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BREAKING OUT OF POVERTY TRAPS: INTERNAL MIGRATION AND INTERREGIONAL CONVERGENCE IN RUSSIA

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ABSTRACT

Breaking out of poverty traps: Internal migration and interregional convergence in Russia*

We study barriers to labor mobility using panel data on gross region-to-region migration flows in Russia for 1995-2010. We find that barriers that hindered internal migration in 1990s have been generally eliminated by the end of 2000s. In 1990s many poor Russian regions were in poverty traps: potential migrants wanted to leave those regions but could not afford to finance the move. In 2000s (especially in late 2000s), these constraints were no longer binding. Overall economic growth and development of financial markets allowed even the poorest Russian regions to grow out of poverty traps resulting in convergence between Russian regions in 2000s.

JEL Classification: J61 and R23
Keywords: internal migration, liquidity constraints and poverty traps

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1. Introduction

This paper is an empirical study of the barriers to labor mobility and of resulting geographical poverty traps. Labor mobility is one of the most important issues in economic development in terms of its impact on human welfare. Large differentials – both within and between countries – in incomes, living standards, productivity, public goods and other development outcomes imply high individual and social returns to migration (Human Development Report, 2009). However, the very fact that these differentials persist implies there are also substantial barriers to labor mobility. These barriers may be especially high for people with low earnings and assets – those who would benefit from mobility the most. These people are locked in poverty traps: while they are those who would want to move, they are also the ones who are not able to move – for example, because they do not have cash or access to finance to pay for the move.

Empirical analysis of such geographical poverty traps is an important yet a challenging task. By definition, we do not observe the costs of mobility for those potential migrants who cannot and therefore do not move. Furthermore, it is also difficult to quantify factors that allow breaking out of poverty traps. A poverty trap is a stable equilibrium (characterized by high barriers to mobility); bringing down the barriers to mobility and breaking out of the poverty trap requires a major change in external circumstances. In this paper we study interregional migration in Russia where such a dramatic change took place. As we argue below, certain specific features inherited from the Soviet period make Russia a unique testing ground for an empirical study of barriers to migration, poverty traps and factors that help eliminating the poverty traps.

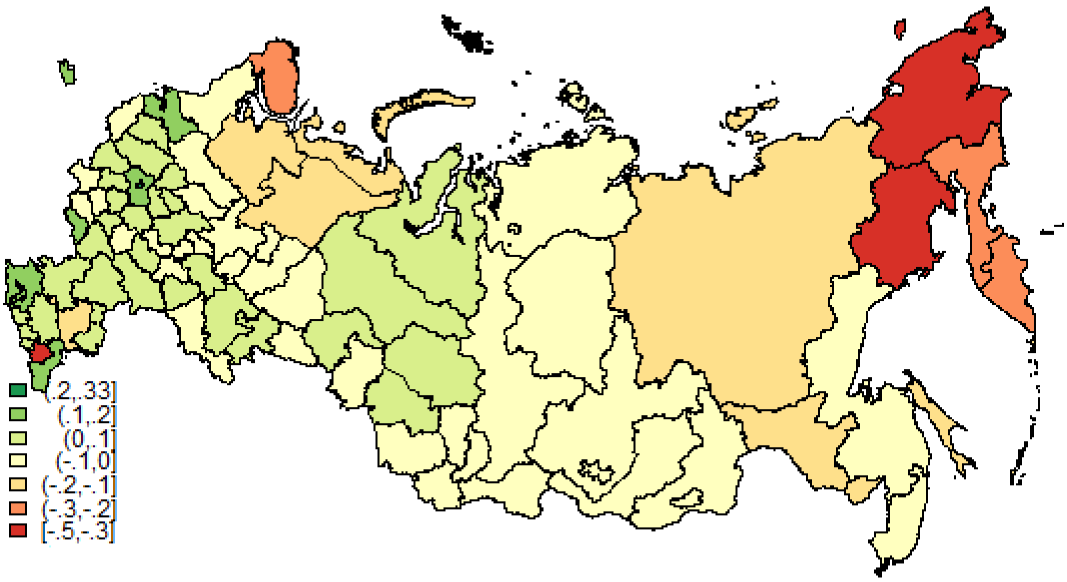
To identify the regional poverty traps, we use panel data for gross region-to-region migration flows for 1995-2010 in Russia. We analyze the relationship between income in the sending region and outgoing migration. Controlling for pairwise region-to-region fixed effects and time dummies, we find that migration from richer regions follows the normal push-and-pull logic: migrants tend to go from regions with low income, high unemployment and worse public goods to regions with high income, low unemployment and better public goods.

However, this conventional pattern does not hold for the poorest regions. In particular, migrants from these regions are willing to move but — because of the financial constraints— they are not able to move. In these regions the increase in income results in higher (rather than lower) outward migration – as financial constraints become less binding. This distinction between the regions in the poverty traps (where higher income results in higher outward migration) and the richer regions (where higher income results in lower outward migration) allows us identifying the income threshold below which potential migrants are willing but are not able to move. We use different parametric and semiparametric methods and in each case arrive at similar estimates for the threshold (about $3000 per year).

Furthermore, we find a dramatic change in the importance of poverty traps over time. Our estimates imply that these poverty traps were widespread in 1990s but virtually disappeared by the end of 2000s. While in 1990s tens of regions were locked in the poverty traps, by 2010 only one (small) region had the income below the threshold and therefore could be considered being in the poverty trap. This change may be explained by the overall economic growth that allowed Russian regions to overcome liquidity constraints through simply growing out of the poverty traps. We run additional tests to show that financial development has also contributed to relaxing liquidity constraints.

There are three reasons that make Russia in 1990s and 2000s uniquely suited for our analysis. First, the allocation of population and physical capital at the beginning of transition was far from the spatial equilibrium in a market economy – thus creating a large potential for geographical labor reallocation. Before 1990s, Soviet industrialization policies often pursued political or geopolitical rather than economic goals. Even when they reflected economic realities, decision-making was distorted substantially by central planning, price controls and subsidies. Also, the allocation of production was intended to serve a different country – the Soviet Union (or even the whole Council for Mutual Economic Assistance countries) rather than Russia. This is why the convergence started out with an exogenous allocation that was not driven by market forces. Not surprisingly, transition to market had to involve moving millions of people across Russian regions. Figure shows the official data on net migration to/from Russian regions over 1995-2010 as a share of 1995 population. The significance of these flows is large: some Russian regions lost tens of percents of their populations with others gaining tens of percents.[4]

Figure 1. Net migration for the period of 1995-2010, share of 1995 population.



[4] As we discuss below, we focus on 1995-2010 period as the data before 1995 are not reliable. Also, in 2011, Russian statistical agency changes the methodology of accounting for internal migration and the data are no longer comparable to pre-2011 data.

The second important feature of Russian transition was the timing of reallocation and institutional change. The subsidies, price controls and foreign trade restrictions were removed virtually overnight in 1992. This made many regional economies non-competitive and created substantial interregional differences in wages and incomes. However, as financial markets and real estate markets developed slowly, the reallocation was hindered by major barriers. In this sense, Russia was a unique natural experiment for understanding how the markets and institutions matter for reallocation of production factors. While distortions were large already in 1990s, the financial and real estate markets were still underdeveloped. Over time, markets and institutions developed and barriers to reallocation of capital and labor decreased. Comparing the dynamics of migration flows and interregional differentials in 1990s and in 2000s therefore allows understanding the quantitative importance of market imperfections for factor mobility.

The third unique feature of Russian transition to market is low household assets. This helps identifying the importance of financial constraints as a barrier to mobility (as income becomes the key proxy for the ability to move). Although Russia is a middle-income country, Russian households entered transition with very low – virtually trivial – personal assets. During the Soviet times most assets were owned by the state. The personal savings were destroyed by hyperinflation of 1992. The main asset of Russian households – housing – was given to them for free in 1990s but the size (16 and 23 square meters per capita in 1990 and in 2010, respectively) and the quality of this real estate was so poor that the market value of housing remained very small. This is especially true outside Moscow and Saint Petersburg – and even more so in depressed regions where potential migrants want to leave from.[5] The Global Wealth Report (2012) estimates the average value of Russian real estate in 2012 at about $8,000 per adult (about half of the annual GDP per capita).The very same report estimates the average financial assets at only $4000 per adult. Moreover, if one takes into account the acute wealth inequality in Russia (highest in the world except for small Caribbean nations, according to the Global Wealth Report) the median personal wealth is even lower – about $1200 per adult or less than 10% of annual GDP per capita (Global Wealth Report, 2012).

These three features of Russian transition imply that there was a large potential for interregional labor migration in Russia that was however hindered by financial constraints. However, as income grew and financial markets development in 2000s, the barriers to mobility

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[5]An important feature of Soviet industrialization was the geographical concentration of production. Believing in economy of scale rather than in competition, Soviet planners have created many one-company towns (which are defined in Russia as settlements where at least 25% employment is within a single firm). Even in 2010, the Russian government's Program for the Support of Monotowns listed 335 monotowns (out of the total of 1099 Russia's towns and cities); their population accounts for a *quarter* of Russia's urban population. In such towns, the largest employer's financial difficulties directly suppress housing prices and further undermined potential migrants' ability to move out.

were lowered, and poverty traps disappeared. This allows an empirical identification of both the presence of regional poverty traps, and their subsequent disappearance.

The rest of the paper is structured as follows. In the next Section, we discuss related literature. Section 3 provides a general background on the evolution of interregional differentials and interregional migration in Russia. Section 4 describes a simple model of poverty traps that shows why the relationship between the income in the region of origin and the migration from this region is non-monotonic. In Section 5, we discuss our empirical specifications and describe the data. In Section 6 we discuss the empirical results. In Section 7, we compare the magnitudes of the parameters of poverty traps that we estimate through different parametric and semiparametric specifications; we find that three different methodologies provide strikingly similar results. In Section 8 we discuss regressions that include proxies for financial development. Given that these variables are only available for a much shorter period of time, we present these results as additional evidence rather than include it into the main empirical section. In Section 9, we conclude and discuss avenues for further research.

2. Related literature

As the literature on internal migration is very large, in this Section we only discuss papers that study the relationship between migration and income in origin region and the effect of liquidity constraints on migration. As discussed in the seminal paper by Banerjee and Kanbur (1981), liquidity constraints may result in a non-linear relationship between income and propensity to migrate out of a region. In poor regions, potential migrants are willing to move but may not be able to afford the move; in this case an increase in income decreases the incentives to move but relaxes the financial constraints. In our paper, we develop these insights from Banerjee and Kanbur into a simple model of migration decisions of heterogeneous migrants under financial constraints.

Banerjee and Kanbur cite several studies that provide evidence of such a non-monotonic relationship; since publication of their paper, there has been a number of papers offering additional evidence (see, e.g., de Haas (2009) and Human Development Report (2009) for the case of international migration).

Hatton and Williamson (2005) and Williamson (2006) argue that poverty traps and non-monotonic relationship between income and outgoing migration is not a new phenomenon but has been important in the long-distance migration in the last 200 years. Even in the times where there were no visa restrictions, poverty was binding constraint on emigration. Williamson (2006) writes: “In fact, ever since ‘free’ mass migration started two centuries ago it has always been true that the richer of the poor regions, and the richer within poor regions, are the first to make the long distance move to the richest regions.” This directly implies an inverse-U-shaped relationship between income of the sending country and migration flows. Williamson refers to it as the “Emigration Life Cycle” (Williamson, 2006, Figure 2).

Andrienko and Guriev (2004) study internal migration in Russia and show that in about 30% poorest regions of Russia (hosting about 30% of Russia's population) the potential outgoing migrants are indeed locked in a poverty trap. For these regions, an increase in income would result in relaxing the liquidity constraints and *higher* rather than lower outmigration. These results are also consistent with Gerber (2006) who analyzes the determinants of net migration rates in 77 Russian regions. He finds that the (predictable) effect of wages on net migration is increasing over time. The importance of poverty traps in the early years of transition would weaken the positive effect of wages on net migration. Indeed, in a poor region an increase in wages would result in increase in both immigration and outmigration (the latter due to overcoming the binding financial constraints). In later periods, as poverty traps became less important, the latter effect disappeared so the positive effect of wages became stronger.

McKenzie and Rapoport (2007) find a similar non-monotonic relationship between wealth and probability to migrate from Mexico to the US migration in communities with small migration networks. However, they mention that liquidity constraints become less important for communities with larger networks. They use survey data and estimate linear model of probability to migrate with quadratic term for wealth and the interactions of wealth with migration network. Angelucci (2012) also finds the importance of financial constraints for Mexican migrants.

Phan and Coxhead (2010) analyze inter-provincial migration and inequality in Vietnam. They find liquidity constraints for some provinces using semiparametric estimates for the impact of income in the sending province on migration. Michálek and Podolák (2010) analyze a relationship between socio-economic disparities and internal migration in Slovakia. They show that there are significant regional disparities in wage, unemployment in 1996-2007. However internal migration is relatively low. The authors suggest that the reason is liquidity constraints. Horváth (2007) finds similar results for internal migration of Czech population in 1992-2001 – most migration takes place between richer regions.

Golgher et al. (2008) and Golgher (2012) find that poor migrants in rural areas in Brazil have a limited range of options whether and/or where to migrate and are partially trapped in their home regions. The authors show that in the poor parts of Brazil there are substantial barriers to long-haul migration (even though short-haul migration is possible).

Djajic et al. (2013) consider international migration and show that the relationship between the source-country wage and emigration pressure is hump-shaped. They test this inverted-U relationship for three different skill groups of migrants separately and find strong statistical evidence of it for low-skilled migrants.

Several recent papers use individual and household-level data – with mixed results. Beam et al. (2010) show the importance of financial constraints for the migration decision in the Philippines using randomized experiment at the household level. Beedle et al. (2011) follow a panel of individuals in Tanzania for 13 years and track the impact of mobility on their consumption. They find large returns to migration and therefore argue that there are substantial exit barriers for certain categories of potential migrants. They however find no evidence of the role of financial constraints. Abramitzky, Boustan and Eriksson (2012) study the effect of wealth on the decision to migrate, either internally or internationally, during the Age of Mass Migration (1850-1913) using data on 50 thousand Norwegian men. They estimate binary and multinomial logit models of migration choice. They explain the migration decision with various household characteristics including household assets. They do not find the evidence of liquidity constraints. In their data, parental wealth discourages migration. Apparently, wealth influenced the migration process through its effect on opportunities in the source country, rather than through the use of family resources to finance migration costs which were rather low. However, they suggest that today migration costs are much higher and liquidity constraints may be more important. Dustmann and Okatenko (2013) find positive relationship between individual migration propensities and individual assets in sub-Saharan Africa and Asia regions. And migration intensive not much affected by wealth in Latin America. Mendola (2008), Sharma and Zaman (2013) find budget constraints for the external migrants from Bangladesh, McDonald and Venezuela (2012) find the same for migrants from the Philippines. However in these papers authors use micro data.

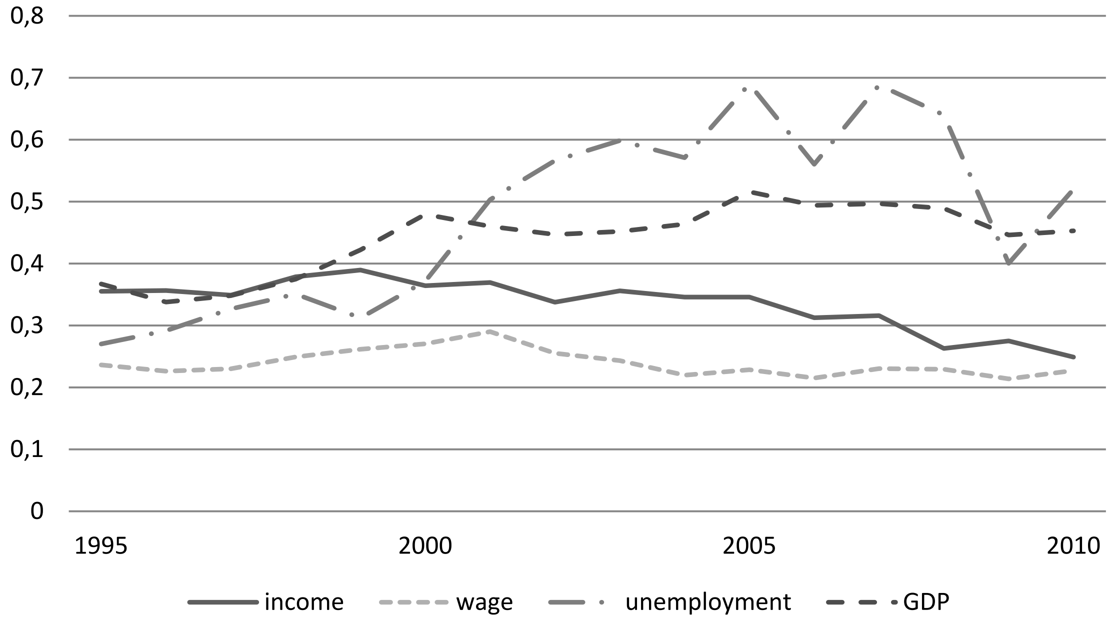
Our paper is also related to the literature on the decreasing internal migration rates in the US. Molloy, Smith and Wozniak (2011) provide an extensive survey of this literature and conclude that there is still no convincing explanation of the phenomenon. In particular, they show that the slowdown is not due to developments in demographics, labor and housing market. They conjecture that the reason may be that the potential for interregional migration is lower today than decades before – because of the completion of the "multidecade adjustment processes" or because of higher efficiency of working from home or because of more uniform geographical distribution of demand for skills.

We contribute to the literature in several ways. First, our paper studies panel data on gross migration flows thus controlling for many important determinants of migration. Second, we use both parametric and semiparametric methods that produce similar estimates of barriers to mobility. Third, we document the change in external factors that allow migrants to overcome these barriers and break out of the regional poverty traps.

3. Interregional differentials, convergence and migration in Russia

In this section we discuss the basic trends in interregional differentials and migration in Russia. Figure 2 presents the interregional differentials in incomes, wages, unemployment and GDP per capita. This Figure shows that there was no convergence in GDP per capita, incomes, wages and unemployment rates in 1990s. The situation changed dramatically in 2000s. Interregional differences in unemployment rates declined sharply in 2005-10. The convergence in incomes and wages started even earlier (around year 2000). The magnitude of convergence in 2000s is large: interregional dispersions of real incomes, real wages and unemployment rates declined by a third. As we argue below the fact that there is convergence in incomes and wages and no convergences in GDP per capita is consistent with falling barriers to mobility.

Figure 2. Differences among Russian regions in terms of logarithms of real incomes, real wages, unemployment, real GDP per capita.[6]

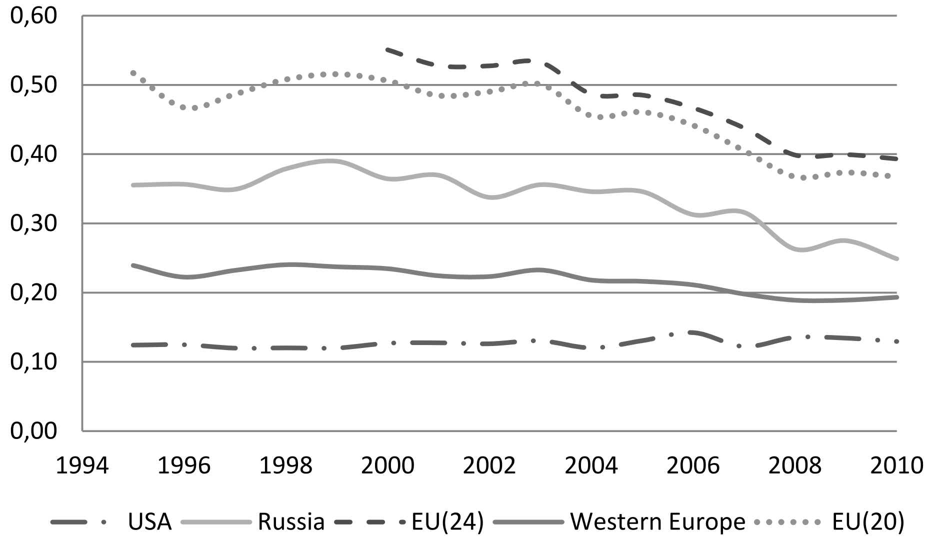


Source: Rosstat's official data, authors' calculations.

Are these interregional differences still large compared to other countries? It turns out that while recent convergence in incomes did not make Russia as uniform as the US or Western Europe, differences in incomes between Russian regions are lower than the differences between subnational NUTS-2 units in the EU-24 (Figure 3).This is quite striking given that EU also had a decade of fast convergence.

[6]We calculate population-weighted measures of interregional differences in order to make our results internationally comparable. The results for the unweighted measures are very similar (see Figure 2 in the Online Appendix.). In order to control for interregional price differentials, we divide nominal variables by the regional subsistence levels.

Figure 3. Russian convergence in the international perspective: population-weighted standard deviation of log of real income across subnational units in Russia, Europe and the United States.



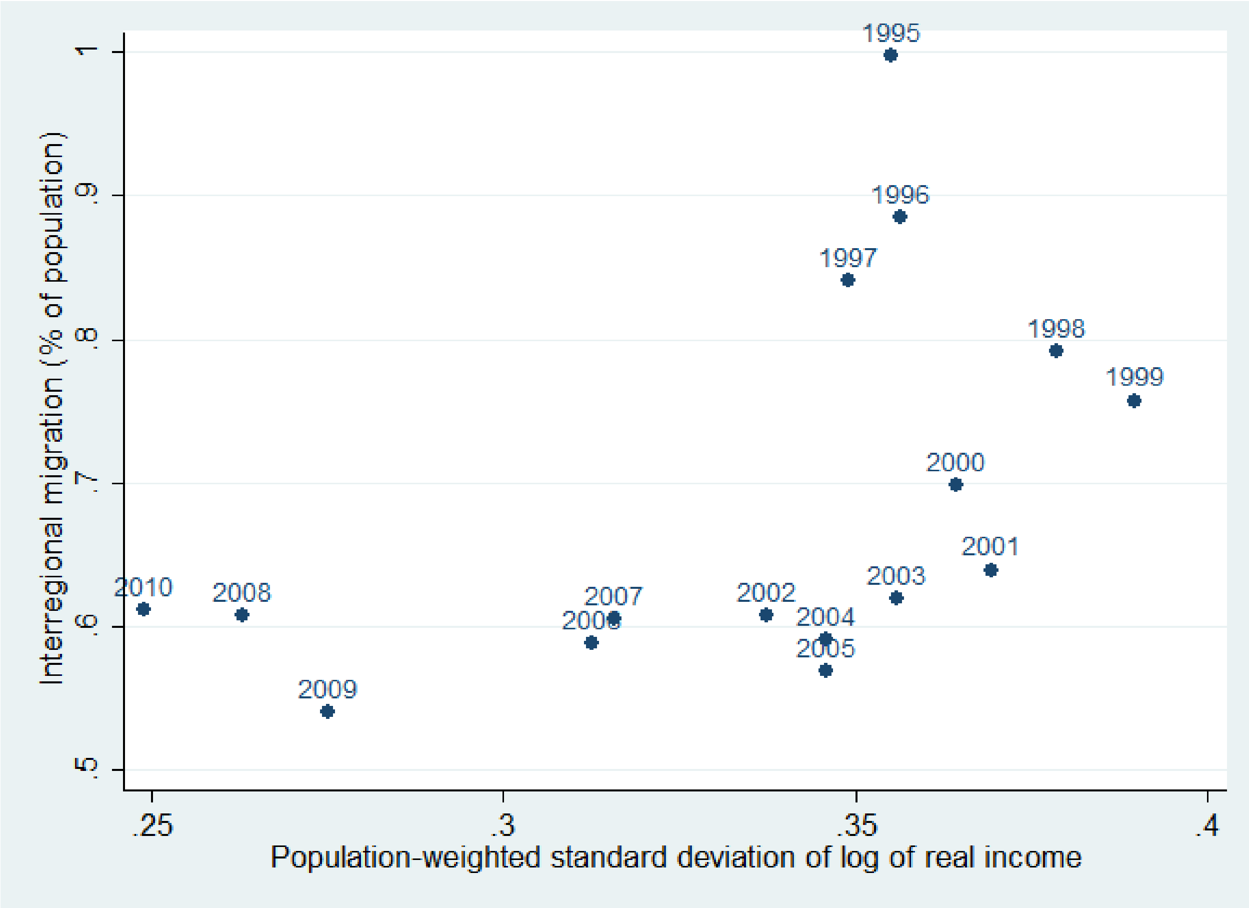
Note: For the EU and Western Europe unit of observation is NUTS-2 region.[7]

Figure 4 shows the evolution of interregional differentials in income and migration rates over time. The convergence in incomes was taking place along with the decreasing migration. This is consistent with our conjecture that low convergence in 1990s was explained by the high barriers to mobility. While many poor regions' residents were willing to migrate to richer regions, they were not able to. They simply were too poor to afford the move, and they could not borrow to finance the move as the financial markets were underdeveloped. In 2000s the situation changed: as Russians' incomes grew and Russia's financial markets developed, barriers to mobility and therefore poverty traps disappeared. Lower barriers to mobility resulted in the convergence between wages and incomes – through a threat of mobility which has become more credible as barriers to mobility decreased. The convergence in wages and incomes reduced the incentives to migrate – and the migration rates did decrease as well.[8]

[7]NUTS is the Nomenclature of Territorial Units for Statistics, a hierarchical system for collecting regional statistics in the EU. Average size of a NUTS-2 region is about 2.5 million people, average size of a Russian region is 1.8 million people.
Data sources:EU, Statistics Database of European Commission, Eurostathttp://epp.eurostat.ec.europa.eu. We consider disposable income deflated to purchasing power standard based on final consumption per capita.USA Census Bureau www.census.gov.EU (20):Belgium, Czech Republic, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Latvia, Lithuania, Netherlands, Austria, Poland, Portugal, Romania, Slovakia, Finland, Sweden, United Kingdom.EU (24): all European Union countries except Malta, Cyprus, Luxemburg. For EU (20) and EU (24) we consider only those NUTS-2 units for which there is data for each year. Western Europe: Austria, Belgium, Germany, Ireland, Greece, France, Italy, Netherlands, Portugal, Finland, Sweden, United Kingdom.

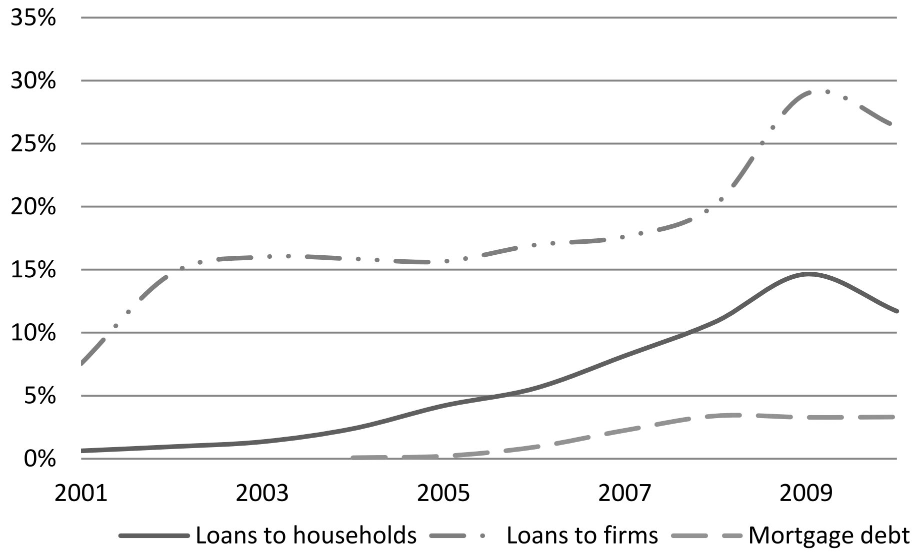
[8] When Molloy et al. (2011) discuss the puzzle of falling internal migration rates in the US in 2000s, they also suggest that one of the most plausible explanations may be that the potential of migration within the US is largely exhausted.

Figure 4. Interregional migration rates and interregional differences in real incomes.



In 2000s, Russia has also experienced a rapid development of financial sector (unfortunately, reliable and consistent data only start in 2001, and data on mortgages only begin in 2004). As shown in Figure 5, all indicators of financial development have grown substantially in 2001-2008. As a result of financial crisis there was a slight decline in 2009-10. At the peak, in 2009 the average level loans to firms, households and mortgage debt was 29%, 14.6% and 3.3% of GDP, correspondingly. This is an impressive growth given that in 2001 lending to households (including mortgages) were essentially trivial, and the loans to firms were only 7% of GDP.

Figure 5. Average ratio of outstanding loans to households, loans to firms, and mortgage debt to GDP (%).



4. A simple model of a poverty trap in migration

In this section we develop a simple model that captures the intuition for a non-monotonic relationship between income at the region of origin and migration flows.

Consider a model with two periods. In the first period, a migrant earns her income *y* in her home region and then decides whether to move or to stay. In the second period, her income depends on the first period's decision: either *y* in the origin region (we will refer to the origin region as the "region i") or *Y* in the destination region ("region j"). Migration is costly: in order to move, the migrant has to pay *C* in cash. We assume that this cost is sufficiently small relative to the income at destination: $C<Y/2$.

There is a distribution of incomes *y* in the origin region with cumulative distribution function $F(y-y_m)$, where y_m is an exogenous parameter. The function F is normalized so that $Ey=y_m$ (i.e. the average income in the region is exactly y_m). Suppose that the distribution F has a finite support (e.g. from y^L to y^H).

Let us consider the migration outcomes:

1. If $y<C$, the migrant does not have cash to move. She stays in region i, and receives y in the first period and in the second period. Her total payoff is therefore 2y.
2. If $y\geq C$, the migrant may choose to migrate.
    a. If she migrates, she pays the cost C and in the second period she receives Y. Her total payoff is $y-C+Y$.
    b. If she stays, then in the second period she receives y. Her total payoff is 2y.

Comparing cases 2a and 2b, we immediately find that the potential migrant prefers to migrate if $y-C+Y>2y$ (for simplicity we assume that in case of indifference over payoffs, the migrant stays put). Therefore migration takes place if and only if $y \geq C$ *and* $y<Y-C$.

As the income at origin y is distributed with c.d.f. F(y), the number of migrants is

$$M=F(Y-C)-F(C).$$

As we assumed above that $C<Y/2$, we have $Y-C>C$, so at least some people migrate.

Let us now carry out comparative statics with regard to a change in average income in the origin region y_m that we model as a shift of the whole income distribution. How does M depend on y_m? The analysis above implies

$$M'(y_m) = - f(Y-C-y_m) + f(C-y_m)$$

where $f=F'$ is the density function.

Now we can fully solve the model and find the impact of income on migration $M'(y_m)$ for all constellations of parameter. The solution depends on whether $Y-C-y^H$ is above or below $C-y^L$ (see Table 1). Let us discuss the intuition behind the results presented in the Table 1 for the the first case where $Y-C-y^H<C-y^L$. If the average income is very small $y_m< C-y^H$, then nobody can afford to migrate, even the richest workers with $y=y_m+y^H<C$. As the income is growing further, at least some rich workers are both able to move $y_m+y^H>C$ and willing to move $y_m+ y^H< Y-C$. In this case, an increase in income results in higher migration. Further increase in income results in an ambiguous effect on migration: on one hand side, a greater number of poor workers are breaking out of poverty traps but fewer rich workers are willing to move. When average income increases further and $y_m+ y^L$ exceeds C, the impact of income on migration is certainly negative: even the poorest workers are out of poverty traps and lower willingness to migration results in lower migration. Finally, when $y_m+ y^L$ exceeds Y-C, migration comes down to zero as no workers are interested in migration.

For the second case, where $Y-C-y^H>C-y^L$ the analysis is similar with one major difference. There is a range of incomes when the poorest workers are already out of poverty traps $y_m+ y^L>C$ and the richest workers are still poor enough to be interested in migration $y_m+ y^H< Y-C$. In this range, all workers are both able and willing to migrate. Thus everybody migrates and the marginal effect of the change of income is trivial.

Table 1.Relationship between average income and migration for different levels of income in a region.

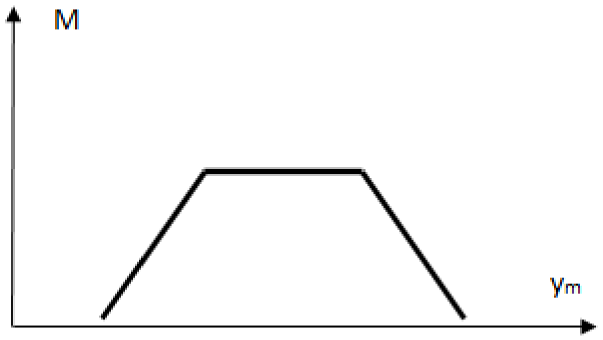
Case 1: $Y-C-y^H<C-y^L$		Case 2: $Y-C-y^H>C-y^L$	
Parameters	Outcome	Parameters	Outcome
$y_m< C-y^H$	$M'(y_m)=0$, $M=0$, nobody can migrate	$y_m< C-y^H$	$M'(y_m)=0$, $M=0$, nobody can migrate
$C-y^H<y_m< Y-C-y^H$	$M'(y_m)>0$	$C-y^H<y_m< C-y^L$	$M'(y_m)>0$
$Y-C-y^H<y_m< C-y^L$	$M'(y_m)$ may be either positive or negative[9]	$C-y^L<y_m< Y-C-y^H$	$M'(y_m)=0$, $M=1$, everybody migrates
$C-y^L<y_m< Y-C-y^L$	$M'(y_m)<0$	$Y-C-y^H<y_m< Y-C-y^L$	$M'(y_m)<0$
$Y-C-y^L<y_m$	$M'(y_m)=0$, $M=0$, nobody wants to migrate	$Y-C-y^L<y_m$	$M'(y_m)=0$, $M=0$, nobody wants to migrate

In both cases, the relationship between average income in the origin region and the migration flow is non-monotonic. As the whole income distribution moves to the right, first M increases, then stays constant (in the Case 2) or goes up/down (in the Case 1), then certainly decreases.

The Figure 6 illustrates the relationship for the Case 2 ($Y-C-y^H>C-y^L$). In the Case 1 ($Y-C-y^H<C-y^L$), the middle range of the graph is flat only if the distribution is uniform: in this case, as the average income y_m increases, the number of migrants who break out of the poverty trap and emigrate equals exactly the number of people who lose the willingness to migrate. If the distribution is not uniform, the middle range of the graph does not have to be flat.

[9] If the distribution is uniform, $M'(y_m)=0$

Figure 6.Migration as a function of the mean income at origin for the case of the uniform distribution of incomes at origin (for the case $Y-C-y^H>C-y^L$).



Also, the decreasing and increasing parts of the relationship may be non-linear (they are precisely linear only for the uniform distribution). But the model predicts with certainty that there is an increasing part for low y_m (for $y_m<\min\{C-y^L,Y-C-y^H\}$), and there is a decreasing part for high y_m(for $y_m>\max\{C-y^L,Y-C-y^H\}$).

5. Empirical specifications and data

5.1. Empirical specifications

We estimate a modified gravity model similar to the one in Andrienko and Guriev (2004). The main idea of 'gravity' models is that migration flow depends positively on number of people in both sending region i and receiving region j and decreases with distance between two regions (similarly to the force of gravity between two bodies being proportional to masses of the two bodies and decreasing with distance between them).We use the following log-linear specification of the modified gravity model:[10]

$$\ln M_{i,j,t} = \alpha_{i,j} + \phi \ln income_{i,t} + \varphi \ln income_{j,t} + \sum_{k\in K} \gamma_k \ln X_{k,i,t} + \sum_{k\in K} \delta_k \ln X_{k,j,t} + \sum_{t\in T} \theta_t + \varepsilon_{i,j,t} \quad (1)$$

The dependent variable is a logarithm of number of migrants who move from region i to region j in year *t.*[11]In order to control for distance, initial conditions and legacies, we include fixed effects $\alpha_{i,j}$ for each pair of regions. We will assume throughout the paper that error terms are not correlated with explanatory variables and fixed effects, and are not serially correlated, so the fixed-effects estimation is not biased.

[10]The alternatives include a Poisson model or a negative binominal model. However, as Andrienko and Guriev (2004) show, results are very similar.
[11]The log specification cannot deal with trivial observations. We add 0.5to all observations. Only 1.7% of observations in the sample have zero number of migrants.

The key variables are $\ln income_i$ and $\ln income_j$, the logarithms of per capita real income in an origin and destination regions, correspondingly. $X_{k,i,t}$ and $X_{k,j,t}$ are characteristics of the source and host regions that may change over time, such as the unemployment rate, the characteristics of the housing market (housing price, new flats constructed, square meters of housing per capita), demographic structure (log population, share of young people, share of older people in the population),the provision of public goods, e.g., roads, healthcare (doctors per capita and hospital beds per capita), public transportation (buses per capita), education (number of students) etc. We also include time dummies.

As we are especially interested in the effects of liquidity constraints and poverty traps, we will also include squared real per capita income for the sending regions. In the previous Section we discuss why the existence of poverty traps implies a non-monotonic relationship between the income at the origin and the intensity of migration. If financial markets are developed and there are no liquidity constraints then coefficient ϕ should be negative and coefficient φ should be positive. Migration is the likelier the lower the income at origin and the higher the income at destination. However, as shown in the previous Section, in the presence of financial constraints, the coefficient ϕ should be positive for the poorest regions.

The specification (1) does not automatically rule out endogeneity. Certain right-hand side variables (including income, unemployment, public goods) may depend on migration. We believe however that these effects are negligible since—as shown in Figure 4—migration in Russia is very small (0.5-1.0 per cent of population per year).

In order to understand the role of financial development, we include an interaction between income and financial development (and control for financial development directly). If our hypothesis of the importance of financial development is correct, we should find that financial development relaxes the liquidity constraints; thus, the positive effect of income in sending regions on migration is less likely. In other words, our theory predicts a negative coefficient at the interaction of financial development and income at the origin region. Unfortunately, the date on financial development only start in 2001 so we present the regressions with financial development as additional evidence (in Section 8).

5.2. Data

We use official data on income per capita, the unemployment rate, GDP and different characteristics of quality of life and economic activity which we mentioned in the previous at the regional level from the Russian Statistical Service (Rosstat)[12] for the period of 1995-2010 for 78 regions.[13] We exclude the Republic of Ingushetia and the Republic of Chechnya due to the

[12] http://gks.ru Russian Statistical Service (Rosstat).
[13] In some specifications, data on Chukotka are not available. In these cases we have 77 observations.

unavailability of data, as well as 9 autonomous districts (Nenets, Komi-Perm, Khanty-Mansijsk, Yamalo-Nenets, Taimyr/Dolgano-Nenets, Evenk, Ust-OrdynBuryat, AginskBuryat, and Koryak) which are administrative parts of other regions. We restrict ourselves to 1995-2010 as there are no reliable data on deflators before 1995 and because as Rosstat changed methodology of measuring interregional migration after 2010.

In order to take into account price level differences, we deflate incomes by the regional consumer price index (CPI).[14]This allows us to control for region-specific inflation rates that are sufficient for regression models with fixed effects (Section 6).

As a proxy for financial development we use the ratio of outstanding loans to households and to firms to GDP.

We analyze interregional migration data for the period from 1995 to 2010 using region-to-region annual migration flows. These data are collected by the Interior Ministry and are available—albeit not free of charge—from Rosstat. These data reflect the official count of registered migrants (i.e. of those people who change their registration in this particular year[15]). We end up with 77*77 observations every year.[16] In the next Subsection we discuss the main facts about interregional migration in Russia based on these data. Table 6 in the Appendix provides the summary statistics and definition of all the variables we use in our regressions.[17]

[14]As a robustness check we also use the regional subsistence level in rubles as an alternative deflator; the results are very similar. There are no subsistence level data for 2000; we interpolated this year as an average of 1999 and 2001.

[15] Since 1993 Russians can move freely around the country. Before this the mobility was limited by “propiska”, where the internal migrant’s registration had to be approved by the host city.

[16] We have data on migration for 78 regions but we exclude Chukotka as there are no data for many explanatory variables for this region.

[17]We fill in some missing data. For Leningrad oblast we take a number of students 0.1 per 1000 population in 1995 as it is in a 1994. For Sakhalin oblast we consider 1 bus per 100 thousand people for 2008 and 2010 – this is the value reported by Rosstat for the year 2009.

6. Empirical results

6.1. Linear and quadratic specifications

Table 2 presents the main results for the specification (1). In column 1 we run the specification with linear terms for log income. In column 2, we add squared log income – in order to test for non-monotonicity of the relationship between income and migration. In columns 3 and 4 we re-run specifications 1 and 2 excluding Moscow and Saint Petersburg. Moscow and Saint Petersburg are the only two region-cities in Russia; they are a destination of choice for migrants from all other regions. Therefore it is important to check whether the results are robust to excluding these two cities.

The main focus of our analysis is on the role of income. As expected, the effect of income in the receiving region on migration flow is positive. When we add the squared income, the coefficient at the squared income is negative but small. In other words, migrants prefer to move to higher-income regions, but there is a satiation effect. The peak of this quadratic relationship is at 12; this is above any regional incomes in our dataset – thus the effect of income in the receiving region is positive for all region-to-regions migrations in Russia in 1995-2010.

The effect of income in the sending region is different. The first specification (that only includes a linear term) shows that the average effect of income is insignificant. However, once we add a squared income term, we see that the relationship between income and out-migration is non-monotonic: the effect of income on out-migration is positive in poorer regions and negative in richer regions (as predicted by the model). Based on the coefficients at income and at squared income we calculate the peak of the quadratic relationship at 9.2. Using simulation methods for the joint distribution of the coefficients we estimate the confidence interval for the peak of the quadratic relationship and find it to be (8.7, 10.0).

Other coefficients are generally consistent with the gravity model. Migration is correlated with the size of both sending and receiving regions – with coefficients being significantly larger than 1.The coefficients at the proxies for public goods, amenities and quality of life are also generally intuitive. People move from regions with high unemployment and infant mortality to regions with low unemployment and infant mortality. Migrants prefer regions with a greater number of doctors and hospital beds per capita. Migrants also prefer regions with higher proportion of women, students, young and old people. They move from regions with higher highway density and higher number of buses per capita (both are measures of mobility). The effects of public goods and demographics should not be overinterpreted however as the measures of public goods provisions co-move together and may reflect omitted variables related to both regional and federal fiscal policy. In what follows we abstain from discussing the role of the public goods. However, we do include them in all regressions to control for potential heterogeneity.

We also control for the income distribution through including Gini coefficient for income. The coefficients are significant and negative for both origin and destination regions. The negative coefficient for the destination region probably reflects the aversion to inequality (migrants prefer to migrate to more equal regions). The negative coefficient for the sending region is consistent with importance of poverty traps: those who would like to migrate are probably in the lower income quantiles; controlling for average income in the region, a higher Gini coefficient implies that these potential migrants are more likely to be poor and therefore less likely to be able to move.

We include two measures of the real estate market development: availability of housing (in square meters per capita) and price of real estate (in CPI-adjusted rubles per square meter). As both variables are in logs, the sum of the coefficients is the coefficient at the log of the value of housing per capita. The effect of real estate market is consistent with the importance of financial constraints – as well as with the existence of Tiebout competition. Migrants leave regions with lower housing prices in favor of regions with higher housing prices. This may be due to the fact that housing price (in real terms) reflects quality of life. The availability of housing (per capita in square meters) positively affects both the arrivals and the departures of migrants. If we add up the coefficients at the price per square meter and the number of square meters per capita, we find that the value of housing (in real rubles per capita) increases both in-migration and out-migration. The latter effect is consistent with the importance of financial constraints.

We also include newly constructed flats (using a three-year moving average) but do not find any significant effect.

Table 2. Results of regressions with and without squared terms.

	1	2	3	4
VARIABLES	Main	With squared income	Without Moscow and Saint Petersburg	Without Moscow and St Petersburg, w/ sq. income
Population i (log)	1.75***	1.80***	1.57***	1.63***
	(0.10)	(0.10)	(0.11)	(0.11)
Population j (log)	1.96***	2.00***	1.74***	1.73***
	(0.10)	(0.10)	(0.10)	(0.11)
Income i (log)	0.03	0.76***	-0.03	0.45**
	(0.02)	(0.16)	(0.02)	(0.19)
Income squared i (log)		-0.04***		-0.03**
		(0.01)		(0.01)
Income j (log)	0.18***	0.70***	0.17***	0.15
	(0.02)	(0.17)	(0.02)	(0.20)
Income squared j (log)		-0.03***		0.00
		(0.01)		(0.01)
Ginii (log)	-0.08*	-0.08*	-0.09**	-0.09**
	(0.04)	(0.04)	(0.05)	(0.05)
Gini j (log)	-0.12***	-0.12***	-0.14***	-0.14***
	(0.04)	(0.04)	(0.05)	(0.05)
Unemployment rate I (log)	0.06***	0.06***	0.04***	0.04***
	(0.01)	(0.01)	(0.01)	(0.01)
Unemployment rate j (log)	-0.07***	-0.07***	-0.07***	-0.07***
	(0.01)	(0.01)	(0.01)	(0.01)
Housing price i (log)	-0.05***	-0.05***	-0.05***	-0.05***
	(0.01)	(0.01)	(0.01)	(0.01)
Housing price j (log)	0.05***	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)
Provision of housing i (log)	0.41***	0.40***	0.15*	0.15*
	(0.08)	(0.08)	(0.09)	(0.09)
Provision of housing j (log)	0.62***	0.61***	0.61***	0.61***
	(0.08)	(0.08)	(0.09)	(0.09)
New flats i(moving average, log)	-0.01	-0.002	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
New flats j(moving average log)	-0.01	-0.00	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Life expectancy i (log)	-0.05	-0.08	0.10	0.07
	(0.20)	(0.20)	(0.21)	(0.21)
Life expectancy j (log)	-0.56***	-0.58***	-0.36*	-0.36*
	(0.19)	(0.19)	(0.20)	(0.20)
Infant mortality ratei(log)	0.04***	0.04**	0.03*	0.03*
	(0.01)	(0.01)	(0.02)	(0.02)
Infant mortality rate j(log)	-0.08***	-0.08***	-0.08***	-0.08***

	(0.02)	(0.02)	(0.02)	(0.02)
Doctors i (log)	0.08	0.12**	0.12**	0.15**
	(0.06)	(0.06)	(0.06)	(0.06)
Doctors j (log)	0.17***	0.20***	0.19***	0.19***
	(0.06)	(0.06)	(0.06)	(0.06)
Hospital beds i (log)	0.04	0.04	-0.002	-0.003
	(0.04)	(0.04)	(0.04)	(0.04)
Hospital beds j (log)	0.31***	0.31***	0.27***	0.27***
	(0.04)	(0.04)	(0.04)	(0.04)
Telephones i (log)	-0.01	-0.03	-0.09***	-0.10***
	(0.03)	(0.03)	(0.03)	(0.03)
Telephones j (log)	-0.16***	-0.18***	-0.15***	-0.15***
	(0.03)	(0.03)	(0.03)	(0.03)
Highway density i (log)	0.04**	0.04**	0.03*	0.03*
	(0.02)	(0.02)	(0.02)	(0.02)
Highway density j (log)	-0.00	-0.00	0.03	0.03
	(0.02)	(0.02)	(0.02)	(0.02)
Buses i (log)	0.03***	0.03***	0.03***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)
Buses j (log)	-0.02*	-0.01*	-0.03***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)
Share of young i, t-1	-0.02***	-0.01***	-0.02***	-0.02***
	(0.01)	(0.01)	(0.01)	(0.01)
Share of young j, t-1	0.06***	0.06***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)
Share of old i, t-1	-0.05***	-0.04***	-0.04***	-0.04***
	(0.004)	(0.004)	(0.004)	(0.004)
Share of old j, t-1	0.02***	0.03***	0.02***	0.02***
	(0.004)	(0.005)	(0.005)	(0.01)
Students i (log), t-1	-0.08***	-0.07***	-0.08***	-0.08***
	(0.01)	(0.01)	(0.01)	(0.01)
Students j (log), t-1	0.10***	0.10***	0.11***	0.11***
	(0.01)	(0.01)	(0.01)	(0.01)
Women i (log), t-1	0.47**	0.50**	-1.39***	-1.22***
	(0.23)	(0.22)	(0.29)	(0.29)
Women j (log), t-1	-3.06***	-3.04***	-3.72***	-3.73***
	(0.22)	(0.21)	(0.29)	(0.30)
Year dummies included	Yes	Yes	Yes	Yes
Observations	84,666	84,666	80,222	80,222
R2-within	0.308	0.308	0.309	0.310
Number of pairs	5,929	5,929	5,625	5,625

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

6.2. Piecewise-linear specification

In the previous section we reported the results with quadratic specifications that imply that the relationship between migration and income in the sending region is non-monotonic. In regions with low incomes, a higher income is associated with higher out-migration – these are the regions in a poverty trap. However, the quadratic specification results in a large confidence interval for the peak of the income-migration relationship. In this subsection, we use a more straightforward method and consider a piecewise-linear specification. Our model (Section 3) implies that for high incomes the slope of the relationship between income in the sending region and migration is negative while for the low incomes the slope is positive. For simplicity, we approximate this relationship with just one kink and run the following regression:

$$\begin{aligned}\ln M_{i,j,t} &= \alpha_{i,j} + a\left(\ln income_{i,t} - \gamma\right) I\left(\ln income_{i,t} \le \gamma\right) + \\ &+ b\left(\ln income_{i,t} - \gamma\right) I\left(\ln income_{i,t} > \gamma\right) + controls_{i,t} + \varepsilon_{i,j,t}\end{aligned} \qquad (2)$$

where $I(\cdot)$ is the indicator function, γ is the threshold at which the kink (and possibly a jump)takes place. An alternative way of writing (2) is:

$$\ln M_{i,j,t} = \begin{cases} \alpha_{i,j} + a\left(\ln income_{i,t} - \gamma\right) + controls_{i,t} + \varepsilon_{i,j,t}, & \ln income_{i,t} \le \gamma, \\ \alpha_{i,j} + b\left(\ln income_{i,t} - \gamma\right) + controls_{i,t} + \varepsilon_{i,j,t}, & \ln income_{i,t} > \gamma. \end{cases}$$

Thus in our case there are two regimes: "before" (to the left of the threshold: $\ln income_{i,t} \le \gamma$) and "after"(to the right of the threshold: $\ln income_{i,t} > \gamma$). Our model (in Section 3) would be consistent with the data as long as for some threshold γ there is a significant difference between slopes *a* and *b* and that *b*<0<*a*.

In order to estimate model (2) we use least squares estimation for transform variables (Hansen, 1999) to extract fixed individual effects (3).

$$\ln M^{*}_{i,j,t} = \beta \ln income^{*}_{i,t}\left(\gamma\right) + controls_{i,t}{}^{*} + \varepsilon^{*}_{i,j,t} \qquad (3)$$

Where $\ln M^{*}_{i,j,t} = \ln M_{i,j,t} - T^{-1}\sum_{t=1}^{T} \ln M_{i,j,t}$,

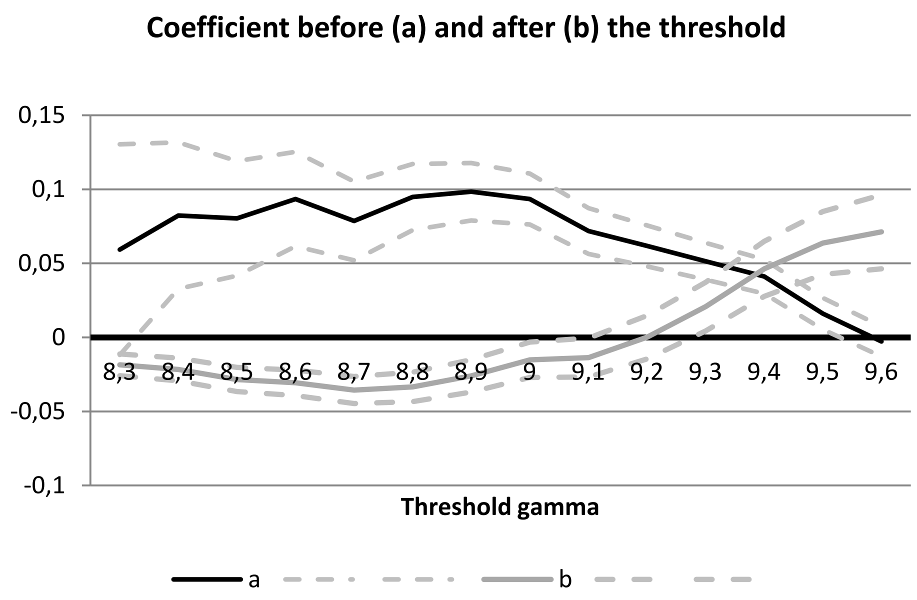
$\ln income^{*}_{i,t}\left(\gamma\right) = \begin{pmatrix} \ln income_{i,t} - T^{-1}\sum_{t=1}^{T} \ln income_{i,t} I\left(\ln income_{i,t} \le \gamma\right) \\ \ln income_{i,t} - T^{-1}\sum_{t=1}^{T} \ln income_{i,t} I\left(\ln income_{i,t} > \gamma\right) \end{pmatrix}$ and

$\varepsilon^{*}_{i,j,t} = \varepsilon_{i,j,t} - T^{-1}\sum_{t=1}^{T} \varepsilon_{i,j,t}$, T is a number of years. Therefore, we do transformation of income variable separately before and after the threshold point. For all other variables we use the conventional within-transformation.

Then we estimate (3) for different thresholds γ. Finally, we find $\hat{\gamma}$ as the threshold with the minimum residual sum of squares (RSS) from equation (3). The minimum RSS is at log real income equal to $\hat{\gamma}$ =9.0. Using Hansen's methodology,[18] we test the hypothesis of the significance threshold. The test statistic is F1=112.7[19], p-value=0.000.Therefore there are indeed two 'regimes'.[20]We also calculate 95% confidence interval for threshold and find (8.9, 9).[21]

Figure 7 presents the coefficient at income whenever it is below the threshold (coefficient *a*) and coefficient at income when it is above the threshold (coefficient *b*) for different levels of thresholds. We see that for all thresholds below 9.1 the coefficients are consistent with our theory. If income is low, its effect on outward migration is positive (coefficient *a*). If income is high (above the threshold), its effect on outward migration is negative.

Figure 7. Results for regressions with structural break for different threshold levels.



[18] For Hansen procedure we need a balanced panel. Since there is no price of housing for all regions and all periods, we estimate model without this variable.
[19]Using bootstrap procedure (Hansen, 1999), we calculate 10%, 5%, 1% critical values for likelihood ratio test. They are 63.2, 68.9, and 80.8, correspondingly.
[20] We have also tested hypothesis of two thresholds, however, we did not find significant results.
[21] Confidence interval is defined as a threshold parameter for which likelihood ratio is below the 5% critical value (7.35). This rule and critical value are from Hansen (1999). In our case likelihood ratio is testing null hypothesis that $\gamma = 9$.

6.3. Semiparametric estimations

In this Section, instead of estimating a quadratic or piecewise-linear relationship between income in the sending region and migration, we use a semiparametric approach. We assume that there is a parametric form for all variables (except income in the sending region) and a non-parametric relationship between the income in the sending region and migration:[22]

$$\ln M_{i,j,t} = \alpha_{i,j} + f\left(\ln income_{i,t}\right) + \varphi \ln income_{j,t} + \sum_{k \in K} \gamma_k \ln X_{k,i,t} + \sum_{k \in K} \delta_k \ln X_{k,j,t} + \sum_{t \in T} \theta_t year_t + \varepsilon_{i,j,t} \quad (4)$$

Figure 8 presents the results of this semiparametric estimation. Results for all regions and for the specification without Moscow and Saint Petersburg are very similar. The graphs show that the data are generally consistent with the theoretical predictions. If the regions are poor, increase in income results in higher out-migration; for richer regions, further increase in income results in lower migration. The peak is now somewhat lower: it is reached at log income equal to 8.8 (rather than 9.0 as before). The 95% confidence interval for the peak is (8.6, 9.1)[23]. The log real income at 8.8 implies that the average income is equal to exp(8.8)$\approx$6634in 2010 rubles and 1.12 Russian average subsistence levels in 2010).

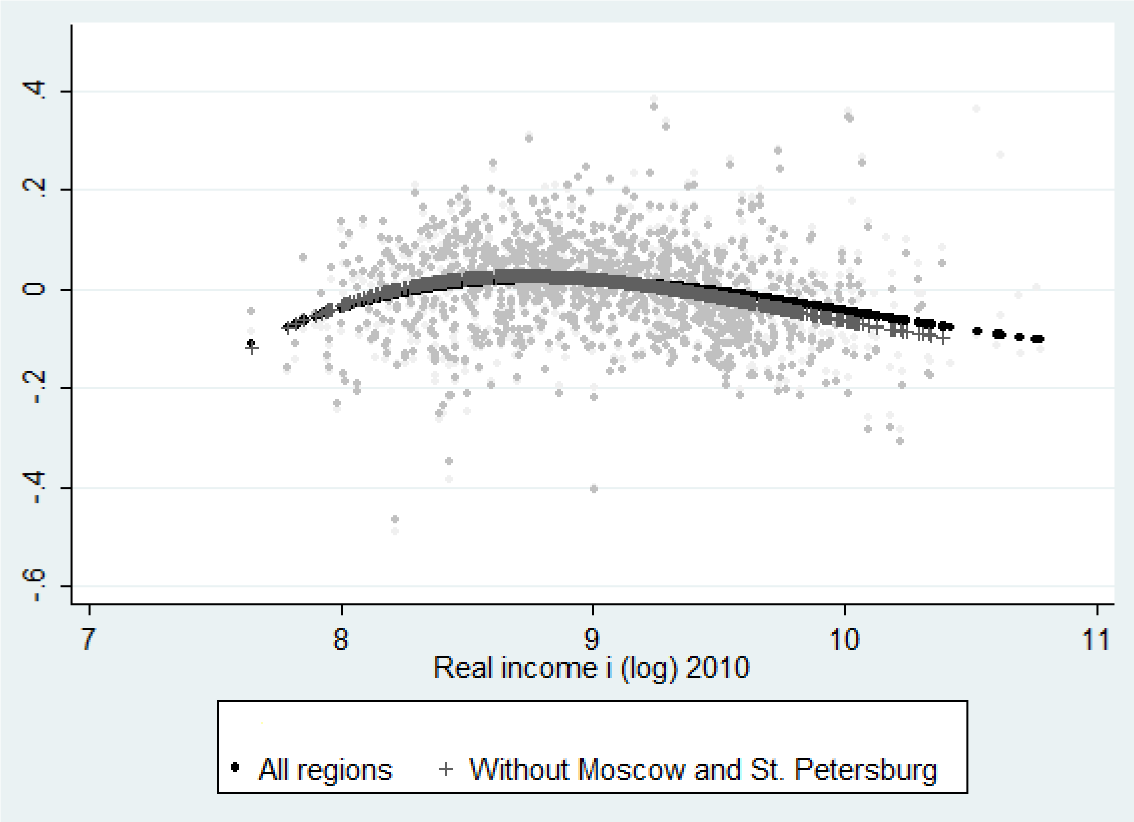
[22] Our approach is based on Baltagi and Li, (2002).We use the "xtsemi-par" command for Stata written by Libois and Verardi (2012). To perform the non-parametric fit we use B-splines (Newson, 2001).Baltagi and Li (2002) prove that the curve *f* can be estimated by regressing residuals from equation (4) on log income in the sending region using a standard non-parametric regression estimator:

$$\hat{\varepsilon}_{i,j,t} = \ln M_{i,j,t} - \hat{\alpha}_{i,j} - \hat{\varphi} \ln income_{j,t} - \sum_{k \in K} \hat{\gamma}_k \ln X_{k,i,t} - \sum_{k \in K} \hat{\delta}_k \ln X_{k,j,t} - \sum_{t \in T} \hat{\theta}_t year_t$$

To obtain the estimates of the individual fixed effects $\hat{\alpha}_{i,j}$ and regression coefficients, the authors suggest estimate model (4) in first differences using ordinary least squares and approximate first difference of unknown function *f* by series $p^k\left(\ln income_i\right)$. Here $p^k\left(\ln income_i\right)$ are the first k terms of a sequence of functions $\left(p^1\left(\ln income_i\right), p^2\left(\ln income_i\right)...\right)$.

[23] We calculate confidence interval using bootstrap procedure.

Figure 8. Results of semiparametric estimations. Log migration as a function of log real income in the sending region in 2010 rubles.



6.4. Robustness checks

To check the robustness of our results we estimate equation (1) for subsamples of close and distant regions. We also estimate the model for different sub-periods (we consider 1996-2000, 2000-05 and 2005-10).

Table 3 shows the results for geographical sub-samples. Columns 1-2 present the results for pairs of regions that are at most 500 kilometers away from each other. We calculate distance between regions as a railway distance between their capitals. If there is no railway connection between the regions' capitals, we calculate the distance by a highway. Columns 3-4 present the results for the pairs of regions that are 500-2000 kilometers away from each other. The results for the "distant" pairs of regions (more than 2000 kilometers away from each other) are presented in columns 5 and 6.

The coefficients at the income at origins show that the poverty traps only exist for large distances (this result is similar to Vakulenko et al., 2011). For the long-haul migration (more than 2000 kilometers) we find a familiar non-monotonic relationship with a peak at log income equal to 1.087/(2*0.059)=9.2. If income in the sending region is below this level, the impact of income on migration is positive; if income is above this threshold, the slope of the relationship is negative. This relationship holds neither for the medium-haul nor for short-haul migration.

For the intermediate distances (500-2000 kilometers) there is no significant relationship. For the close pairs of regions the relationship is actually U-shaped.

Table 3.Results for different distances between regions.[24]

	1	2	3	4	5	6
VARIABLES	<500 km	<500 km With squared income	500-2000km	500-2000km With squared income	>2000 km	>2000 km With squared income
Population i (log)	1.04***	0.94***	1.49***	1.50***	1.85***	1.92***
	(0.26)	(0.25)	(0.14)	(0.14)	(0.15)	(0.15)
Population j (log)	2.24***	2.22***	1.71***	1.75***	2.24***	2.30***
	(0.24)	(0.24)	(0.14)	(0.14)	(0.14)	(0.14)
Income i (log)	0.12**	-1.61***	0.02	0.19	0.04	1.09***
	(0.05)	(0.39)	(0.03)	(0.22)	(0.03)	(0.23)
Income squared i (log)		0.10***		-0.01		-0.06***
		(0.02)		(0.01)		(0.01)
Income j (log)	0.13**	-0.56	0.19***	0.56**	0.18***	0.92***
	(0.05)	(0.41)	(0.03)	(0.25)	(0.03)	(0.25)
Income squared j (log)		0.04*		-0.02		-0.04***
		(0.02)		(0.01)		(0.01)
Unemployment rate i (log)	0.05**	0.05***	0.08***	0.08***	0.04***	0.03**
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Unemployment ratej (log)	-0.02	-0.02	-0.07***	-0.07***	-0.07***	-0.08***
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	6,246	6,246	31,104	31,104	47,286	47,286
R2-within	0.550	0.556	0.388	0.389	0.276	0.277
Number of pairs	427	427	2,144	2,144	3,356	3,356

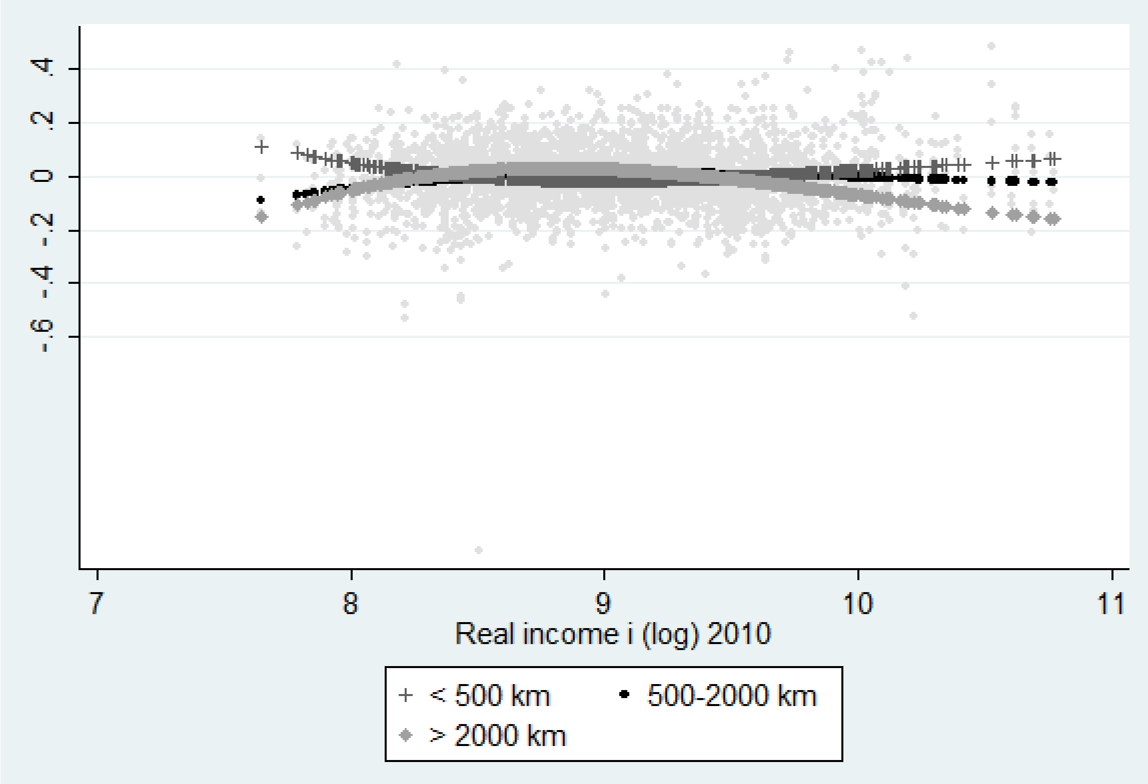
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Semiparametric results for different distances (presented in

Figure 9) produce similar results. The peak for distant pairs of regions is 8.8 (in terms of the logarithm of real income).

[24] This table presents the coefficients only for the selected variables of interest. The full estimation results are in the Online Appendix Table 2.

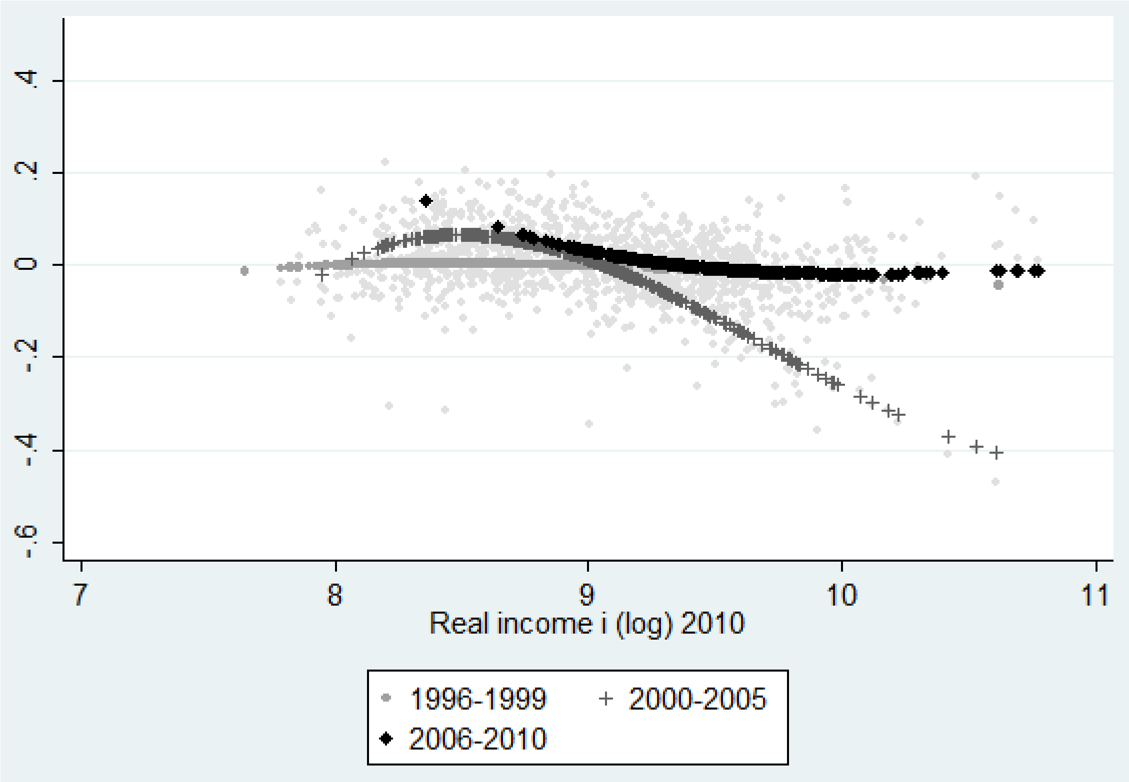
Figure 9. Results of semiparametric model for different distances.



We have also estimated the relationship between income and migration for different subperiods. Figure 10 presents the results for 1990s, early 2000s and late 2000s.[25] The graphs show that in 1990s the semiparametric relationship is monotonically increasing (the effect of poverty traps dominates). In early 2000s, there is indeed an inversed U-shaped relationship (consistent with our theory). This relationship disappears in 2005-10. This is not surprising – in 2005-10, incomes in the vast majority of regions are higher than the thresholds identified above.

[25]The regressions with linear and squared terms for these and other subperiods are reported in Table 7 in the Appendix and Table 3 in the Online Appendix. The regressions confirm the absence of poverty traps in the 2005-10 period.

Figure 10. Results of semiparametric model for different subperiods.



As a robustness check, we also run our main specification with lagged independent variables. The results for one-year and two-year lags are presented in Table 6 and Table 7 in the Online Appendix. It turns out that specifications with lags have much lower explanatory power. Also, in neither specification we find any significant relationship between lagged income (or squared income) in the sending region and migration. This confirms our choice of the contemporaneous specification (1).

We have also estimated a specification where instead of incomes at origin and destination we included only a difference between them (see Table 8 in the Appendix). We do find that the difference between income at destination and income at origin does have a positive effect on migration. We have also added squared difference and found that the coefficient at squared difference is positive. This is consistent with a conjecture that there is a fixed cost of migration and that the financial constraints are binding.

As yet another robustness check, we also estimate a semiparametric model with nonlinear relationships between migration and income in the receiving region. These results are presented in the Figure 13in the Appendix. The growth in income generally results in higher immigration. This is true for regions with logarithm of income higher than 8.3 (4024 in 2010 rubles); only very few region-year are below this threshold in our data.

7. Discussion of results

In the Table 4 we summarize the estimates of thresholds and peaks of the relationships between the real income in a sending region and intensity of migration. The results of different methods are quite similar.

Table 4. Estimates of peaks of the relationship between income and migration.

N	Model	Peak (in logarithms of monthly real income)	95% confidence interval	Russian rubles 2010per month
1	Linear and squared income	9.2	(8.7, 10.0)	9897
2	Models with structural break	9.0	(8.9, 9.0)	8103
3	Semiparametric model	8.8	(8.6, 9.1)	6634

In Figure 11, we plot the evolution of percentiles of interregional income distribution over time.[26] Assuming the critical real income being to 9 in log terms (or 8103 rubles in 2010 prices, about $270 per month or about $3000 per year), how many regions were locked in poverty traps in each year? It turns out that 89.6% of regions were in a poverty trap in 1995, 84.4% – in 2000, 27.2% –in 2005, and 1.3% (i.e. exactly 1 region, Kalmykia) – in 2010. In other words, the number of regions which are in a poverty trap has decreased substantially during 2000s.

[26] See the Online Appendix Figure 1 for the same graph with alternative deflators.

Figure 11.Evolution of distribution of regions by real income.

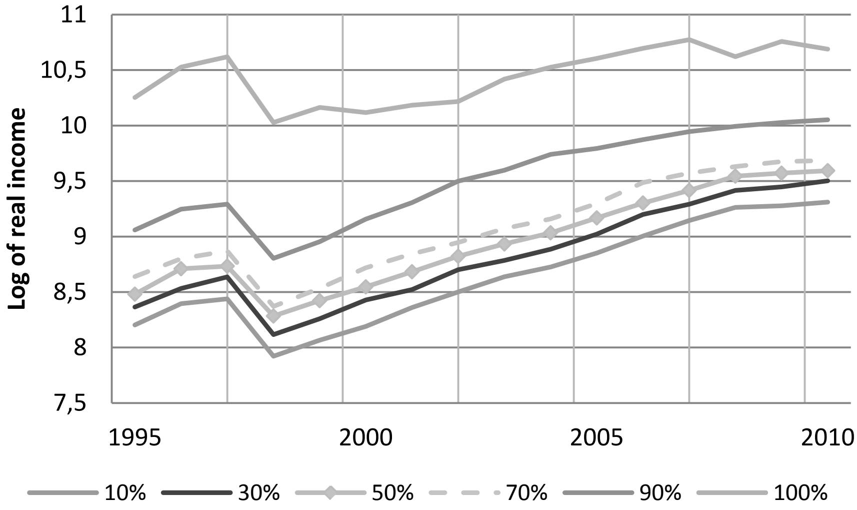
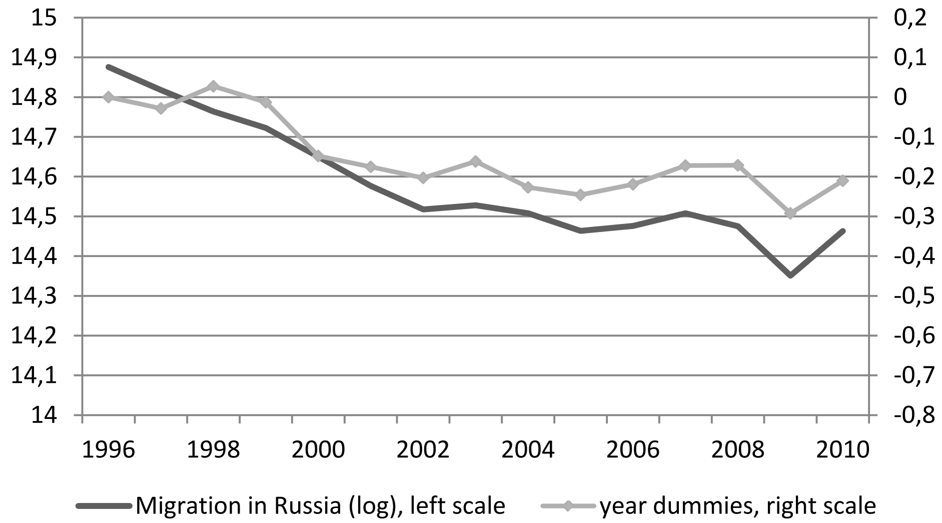


Table 4 implies that while convergence in 1990s was indeed slowed down by poverty traps, the situation changed in 2000s. The overall economic growth let the poor Russian regions "grow out" of their poverty traps. In addition, financial development relaxed liquidity constraints. This brought down an important barrier to labor reallocation across Russian regions and resulted in faster convergence between income and wages in 2000s.

How can this be reconciled with falling migration rates in 2000s? In order to understand this, in Figure 12 we plot the year dummies from the main specification (Table 2, Column 1). We see that there was almost no change in the year dummies in 2000s.This implies that the fall in interregional migration during 2000s was explained precisely by the decreases in interregional differences – and not by some exogenous downward trend in migration (whatever could explain such a downward trend). In this sense, the decrease in migration in 2000s is normal: as the barriers to migrations decreased and wages and incomes converged, the number of actual migrants also fell as the incentives to migrations are no longer as high as they used to be.

Figure 12. Evolution of migration over time: internal migration in Russia in 1996–2010 and time dummies in the main regression.



8. Financial development

In this section we expand the main specification (1) adding proxies for financial development such as loans to firms, households and mortgage debt as a percent of GDP. As the data on loans to firms and households are available only since 2001 and data of mortgage debts only start since 2004, the timespan in this section is much shorter.

Table 5 presents regressions with the ratio of loans to households to GDP (the regressions with alternative measures of financial development are provide in the Table 5 in Online Appendix; the results are similar).

In line with our theory, financial development does result in higher outward migration. Moreover, the coefficient at the interaction term between financial development and income is negative. In other words, if this region is more financially developed, liquidity constraints are less binding as a barrier for migration – the outgoing migration is less positively linked to income in the sending region.

We also run regressions with squared income and interaction of financial development and interaction with squared income. Again, consistent with the theory, we find that in the regions with higher level of financial development the coefficient at squared income is more positive (i.e. is closer to zero); therefore in more financially developed regions the non-monotonic relationship between income and migration is less likely to be observed.

Table 5.Regressions with financial development.

VARIABLES	1 Main	2 With squared income	3 Without Moscow and Saint Petersburg	4 Without Moscow and St Petersburg, w/ sq. income
Population i (log)	1.40***	1.33***	1.50***	1.39***
	(0.15)	(0.15)	(0.17)	(0.17)
Population j (log)	2.37***	2.41***	2.10***	2.16***
	(0.14)	(0.14)	(0.16)	(0.16)
Income i (log)	-0.03	-4.14***	-0.03	-5.58***
	(0.05)	(0.84)	(0.05)	(0.95)
Income squared i (log)		0.22***		0.29***
		(0.04)		(0.05)
Income*loans i (log)	-0.02**	-0.63***	-0.02**	-0.89***
	(0.01)	(0.19)	(0.01)	(0.21)
Income squared*loans i (log)		0.03***		0.04***
		(0.01)		(0.01)
Loans i (log)	0.16**	3.13***	0.14*	4.32***
	(0.08)	(0.88)	(0.08)	(0.98)
Income j (log)	0.06	1.35*	0.11**	2.45***
	(0.05)	(0.78)	(0.05)	(0.87)
Income squared j (log)		-0.07*		-0.13***
		(0.04)		(0.05)
Income*loans j (log)	-0.01	0.34*	-0.01	0.83***
	(0.01)	(0.18)	(0.01)	(0.21)
Income squared*loans j (log)		-0.02*		-0.05***
		(0.01)		(0.01)
Loans j (log)	0.11	-1.47*	0.06	-3.69***
	(0.07)	(0.83)	(0.08)	(0.95)
Gini (log) i	-0.09	-0.03	-0.05	-0.02
	(0.08)	(0.09)	(0.10)	(0.10)
Gini (log) j	-0.21**	-0.25***	-0.36***	-0.45***
	(0.09)	(0.09)	(0.10)	(0.10)
Unemployment rate (log) i	0.03***	0.03***	0.03***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)
Unemployment rate (log) j	-0.05***	-0.05***	-0.06***	-0.06***
	(0.01)	(0.01)	(0.01)	(0.01)
Housing price i (log)	-0.03**	-0.03**	-0.03*	-0.03*
	(0.02)	(0.02)	(0.02)	(0.02)
Housing price j (log)	0.06***	0.06***	0.05***	0.05***
	(0.02)	(0.02)	(0.02)	(0.02)
Provision of housing i (log)	0.53***	0.44***	0.56***	0.43**
	(0.16)	(0.16)	(0.17)	(0.17)
Provision of housing j (log)	0.39***	0.41***	0.40***	0.43***
	(0.14)	(0.14)	(0.15)	(0.15)

New flats (moving average, log) i	-0.05***	-0.04***	-0.05***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)
New flats (moving average log) j	0.05***	0.04***	0.05***	0.04***
	(0.01)	(0.01)	(0.01)	(0.01)
Life expectancy (log) i	0.70**	0.75***	0.69**	0.74***
	(0.27)	(0.27)	(0.28)	(0.28)
Life expectancy (log) j	-1.50***	-1.55***	-1.17***	-1.20***
	(0.26)	(0.25)	(0.26)	(0.26)
Infant mortality rate (log) i	0.06***	0.07***	0.06***	0.06***
	(0.02)	(0.02)	(0.02)	(0.02)
Infant mortality rate (log) j	-0.07***	-0.07***	-0.07***	-0.06***
	(0.02)	(0.02)	(0.02)	(0.02)
Year dummies included[27]	Yes	Yes	Yes	Yes
Public goods included	Yes	Yes	Yes	Yes
Observations	58,223	58,223	55,211	55,211
R2-within	0.104	0.105	0.104	0.106
Number of pairs	5,929	5,929	5,625	5,625

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[27] Coefficients at the year dummies and public goods are reported in the Online Appendix Table 4.

9. Concluding remarks

Our parametric and semiparametric analysis of internal migration in Russia helps to understand and quantify barriers to labor mobility and the regional poverty traps. Using parametric and non-parametric methods we arrive at similar estimates of the barriers to move: residents of regions with annual income below $3000 are likely to be willing but unable to afford the move. We also show how economic growth and financial development help breaking out of poverty traps.

Lower barriers to geographical labor mobility result in convergence in wages and incomes but these do not have to imply an increase in migration per se. In particular, Russian interregional migration rates have gone down in 2000s; we show that this reduction is explained by lower interregional differences (and therefore lower incentives to migrate). The interregional differences are lowered not because many workers actually migrate but because their threat to migrate is credible – due to the lower barriers to migration.

The other interesting implication of our analysis is that convergence in incomes and wages can take place even in the presence of large and persistent interregional differences in GDP per capita --- as it has been the case in Russia in 1990s and 2000s.[28] The only way to reconcile convergence in wages and incomes and non-convergence in per capita GDP is as follows. As long as barriers to labor mobility are removed, mobility (or even a threat of mobility) protects workers. At the same time, Russian regions still differ substantially in terms of total factor productivity. These differences may be explained either by (i) geographical factors, (ii) productivity of inherited capital stock and infrastructure, or (iii) political and economic institutions. Unfortunately, the available data do not allow us to distinguish between these three explanations.

[28] As we show in Guriev and Vakulenko (2012), interregional dispersions in GDP per capita in Russia remain high not only by European standards but also by standards of less developed countries.

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11. Appendix

Table 6.Summary statistics of the variables.

Variable	Definition	Years available	Obs	Mean	Std. Dev.	Min	Max
Migration	Number of people migrated from one region to another in a given year	1995-2010	97344	363.13	2313.11	0.5	67520
Migration (log)	Logarithmof migration	1995-2010	97344	3.91	1.74	-0.69	11.12
Population	Average population per year	1995-2010	97344	1838781	1606615	49056	11500000
Income	Income per capita to subsidence level	1995-2010	97344	2.00	0.79	0.71	6.45
Income (log)	Log of Income per capita to subsidence level	1995-2010	97344	0.63	0.36	-0.34	1.86
Real income	Income per capita (2010 prices)	1995-2010	96096	9602.50	5955.797	2092.72	47747.7
Real income (log)	Log of Income per capita (2010 prices)	1995-2010	96096	9.01	0.550	7.646	10.77
Wage	Wage to subsidence level	1995-2010	91104	2.32	0.82	0.71	7.84
Wage (log)	Log of wage to subsidence level	1995-2010	91104	0.79	0.34	-0.34	2.06
GDP	Real GDP per capita	1996-2010	85176	11011.0	9393.81	1577.72	97736.71
Poverty	Share of population with money income below subsistence level %	1995-2010	96486	26.87	12.51	8.1	77.9
Gini	Gini coefficient (measure of inequality in a region)	1995-2010	96564	0.36	0.05	0.23	0.62
Unemployment rate	Unemployment rate ILO	1995-2010	97344	10.11	4.64	0	32.4

Housing price	Price per square meterdeflated by CPI	1996-2010	87828	29234.7	16878.16	4541.54	186018.8
Provision of housing	Availability of dwellings per capita in square meters	1995-2010	97344	20.40	2.84	12.1	31.5
New flats	New flats constructed	1995-2010	97344	30.81	16.44	0.90	122.42
Life expectancy	Life expectancy at birth	1995-2010	97344	65.49	2.88	53.76	74.37
Infant mortality rate	Number of deaths of children under 1 year per 1,000 newborn per year	1995-2010	97344	13.59	5.02	4.28	42.1
Doctors	Number of doctors per 10,000 population	1995-2010	97344	45.69	10.37	27	87.4
Hospital beds	Number of hospital beds per 10,000 population	1995-2010	97344	120.05	23.43	68.1	252.4
Telephones	Number of telephone lines per 100 households	1995-2010	97344	204.09	73.41	42.9	420.4
Highway density	Highway density per 1,000 square km	1995-2010	97344	120.59	98.23	0.8	670
Buses	Number of busses per 100,000 population	1995-2010	97188	62.09	26.26	1	153
Share of young	Share of people less than working-age	1995-2010	97344	19.16	4.09	12.3	35.8
Share of old	Share of people greater than working-age	1995-2010	97344	19.89	4.38	5.2	27.4
Students	Number of students per 10,000 population	1995-2010	97344	334.686	174.3048	0	1256.25
Women	Relation of women to 1,000 men	1995-2010	97344	1137.47	61.69	901	1249
Homicides	Number of reported homicides and attempts to murder	1995-2010	97344	348.42	300.84	7	1749
Mobile	Number of registered mobile	2000-	65442	1808.09	4228.42	0.1	39688.8

telephones	phones, thousand	2010					
Urban	Towns residents %	1995-2010	97344	69.33	12.50	23.6	100
Loans to households	Loans to households with respect toGDP	2001-2010	60294	0.061	0.054	0.001	0.267
Loans to firms	Loans to firms with respect to GDP	2001-2010	60684	0.137	0.176	0.007	3.064
Mortgage debt	Mortgage debt with respect to GDP	2004-2010	42432	0.019	0.017	0.000	0.083

Table 7.Results for different time periods[29].

	1	2	3	4	5	6
VARIABLES	1996-2000	1996-2000 With squared income	2000-2005	2000-2005 With squared income	2005-2010 With squared income	2005-2010 With squared income
Population i (log)	2.20***	2.23***	2.04***	2.16***	0.97***	0.93***
	(0.31)	(0.32)	(0.31)	(0.32)	(0.21)	(0.21)
Population j (log)	1.22***	1.23***	0.84***	0.94***	2.19***	2.26***
	(0.30)	(0.30)	(0.30)	(0.31)	(0.19)	(0.20)
Income i (log)	0.002	-0.86***	0.04	1.01***	-0.005	-0.72
	(0.05)	(0.25)	(0.04)	(0.33)	(0.05)	(0.67)
Income squared i (log)		0.05***		-0.06***		0.04
		(0.01)		(0.02)		(0.04)
Income j (log)	-0.13***	-0.57**	0.02	0.85**	-0.01	1.11*
	(0.04)	(0.24)	(0.05)	(0.33)	(0.05)	(0.67)
Income squared j (log)		0.03*		-0.05**		-0.06*
		(0.01)		(0.02)		(0.03)
Unemployment rate i (log)	0.05***	0.04***	-0.01	-0.01	0.03**	0.03**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Unemployment rate j (log)	-0.04**	-0.04**	-0.01	-0.02	-0.02*	-0.02*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Observations	25,376	25,376	35,270	35,270	35,574	35,574
R2-within	0.159	0.160	0.105	0.105	0.040	0.040
Number of pairs	5,625	5,625	5,929	5,929	5,929	5,929

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8.Results of regressions with difference between incomes at origin and destination. Dependent variable: log migration.

	1	2	3	4
VARIABLES	With difference in incomes	With difference in incomes and squares	With difference in income and income in origin	With difference in income and income in origin and squares
Population i (log)	1.83***	1.84***	1.75***	1.81***

[29] We present only part of results in this section. The full estimation results are in the Online Appendix Table 3.

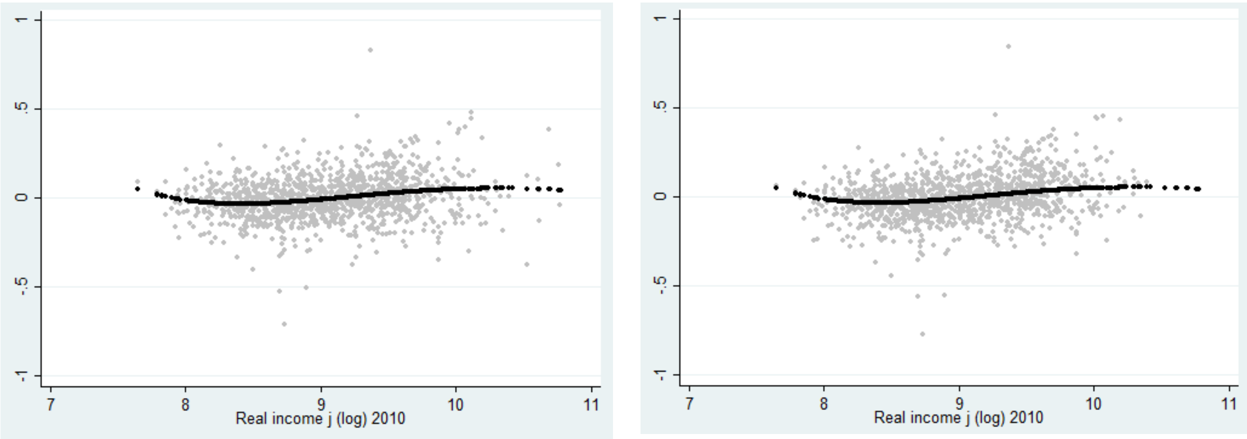
	(0.10)	(0.10)	(0.10)	(0.10)
Population j (log)	2.05***	2.05***	1.96***	1.97***
	(0.10)	(0.10)	(0.10)	(0.10)
Ln(income)j – ln(income)i	0.07***	0.07***	0.18***	0.17***
	(0.02)	(0.02)	(0.02)	(0.02)
(Ln(income)j – ln(income)i)^2		0.05***		0.05***
		(0.01)		(0.01)
Income i (log)			0.21***	0.96***
			(0.03)	(0.16)
Income squared i (log)				-0.04***
				(0.01)
Ginii (log)	-0.01	-0.02	-0.08*	-0.10**
	(0.04)	(0.04)	(0.04)	(0.04)
Gini j (log)	-0.05	-0.06	-0.12***	-0.14***
	(0.04)	(0.04)	(0.04)	(0.04)
Unemployment rate I (log)	0.06***	0.06***	0.06***	0.06***
	(0.01)	(0.01)	(0.01)	(0.01)
Unemployment rate j (log)	-0.07***	-0.07***	-0.07***	-0.07***
	(0.01)	(0.01)	(0.01)	(0.01)
Real housing price i (log)	-0.05***	-0.05***	-0.05***	-0.05***
	(0.01)	(0.01)	(0.01)	(0.01)
Real housing price j (log)	0.05***	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)
Housing availability i (log)	0.46***	0.41***	0.41***	0.35***
	(0.08)	(0.08)	(0.08)	(0.08)
Housing availability j (log)	0.67***	0.62***	0.62***	0.57***
	(0.08)	(0.08)	(0.08)	(0.08)
New flats i (moving average, log)	-0.01	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
New flats j (moving average log)	-0.00	-0.00	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Life expectancy i (log)	-0.05	-0.05	-0.05	-0.08
	(0.20)	(0.20)	(0.20)	(0.20)
Life expectancy j (log)	-0.56***	-0.56***	-0.56***	-0.56***
	(0.19)	(0.19)	(0.19)	(0.19)
Infant mortality ratei (log)	0.04***	0.04***	0.04***	0.04**
	(0.01)	(0.01)	(0.01)	(0.01)
Infant mortality rate j (log)	-0.08***	-0.08***	-0.08***	-0.08***
	(0.02)	(0.02)	(0.02)	(0.02)
Doctors i (log)	0.08	0.08	0.08	0.13**
	(0.06)	(0.06)	(0.06)	(0.06)
Doctors j (log)	0.17***	0.17***	0.17***	0.17***
	(0.06)	(0.06)	(0.06)	(0.06)
Hospital beds i (log)	0.06	0.05	0.04	0.03
	(0.04)	(0.04)	(0.04)	(0.04)
Hospital beds j (log)	0.32***	0.32***	0.31***	0.30***

	(0.04)	(0.04)	(0.04)	(0.04)
Telephones i (log)	-0.00	-0.01	-0.01	-0.04
	(0.03)	(0.03)	(0.03)	(0.03)
Telephones j (log)	-0.15***	-0.16***	-0.16***	-0.17***
	(0.03)	(0.03)	(0.03)	(0.03)
Highway density i (log)	0.03*	0.03*	0.04**	0.04**
	(0.02)	(0.02)	(0.02)	(0.02)
Highway density j (log)	-0.01	-0.01	-0.003	-0.002
	(0.02)	(0.02)	(0.02)	(0.02)
Buses i (log)	0.02***	0.03***	0.03***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)
Buses j (log)	-0.02**	-0.02*	-0.02*	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Share of young i, t-1	-0.02***	-0.02***	-0.02***	-0.01***
	(0.01)	(0.01)	(0.01)	(0.01)
Share of young j, t-1	0.05***	0.05***	0.06***	0.06***
	(0.01)	(0.01)	(0.01)	(0.01)
Share of old i, t-1	-0.05***	-0.05***	-0.05***	-0.04***
	(0.004)	(0.004)	(0.004)	(0.004)
Share of old j, t-1	0.02***	0.02***	0.02***	0.03***
	(0.004)	(0.004)	(0.004)	(0.004)
Students i (log), t-1	-0.08***	-0.08***	-0.08***	-0.07***
	(0.01)	(0.01)	(0.01)	(0.01)
Students j (log), t-1	0.10***	0.10***	0.10***	0.10***
	(0.01)	(0.01)	(0.01)	(0.01)
Women i (log), t-1	0.55**	0.36	0.47**	0.31
	(0.23)	(0.24)	(0.23)	(0.23)
Women j (log), t-1	-2.98***	-3.17***	-3.06***	-3.24***
	(0.22)	(0.23)	(0.22)	(0.23)
year1997	-0.02*	-0.01	-0.03***	-0.02*
	(0.01)	(0.01)	(0.01)	(0.01)
year1998	-0.06***	-0.06***	0.03	0.05**
	(0.01)	(0.01)	(0.02)	(0.02)
year1999	-0.07***	-0.06***	-0.01	0.01
	(0.02)	(0.02)	(0.02)	(0.02)
year2000	-0.18***	-0.17***	-0.15***	-0.12***
	(0.02)	(0.02)	(0.02)	(0.02)
year2001	-0.20***	-0.18***	-0.18***	-0.12***
	(0.03)	(0.03)	(0.03)	(0.03)
year2002	-0.21***	-0.18***	-0.20***	-0.14***
	(0.04)	(0.04)	(0.04)	(0.04)
year2003	-0.15***	-0.11**	-0.16***	-0.08
	(0.05)	(0.05)	(0.05)	(0.05)
year2004	-0.21***	-0.16***	-0.23***	-0.13**
	(0.05)	(0.05)	(0.05)	(0.05)
year2005	-0.21***	-0.15***	-0.25***	-0.13**
	(0.06)	(0.06)	(0.06)	(0.06)
year2006	-0.15**	-0.10	-0.22***	-0.09

	(0.06)	(0.06)	(0.06)	(0.07)
year2007	-0.09	-0.03	-0.17***	-0.04
	(0.07)	(0.07)	(0.07)	(0.07)
year2008	-0.07	-0.01	-0.17**	-0.03
	(0.07)	(0.07)	(0.07)	(0.07)
year2009	-0.18***	-0.12*	-0.29***	-0.15**
	(0.07)	(0.07)	(0.07)	(0.07)
year2010	-0.09	-0.03	-0.21***	-0.07
	(0.07)	(0.07)	(0.07)	(0.07)
Observations	84,666	84,666	84,666	84,666
R2-within	0.307	0.308	0.308	0.309
Number of pairs	5,929	5,929	5,929	5,929

Robust standard errors in parentheses
***** p<0.01, ** p<0.05, * p<0.1**

Figure 13.Results of semiparametric regression models for receiving regions.



a) All regions

b) Without Moscow and Saint Petersburg

Online Appendix

Table 1. Results of regressions with and without squared terms. Dependent variable: log migration.

VARIABLES	1 Main	2 Squared income	3 Without Moscow and Saint-Petersburg	4 Without Moscow and Saint Petersburg, squared income
Population i (log)	1.750***	1.802***	1.572***	1.633***
	(0.099)	(0.098)	(0.109)	(0.111)
Population j (log)	1.964***	2.002***	1.737***	1.734***
	(0.096)	(0.096)	(0.104)	(0.107)
Income i (log)	0.035	0.758***	-0.027	0.450**
	(0.023)	(0.157)	(0.024)	(0.192)
Income squared i (log)		-0.041***		-0.027**
		(0.009)		(0.011)
Income j (log)	0.175***	0.696***	0.169***	0.148
	(0.023)	(0.169)	(0.025)	(0.205)
Income squared j (log)		-0.029***		0.001
		(0.010)		(0.012)
Ginii (log)	-0.084*	-0.082*	-0.093**	-0.092**
	(0.043)	(0.043)	(0.047)	(0.047)
Gini j (log)	-0.124***	-0.123***	-0.143***	-0.143***
	(0.042)	(0.042)	(0.046)	(0.046)
Unemployment rate I (log)	0.062***	0.059***	0.037***	0.036***
	(0.009)	(0.009)	(0.009)	(0.009)
Unemployment rate j (log)	-0.069***	-0.071***	-0.072***	-0.072***
	(0.009)	(0.009)	(0.009)	(0.009)
Housing price i (log)	-0.051***	-0.050***	-0.048***	-0.048***
	(0.011)	(0.011)	(0.012)	(0.012)
Housing price j (log)	0.047***	0.049***	0.055***	0.055***
	(0.011)	(0.011)	(0.011)	(0.011)
Provision of housing i (log)	0.409***	0.404***	0.147*	0.155*
	(0.082)	(0.083)	(0.087)	(0.088)
Provision of housing j (log)	0.617***	0.613***	0.608***	0.608***
	(0.082)	(0.083)	(0.086)	(0.086)
New flats i (moving average, log)	-0.010	-0.005	0.010	0.013
	(0.009)	(0.009)	(0.010)	(0.010)
New flats j (moving average log)	-0.006	-0.002	-0.012	-0.012
	(0.009)	(0.009)	(0.009)	(0.009)
Life expectancy i (log)	-0.047	-0.082	0.096	0.067
	(0.201)	(0.201)	(0.208)	(0.208)
Life expectancy j (log)	-0.556***	-0.581***	-0.363*	-0.361*
	(0.191)	(0.191)	(0.199)	(0.199)
Infant mortality ratei (log)	0.039***	0.037**	0.029*	0.028*
	(0.015)	(0.015)	(0.015)	(0.015)
Infant mortality rate j (log)	-0.082***	-0.084***	-0.077***	-0.077***
	(0.016)	(0.016)	(0.016)	(0.016)
Doctors i (log)	0.077	0.121**	0.125**	0.147**
	(0.059)	(0.061)	(0.061)	(0.062)
Doctors j (log)	0.169***	0.200***	0.194***	0.193***
	(0.056)	(0.057)	(0.057)	(0.058)
Hospital beds i (log)	0.043	0.036	-0.002	-0.003
	(0.039)	(0.039)	(0.040)	(0.040)
Hospital beds j (log)	0.311***	0.306***	0.271***	0.271***
	(0.039)	(0.039)	(0.040)	(0.040)
Telephones i (log)	-0.010	-0.035	-0.091***	-0.101***
	(0.026)	(0.026)	(0.027)	(0.028)
Telephones j (log)	-0.163***	-0.180***	-0.154***	-0.154***
	(0.025)	(0.026)	(0.029)	(0.029)
Highway density i (log)	0.037**	0.037**	0.034*	0.034*
	(0.018)	(0.018)	(0.018)	(0.018)

Highway density j (log)	-0.003	-0.003	0.026	0.026
	(0.018)	(0.018)	(0.019)	(0.019)
Buses i (log)	0.027***	0.028***	0.033***	0.033***
	(0.007)	(0.007)	(0.007)	(0.007)
Buses j (log)	-0.015*	-0.015*	-0.027***	-0.027***
	(0.009)	(0.008)	(0.009)	(0.009)
Share of young i, t-1	-0.022***	-0.015***	-0.025***	-0.020***
	(0.005)	(0.005)	(0.006)	(0.006)
Share of young j, t-1	0.056***	0.061***	0.051***	0.050***
	(0.005)	(0.005)	(0.006)	(0.006)
Share of old i, t-1	-0.050***	-0.042***	-0.041***	-0.037***
	(0.004)	(0.004)	(0.004)	(0.005)
Share of old j, t-1	0.023***	0.028***	0.020***	0.020***
	(0.004)	(0.005)	(0.005)	(0.005)
Students i (log), t-1	-0.077***	-0.074***	-0.085***	-0.082***
	(0.009)	(0.009)	(0.009)	(0.009)
Students j (log), t-1	0.102***	0.104***	0.111***	0.111***
	(0.011)	(0.011)	(0.011)	(0.011)
Women i (log), t-1	0.469**	0.497**	-1.387***	-1.223***
	(0.229)	(0.224)	(0.286)	(0.293)
Women j (log), t-1	-3.058***	-3.038***	-3.725***	-3.732***
	(0.216)	(0.212)	(0.290)	(0.299)
year1997	-0.029***	-0.020**	-0.017	-0.014
	(0.010)	(0.010)	(0.011)	(0.011)
year1998	0.027	0.064***	0.004	0.019
	(0.020)	(0.020)	(0.022)	(0.022)
year1999	-0.013	0.020	-0.015	-0.002
	(0.020)	(0.021)	(0.022)	(0.023)
year2000	-0.148***	-0.112***	-0.144***	-0.131***
	(0.025)	(0.025)	(0.027)	(0.027)
year2001	-0.175***	-0.124***	-0.123***	-0.106***
	(0.032)	(0.032)	(0.036)	(0.036)
year2002	-0.203***	-0.144***	-0.130***	-0.112***
	(0.038)	(0.038)	(0.043)	(0.043)
year2003	-0.162***	-0.086*	-0.062	-0.039
	(0.045)	(0.046)	(0.052)	(0.052)
year2004	-0.227***	-0.136***	-0.119**	-0.091
	(0.051)	(0.052)	(0.058)	(0.059)
year2005	-0.246***	-0.142**	-0.123*	-0.091
	(0.056)	(0.058)	(0.064)	(0.065)
year2006	-0.219***	-0.103	-0.099	-0.062
	(0.062)	(0.064)	(0.070)	(0.072)
year2007	-0.172***	-0.050	-0.056	-0.017
	(0.066)	(0.068)	(0.075)	(0.076)
year2008	-0.172**	-0.045	-0.061	-0.019
	(0.069)	(0.071)	(0.078)	(0.079)
year2009	-0.292***	-0.165**	-0.177**	-0.135*
	(0.069)	(0.071)	(0.078)	(0.080)
year2010	-0.210***	-0.090	-0.101	-0.061
	(0.070)	(0.071)	(0.079)	(0.080)
Observations	84,666	84,666	80,222	80,222
R2-within	0.308	0.308	0.309	0.310
Number of pairs	5,929	5,929	5,625	5,625

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2. Results for different distances between pairs of regions (migration model).

VARIABLES	1 <500 km	2 <500 km With squared income	3 500-2000km	4 500-2000km With squared income	5 >2000 km	6 >2000 km With squared income
Population i (log)	1.041***	0.940***	1.488***	1.497***	1.846***	1.921***
	(0.257)	(0.252)	(0.144)	(0.142)	(0.148)	(0.147)
Population j (log)	2.244***	2.217***	1.714***	1.745***	2.242***	2.297***
	(0.241)	(0.240)	(0.142)	(0.144)	(0.144)	(0.143)
Income i (log)	0.124**	-1.610***	0.016	0.187	0.041	1.087***
	(0.052)	(0.392)	(0.033)	(0.221)	(0.032)	(0.235)
Income squared i (log)		0.098***		-0.010		-0.059***
		(0.022)		(0.012)		(0.013)
Income j (log)	0.130**	-0.556	0.190***	0.560**	0.178***	0.919***
	(0.052)	(0.410)	(0.032)	(0.247)	(0.032)	(0.250)
Income squared j (log)		0.039*		-0.021		-0.042***
		(0.023)		(0.014)		(0.014)
Ginii (log)	-0.174**	-0.157*	-0.008	-0.012	-0.182***	-0.164***
	(0.085)	(0.087)	(0.061)	(0.061)	(0.064)	(0.063)
Gini j (log)	-0.046	-0.050	-0.149**	-0.156***	-0.152**	-0.138**
	(0.087)	(0.087)	(0.059)	(0.059)	(0.063)	(0.063)
Unemployment rate I (log)	0.048**	0.048***	0.082***	0.082***	0.041***	0.035**
	(0.019)	(0.018)	(0.012)	(0.012)	(0.014)	(0.014)
Unemployment rate j (log)	-0.020	-0.018	-0.068***	-0.069***	-0.073***	-0.077***
	(0.019)	(0.018)	(0.012)	(0.012)	(0.014)	(0.014)
Housing price i (log)	-0.002	-0.004	0.004	0.005	-0.076***	-0.074***
	(0.025)	(0.024)	(0.014)	(0.014)	(0.016)	(0.016)
Housing price j (log)	0.037	0.032	0.064***	0.064***	0.045***	0.046***
	(0.025)	(0.024)	(0.015)	(0.015)	(0.015)	(0.015)
Provision of housing i (log)	0.548***	0.531***	0.588***	0.590***	0.256**	0.237**
	(0.181)	(0.172)	(0.127)	(0.127)	(0.117)	(0.117)
Provision of housing j (log)	0.895***	0.917***	0.894***	0.898***	0.468***	0.453***
	(0.160)	(0.157)	(0.129)	(0.130)	(0.111)	(0.111)
New flats i (moving average, log)	-0.113***	-0.129***	-0.060***	-0.059***	0.019	0.027**
	(0.024)	(0.023)	(0.015)	(0.015)	(0.012)	(0.012)
New flats j (moving average log)	0.074***	0.068***	0.026*	0.029*	-0.029**	-0.023*
	(0.024)	(0.024)	(0.015)	(0.015)	(0.012)	(0.012)
Life expectancy i (log)	0.297	0.461	-0.132	-0.146	0.182	0.128
	(0.483)	(0.476)	(0.298)	(0.298)	(0.279)	(0.277)
Life expectancy j (log)	0.608	0.541	-1.246***	-1.269***	-0.364	-0.405
	(0.467)	(0.463)	(0.291)	(0.292)	(0.265)	(0.265)
Infant mortality ratei (log)	0.043	0.045	0.045**	0.045**	0.044**	0.038*
	(0.028)	(0.027)	(0.022)	(0.022)	(0.021)	(0.021)
Infant mortality rate j (log)	-0.036	-0.036	-0.080***	-0.080***	-0.089***	-0.094***
	(0.034)	(0.033)	(0.021)	(0.021)	(0.023)	(0.023)
Doctors i (log)	0.049	-0.040	0.302***	0.313***	0.052	0.112
	(0.144)	(0.148)	(0.084)	(0.085)	(0.082)	(0.083)
Doctors j (log)	0.168	0.112	0.251***	0.276***	0.091	0.133*
	(0.132)	(0.137)	(0.081)	(0.083)	(0.078)	(0.079)
Hospital beds i (log)	0.335***	0.363***	0.102*	0.097*	-0.016	-0.018
	(0.092)	(0.095)	(0.053)	(0.053)	(0.059)	(0.059)
Hospital beds j (log)	0.186**	0.206**	0.270***	0.260***	0.367***	0.366***
	(0.092)	(0.094)	(0.053)	(0.053)	(0.057)	(0.057)
Telephones i (log)	0.054	0.111*	0.011	0.004	-0.060	-0.090**

	(0.064)	(0.066)	(0.036)	(0.036)	(0.037)	(0.037)
Telephones j (log)	-0.191***	-0.163***	-0.187***	-0.201***	-0.129***	-0.150***
	(0.061)	(0.061)	(0.036)	(0.037)	(0.037)	(0.038)
Highway density i (log)	0.120***	0.106***	0.054**	0.056**	0.006	0.003
	(0.037)	(0.038)	(0.025)	(0.025)	(0.026)	(0.026)
Highway density j (log)	-0.107***	-0.103***	-0.026	-0.023	0.010	0.008
	(0.037)	(0.038)	(0.027)	(0.027)	(0.027)	(0.027)
Buses i (log)	0.009	-0.002	0.024**	0.025**	0.029***	0.029***
	(0.019)	(0.019)	(0.012)	(0.012)	(0.009)	(0.009)
Buses j (log)	-0.034*	-0.038*	-0.052***	-0.050***	-0.005	-0.005
	(0.020)	(0.021)	(0.011)	(0.011)	(0.012)	(0.012)
Share of young i, t-1	-0.006	-0.020	-0.028***	-0.027***	-0.029***	-0.018**
	(0.013)	(0.014)	(0.008)	(0.007)	(0.008)	(0.008)
Share of young j, t-1	0.061***	0.055***	0.079***	0.082***	0.037***	0.045***
	(0.013)	(0.013)	(0.008)	(0.008)	(0.008)	(0.008)
Share of old i, t-1	-0.044***	-0.058***	-0.022***	-0.020***	-0.048***	-0.037***
	(0.015)	(0.016)	(0.007)	(0.008)	(0.006)	(0.006)
Share of old j, t-1	0.027*	0.018	0.023***	0.027***	0.025***	0.033***
	(0.014)	(0.015)	(0.008)	(0.008)	(0.006)	(0.006)
Students i (log), t-1	-0.043**	-0.048***	-0.103***	-0.102***	-0.061***	-0.055***
	(0.018)	(0.018)	(0.012)	(0.012)	(0.015)	(0.014)
Students j (log), t-1	0.023	0.018	0.092***	0.093***	0.117***	0.121***
	(0.019)	(0.020)	(0.013)	(0.012)	(0.020)	(0.020)
Women i (log), t-1	1.665***	1.922***	0.141	0.136	-0.119	-0.013
	(0.458)	(0.483)	(0.307)	(0.305)	(0.372)	(0.361)
Women j (log), t-1	-1.335***	-1.368***	-4.237***	-4.227***	-2.481***	-2.410***
	(0.443)	(0.489)	(0.320)	(0.318)	(0.326)	(0.320)
year1997	-0.064***	-0.075***	-0.032**	-0.029**	-0.028*	-0.015
	(0.023)	(0.025)	(0.013)	(0.014)	(0.016)	(0.016)
year1998	0.004	-0.057	0.003	0.018	0.023	0.079**
	(0.037)	(0.041)	(0.028)	(0.029)	(0.031)	(0.032)
year1999	-0.007	-0.062	-0.039	-0.027	-0.029	0.024
	(0.040)	(0.043)	(0.028)	(0.029)	(0.034)	(0.033)
year2000	-0.040	-0.099*	-0.150***	-0.137***	-0.201***	-0.142***
	(0.048)	(0.052)	(0.034)	(0.035)	(0.041)	(0.041)
year2001	-0.070	-0.159**	-0.142***	-0.123***	-0.254***	-0.173***
	(0.065)	(0.074)	(0.043)	(0.045)	(0.054)	(0.053)
year2002	-0.090	-0.194**	-0.181***	-0.159***	-0.288***	-0.196***
	(0.079)	(0.090)	(0.052)	(0.054)	(0.063)	(0.062)
year2003	-0.056	-0.192*	-0.135**	-0.105	-0.257***	-0.142*
	(0.097)	(0.112)	(0.062)	(0.064)	(0.075)	(0.074)
year2004	-0.076	-0.242*	-0.190***	-0.154**	-0.344***	-0.207**
	(0.110)	(0.129)	(0.070)	(0.073)	(0.084)	(0.084)
year2005	-0.128	-0.318**	-0.208***	-0.166**	-0.371***	-0.216**
	(0.120)	(0.143)	(0.077)	(0.080)	(0.092)	(0.092)
year2006	-0.178	-0.391**	-0.201**	-0.153*	-0.340***	-0.166
	(0.132)	(0.157)	(0.086)	(0.090)	(0.102)	(0.102)
year2007	-0.175	-0.401**	-0.173*	-0.123	-0.289***	-0.106
	(0.138)	(0.165)	(0.092)	(0.096)	(0.109)	(0.109)
year2008	-0.189	-0.424**	-0.187*	-0.134	-0.287**	-0.097
	(0.143)	(0.171)	(0.097)	(0.101)	(0.113)	(0.113)
year2009	-0.337**	-0.575***	-0.301***	-0.248**	-0.412***	-0.221*
	(0.143)	(0.171)	(0.098)	(0.102)	(0.114)	(0.114)

year2010	-0.262*	-0.486***	-0.234**	-0.184*	-0.320***	-0.140
	(0.139)	(0.165)	(0.099)	(0.103)	(0.115)	(0.115)
	(6.144)	(6.321)	(5.187)	(5.351)	(5.794)	(6.068)
Observations	6,246	6,246	31,104	31,104	47,286	47,286
R2-within	0.550	0.556	0.388	0.389	0.276	0.277
Number of pairs	427	427	2,144	2,144	3,356	3,356

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3. Results for different time periods (migration model).

VARIABLES	1 1996-2000	2 1996-2000 With squared income	3 2000-2005	4 2000-2005 With squared income	5 2005-2010 With squared income	6 2005-2010 With squared income
Population i (log)	2.196***	2.232***	2.043***	2.155***	0.974***	0.930***
	(0.315)	(0.316)	(0.312)	(0.317)	(0.208)	(0.214)
Population j (log)	1.216***	1.235***	0.843***	0.939***	2.189***	2.259***
	(0.298)	(0.299)	(0.304)	(0.312)	(0.193)	(0.200)
Income i (log)	0.002	-0.859***	0.044	1.015***	-0.005	-0.721
	(0.048)	(0.246)	(0.044)	(0.328)	(0.050)	(0.674)
Income squared i (log)		0.050***		-0.056***		0.038
		(0.014)		(0.019)		(0.035)
Income j (log)	-0.132***	-0.571**	0.017	0.846**	-0.013	1.106*
	(0.044)	(0.245)	(0.045)	(0.333)	(0.051)	(0.670)
Income squared j (log)		0.025*		-0.048**		-0.059*
		(0.014)		(0.019)		(0.035)
Ginii (log)	-0.091*	-0.081*	-0.066	-0.040	0.074	0.073
	(0.047)	(0.047)	(0.096)	(0.097)	(0.173)	(0.173)
Gini j (log)	0.086*	0.092**	0.040	0.063	-0.274	-0.271
	(0.046)	(0.046)	(0.099)	(0.100)	(0.173)	(0.172)
Unemployment rate I (log)	0.047***	0.044***	-0.006	-0.013	0.033**	0.031**
	(0.016)	(0.016)	(0.015)	(0.015)	(0.013)	(0.013)
Unemployment rate j (log)	-0.038**	-0.040**	-0.012	-0.018	-0.025*	-0.023*
	(0.017)	(0.017)	(0.015)	(0.015)	(0.013)	(0.013)
Housing price i (log)	-0.069***	-0.075***	-0.016	-0.020	0.014	0.014
	(0.013)	(0.013)	(0.019)	(0.019)	(0.020)	(0.020)
Housing price j (log)	0.062***	0.059***	0.049**	0.045**	0.051**	0.051**
	(0.013)	(0.013)	(0.019)	(0.019)	(0.020)	(0.020)
Provision of housing i (log)	0.144	0.102	0.587***	0.446**	0.236	0.205
	(0.144)	(0.143)	(0.198)	(0.208)	(0.190)	(0.193)
Provision of housing j (log)	0.114	0.092	0.323	0.203	0.600***	0.649***
	(0.154)	(0.153)	(0.207)	(0.216)	(0.174)	(0.177)
New flats i (moving average, log)	-0.032	-0.038	-0.027	-0.016	-0.007	-0.008
	(0.024)	(0.024)	(0.019)	(0.019)	(0.021)	(0.021)
New flats j (moving average log)	0.103***	0.100***	0.049**	0.058***	-0.046**	-0.045**
	(0.024)	(0.024)	(0.019)	(0.019)	(0.020)	(0.020)
Life expectancy i (log)	-0.535	-0.462	-0.485	-0.514	0.376	0.416
	(0.372)	(0.375)	(0.397)	(0.396)	(0.368)	(0.364)
Life expectancy j (log)	-0.364	-0.327	0.285	0.260	-1.048***	-1.111***
	(0.391)	(0.391)	(0.390)	(0.389)	(0.351)	(0.349)
Infant mortality ratei (log)	-0.009	-0.008	0.028	0.030	0.056**	0.060***
	(0.031)	(0.031)	(0.024)	(0.024)	(0.023)	(0.023)
Infant mortality rate j (log)	-0.016	-0.016	-0.017	-0.015	-0.064**	-0.069***
	(0.031)	(0.031)	(0.025)	(0.025)	(0.026)	(0.025)
Doctors i (log)	0.089	0.062	0.332**	0.398***	-0.085	-0.089
	(0.106)	(0.106)	(0.147)	(0.150)	(0.095)	(0.095)
Doctors j (log)	0.541***	0.527***	-0.135	-0.079	0.060	0.066
	(0.107)	(0.107)	(0.142)	(0.145)	(0.112)	(0.112)
Hospital beds i (log)	-0.329***	-0.318***	0.018	-0.004	-0.111*	-0.111*

	(0.095)	(0.095)	(0.087)	(0.087)	(0.061)	(0.061)
Hospital beds j (log)	-0.181**	-0.175*	0.341***	0.322***	0.102*	0.103*
	(0.090)	(0.090)	(0.088)	(0.088)	(0.062)	(0.062)
Telephones i (log)	-0.040	-0.062	-0.041	-0.087*	0.009	0.015
	(0.057)	(0.057)	(0.041)	(0.044)	(0.065)	(0.065)
Telephones j (log)	-0.364***	-0.376***	0.022	-0.017	-0.041	-0.049
	(0.060)	(0.061)	(0.040)	(0.044)	(0.069)	(0.069)
Highway density i (log)	-0.216**	-0.190**	0.037	0.036	0.055**	0.052**
	(0.097)	(0.096)	(0.026)	(0.026)	(0.022)	(0.022)
Highway density j (log)	0.313***	0.327***	0.036	0.035	0.012	0.016
	(0.105)	(0.105)	(0.030)	(0.030)	(0.022)	(0.022)
Buses i (log)	-0.130***	-0.134***	0.018	0.015	0.045***	0.041***
	(0.041)	(0.041)	(0.014)	(0.014)	(0.014)	(0.014)
Buses j (log)	0.126***	0.124***	0.018	0.015	-0.067***	-0.060***
	(0.041)	(0.041)	(0.015)	(0.015)	(0.014)	(0.014)
Share of young i, t-1	-0.021	-0.019	-0.025*	-0.014	-0.021	-0.025*
	(0.017)	(0.016)	(0.013)	(0.013)	(0.014)	(0.015)
Share of young j, t-1	0.112***	0.114***	0.064***	0.072***	0.010	0.016
	(0.017)	(0.017)	(0.013)	(0.014)	(0.015)	(0.016)
Share of old i, t-1	-0.060***	-0.058***	-0.053***	-0.044***	0.028**	0.022
	(0.016)	(0.016)	(0.008)	(0.009)	(0.013)	(0.014)
Share of old j, t-1	0.047***	0.048***	0.034***	0.042***	-0.046***	-0.037**
	(0.015)	(0.015)	(0.009)	(0.009)	(0.013)	(0.014)
Students i (log), t-1	-0.119***	-0.116***	-0.051***	-0.048**	-0.086*	-0.087*
	(0.019)	(0.019)	(0.019)	(0.019)	(0.049)	(0.049)
Students j (log), t-1	0.069***	0.071***	0.072***	0.074***	0.064	0.066
	(0.020)	(0.020)	(0.018)	(0.017)	(0.048)	(0.048)
Women i (log), t-1	-4.754**	-3.748*	1.377***	1.247***	-2.014	-2.402
	(2.209)	(2.229)	(0.303)	(0.305)	(1.944)	(1.955)
Women j (log), t-1	8.585***	9.098***	-2.325***	-2.436***	0.664	1.269
	(2.125)	(2.154)	(0.295)	(0.299)	(1.909)	(1.918)
year1997	0.034**	0.035**				
	(0.016)	(0.016)				
year1998	-0.026	-0.029				
	(0.034)	(0.034)				
year1999	0.031	0.039				
	(0.039)	(0.038)				
year2000	0.013	0.028				
	(0.050)	(0.050)				
year2001			-0.043	-0.001		
			(0.029)	(0.031)		
year2002			-0.076	-0.007		
			(0.047)	(0.050)		
year2003			-0.051	0.060		
			(0.064)	(0.072)		
year2004			-0.127	0.019		
			(0.081)	(0.091)		
year2005			-0.142	0.034		
			(0.097)	(0.109)		
year2006					0.014	0.013
					(0.022)	(0.022)
year2007					0.054	0.053
					(0.035)	(0.035)
year2008					0.032	0.030
					(0.044)	(0.044)
year2009					-0.071	-0.074
					(0.050)	(0.051)
year2010					0.027	0.022
					(0.055)	(0.058)
Observations	25,376	25,376	35,270	35,270	35,574	35,574
R2-within	0.159	0.160	0.105	0.105	0.040	0.040
Number of pairs	5,625	5,625	5,929	5,929	5,929	5,929

Table 4. Regressions with financial development (migration model).

VARIABLES	1 Main	2 With squared income	3 Without Moscow and Saint Petersburg	4 Without Moscow and Saint Petersburg, with squared income
Population i (log)	1.399***	1.332***	1.502***	1.390***
	(0.153)	(0.155)	(0.166)	(0.168)
Population j (log)	2.370***	2.412***	2.096***	2.165***
	(0.143)	(0.145)	(0.157)	(0.158)
Income i (log)	-0.028	-4.143***	-0.033	-5.580***
	(0.049)	(0.844)	(0.051)	(0.946)
Income squared i (log)		0.216***		0.292***
		(0.044)		(0.050)
Income*loans i (log)	-0.020**	-0.633***	-0.018**	-0.887***
	(0.008)	(0.189)	(0.009)	(0.213)
Income squared*loans i (log)		0.031***		0.045***
		(0.010)		(0.012)
Loans i (log)	0.155**	3.134***	0.144*	4.321***
	(0.077)	(0.876)	(0.081)	(0.985)
Income j (log)	0.058	1.346*	0.114**	2.452***
	(0.048)	(0.779)	(0.051)	(0.870)
Income squared j (log)		-0.070*		-0.130***
		(0.041)		(0.046)
Income*loans j (log)	-0.010	0.336*	-0.006	0.828***
	(0.008)	(0.181)	(0.009)	(0.207)
Income squared*loans j (log)		-0.019*		-0.046***
		(0.010)		(0.011)
Loans j (log)	0.110	-1.474*	0.057	-3.687***
	(0.075)	(0.833)	(0.079)	(0.948)
Ginii (log)	-0.088	-0.027	-0.046	-0.025
	(0.085)	(0.089)	(0.096)	(0.098)
Gini j (log)	-0.208**	-0.253***	-0.357***	-0.448***
	(0.088)	(0.091)	(0.099)	(0.101)
Unemployment ratei (log)	0.035***	0.034***	0.031***	0.031***
	(0.011)	(0.011)	(0.012)	(0.012)
Unemployment ratej (log)	-0.049***	-0.046***	-0.063***	-0.058***
	(0.010)	(0.011)	(0.011)	(0.011)
Housing price i (log)	-0.032**	-0.033**	-0.029*	-0.029*
	(0.015)	(0.015)	(0.016)	(0.016)
Housing price j (log)	0.058***	0.062***	0.048***	0.055***
	(0.015)	(0.015)	(0.016)	(0.016)
Provision of housing i (log)	0.534***	0.439***	0.561***	0.429**
	(0.164)	(0.163)	(0.170)	(0.169)
Provision of housing j (log)	0.388***	0.407***	0.400***	0.427***
	(0.142)	(0.143)	(0.149)	(0.151)
New flats i(moving average, log)	-0.047***	-0.042***	-0.046***	-0.040***
	(0.012)	(0.012)	(0.013)	(0.013)
New flats j(moving average log)	0.046***	0.043***	0.046***	0.041***
	(0.012)	(0.013)	(0.013)	(0.013)
Life expectancy i (log)	0.699**	0.753***	0.689**	0.737***
	(0.272)	(0.271)	(0.281)	(0.280)
Life expectancy j (log)	-1.503***	-1.546***	-1.168***	-1.202***
	(0.255)	(0.255)	(0.264)	(0.262)
Infant mortality ratei (log)	0.063***	0.071***	0.056***	0.060***
	(0.017)	(0.017)	(0.018)	(0.018)
Infant mortality rate j (log)	-0.066***	-0.068***	-0.065***	-0.063***
	(0.018)	(0.018)	(0.019)	(0.019)
Doctors i (log)	0.094	0.076	0.103	0.085
	(0.081)	(0.081)	(0.083)	(0.083)
Doctors j (log)	0.019	0.016	0.007	-0.010
	(0.084)	(0.084)	(0.086)	(0.086)

Hospital beds i (log)	0.029	0.037	0.041	0.051
	(0.046)	(0.046)	(0.047)	(0.047)
Hospital beds j (log)	0.305***	0.301***	0.261***	0.249***
	(0.047)	(0.047)	(0.048)	(0.048)
Telephones i (log)	-0.040	-0.005	-0.047	-0.018
	(0.031)	(0.032)	(0.033)	(0.033)
Telephones j (log)	-0.002	-0.004	-0.007	-0.003
	(0.031)	(0.032)	(0.034)	(0.034)
Highway density i (log)	0.046**	0.032*	0.035*	0.020
	(0.019)	(0.019)	(0.020)	(0.020)
Highway density j (log)	-0.050**	-0.048**	-0.028	-0.031
	(0.020)	(0.020)	(0.021)	(0.021)
Buses i (log)	0.031***	0.028***	0.038***	0.035***
	(0.009)	(0.009)	(0.009)	(0.009)
Buses j (log)	-0.041***	-0.038***	-0.055***	-0.048***
	(0.009)	(0.009)	(0.010)	(0.010)
Share of young i, t-1	-0.012	-0.022***	0.000	-0.006
	(0.008)	(0.008)	(0.009)	(0.009)
Share of young j, t-1	0.062***	0.065***	0.044***	0.044***
	(0.008)	(0.008)	(0.009)	(0.009)
Share of old i, t-1	0.012*	-0.005	0.021***	0.001
	(0.007)	(0.008)	(0.007)	(0.008)
Share of old j, t-1	-0.016**	-0.011	-0.030***	-0.022***
	(0.007)	(0.008)	(0.008)	(0.008)
Students i (log), t-1	-0.080***	-0.085***	-0.082***	-0.087***
	(0.021)	(0.021)	(0.022)	(0.022)
Students j (log), t-1	0.111***	0.111***	0.108***	0.106***
	(0.021)	(0.021)	(0.022)	(0.022)
Women i (log), t-1	-1.593**	-1.244	-2.859***	-3.324***
	(0.791)	(0.797)	(0.954)	(0.957)
Women j (log), t-1	-6.050***	-6.226***	-4.615***	-4.812***
	(0.806)	(0.814)	(1.013)	(1.018)
year2002	-0.001	-0.007	0.000	0.004
	(0.014)	(0.015)	(0.017)	(0.018)
year2003	0.057**	0.040	0.057*	0.059*
	(0.027)	(0.028)	(0.035)	(0.035)
year2004	0.022	-0.001	0.018	0.021
	(0.039)	(0.040)	(0.050)	(0.050)
year2005	0.031	0.007	0.026	0.036
	(0.051)	(0.052)	(0.064)	(0.064)
year2006	0.101	0.080	0.081	0.103
	(0.064)	(0.065)	(0.079)	(0.080)
year2007	0.179**	0.164**	0.152*	0.189**
	(0.075)	(0.076)	(0.091)	(0.093)
year2008	0.197**	0.192**	0.160	0.211**
	(0.082)	(0.083)	(0.099)	(0.101)
year2009	0.096	0.100	0.054	0.123
	(0.086)	(0.088)	(0.103)	(0.106)
year2010	0.175**	0.184**	0.126	0.196*
	(0.086)	(0.087)	(0.102)	(0.105)
Observations	58,223	58,223	55,211	55,211
R2-within	0.104	0.105	0.104	0.106
Number of pairs	5,929	5,929	5,625	5,625

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. Regressions with different indicators of financial development (migration model).

VARIABLES	1 Loans to firm	2 Loans to firm with squares	3 All Loans	4 All loans with squares	5 Mortgage debt	6 Mortgage debt with squares
Population i (log)	1.415***	1.396***	1.400***	1.368***	0.737***	0.585**
	(0.150)	(0.153)	(0.151)	(0.153)	(0.243)	(0.246)
Population j (log)	2.321***	2.280***	2.337***	2.306***	2.110***	2.375***
	(0.140)	(0.141)	(0.140)	(0.142)	(0.225)	(0.231)
Income i (log)	0.000	-0.151	-0.005	-0.720	-0.040	-15.118***
	(0.043)	(0.646)	(0.042)	(0.620)	(0.095)	(3.366)
Income squared i (log)		0.008		0.038		0.789***
		(0.034)		(0.033)		(0.174)
Income*fin_devi (log)	-0.024**	0.136	-0.027**	0.016	0.024	-3.170***
	(0.010)	(0.222)	(0.010)	(0.232)	(0.022)	(0.730)
Income squared*fin_devi (log)		-0.009		-0.003		-0.069***
		(0.012)		(0.013)		(0.022)
Fin_devi (log)	0.204**	-0.507	0.232**	0.085	-0.169	15.058***
	(0.090)	(1.033)	(0.096)	(1.074)	(0.204)	(3.510)
Income j (log)	0.042	-0.883	0.040	-0.530	-0.183**	10.629***
	(0.043)	(0.575)	(0.043)	(0.570)	(0.081)	(2.121)
Income squared j (log)		0.050		0.031		-0.567***
		(0.030)		(0.030)		(0.109)
Income*fin_dev j (log)	-0.022**	-0.435**	-0.020*	-0.296	-0.040***	1.276***
	(0.010)	(0.207)	(0.011)	(0.224)	(0.013)	(0.437)
Income squared*fin_dev j (log)		0.023**		0.015		0.167***
		(0.011)		(0.012)		(0.038)
Fin_dev j(log)	0.171*	2.061**	0.166*	1.422	0.398***	-5.906***
	(0.089)	(0.955)	(0.098)	(1.033)	(0.128)	(2.136)
Unemployment rate (log) i	0.032***	0.034***	0.033***	0.036***	0.036**	0.029*
	(0.011)	(0.011)	(0.011)	(0.011)	(0.015)	(0.015)
Unemployment rate (log) j	-0.045***	-0.047***	-0.045***	-0.046***	-0.034**	-0.031**
	(0.011)	(0.011)	(0.011)	(0.011)	(0.014)	(0.015)
Housing price i (log)	-0.033**	-0.030*	-0.032**	-0.031**	0.047**	0.031
	(0.015)	(0.016)	(0.015)	(0.016)	(0.023)	(0.023)
Housing price j (log)	0.048***	0.044***	0.050***	0.048***	0.069***	0.051**
	(0.015)	(0.015)	(0.016)	(0.016)	(0.023)	(0.024)
Provision of housing i (log)	0.656***	0.638***	0.577***	0.571***	0.231	0.187
	(0.160)	(0.160)	(0.160)	(0.160)	(0.204)	(0.203)
Provision of housing j (log)	0.508***	0.523***	0.471***	0.469***	0.591***	0.805***
	(0.140)	(0.140)	(0.139)	(0.139)	(0.183)	(0.186)
New flats i(moving average, log)	-0.049***	-0.051***	-0.046***	-0.049***	-0.014	0.008
	(0.012)	(0.012)	(0.012)	(0.012)	(0.025)	(0.025)
New flats j(moving average log)	0.039***	0.041***	0.040***	0.041***	-0.103***	-0.090***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.024)	(0.024)
Life expectancy i (log)	0.561**	0.575**	0.587**	0.600**	0.435	0.800
	(0.273)	(0.272)	(0.273)	(0.271)	(0.511)	(0.522)
Life expectancy j (log)	-1.436***	-1.435***	-1.400***	-1.384***	-1.671***	-1.680***
	(0.257)	(0.257)	(0.257)	(0.257)	(0.498)	(0.495)
Infant mortality ratei (log)	0.051***	0.052***	0.059***	0.062***	0.029	0.032
	(0.017)	(0.017)	(0.017)	(0.017)	(0.026)	(0.027)
Infant mortality rate j (log)	-0.071***	-0.070***	-0.066***	-0.064***	-0.076**	-0.071**
	(0.018)	(0.018)	(0.018)	(0.018)	(0.030)	(0.030)
Doctors i (log)	0.174**	0.151*	0.170**	0.144*	-0.154	-0.116
	(0.084)	(0.084)	(0.083)	(0.084)	(0.109)	(0.109)
Doctors j (log)	-0.155*	-0.138	-0.126	-0.118	0.164	0.173
	(0.088)	(0.090)	(0.087)	(0.087)	(0.117)	(0.117)
Hospital beds i (log)	-0.017	-0.016	-0.008	-0.010	-0.088	-0.109
	(0.046)	(0.046)	(0.045)	(0.045)	(0.070)	(0.070)
Hospital beds j (log)	0.327***	0.323***	0.323***	0.323***	0.007	-0.014
	(0.047)	(0.047)	(0.046)	(0.046)	(0.070)	(0.070)
Telephones i (log)	-0.043	-0.033	-0.035	-0.020	0.031	0.040
	(0.032)	(0.032)	(0.032)	(0.032)	(0.077)	(0.077)

Telephones j (log)	-0.007	-0.004	-0.010	-0.008	0.176**	0.166**
	(0.031)	(0.031)	(0.031)	(0.032)	(0.083)	(0.083)
Highway density i (log)	0.049**	0.046**	0.048**	0.045**	0.075*	0.056
	(0.019)	(0.019)	(0.019)	(0.019)	(0.044)	(0.043)
Highway density j (log)	-0.041**	-0.039*	-0.041**	-0.041**	-0.061	-0.042
	(0.020)	(0.020)	(0.020)	(0.020)	(0.043)	(0.043)
Buses i (log)	0.028***	0.029***	0.029***	0.029***	0.045***	0.041**
	(0.008)	(0.009)	(0.008)	(0.009)	(0.016)	(0.016)
Buses j (log)	-0.030***	-0.036***	-0.036***	-0.040***	-0.077***	-0.057***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.017)	(0.017)
Share of young i, t-1	-0.009	-0.013	-0.011	-0.016*	0.002	-0.007
	(0.008)	(0.008)	(0.008)	(0.008)	(0.020)	(0.020)
Share of young j, t-1	0.064***	0.061***	0.061***	0.059***	0.009	0.008
	(0.008)	(0.009)	(0.008)	(0.009)	(0.022)	(0.022)
Share of old i, t-1	0.005	0.001	0.008	-0.000	-0.006	-0.032
	(0.006)	(0.008)	(0.007)	(0.008)	(0.020)	(0.021)
Share of old j, t-1	-0.024***	-0.027***	-0.022***	-0.025***	-0.054***	-0.030
	(0.007)	(0.008)	(0.007)	(0.008)	(0.017)	(0.019)
Students i (log), t-1	-0.099***	-0.104***	-0.091***	-0.098***	-0.139**	-0.152**
	(0.022)	(0.022)	(0.021)	(0.021)	(0.066)	(0.066)
Students j (log), t-1	0.113***	0.113***	0.110***	0.110***	0.147**	0.158**
	(0.021)	(0.021)	(0.021)	(0.021)	(0.066)	(0.066)
Women i (log), t-1	-1.763**	-1.993**	-1.924**	-2.055**	0.003	-0.337
	(0.778)	(0.819)	(0.773)	(0.809)	(2.398)	(2.386)
Women j (log), t-1	-6.543***	-6.159***	-6.303***	-6.074***	0.379	2.917
	(0.806)	(0.843)	(0.798)	(0.839)	(2.277)	(2.282)
year2002	0.010	0.007	0.011	0.008		
	(0.014)	(0.015)	(0.014)	(0.015)		
year2003	0.080***	0.070**	0.079***	0.069**		
	(0.027)	(0.028)	(0.027)	(0.028)		
year2004	0.046	0.029	0.044	0.026		
	(0.037)	(0.039)	(0.037)	(0.039)		
year2005	0.058	0.037	0.056	0.033		
	(0.047)	(0.049)	(0.047)	(0.049)		
year2006	0.135**	0.111*	0.133**	0.107*		
	(0.061)	(0.062)	(0.061)	(0.063)		
year2007	0.212***	0.186***	0.214***	0.187***	-0.004	-0.031
	(0.070)	(0.072)	(0.071)	(0.073)	(0.028)	(0.029)
year2008	0.230***	0.204***	0.236***	0.211***	-0.029	-0.070
	(0.076)	(0.077)	(0.077)	(0.078)	(0.043)	(0.044)
year2009	0.143*	0.119	0.144*	0.123	-0.075	-0.127**
	(0.080)	(0.081)	(0.081)	(0.083)	(0.052)	(0.054)
year2010	0.222***	0.202**	0.223***	0.208**	0.041	-0.017
	(0.081)	(0.082)	(0.082)	(0.083)	(0.061)	(0.063)
Ginii(log)	-0.126	-0.150	-0.119	-0.131	0.384*	0.580***
	(0.087)	(0.092)	(0.086)	(0.092)	(0.204)	(0.201)
Gini j(log)	-0.145	-0.099	-0.132	-0.103	-0.308	-0.309
	(0.089)	(0.094)	(0.089)	(0.094)	(0.211)	(0.210)
Observations	58,525	58,525	57,919	57,919	29,645	29,645
R2-within	0.103	0.103	0.104	0.105	0.045	0.048
Number of pairs	5,929	5,929	5,929	5,929	5,929	5,929

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6. Results of regressions with one-year lagged independent variables. Dependent variable: log migration.

VARIABLES	1 Main	2 With squared income	3 Without Moscow and Saint Petersburg	4 Without Moscow and St Petersburg, w/ sq. income
Population i (log), t-1	2.251***	2.284***	2.109***	2.123***
	(0.116)	(0.118)	(0.126)	(0.130)
Population j (log), t-1	1.652***	1.738***	1.519***	1.611***
	(0.114)	(0.115)	(0.124)	(0.128)
Income i (log), t-1	-0.005	0.221	-0.042*	0.039
	(0.023)	(0.166)	(0.024)	(0.199)
Income squared i (log), t-1		-0.013		-0.005
		(0.009)		(0.011)
Income j (log), t-1	0.272***	0.861***	0.254***	0.772***
	(0.023)	(0.168)	(0.025)	(0.205)
Income squared j (log), t-1		-0.033***		-0.029**
		(0.009)		(0.012)
Ginii (log) , t-1	-0.026	-0.025	-0.024	-0.024
	(0.042)	(0.042)	(0.046)	(0.046)
Gini j(log), t-1	-0.288***	-0.285***	-0.287***	-0.286***
	(0.041)	(0.041)	(0.044)	(0.043)
Unemployment rate i(log), t-1	0.051***	0.050***	0.029***	0.029***
	(0.009)	(0.009)	(0.010)	(0.010)
Unemployment rate j(log), t-1	-0.028***	-0.030***	-0.042***	-0.043***
	(0.009)	(0.009)	(0.009)	(0.009)
Housing price i (log), t-1	-0.035***	-0.034***	-0.033***	-0.033***
	(0.011)	(0.011)	(0.011)	(0.012)
Housing price j (log), t-1	-0.001	-0.000	-0.000	0.000
	(0.011)	(0.011)	(0.011)	(0.011)
Provision of housing i (log), t-1	0.464***	0.455***	0.280***	0.279***
	(0.082)	(0.083)	(0.085)	(0.086)
Provision of housing j (log), t-1	0.861***	0.837***	0.756***	0.748***
	(0.086)	(0.086)	(0.088)	(0.088)
New flats i(moving average, log), t-1	-0.008	-0.007	0.011	0.011
	(0.009)	(0.009)	(0.010)	(0.010)
New flatsj (moving average log), t-1	-0.028***	-0.023**	-0.035***	-0.031***
	(0.009)	(0.009)	(0.010)	(0.010)
Life expectancy i(log), t-1	-0.405**	-0.425**	-0.308	-0.315
	(0.205)	(0.204)	(0.211)	(0.211)
Life expectancy j(log), t-1	-0.753***	-0.805***	-0.521**	-0.566***
	(0.198)	(0.197)	(0.203)	(0.203)
Infant mortality rate i(log), t-1	0.052***	0.051***	0.047***	0.047***
	(0.015)	(0.015)	(0.016)	(0.016)
Infant mortality rate j(log), t-1	-0.070***	-0.071***	-0.050***	-0.051***
	(0.016)	(0.016)	(0.017)	(0.017)
Doctors i (log), t-1	0.167***	0.180***	0.219***	0.223***
	(0.062)	(0.063)	(0.064)	(0.065)
Doctors j(log), t-1	0.274***	0.306***	0.278***	0.303***
	(0.058)	(0.059)	(0.059)	(0.060)
Hospital beds i(log), t-1	0.061	0.057	0.031	0.030
	(0.041)	(0.041)	(0.042)	(0.042)
Hospital beds j(log), t-1	0.364***	0.356***	0.313***	0.310***
	(0.042)	(0.042)	(0.043)	(0.043)
Telephones i(log), t-1	-0.041	-0.050*	-0.119***	-0.121***
	(0.027)	(0.028)	(0.029)	(0.029)
Telephones j(log), t-1	-0.160***	-0.181***	-0.136***	-0.151***
	(0.027)	(0.028)	(0.030)	(0.031)
Highway density i(log), t-1	0.010	0.010	0.003	0.003
	(0.018)	(0.018)	(0.019)	(0.019)
Highway density j(log), t-1	0.034*	0.034*	0.063***	0.062***

	(0.020)	(0.020)	(0.020)	(0.020)
Buses i(log), t-1	0.021***	0.021***	0.025***	0.025***
	(0.008)	(0.008)	(0.008)	(0.008)
Buses j(log), t-1	-0.024***	-0.024***	-0.042***	-0.043***
	(0.009)	(0.009)	(0.009)	(0.009)
Share of young i, t-1	-0.013**	-0.010*	-0.016**	-0.015**
	(0.006)	(0.006)	(0.006)	(0.007)
Share of young j, t-1	0.037***	0.044***	0.034***	0.040***
	(0.006)	(0.006)	(0.006)	(0.007)
Share of old i, t-1	-0.045***	-0.043***	-0.039***	-0.038***
	(0.004)	(0.005)	(0.005)	(0.005)
Share of old j, t-1	0.026***	0.033***	0.022***	0.027***
	(0.005)	(0.005)	(0.005)	(0.005)
Students i (log), t-1	-0.059***	-0.058***	-0.064***	-0.064***
	(0.011)	(0.011)	(0.011)	(0.011)
Students j (log), t-1	0.115***	0.119***	0.128***	0.132***
	(0.013)	(0.013)	(0.013)	(0.013)
Women i (log), t-1	0.469*	0.496**	-1.193***	-1.167***
	(0.245)	(0.244)	(0.296)	(0.302)
Women j (log), t-1	-4.191***	-4.120***	-4.543***	-4.373***
	(0.232)	(0.231)	(0.308)	(0.316)
year1998	-0.062***	-0.057***	-0.050***	-0.047***
	(0.010)	(0.010)	(0.010)	(0.010)
year1999	0.038*	0.065***	0.028	0.048**
	(0.021)	(0.022)	(0.023)	(0.024)
year2000	-0.129***	-0.101***	-0.125***	-0.105***
	(0.023)	(0.023)	(0.025)	(0.025)
year2001	-0.187***	-0.148***	-0.143***	-0.118***
	(0.031)	(0.031)	(0.034)	(0.035)
year2002	-0.233***	-0.189***	-0.178***	-0.150***
	(0.036)	(0.036)	(0.040)	(0.040)
year2003	-0.217***	-0.165***	-0.147***	-0.114**
	(0.043)	(0.043)	(0.048)	(0.049)
year2004	-0.279***	-0.212***	-0.188***	-0.145**
	(0.049)	(0.051)	(0.057)	(0.058)
year2005	-0.291***	-0.215***	-0.188***	-0.139**
	(0.055)	(0.056)	(0.063)	(0.065)
year2006	-0.265***	-0.179***	-0.151**	-0.096
	(0.060)	(0.062)	(0.069)	(0.071)
year2007	-0.211***	-0.117*	-0.100	-0.039
	(0.065)	(0.068)	(0.074)	(0.077)
year2008	-0.215***	-0.118*	-0.115	-0.051
	(0.069)	(0.072)	(0.078)	(0.081)
year2009	-0.313***	-0.214***	-0.212***	-0.146*
	(0.072)	(0.074)	(0.081)	(0.084)
year2010	-0.252***	-0.155**	-0.147*	-0.083
	(0.071)	(0.074)	(0.080)	(0.084)
Observations	78,737	78,737	74,597	74,597
R2-within	0.270	0.271	0.272	0.272
Number of pairs	5,929	5,929	5,625	5,625

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7. Results of regressions with two-year lagged independent variables. Dependent variable: log migration.

VARIABLES	1 Main	2 With squared income	3 Without Moscow and Saint Petersburg	4 Without Moscow and St Petersburg, w/ sq. income
Population i (log), t-2	2.376***	2.343***	2.321***	2.274***
	(0.126)	(0.127)	(0.138)	(0.143)
Population j (log), t-2	1.287***	1.451***	1.058***	1.228***
	(0.124)	(0.127)	(0.135)	(0.142)
Income i (log), t-2	0.005	-0.222	-0.017	-0.283
	(0.024)	(0.166)	(0.025)	(0.203)
Income squared i (log), t-2		0.013		0.015
		(0.009)		(0.012)
Income j (log), t-2	0.311***	1.459***	0.294***	1.249***
	(0.025)	(0.167)	(0.027)	(0.209)
Income squared j (log), t-2		-0.065***		-0.054***
		(0.009)		(0.012)
Ginii (log) , t-2	0.037	0.036	0.046	0.046
	(0.042)	(0.042)	(0.046)	(0.046)
Gini j(log), t-2	-0.334***	-0.331***	-0.341***	-0.340***
	(0.042)	(0.042)	(0.044)	(0.044)
Unemployment rate i(log), t-2	0.022**	0.024**	0.001	0.002
	(0.009)	(0.009)	(0.010)	(0.010)
Unemployment rate j(log), t-2	-0.027***	-0.034***	-0.030***	-0.034***
	(0.009)	(0.009)	(0.010)	(0.010)
Housing price i (log), t-2	-0.007	-0.008	-0.005	-0.006
	(0.011)	(0.011)	(0.011)	(0.011)
Housing price j (log), t-2	0.022**	0.025**	0.026**	0.029**
	(0.011)	(0.011)	(0.011)	(0.011)
Provision of housing i (log), t-2	0.354***	0.365***	0.210**	0.217**
	(0.083)	(0.083)	(0.087)	(0.087)
Provision of housing j (log), t-2	0.620***	0.563***	0.522***	0.497***
	(0.098)	(0.098)	(0.100)	(0.100)
New flats i(moving average, log), t-2	-0.007	-0.009	0.011	0.009
	(0.010)	(0.010)	(0.010)	(0.010)
New flatsj (moving average log), t-2	-0.043***	-0.033***	-0.053***	-0.045***
	(0.010)	(0.010)	(0.011)	(0.011)
Life expectancy i(log), t-2	-0.490**	-0.471**	-0.429**	-0.406*
	(0.210)	(0.210)	(0.218)	(0.218)
Life expectancy j(log), t-2	-0.747***	-0.845***	-0.472**	-0.553**
	(0.210)	(0.209)	(0.215)	(0.215)
Infant mortality rate i(log), t-2	0.002	0.002	-0.003	-0.002
	(0.015)	(0.015)	(0.016)	(0.016)
Infant mortality rate j(log), t-2	-0.082***	-0.085***	-0.052***	-0.053***
	(0.017)	(0.017)	(0.017)	(0.017)
Doctors i (log), t-2	0.228***	0.213***	0.289***	0.272***
	(0.066)	(0.067)	(0.068)	(0.069)
Doctors j(log), t-2	0.173***	0.250***	0.165***	0.223***
	(0.062)	(0.063)	(0.063)	(0.065)
Hospital beds i(log), t-2	0.073*	0.076*	0.051	0.053
	(0.043)	(0.043)	(0.044)	(0.044)
Hospital beds j(log), t-2	0.310***	0.293***	0.251***	0.245***
	(0.044)	(0.044)	(0.045)	(0.045)
Telephones i(log), t-2	-0.030	-0.022	-0.114***	-0.106***
	(0.028)	(0.028)	(0.030)	(0.031)
Telephones j(log), t-2	-0.069**	-0.111***	-0.038	-0.066**
	(0.028)	(0.029)	(0.031)	(0.032)
Highway density i(log), t-2	0.013	0.014	0.005	0.006
	(0.019)	(0.019)	(0.019)	(0.019)

Highway density j(log), t-2	0.067***	0.065***	0.099***	0.096***
	(0.020)	(0.020)	(0.020)	(0.020)
Buses i(log), t-2	0.015*	0.016*	0.019**	0.020**
	(0.008)	(0.008)	(0.008)	(0.008)
Buses j(log), t-2	-0.032***	-0.034***	-0.054***	-0.057***
	(0.010)	(0.009)	(0.010)	(0.010)
Share of young i, t-2	-0.003	-0.006	-0.006	-0.009
	(0.006)	(0.006)	(0.007)	(0.007)
Share of young j, t-2	0.023***	0.036***	0.017**	0.028***
	(0.006)	(0.006)	(0.007)	(0.007)
Share of old i, t-2	-0.035***	-0.037***	-0.028***	-0.031***
	(0.005)	(0.005)	(0.005)	(0.005)
Share of old j, t-2	0.032***	0.046***	0.025***	0.035***
	(0.005)	(0.005)	(0.005)	(0.006)
Students i (log), t-2	-0.027**	-0.028**	-0.035***	-0.037***
	(0.011)	(0.011)	(0.011)	(0.011)
Students j (log), t-2	0.093***	0.098***	0.108***	0.113***
	(0.012)	(0.012)	(0.012)	(0.012)
Women i (log), t-2	0.261	0.231	-0.970***	-1.055***
	(0.246)	(0.246)	(0.310)	(0.317)
Women j (log), t-2	-4.599***	-4.449***	-5.143***	-4.838***
	(0.243)	(0.242)	(0.320)	(0.331)
year1999	-0.039***	-0.032***	-0.031***	-0.026**
	(0.010)	(0.010)	(0.011)	(0.011)
year2000	-0.004	0.025	-0.016	0.007
	(0.022)	(0.022)	(0.024)	(0.025)
year2001	-0.150***	-0.119***	-0.150***	-0.127***
	(0.023)	(0.023)	(0.025)	(0.026)
year2002	-0.191***	-0.148***	-0.160***	-0.131***
	(0.032)	(0.033)	(0.036)	(0.037)
year2003	-0.205***	-0.156***	-0.168***	-0.134***
	(0.038)	(0.039)	(0.042)	(0.043)
year2004	-0.316***	-0.257***	-0.269***	-0.228***
	(0.046)	(0.046)	(0.051)	(0.052)
year2005	-0.358***	-0.282***	-0.291***	-0.239***
	(0.053)	(0.054)	(0.060)	(0.062)
year2006	-0.340***	-0.254***	-0.268***	-0.208***
	(0.059)	(0.061)	(0.067)	(0.070)
year2007	-0.314***	-0.218***	-0.232***	-0.166**
	(0.064)	(0.067)	(0.073)	(0.077)
year2008	-0.352***	-0.247***	-0.284***	-0.210**
	(0.070)	(0.073)	(0.079)	(0.084)
year2009	-0.476***	-0.367***	-0.417***	-0.340***
	(0.075)	(0.078)	(0.084)	(0.089)
year2010	-0.390***	-0.278***	-0.334***	-0.255***
	(0.077)	(0.081)	(0.087)	(0.092)
Observations	72,808	72,808	68,972	68,972
R2-within	0.222	0.223	0.225	0.225
Number of pairs	5,929	5,929	5,625	5,625

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 1. Number of regions above and below thresholds over time for log of income to minimum living standards.

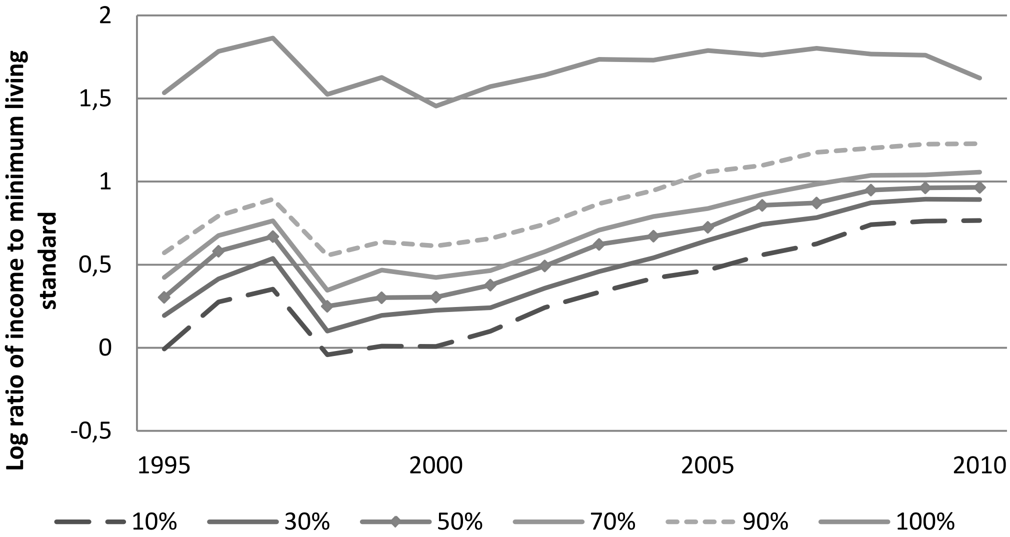


Figure 2. Unweighted standard deviation between regions, logs of real wages, real incomes, real GDP per capita and unemployment rate.