been lower for people living in Eastern Europe compared with Western European levels, mainly because of differences in health services and diet, in particular alcohol consumption. Male life expectancy was 62 years in 1960 for Russian men. It increased in the years 1986-1992 and then in late Nineties dropped to 59 years, the lowest value of the past three decades. In 2010 it is recovering and now it is 63 years.

2.3 Mortality rate

The pattern of male mortality rate is crucial to understand the reasons for the decline in male life expectancy. Two recent papers offer different explanations: Treisman (2010) adopts a political economy approach and, using regional data, finds that the reason for the increased mortality among middle-aged men is the decrease in the relative price of vodka compared with beer: between 1990 and 1994, the price of vodka dropped by 77 percent in real terms. Alcohol consumption and related health problems are indeed the first cause of death among middle-aged men. Denisova (2010) uses household and individual level data from the Russia Longitudinal Monitoring Survey and finds that the dangerous effect of smoking has the same magnitude of alcohol addiction, and therefore policy measures should focus on this point, and also relative social status is significant. The drop is more severe for men and this evidence strengthens the validity of the reasons identified so far. It is not the signal of a general worsening in life conditions or health services, given that female life expectancy did not show the same trend nor is female mortality rate so high, and also infant mortality has improved much over time.

New policies against alcohol consumption have been adopted at the national level: in 2010, the beer industry faced increased taxation by 200 percent and the minimum price of vodka has been doubled; since 2011, also beverages containing less than 10 percent alcohol have been classified as alcoholic and not just beverages, so that it is now possible to control the selling of beer and spirits.

The mean death rate for Russians, shown in figure 4, in 2009/2010 is 14 deaths per 1,000 people, the specific value for men is 16 per 1,000 people. The value is almost double than the world average, which is 8.6 per 1,000 people, and also higher than in the European Europe, where it is 9.6.

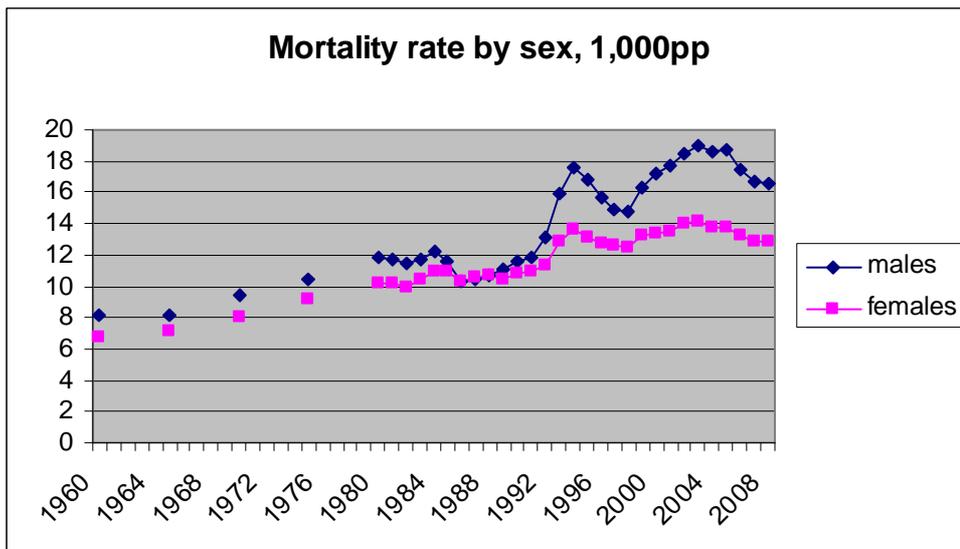


Figure 4 – Mortality rate by sex
 Source: author’s elaborations on Rosstat data, Demographic Yearbook of Russia

Finally, figure 5 shows the pattern of infant mortality rate. It was 36 deaths per 1,000 live births for children under 1 year of age in 1960 and decreased to 7.5 per 1,000 in 2010 for improvements in health care and diet.

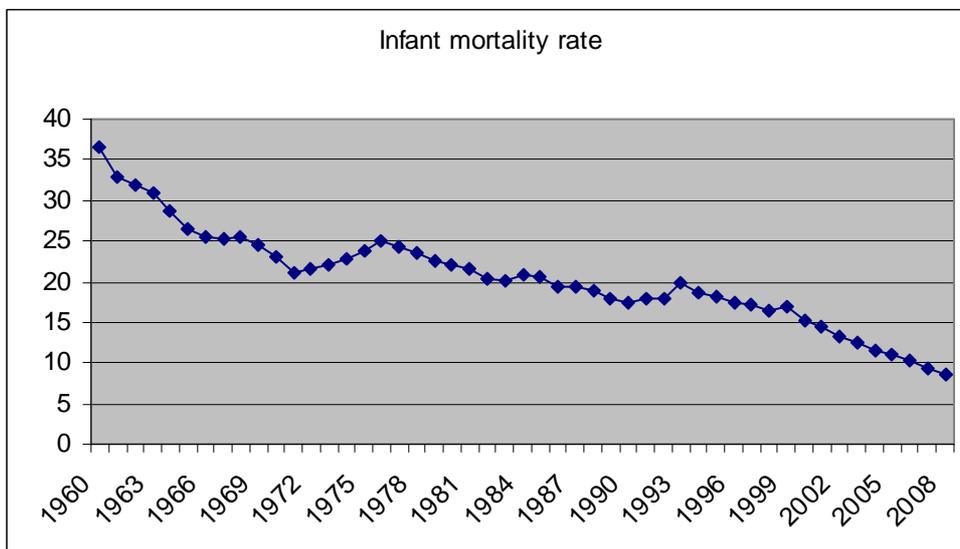


Figure 5 – Infant mortality rate

This indicator, which is considered one of the most important to evaluate the wellbeing of a country and its social services, is however still higher than European Union (5.7 per 1,000 live births) or United States standards (6.3 per 1,000 live births). In Eastern European countries as the Czech Republic, Belarus and Slovakia it is below

6.5 per 1,000 live births. One key factor, which is specific to all health services in Russia, is regional variation: in Moscow it is around 6 per 1,000 live births, but around 30 per 1,000 live births in some regions of the Far Eastern area, which also suffered by high out-flows of residents in the Nineties and therefore received less resources and investments through time.

2.4 Migration patterns

With the in-flows in the early Nineties, almost five millions people moved from foreign countries to Russia from 1990 to 2009, mainly from CIS countries. As shown in figure 2, this positive flow is reflected in the age structure of the population which shows a negative natural increase, but the share of working age population is increasing from 1996. Figure 6 shows that the first years after the dissolution of the Soviet Union and the elimination of the restrictions of movements had the highest migration rate and in 1995 immigration from foreign countries signed a +850,000 people.

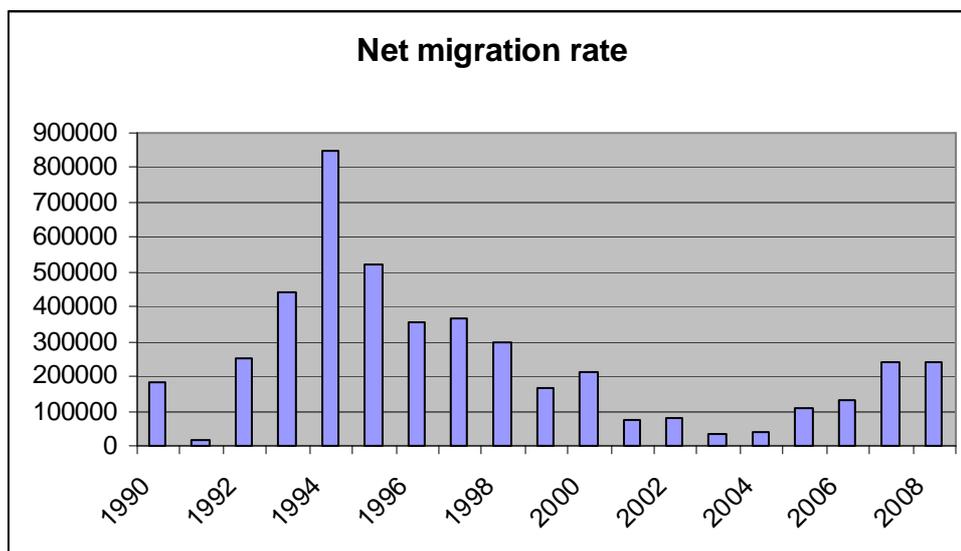


Figure 6 – Net migration rate

With the phenomenon of migration, the composition of Russian population is also changing. Soviet authorities tried to avoid the depopulation of remote areas as the Far East or Siberia with limitations on the freedom to set the residence in a certain city or area²¹ in fact the flows have mainly been from the North and Far East to Southern and Central Districts. The Far East lost almost 1 million people in the time span 1990-1999,

²¹ The *propiska* was formally abolished in 1992 and substituted with a registration

whereas Siberia lost about 200,000 inhabitants. In general, the reasons why more and more people wanted to move to areas were finding job opportunities and better life conditions with regards to climate and facilities like transports, schools and hospitals. In the area of the Caucasus, the trend has been an out-flow of Russians and a concentration, in each area/republic, of the specific vocal ethnic group. According to the census of 2002²², six ethnical groups other than Russians have a population which counts more than one million people, and their lifestyles vary for religion, fertility rates, female participation rate and other factors. These groups are Tatars (3.8 percent), Ukrainians (2 percent), Bashkirs (1.15 percent), Chuvash (1.13 percent), Chechens (0.94 percent) and Armenians (0.78 percent). Inter-regional migration flows have modified not only density, but also population composition. In particular, the higher fertility rates among some groups have changed the size of the population of the regions they moved in and also the relative shares with respect to the past, in particular in North Caucasus. The relative share of Russians versus non-Russians also changed, as Russians were 81.5 percent of the total population in 1989 and 79.8 in 2002.

3. Fertility patterns

3.1 Total and age-specific fertility rates

Total fertility rate is defined by the CIA Worldbook as “the average number of children that would be born to a woman over her lifetime if she were to experience the exact current age-specific fertility rates through her lifetime, and she were to survive from birth through the end of her reproductive life”. Child-bearing years are considered 15-49 but 15-40 is widely used, since the chances to have children for women older than 40 years are limited. Figure 7 shows total fertility rate for Russian women since 1960 while figure 8 provides more detailed data with age-specific birth rates, which are defined as “live births per 1,000 women in each age-group”.

Looking at total fertility rate, the most evident drop is in the years around 1987-1995, few years before the dissolution of the Soviet Union up to the very first years of transition, when the economy had the sharpest decline. The small drop in the previous decades is in fact in line with other industrialized countries. Total fertility rate, which was still above 2 children per woman in the year 1989, reached the lowest value ever in

²² Available online at www.demoscope.ru, Bulletin N. 81, September 2004 (in Russian).

2000 with 1.2 children per woman, and it appeared to be in a slowly increasing path only in 2008-2010.

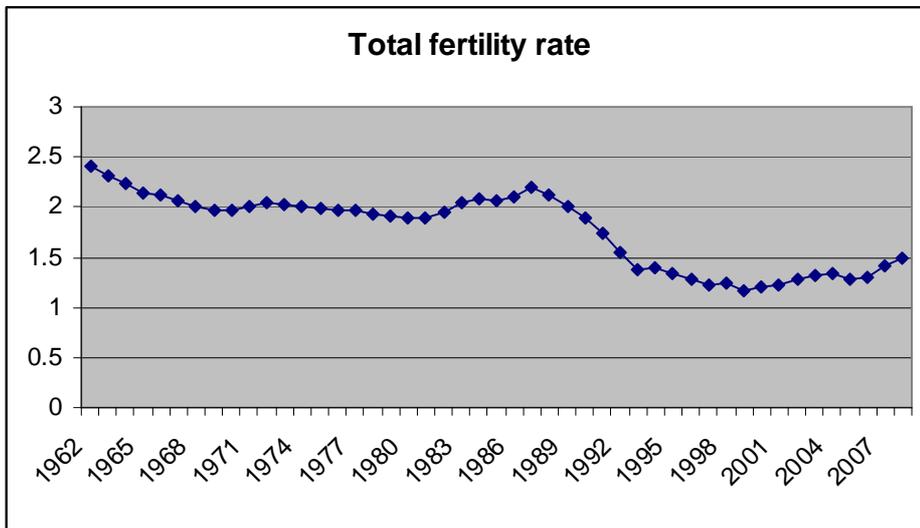


Figure 7 – Total fertility rate

Figure 8 describes more in detail how the decision of Russian women has changed through time according to their age. Before 1980, data are available only for selected years. Two main trends are present: on the one hand increasing trend for births at young age between 15 and 29 years which lasted until mid-Nineties; on the other hand, fast decreasing trends for births between 20 and 29 years which started in early Nineties.

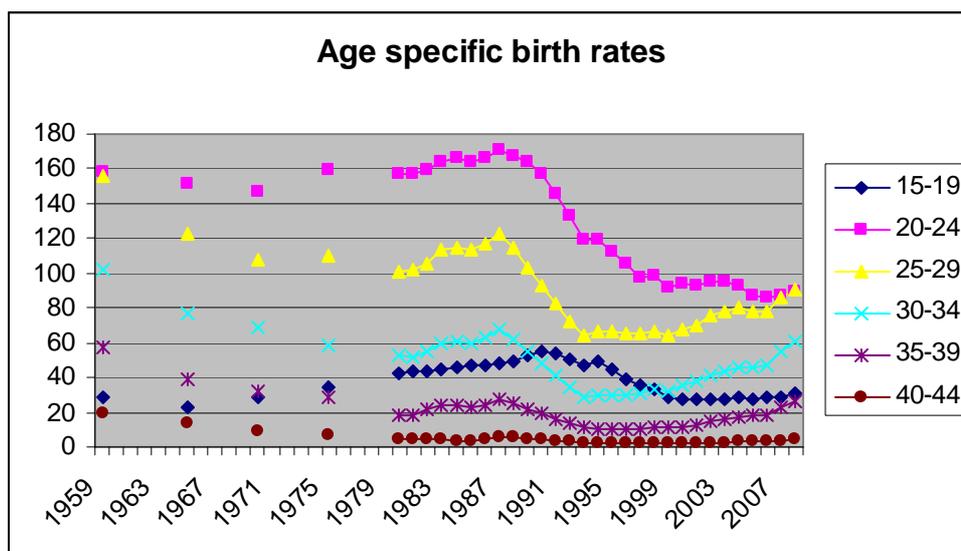


Figure 8 – Age specific birth rates

The increasing patterns before the Nineties were sustained by extensive public services provided to families by the Soviet Union system, which could alleviate the economic burden of childbearing, if not the time constraints due to the balance between works at home, the amount of time spent queuing up to buy foodstuff and work outside²³, so mothers with more than two children would have priority for queues in shops and families with children used to have priority for bigger houses assignments, while day-care for kids, all levels of education and health care were universally provided. With the economic crisis, births rates declined for all age-groups, in a pro-cyclical trend: as economic conditions worsen, fertility rates decline. The same pro-cyclical trend, which would predict higher fertility rates with the improvement of life conditions, is not found in all age-groups after the year 2000 when economic growth started but only for the group 25-34. To see if a postponement effect of childbearing is emerging, the analysis would require data on completed fertility for different cohorts, which however are not available at this level of aggregation. For this reason, here I will discuss only the pattern of maternal age at childbirth at the national level and discuss more in detail the issue of postponement with individual level data.

3.2 Maternal age at childbirth

The demographic indicator which must be combined with age-specific birth rates to find the determinants of the decline in fertility is the age of the mother at childbirth, in particular for the first child. As shown in figure 9, this value did not change significantly through decades: it was around 24 years old for first-time mothers in the Sixties (who were the cohort of late Thirties-Forties), it declined to a value of 23 years from the Seventies to the year 2000 and since then it is now 24-25 years. It is worth noting that 24 years is the age that defines the threshold between the age groups 20-24 and 25-29. This purely computational threshold could explain why - despite the evidence of no postponement effect among Russian women - in figure 8 birth rates for these two groups have opposite trends after the year 2000 - with births decreasing for women aged 20-24 and increasing for women aged 25-29 - and eventually converge to the same level in 2008.

²³ See Stone (1969) for some insights on daily queues in Soviet Russia.

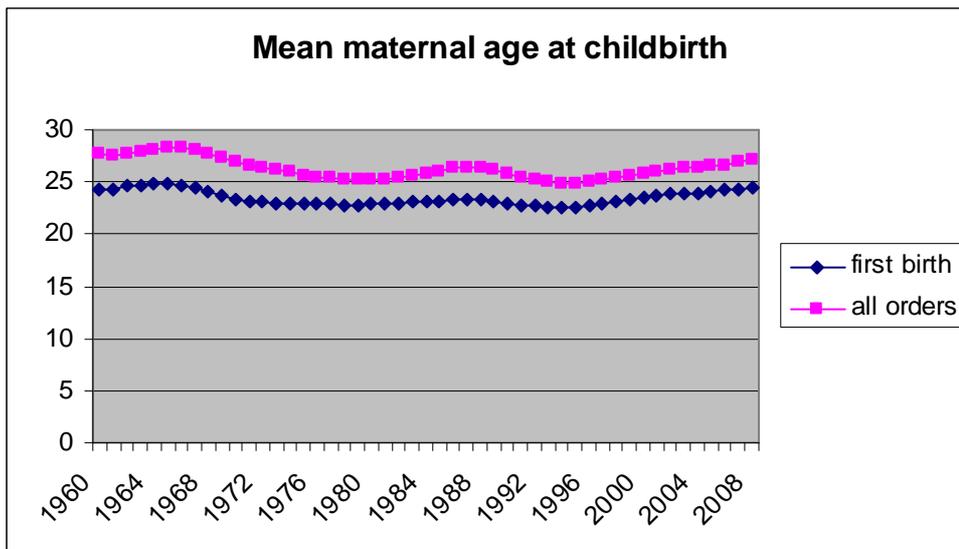


Figure 9 – Mean maternal age at childbirth

The habits of Russian families changed from Soviet times up to the recent years, but Russian women do not seem to be affected by the phenomenon of postponement of first motherhood as is happening in other European countries. In fact, the drop in age-specific birth rates in figure 8 is common to all age-groups (20-24, 25-29 and 30-34) and not only to the first one. The cohort born in the Seventies has been the most affected by all the phenomena related to transition: born and raised in a system where the State virtually cared for every aspect of life like health care, education, employment, housing, this cohort was the one who suffered more from the failure of the system. For fertility decision, they found out that housing was becoming less affordable, daily-care for children would not have been provided anymore by all firms and, as a first thing, the labor market they expected did not exist anymore. For the age-group 25-29, combining figure 8 and 9 for all-orders birth the drop can be considered as a drop in second births: 25-29 years old women are generally not first-time mothers and mean maternal age at all order-birth is slightly increased, but is still between 25 and 27 years since 1990. This group is the focus of the more recent policies analyzed in section three and adopted to boost fertility, which tend to balance the decision to have children with the high participation rate of women in the Russian labor market

3.3 Mean age at first marriage

Although available starting only from 1996 in figure 10, data for the mean age at first marriage for both men and women do not provide evidence of a consistent increasing

path. It is indeed in line with the age of the mother at first childbirth and age-specific fertility rates analyzed so far. For men, from 1980 to 1996 the age of the grooms increased on average only by .5 year, while for brides it actually decreased by few months with respect to the Eighties. For the same time period, 2/3 of the marriages per 1,000 females involve women younger than 25 years of age²⁴

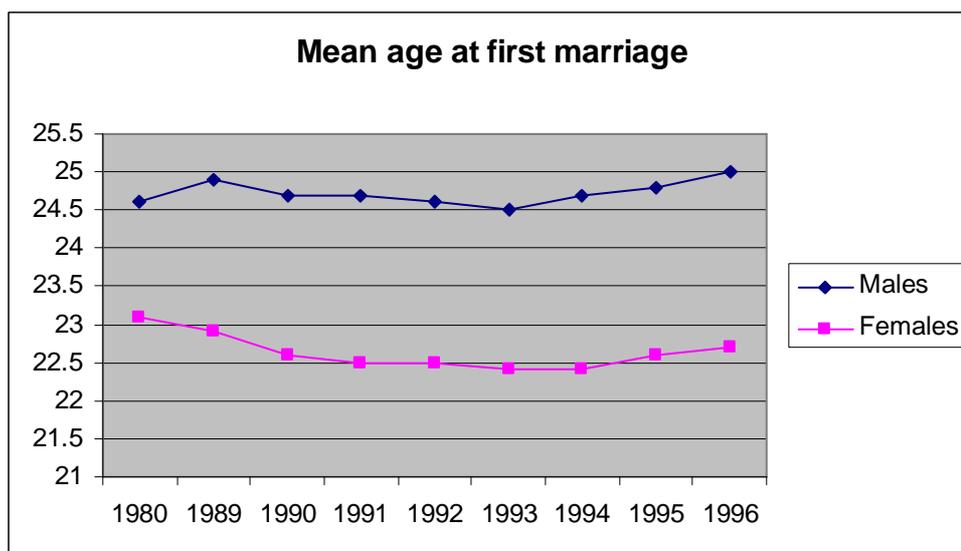


Figure 10 – Mean age at first marriage
Data source: Generations and Gender Program, Contextual Database

3.4 Abortion rate

The practice of abortion in Russia is widespread and much diffused than in Western European countries (figure 11). Russia has been the first country in the world to legalize abortion in 1920. The practice then became illegal in the Stalin years up to 1955. It is now legal on request of the woman up to 12 weeks of pregnancy, and at any stage of the pregnancy for medical reasons²⁵.

²⁴ Generations and Gender Program, Contextual Database. Available online at www.ggp-i.org

²⁵ Federal Law 22 July 1993, N. 5487-1 and amendments

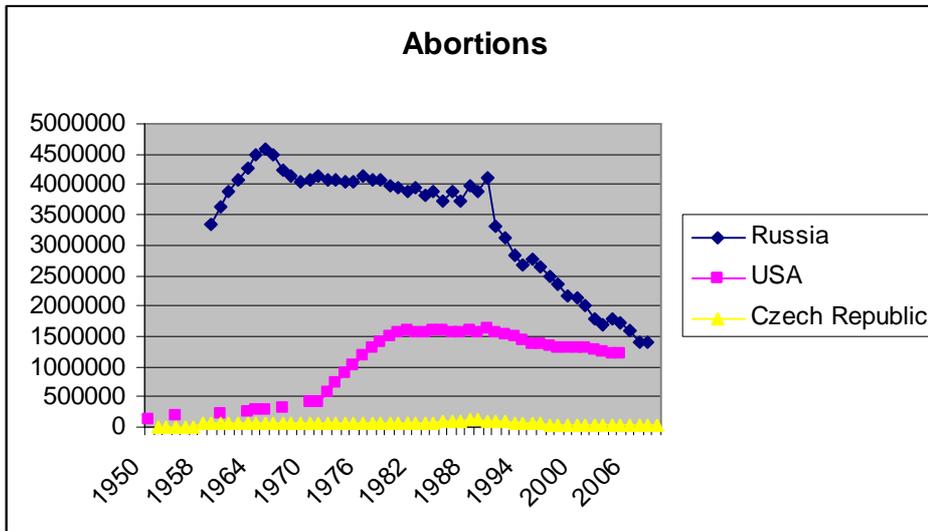


Figure 11 – Abortion rate
 Data source: Generations and Gender Program, Contextual Database

In 2007, for the first time the number of births has been higher than the number of abortions: 1.6 million births and 1.3 million of abortions were registered in Russia. The numbers have decreased much after the dissolution of the Soviet Union, when oral contraceptives became available, but Russia still had 1.4 millions abortions in 2009, whereas in other Eastern countries as the Czech Republic, they do not reach 25,000. In 2011, President Medvedev signed amendments to the law so that women are better informed about the risks of abortion on health and future chances of having children.

4. Pro-fertility policy measures

In Soviet times it was around the Seventies when discussions about fertility patterns started to recognize the potential problems of decreasing fertility. Weber and Goodman (1981) provide an insight on the debate during the 26th Congress of the Communist Party of the Soviet Union, when the idea of differentiated regional interventions was adopted, and a summary of the legislation in the Eighties. Mothers had 56 days of pre-natal leave and 56 days of post-natal leave, and unpaid leave was allowed for one year then extended to 18 months of the child. Partially paid leave differentiated by region started in 1981. Family income supplements for families under the subsistence income

level were introduced in 1974 and since 1981 child allowances increasing in the number of children was introduced²⁶.

Today, policy makers are concerned for the future labor force and the chances of the country to maintain adequate levels of production and economic growth²⁷ and to sustain social security because the dependency ratio²⁸ is likely to increase in the next decade. The laws and measures adopted since the early Nineties are focused on working mothers and, in recent years, on the decision to have a second child. Labor participation rate of Russian women is around 60 percent²⁹ and the number of children per woman is 1 since more than a decade. In 1991, universal child allowances were introduced but analysis as Misikhina (1999), Denisova, Kolenikov and Yudaeva (2000) find that only 1/3 of the eligible families received the benefits, with wealthier families receiving more than poorer ones. In 1998 it was prescribed that only families below the subsistence income level of the region were eligible for child allowances, but then in 1999 the Duma suspended the federal family planning programs, in reaction to the financial crisis of 1998 and the small effects of the policies adopted in the past decade.

According to the Labour Code of the Russian Federation³⁰, benefits for working mothers are paid by the regional Social Insurance Fund until the child reaches the age of 18 months. According to article 255, working mothers are granted seventy calendar days of pre-natal leave and seventy calendar days of post-natal leave (longer periods are prescribed for multiple births) at full salary, with a minimum set for the year 2011³¹ at 2,200 rubles (doubled for second and subsequent children) and a maximum of 35,000 rubles. For the first 18 months of life of the child, mothers must receive 40 percent of the salary of the previous year, with a minimum of 2,200 rubles and a maximum of 14,000 rubles. The leave benefits from 18 months to 3 years old of age of the child are set at 50 rubles³² and paid by the employer. Moreover, a lump-sum allowance for childbirth of 10,000 rubles can be requested by the working parent of the family at the Social Insurance Fund according to different income criteria depending on the region of residence, according to a regional indexation system. A family-income criterion is applied also for monthly child allowance if the mother is unemployed and does not

²⁶ See Weber and Goodman (1981) for a detailed summary and remainder to Soviet legislation and official speeches

²⁷ See note 4

²⁸ This indicator is the ratio between population outside the labor force (under 14 and over 65) and the labor force (population aged 15-65)

²⁹ This same value is the one defined as a goal of the Lisbon agenda for the European Union, still not reached

³⁰ Available online in English at <http://www.ilo.org/dyn/natlex/docs/WEBTEXT/60535/65252/E01RUS01.htm#chap41>

³¹ Federal Law of 2010 N. 357-FZ

³² Presidential Decree of 1994 N. 1206

receive unemployment benefits. Rules are prescribed also for single mothers. A lump-sum benefit of 440 rubles is provided to women who registered in a medical institution before the 12th week of pregnancy. Additional lump-sum allowances are provided to young couples of less than 30 years of age and for third child and subsequent³³.

Finally, at the end of 2006 the government started the Maternity Capital Program for Russian Citizens³⁴ (also called Maternal Capital Program) which is a policy designed to give incentives towards the decision to have a second (or subsequent) child. Women giving birth to or adopting a second child (or third/forth etc, if the grant was not requested for the previous one, i.e. the second/third child) are eligible to apply for a grant set at 344,000 rubles (8,600 euro) in 2010, not to be spent before the child turns three years old. The grant was set at 250,000 rubles when the program started and it is indexed on inflation. It can be used for loans, housing, education, or added to the mother's pension fund. Official data in figure 7 shows a small increase in fertility rates in very recent years, but it is too early to make any policy evaluation about the Maternity Capital Program given its very recent start. Moreover, when survey data will be available, it will be feasible to evaluate if this program is influencing the fertility decision of Russian women³⁵.

5. International comparisons

For international comparisons I chose to analyze the patterns of two Eastern countries (Belarus and Poland) and the United States³⁶. Historically the USA have been the opponent of the Soviet Union and also they can offer a relevant geographical extension with different climatic areas and land features within the country which made them an interesting case to compare with Russia. Poland and Belarus are instead much smaller than Russia, but still interesting to compare for their different approach to transition after the dissolution of the Soviet Union. Poland became the benchmark model for institutional reforms in late Eighties for its system of privatizations and liberalizations and, after decades as a Soviet satellite state, finally became a member of the European Union in 2004. Belarus, on the other hand, keeps stronger connections with the old Soviet system and its government since early Nineties openly opposed to the path of

³³ Federal Law of 1995 N.81-FZ and Federal Law of 2008 N.308-FZ and amendments. See www.kukuzya.ru (in Russian) for a complete coverage of the benefit system.

³⁴ Federal Law N. 256-FZ

³⁵ Questions about the Maternal Capital Program are asked in recent waves of the Russia Longitudinal Monitoring Survey, but by now data are not available for public use.

³⁶ Data from the Contextual Database of the Generations and Gender Program

privatizations and liberalizations suggested by international organizations. Although subject to severe critics from the United States and the European Union for the limitations to democratic rights against its population, but with positive relations with the Russian government, Belarus is a country worth studying indeed for its complicated approach to transition.

The population of the United States doubles the one of Russia, which has vast areas of its land scarcely inhabited for severe climate conditions and permafrost. As shown in figure 12, the population of the USA is increasing, whereas Russia shows a decline since the late Nineties. Both Poland and Belarus have stable population in the Nineties and therefore did not face a declining path like Russia, which, as a consequence, confirms to be unique also among Eastern countries.

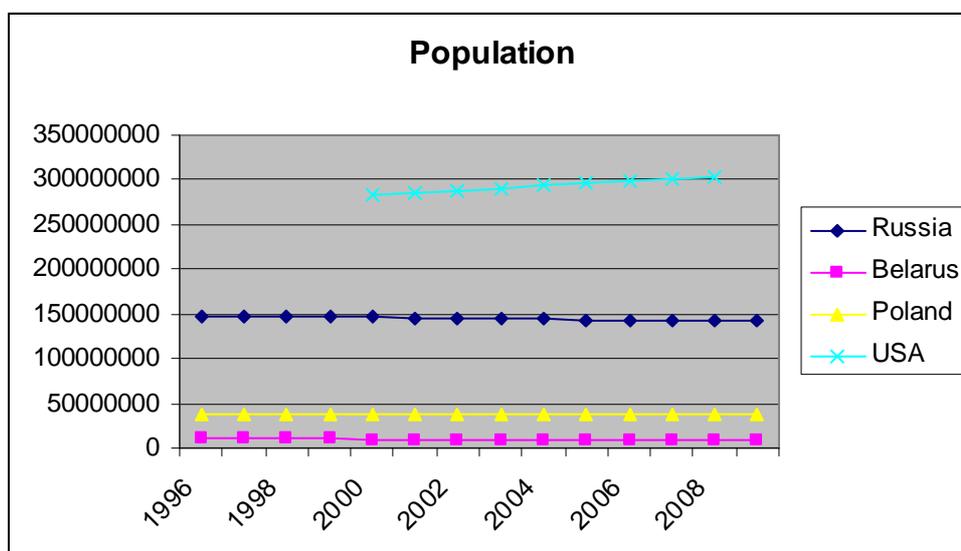


Figure 12 – Population of Russia, Belarus, Poland and the United States

It is also worth stressing that in the same years, Russia had positive net immigration, while for Poland it was negative: OECD data report negative net migration rate since 2001 with an average value of -0.5 per 1,000 population, while Russia has an average +1.5.

Death rate per 1,000 people in figure 13 provides clear evidence of the unique pattern of mortality among Russians. First, two different magnitudes are evident, for Eastern and Western countries: Poland and the USA are on a declining pattern, with values between 8 and 10 deaths per 1,000 people. World average is 8.6. Both Russia

and Belarus are on a higher scale, between 14 and 16 deaths per 1,000 people. Belarus is stable at a value of 14 since 2000, while Russia had two peaks, in 2004 and in 2006.

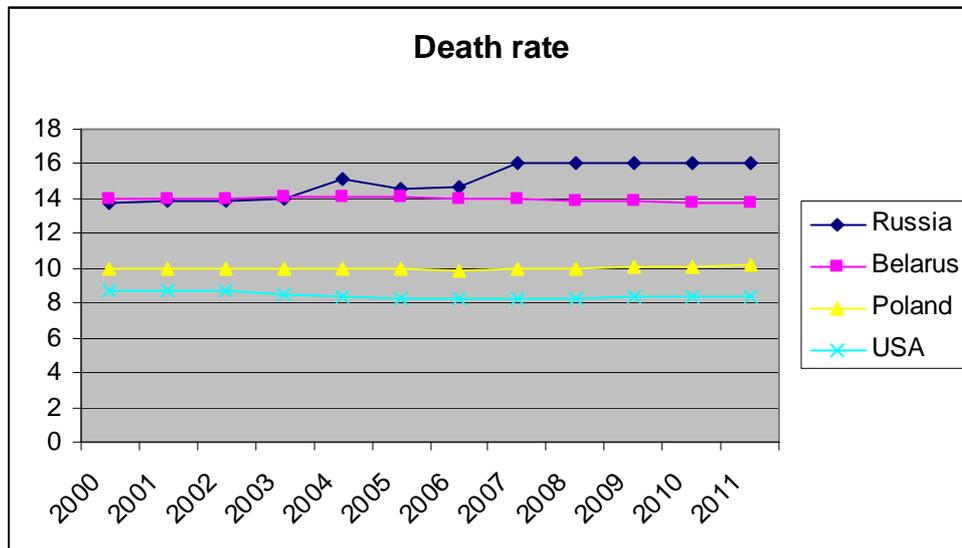


Figure 13 – Death rate in Russia, Belarus, Poland and the United States

The same two scales are found in life expectancy at birth, in figure 14. In the USA it is increasing since the Sixties and now around a value of 77 years. Poland had a small negative flexion between late Eighties and mid-Nineties, but indeed male life expectancy declined by just one year and then followed an increasing path. The value is now 70 years.

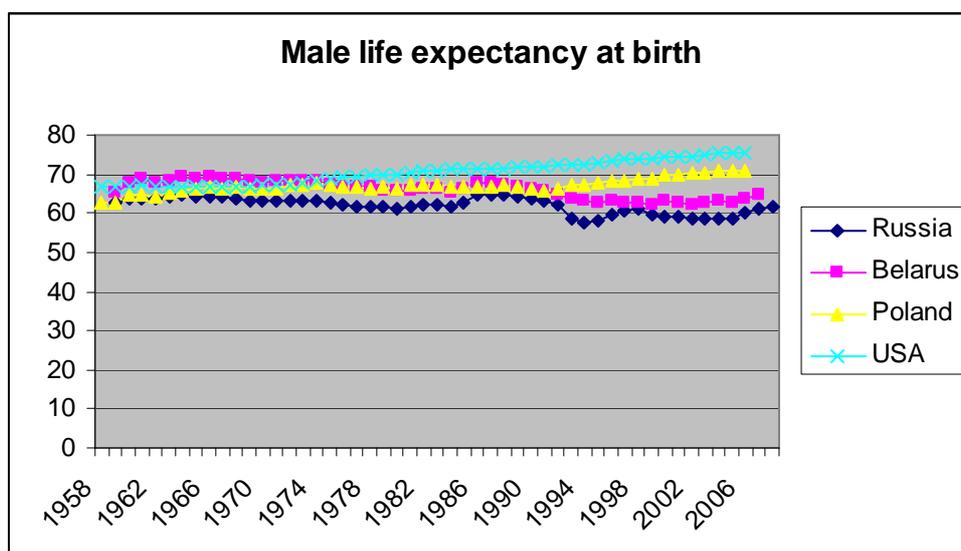


Figure 14 – Male life expectancy at birth in Russia, Belarus, Poland and the United States

The pattern for Belarus is decreasing over time: life expectancy decreased from 70 years in the Sixties to 65 years today, with a positive flexion in the years 1988-1989. Today male life expectancy for Russian men is the lowest one among the countries of analysis, with 62 years. It is also the only one which had a decline between 1994 and 1998 and it reached the lowest value of 57 years in 1996. As said, two causes have been identified: a negative reaction to the economic crisis and the high alcohol consumption among Russian men which the government is trying to reduce increasing prices and controlling sale and production with new regulations.

Looking at fertility-related issues, two indicators are here compared: total fertility rate and mean age of mother at first childbirth. As figure 15 shows, first-time mothers in Poland and the United States are now between 25 and 26 years old. The United States were around a value of 22 years in the Sixties and the indicator followed an increasing pattern through time. Values for Poland are not available before the Seventies, when the age remained stable around 23 years and then increased since the Nineties to 26 years. As already mentioned, Russia did not face high changes through time in fact the value was around 24 in the Sixties, it declined for some decades to 22 years and is now at the same value of the Sixties, at 24-25 years. Long time series are not available for Belarus which however appears to be on the same scale as Russia, confirming the hint of Western versus Eastern countries.

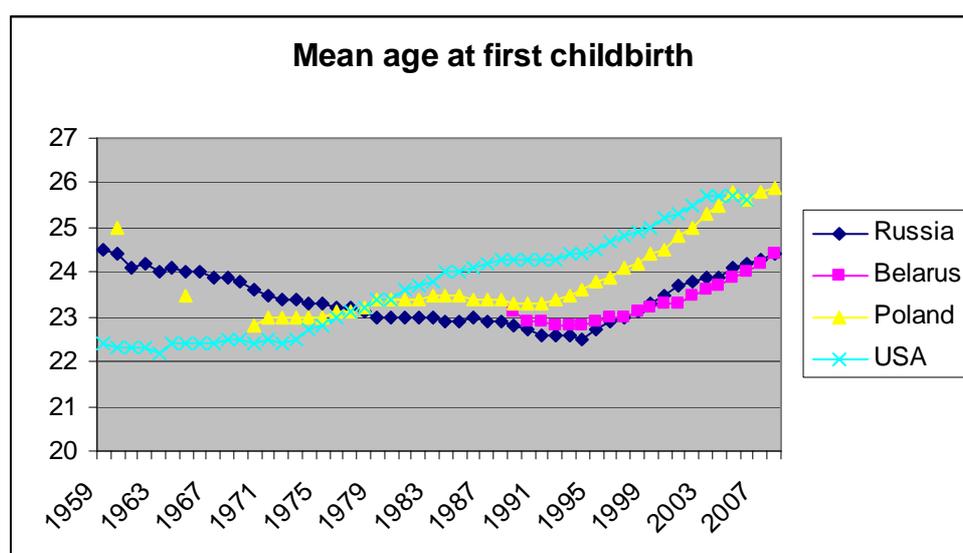


Figure 15 – Mean age at first childbirth in Russia, Belarus, Poland and the United States

Finally, the patterns of total fertility rate are shown in figure 16.

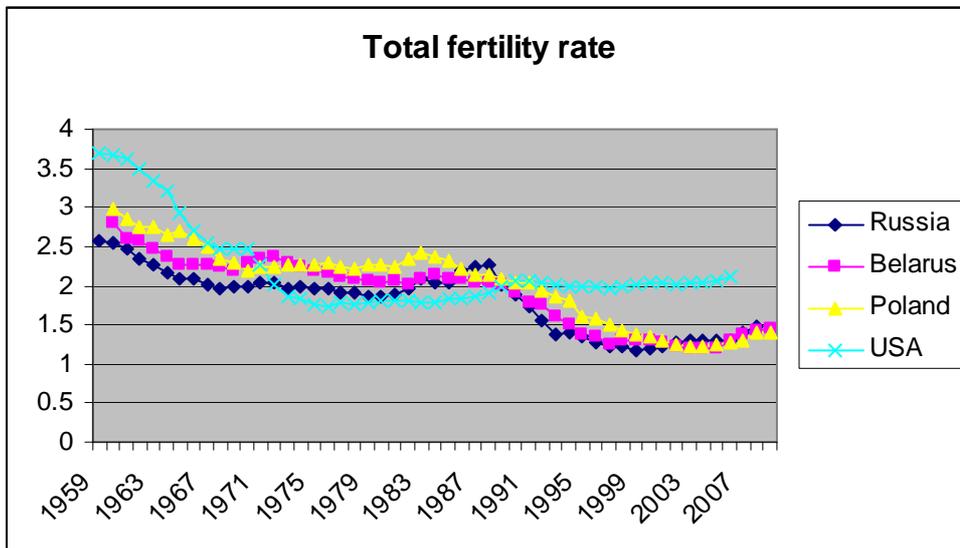


Figure 16 – Total fertility rate in Russia, Belarus, Poland and the United States

For this indicator, which is however on average and not age-specific, the outlier are the United States. In Russia, Belarus and Poland the average number of children per woman is now around 1.4, while it is still 2 in the US. The drop in Russian fertility between late Eighties and mid-Nineties appears sharper than the cases of Belarus and Poland and through time Russia has had the lowest fertility rates among all the countries of analysis. What emerges from the data is therefore not a unique case of low fertility for Russia, but a unique combination of low fertility, high mortality and low life expectancy which motivates the concerns of the Russian government and the policies adopted to sustain the population. As reported before, measures to reduce alcohol consumption are also in place, but due to the need to keep the dependency ratio balanced and guarantee the sustainability of the pension system and the size of the population itself, the main focus of the government is on fertility patterns.

6. Concluding remarks

In this chapter I presented a preliminary descriptive analysis of Russian demographic patterns in the past decades. The negative impact of the severe economic crisis which followed the transition from the Soviet system to a market economy and the changes in the Russian society appear in numerous indicators such as male mortality, birth rates and life expectancy. On the other hand, long-term improving trends are found for infant

mortality and more conscious and safe contraception and abortion decisions. As for Western European trends, Russia shows the positive absence of a postponement effect of childbearing, in fact the mean age of mothers at childbirth is still 24-25 years like in the past decades, and the negative presence of high alcohol consumption which is detrimental to male health and life expectancy. In the next chapters I will extend the analysis of the decline in birth rates studying the relation between fertility – both realized and intentional - income and economic uncertainty using data at the national, regional and individual level.

References

Denisova I., Kolenikov S., Yudaeva K. (2000) Child Benefits and Child Poverty. *Working Paper w2006, Center for Economic and Financial Research (CEFIR)*

Denisova I. (2010) Adult Mortality in Russia: A Microanalysis. *Economics of Transition, Vol.18, Issue 2, pp. 333-363, April 2010*

Goskomstat

Statistical Yearbooks of the USSR (*books*)

Statistical Yearbooks of the Russian Soviet Federative Socialist Republic (*books*)

Misikhina S. (1999) Social Payments and Benefits in the Russian Federation. *Problems of Economic Transition, Volume 42, Number 9, October 1999*

Pugh C. and Lewin S. (1991) Housing, gender and family policies in the Soviet Union under perestroika. *Journal of Housing and the Built Environment Volume 6, Number 1 (1991), pp. 47-55*

Rosstat – Statistics of Russia

Demographic Yearbooks of Russia

Stone O.M. (1969) The New Fundamental Principles of Soviet Family Law and Their Social Background. *The International and Comparative Law Quarterly, Vol.18, No.2 (Apr. 1969), pp. 392-423*

Treisman D. (2010) Death and prices. The political economy of Russia's alcohol crisis. *Economics of Transition, Volume 18 (2) 2010, pp. 281-331*

Weber C. and Goodman A. (1981) The Demographic Policy Debate in the USSR. *Population and Development Review Vol.7, No.2 (June 1981), pp. 279-295*

Chapter 4

The Only-Child Decades

Fertility Behavior in Russia

1965-2009

1. Introduction

Total fertility rate had a sharp decline in Russia in the last two decades. In the period from the Sixties to 2008, the average number of children per woman decreased from 2.5 to 1.4, a level which calls for Russia as a lowest-low fertility country. The most evident drop has been in the years between 1987 and 1995, few years before the dissolution of the Soviet Union. The lowest value ever was reached in 2000 with 1.2 children per woman and it appeared to be on a slowly increasing path since 2007.

Declining fertility is not a special feature of Russian demographic patterns, but a world-wide phenomenon therefore what makes the Russian case worth investigating is the effect of the economic crisis and the transition on fertility patterns. Is fertility procyclical or countercyclical over time? What is the effect of regional-specific characteristics? What drives the intention to have children of Russian women? This paper applies a data-specific, top-down strategy to answer these questions.

Empirical studies at the aggregate and individual level give mixed results. Kohler and Kohler (2002) study the relation between crisis and fertility in the early Nineties and find a positive association between early years of crisis and fertility. Grogan (2003) studies the fertility crisis after the transition across Eastern Europe and Russia and finds a negative relation between income and fertility, in line with the economic crisis argument. Grogan (2006) uses waves of the Russia Longitudinal Monitoring Survey - which is a nationally representative survey - between 1994 and 2001 and finds that income decline in the first years of transition had a negative effect on fertility and childcare structures do not play a relevant role in fertility decisions. Perelli-Harris and Gerber (2009) uses the Survey of Stratification and Migration Dynamics in Russia to analyze the effect of maternity leave on employment and on the decision to have a second child and they find a positive effect of maternity polices on both issues. Finally, Brainerd (2007), analyzing the decline in fertility through both the Russia Longitudinal Monitoring Survey and aggregate data for the decade of recovery 1990-2001, finds a positive relationship between household income and fertility, and a negative

relationship between unemployment and fertility. Childcare structures are significant at 10 percent level, a small magnitude as found by Grogan (2006).

This paper analyzes long-term and short-term trends in fertility patterns using a top-down approach. Long-term national data from 1965 are analyzed and discussed graphically, whereas regional level data, which are available for the period 1995-2008 for total fertility rate and for age groups, are employed in fixed-effects panel data models to determine what factors affect fertility patterns. Then, individual data from three waves of the Russia Longitudinal Monitoring Survey (RLMS) are employed in a logit model to determine what factors affect the desire to have children and whether these factors changed through time.

The paper is organized as follows: in paragraph 2 I will define the theoretical framework of fertility behavior and the expected feature of the Russian case, paragraph 3 will present data sources and methods and the empirical analysis will be presented and discussed in paragraph 4. Each section is devoted to a specific type of data and is self-contained. Finally, the last paragraph will summarize the results to give a comprehensive picture of Russian fertility patterns and will present concluding remarks.

2. Theoretical framework

The literature on fertility determinants is extensive and the debate about the pro-cyclical or countercyclical direction of fertility is still in place because results mainly depend on the sample and the period of analysis. Most long term cross-sectional studies (D'Addio and D'Ercole 2005, Engelhardt et al 2004) find a negative relation between income and fertility, but this trend seems to be reversing in the recent years. The issue for Russia and transition countries is further enriched by the features of transition itself, in particular the serious income decline in early Nineties.

Two primary models have been developed by the literature to link fertility behavior and income: Becker's and Easterlin's. Both frameworks attempt to explain the empirical negative relation between income and fertility. Becker focuses on the opportunity cost of children and the trade-off between quantity and quality of children, Easterlin, instead, considers cohort size and relative income. In this section I will briefly summarize both models and their underlying assumptions, then I will focus specifically on Russia and the role of the economic crisis argument.

In his seminal work, Becker (1960) models the demand for children in the context of a trade off between quality and quantity. Children are considered as consumer durables, and so it is likely that a rise in income would increase the amount spent on them. As for quality, as income increases, families will purchase more goods of better quality. As stressed by Becker (1960, p. 217), *“it suggests that a rise on income would increase both the quality and the quantity of children desired; the increase in quality being large and the increase in quantity small”*. While the increase in quality is confirmed by real world evidence, raw data mostly show a negative relation between income and quantity of children. Also, contraceptive knowledge and its diffusion converted the positive desired relation into the negative actual one. Other factors involved in the observed negative relation are numerous: decline in child mortality, increased costs of raising children – which is strictly related to their quality, movement from farm to urban communities, increased education and marriage postponement, among others.

Therefore, it is clear that quantity and quality are strictly related, as an increase in income would affect both, that is to say that as income grows or contraceptive knowledge diffuses or the cost of raising children increases, family demand switches from quantity to higher quality. Further studies (Becker and Lewis 1973, Willis 1973) extended this framework of quantity versus quality in a setting where the decision to have children is the combination of two effects: a substitution or price effect and an income effect which act through labor participation. When income increases, the substitution effect leads to an increase in the opportunity cost of spending time with children - with a negative effect on the decision to have children. On the other hand, the income effect moves in the opposite direction having a positive effect on children demand. The crucial factor in determining fertility behavior is labor participation, in fact since labor participation decisions for men are generally not affected by the decision to have children, men only have the second channel, that is the positive income effect: an increase in the husband wage is supposed to have an increasing effect on the demand for children. On the other hand, the final effect for women is the combination of the same income effect and the substitution effect because an increase in woman’s wage would have a negative effect on the demand for children through the substitution effect.

Critics, like Okun, to the model of 1960 mainly refer to the definition of children quality, which is likely not to be a choice of the family but a straightforward consequence of family standard of living, and considerations about the inner difference

between children and durable goods when dealing with quantity and quality income elasticity. Finally, as men acquire a more relevant role in children care and adequate childcare is provided to parents, higher female wages could make their income effect prevail.

Easterlin's model (1987) is based on the concepts of cohort size and relative income, which refers to young adults earnings relative to their aspirations. In the first part of the model, he defines the relation between cohort size, unemployment and family formation. Low birth cohorts face lower competition and more favorable career conditions, which ultimately result in a rise in employment and family formation, whereas the opposite will be true for the next generation, which will be formed by a large cohort. In the second part of the model, relative income is introduced as a determining factor of family formation, together with aspirations and social environment. Easterlin argues that as relative income increases, family formation and the number of children will increase. This model encompasses economics, psychology - through material aspirations - and sociology - through social characteristics as religion, community values etc - and it is considered to be valid for the United States fertility patterns between 1940 and 1980 and proved to be confirmed also for Europe. Macunovich (2003) extends Easterlin's model to female participation rate and specific features of the US economy as trade deficit.

Critics to this model mainly refer to its less orthodox approach with respect to Becker's model and its failure in predicting fertility patterns in the US after 1980. The major limitation of the model is data availability for wages and how to define aspirations and social environment.

The decline of Russian fertility has been studied extensively by Russian demographers (see Zakharov 1999, 2008, Zakharov and Ivanova 1996 for a comprehensive analysis), but empirical studies are limited, especially at the regional level, given the only recent availability of data and the relatively short time period. To my knowledge, the only paper using regional data is Brainerd (2007), who focuses on the decade 1990-2001.

Two theoretical issues need to be considered when dealing with transition countries and their fertility decline. On the one hand, as analyzed by Zakharov (1999, 2008), the general trend of declining fertility is in line with the predictions of the framework designed by Becker. At the same time, transition countries began to follow the path of

the Second Demographic Transition with a delay with respect to Western European countries, mainly because of the pro-natalist policies of the Soviet Union. On the other hand, the economic crisis argument must be considered when transition countries are analyzed. According to this argument, transition countries experienced sharply declining fertility rates as a response to uncertainty, unemployment and wage reductions following the collapse of the Soviet Union. Also, relative deprivation and the feeling to be poorer with respect to other people or to previous years will depress family formation and fertility.

3. Data sources and methods

This study employs a top-down strategy which is data specific. Three levels of data are used: national data from 1965 onwards, regional data from 1995 to 2008 and individual-survey data from the Russia Longitudinal Monitoring Survey for the years 1994-1995 (wave 5), 2002-2003 (wave 11) and 2008-2009 (wave 18). Sources for national data are the Statistical Yearbooks of USSR, the Statistical Yearbooks of the Russian Soviet Federative Socialist Republic and the Demographic Yearbooks of Russia. Regional data are from the Demographic Yearbooks of Russia and the volumes Regions of Russia. Individual level data are from multiple waves of the Russia Longitudinal Monitoring Survey (RLMS).

With national data, the theoretical issue of the pro or countercyclical relation between income and fertility is graphically analyzed and discussed, as are female employment and education. Given data sources for the Soviet period, whose reliability is sometimes a critical issue as for labor data, and the structural break of 1991, this strategy appears as the most suitable one. With regional data available after 1994 different panel data models are tested to control for regional characteristics. Individual level data from the RLMS are employed in a logistic regression model to detect the factors affecting the probability of desiring children wave-by-wave.

4. Empirical analysis

Each section is data specific in its empirical strategy and it is self-contained. Results are discussed in each section, and compared and summarized in the next paragraph.

4.1 National data

Most industrialized countries in the past decades have followed a common pattern of higher income, higher life expectancy, lower death rates and fertility rates in line with the Second Demographic Transition. This has not been the case for Russia. Fertility indeed has declined, but life expectancy today is at the same level of the past five decades for women and much lower for men, while income had a sharp decline from 1990 to 2000. During the early years of transition, lower fertility in Russia has not been associated to higher incomes or increase in life conditions, but it has instead been the reaction to economic uncertainty, high unemployment and income inequalities, a phenomenon in line with the economic crisis argument.

A consistent long term relation between income and fertility has not been identified so far, due to data availability and the high economic instability. Results depend much on the time horizon used in the analysis. Figure 1 shows the dynamic of per capita gross domestic product (GRP) and total fertility rate (TFR) since 1965. While total fertility rate is specific for Russia, the series of per capita gross domestic product (GDP) is taken from Maddison³⁷ and represents the whole Soviet Union until 1989 and Russia from 1989.

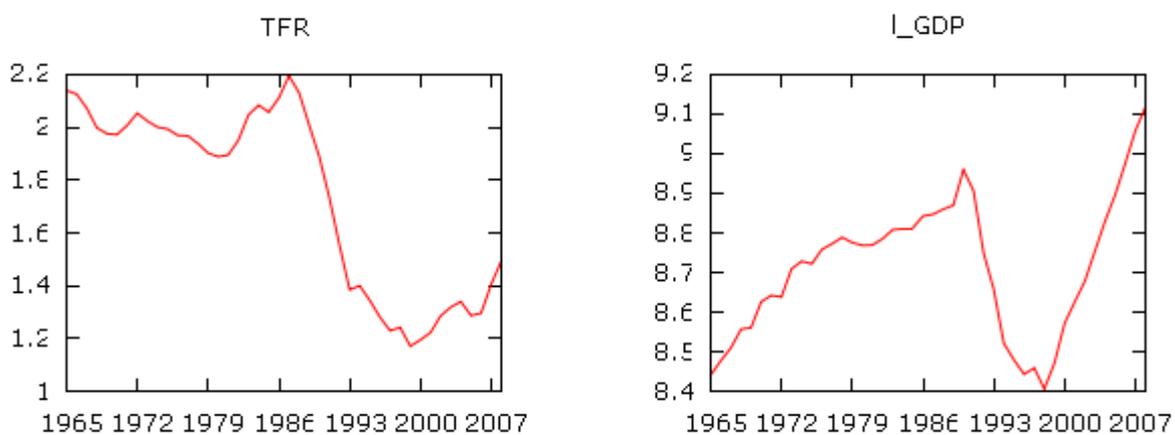


Figure 1 Dynamic of total fertility rate (TFR) and per-capita gross domestic product (GDP)
Data sources: Statistical Yearbooks of USSR, the Statistical Yearbooks of the Russian Soviet Federative Socialist Republic and the Demographic Yearbooks of Russia

³⁷ Data and publications available online at www.ggd.net/maddison/

The GDP graph shows an upward trend until the structural break in 1991, when the Soviet Union collapsed. After the financial crisis of 1998, the recovery phase ended and GDP shows average annual growth rates of 5-6 percent. The TFR graph instead shows a non monotonic path until 1987-1988, but absolute values remained on average around the replacement level of 2.1 children per woman. The sharp decline appears a few years before the structural break of GDP and it clearly shows a severe decline from 2.2 children per woman in 1987 to 1.4 children per woman in 1992. The trend then decreased until the year 2000, and it reached value 1.5 children per woman in 2008, the same found in 1990. It is worth stressing that if TFR values are not much different from other low-fertility countries like Germany, Italy or Japan, Russian peculiarities are the severe decline in late Eighties – in line with the economic crisis argument – and the combination of fertility decline and decline in life expectancy, which is not found in other industrialized country. Family policies or benefits do not seem to have ever had the expected effects on fertility decisions of Russian women and families. The issue is crucial for the labor market and sustainable economic growth, given that a consistent, long-run trend of declining population, high mortality rates for working-age population - men in particular - will likely lead to a decline in the labor force, higher dependency ratio and non-sustainability of the pension system.

Graphical analysis of the data leads to the conclusion that total fertility rate appears pro-cyclical, with TFR and GDP following parallel patterns.

Figure 2 shows the dynamic of female education and female employment for Russia from 1965.

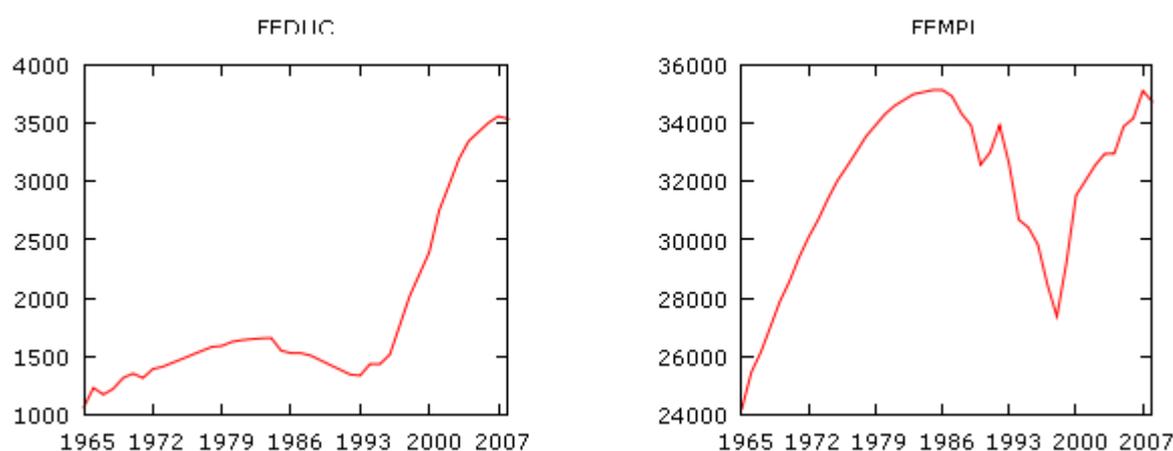


Figure 2 Dynamic of female education and female employment

Data sources: Statistical Yearbooks of USSR, the Statistical Yearbooks of the Russian Soviet Federative Socialist Republic and the Demographic Yearbooks of Russia

Employment rate should be taken with caution, as the Soviet government claimed that unemployment was liquidated in the early Thirties (see Gregory and Collier 1988). Female education is measured as thousand of female students enrolled in higher and secondary specialized educational institutions. The share of male and female students is available until 1987 and rather homogeneous through time, around 50/50. As for higher education, the number of female students more than doubled after the recovery phase.

Female employment is measured in thousand of people and the graph shows that the number of women employed increased year-by-year with population until the end of the Soviet Union and had a sharp decline up to the financial crisis of 1998, then increasing again with economic growth.

A lack of significant correlation exemplified by a 1.7 positive but indeed no significant correlation between GDP and TFR opens itself to further data inspection. The other correlations are .01 not significant correlation between TFR and female employment, as expected in a planned economy with full employment; negative -.65 correlation significant at 1 percent between female education and TFR, as expected by the fact that female education counts students enrolled; .82 correlation significant at 1 percent between GDP and employment and .44 correlation between GDP and students enrolled.

4.2 Regional data

Total fertility rate had a sharp decline in Russia in the last two decades and factors as climate, population density, religion and agrarian or industrial vocation of the region play a relevant role in fertility behavior of the resident population. The purpose of this section is to provide insights into the determinants of the Russian fertility decline at the regional level. The regional dataset employs data from various issues of the volumes Regions of Russia and the Demographic Yearbooks of Russia published by Rosstat. It is a balanced panel of 74 Russian regions covering the period 1995-2008. The regions which are excluded are Kaliningrad (Russian territory between Poland and Lithuania), Chechnya, Ingushetia, Chukotka, Tuva and Altai Republic because data are incomplete.

4.2.1 Regional trends

Today Russia has a population of about 142 millions people and 73 percent is living in urban areas. The share of rural population has not changed greatly in the past few decades and remains around 27 percent. A national level population density of 8.3 pp/km² is low compared to the 32 pp/km² of the United States and 112 pp/km² of the European Union. For both indicators, the situation at regional level is not homogeneous for a number of reasons. Climate conditions have a major effect on the distribution of the population across the country, with the European part being the most populated. Asian Russia accounts for 75 percent of Russian territory, but only 22 percent of the Russian population. Regional variation in Russian population dynamics received attention first in the Seventies³⁸ when the decision to adopt *ad hoc* policy measures was taken and maintained until late Nineties. In 1998, pro-natalist policies taken at a regional level were canceled owing to financial constraints and their inability to reach the expected goals. As shown in figure 3, the difference in total fertility rate between rural and urban population is decreasing over time, but it still remains in 2009. In 1962, the average number of children per woman in rural Russia was above three, while it was two in urban areas. Today, in urban areas total fertility rate is below replacement level while in rural areas it is still around 2 children per woman.

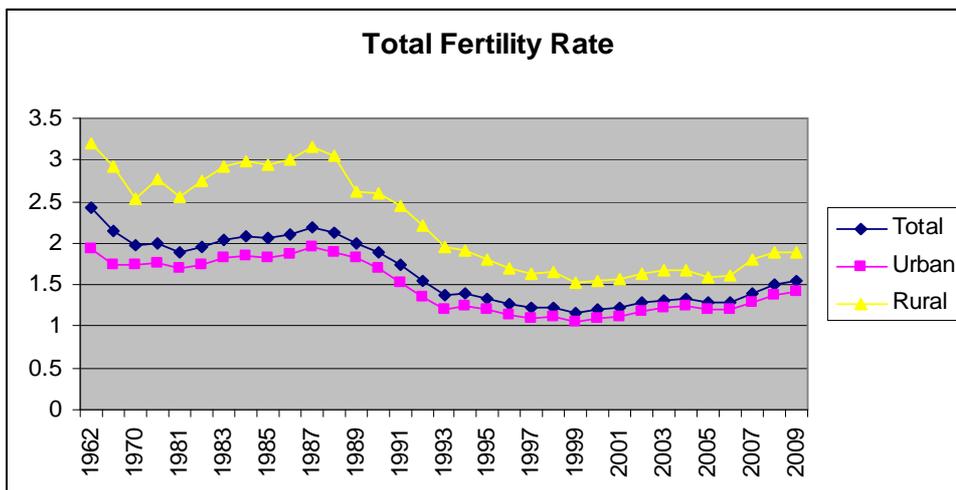


Figure 3 – Total Fertility Rate – rural and urban population

³⁸ Weber and Goodman (1981) document the demographic debate since 1976 and report the results of the 26th Congress of the Communist Party of the Soviet Union held in 1981, where it was decided to introduce gradually “*step by step in different regions of the country*” new pro-natalist measures (lump-sum grants and partially paid maternity leave)

Table 1 shows the age specific birth rates per 1,000 women in the years 1998 and 2008. Across all Districts the age groups with the highest number of births are those of women aged 20-24 and 25-29 years old, in line with the evidence at the national level.

District	Central		North-W		Southern		Volga		Urals		Siberian		Far Eastern	
	1998	2008	1998	2008	1998	2008	1998	2008	1998	2008	1998	2008	1998	2008
15-19	30.2	25	27.1	24.7	38.8	34.8	32.3	27	35.4	34.4	39.9	38.6	39.8	35.5
20-24	90.9	79.4	85.3	75	113.3	102.9	101.7	89	101.5	93.5	103.5	98.4	98.3	94.1
25-29	62.1	85.6	63.4	85.8	78.7	97.1	71.3	91.4	69.7	95.5	66.7	94.1	66.1	89
30-34	29.5	56.4	30.2	58.2	41	66.1	35	60	33.3	62.7	32.4	62	34.6	58.8
35-39	10.1	23.9	10.3	24.6	15.3	30.1	11.6	25.3	11	27.3	11.2	26.1	13.2	26.2

Table 1 - Age Specific Birth Rates – Federal Districts
Notes: live births per 1,000 women in the specific age group

There are differences between areas specialized in industrial activities and rural areas, in fact in the Central and North-Western Districts the number of births in the group 20-24 is lower than in the Southern District by a factor of 20 births per 1,000 women. Results for Asian Russia are in between those for European Russia and the Caucasus and rather similar across Districts. Through time all Districts had a reduction in the first two age groups and an increase in the groups 25-29 and 30-34. The shift between the group 20-24 and the subsequent one is likely due to the decision to delay motherhood, a phenomenon which however remains weaker in Russia than in Western European countries. The reduction in the segment 20-24 is more pronounced in the richest Districts – which also have lower absolute numbers - than in isolated areas like Siberia and the Far East, where it is limited to 3-4 births per 1,000 women. Finally, birth rates across all age groups are higher in 2008 than in 1998, providing evidence together with the dynamic of total fertility rate in figure 3 than the reduction of the Nineties must be analyzed in light of the general economic crisis of the country at the time.

Figures 4 and 5 show the dispersion of crude birth rates across regions in 1990 and in 2009. The mean crude birth rate per 1,000 population was 14 in 1990 and it recovered to 13 in 2009 after the critical central phase of transition. The overall distribution did not change over time, in fact the regions characterized by low birth rates are concentrated mostly in European Russia in both years.

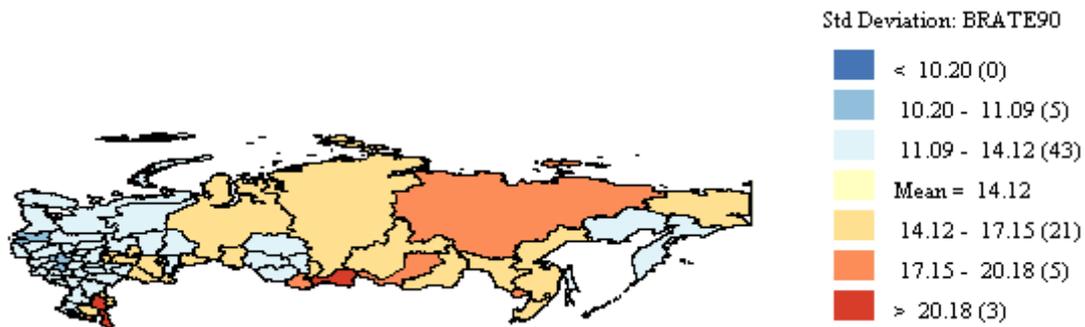


Figure 4 – Standard deviation of crude birth rates across regions in 1990.
 Author’s elaborations using Rosstat data, software Geoda

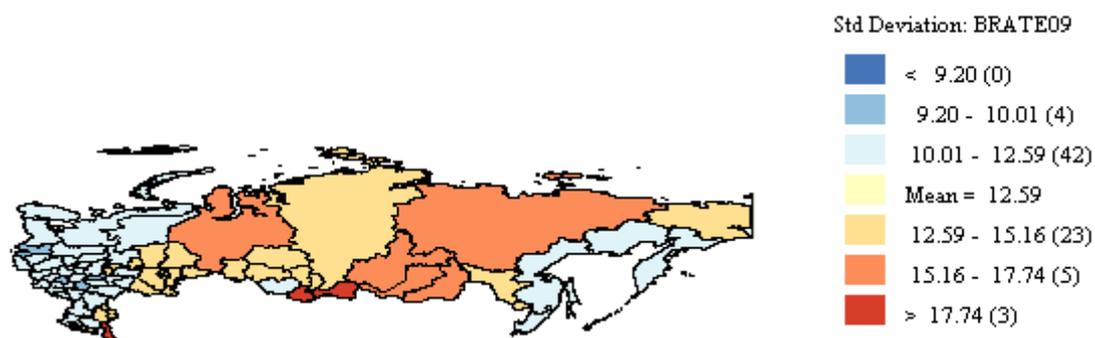


Figure 5 – Standard deviation of crude birth rates across regions in 2009.

In the past few decades the population density in the least populated areas of the north and Far East dropped significantly (see Kontorovic 2000). The population in the Far East dropped by 15 percent after 1991 and today remains around 1 pp/km² with inhabitants migrating to the European and Southern Russia regions where climate conditions and job opportunities are better. Using the Federal Districts as reference, all have two thirds of the population living in urban areas except the Southern and Siberian regions where the share is around fifty percent.

Figure 6 shows the percentage population change in selected years (1990, 1995, 2001-2007) for each of the seven Federal Districts. In 1990 all had a positive population change, with high internal differences. In the Central District ten of the eighteen regions were already on a negative path whilst Moscow bucked the trend with +1.5.

The District with the highest population growth was the Southern one, with Chechnya +6.5 and Dagestan +3. Only five years later in 2007/2008, did all the Districts show a negative path moving towards zero or positive values except for the Southern

and the Central. In 2009, eighteen regions out of 89 had a positive population growth. In 2008 and 2009 the Southern remained the only District with positive natural increase of population but was joined by the Urals and Siberian Districts the following year when they showed a small but positive natural increase. Total fertility rates vary from 1.3 in industrialized urban areas to around 2 children per woman in remote rural areas of Siberia and in the Southern regions where there is a Muslim majority.

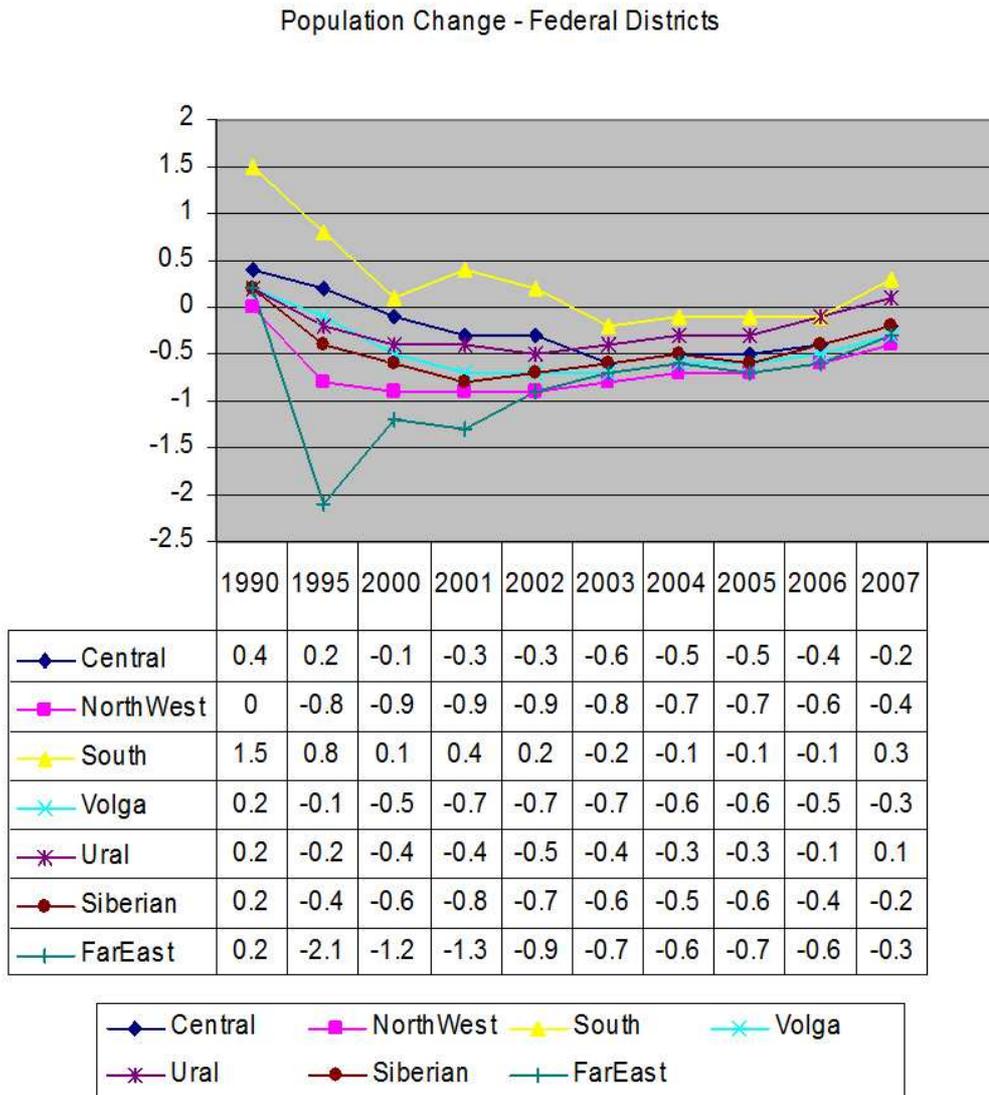


Figure 6 – Population change in the Federal Districts

Aside fertility, mortality rates play a major role in shaping regional population. Figures 7 and 8 show the standard deviation of crude death rates on 1,000 population across regions in 1990 and in 2009.

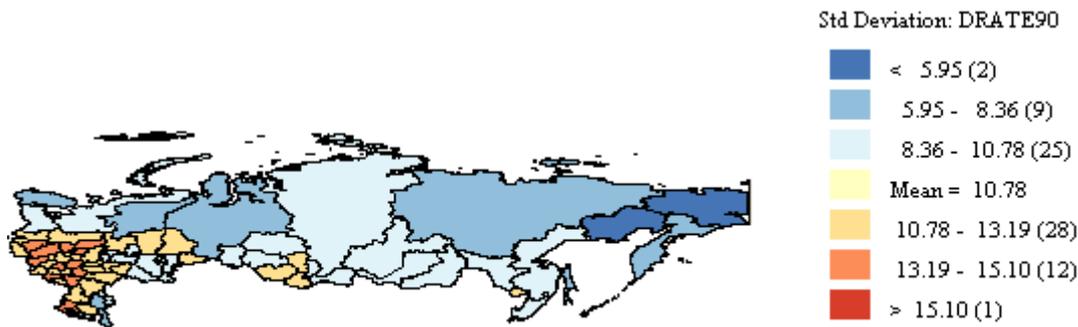


Figure 7 – Standard deviation of crude birth rates across regions in 1990.

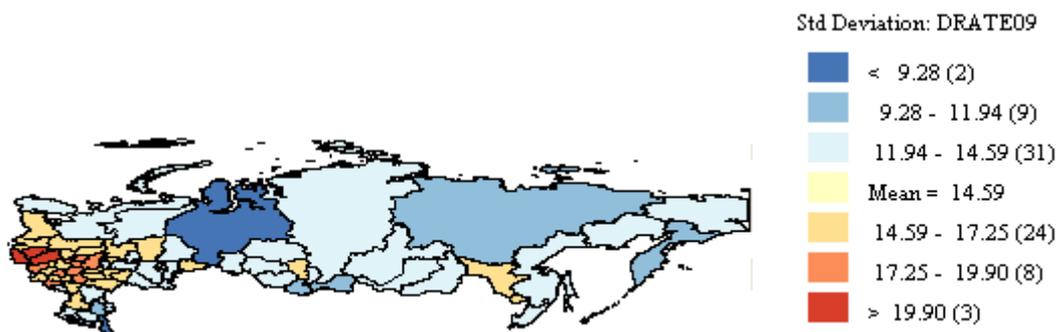


Figure 8 – Standard deviation of crude birth rates across regions in 2009.

Crude death rates faced an increase over time from 11 per 1,000 population in 1990 to almost 16 in 2009. The regions with the highest death rates are in European Russia, whereas numbers in Asian Russia remain under the national average.

Inter-regional migration flows have modified Russian population in both density and composition for example, compared to previous decades North Caucasus has shown an increase in population due to the higher fertility rates of the groups that have migrated there.

Better job opportunities, climate and life conditions in the Southern and Central Districts led to a migration from the North and Far East Districts resulting in a loss of 200,000 and one million inhabitants respectively between the years of 1990 and 1999. In the area of the Caucasus, the trend has been an out-flow of Russians and a concentration, in each republic, of the specific vocal ethnic group. The percentage of Russians in the entire population fell from 81.5 percent in 1989 and 79.8 in 2002. It is worth noticing that in 2001 a positive population change occurred only in the regions in which non-Russians migrated.

Religion is also likely to affect life habits and especially female participation rate in the labor market. The first and second most practiced religions in Russia are Christian Orthodox and Islam, with minor shares of Protestants, Catholics and Buddhists. Islam covers about one seventh of the total population and Muslims are the majority in the regions of the Caucasus and in some regions in the Volga area, mainly Bashkortostan and Tatarstan Republic, where more than 50 percent of the population is Muslim. Regional differences are in some cases influenced also by the main religion of the area, for instance Muslims consume less alcohol than other groups and therefore have fewer alcohol-related problems.

4.2.2 Results

The period of analysis goes from 1995 to 2008 and is divided in two sub-periods before and after the year 2000. First I employ as dependent variable the age-specific birth rate of the total age group 15-49 years old women, then each age-specific birth rate group 15-19, 20-24, 25-29, 30-34, 35-39. The set of covariates includes the log of real per capita gross regional product as a proxy for income, the series of current price index as a proxy for uncertainty and volatility, the share of preschool coverage (used as the proxy for regional pro-natalist policies given that more specific data are not available at this level of aggregation) and the female labor participation rate. The inclusion of regional fixed-effects allows us to control for time-invariant characteristics at the regional level such as climate, share of rural and urban population, agrarian or industrial vocation of the region. The advantage of the inclusion of fixed effect is great for Russian regional fertility studies given that most of the regional peculiarities are time-invariant or rather stable through time so the issue of omitted variables is highly reduced and estimation results are more precise.

Control for male life expectancy is required in order to test if the increase in male mortality and the decrease in male life expectancy had an impact on fertility. According to Brainerd (2007) this hypothesis is supported if the coefficient for male life expectancy is positive and significant and she finds positive but not significant results controlling for male life expectancy. I controlled for male life expectancy and the coefficient is negative and not significant in all specifications, meaning that there are no

signs that the decrease in male life expectancy is also affecting and damaging fertility decisions. Given its non significance, male life expectancy is not included on results.

Regression results are reported in table 2 in the Appendix. The effect of real per capita GRP on fertility is negative in all specifications, showing a negative association between the proxy for income and fertility in line with Becker's model predictions. The result is robust to different specifications using also the lagged value of GRP to avoid issues of simultaneity. In order to control for the non-linear component, it is necessary to test also for the square of GRP. The sign of squared income is positive and significant, suggesting that the relation between fertility and income is U-shaped. Fertility is expected to decline as income increases, but this negative effect decreases as income further increases, therefore fertility will eventually rise when income reaches a certain threshold. For the whole sample, as income increases by 1 percent, birth rates decrease on average by a factor of 70 births per 1,000 women, by contrast when income increases above a certain threshold, birth rates increase by a factor of 3 births per 1,000 women.

Regional consumer price index and its lagged value - since the decision to have a child is taken at least one year before the birth of the child – has been used as a proxy for economic uncertainty and instability. The coefficient has the expected negative sign, but it is generally not significant.

The relation between fertility and female labor participation is negative and significant, showing that employed women are discouraged to have children. Interestingly, this trend is reversed controlling for the interaction between female labor participation rate and pre-school coverage: the interaction term is positive and significant across all specifications. If external childcare is adequately provided, employed women do have positive birth rates. The issue of childcare structure for pre-school kids is a critical one for Russian women. During the Soviet time, preschool belonged to the set of free services provided to the population together with education and healthcare. Childcare was indeed provided by the firm where the mother was employed and given that employment was practically universal, families were relieved from the problems related to childcare availability. With transition and in particular until the year 2000, the availability of preschools decreased on the one hand because the Soviet system of full employment and childcare provided at the firm level was not existing anymore, on the other hand the actual number of kids was decreasing cohort by

cohort and so did the availability of childcare services. With lower birth rates, supply decreased for lack of financial resources by the State and also in response to the lower demand by families.

Table 3 shows regression results for specification (7) for each specific age-group, which allow to detect any difference in signs or magnitude of the economic and social factors depending on the age of the woman. Results for the first group 15-19 years old women should be taken with caution, as the fertility level is low in this group and in addition most of the group is still not participant in the labor market. As for the whole sample, the most evident difference is the magnitude of income coefficients. For the age group 20-24, the decrease in birth rate in response to a 1 percent variation in income is 95 births per 1,000 women, whereas it was 60 births less in the total age group. The reduction is decreasing in age as expected by the fact that as women become older and reach completed fertility, the effect of income on their decision decreases.

The analysis is then repeated for the two subsamples 1995-1999 and 2000-2008. The threshold is defined by the turning point of the 1998 crisis and subsequent economic growth. Estimation gives results which are consistent with those of the whole sample.

4.3 Individual data

The aim of this paragraph is to analyze what factors affect the intention to have children among a nationally representative sample of Russian women in order to extend the analysis conducted so far and find any difference in fertility behavior between aggregate data and the intentions of Russian citizens.

The Russia Longitudinal Monitoring Survey (RLMS) is a nationally representative household-based survey designed to monitor the effects of Russian reforms on the health and welfare of Russian households and individuals in the Russian Federation. The project started in 1992 and so far 18 waves have been collected. Phase I is composed of the first four waves, while Phase II begins with wave 5. The RLMS has been used for fertility-related studies by Kohler and Kohler (2002), Brainerd (2007), Grogan (2006, 2010), Perlman and McKee (2009) among others. I use three waves of the RLMS: waves V, XI and XVIII to compare the individual behavior between early years of transition (years 1994-1995), first years of recovery after transition itself and

the financial crisis of late Nineties (year 2002-2003) and today (years 2008-2009), after a decade of economic growth.

4.3.1 Method and data

The method for the empirical analysis is the logistic regression model used to analyze settings where the response variable is a binary variable which assumes only value 1 (success, if the event occurs) or 0 (failure, if the event does not occur). Results are shown in table 5 in the Appendix expressed in term of *odds ratio* of “intending to have a child” relative to “do not intending to have a child” for that category of the control variable with respect to its baseline equal 1. For the interpretation of results, more positive parameters estimates refer to an increased likelihood of desiring a child. For instance, if the binary variable “married” reports an odds ratio of 1.80, we can say that for married women – with respect to the base category “single women” - the odds of intending to have a child increase by a factor of 1.80, holding other controls constant. For an easier interpretation of results I will compute and discuss also predicted probabilities.

The dependent variable is the intention of the respondent to have (other) children, which is designed as a binary variable equal one if the intention is positive and zero if the woman does not intend to have other children. As shown by aggregate data and the concerns of the government, most of Russian women have only one child so it is straightforward to investigate which socio-economic factors have an impact on their decisions. The individual level of analysis allows to control for household income, self-perception of the respondent, her labor market status, parity (defined as number of children and whether the respondent has children or not), her educational level and whether she is married or single, all factors which were not available at the regional level.

Summary statistics for the three rounds are available in Table 4. The sample in each round is restricted to women aged 18-45 years. All the three waves of the RLMS provides real household income in 1992 rubles and I will use also two rank factors to control for economic conditions: self-perception about overall life satisfaction and self-perception about individual economic conditions with respect to the society. The variable for life satisfaction asks “*To what extent are you satisfied with your life in general at the present time?*” and answers are divided in five categories from “*fully satisfied=1*” to “*not at all satisfied=5*”. The second question asks to indicate on a scale

from one (“*poor*”) to nine the step where the respondent perceives herself to be in terms of income with respect to the society. Both indexes are slightly increasing over the period. I will refer to the first question as absolute self-perception and to the second one as relative self-perception.

A respondent is considered participant in the labor market if she is currently employed or on paid/unpaid leave. The share of participants is rather constant through time and higher with respect to Western standards, it is indeed around 70 percent. In 2004, employment rate of women as a percentage of female population aged 15-64 was 45 percent in Italy, 59 percent in Germany and 62 percent in Russia (OECD, IMF data). Mean income and the drop between round V and round XI in particular reflect the dynamics of the Russian recovery after the end of the Soviet Union.

The most significant fact highlighted by the summary statistics is the drop in the share of women who have ever had a child in the last wave of the survey. The share of mothers was around 90 percent in the waves held in 1994 and in 2001, whereas it decreased to 66 percent in the sample of 2009: these are women born between 1965 and 1992, the cohorts who have been more involved in the economic and social changes of the Nineties, in fact most of the mothers of the first two waves had given birth before the dissolution of the Soviet Union or in the first early years. The last round of the survey is also the one with the highest real income level, which followed since the year 2001/2002 an increasing pattern.

4.3.2 Results

Results for the logit model are available in table 5. The relationship between household income and the intention to have (other) children has positive value in all waves, but its effect on predicted probability is low in magnitude, for instance for an employed woman aged 30 doubling income in different ranges increases the probability to want a child only by two percentage points in 1995 and 1 percentage point in 2008. On the other hand, the factors with a significant consistent pattern both in magnitude and through time are the self-perception factors showing that more than the income *per se*, what matters for Russian women and families is perceive wellbeing.

Looking at the perception on individual economic conditions, the effect of self-perception (both absolute and relative) on the likelihood of desiring to have children is positive in both scales. A respondent who is fully satisfied with her economic condition has a probability to want children of .32 in 1994, .23 in 2002 and .55 in 2008 and

absolute self-perception shows similar magnitudes. Looking at the dynamic across waves, the magnitude of the effect decreased in the time period 1995-2002 which was indeed characterized by high instability and very low birth rates, whereas it increased significantly in the recent years.

The relationship between education and fertility desire is positive overall and the probability of wanting children is slightly increasing with grade although the predicted probabilities differ by a few percentage points for women with higher levels of education with respect to the baseline. It is worth noting that more than half of the sample has a high school diploma or higher grade level, so that achieved education is not a factor able to discriminate among individuals in the sample.

Labor participation rate did not change dramatically for Russian women over time, in fact summary statistics show that the share of participant mothers is stable across waves. The share of employed mothers who declare to want a child is increasing over time from 20 percent of working mothers in 1994 to 31 percent of working mothers in 2008 and comparable increases are found in the logit model looking at the predicted probabilities to want a child for employed mothers: the values are .22, .25 and .48 wave by wave. It is interesting to notice that the probability of wanting children for childless employed women increased by 14 percentage points between 1994 and 2008. In fact, starting from 2002 the group with the highest probability of desiring children is not anymore “childless women out of the labor market” – the model of the stay-at-home mum - but “employed childless women”.

Individual level data allow to link the desire to have children with the actual number of children of the respondent, which is the most relevant connection for policy analysis. In 2007 the Russian government introduced a new policy, called the Maternity Capital Program, designed to give incentives toward the decision to have a second or subsequent child. Women giving birth to or adopting a second child (or third/forth etc, if the grant was not requested for the previous one, i.e. the second/third child) are eligible to apply for a grant set at 344,000 rubles (8,600 euro) in 2010 not to be spent before the child turns three years old. The grant was set at 250,000 rubles when the program started and it is indexed on inflation. It can be used for loans, housing, education, or added to the mother’s pension fund. The logit model shows that women who already have children, without disentangling for parities, are less likely to want other children than childless women, but the probability is increasing in self-perception

also for this group. Looking at transition into motherhood (which is the intention to have a first child), the predicted probabilities to want a first child are .74 in 1994 and .67 in 2008: although data on the share of childlessness in Russia are not available, it is likely that this phenomenon increased also at the aggregate level clarifying part of the decrease in crude birth rates. For mothers of one child, the probability to want a second child is .33 in 1994 and .46 in 2008 showing that the two-children family model is not shrinking *per se* but actually limited by the difficulties of balancing work and motherhood and financial constraints.

5. Concluding remarks

This paper aimed to provide a comprehensive analysis of Russian fertility patterns from the Sixties employing data at the national, regional and individual levels, collected with different techniques. This study suggests that at the national level fertility appears to be pro-cyclical, on a parallel line with the proxy for business cycle and in line with the economic crisis argument although the correlation between the two variables is limited, while at the regional level the fixed-effects analysis allows to control for regional-specific effects which could have an impact on fertility. This deeper level of inspection reveals that the relation between income and fertility is U-shaped, meaning that fertility is decreasing in income until income reaches a certain threshold. Above this threshold fertility increases with income by a factor of 3 births per 1,000 women. The U-shaped relation is also confirmed for each age group with different magnitudes, in fact the highest decrease is found for the age group 20-24 and it is decreasing in age.

Interestingly the logit model shows that for Russian women self-perception and perceived wellbeing at the absolute level and with respect to the society are more relevant than the income *per se*; as a result fertility intention is increasing in self-perception. At the individual level the variable that is correlated with fertility expressed as the desire to have children is not income but perceived wellbeing in the form of self-perception of the respondent about her life in general and self-perception about her economic condition.

The relation between labor participation, motherhood and desired fertility does not show dramatic changes over time in trends, employed mothers are still less likely to desiring children than unemployed childless women in 1994 and in 2008, whereas a novelty of the last two waves is the evidence that within waves the specification with

the highest probability of desiring children is not unemployed childless women anymore (the stay-at-home mum model), but unemployed childless women.

As for policy advises, it appears that the recent policy measure Maternity Capital Program is designed to reach to correct target represented by mothers of one child. The probability of desiring the first child is indeed almost double than the probability of desiring a second one and this evidence calls for *ad hoc* policy measures. Given that the first applicants received the grant in 2010, when individual level data will be available it will be possible to assess critically whether the Maternity Capital Program had the expected effects on fertility behavior.

References

Becker G. S. (1960) An Economic Analysis of Fertility. In *Becker, ed., Demographic and Economic Change in Developed Countries*. Princeton, N.J.: Princeton University Press

Becker G S. and Lewis H. G. (1973) On the Interaction between the Quantity and Quality of Children. *The Journal of Political Economy* 81: pp S279-S288

Brainerd E. (2007) The Baby Decision Amid Turmoil: Understanding the Fertility Decline In Russia of the Nineties. *Williams College*

D'Addio A.C. and D'Ercole M.M. (2005) Policies, Institutions and Fertility Rates: A Panel Data Analysis for OECD Countries. *OECD Economic Studies No.41, 2005/2*

Easterlin R. (1987) Birth and Fortune: The impact of numbers on personal welfare. *Second Edition*. Chicago University Press.

Engelhardt H., Kogel T. and Prskawetz A. (2004) Fertility and women's employment reconsidered: A macro-level time-series analysis for developed countries, 1960-2000. *Population Studies, Vol.58, No.1, 2002, pp.109-120*

Gavrilova N.S., Semyonova V.G., Evdokushkina G.N., Ivanova A.E., Gavrilov L.A. (2009) Problems with Mortality Data in Russia. *Paper for 2005 PAA Annual Meeting*

Goskomstat

Statistical Yearbooks of the USSR (*books*)

Statistical Yearbooks of the Russian Soviet Federative Socialist Republic (*books*)

Gregory P. R. and Collier I. L. (1988) Unemployment in the Soviet Union: Evidence from the Soviet Interview Project. *The American Economic Review, Vol.78, No.4 (Sept 1988), pp 613-632*

Grogan L. (2002) What caused the post transition fertility decline in Central and Eastern Europe and the Former Soviet Union? *Department of Economics University of Guelph*

Grogan L. (2006) An Economic Examination of the Post-transition Fertility Decline in Russia. *Post-Communist Economies, Volume 18, issue 4 pp 363-397*

Grogan L. and Koka K. (2010) Young Children and Women's Labour Force Supply in Russia, 1992-2004. *Economics of Transition, Volume 18(4) 2010, 715-739*

Kohlmann A. and Zuev S. (2001) Patterns of childbearing in Russia 1994-1998. *MPIDR WP 2001-18, July 2001*

Kohler H. and Kohler I. (2002) Fertility Decline in Russia in the Early and Mid 1990s. *European Journal of Population* 18: 233-262

Kontorovich V. (2010) Can Russia Resettle the Far East? *Post-Communist Economies*, 12:3, pp. 365-384

Lindner R. (2008) Excerpt from Russlands defekte Demographie. *SWP-Studie, Berlin 2008*

Macunovich D. (2003) Chapter 8 - Economics of Gender and the Family. *Edited by Karine Moe, Blackwell Publishers*

Perelli-Harris B. and Gerber T. (2009) Maternity leave in Russia: Policies and effects on labor market transition and childbearing. *Annual Meeting of the Population Association of America, Princeton, US*

Perlman F. and McKee M. (2009) Trends in family planning in Russia 1994-2003. *Perspectives on Sexual and Reproductive Health* 41(1)

Rosstat – Statistics of Russia

Statistical Yearbooks of Russia and Regions of Russia, various issues 1996-2010 (*books*)

Russia Longitudinal Monitoring survey, RLMS-HSE

Conducted by Higher School of Economics and ZAO “Demoscope” together with Carolina Population Center, University of North Carolina at Chapel Hill and the Institute of Sociology RAS.

RLMS-HSE sites: <http://www.cpc.unc.edu/projects/rlms-hse>, <http://www.hse.ru/org/hse/rlms>

Stone O.M. (1969) The New Fundamental Principles of Soviet Family and Their Social Background. *The International and Comparative Law Quarterly*, Vol.18, No.2 (April 1969), pp- 392-423

Weber C. and Goodman A. (1981) The Demographic Policy Debate in the USSR. *Population and Development Review*, Vol. 7, No.2 (June 1981), pp. 279-295

Willis Robert J. (1973) A New Approach to the Economic Theory of Fertility Behavior. *The Journal of Political Economy*, Vol. 81, No. 2, Part 2

Zakharov S.V. (1999) Fertility, Nuptiality and family planning in Russia: problems and perspectives. *Population under Duress: The Geodemography of Post-Soviet Russia. Boulder: Westview Press: 41-58*

Zakharov S.V. (2008) Russian Federation: From the first to the second demographic transition. *Demographic Research*, Volume 19, Article 24, Pages 907-972

Zakharov S.V. and Ivanova E.I. (1996) Regional fertility differentiation in Russia: 1959-1994.
Studies on Russian Economic Development 7(4): 354-365

Appendix

Table 2 – Fixed-effects panel model

y: age-specific birth rate per 1,000 women aged 15-49 - time interval 1995-2008							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Income	-3.55 (2.6) *		-71.9 (28.3) ***	-70.8 (29.5) **	-58.5 (27.3) **	-73.2 (28.7) ***	-59.5 (20.5) ***
Income _{t-1}		-3.02 (2.02) *					
Income ²			3.16 (1.2) ***	3.1 (1.2) ***	2.5 (1.2) **	3.2 (1.2) ***	2.6 (.9) ***
Uncertainty				-.002 (.001)			
Uncertainty _{t-1}					-.002 (.002)		
Pre-school coverage						.03 (.06)	-.91 (.43) **
Female labor pt rate						-.11 (.05) *	-.97 (.45) **
Pre-school cov*fem pt rate							.01 (.007) **
Regional fixed effects	√	√	√	√	√	√	√
Time effects	√	√	√	√	√	√	√
R ²	.66	.71	.70	.70	.73	.70	.72
Obs.	962	962	1036	1036	962	1036	1036

Notes: *** indicates 1 percent significance; ** 5 percent significance; * 10% significance;
Robust clustered standard errors in parenthesis

Pre-school coverage and female labor participation rate at t-1 give consistent results. Not included, results available upon request

Table 3 – Fixed-effects panel model – age groups

y: age-specific birth rate per 1,000 women - time interval 1995-2008					
<i>Age groups</i>	15-19	20-24	25-29	30-34	35-39
Income	-8.6 (11.2)	-95.01 (37.2) ***	-66.7 (40.7) *	-36.7 (26.2)	-17.4 (9.2) **
Income ²	.31 (.51)	4.01 (1.86) ***	2.8 (1.8) *	1.6 (1.1)	.76 (.04) **
Uncertainty _{t-1}	-.002 (.001) *	-.006 (.003) **	-	-	-
Pre-school coverage	-.68 (.19) ***	-1.28 (.78) *	-1.5 (.86) *	-1.03 (.49) ***	-.49 (.20) **
Female labor pt rate	-.64 (.218) ***	-1.64 (.82) **	-1.74 (.92) *	-1.29 (.52) ***	-.43 (.20) **
Pre-school cov*fem pt rate	.01 (.003) ***	.02 (.01) *	.03 (.01) **	.01 (.008) ***	.007 (.003) **
Regional fixed effects	√	√	√	√	√
Time effects	√	√	√	√	√
R ²	.76	.66	.77	.90	.91
Obs.	962	962	1036	1036	1036

Notes: all columns test specification (7) in table 2

*** indicates 1 percent significance; ** 5 percent significance; * 10% significance;

Robust clustered standard errors in parenthesis

Table 4 Summary statistics Russia Longitudinal Monitoring Survey

Round	V		XI		XVIII	
Observations (women aged 18-45)	2,435		2,815		3,214	
Mean household income in real terms, y. 1992 rubles	96,495		89,638		157,916	
Participant in the labor market	1,782 (73%)		1,949 (70%)		2,259 (70%)	
Have children	Yes=1,896 (93%)	No=139	Yes=2,013 (92%)	No=169	Yes=2,139 (66%)	No=1,074
Share of mothers who are employed	77%		74%		78%	
Mean number of children	1.7		n.a.		1.4	
Intention to have (other) children	Yes= 670	No=1,435	Yes=975	No=1,479	Yes=1,430	No=1,528
Positive intention among mothers	22%		26%		32%	
Positive intention among working m.	20%		25%		31%	
Entitled to child benefits	1,761 (58%)		1,619 (32%)		1,256 (21%)	
Status (married=1)	n.a.		1,495 (53%)		1,361 (42%)	
Mean grade level	9.6		9.8		9.9	
Mean household income satisfaction (max=1 out of 5)	4 = <i>“less than satisfied”</i>		3 = <i>“both yes and no”</i>		3 = <i>“both yes and no”</i>	
Mean personal economic conditions satisfaction (max=9 out of 9)	3.5		4		4	

Author’s calculations on Russia Longitudinal Monitoring Survey data

Table 5 – Logistic regression model, odds ratios

<i>Wave</i>	V	XI	XVIII
<i>Dependent variable</i>	<i>Do you want to have (other) children?</i>		
Age	1.32 (.16) °	1.29 (.18) *	1.67 (.13) °
Age squared	.99 (.002) °	.99 (.002)	.98 (.001) °
Household income, 1992 th. rub	1.00 (.0004) **	1.00 (.0007)	1.00 (.0003) °
Overall life satisfaction ^a	1	1	1
	.54 (.24)	.78 (.28)	1.15 (.26)
	.52 (.21)	.72 (.26)	1.21 (.29)
	.41 (.17) **	.59 (.22) *	1.18 (.30)
	.44 (.18) **	.22 (.11) °	1.13 (.35)
Individual econ. cond satisf. ^b	1	1	1
	.90 (.31)	.95 (.48)	1.73 (.72)
	1.03 (.32)	1.38 (.63)	1.50 (.58)
	1.49 (.46)	1.43 (.68)	2.88 (1.12) °
	1.40 (.44)	1.43 (.74)	3.06 (1.40) °
	1.06 (.45) *	1.15 (.74)	4.09 (2.08) °
	2.49 (1.7) *	-	4.18 (2.10)
2.89 (1.8) °	-	1.44 (1.20)	
Labor market pt	.89 (.14) °	1.43 (1.27) **	1.15 (.17) °
Mother	.08 (.02) °	.02 (.01) °	.03 (.04) °
Parity ^c	0 children 1	n.a.	0 children 1
	1 child .10 (.07) °		1 child .33 (.05) °
	2 children .02 (.01) °		2 children .05 (.01) °
Education (binary=1 if high school and higher)	.92 (.14)	1.37 (.26) *	1.04 (.14)
Married	n.a.	.71 (.12) *	1.22 (.19) °
Observations	1,521	1,179	1,692
Pseudo R ²	.28	.31	.32

Notes to table 5:

For space reasons, in table 5 significance level are indicated as follows:

° indicates 1 percent significance; ** 5 percent significance as usual; * 10 percent significance as usual.

All specifications control for unobserved heterogeneity with individual weights

a/ Overall life satisfaction 1=fully satisfied, 5=completely unsatisfied

b/ Economic condition 1=completely unsatisfied, 9=absolutely satisfied

c/ Parity is a factor variable, the first rank is 0 children. Parities higher than 2 are limited to few observations, not reported on results. “Parity” and “Mother” are tested alternatively.

Chapter 5

Why Not a Second Child?

An Economic Analysis of Fertility Behavior of Russian Parents

1. Introduction

The Russian population has dealt with dramatic changes since the late Eighties which involved every aspect of life, in fact structure of the economy, employment, housing, education and many other features of the country were rebuilt in the new context of a modern market economy. Each one of these features has an impact on the decisions of family formation, and fertility behavior has indeed been deeply modified since the Soviet period, not only in Russia but in all Eastern European countries. Total fertility rate has been decreasing in the last decades all over the industrialized countries and not only in transition countries, as recognized by an extensive literature on fertility determinants (see Narayan and Peng 2006 for Japan, Del Boca 2002 for Italy).

The case of Russia is peculiar also among transition countries because of the dramatic shock that fertility at aggregate level experienced just in few years around 1989 and the increased male mortality, which are likely to exacerbate the negative effects of declining population. Total fertility rate dropped under the replacement level of 2.1 children per woman in the early Nineties and it is now at 1.4, on a slightly increasing path after two decades of decline (Grogan 2002, 2006). Although the habits of Russian families have changed through time, Russian society still maintains its own traditional characteristics in fertility behavior.

As a matter of fact, the main difference between Western European countries and Russia in this setting is the postponement of fertility, in fact aggregate statistics and the literature³⁹ show that mean maternal age at first childbirth has been stable or only slightly increasing at 24-25 years old since the Sixties for Russian women whereas today mean maternal age at first childbirth is much higher than in previous decades in Western European countries and particularly in Greece, Italy and Spain in Southern Europe. On the other hand, the age-specific birth rates of Russian women aged 24-30

³⁹ See Philipov and Kohler (1999), Kohler, Billari and Ortega (2002), Billari and Kohler (2002)

years suffered a severe decline. The combined analysis of these data and the evidence that most Russian women have already reached their completed fertility when they are 35 years old prove that the trend is the one of not having more than one child rather than to consistently postpone the fertility, which is the reason why the Soviet model family of two children is now *de facto* substituted by the only-child family.

Motivated by this consistent aggregate evidence this paper uses individual level data from the Generations and Gender Survey (GGS) realized by Unece in 2004 to shed light on two fundamental features of family formation: postponement and fertility intentions. The two topics are indeed connected: due to the limited reproductive time span each woman has, if the first birth is postponed it is less probable to have other children and the decision to stop at parity 1 may not be intentional. On the other hand, if postponement of first birth is not a typical behavior of Russian women, it is straightforward to see what affects their fertility intentions to have a first and a second child and why they decide not to have a second child. In light of the measures introduced by the Maternity Capital Program, though the dataset uses data collected in 2004 and the Maternity Capital Program began in 2007, it is essential to analyze what is the pattern that Russian women and parents are following, and what is the impact of income and other economic and social factors on parents' decisions.

The paper is organized as follows: in the second paragraph, the general trends of the Russian fertility patterns and issues related to postponement are analyzed at aggregate level, paragraph 3 describes the theoretical framework and paragraph 4 presents data and method. Finally, results for first-birth intentions, evidence on postponement effect and second-birth intentions are discussed in paragraph 5. Paragraph 6 provides robustness checks and the last paragraph concludes.

2. Russian fertility trends

As seen in the previous chapters, in the early years of transition the Russian economy suffered dramatic changes: real gross domestic product per capita decreased by 40 percent between 1989 and 1999, from 3,500 dollars to 2,000 dollars, while unemployment increased from a rate of 4.7 percent in 1992 to 13 percent in 1999⁴⁰. With the turning point of the financial crisis of 1998, just after the first decade of transition, a new phase of economic growth started. Since then, with the exception of

⁴⁰ Data source: Rosstat Yearbooks, IMF World Economic Outlook

the very recent years starting from 2008, the economy had an annual growth rate of gross domestic product of 5-6 percent. Russian population experienced a sharp decline since 1996/1997 when, after decades of positive growth rates or stable population size, for a combination of lower fertility rates and increasing mortality rates this trend was interrupted. At the same time, as shown in figure 1 the age-composition of the population started to show increasing shares of elderly people relatively to younger cohorts.

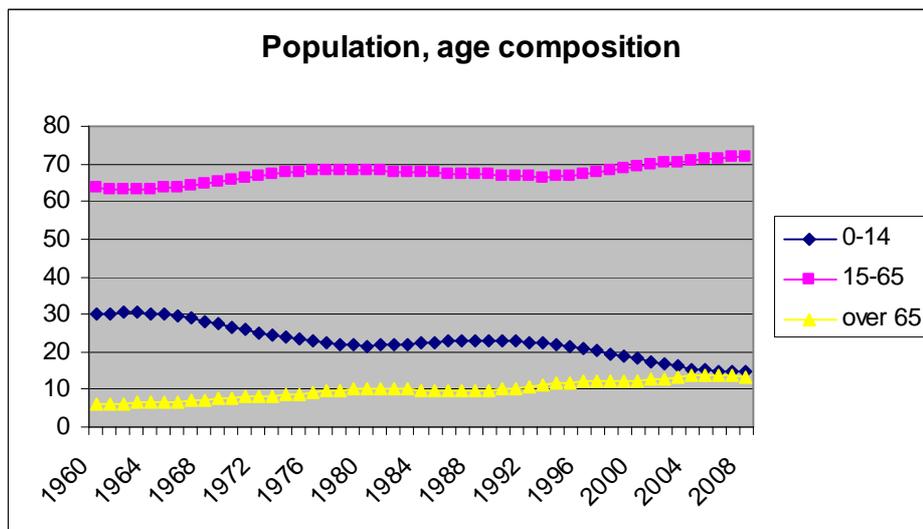


Figure 1 - Age composition of the population

Aside crude birth rates, what matters most to determine the causes of the decline in fertility and the peculiar characteristics of the decline in second-births is the age of the mother at first childbirth and then what factors affect her decision to have a child conditioning on parity. As shown in figure 2, the mean age of first time mothers did not change significantly through decades.

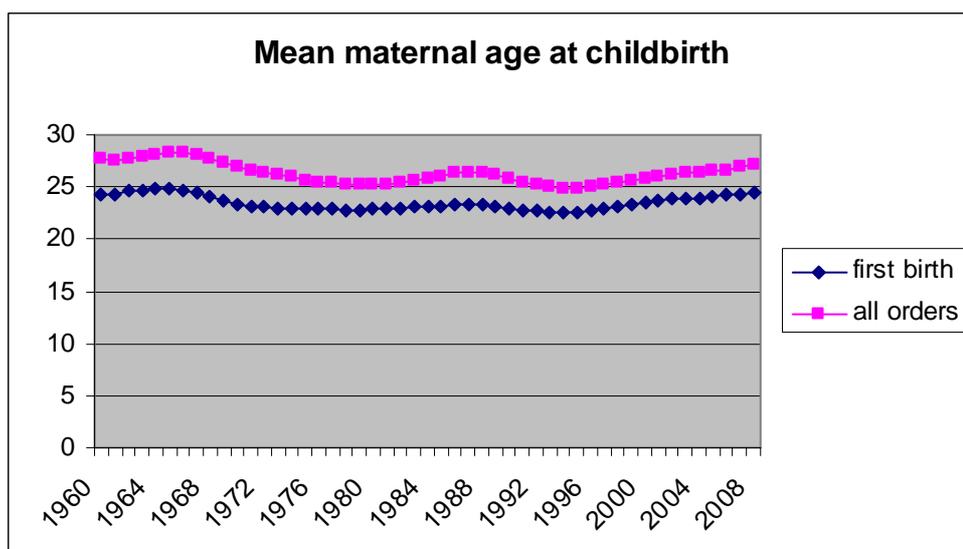


Figure 2 - Mean maternal age at childbirth

The value was around 24 years in the Sixties, then dropped to 23 years from the Seventies to the year 2000 and since then it recovered to the value 24-25 years like in the Sixties. Therefore, looking at national aggregate evidence Russian women do not seem to be affected by the phenomenon of postponement of motherhood as it is happening in other European countries.

The postponement of childbearing has been studied extensively by the literature⁴¹. Following Philipov and Kolher (1999), two effects must be combined in the analysis of total fertility rate: *tempo effect* and *quantum effect*. The *tempo effect* is the change in period fertility due to changes in the *timing* of births, while the *quantum effect* is the change in cohort fertility due to changes in the *number* of births. If the decrease in fertility is due to the *tempo effect*, postponement - which is measured by the increase in the mean maternal age at childbirth - is present. The two effects are negatively correlated because as the age of the mother increases, progression to second or third births will be less likely and eventually her completed fertility will decrease.

Several factors explain the decision of individuals to postpone fertility⁴² or in general to change their fertility behavior like economic uncertainty, the rise in female education and the inadequate institutional setting. In transition countries, economic uncertainty, the struggle to find a stable job and the profound changes in family-related policies and benefits played a major role, whereas female education – and educational

⁴¹ Lesthaeghe and Moors (2000), Kohler, Billari and Ortega (2002), Billari and Kohler (2002), Billari (2008)

⁴² See Billari (2008), Balbo (2009) among others

level of the population in general – was already high and not dramatically affected by transition.

Postponement is not found in all transition countries, in fact countries which recovered rapidly like Poland are now following Western European patterns of postponement while Russia, Bulgaria and Belarus are not. Philipov and Kohler (1999, p.11) perform a decomposition of the total fertility rate in *tempo effect* and *quantum effect* for Russia and some Eastern European countries. Results show that Russia and Bulgaria did not follow the pattern of the other countries: the evidence of postponement is limited to an increase of just few months in the mean age at first birth, so that the reduction in fertility is instead due to the *quantum effect* for the early years of transition and to a slowly emerging postponement effect for second births only in the recent years, which frequently ends up in the decision not to have a second child. Evidence in favour of the absence of a strong postponement effect in Russia is found also by Lesthaeghe and Moors (2000) and Billari and Kohler (2002), meaning that the pattern of lowest-low fertility is not mainly attributed to the *tempo effect*, but to the *quantum effect* and in particular to the decrease in second births.

In Russia, the cohort born in the Seventies has been the most affected by all the phenomena related to transition: born and raised in a system where the State virtually cared for every aspect of life as health care, education, employment, housing, these people were the ones who suffered more the failure of the system. For the age-group 25-29, the drop can be considered as a drop in second births because 25-29 years old women are generally not first-time mothers. This group is the focus of the recent policy called Maternity Capital Program, a policy designed to give incentives toward the decision to have a second (or subsequent) child. Women giving birth to or adopting a second child (or third/forth etc, if the grant was not requested for the previous one, i.e. the second/third child) are eligible to apply for a grant set at 344,000 rubles (8,600 euro) in 2010, not to be spent before the child turns three years old. The grant was set at 250,000 rubles when the program started and it is indexed on inflation. It can be used for loans, housing, education, or added to the mother's pension fund.

3. Theoretical framework of fertility intentions

Thanks to the growing number of individual and household surveys, the literature on fertility intentions is extensive across developed and developing countries⁴³. The questions that are asked to the respondents generally take the form “*Do you want to have children? How many more children would you like to have? Do you intend to have other children in the next two/three years? What is your ideal family size?*” etc. The question that I use in this study from the first wave of the GGS survey is “*Do you intend to have a/another child during the next three years?*”.

In all types of surveys, the way in which questions are phrased plays a major role. In the previous chapter the question asked to respondents of the Russia Longitudinal Monitoring Survey was “*Do you want to have (other) children?*” and it expressed a *desire* of the respondent whether to have other children, whereas the Generations and Gender Survey asks about *intention*. Both concepts call for a rational decision of the respondent, but for intentions it is assumed that the respondent is taking into account not simply her ideal family size and her life conditions, but the family size she actually plans to realize. *Desire* can be seen as a necessary, not sufficient condition for *intention* because contingent factors could affect the actual realisation of her desire.

The inner value of both concepts for empirical studies is debated. How much can researchers rely on the assumption that a respondent is able to make rational predictions on her future life, given that future conditions are unknown? Are desires and intentions good predictors for actual behavior? According to the theory of planned behaviour (Ajzen 1991) - which is the theoretical background of the empirical analysis on the topic⁴⁴ – intentions are determined by three factors: attitudes towards the behavior itself, subjective norms about the behavior and the extent to which the behavior is perceived to be under control. Manski (1990, p.940) stresses that “*divergences may simply reflect the dependence of behaviour on events not yet realized at the time of the survey*” and not being caused by the inability of the individuals to make correct predictions on their future. He underlines also that a common way to improve reliability is to extend the set of choice available for response as it is indeed the case of the ordered response variable that I use in this study.

⁴³ See Thomson (1997), Philipov, Speder and Billari (2006)

⁴⁴ See Philipov et al (2006), Balbo (2009)

As seen in the previous chapters, the drop in Russian fertility has been studied extensively, but to my knowledge this is the first study which deals explicitly with finding the determinants of first and second birth intentions using the Generations and Gender Survey.

4. Data and method

4.1 Data

The Generations and Gender Survey (GGS) is part of the Generations and Gender Program, a cross-national study on family relationships coordinated by the United Nations Economic Commission for Europe. The aim of the Generations and Gender Survey is to study what factors influence fertility, family formation and the relation between generations. It is designed as a panel survey with three waves, at an interval of three years. König (2001) uses the German and the Hungarian editions of the survey to analyze the differences in fertility intentions in the two countries, Balbo (2009) analyzes fertility intentions in Georgia while Rieck (2006) focuses on fertility intentions among Russian men.

For the Russian survey the sample is a nationally representative sample (constructed through multistage probability sampling) of Russian citizens of Russian citizens aged 17-79 at the time of the first wave and so far the released data for the Russian Federation are indeed those of the first wave, conducted from June to August 2004. Two subsequent waves at a interval of three years each will allow to have in the end a panel of individuals followed for six years.

In the first wave, 11,261 persons were interviewed, 4,223 men (37.5 percent) and 7,038 women (62.5 percent). All tables report my calculations on the GGS dataset. Restricting the sample to female respondents aged 18-40, 2,509 observations remain. Questions related to fertility are asked also to women older than 40, but because of biological reasons and the typical Russian fertility patterns, the chances of having children after the age of 40 are limited.

The two samples used in the empirical analysis are childless women and mothers of only one child. The total number of mothers aged 18-40 is 1,833, whereas childless women aged 18-40 are 676. In table 1.1 I classified mothers according to parity and this is the legend for child type in the second column of the table: a/ biological child with current partner; b/ biological child with former partner; c/ stepchild; d/ adopted child; e/

foster child. For 13 observations the child type is indicated as “*not reported/not applicable*”.

Mothers with	Child type	
Only 1 child = 999 mothers	<i>a</i>	678
	<i>b</i>	280
	<i>c</i>	25
	<i>d</i>	1
	<i>e</i>	2
2 children	616	
3 children	177	
4+ children	41	
Mothers, not by parity	1833	
<i>Observations (women aged 18-40)</i>	2509	

Table 1.1 Children grid, by parity and type

To avoid any prior assumption on second-birth intentions on the basis of a biological or a non biological child, I do not restrict the analysis to a specific type, but control for child type collapsing the five types in a dummy equal to 1 if the child is biological, 0 if he/she is a stepchild, adopted or foster child.

Here I will describe the data, how they are registered in the Generations and the Gender Survey and how I will define them in the empirical models. The models used in the empirical analysis are the ordered logit model, a discrete choice model for ordered response variables, and the logit model used as a robustness check⁴⁵.

Response variable. The question related to fertility intentions which will be used as response variable is “*Do you intend to have a/another child during the next three years?*” and in table 1.2 I report the answers given by the two samples according to the four ordered categories “definitely not/probably not/ probably yes/definitely yes”. In the group of childless women answers are equally distributed among choices and the category with the highest frequency is as expected “probably yes”, whereas the one with the lowest frequency is “definitely yes” and the number of women who do not intend to have children for sure is higher than the number of those who definitely plan to become mothers. Looking at mothers with one child, 65 percent of them answered that they do not intend to have other children in the next three years, with the decision being definite

⁴⁵ Both models accept factor variables, but some post estimation commands for ordered logit in Stata 11 do not work if factor variables used. For this reason, I will construct binary variables.

or still not taken for good. In the empirical analysis, the software automatically sets the category with the highest frequency as base outcome, so “definitely not” will be the base outcome with respect to the other three options.

	Childless women	Mothers, 1 child
Definitely not	153	340
Probably not	151	262
Probably yes	197	230
Definitely yes	119	82
<i>Respondents</i>	<i>620</i>	<i>914</i>

Table 1.2 - Intentions to have a/another child in the next three years

Respondents’ vital statistics. In each specification I control for the age of the respondent and in the regressions of mothers’ intentions I control also for the age, sex and type of the first child. The mean age of women with one child is 30 years and their mean age at first childbirth was 22 years. The mean age of childless women is 23 years so that the individual data are in line with the aggregate statistics which show that the age-group of first time Russian mothers is 20-25 years old women⁴⁶. The mean age of the biological children is 8 years, whereas it is slightly higher for stepchildren or adopted children as expected by the time needed to make the decision to adopt, the adoption process itself or the time of family dissolution of their current partner, in the case of mothers of a stepchildren. Half of the children are girls and half boys. I control also for the status of the respondent being single or in a relationship without disentangling marriage from cohabitation given that cohabitation is increasing among younger couples in Russia as it is in Western European countries. Among childless women, 75 percent of the sample is single, while among mothers with one child the share without a partner is 33 percent.

Education. Education is defined through the international Isced system developed by Unesco⁴⁷, with ranking from 0 (pre-primary education) to 6 (second stage of tertiary). In tables 1.3. and 1.4 I show the distribution of respondents of the two samples on the categories of the response variable on the basis of their highest achieved level of education.

⁴⁶The GGP Contextual database reports 29.6 years as a mean age at first birth for Italian women in 2004, 27.9 for Germans in 2005, 24 for Russians.

⁴⁷ International Standard Classification of education

Educational level	Intention to have a child during then next three years				Total
	Definitely not	Probably not	Probably yes	Definitely yes	
Primary	0	0	0	1	1
Lower secondary	6	3	5	4	18
Upper secondary	60	47	45	22	174
Post secondary	11	18	26	12	67
First stage of tertiary	68	76	108	73	325
Second stage of tert.	1	0	1	0	2
<i>Total</i>	<i>146</i>	<i>144</i>	<i>185</i>	<i>112</i>	<i>587</i>

Table 1.3 Fertility choices and highest reached educational level, childless women

Educational level	Intention to have a child during then next three years				Total
	Definitely not	Probably not	Probably yes	Definitely yes	
Pre primary&primary	1	0	1	1	3
Lower secondary	12	13	6	7	38
Upper secondary	80	66	52	13	211
Post secondary	73	47	41	12	173
First stage of tertiary	151	123	112	44	430
Second stage of tert.	2	0	1	0	3
<i>Total</i>	<i>319</i>	<i>249</i>	<i>213</i>	<i>77</i>	<i>858</i>

Table 1.4 Fertility choices and highest reached educational level, women with one child

With respect to the educational levels the two samples have different distributions and in particular the first group have lower educational levels, but differences are essentially determined by age, in fact the women of the first sample have not yet reached their absolute highest possible level of education like the second group, but only the highest possible level conditioning on their actual age (which is on average 23 years old). On the other hand, the joint distribution is similar across groups.

Employment status. Labor participation rate of Russian women is at aggregate level higher than the one of selected Western European countries⁴⁸. The distribution of respondents in the four categories of the response variable according to their employment status is shown in table 1.5 for childless women and in table 1.6 for women with one child. As for education, statistics for the first group are influenced by age.

⁴⁸ In 2004 employment rate of women as a percentage of female population aged 15-64 was 45 percent in Italy, 59 percent in Germany and 62 percent in Russia

Employment status	Intention to have a child during then next three years				Total
	Definitely not	Probably not	Probably yes	Definitely yes	
Employed-self emp	46	75	128	72	321
Unemployed	15	8	17	19	59
Student	80	65	44	17	206
Looking after the home	6	1	6	6	19
other	6	2	2	5	14
<i>Total</i>	<i>152</i>	<i>151</i>	<i>197</i>	<i>119</i>	<i>619</i>

Table 1.5 Fertility choices and employment status, childless women

Employment status	Intention to have a child during then next three years				Total
	Definitely not	Probably not	Probably yes	Definitely yes	
Employed-self emp	240	167	163	42	612
Unemployed	20	22	12	2	56
Student	4	6	4	5	19
On maternity leave	38	33	23	14	108
Stay-at-home	35	34	26	18	113
other	2	0	2	1	5
<i>Total</i>	<i>339</i>	<i>262</i>	<i>230</i>	<i>82</i>	<i>913</i>

Table 1.6 Fertility choices and employment status, women with one child

Half of the childless women group is composed of employed women and 30 percent is still in school or in vocational training. More than half of the second sample is employed or self-employed and twelve percent is currently on maternal or parental leave. Part-time contracts are not frequently used in the Russian labor market, the share of part-time workers is 8 percent in the second sample, so the sample of mothers with one child is almost totally composed of women working fulltime. Looking at women who are not participating in the labor market, 12 percent is composed of stay-at-home mothers. A rather small six percent of the sample is unemployed, a share that represents those who are not voluntarily out of the labor force given that fulltime mothers and students have *ad hoc* categories.

Since the sample is composed of women who have already a child, one may think that a self-selection mechanism into employment is in place, though the sample participation rate is in line with the aggregate one. I compute the same distribution not parity-specific for all the women aged 18-40 interviewed by the Generations and Gender Survey. The cross tabulation does not provide evidence that a self-selection process has taken place and the relative shares in all categories are the same for my sample and the whole GGS.

For the empirical analysis, for childless women I will create three binary variables: a binary variable for employed respondents, one for students and one for other categories. For the second group I will define three binary variables: a binary variable specifically for mothers currently on leave, one for employed mothers and one for the other categories, which will be the reference category. The direction that links fertility and employment is a debated topic as expressed by Cramer (1980) and the rich subsequent literature. The direction is generally considered to be from fertility to employment in the short period, and from employment to fertility in the long time horizon when individuals plan their family size. Following this theoretical argument and given that the response variable asks what is the intention in the next three years, I use employment status as a control variable⁴⁹. Income by work and other sources as rents for the previous twelve month in euro is also available.

Self-reported effects on respondent's life of having a/another child and factors affecting the intention to have one. The Generations and Gender Survey allows to elicit directly from the sample of interest what are the factors that affect the intention to have (other) children and what effects would the birth of the child have on the life of the respondent herself. The questions concern the expected effect on various aspects of life such as financial situation, employment opportunities for both the respondent and her partner, quality of the relation with the partner and satisfaction from life among others. The questions about factors that could affect the intention concern work, financial situation, employment opportunities, health, partner and his work/financial situation. As for the empirical analysis, I will create a group of binary variables to investigate the effects of having another child on the employment situation, on the financial situation and one question to investigate how the availability of childcare is affecting the decision. As said before, three years after the survey was conducted, the government introduced the Maternity Capital Program giving incentives toward the decision of having a second child, with a grant of about 10,000 euro to be used for specific purposes. The survey and the Maternity Capital Program are independent of each other, but this group of questions will allow to see if, for a sample which is precisely the target of the Maternity Capital Program, the incentives offered by the government are in line with the needs of Russian mothers with one child.

⁴⁹ The GGS survey provides another response variable which is specific for analysis of *current fertility desire* in the short period, while the one I chose for this study is designed for *long term intentions*.

Partner's characteristics. Most of the second sample is composed of women with a partner, so I will control for being in a relationship with a binary variable without distinguishing between married couples and couples which cohabit without being legally married. I will control also for partner characteristics such as his education, income and employment status. With the income specifically recorded for the woman and the partner, it has been then possible to control for the different effects of an increase in income for the mother and the father developed in Becker's model. In the second sample I will control also for the desire of the partner to have other children, a question that will allow to elicit the effect on fertility intentions of the agreement or disagreement within the couple on family size.

4.2. Method

The method used in the empirical analysis of intentions is the ordered logit model, a discrete choice model applied to categorical variables with a natural ordering. Typical examples are opinion surveys like "How a good job do you think the president is doing?" with choices "Very good job/good job/neither good nor bad/poor job/very poor job" or "How well do you like this book? Rate the book from 1 to 7" (Train 2009).

The model description is based on Greene and Hensher (2009), Train (2009) and UCLA Academic Technology Services online.

The ordered logit model is used to describe the data generating process for a random outcome that takes a set of discrete, ordered outcomes. The unobservable random variable U is defined as

$$U_i^* = x_i' \beta + z_i' \gamma + \varepsilon_i \quad (1)$$

The respondent, by giving her answer, reveals a censored version of U_i^* through a discrete response that, in this study, takes the form

$$\begin{aligned} Y_i &= 1 \text{ definitely not intend to have a (second) child} & (2) \\ &= 2 \text{ probably not intend} \\ &= 3 \text{ probably intend} \\ &= 4 \text{ definitely intend} \end{aligned}$$

The translation between the latent variable (1) and the observed variable (2) produces the ordered choice model

$$\begin{aligned}
 Y_i &= 1 \text{ if } U_i^* \leq \mu_0 \\
 &= 2 \text{ if } 0 < U_i^* \leq \mu_1 \\
 &= 3 \text{ if } \mu_1 < U_i^* \leq \mu_2 \\
 &= 4 \text{ if } \mu_2 < U_i^* \leq \mu_3
 \end{aligned}
 \tag{3}$$

where μ are the threshold parameters to be estimated with the other model parameters.

In discrete choice models, the coefficients do not have an immediate interpretation: as explained by Greene (2009), “*neither the sign nor the magnitude directly indicates the effect of changes in a variable on the observed outcome*”. The model assumes a logistic distribution for the errors ϵ_i , so that predicted probabilities can be calculated and used for an easier discussion of results. The probit model which assumes an underlying normal distribution gives as usual results which are very similar to those of the logit.

The interpretation of the ordered logit coefficient is that for one unit increase in the independent variable (a change from 0 to 1 for binary variables), the response variable is expected to change by its underlying coefficient in the ordered log-odds scale, while the other variables in the model are held constant. For instance, with regard to the variable “having or not a partner” and supposing to obtain a log-odds of .50 we could say that for one unit increase in the control variable “couple” (i.e. a change from 0 to 1, because the variable is binary) we would expect a .50 increase in the log odds of being in a higher level of “intention” (i.e. moving from the base outcome “definitely not” to one of the remaining three, where it is more probable to intent to have a child) holding all other controls constant.

Since the interpretation of the log odds is not immediate, for an easier interpretation results will be discussed based on predicted probabilities. In the Appendix I will report in table 2 the log odds for the two samples and I will discuss results in the text using predicted probabilities.

One of the assumptions of the ordered logit model is that the relationship between each pair of outcome groups is the same. The model assumes that the coefficients that describe the relationship between the lowest versus all higher categories of the response variable are the same as those that describe the relationship

between the next lowest category and all higher categories, etc. For this reason, the model gives only one set of coefficients. The assumption is that the slope coefficients are the same across the levels of the response variable and each probability curve differs only in being shifted to the right or to the left. This is called the proportional odds assumption or the parallel regression assumption (see UCLA Academic Technology Services online). Results for the Brant test on the parallel regression assumption are shown in the table of results in the Appendix. If the assumption is violated, the solutions are to apply a generalized ordered logit model or a standard logit model. Given that the generalized ordered logit results do not have an easier interpretation and diagnostics are limited, as a robustness check I will perform the analysis also through a logistic regression model collapsing the ordered dependent variable in a binary variable which assigns value 1 to the categories “definitely intending” and “probably intending” to have a child, zero to “probably not intending” and “definitely not intending” to have a child.

5. Empirical analysis

5.1 Intention to have a first child

Transition into motherhood is a life-changing decision which involves factors like age, current and future employment and financial situation, whether the individual is optimistic about her overall future and eventually the country where she lives in, whether the society provides help to families. In this study I will focus in particular to the role of income and uncertainty to test the empirical validity of Becker’s model and the economic crisis argument. The availability of data on income of the woman and income of her partner will allow to detect the substitution effect and the income effects of Becker’s model, whereas the questions on the expected effects of childbearing will allow to test the role of uncertainty.

Results are shown in table 2 in the Appendix. For the precision of estimates, I did not include “couple” and partner characteristics because only few observations remained given that the majority of this sample is single. Moreover, due to the limited number of observations, the Brant test for parallel regression assumption could not be computed.

The demographic variables show that the ordered logit of being in a category higher than “definitely not intending to have a first child” is higher than 1 and

significant for the age of the woman, in fact the predicted probability of “probably intending” to become mother for a woman aged 23 – which is the mean age of the sample – is .35, while it is .39 for women aged 30.

The logit of being in a higher category for students and women with a university degree is negative and the predicted probabilities of “definitely intending to become mother” within the next three years is .16 for more educated women and .50 for women with high school diploma.

Finally, feeling insecure about her own financial situation and her work condition has a highly detrimental effect on the intention to become mother. The result is not surprising given that half of the sample declared to be employed. The predicted probability of “probably intending to become mother” for an employed woman with a university degree who is concerned for her financial or work situation is .28, whereas it is .35-.39 if she is not concerned on these issues.

5.2. Mean maternal age at first birth

Looking at aggregate statistics on the mean age of mothers at first birth in figure 2, a strong postponement effect does not appear to characterize the fertility behavior of Russian women. Mean age at first birth was 24-25 years in 1960 and it is still the same age today. Moreover, the pattern in the decades in between is a decreasing one, showing that Russian women have continued through time to have their first child in their twenties. Balbo (2009) carries out a survival analysis to investigate mean maternal age at birth in Georgia and found a similar pattern. Kesseli (2008) performs an event-history analysis for Russian cohorts between 1930 and 1986 and finds that cohorts born between 1930 and 1986 had the first child earlier than subsequent cohorts, whereas the trend is opposite for young women but the size is limited..

I will divide my sample of interest in four groups to see if it is in line with aggregate statistics or it is characterized by a postponement effect which could explain the decline in second births using a biological phenomenon. If on the contrary, the decision to have the first child is not delayed, then the drop in second births is more likely to be intentional and driven by other factors than age.

The birth year of the sample stands between 1963 and 1986. I defined four groups: 1963-1967, 1968-1974, 1975-1980 and 1981-1986, hence in table 3 I am showing statistics for each group.

	N	Mean	St.dev	Median	Min	Max
1963-1967	181	23.8	4.2	23	16	37
1968-1974	344	23.1	4	22	16	36
1975-1980	352	21.7	2.6	21	14	28
1981-1986	119	19.2	2	20	13	23

Table 3 Mean maternal age at first child

Data do not reveal the presence of a postponement effect and results are in line with aggregate statistics. Mean and median maternal age at first birth remain in the early-middle twenties and also the minimum age in each cohort is in line with the cases of early teen pregnancies. The maximum age in each cohort, on the other hand, strengthens the assumption that a strong postponement effect is not in place: for the mothers of one child surveyed by the GGS, the maximum age when they had their first child is decreasing through time, a pattern which is common to some other Eastern European countries and not to Western Europe.

5.3. Intention to have a second child

The decision to have a second child differs inherently from the decision to enter into motherhood from various perspectives. The mother is likely to have less uncertainty on her skills, the expenses she will have to bear, how motherhood affects her daily routine and work. The experience she acquired during the first childbearing contributes also to the strength of the regression results, given that it is likely that intentions to proceed to higher parities are more conscious than transition into motherhood.

Different features of second birth intentions have been analyzed by the literature. Olah (2003) analyzes second birth intentions in Sweden and Hungary to compare a gender-parity country with a traditional one. She finds a positive effect of family policies which reconcile parenthood and employment in Sweden and a positive effect of household tasks division in both countries. In both Sweden and Hungary no negative effect of female education is found, showing that policies aimed at reducing fertility costs for women are effective. Cooke (2004) uses data from the German Socio Economic Panel to analyze predictors of tasks division within the family and how tasks division affects the intention to have a second child. She finds that the contribution of fathers in childcare increases the likelihood to have a second child while the time devoted to general household tasks does not. Miller Torr and Short (2004) test the effect of tasks division in the United States – where total fertility is not lower than the

replacement level of 2.1 children per woman - using data from the National Survey of Families and Households and find that the relationship is U-shaped, with the threshold being the wife doing less than half of family tasks (modern couples) and the wife doing more than 80 percent of them (traditional couples). Finally, Craig and Siminski (2010) employ data from the Household, Income and Labor Dynamics in Australia Survey and find that neither the time allocation of fathers to household tasks nor the relative shares have a significant impact on the decision to have a second child, but mothers' own amount of tasks decreases the probability of moving to higher parity.

The demographic variables of the first child show that for a one year increase in his/her age, the expected log-odds decrease by .08 when moving to a higher category, i.e. moving from the base outcome "definitely not intending" to the other categories. In fact, predicted probabilities of "probably intending to have a second child" are .37 if the first child is 2 years old, .34 if he/she is 4 years old and .29 if he/she is 8 years old, holding other controls constant. The age of 8 years is relevant from a policy perspective in this study because the mean age of the first child is indeed 8 years and predicted probabilities from that age on decrease consistently.

The ordered logit for a biologic first child is -1.38 less than that for a non-biological first child, holding other controls constant. As expected, if the first child is a biological child of the respondent, she is less likely to intend to have a second one. The predicted probabilities of "definitely not intending" and "definitely intending" to have a second child are .24 and .07 respectively for a first biological child, .05 and .31 for a first non-biological child. Given that 97 percent of the sample is the biological mother of her first child and aggregate statistics are similar, this evidence does not create positive expectations of a consistent increase in second births in the near future.

As for the age of the respondent, the probability of moving to higher categories is decreasing in age: a mother aged 25 years old has a 9 percent predicted probability of "probably intending to have a second child", whereas a mother aged 30 years old has a 6 percent probability. The trend was opposite in the group of childless women, where indeed the intention to become mother was increasing in the age of the respondent. Clearly once motherhood desires have been realized, the respondent feels less hurry to proceed to higher parities.

The logit of mothers being in a higher category is .68 more likely if they are employed, meaning that employed women have higher probabilities of being in a higher category.

An employed mother aged 30 has a .33 probability of “probably intending” to have a second child, whereas it is .21 if she is unemployed.

Personal income and partner’s income or his employment status are not significant (for partners the effect acts through educational level being a university degree or higher) and predicted probabilities do not significantly change for different incomes, whereas the expected effect on work situation of the mother is highly significant, as the employment status. If the respondent thinks that her work situation is likely to worsen with a second child, she is less likely to “probably intend to have a child”, in fact the predicted probabilities are .26 for an employed concerned mother aged 30 and .30 for the same woman not concerned for her work situation.

In all respondent’s profiles, if she is orthodox her probabilities are lower than being atheist or muslim or other religions, while religion had no role in transition into motherhood.

The most interesting result for this sample of mothers with respect to the sample of childless women is the possibility to elicit the effect of partner’s intentions on family size. The positive intention of the partner has a high positive significant effect on the intention of the mother: an employed mother aged 30 who is concerned for her work condition has a .38 percent probability of “probably intending to have a second child” if her partner desires a second child, and a .17 probability if he does not intend.

His positive attitudes more than compensate for the concerns of the woman on her work conditions, which is one of the most significant predictors: the predicted probability for an employed mother aged 30 who is concerned for her work condition and has a partner with positive attitudes is .38, whereas it is .30 if the same woman is not concerned for her work conditions, but her partner does not desire other children.

6. Robustness checks

As a robustness check, first I run again the regressions of the ordered logit model excluding those variables which proved to have a limited effect on predicted probabilities: results are consistent and the Brant test is still valid with a p-value of 1.6, i.e. the parallel regression assumption is not violated.

The limited number of observations in the sample of childless women did not allow to perform the Brant test, so I repeat the analysis – for both samples – through a standard logit model. The dependent variable in these specifications is a binary variable equal

one if the respondents “probably intend” or “definitely intend”, equal zero in the other two categories.

I perform different specifications and show results in table 4 in the Appendix for the same specification of the ordered logit model. Among various specifications, I use also the original factor variables for the levels of completed education, employment status and religion and results are confirmed. As in the ordered logit model, the limited number of observations remains a critical point and it does not allow to control for partner’s characteristic.

Results for the intention to have a second child are in line with those of the ordered logit model which also performs better for variables’ significance and strengthens the validity of the original ordered specification shown by the Brant test.

7. Concluding remarks

The aim of this study was to analyze the determinants of first and second birth intentions among Russian women to determine what factors drive their decision to enter into motherhood and to proceed to higher parities.

For the second sample, results have policy implications in light of the Maternity Capital Program designed to give incentives in order to promote second births. Since the late Eighties, the Russian family model has changed from the traditional two-children family to the one-child family and previous studies found mixed results on the effects of income and uncertainty on fertility behavior.

Using the Generations and Gender Survey, this study suggests that transition into motherhood is determined by age, level of education and concerns of the woman on her financial situation and the availability of childcare. In particular, results for age confirm that the *social norm* is still one of becoming a mother in the early twenties and not to postpone fertility, in fact the probability of intending to have a child is increasing in age once mid-twenties are reached childless. Obstacles to motherhood are concerns on the availability of social services and the effects on financial situation.

The decline in second-birth has a richer design given the availability of the characteristics of the first child and the possibility to control for partner’s intention. The decline is not driven by a consistent postponement of first births as in other European countries like Italy or Germany, but by perceived uncertainty. Mothers facing uncertainty in their employment status and financial situation are reluctant to have a second child, while, on the other hand, income *per se* does not play a role in their

decision. Given that most of the sample is currently employed, it is likely that income acts through concerns on employment status.

The positive attitudes of the partner toward to decision to have a second child is crucial and its effects more than compensate for the decrease of intending to have a second child driven by financial or work concerns.

The Maternity Capital Program has a long-term design given that it assigned the grant to the mother when the child is three years old and only for specific purposes. For its long-term financial incentive and in particular for the possibility given to employed mothers – which are the majority of the group - to collect the grant in their pension fund, the program could indeed prove to reach the target correctly and to sustain the traditional two-children family model in Russia.

References

Ajzen I. (1991) The Theory of Planned Behaviour. *Organizational Behaviour and Human Decision Processes* 50:179-211.

Balbo N. (2009) Recent Fertility Trends and Second Birth Decision-Making in Georgia. *Milan: Dondena Center For Research on Social Dynamics, WP*

Billari F. (2008) Lowest-Low Fertility in Europe: Exploring the Causes and Finding Some Surprises. *The Japanese Journal of Population, Vol. 6, No. 1 (March 2008)*

Billari F. and Kohler H. (2002) Patterns of Lowest-Low Fertility in Europe. *MPIDR Working Papers WP-2002-40 Max Planck Institute for Demographic Research, Rostock, Germany*

Cooke L.P. (2004) The Gendered Division of Labor and Family Outcomes in Germany. *Journal of Marriage and Family* 66 (December 2004): 1246-1259

Craig L. and Siminski P. (2010) Men's Housework, Women's Housework, and Second Births in Australia. *Social Politics 2010 Volume 17 Number 2*

Cramer C.J. (1980) Fertility and Female Employment: Problems of Causal Direction. *American Sociological Review, Vol.45, No.2 (Apr. 1980), pp.167-190*

Del Boca D. (2002) The Effect of Child Care and Part Time Employment on Labour Supply and Fertility" *Journal of Population Economics* 14, 3, 2002

Greene W. (2008) Discrete Choice Modeling. *The Handbook of Econometrics: Vol.2, Applied Econometrics, Part 4.2., ed. T. Mills and K. Patterson, Palgrave, London*

Greene W., Hensher D.A. (2010) Modeling Ordered Choices. *Cambridge University Press*

Grogan L. (2002) What Caused the Post Transition Fertility Decline in Central and Eastern Europe and the Former Soviet Union? *Department of Economics University of Guelph*

Grogan L. (2006) An Economic Examination of the Post-transition Fertility Decline in Russia. *Post-Communist Economies, 18: 4 pp 363-397*

Grogan L., Koka K. (2010) Young children and women's labour force participation in Russia, 1992-2004. *Economics of Transition, Volume 18(4) 2010, 715-739*

Kesseli K. (2008) First Birth in Russia: Everyone does It Young. *Finnish Yearbook of Population Research* 43 (2007-2008), pp.41-62

Kohler H., Billari F. and Ortega J.A. (2002) The Emergence of Lowest-Low Fertility in Europe During the 1990s. *Population and Development Review, The Population Council, Inc., Vol. 28(4), pages 641-680*

Konig S. (2011) Higher Order Births in Germany and Hungary. *Mannheimer Zentrum Fur Europaische Sozialforschung WP Nr. 146-2011*

Lesthaeghe R. and Moors G. (2000) Recent Trends in Fertility and Household Formation in the Industrialized World. *Review of Population and Social Policy, No. 9, 2000, 121-170*

Manski C.F. (1990) The Use of Intentions to Predict Behavior: A Best-Case Analysis. *Journal of the American Statistical Association, Vol.85, No.142 (Dec. 1990), pp. 934-940*

Miller Torr B. and Short S.E. (2004) Second Births and Second Shift: A Research Note on Gender Equity and Fertility. *Population and Development Review, Vol.30, No. 1 (Mar. 2004), pp. 109-130.*

Narayan P.K. and Peng X. (2007) Japan's Fertility Transition: Empirical evidence from the bounds testing approach to cointegration. *Japan and the World Economy 19 (2007) 263-278*

Olah L. SZ (2003) Gendering Fertility: Second Births in Sweden and Hungary. *Population Research and Policy Review 22: 171-200, 2003.*

Philipov D. and Kohler H. (1999) Tempo Effects and Fertility Decline in Eastern Europe: Evidence from Bulgaria, the Czech Republic, Hungary, Poland and Russia. *MPIDR Working Paper WP 1999-08 July 1999.*

Philipov D., Spéder Z. and Billari F.C. (2006) Soon, later, or ever? The impact of anomie and social capital on fertility intentions in Bulgaria (2002) and Hungary (2001). *Population Studies: A Journal of Demography, 60:3, 289-308*

Rieck D. (2006) The Influences of Economic Conditions on Fertility Intentions of Russian Men. *European Population Conference 2006, Liverpool (UK)*

Thomson E. (1997) Couple Childbearing Desires, Intentions, and Births. *Demography, Vol.34, No. 3 (Aug.1997), pp.343-354*

Train K. (2009) Discrete Choice Methods with Simulation. *Cambridge University Press*

Appendix

Table 2 Ordered logit results, log-odds

	Childless women	Mothers with one child
Age of the respondent		
18-24	.61 (.59)	<i>ref</i>
25-29	2.78 (.83) ***	.18 (.37)
30-34	2.31 (.72) ***	.04 (.42)
35-40	<i>ref</i>	-.75 (.52) *
Age of the first child	-	-.08 (.03) *
Type of the first child (binary=1 if biological child)	-	-1.38 (.64) *
Sex of the first child (binary=1 if	-	-.01 (.22)
Education (binary=1 university and higher)	-1.67 (.82) **	.17 (.23)
Employment status		
Employed	-.31 (.59)	.68 (.38) **
Unemployed/others	<i>ref</i>	<i>ref</i>
On maternal leave	-	-.22 (.45)
Students	-1.16 (.75) *	-
Income (thousand euro)	-.18 (.14)	-.04 (.06)
Effects of having a child on		
Work (binary=1 if worsening)	-.02 (.43)	-.77 (.25) ***
Financial situation (binary=1 if worsening)	-1.10 (.47) ***	-.29 (.24)
Factors affecting the intention		
Availability of childcare (binary=1 if affecting the intention)	-1.21 (.51) ***	-.004 (.29)
Couple (binary=1 partnership)	-	-
Respondent's religion (binary=1 if orthodox, 0 others)	.25 (.48)	-.45 (.27) **
Partner's characteristics		
His fertility intention (binary=1 if yes, 0 if no/not sure)	-	1.22 (.24) ***
Education (binary=1 university and higher)	-	.53 (.23) ***
Employment status (binary=1 if employed, 0 otherwise)	-	-.32 (.34)
Income (thousand euro)	-	-.007 (.02)
<i>Observations</i>	<i>107</i>	<i>345</i>
<i>LRchi2</i>	<i>40.17</i>	<i>142.35</i>
<i>Prob > chi2</i>	<i>0.00</i>	<i>0.00</i>
<i>Pseudo R2</i>	<i>.16</i>	<i>.14</i>
<i>Brant test p-value</i>	<i>-</i>	<i>.29</i>

Notes on the next page

Notes to table 2

* indicates 10 percent significance, ** 5 percent significance, *** 1 percent significance

The null hypothesis of the Brant test is H0: parallel regression assumption violated, so a p-value higher than .10 provides evidence that the assumption is not violated and the ordered logit model is correctly specified.

Table 4 Logit results, log odds

	Childless women	Mothers with one child
Age of the respondent		
18-24	.42 (.79)	<i>ref</i>
25-29	2.07 (1.07) **	.69 (.50)
30-34	1.18 (1.03)	.62 (.58)
35-40	<i>ref</i>	-.21 (.77)
Age of the first child	-	-.04 (.04)
Type of the first child (binary=1 if biological child)	-	-2.50 (1.12) *
Sex of the first child (binary=1 if	-	-1.17 (1.30)
Education (binary=1 university and higher)	-2.02 (1.18) **	.16 (.34)
Employment status		
Employed	-.17 (.71)	.34 (.59)
Unemployed/others	<i>ref</i>	<i>ref</i>
On maternal leave	-	-.43 (.64)
Students	-1.93 (.91) *	-
Income (thousand euro)	-.20 (.18)	-.05 (.08)
Effects of having a child on		
Work (binary=1 if worsening)	1.08 (.72)	-.66 (.35) **
Financial situation (binary=1 if worsening)	-2.10 (.76) ***	-.62 (.32) **
Factors affecting the intention		
Availability of childcare (binary=1 if affecting the intention)	-.67 (.66) ***	-.87 (.44)
Couple (binary=1 partnership)	-	-
Respondent's religion (binary=1 if orthodox, 0 others)	.33 (.59)	-.71 (.40) *
Partner's characteristics		
His fertility intention (binary=1 if yes, 0 if no/not sure)	-	1.41 (.29) ***
Education (binary=1 university and higher)	-	.40 (.32)
Employment status (binary=1 if employed, 0 otherwise)	-	-.40 (.45)
Income (thousand euro)	-	-.007 (.02)
<i>Observations</i>	<i>107</i>	<i>309</i>
<i>Pseudo R2</i>	<i>.22</i>	<i>.22</i>

* indicates 10 percent significance, ** 5 percent significance, *** 1 percent significance

Conclusions

The research developed within this doctoral thesis deals with several aspects of the Russian economic and social patterns before and after the dissolution of the Soviet Union. The main contribution to the literature on Russian transition is the focus on regions in different topics such as income disparities, fertility determinants and fertility intentions.

In chapter one I reviewed the paths of the Russian transition from a planned economy to a market economy focusing on regions. The analysis of the composition of the Gross Regional Product has provided evidence of *between* and *within* Districts differentials, in fact on the one hand the Districts in European Russia and in the South present a range of economic activities whereas the Districts with oil availability are specialized in heavy industry, on the other hand high disparities remain *within* District if the area has a strong specialization in oil-related activities.

The literature on spatial analysis has shown that the visual inspection of the geographical correlation between observations can be very useful in order to understand the patterns of development of a country. In chapter one the analysis of income dispersion has shown that the regions are characterized by growing disparities.

In chapter two I applied exploratory spatial data analysis and spatial econometrics techniques to shed light on an empirical issue which is still debated by the literature, that is the presence of convergence or divergence in per capita income across Russian regions. The results of this approach were interesting on several grounds. First of all, Russian regions are characterized by clusters of homogeneous type and this evidence precludes findings of convergence. Results were consistent to different specifications and to the use of both the spatial correlation model and the spatial error model. Although the introduction of the spatial patterns did not remove the diverging effect, it showed that the regions which are responsible for the spatial correlation are diminishing over time and, in particular, new clusters of non-homogeneous type are emerging.

The Moran's I index which measures spatial correlation decreases over the period and the spatial econometrics estimates showed that controlling for spatial patterns, the degree of divergence declines whereas the proxy for technical progress remains not significant. This result confirms the conclusions drawn by the exploratory spatial data analysis towards a decrease in the spatial concentration of economic activities which

could indeed lead to a convergence result if adequately promoted and sustained in the near future.

Second, the clusters were stronger in the first phase of transition and they are diversifying in the recent years. Following the suggestion by Solanko (2003) and splitting the sample in two sub periods 1995-1999, 2000-2008 this study showed that the pattern of divergence was stronger in the first phase, whereas it is sharply decreasing in the second phase. This evidence combined with the visual inspection of the clusters proved that not only the cluster of high-high income type regions is less numerous, but the low-low income type cluster in the Caucasus is smaller: in fact, the regions which succeeded in diversifying their economic activities and maintain a stable political climate are now facing higher growth rates of income.

As a general result, economic diversification and political stability proved to be the vehicles upon which disparities can be reduced. In fact, the concentration of investments in the area of Moscow and in the Urals in last decades did not contribute to the development of poorer areas, but indeed it disrupted resources from sectors such as manufacturing and services which need to be adequately sustained.

As for the path of transition, Russia retains its own peculiar characteristics also for the demographic situation. Chapter three was dedicated to the descriptive analysis of Russian vital statistics since the Sixties and in chapter four I extended the descriptive analysis of trends using national, regional and individual levels data.

Results proved that the difficulties of identifying a clear pro-cyclical or counter-cyclical relation between fertility and income can be attributed to two factors. On the one hand, the relation is U-shaped at the regional level, meaning that fertility is decreasing in income as predicted by Becker's model, but the relation is non monotonic and as income increases up to a certain threshold, fertility also does. To my knowledge this was the first study which analyzed the topic at the regional level for the whole period after transition. On the other hand, the logit model for the data of the Russia Longitudinal Monitoring Survey showed that more than income, the intention to have children is positive related to self-perception indexes such as feeling secure about the personal financial situation. From a policy perspective point of view, we can say that feeling secure with adequate resources could help to sustain the two-children traditional family model and that the Maternity Capital Program – which is reaching the correct

target – could prove to be efficient if combined with adequate provisions of services to employed mothers.

In chapter five I use data from the first wave of the Generations and Gender Survey to analyze the issue of birth intentions and postponements in a sample of women interviewed in 2004. To my knowledge this was the first study which analyzed both first birth intentions and second birth intentions. It appears also to be so far the first attempt to gain hints on the expected effectiveness of the Maternity Capital Program though the two are not directly linked. Although the survey is not regionally representative, the richness of the questions asked to the respondents allowed to understand more in depth why Russian women generally have only one child despite the fact that the two-children family model still proved to be the social norm. Results showed that still in 2004 women entered into motherhood at the same age as they did in Soviet times, when they are around 24-25 years old and they did not move to the Western European standard of postponing fertility. On the other hand, given the high participation rate of Russian women which also dates back to Soviet times, if they face uncertainty in their employment condition they tend not to have a second child. Although data on the Maternity Capital Program are not yet available, we can try to give some policy advices. The Program assigns the grant to the mother when the child is three years old and it can be used only for specific purposes. Given that the most important concerns of the respondents deal with the employment condition – which has a long term perspective - the possibility given to employed mothers to collect the grant in their pension fund could indeed help to sustain the traditional two-children family model in Russia.