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Regional Economies and Interregional Population Migration : A Case of Russia*

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1. Introduction

The objectives of this study are (1) to test the applicability of the *Gravity Models* on interregional migration in the Russian Federation after the collapse of the Soviet Union and (2) to examine the effects of distance and regional economic conditions on migration flows.

It is very surprising that ***distance-decay effects*** were not verified clearly even in Mitchneck (1991), the pioneering study in Soviet/Russian regional researches :

> ... distance did not play a strong role in destination choice for migrants from the European RSFSR origins during 1968-1969. ... In all models, flows to East Siberia and the Far East exceed the predicted values. (Mitchneck, 1991, p. 172)

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Cole and Filatotchev (1992) also pointed out that 'Beyond about 1,000 km there is no further decay of intensity with distance' (Cole and Filatotchev, 1992, p. 434). This phenomenon may be attributable to the Former Soviet Union's extensive periphery-oriented development strategies. After the collapse of the Soviet Union, however, interregional migration patterns in Russia must be changed because of the transformation in economic and political conditions.

First, origin-to-destination tables based on *Economicheskiy Rrayon* or *Federal'niy Okrug* are used. The technique used in the paper is comparable with that of Mitchneck (1991) and Andrienko and Griev (2002). Simple OLS-based gravity models with including distance variables would be applied. Second, recent analysis conducted by the author on migration flows based on net migration data for each *oblast'* will be briefly introduced.

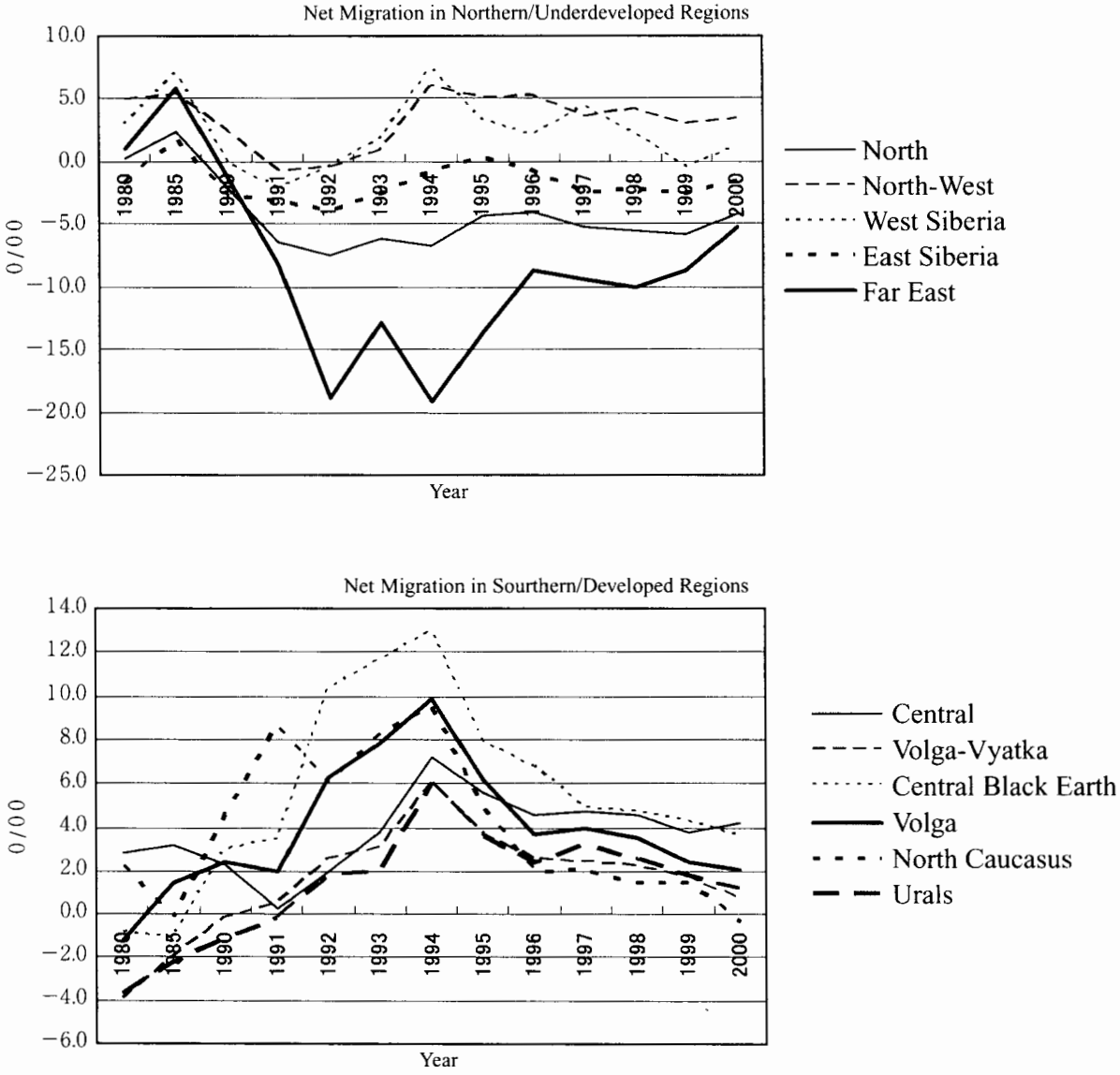
2. Recent Migration Patterns in Russia

The most critical differences that become evident when comparing Russian migration patterns before and after the Soviet era are (1) the emergence of large out-migration from the Far North regions and (2) the increases in in-migration rates into advanced/industrialized areas and into warm farming regions.

After the middle 1970s into the 1980s, when the Soviet society was recovering from exuberant government development strategies, great importance was placed on further development of already-advanced European regions and resource-mining regions. On the other hand, it was very difficult to entice laborers to settle in frontier areas. Higher wages in these areas were insufficient to offset the deficiencies in the infrastructure. In addition, it was quite expensive to develop the frontier because of the severe environmental conditions. However, big projects, such as constructing new industrial zones in peripheral regions, were discontinued in this period. Rather, seasonal or day workers were used in underdeveloped areas, but these workers were only provided with barracks. In order to avoid maintaining

the infrastructure and to promote short-term efficiency, the government intended to entice day workers into the Far North by using wage incentives. In the Far North, which has very large natural resources, development incentives were provided by the central administration with clearly positive results. Thus, large in-migration into such areas as Siberia or the Far East was observed until the end of the 1980s (See Figure 1).

Figure 1 : Net Migration in Each Region, 1980-1999



(*Sources* : TsSU RSFSR, 1980, pp. 6-9, TsSU RSFSR, 1981, pp. 6-8, Goskomstat Rossii, 1993, pp. 26-28, Goskomstat Rossii, 1999, pp. 64-65 and Goskomstat Rossii, 2001, pp. 63-64.)

The collapse of the Soviet Union caused drastic changes in the patterns. In-migration into already-advanced areas and out-migration from the north emerged in 1990s. This can be clarified when plotting net migration as geographical information. After the 1990s, in many regions in Siberia or in the Far East, percentage-scale out-migration flows were observed, excluding Chumen', which included large mining bases.

Numerous causes can be cited for this phenomenon. Especially significant are the racial/political factors (Chechen, North Osetiya, Ingush) and return migration (from Central Asia and the Baltic states). It would, however, be impossible and beyond the scope of this study to consider every possibility. Based on the author's interest, this study is limited to the analysis on economic and geographical factors.

3. The Model and Data

3.1 The Gravity Model

The basic form would be as follows :

$$M_{od} = g \frac{P_o P_d}{d_{od}^2} \quad (1)$$

where M_{od} = migration from o to d ; P = population ; d = distance between o and d ; g = a constant.

To examine the effects of economic activity in regions, the basic model would be modified as follows :

$$M_{od} = g \frac{(G_o G_d)(P_o P_d)}{d_{od}^2} \quad (2)$$

where G = gross regional output. The definitions of other variables are the same as those in the equation (1).

3.2 Data

Official Data (Goskomstat RF, *Chislennost' i Migratsiya Naseleniya Rossiiskoy Federatsii v **** godu*, and Goskomstat RF, *Regiony Rossii **** godu*) were utilized in the analyses. Origin-to-Destination tables based on *Ekonomicheskiy Raion* (in 1998 and 1999) or *Federal'niy Okrug* (in 2000) would be utilized to clarify the effects of geographical factors on migration patterns. Distance between the largest cities in each region is treated as a proxy for d_{od}.

4. Results and Interpretation

A gravity model presented in the equation (2) was estimated based on the origin-to-destination table in 2000, 1999 and 1998. All variables are transformed into logarithm. The analysis on migration flows in 2001 cannot be conducted because GRP data by region in 2000 are still not published. The results are presented in Table 1.

The regression coefficient of the distance variable itself shows the negative sign (Table 1). As for the population variable and gross regional products, the original equation (2) does not fit enough ; that is, when GRP of origin regions affect significantly, then those of destination regions do not work well. This may indicate the existence of multicolinearity (See Table 2, the correlation matrix). However, when they were estimated significantly, coefficients of population or GRP variables obtained intuitively understandable positive signs. In addition, in all cases, distance variables worked well enough.

This is a critical change in population flows in Russia. Formerly, in the Soviet Union, intensive development policies were implemented and many laborers were relocated from European areas of the USSR into Siberia or the Far East : hence, distance did not show statistically significant effects on migration. In contrast, after the collapse of the Soviet Union, geographical factors critically affects on population redistribution, just as in other West European countries.

Table 1 : Migration, Population, Distance and GRP : Estimation Results

	1998	1999	2000
	β	β	β
log(Go)	0.67*	0.64*	−0.24
(Standard Errors)	0.21	0.21	0.23
log(Gd)	0.14	0.08	0.23
(Standard Errors)	0.21	0.21	0.23
log(Po)	−0.17	−0.06	0.41
(Standard Errors)	0.26	0.24	0.22
log(Pd)	0.83*	0.92*	0.58*
(Standard Errors)	0.26	0.24	0.22
log(d ^ 2)	−0.12*	−0.11*	−0.14*
(Standard Errors)	0.04	0.04	0.06
constant	−2.43*	−2.87*	0.76
(Standard Errors)	0.82	0.85	1.72
Adj.R-squared	0.50	0.5	0.59
D.F.	104	104	36

* : significant at 5 % level.

Table 2 : Correlation Matrix

1998	log(Go)	log(Gd)	log(Po)	log(Pd)	log(d ^ 2)	log(M)
log(Go)	1.000					
log(Gd)	−0.100	1.000				
log(Po)	0.873	−0.087	1.000			
log(Pd)	−0.087	0.873	−0.100	1.000		
log(d ^ 2)	−0.002	−0.002	−0.153	−0.153	1.000	
log(M)	0.341	0.480	0.299	0.571	−0.296	1.000

1999	log(Go)	log(Gd)	log(Po)	log(Pd)	log(d ^ 2)	log(M)
log(Go)	1.000					
log(Gd)	−0.100	1.000				
log(Po)	0.861	−0.086	1.000			
log(Pd)	−0.086	0.861	−0.100	1.000		
log(d ^ 2)	−0.022	−0.022	−0.154	−0.154	1.000	
log(M)	0.351	0.471	0.307	0.570	−0.294	1.000

2000	log(Go)	log(Gd)	log(Po)	log(Pd)	log(d ^ 2)	log(M)
log(Go)	1.000					
log(Gd)	−0.167	1.000				
log(Po)	0.804	−0.134	1.000			
log(Pd)	−0.134	0.804	−0.167	1.000		
log(d ^ 2)	−0.367	−0.367	−0.384	−0.384	1.000	
log(M)	0.104	0.634	0.197	0.678	−0.596	1.000

The results clearly show that population migration patterns in Russia have become rational ones. Distance-decay effects on migration, which were not observed in the Soviet Union formerly, were apparently presented. Additionally, economic activeness of respective regions may have critical effects on population redistribution. Thus, the effects of economic conditions on migration flows will be discussed in the last section.

5. Migration and Regional Economy : Results from the Recent Paper (Kumo, 2003 b)[1]

In this section, analyses recently conducted by the author (Kumo, 2003 b) are presented. Official statistics are used to analyze migration factors. Net migration in each region in 1994, 1997, and 2000 is regarded as an explained variable. Although census-based gross population flow data is usually utilized in detailed migration analysis, official population census was not conducted through the 1990s in Russia ; thus, the net migration rate is taken as a dependent variable. Because the origin-to-destination table does not exist for each oblast' level, distance variables can not be included. Factors thought to affect migration decisions are as follows :

Indicators of Economic Agglomeration :

Population (1000), Labor Power (1000), Gross Regional Products (million rubles), Gross Industrial Output (million rubles), Gross Agricultural Output (million rubles)

Indicators of Social Infrastructure :

Railroad Density (km/sq. km), Surfaced Road Density (km/sq. km)

Indicators of Regional Economic Conditions :

Unemployment Rates (%), Per Capita Income (Rubles), Per Capita Gross Regional Products (Rubles), Regional Economic Growth Rates (%), Growth

1 Reprinted with permission from *Far Eastern Studies*, vol. 2, 2003.

Rates of Gross Industrial Output (%), Growth Rates of Gross Agricultural Output (%), Per Capita Newly Constructed Houses, Per Capita Retail Expenditure (Rubles), Per Capita Expenditure on Services (Rubles), Percentage Share of Firms in Debt (%), Capital Accumulation (million rubles), Consumer Price Index (%)

Indicators of Welfare/Cultural Conditions :

Percentage Share of Urban Population (%), Per Capita Housing Space (square m), Percentage Share of University Students in Total Population (%), Per Capita Hospital Beds, Per Capita Number of Doctors (100), Per Capita Number of Crimes Committed

Indicators of Climate Conditions :

A Dummy Variable for Far North Regions[2] which locate in the Arctic Circle (0/1)

All variables are for each region (*oblast'* and *kray*) and are given a one-year lag in comparison with the explained variable. Autonomic Regions (*Autonomniy okrug*) are included in the respective *oblast'*. The Chechen and Ingush republics are excluded from the analysis because of their extraordinary environment. The number of samples is 77. All data were obtained from Goskomstat Rossii, *Regiony Rossii*, 2001. A simple OLS analysis was conducted. All variables were introduced linearly. The results using stepwise techniques are shown in Table 3.

In general, the results are intuitively acceptable and are consistent with previous studies. The fact that per capita housing space, which is regarded as a welfare indicator, shows a positive coefficient in 1997 and in 2000 is easily understandable. It is notable, however, that regions that show large housing spaces may be in warm southern European areas, not in advanced regions, such as Moscow or Saint

2 "Far North regions" are officially defined as backward areas, where high wage rates had been set during the Soviet era to offset sever environmental conditions.

Petersburg.

The percentages of firms in debt show negative coefficients throughout the years surveyed, and growth rates of labor power in regions obtained positive coefficients in 1994 and 1997. All these results show that regional economic conditions have a clear effect on migration decisions. In 2000, improved production of agricultural products and gains in the number of newly constructed houses had positive effects on migration, which was quite understandable. It should be mentioned that regions that show high numbers of per capita newly constructed houses are near large cities, such as Moscow or Saint Petersburg. Railroad density, which is a condition of regional infrastructure, positively affected the flow of population in 1997 and 2000, which also seems quite natural.

The per capita crime numbers seem somewhat unusual. This percentage shows a positive and significant coefficient in 2000, which may suggest that larger cities with many crimes had attracted more people in recent years. From other point of view, brisk regions would attract both official and unofficial economic activity, hence, it is natural that positive correlation is observed between net migration and crime numbers. The negative coefficient shown by growth rates of capital investment in 2000 and the negative effect that per capita income had on migration in 1994 may suggest that (1) backward regions have little infrastructure and (2) peripheral regions, which have severe climate conditions, are still given wage rate incentives, which still fail to offset the low standard of living in these areas.

A striking result is obtained for the dummy variable, which is given to the regions of the Far North. It was strongly significant for all years, and the regression coefficient was the largest, again for all years. The term dummy variable is the same as that used in the 1997 and 2003 papers (Kumo, 1997, 2003 a). It was shown that climate conditions also rationally affect on migration patterns.

Table 3 : Estimation Results Obtained by Using a Stepwise Technique

		1994	1997	2000
Infrastructure	Railroad Density	−	0.008 (1.85)	0.061 * (2.28)
Economic Indicators	Per Capita Income	−0.026 * (2.455)	−	−
	Firms in Debt	−0.359 * (2.79)	−0.247 * (4.56)	−0.870 * (2.63)
	Growth in the Number of Laborers	0.937 * (3.39)	0.303 * (2.15)	−
	Unemployment Rate	−	−0.229 (1.70)	−
	Growth of Capital Accumulation	−	−	−0.155 * (2.19)
	CPI	−	−0.192 (1.93)	−
	Expenditure on Services	−0.000 (1.67)	−0.009 (1.93)	−
	Growth of Agricultural Products	−	−	0.496 * (2.30)
	Per Capita Newly Constructed Houses	−	−	0.127 * (4.69)
Welfare/Cultural Indicators	Per Capita Housing Space		0.962 * (3.06)	4.719 * (2.68)
	Urban Population Share	−	−7.177 (1.65)	−
	Per Capita Hospital Beds	−0.096 (1.95)		
	Per Capita Number or Crimes	−	−	0.010 * (2.24)
Climate	Dummy for North	−9.43 * (2.316)	−8.678 * (5.32)	−45.84 * (5.16)
	Constant	45.922 * (6.876)	30.01 * (2.05)	−130.4 * (2.67)
	Adj. R-sq.	0.808	0.705	0.720
	Degree of Freedom	70	69	68
	F-Value	43.31	19.34	22.851
	Significance	**	**	**

** : Significant at 1 % level ; * : Significant at 5 % level. T-values are in the parentheses below the respective coefficient.

6. Conclusion

The results clearly show that economic and geographical (gravity) factors critically affect migration decisions in Russia in an intuitively-understandable way. Thus, the application of stylized theories on the examination of interregional population migration in Russia or on the analysis of Russian regional economies seems reasonable[3].

However, one can point out that several points remain unsolved in this paper :

1) *Oblast*-level origin-to-destination tables are still not obtained. In order to analyze the effects of geographical conditions in detail, the regions should be divided into *oblast* or other comparable units.
2) Regional analyses based on *Federal'niy Okrug* are, in this regard, less desirable than those based on *Ekonomicheskiy Rayon*.
3) Inter-former Union republican migration flows were not examined in the analysis.

Although the above and other problems are involved, distance-decay effects and the effects of climate conditions on migration were significantly observed ; hence, geographical factors must be taken into consideration when analyzing migration in Russia. Additionally, as a matter of course, economic conditions in each region also critically affects on population flows. These results are comparable with those of Andrienko and Griev (2002) and Kumo (2003 a).

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