1. Introduction

Scope and Purpose

The objective of this study is to investigate the problem of population redistribution and industrial location patterns in the former Soviet Union and Russia. After a general review of Soviet regional economies, population redistribution policies and actual migration patterns are structurally analyzed. After that, trends in the USSR and Russia in the regional economic development strategy are identified, and industrial location patterns are analyzed. Finally, the relative impact of geographical and political factors on Soviet regional industrialization is examined.

Hence, this study is a case study of changes in interregional population migration patterns and industrial location of a particular country's development process. In-depth empirical research on the relationships among the economic development process, population redistribution, and regional industrialization are presented in this study, and, because the economy of the Soviet Union is an unusual example, general insights into these relationships are revealed. The Soviet economy was centrally planned and had experienced extensive development through its socialistic industrialization policy.

Population migration has long been the subject of theoretical analysis. Income differentials were identified by some researchers as a primary cause of migration, and vast empirical studies have been based on this point of view. The explanatory power of income differentials on migration patterns was very strong in developing countries such as Japan in the 1960s.

In the Soviet Union in the past and in Russia now, the existence of regional economic differentials itself is unavoidable because of the vastness of the territory. Regional differentials on the various levels of economic development were politically controlled by the socialist government, which had administrative power. The regional correlation between the inequalities in output and in per capita income had weakened. In addition, a lack of regional statistics in the Soviet Union made it difficult for researchers to reconstruct population migration resulting from interregional differentials in the levels of development.

Of course, even in socialist states, interregional population flows were continuously observed. The primary trends of population flow in the Soviet Union were not characterized by migration from peripheral to advanced

areas. The scale of population inflows into regions targeted for development, such as Siberia and Central Asia, was extraordinarily large in the USSR. These population flows may be attributable to the government of the Communist Party. Therefore, in-depth studies of migration factors may have been avoided in the Soviet Union because the population shifts were generally attributed to political factors.

However, it is not unreasonable to question whether a central government could have controlled migration to such an extent. The collapse of the Soviet Union clearly shows that unpopular policies ultimately fail. The fact that the government tried to control labor balances does not mean that it effectively managed population shifts. An analysis of the economy's influence on migration seems appropriate. One of the questions to be answered is how the control by the central government affected the redistribution of the population. When the planning of regional development is considered, the problems associated with available sources of labor cannot be disregarded. The policies used to manipulate the redistribution of the Soviet population should be used as a lesson by policymakers. For the USSR to have accomplished its economic plans, *a priori* decisions on the scale of labor in each region or controls on geographical distribution of population must have been indispensable. The experimentation in the Soviet Union shows how regional economic development strategy worked. Thus, the effectiveness of the incentives provided by the central administration of the former Soviet Union is examined.

Regional patterns of development in the former USSR are another main topic of this study. In general, the geographic distribution of natural resources critically affects the location of industry in a country. Various studies demonstrate the importance that natural resources had in determining the industrial sites throughout the former Soviet Union.

It is still not clear, however, which role institutional/ideological factors and agglomeration economies resulting from the extent of the market played in the Soviet industrialization process of regional economies. This inadequate explanation is attributable to the limited availability of regional statistics for the former USSR. However, the collapse of the former Soviet Union ultimately made it possible to gain access to the regional data that was available.[1]

The interrelationship between transport costs, agglomeration economies, natural resource location, and regional development patterns

[1] Kuboniwa's (1996a, 1996b) 'historical quantitative analysis' concerning Central Asian states of the former Soviet Union is based on such a situation.

has long been investigated in many fields. In recent years, however, their relationship has been clarified in a more refined form in the field of new economic geography (Krugman, 1991; Fujita, Krugman, and Mori, 1995; Fujita, 1996; Fujita, Krugman, and Venables, 1999). These researchers demonstrated that control of the effects of agglomeration economies or other variables, such as extremely high transportation costs, obstructs industrial concentration, while changes such as reductions in the cost of transportation promote the growth of industrial manufacturing. In addition, these writers demonstrated that population and historical conditions, some of which were accidental, play critical roles in the developmental patterns of specific regions.

Some authors have already verified their hypotheses empirically. Fujita and Tabuchi (1997) have pointed out that the realization of the Tokyo monopolar system in Japan can be regarded as a concentration process of knowledge-intensive industries, in which agglomeration economies play a critical role. After comparing the locational behavior of semiconductor industries in Japan with that in the USA, Arita and Fujita (1997) showed that advantages in transportation costs and political and historical conditions have significant effects on the choices. A number of studies in geography, concentrating heavily on the United States, have investigated the relationships among transportation costs, the location of natural resources, and regional development.[2]

On the other hand, little research of a similar nature is available concerning the Soviet Union. This situation may have resulted from the general view that decisions concerning the location of industries in the USSR were made by the central government based on policy considerations rather than on economic efficiency. Of course, this might be partially true: Telepko (1963), Dienes (1972), and Nakamura (1988), among others, investigated such decision-making processes. In addition, it has been very difficult to study actual locational patterns and interregional migration patterns in the Soviet Union because of limitations concerning the published regional data.[3] However, recent regional data

[2] For example, see Borchert (1967).

[3] Ruble-based statistics were not published until very recently. The only accessible data about gross industrial output was related to growth rates. Quantity indices of specific articles based on tonnage or other indicat ors were published. Examples of studies utilizing these statistics are those by Hoyt (1959) and Dellenbrant (1980). Stanley (1960) used the number of industrial workers as a proxy for industrial output. Kelly (1974) investigated industrial location patterns in the USSR, taking the production of electricity as the industrial output.

published by the Russian Governmental Commission of Statistics and the World Bank made it possible to conduct a more detailed investigation of the Russian/Soviet regional economies. Thus, regional development patterns in the Soviet Union and Russia were examined to see how efficiency-based factors had affected the centrally planned economy.

Overview

A review of general information on the Soviet regional economies and a brief analysis on regional inequalities in the USSR based on the Factor Analysis method are presented in Chapter 2. The first part of this study is devoted to the analysis of interregional migration in the former Soviet Union and Russia. In Chapter 3, migration studies in the USSR and Russia are reviewed. Inter-Union republican migration patterns in the Soviet Union are analyzed in Chapter 4, focusing on economic and political factors. Changes in migration patterns in transformational Russia are examined in Chapter 5. The second part of the book focuses on industrial location patterns and regional economies in the Soviet Union and Russia. In Chapter 6, industrial location policies implemented during the Soviet era are reviewed. Chapter 7 concentrates on the estimation of regional industrial output and the examination of regional efficiency differentials, which should have played critical roles in location decisions by the production function analysis. Sequential regional economic characteristics actualized in Russia under transformation are presented in Chapter 8, and Chapter 9 summarizes the results and their implications.

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2. Soviet Economy in Regional Perspectives: Some Basic Information

2.1 Development Strategy in the Soviet Union

Long-term Tendency in Soviet Economic Growth

The Russian Empire was an underdeveloped peripheral European state at the beginning of the 20th Century, but extensive development policies implemented during the Soviet era industrialized the USSR. As can be seen in Table 2-1, Soviet economic growth was very impressive, especially in the 1950s and 1960s. Industrial output in 1985 was almost 200 times that of 1913, and the national income in 1985 was 90 times that of 1913 (See Table 2-2 and Figure 2-1). The growth of the heavy industry was remarkable.

TABLE 2-1
SOVIET GROWTH DATA, 1928-1985 (IN PERCENT)

	CIA Estimate	Soviet Official Statistics
GNP		
1928-85	4.3	8.8
1928-41	5.8	13.9
1950s	6	10.1
1960s	5.2	7.1
1970s	3.7	5.3
1980-85	2	3.2
Capital Growth		
1928-66	7.4	7.2
1960-81	7.6	8.1

Source: Fischer (1994)

TABLE 2-2
SOVIET ECONOMIC GROWTH SINCE THE OCTOBER REVOLUTION
(1913=1)

	1913	1940	1950	1960	1970	1980	1985
Gross Social Products	1	5.1	8.2	21	41	69	82
National Income	1	5.3	8.8	23	46	75	90
Fixed Fond for Production	1	2.6	3.3	8.3	19	42	57
Industrial Products	1	7.7	13	40	92	163	195
Heavy Industries	1	13	27	89	214	391	468
Light Industries	1	4.6	5.7	15	30	50	61
Agricultural Products	1	1.4	1.4	2.2	3.1	3.4	3.8
Labor	1	2.6	3.1	4.8	7	8.7	9.1
Labor Productivity	1	4.9	8.4	19	36	53	62

Source: *Narodnoe Khozyaystvo SSSR za 70 let*, GosKomStat SSSR, 1987, p.7.

However, growth rates of industrial output, agricultural products, and national income began falling in the 1970s. Declines in population growth, service-sector expansion, exploitation in peripheral Siberia, expansion of armaments, and other factors may have contributed to this economic deterioration.

Table 2-3 provides more detailed Soviet growth data. Up to the 1950s, the Soviet economy showed intensive growth in both the industrial and agricultural sectors, followed by a slowdown after the 1960s. More correctly, the industrial growth rate, which had been increasing by 10% annually until 1960, fell to 8.6% in the first half of the 1960s. In the 1970s, it decreased to 7.4% and, by the second half of the 1970s, to 4.4%. As for the growth of the national income, it fell constantly from the 1950s through the first half of the 1960s; however, it recovered in the second half of the 1960s. A rise in the growth of the national income in the 1960s was attributable to the recovery of agricultural production, since the agricultural sector occupied a large share of the Soviet economy (Nihei, 1998). However, after that, in the 1970s and 1980s, the national growth rate of income and industry continuously decelerated.

Figure 2-1
Soviet Economic Growth since the October Revolution (1913=1)
Source: See Table 2-6.

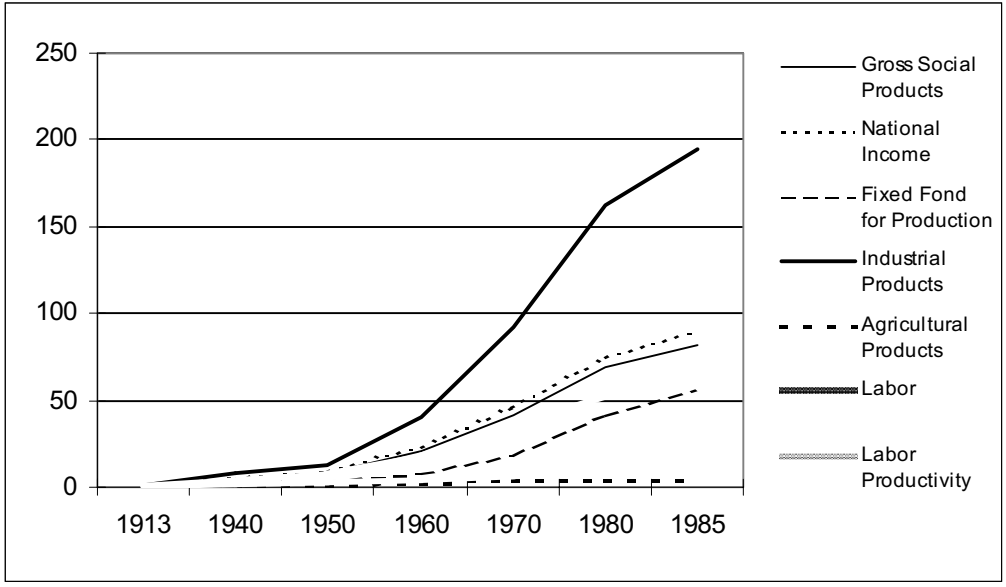


TABLE 2-3
SOVIET ECONOMIC GROWTH

Growth Rate/year	1928 -32	1933 -37	1938 -40	1941 -45	1951 -55	1956 -60	1961 -65	1966 -70	1971 -75	1976 -80	1981 -85	1986 -90
National Income	16.1	16.2	10	-3.6	9.5	8.2	6	7.7	5.7	4.2	3.2	1.3
Industrial Output	19.2	17.1	13.2	-1.7	13.2	10.4	8.6	8.5	7.4	4.4	3.6	2.5
Agricultural Output	-3.6	4.6	1.7	-9.4	4.1	5.7	2.4	4.2	0.6	1.6	1	1.9
Production Fond												
In Total					9.3	10.3	9.5	8.1	8.7	7.4	6.4	4.8
Industry					11.3	11.2	11.1	8.7	8.6	7.4	6.7	4.8
Agriculture					8.4	9.1	8.6	6.6	9.6	7.3	5.9	4
Capital Productivity												
In Total					1.02	0.8	0.63	0.98	0.66	0.57	0.5	0.27
Industry					1.17	0.93	0.77	0.97	0.86	0.59	0.54	0.52
Agriculture					0.49	0.63	0.28	0.64	0.06	0.22	0.17	0.48

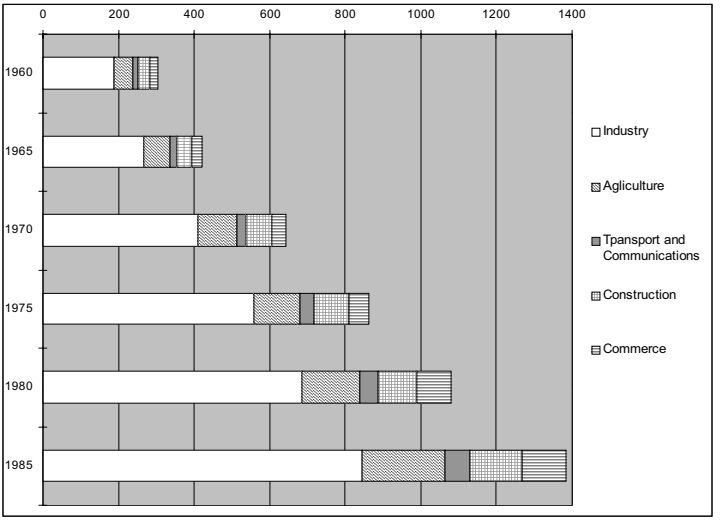
Source: Nihei (1998), p.187.

Sector Structure

The industrial sector of the USSR expanded in output throughout the Soviet era. The percentage of the industrial sector of the national economy of the Soviet Union reached 60 at the beginning of the 1960s and remained stable until the 1980s (See Figure 2-2).

Table 2-4 shows the percentage of labor by sector, and Figure 2-3 presents the investment from all resources. The percentage of industrial workers of all areas jumped dramatically in the first half of the 20th Century, from less than 10 to over 30 percent. After the 1960s, it remained at 40 percent until the end of the Soviet era. An agricultural-based underdeveloped country was changed into an industrialized nation within 50 years.

FIGURE 2-2
SECTORAL STRUCTURE OF THE SOVIET ECONOMY
(OUTPUT; IN BILLION RUBLES)



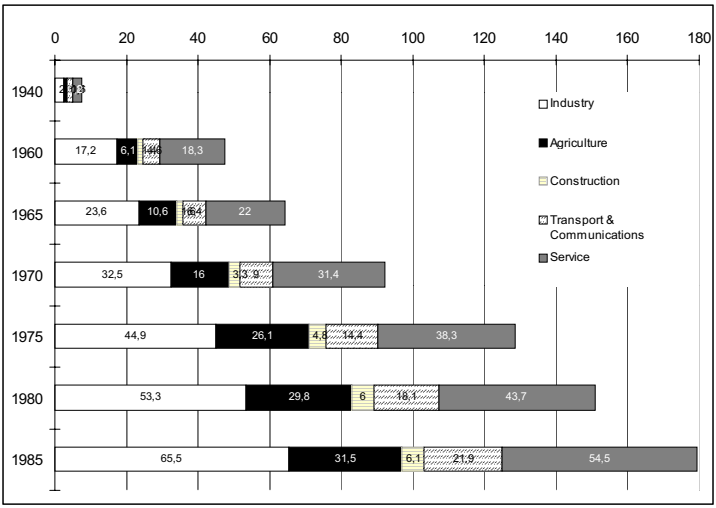
Source: *Narodnoe Khozyaystvo SSSR 1922-1982*, TsSU SSSR, Finansy I Statistika, 1982, p.67; *Narodnoe Khozyaystvo SSSR 1922-1972*, TsSU SSSR, Statistika, 1972, p.59.; *Narodnoe Khozyaystvo SSSR za 70 let*, Goskomstat SSSR, Finansy I Statistika, 1987, p.122.

TABLE 2-4
PERCENTAGE SHARE OF LABOR POWER BY SECTOR

	1913	1940	1960	1965	1970	1975	1980	1985
Total	100	100	100	100	100	100	100	100
Industry	9	23	32	36	38	38	39	38
Agliculture	75	54	39	31	25	23	20	20
Transport & Communication	2	5	7	8	8	9	9	9
Commerce	9	5	6	6	7	8	8	8
Service	5	14	16	19	22	22	24	25

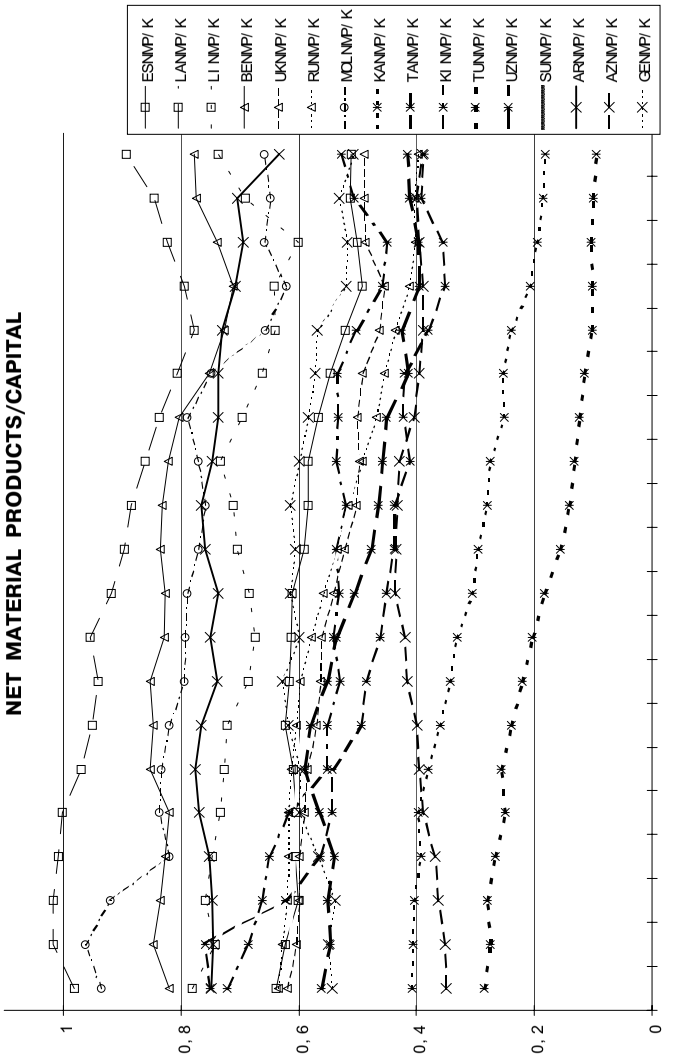
Source: *Narodnoe Khozyaystvo SSSR 1922-1982*, TsSU SSSR, Finansy I Statistika, 1982, p.397; *Narodnoe Khozyaystvo SSSR 1922-1972*, TsSU SSSR, Statistika, 1972, p.459.; *Narodnoe Khozyaystvo SSSR za 70 let*, Goskomstat SSSR, Finansy I Statistika, 1987, p.410.

FIGURE 2-3
INVESTMENT BY SECTOR



Source: *Narodnoe Khozyaystvo SSSR za 70 let*, Goskomstat SSSR, Finansy I Statistika, 1987, pp.328-329.

FIGURE 2-4
NET MATERIAL PRODUCTS/CAPITAL



Data Source: World Bank Estimation (calculated by the author)

An extensive development strategy lies behind this rapid industrialization. Investment priority was given to the industrial sector, especially to heavy industry. This resulted in dramatic growth in manufacturing. However, the heavy investment in the industrial sector caused a decrease in capital productivity.

The overall growth of the Soviet Union was not so different from that of East Asia from 1960 to 1990; however, it is peculiar that growth in the Soviet Union declined as a growth strategy was being implemented. (Easterly and Fischer, 1995). Soviet industry is characterized by the co-existence of a high capital-to-output ratio and a low output growth rate (See Figure 2-4). Comparatively, in the USA, the capital/output ratio was almost stable after the 1950s (Sakai, 2000, p.64), which implicitly shows that technological development more than offset decreasing returns to scale in the United States. From this point of view, the inefficiencies of Soviet industrialization are quite obvious.

2.2 Geographical Distribution of Natural Resources and Markets in the Soviet Union

For a long time, the Soviet Union experienced various kinds of regional disparities. Although European Russia (west of the Ural Mountains, see Figure 2-5) occupied less than a third of the territory of the Russian Soviet Federational Socialist Republic (RSFSR), it yielded more than three-quarters of the industrial product of the RSFSR in 1980 (estimated from *Goskomstat* RF, 1995, 1997). Some fluctuations occurred in regional growth rates or natural resource output patterns due to changes in development policies, but the overall trend did not change throughout the Soviet era.

The western part of the USSR was generally more developed and densely populated than the east. However, the eastern regions (Siberia, the Far East region of the Soviet Union, and the Central Asian states) have abundant natural resources, such as coal, crude oil, and tin. The sparsely inhabited regions in the Far North within the Arctic Circle also have an abundance of natural resources but are the least developed.

FIGURE 2-5
REGIONAL DIVISION OF THE FORMER USSR

Economic Regions in Russian Federation and Union Republics

1. Central Black Earth 2. Volga-Vyatka 3. North Caucasus 4. Estonia 5. Latvia 6. Lithuania 7. Belarus 8. Ukraine 9. Moldova 19. Georgia 11. Armenia 12. Azerbaijan 13. Turkmenistan 14. Uzbekistan 15. Kyrgyzstan 16. Tajikistan

For instance, it has already been pointed out that, in the early stages of the Soviet period, coal was found in Siberia, the Ukraine, and Kazakstan, while crude oil was found in Azerbaijan, West Siberia, and the Central Asian states (Table 2-5). It is reasonable that firms should be located in resource-extracting areas for this kind of fuel industry. It will be shown later that the Soviet government also consistently promoted the development of specific regions specializing in resource extraction. However, traditionally, populations were limited in these areas. It was difficult for laborers to settle in Siberia or the Central Asian states because of the severe climate and the existence of cultural conflicts; therefore, development costs in these regions were higher than those in the European parts of the Soviet Union. According to Kapustin and Kuznetsova (1972), the cost of living on Sakhalin (Far East), where enormous oilfields exist, is twice that in Central Asia. The cost to offset severe conditions in developing areas, i.e., wage rates determined by the government, was also higher than that in other regions. Because of the exhaustion of crude oil and coal deposits in the central and northwestern regions after the 1960s, coal and crude oil output in the Siberian regions rapidly increased.

On the other hand, population and manufacturing industries were located mainly in European Russia, which is contradictory to the locations of natural resources (Figure 2-6). Increases in the growth of the regional population in the Soviet Union occurred in Siberia, the Urals, Kazakhstan, and Uzbekistan, where intensive development projects were carried out during the Soviet era. Such tendencies are not seen, however, in the North Caucasus or other parts of Central Asia.

The distribution of the population was almost the same as that of industrial production. Slightly less than 80 percent of the total population resided on the west side of the Ural Mountains in 1980 (Table 2-6). Likewise, the living standards were higher in the western part of the country than in the east (Table 2-7).

As can be observed from these tables, the western regions were generally more developed and more densely populated than the eastern regions. However, the eastern regions have abundant natural resources, such as coal, crude oil, and tin. The sparsely inhabited regions of the Far North within the Arctic Circle also had abundant natural resources but were the least developed. To cope with this situation, the Soviet government stimulated industrial development in Siberia, the Far East, and the regions of the Far North.

TABLE 2-5

NATURAL RESOURCES OUTPUT IN EACH REGION

	1) Crude Oil (1000t)			2) Coal (1000t)			3) Steel (1000t)**		
	1913	1940	1960	1913	1940	1956	1940	1950	1960
Russia (Crude oil output was concentrated in North Caucasus)	1295	7039	118861	(6039)	(72798)	(250816)	(9311)	(18546)	(36588)
North-West	*	*	*	-	576.7	15852	-	-	2179
Central	*	*	*	-	10093	42194	195	448	632
North-Caucasus	*	*	*	300	11239	28205	-	-	
Ural	*	*	*	2528	11956	52299	8082	15497	27269
West-Siberia	*	*	*	774	22487	66140	493	2185	4279
East-Siberia	*	*	*	847	9229	28847	-	3	1688
Far East	*	*	*	373	7217	17279	-	-	-
Ukraine	1047	353	2159	22796	83841	172109	8938	8351	26155
Belarus	-	-	-	-	-	-	5	5	120
Uzbekistan	13	119	1603	-	3	3410	11.4	119	297
Kazakhstan	118	697	1610	90	6972	32383	-	131	305
Georgia	-	41	34	70	625	2850	0.2	77	1131
Azerbaijan	7669	22231	17833	103	1475	3502	24	44	599
Lithuania	-	-	-	-	-	-	-	-	2
Latvia	-	-	-	-	-	-	28	55	90.7
Kyrgyzstan	-	24	464	28	204	854	-	-	0.63
Tajikistan	10	30	17	-	2	-	-	-	0.63
Armenia	-	-	-	-	-	-	-	0.01	0.22
Estonia	-	-	-	-	-	-	-	0,7	5,14
Turkmenistan	129	587	5278	27	2.3	-	-	-	-

* indicates the lack of data. **Steel production statistics for Russian Economic Regions are no published. Figures for Economic Regions in Russia denotes output of iron ore. Sources: TsSU SSSR, 1969, p.205, 1974, p.262; TSSU RSFSR 1960, p.90, 1961, p.93; Goskomstat RF, 1994, p.624; SNG Komstat, 1992.

FIGURE 2-6
POPULATION IN EACH REGION (IN THOUSAND)

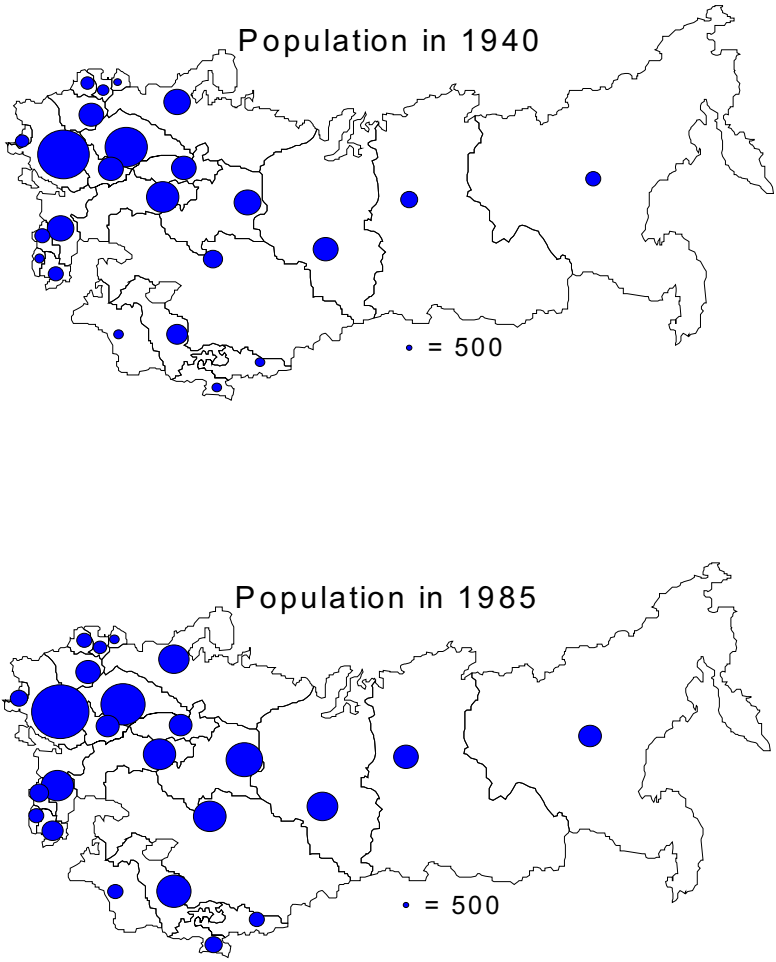


TABLE 2-6
POPULATION IN THE RSFSR

	Population (1000)			Territory
Region	1980	1985	1991	1000sq.km
North	5635	5897	6161	1466
North-West	7736	8035	8305	197
Central	29077	29721	30478	485
Volga-Vyatka	8352	8339	8480	263
Central Black Earth	7762	7708	7761	168
Volga	15590	15926	16586	536
North Caucasus	15617	16230	17030	355
Ural	19468	19790	20397	824
Western Siberia	13081	14146	15158	2427
Eastern Siberia	8246	8725	9243	4123
Far East	6920	7510	8057	6216
Russian Federation	139028	148041	148543	17075

(Source: Goskomstat RF, 1993)

TABLE 2-7
REGIONAL DISPARITY IN THE RSFSR

	Per capita floor space (m^2)		Gas line spread (%)	
Region	1980	1985	1980	1985
North	15	16.8	64	64
North-West	17.1	18.2	91	86
Central	16.2	17.5	84	82
Volga-Vyatka	15	16.5	89	90
Central Black Earth	16.3	18.3	85	86
Volga	15	16.5	87	86
North Caucasus	14.5	16	83	86
Ural	14.2	15.6	81	82
Western Siberia	13.7	15.3	34	32
Eastern Siberia	12.8	15.7	25	23
Far East	12.8	14.3	29	29
Russian Federation	14.9	16.4	73	72

(Source: Goskomstat RF, 1993)

TABLE 2-8
RETAIL TRADE TURNOVER AND VOLUME OF PUBLIC AMENITIES

	(million rubles)	Retail Trade Turnover			Volume of Public Amenities		
	Republics/Regions	1950	1965	1980	1965	1975	1985
	(Russia)	23661	63181	155088	1148.4	3565.4	5476.3
Europe /West of Ural	North-West	3128	7358	17170	153.9	393.4	622.2
	Central	6946	19191	38945	301.6	833.4	1191.1
	Volga-Vyatka	1241	3203	7843	56.1	196	288.3
	Central Black Earth	946	2775	6600	46.5	183.5	251.9
	Volga	1768	7204	17792	130.2	442.9	569.4
	North Caucasus	1721	5539	14232	123.8	417.4	625.4
	Ural	3049	7046	15679	124.3	387.5	749.6
East of Ural	West Siberia	1925	5426	14083	97	321.1	519.7
	East Siberia	1316	3552	8834	52.2	177	294.4
	Far East	1622	3616	9493	55.9	190.3	328.3
Europe /Baltic	Ukraine	5731	18504	46743	334.5	1361.6	2013
	Belarus	889	3111	9909	57.5	256.6	478
	Moldova	231	1048	3526	28	100.7	133
	Lithuania	301	1274	4131	29.1	113.4	169
	Latvia	438	1404	3725	40.7	112.9	166
	Estonia	282	820	2258	20.6	58	93

	(million rubles)	Retail Trade Turnover			Volume of Public Amenities		
	Republics/Regions	1950	1965	1980	1965	1975	1985
North Caucasus /Central Asia	Georgia	642	1530	4328	32.4	115.1	236
	Azerbaijan	538	1335	3747	22.7	89.4	168
	Armenia	237	759	2627	16.2	63.4	119
	Uzbekistan	1089	3267	10333	50.7	264.9	440
	Kyrgyzstan	242	871	2607	16.4	69.4	115
	Tajikistan	226	726	2311	13.6	61.4	118
	Turkmenistan	246	636	2018	9.9	48	83
	Kazakhstan	1120	4944	12992	76.7	299	512

Sources: TsSU SSSR, 1965, p.633, 1976, p.663, 1981, p.460, 1986, p.488; TsSU RSFSR, 1959, pp.393-394, 1976, pp.373-374, pp.408-409, 1982, pp.247-248, 1991, pp.199-201.

As indicators of the stages of economic development, the turnover in retail trade and the volume of public amenities[4] are shown in Table 2-8. There were larger markets in the European parts of the Soviet Union than in Central Asia or Siberia.

As for the regional levels of industrial output, no ruble-based statistics were published; hence, estimating industrial production is one of the primary objectives of this study, as a part of the overall analysis of the regional economic structure of the former Soviet Union. However, regional economic disparities can be evaluated by using various proxy variables. Other than population or retail trade statistics, indicators such as infant death rates, percentage of university students compared to the total population, or other cultural phenomena also indicated the superiority of the European regions to the other regions of the Soviet Union.

2.3 The Primacy of the European Regions: An Application of Factor Analysis

As pointed out in the previous section, value-based regional output data have never been published in the Soviet Union. This fact, which may be attributable to military or political conditions, made it difficult for Soviet researchers to describe regional economic inequalities in the usual ways. In addition, wages that were set by the government were used as political incentives to encourage the development of specific regions within the Soviet Union; therefore, per capita income in each region did not reflect the regional inequalities. Although the regions in the Far North (Siberia and north of the Far East) were characterized by their high average wages, their social infrastructures were the least developed. Thus, previous studies utilized various data when examining regional differentials in the Soviet Union. In the early period, Soviet researchers described regional inequalities in the USSR by using population (Stanley, 1968), consumption of electricity, or the production levels of specific goods in each region (Kelly, 1974: Sugar, cement; Hoyt, 1959).

[4] Volume of expenditures on public amenities for the repair of shoes, clothes, furniture, electric appliances, cars, etc.; expenditures on cleaning, photo development, public baths, hair salons, commuting, and other expenses to the service sector.

After the 1980s, more sophisticated techniques were applied to the analysis of Soviet regions. Sagers (1980) examined regional inequalities in the Soviet Union based on Factor Analysis using relative levels of living-standard indicators, which were calculated from data such as retail sales (ruble volume of trade turnover), housing space (housing fund divided by regional population), hospital beds per 1000 inhabitants, enrollment in secondary schools per 1000 inhabitants, divorce rates, and communist party membership per 1000 inhabitants. Because of the limitations of the data, his analysis covered only 1940, 1960, and 1975, and the samples were taken from individual cities rather than regions. Although he includes investment data among the factors, the volume of government investment itself does not reflect the living standard. In Sagers'(1980) study, the most prosperous were the European (Moscow, Leningrad, Kiev) and Far East regions (Magadan, Sakhalin). These results may be attributable to his selection of examined variables. Indeed, the per capita government-investment volumes in the frontier areas (c.f., Siberia and the Far East) were extremely large.

Hosokawa (1983) also examined Soviet regional inequalities in 1975 using composite indicators based on the Factor Analysis. He utilized population, retail sales, investment, productivity, educational and medical infrastructure indices, and the volume of several agricultural products to calculate composite measures. The first factor calculated, which indicated the level of specialization in secondary/tertiary industry (Hosokawa, 1983, p.108), clearly showed the primacy of the Central region (which included Moscow) and the Ukraine. On the contrary, the western and eastern regions of Siberia and Central Asia were underdeveloped.

Based on the same technique, Factor Analysis, Sagers (1980) and Hosokawa (1983) clarified the prominence of the European regions of the USSR in comparison with parts of Central Asia and Siberia. At the same time, based on an examination of the coefficients of variations and entropy, Sagers (1980) pointed out that regional disparities in living standards in the Soviet Union had been diminished throughout the Soviet era because of regional equalization policies implemented under the socialist government (Sagers, 1980, p.191).

The problem is that Hosokawa (1983) evaluated regional inequalities in Soviet regions in 1975 only, whereas Sagers (1980) examined them in

both 1960 and 1975. In addition, the samples that Sagers (1980) used were based on city, rather than regional, information. Although Alma-Ata, the capital city of Kazakhstan, had the highest standards of living, according to Sagers (1980), the Kazakhstan republic, which is located in Central Asia, was undoubtedly an underdeveloped region of the Soviet Union.

Regional characteristics of the Soviet Union in the 1980s are shown in this section to close the current gap in regional studies. The Soviet Union collapsed in 1991, but, in the late 1980s, the Soviet economy was in disarray because of a liberalization and rebuilding process called Perestroika; hence, economic and social data in 1985 were selected as samples. Following the studies by Hosokawa (1983) and Sagers (1980), we applied the Factor Analysis for the purposes of this study. Under conditions in which value-based indicators are unavailable, it is desirable to evaluate regional standards of living by composite measures calculated from various factors.

2.3.1 Methods and Data

The technique used in this section for the evaluation of regional differentials is called Factor Analysis. Most studies on regional differentials in western countries have examined income disparities as per capita gross-regional products. However, in the Soviet Union, wage rates were not determined by labor productivity. They were set by the central government as an inducement for the development of specific regions. Income statistics do not reflect regional standards of living in the former USSR. Hence, the use of composite measures calculated from various quantitative indicators is more desirable.

The data used in the analysis are shown in Table 2-9. Explanations for each variable are as follows.

Data

Indicators of market size

Population, 1000 inhabitants in each region

Retail sales, ruble volume of retail trade turnover in state and cooperative establishment in total

Services, ruble volume of expenditures on everyday services in total

TABLE 2-9
LEVEL OF LIVING INDICATORS

Market Size	Population (1000) Retail Sales (Total) (million rub.) Services (Total) (million rub.)
Urbanization/ Industrialization	Percentage of Urban Population in Total Pop. Investment(Total/per capita) (million rub./ruble) Industrial Growth (/1975, %) Road Spread (1000km/1000sq.km)
Nominal Income	Retail Sales (Per capita, ruble) Services (Per capita, ruble)
Living Environment	Housing Space per capita (Urban/Rural, sq.m) Housing put into Operation (sq.m)
Healthcare	Doctors (Per 1000 inhabitants) Hospital Beds (Per 1000 inhabitants) Crude Death Rate
Education	University Students (Total/per 1000 inhabitants) Library Holdings
Agliculture	Potatoes (Total/per capita, 1000t/t) Grain (Total/per capita, 1000t/t) Vegetables (Total/per capita, 1000t/t)

Indicators of urbanization/industrialization

Percentage of urban population among the total population

Governmental investment in each region, in total (in millions of rubles) and per capita (in rubles)

Industrial growth rate in ten years, percentage compared to gross industrial output in 1975

Road density in each region, 1000km/sq.km

Indicators of nominal income

Retail sales, per capita ruble volume of retail turnover, in total (in millions of rubles) and per capita (rubles).

Services, per capita expenditures on everyday services, in total (in millions of rubles) and per capita (rubles).

(Because the structure of purchase and price levels was widely different across regions, an equal volume of sales might not indicate an equal level of satisfaction (Sagers, 1980, p.71). Although laborers in frontier regions, such as Siberia or the Far East, had a high nominal income, the price levels in these regions were extremely high (Kapustin and Kuznyetsova, 1972). Again, the wage rate for laborers was used as a government incentive to develop backward regions. Therefore, a high nominal income alone did not reflect a high standard of living in the Soviet Union.)

Indicators of living environment

Housing space, per capita housing space in urban/rural areas, sq.m.

Housing put into operation, per capita housing space put into operation, sq.m.

(These measures should be carefully interpreted. In rural areas that were scarcely inhabited, the average housing space per capita may have been large. Moscow City is the most striking example. Although Moscow City was undoubtedly a well-developed area, the living conditions there were rather poor. All inhabitants had to live in apartment buildings; no one was allowed to build a house. In some cases, two or three families lived in the same apartment.)

Indicators of Healthcare

Doctors, number of doctors per 1000 inhabitants in each region

Hospital beds, number of hospital beds per 1000 inhabitants.

(Because of lack of data, rough quantitative statistics was the most commonly used indicator of health care in the Soviet Union.)

Indicators of Education

University students, number enrolled in college or university-level institutions

Library holdings, number of copies of books, journals, and reviews held in libraries in each region, per capita

Indicators of Agricultural Productions

Crops, gross harvest of grains, in total (1000t) and per capita (tons)

Potatoes, gross harvest of potatoes, in total (1000t) and per capita (tons)

Vegetables, gross harvest of vegetables, in total (1000t) and per capita (tons)

Data sources are: *Narodnoe Khozyaystvo 1985*, *Narodnoe Khozyaystvo SSSR 1988*, *Narodnoe Khozyaystvo SSSR za 70 let*, *Narodnoe Khozyaystvo RSFSR 1987*, *Pokazateli Sotsial'nogo Razvitiya Rossiyskoy Federatsii I ee Regionov 1993*, and *Regiony Rossii 1997*.

Using these variables, the Factor Analysis was conducted. The analysis followed two steps. First, the sample regions were selected: 10 economic regions in the Russian Federation and 14 Union republics (24 samples in total). Second, it was decided that only 69 states in the Russian Federation would be investigated. Economic regions in Russia were comparable with Union republics in size; however, a first analysis could not reveal the regional economic structure in detail, especially the duality of underdeveloped Siberia − and advanced European Russia. As a result, 69 Russian regions, whose statistical data were more readily available than those of other Union-republican regions, were analyzed.

2.3.2 Results and Interpretation

A separate Factor Analysis was performed for each of the sample sets, and two factors were extracted. The two factors explained over/ nearly 60% of the variance in the indicator variables.

TABLE 2-10
FACTOR MATRIX

Variables	Factor 1	Factor 2
Population	0.832819	-0.52757
Urban Population	0.641219	0.554228
Investment	0.919492	-0.19659
per/cap Investment	0.355698	0.512191
Grain	0.77156	-0.37536
per/cap Grain	0.450734	0.20613
Potatoes	0.832153	-0.27358
per/cap Potatoes	0.396323	0.514428
Vegetables	0.678002	-0.60752
per/cap Vegetables	-0.24033	-0.31655
Industrial Growth	0.194014	0.246764
Road Density	-0.07952	0.21497
Retail Sales	0.918865	-0.33735
per/cap Retail Sales	0.518581	0.791101
Services	0.907371	-0.39377
per/cap Services	0.427599	0.804905
Housing Space/Urban	0.511887	0.61889
Housing Space/Rural	0.400016	0.657572
Housing put into Operation	0.919	-0.37783
Hospital Beds	0.588027	0.357806
Doctors	0.474301	0.516029
Death Rate	0.587704	0.441425
University Students	0.878433	-0.34388
per/cap University Students	0.609761	0.397697
Library	0.905866	-0.40478
Contribution	42.21%	22.06%

2.3.2a Analysis of 10 Russian Economic Regions and 11 Union Republics

The factor matrices are shown in Table 2-10, which shows the factor loadings of the indicator variables on the underlying factors.

First, the characteristics of each factor should be determined. According to the factor matrix, the following variables correlated most strongly with Factor 1: retail sales, total investment, services, university students, and libraries. These variables show the extent of the market or industrial bases of respective regions and the advancement of cultural backgrounds. Population size had a strong correlation as well. The high correlation coefficients of total agricultural production with Factor 1 may reflect the size of the regional economy. Hence, Factor 1 could be treated as a market size/industrial agglomeration indicator.

The composition of Factor 2 is somewhat confusing. Per capita retail trade and per capita service variables had the strongest correlation with Factor 2. This result should be carefully examined. Large housing spaces did not necessarily mean good living conditions in the Soviet Union. Rather, well-developed cities such as Moscow or Leningrad (Saint-Petersburg) were notorious for their lack of residential space. On the contrary, in rural areas or underdeveloped regions such as Siberia or the Far East regions in the Russian Federation, average housing space used to be large because these areas were thinly populated. The other variables that showed high correlation coefficients with Factor 2 are per capita retail trade and per capita service variables. This result could be explained in the same way as that of housing space variables. Average wage rates in frontier regions such as Siberia or the Far East were nominally high throughout the Soviet era, but the cost of living in these areas was extremely high (Kapustin and Kuznyetsova, 1972). Hence, a high nominal income could mean economic hardship in certain regions. The strong negative correlation with the per capita vegetable variable could also be construed as supporting evidence for the above interpretation. In the Far North regions, the agricultural industry was not active because of their severe climatic conditions. The negative correlation with the population variable and the service/retail Sales variables might indicate the small market size represented by Factor 2 in those regions. Thus, although further careful examination is still required, Factor 2 would be interpreted at this point as an indicator of housing conditions/nominal income levels.

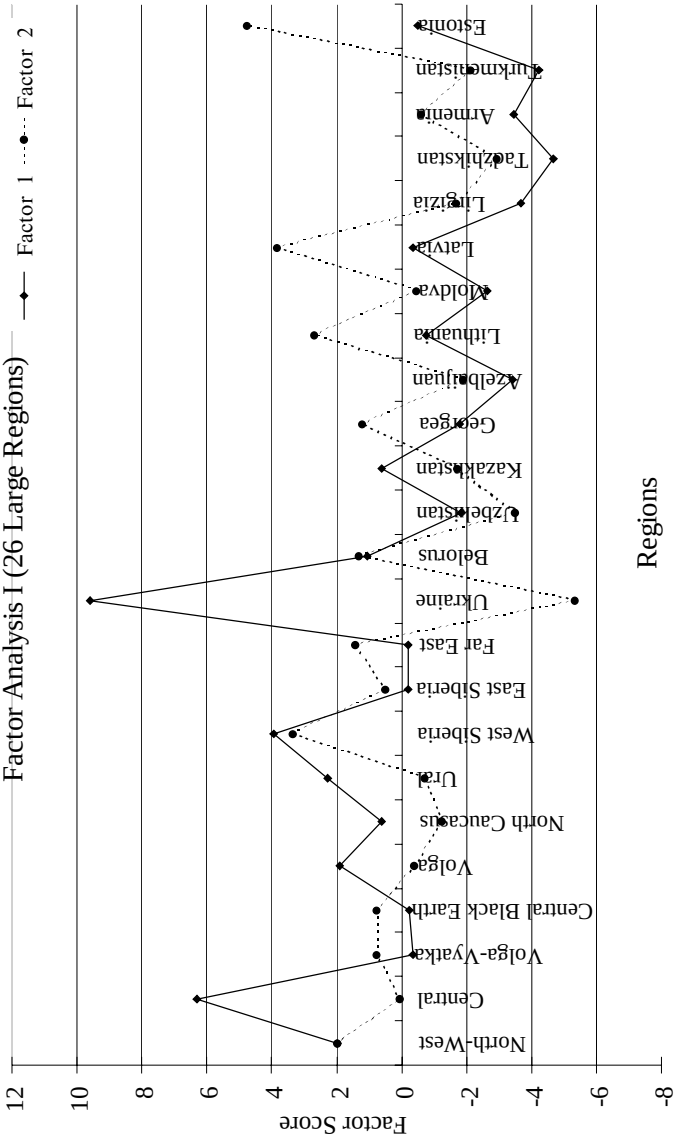


FIGURE 2-7
FACTOR SCORES

Next, we will examine the factor scores of each factor. Since the factor scores are standardized variables, a factor score indicates how much of a particular factor is found in each region relative to the others. These scores are shown in Table 2-11 and Figure 2-7.

Among the factor scores of Factor 1, the most impressive ones are the high scores of the Ukraine Republic and the Central Economic Region of Russia, which includes Moscow City. The extent of economic agglomerations in the Union capital, Moscow, can be seen in these figures. On the other hand, the Ukraine had historically been one of the most developed regions in the Russian Empire. The size of the Ukrainian economy caused problems as well. For example, the Ukraine was the second largest Union republic in population after Russia. The Central Economic Region, the most densely populated region in Russia, had a population of nearly 30 million in 1985, whereas the population of the Ukraine at that time was over 50 million. Treating the Ukraine as one region in the analysis strengthened the scale effects of the Ukraine republic. As a result, Factor 1 showed a very high score for the Ukraine.

Although the West Siberia region also showed a high score, this might be attributable to the existence of enormous resource mining bases (such as Chumen') in the northern part of the West Siberia region. Kazakhstan is another exception in the analysis. In Kazakhstan, vast investment took place because of the existence of nuclear zones and space research centers. Excluding these regions, extremely high scores for Factor 1 could only be observed in European areas. These factor scores are plotted in the map in Figure 2-8. In this figure, the primacy of European regions of the Soviet Union is clearly shown.

As for Factor 2, high scores are seen in the Baltic States (Table 2-10, Figure 2-7). This may indicate relatively good living conditions in this area. The low score for the Central region of Russia could be interpreted as a reflection of the lack of apartment buildings in large cities at the heart of the USSR, while the same low score for the Central Asian states may point to the low quality of the available housing in these regions. On the other hand, the high scores of Factor 2 for the West Siberia and the Far East regions may be attributable to (1) their scarcely inhabited urban areas (a fact that would have enabled inhabitants to enjoy large per capita housing space) and (2) high nominal wage rates which were set by the government to offset the high cost of living in these regions. Again,

TABLE 2-11
FACTOR SCORES

Factor Scores	Factor 1	Factor 2
North-West	1.992388	1.967426
Central	6.290629	0.071869
Volga-Vyatka	-0.34204	0.766153
Central Black Earth	-0.23082	0.750026
Volga	1.895951	-0.38976
North Caucasus	0.603692	-1.2319
Ural	2.260427	-0.73417
West Siberia	3.955557	3.337251
East Siberia	-0.18517	0.515796
Far East	-0.18119	1.438504
Ukraine	9.583608	-5.34251
Belarus	1.069658	1.319771
Uzbekistan	-1.81249	-3.50777
Kazakhstan	0.607388	-1.72237
Georgia	-1.79216	1.214137
Azerbaijan	-3.41362	-1.90583
Lithuania	-0.76345	2.680461
Moldova	-2.65145	-0.47365
Latvia	-0.33845	3.8429
Kyrgyzstan	-3.68806	-1.68556
Tadzhikstan	-4.67881	-2.93366
Armenia	-3.44532	-0.58786
Turkmenistan	-4.23185	-2.13237
Estonia	-0.50441	4.743108

excluding the Far East region and the West Siberia region, the regions that show high Factor 2 scores (an indicator of housing conditions/ income levels) are concentrated in the European regions of the USSR (See Figure 2-9).

Although the data used were highly aggregated, the Factor Analysis that we conducted on 26 Soviet regions clearly demonstrated the West-East duality that was predominant in the Soviet Union. The factor score of Factor 1, which represents the extent of the market/industrial agglomeration, is the highest in the Ukraine republic and the Central Economic Region of Russia, which includes Moscow. On the contrary, Central Asia and the Far East region show low factor scores. Concerning Factor 2, which is related to housing conditions/nominal income levels, the Baltic States and the Northwest region, which includes Leningrad (Saint-Petersburg), showed very high factor scores. The West Siberia and Far East regions are exceptions. Although they showed high Factor 2 scores, these scores might be attributable to their scarce population density and high wage rates, which were used as strong incentives for development in peripheral regions during the Soviet era.

The primacy of European regions, or, in other words, the advanced-West and underdeveloped-East duality of the Soviet Union, has been clearly demonstrated in this analysis. In the next section, we will use smaller units (69 regions in Russia) as samples to try to determine the regional differentials in the Russian Federation in detail.

2.3.2b Analysis of 69 states of the Russian Federation

The data collected were almost the same as those in previous analysis. Exceptions are: (1) in this analysis, the road density variable was not utilized because of lack of data, (2) industrial growth data were calculated compared with industrial output levels in 1980 because of data limitation, (3) per capita housing space data were not divided into urban/rural areas. Two factors were calculated. The results clarified 54% of the variance in the indicator variables. Factor matrices are presented in Table 2-12.

Now, we will define the characteristics of the factors. As in the first analysis presented in the previous subsection, Factor 1 shows a strong correlation with population, retail sales (total), and services (total), which represent the market size of the respective regions. The University Student

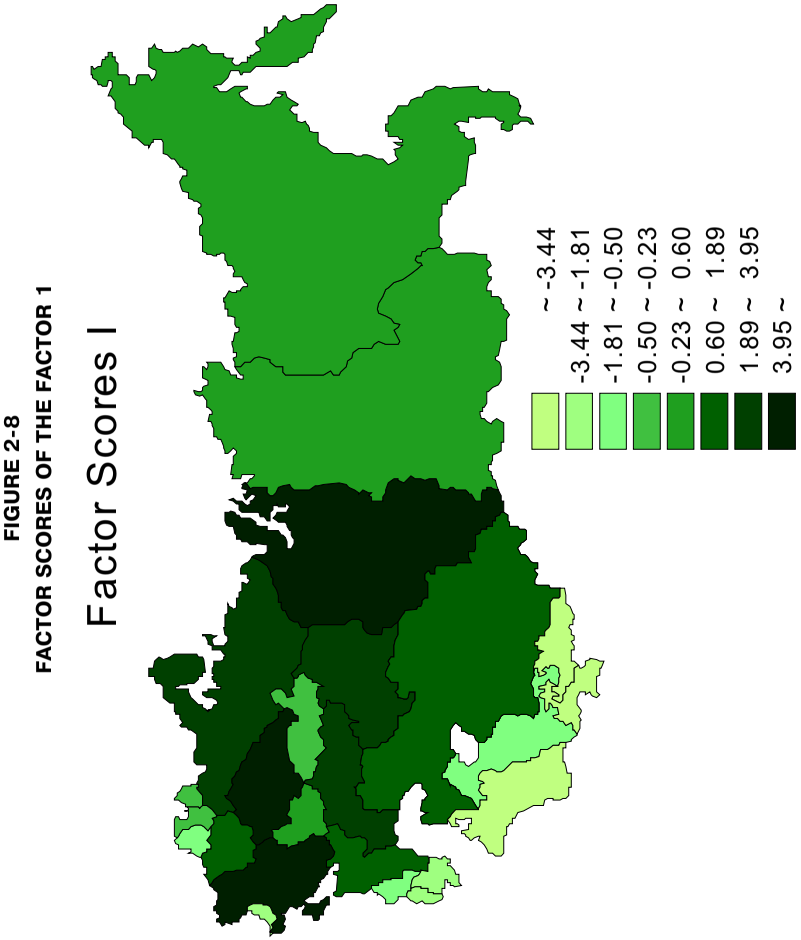


FIGURE 2-8
FACTOR SCORES OF THE FACTOR 1

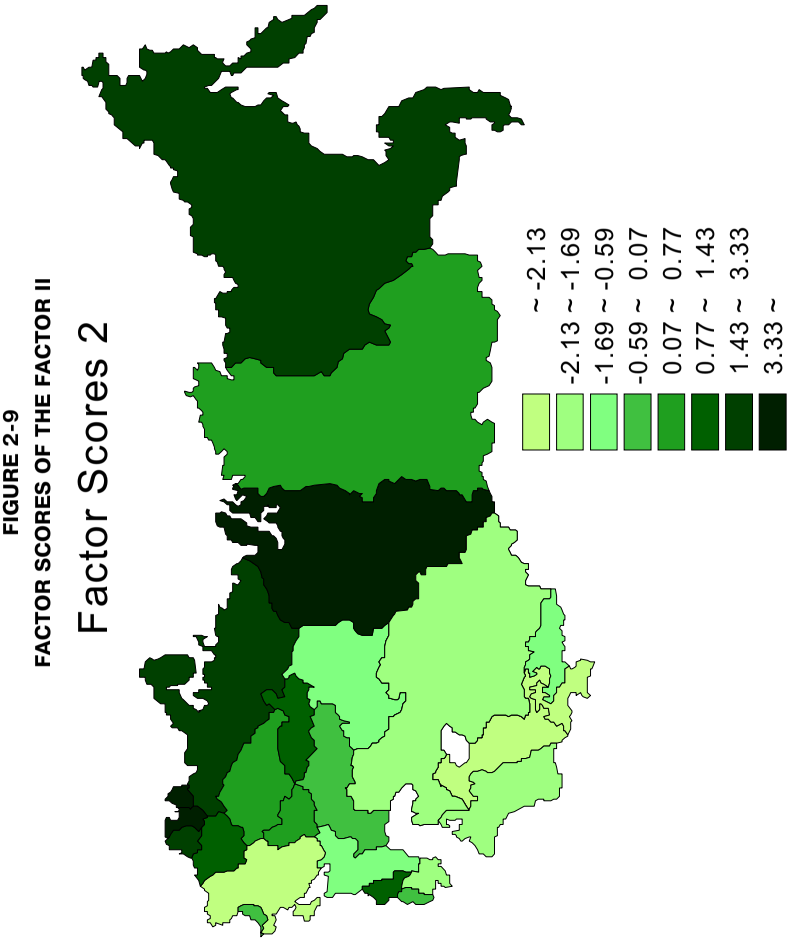


FIGURE 2-9
FACTOR SCORES OF THE FACTOR II

TABLE 2-12
FACTOR MATRIX II

Variables	Factor 1	Factor 2
Population	0.939546	0.264648
Retail Sales	0.9669	-0.03504
Services	0.97862	0.106918
Urban Population	0.572426	-0.38576
Industrial Growth (/1980)	-0.2479	0.109967
Investment	0.712951	-0.02346
per capita Investment	0.128624	-0.41913
pre capita Retail Sales	0.539408	-0.72304
pre capita Services	0.22716	-0.56416
Housing Space	0.239663	0.455922
Housing put into operation	0.878589	0.26236
Doctors	0.619037	-0.49739
Beds	-0.23624	-0.32869
Death Rates	0.089754	0.642245
University Students	0.83601	-0.20414
per/cap University Students	0.895475	-0.13844
Library	0.889323	0.375185
Grain	0.287059	0.649217
per capita Grain	-0.0355	0.652072
Potatoes	0.205824	0.69176
per capita Potatoes	-0.25504	0.505938
Vegetables	0.315908	0.584348
per capita Vegetables	-0.13882	0.359202
Contribution	34.39%	19.82%

variable and the Library Holdings variable also have a strong correlation with Factor 1, which is a comparable result with the previous analysis. Thus, Factor 1 could be regarded as an indicator of market size/industrial agglomeration.

On the other hand, the variables which show high correlation coefficients with Factor 2 are: Agricultural production, Crude Death Rates, and per capita Retail Sales (negative correlation). All of these may indicate that Factor 2 reflects the characteristics of rural living environment. Hence, the Factor 2 could be treated as an indicator of agricultural specialization or rural settlements.

The factor scores for each factor are shown in Table 2-13 and in Figure 2-10. The two projections shown in Figure 2-10 correspond to Leningrad and Moscow. The superiority of these two cities is clearly demonstrated. Not considering these two cities, the regions with high Factor 1 scores appear to be spread over the territories shown in Figure 2-10. However, on the east side of the Ural Mountains, only a few regions show high factor scores for Factor 1. These exceptions are: Kemelov (a crude oil mining center), Novosibirsk (the core of the West Siberia region), Chumen' (a very large resource mining base), and Irkutsk and Krasnoyarsk (in the center of the East Siberia region).

The other factor, Factor 2, shows interesting results. This factor could be interpreted as an indicator of specialization in agricultural activities. In Figure 2-10, the regions shown in the middle have high scores for this factor, especially in the southern part of the European areas, whereas all Siberian/Far Eastern regions show extremely low scores for the agricultural production indicator. This may be attributable to their severe climate conditions.

With the exception of some large resource mining bases and administrative centers, the superiority of the European regions of Russia over Siberia, the Far East, and other eastern regions was demonstrated in the previous analysis based on Union republics and Russian regions. Although Sagers (1980) and Hosokawa (1983) analyzed Soviet regions in 1960 and 1975, respectively, and their data do not always agree, the results for Soviet/Russian regional economies in 1985 obtained in this section are very similar with those shown in their studies.

In other words, the primacy of the European regions of Russia was very stable, and the inferiority of the eastern regions seemed hard to

TABLE 2-13
FACOR SCORES II

Regions	Factor 1	Factor 2	Regions	Factor 1	Factor 2
Kareliya	-1.13485	-1.9974	Adygea	-2.79487	0.305215
Komi	-0.31398	-2.89944	Dagestan	-1.83836	0.360269
Arkhangelsk	-0.27606	-1.7102	Kabardino-Balkardia	-1.98922	-0.67076
Vologda	-0.63922	-0.34942	Karachevo-Cherkessk	-3.05196	-0.05679
Murmansk	-0.25787	-3.47944	North Ocetsiya	-1.33551	-1.35956
Leningrad City	6.754724	-2.79363	Chechen	-2.31717	0.575333
Leningrad	-0.81624	1.457562	Krasnodar	3.619667	4.254432
Novgorod	-1.63386	-0.17785	Stavropol	0.639687	1.232204
Pskov	-1.64648	1.069376	Rostov	3.529253	2.968692
Bryansk	-0.98388	3.212942	Bashkortostan	2.612761	2.853183
Vladimir	-0.55365	-0.03073	Udmurtia	-0.51571	-0.40452
Ivanov	-0.34697	-0.97279	Kurgan	-1.58507	1.761139
Kaluga	-1.7342	0.967937	Orenburg	0.241685	1.248797
Kostroma	-1.32617	-0.6113	Perm	1.362924	0.647826
Moscow City	17.47898	-4.74466	Sverdlovsk	4.093572	0.935411
Moscow	5.539931	3.516975	Chelyabinsk	2.131915	0.807783
Orel	-1.9581	2.002998	Republic Altai	-3.50569	-1.22126
Ryazan	-0.9477	1.96527	Altai	0.900666	2.550774
Smolensk	-1.02863	0.97157	Kemerovo	1.97338	-0.07374
Tver	-0.11773	1.196597	Novosibirsk	1.406165	1.240577
Tula	-0.14694	1.152947	Omsk	0.779172	1.315582
Yaroslav	-0.0387	-0.70511	Tomsk	-0.9945	-1.77265
Mary-El	-2.39217	0.594471	Tyumen	3.489524	-1.76349

TABLE 2-13
FACOR SCORES II

Regions	Factor 1	Factor 2	Regions	Factor 1	Factor 2
Mordovia	-1.80402	0.468291	Buryatia	-1.5099	-1.14757
Chuvashia	-1.53229	1.090362	Tyva	-3.45204	-1.73969
Kirovskaya	-0.55054	0.70439	Khakassia	-2.20943	-1.02101
Nizhegorodskaya	2.659997	1.567407	Krasnoyarskaya	2.520186	0.867944
Belgorodskaya	-1.093	1.575484	Irkutskaya	1.323536	-0.60959
Voronezhskaya	0.512538	2.948646	Chitinskaya	-1.62041	-0.84363
Kurskaya	-1.16935	3.233425	Sakha	-0.9763	-3.40722
Lipetskaya	-1.39141	1.620274	Jewish Autonomic Republic	-2.69351	-1.1959
Tambovskaya	-1.35363	2.336502	Chukch Autonomic Republic	-1.22792	-6.2031
Kalmykiya	-3.1783	-0.83537	Primorskii	0.571703	-1.18169
Tatarstan	2.493064	2.041431	Khabarovskaya	0.293079	-2.44897
Astrakhanskaya	-1.13351	-0.61897	Amur	-1.19492	-1.74163
Volgogradskaya	1.131853	1.664867	Kamchatka	-1.27067	-4.75332
Penzenskaya	-0.91911	1.730887	Magadanskaya	-0.63951	-6.02339
Samarskaya	2.470456	0.930682	Sakhalinskaya	-0.92695	-3.93017
Saratovskaya	1.567254	2.311567	Kaliningradskaya	-1.18038	-1.56219
Ul'yanovskaya	-0.84911	0.800129			

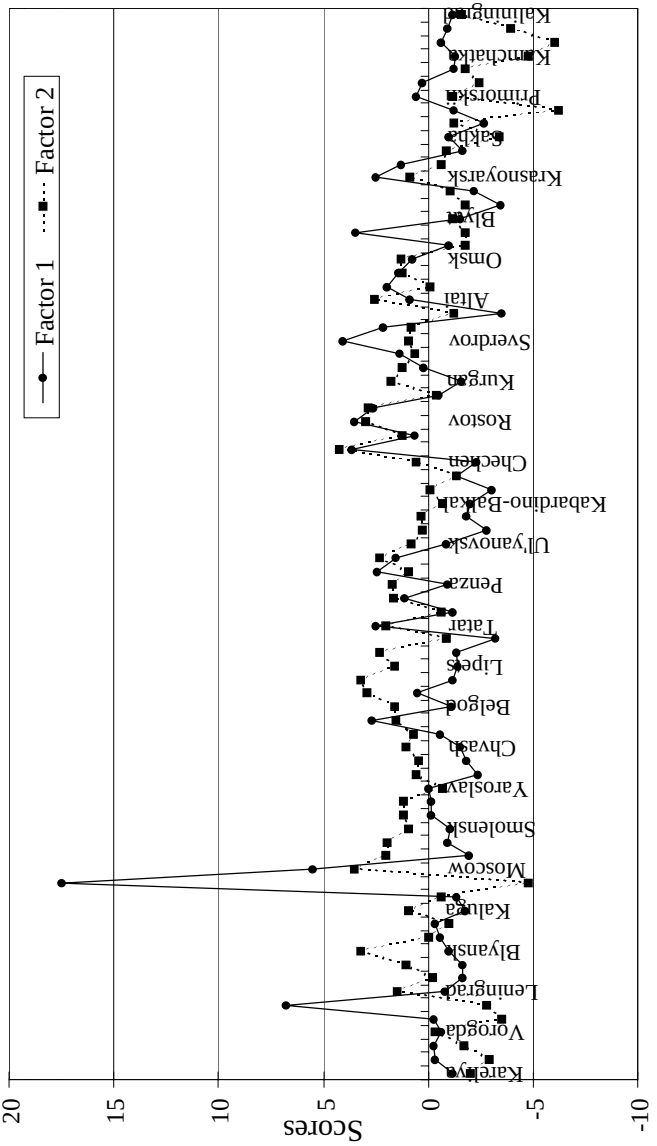


FIGURE 2-10 FACTOR SCORES II

overcome. The seriousness of the results of this regional inequality was heightened by the fact that the Soviet Union kept a vast territory.

To cope with this situation, the Soviet government stimulated industrial development in Siberia, the Far East regions, and the Union republics in Central Asia, aiming at decreasing interregional differentials in economic development levels. This process will be described in the following chapters.

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Part I

Population Migration in the Soviet Union and Russia

The first part of this study is devoted to the analysis of interregional population migration in the former Soviet Union and Russia. Studies on population redistribution were very scarce, which was very surprising because an *a priori* requirement for the implementation of a centrally planned economy is information on the geographical distribution of production power. A review of studies analyzing Soviet interregional population migration is presented in Chapter 3. In Chapter 4, inter-Union republican migration during the Soviet era is examined. Although heavy emphasis was put on development strategy until the 1960s, considerations of the efficiency of this plan led the Soviet government to change its development strategy, which may indicate the limitations in government-led regional economic development. The existence of a 'Migration Turnaround' in the Soviet Union is also pointed out. Changes in migration patterns before and after the collapse of the Soviet Union are examined in Chapter 5. As expected, great changes in migration patterns occurred in Russia. Although the effects of political incentives on migration decisions could be observed, the inefficiency of the regional development policy implemented in the Soviet era might also be suggested as causing migration inflows and excess labor supply in the Far North regions.