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in

Giannias D.A. (ed.), Mergos G. (ed.).
Selected readings on economies in transition

Chania : CIHEAM
Cahiers Options Méditerranéennes; n. 44

2000
pages 117-127

AN INDEX BASED ANALYSIS OF REGIONAL INEQUALITIES IN RUSSIA

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ABSTRACT

Regional indices get special attention because of their all-inclusive nature, which focuses on variables that are able to describe a region and indicate the level of its development. An analysis of a consumer's decision making indicates that the weights used for the regional variables considered and included in the index should not vary across regions. A regional index has been computed for 76 regions of Russia. The values of all the variables incorporated in this index are (i) scaled from 0 - 100, so that the index is independent of units of measurement, and (ii) weighted (the relevant weights were obtained from an experts' opinion survey). According to the adapted regional index, the best regions (which are the ones with the greater index values) are in the Central - Southern part of the country (with the exception of Sackha Republic, which is in the West). The regions with the lower index values are in the Western part of the country and in part of Central Russia (Mariel republic, Moldovia Republic, Perm region).

KEYWORDS:

REGIONAL INEQUALITIES, REGIONAL POLICY, RUSSIA

INTRODUCTION

Regional indices of almost any sort attract attention. The contention is that the well being of economic agents (in terms of either utility or profit) depends on various factors of our external environment such as infrastructure, transportation systems, climate, environmental quality, crime, public services, as well as more traditional pecuniary factors such as the prices of inputs and outputs, the cost of living, the technology that is available and its cost, the conditions of the business environment etc. These are all important location factors.

One consequence of the information technology revolution is the rapid increase in the volume and the availability of data on the social, economic, and physical environments. Economic agents must attempt to make sense of these data to make the best possible decisions. Unfortunately, the rate at which usable information is produced from these data is slowly increasing. There is a lot of data but not enough information. A common way of avoiding being swamped by data is by using indicators as a tool to produce information. Ott (1978) describes indicators in the following way:

«Ideally, an index or an indicator is a tool devised to reduce a large quantity of data down to its simplest form, retaining the most essential meanings for the questions that are being asked of the data. In short, an index is designed to simplify. In the process of simplification, of course, some information is lost. Hopefully, if the index is designed properly, the lost information will not seriously distort the answer to the question».

Certainly, no indicator is perfect and the price to pay for extracting information from the available data is a probable distortion of that data. In order for indices to be a useful tool, they must be designed with care so that they minimise information distortion and are best able to answer the questions that the economic agents and the researchers seek to answer.

Today our societies express, in various ways, their need to improve their knowledge and information about all aspects of our natural and non-natural environments, that eventually determine the possibilities for a healthy development as well as the inequalities that exist across regions. Therefore, it is important to bring reports and statistics to life. Towards this end, the development of regional indices can be extremely useful just as indices of prices and output are widely and successfully used to summarise various aspects of our economies. Justifications for developing an index to represent aspects of a region's environment can be found in Hope and Parker (1990), and Hope et al (1991; 1992).

The locational decisions of economic agents depend on various aspects of their external environment. Within our framework, composite indices are assumed to provide the necessary information to economic agents.

A common characteristic of all indices is that they posses the form of a weighted average of a set of variables (see for example, Blomquist et al (1985) and (1988), Giannias (1996)). Although the selection of regional indicators is best achieved by scientific and expert consensus, public opinion should be used in setting the weights for such indices (Hope et al (1991)). Experts do not necessarily have superior knowledge at the aggregate level, and the major priorities and interests should be socially determined (Gould et al (1988)).

The objective of this paper is 1) to develop a composite index which is offered for a comparative evaluation of 76 regions of Russia, and 2) to use it to obtain rankings that are offered for a comparison of the regions under consideration. Investigating the meaning of the composite index in terms of microeconomics and analysing the decision making process of consumers indicate that we should use the same set of weights for each region unlike Hope et al (1995); this is shown in the next Section. Our regional index may be interpreted as a standards of living index or as an index of the relative development of a region since it takes into consideration variables that all together as a set can approximate the overall condition of the external environment of a region (infrastructure, the availability of public services, including health and education, etc).

A theoretical framework for index development and interpretation.

In the following, we present a framework for an analysis of consumer behaviour concerning their location and other choices, which explicitly introduces a regional index in the analysis. Our framework assumes that consumers within well-defined homogeneous regions have identical tastes and skills, are completely mobile within their region, and have made such choices in locations where they could not be made better off by relocating. Across regions mobility is not possible either because of high moving costs or institutional and legal barriers.

In our analysis, sites or regions are fully described by a bundle of variables: a_{1i}, a_{2i}, ..., a_{Ni}, where, a_{ki} is the kth variable of the site or region i, k = 1, 2, ..., N, and N is the number of variables. A consumer sees and perceives in his own way the variables of a region or site. These specify the regional index value that he assigns to them, RI, which includes all aspects of natural and non-natural external environment of a region. Consumers do not assign the same regional index value to identical bundles of site specific variables. To be more specific, the regional index, RI, is assumed to be a scalar index, and the regional index, RI_{ji}, is one where that consumer j is assigned to a bundle of attributes a1i, a2i, ..., aNi is:

$RI_{ji} = fj(a_{1i}, a_{2i}, ..., a_{Ni})$

The infrastructure of a region, the availability of public services, etc, are assumed to be approximated and be described by the Regional Index (RI) and to affect consumer preferences which are assumed to be described by a utility function. The consumers of a region are assumed to have identical tastes. Let the utility function of a consumer of region j be: $U_j(.)$. Individuals are assumed to consume the numerical good, X, which is a composite good with a price that is equal to one. A consumer supplies one unit of labour and receives his income, I, in return. His income is assumed to be a function of the regional index of the region, for example, for a consumer of region j: $I_j = I_j(RI_{jj})$, and is spent on housing and the numerical good. The rental price of a house in region j is a function of the vector of housing characteristics, h, and the regional index, that is, the rental price of a house is specified by a function of the following form: $P_j = P_j(h,RI_{jj})$. It is assumed that $P_j(h,RI_{jj}) = Rj(RI_{jj})\ h'$, where h' is the transpose of h, and $R_j(.)$ is the vector of implicit prices for each housing characteristic in region j. An equilibrium must be characterised by equal utility for identical consumers within a region.

The consumer's income, $I_j(RI_{jj})$, may depend on the equilibrium of the regional index value that the consumer places on the bundle of regional variables that he faces because a high RI value indicates a «better» external environment which has a positive effect on its productivity and, as a result of it, on the income he earns/pays. Moreover, rents, $P_j(h,RI_{jj})$, may depend on the equilibrium of the characteristics of the region and the value of its regional index. The latter formulation is equivalent to assuming that there may exist price differentiation in the rental housing market since different consumers may assign a different regional index to a region, which implies (or better assumes) that the use a consumer gets from a house depends on how he perceives and appreciates the overall conditions of the external environment of the region he considers (which it has been assumed in our formulation has been given by «his» regional index value). The above specified relationship among consumer income, rents and regional characteristics is empirically verified in Bellante (1979), Johnson (1983), Eberts and Stone (1986), Blomquist et al (1985) and (1988).

A utility maximising consumer of a region j solves the following optimisation problem:

$\max U_j(h,X,RI_{jj})$

with respect to h,X,RI_{jj}

subject to $I_j(RI_{jj}) = Rj(RI_{jj})\ h' + X$

where $I_j(.)$ and $P_j(.)$ are the equilibrium income and rental hedonic equations, respectively.

Let $RI_{jj}*$, h*, and X* be the solutions to the above utility maximisation problem specifying, respectively, the site within that the region the consumer will be located in $RI_{jj}*$, the kind of house he will live in, h*, and how much of the numeraire good X* he will be able to consume. As a result of this, we have that the income of the consumer will be: Ij* = Ij(RIjj*), and that the rent he will pay for his house is: $P_j* = P_j(h*,RI_{jj}*) = R_j*\ h*'$, where $R_j* = R_j(RI_{jj}*)$. Equivalently, the problem can be stated in terms of an indirect utility function $V_j(.)$ where,

$V_j(RI_{jj}*) = \max U_j(h,X,RI_{jj}*)$

with respect to h,X

subject to $I_j(RI_{jj}*) = Rj(RI_{jj}*)\ h' + X$

Equilibrium for a consumer of a region j requires that his utility is the same at all sites within region j, that is, $V_j(RI_{jj}*) = v_{jj}$ for all j, where vjj is a constant for all sites in region j. This equilibrium condition implies that individuals in sites with a better regional index pay for it through reductions in real income in the form of higher rent and lower wage income.

The model described above is illustrated in Figure 1. The upward sloping curve in Figure 1, labelled $V_j(RI)$, shows combinations of regional index values and the maximum utility that an individual of region j would enjoy by facing different vectors of variables (a_{1i}, a_{2i}, ..., a_{Ni}). For example, if our representative consumer were in region 1, where its characteristics are (a_{11}, a_{21}, ..., a_{N1}), he would face the regional index value RI_{j1} and utility v_{j1}. If he or she were located in region 2, where its characteristics are (a_{12}, a_{22}, ..., a_{N2}), he would face the regional index value RI_{j2} and utility v_{j2}, where v_{ji} is the maximum utility that a consumer of region j can enjoy in all locations of region i in equilibrium, for all j and i, that is, $V_j(RI_{ji}) = v_{ji}$. Figure 2 gives the quality of life - indirect utility curves of three different consumers, that is, for j = 1, 2, 3.

To compare life across regions, we must compare the maximum utility that a consumer can enjoy in the regions under consideration. This can be done by looking at either the vjj values for all j or the vji values for all regions i and a given j, where $v_{jj} = V_j(RI_{jj})$ and $v_{ji} = V_j(RI_{ji})$. The problem, however, is that the v_{jj} and v_{ji} values are not readily available or easily obtained. Moreover, the series of the v_{jj} values shows the maximum utility that a consumer enjoys in his region (e.g., the citizen of Moscow in Moscow City, the citizen of St. Petersburg in St Petersburg, etc.) and should not be used for comparing life in different regions because the utilities of different consumers cannot be compared. Therefore, only a v_{ji} based ranking is conceptually correct[1].

If, for our comparison the v_{ji} values are used for all i and a given j, we compare the maximum utility that the chosen consumer of a region j, would enjoy in case he were located in region i. That is, for all regions i we want to compare if for example j = Moscow, then what would be the maximum utility of a citizen of Moscow in Moscow City,Tumen Oblast, St. Petersburg, etc.

It can be seen from Figure 1 that there is a monotonous relationship between v_{ji} and RI_{ji}. This implies that a v_{ji} based ranking and one based on RIji will be identical, that is, both RIj2 > RI_{j1} and $v_{j2} < v_{j1}$ imply that region 2 is preferred to 1. That is, R(2) < R(1), where R(i) is the ranking of region i, i = 1, 2, R(2) = 1, R(1) =2; given that 1) the greater the maximum utility, the higher the position of a region on the relevant ranking (the lower the R(i) value), and 2) the higher the RI value, the higher the position of a region on the relevant ranking (the lower the R(i) value). Therefore, we can obtain a ranking of regions i based on the vji utility levels and the preferences of a consumer of region j by looking at his regional indices across regions since the two rankings will be identical.

The above implies that we are able to obtain a ranking of regions i based on the vji utility levels and the utility structure of a consumer of region j if we are able to compute the RIji

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[1] A ranking based on the v_{jj} values could be obtained if consumer preferences are identical in all regions and if we knew the positions of the V(RI) curves. Suppose now that consumer preferences are identical and that the V(RI) curves are the ones given in Figure 2; note that the curves are not the same because the price of the good X may vary across regions. For example, if the information of Figure 2 were available, we could conclude that region 3 is preferred to 1 and that region 1 is preferred to 2, that is, R(3) < R(1) < R(2) since $v_{33} > v_{11} > v_{22}$, where R(i) is the ranking of region i, i = 1, 2, 3, R(3) = 1, R(1) = 2, R(2) = 3. However, as it can be seen from the example, there is not a monotonic relationship between RIjj and vjj. This implies that a ranking based on RIji, which is observable, will not necessarily be identical to one based on vji , which is unobservable, since $RI_{11} > RI_{33} > RI_{22}$ which implies that according to the RI criterion the ranking should be R(1) < R(3) < R(2), where R(1) = 1, R(3) = 2, R(2) = 3.

values.

To apply the above theory the regional index, RI, can be defined as follows:

$RI_{ji} = \Sigma_{k=1}^{N} (w_{kj}\ a_{ki})/\Sigma_{k=1}^{N} (w_{kj})$ for i = 1, 2, 3, ..., m

where aki is the kth variable of region i, wkj is the weight for the variable k of individual j, N is the number of variables considered, and m is the number of regions being examined. The weights wkj are not necessarily the same across regions since individuals may set a different value and perceive the various regional variables in a different way. That is, the regional index of a region I will depend on whose weights are used to compute it. For example, in the above formula the weights of a consumer of region j are used, which implies that RIji is the regional index value that a consumer of region or group j would assign to region i in case he moved to it. In general, the weights can take any value. For example, they can all be equal to 1/N or be theoretically assigned using principal component or survey results.

The above analysis indicates that in order to obtain a ranking of regions based on the maximum utility they are able to offer to their residents, we must look at the regional index values across regions of a particular consumer and take a ranking based on these regional indices since the two rankings will be identical. This requires that for each region, we substitute in the above formula the aki values of the region and compute the regional index value using the same weights wkj of a consumer of region j.

COMPUTATION OF REGIONAL INDICES

To analyse the differences accross the regions of Russia, an index was computed using Goscomstat 1995 data and the RI formula given above. Twenty-nine variables were considered. These provide information about the labour market, social infrastructure, economic infrastructure, industrial development, privatisation, demography/geography, and regional budget independence. To be more specific, the variables considered are:

1. Unemployment. (Weight = 89).
2. % of region's wages that enterprises are not able to pay. (Weight = 92).
3. % of poor (Goscomstat standard) people in the region. (Weight = 82).
4. % of wealthy (Goscomstat standard) people in the region. (Weight = 74).
5. % of population below subsistence level. (Weight = 94).
6. Survival level of income as a % of average salary. (Weight = 81).
7. % of part time employees. (Weight = 89).
8. Hidden unemployment. (Weight = 93).
9. % of employees in forced vacations (Weight = 90).
10. Labor force (thousands of people) (Weight = 96).
11. Population provision with commercial banks per 100000 people. (Weight = 78).
12. Population provision with banking institutions per 100000 people. (Weight = 75).
13. Number of banks. (Weight = 90).
14. Number of financial institutions. (Weight = 85).
15. Number of banks with a foreign exchange licence. (Weight = 43).
16. Growth in the number of commercial banks. (Weight = 74).
17. Number of commercial banks. (Weight = 93).
18. Number of individually owned cars per 1000 people. (Weight = 44).
19. Actual living space per person. (Weight = 54).
20. Average total living space per person (governmental norms). (Weight = 57).

21. % of housing with central heating. (Weight = 29).
22. Electricity consumption (kwt/h). (Weight = 67).
23. Territory (thousands of square km). (Weight = 35).
24. Population. (Weight = 31).
25. Number of enterprises privatised. (Weight = 92).
26. Number of state enterprises (Weight = 93).
27. The % of each region's budget that is not subsidised by federal funds. (Weight = 99).
28. % of nominal industrial production. (Weight = 90).
29. % real industrial production. (Weight = 93).

An index is obtained using the above 29 variables for the regions of Russia and following the methodology of the previous section. The variables are weighted and the weight for each variable is given in the parenthesis above. To obtain the weights, we used the survey results obtained from a sample of 172 Russian experts who were asked in early 1998 to value, on a 0-100 scale, the importance of each one of the above variables for regional development. The results and a ranking which is based on the regional development values is given in Table 2.

The regional index RI lets us conclude about what «on average» are the inequalities across the ten regions of Greece. These are shown on Map 1.

The mean of RI is 41.29; 33 regions have an RI value greater than the mean, while 43 have an RI value lower than the mean. Only one region (the 1.3% of the regions) has an RI value greater than 65. twenty-two point four (22.4%) per cent of the regions are in the (45 - 54) interval, 27.6% in the (40 - 45), 40.8% of the regions in the (35 - 40), and 7.9% in the (30 - 35).

The ranking of the 76 regions and the relevant map of Russia shows that the regions with the best index values are in the Central - Southern part of the country (with the exception of Sackha Republic, which is in the West). The regions with the lower index values are in the Western part of the country and in part of Central Russia (Mariel republic, Moldovia Republic, Perm region).

CONCLUSIONS

The paper compares the develoment and the possibilities for a further development of the regions of Russia. For this comparison, Goscomstat (1995) data (providing information about some aspects of the regional development in Russia) were used. Of course other variables should be included to incorporate all aspects of regional development but a broader set of data was not available. This makes us view our results as indicative and preliminary. Although the variables included in the RI index can give a sufficient description of important aspects of life in the regions considered (namely, education, environment, and health), more information[2] is needed before global regional development indices are estimated. An extension of this work should also focus on combining data from various sources.

The present analysis for the regions of Russia shows that the regions with the best index values are in the Central - Southern part of the country (with the exception of Sackha Republic, which is in the West). The regions with the lower index values are in the Western part of the country and in part of Central Russia (Mariel republic, Moldovia Republic, Perm region).

[2] That is, more economic and social indicators.

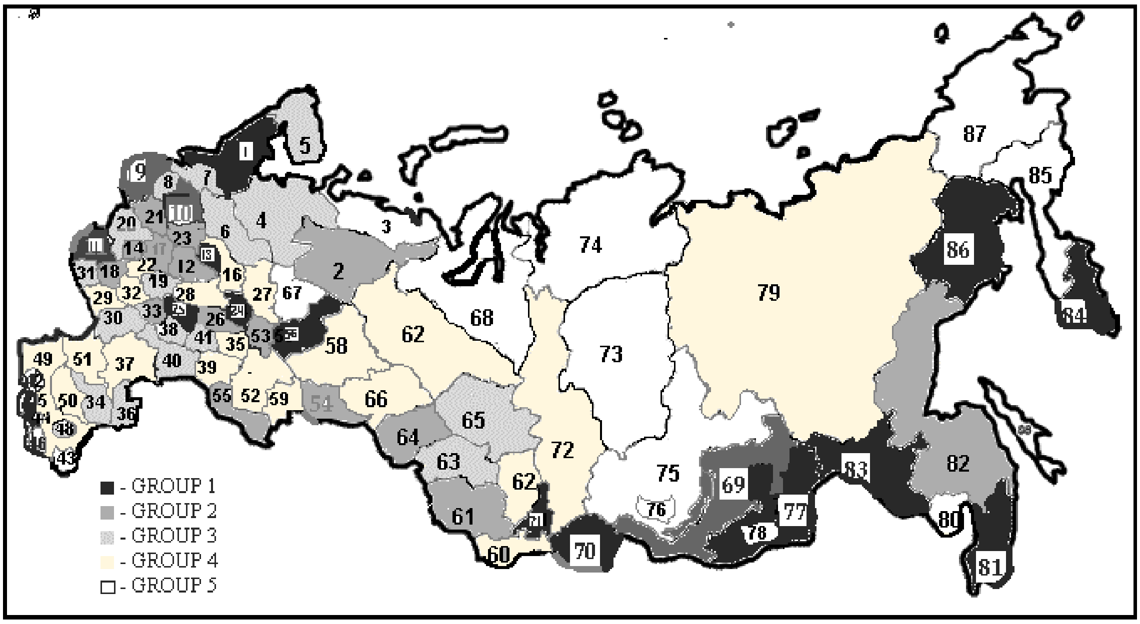
TABLE 1

RDI	REGION	RANKING
68.7	MOSCOW CITY	1
53.71	TUMEN OBL.	2
51.31	St. PETERSBURG	3
49.66	SAMARA OBL.	4
48.43	BASHKORTOSTAN REP.	5
48.4	NIZHNI NOVGOROD OBL.	6
47.76	KRASNOYARSK KRAI	7
47.61	CHELYABINSK OBL.	8
47.22	YAKUTSK-SAKHA REP.	9
47.05	VOLGOGRAD OBL.	10
46.24	KEMEROVO OBL.	11
46.24	ALTAI REP.	12
46.11	BELGOROD OBL.	13
46.08	SVERDLOVSK OBL.	14
45.66	LIPETSK OBL.	15
45.6	ROSTOV OBL.	16
45.35	TATARSTAN REP.	17
45.08	KRASNODAR KRAI	18
44.87	TULA OBL.	19
44.34	VOLOGDA OBL.	20
43.95	ULYANOVSK OBL.	21
43.8	SARATOV OBL.	22
43.69	SMOLENSK OBL.	23
43.64	KALMYK REP.	24
43.11	IRKUTSK OBL.	25
43.1	STAVROPOL KRAI	26
43.1	MURMANSK OBL.	27
42.28	KURSK OBL.	28
42.15	TOMSK OBL.	29
41.97	VORONEZH OBL.	30
41.94	LENINGRAD OBL.	31
41.84	RYAZAN OBL.	32
41.72	KALININGRAD OBL.	33
40.7	PENZA OBL.	34
40.7	ARKHANGELSK OBL.	35
40.69	NOVOSIBIRSK OBL.	36
40.49	DAGESTAN REP.	37
40.48	ASTRAKHAN OBL.	38
40.09	UDMURT REP.	39
39.99	KALUGA OBL.	40
39.82	TAMBOV OBL.	41
39.73	KOSTROMA OBL.	42
39.36	KIROV OBL.	43
39.25	KOMI REP.	44
39.11	OMSK OBL.	45
38.85	TVER OBL.	46
38.79	YAROSLAVL OBL.	47
38.68	KHABAROVSK KRAI	48
38.66	ORENBURG OBL.	49
38.51	OREL OBL.	50
38.37	ALTAI KRAI	51
38.35	KURGAN OBL.	52
38.22	VLADIMIR OBL.	53
38.22	CHUVASH REP.	54
37.91	KAMCHATKA OBL.	55
37.84	KARACHAI-CHERKESS REP.	56
37.83	MOSCOW OBL.	57
37.79	PRIMORSKI KRAI	58
37.6	SAKHALIN OBL.	59
37.51	BRYANSK OBL.	60
37.09	MAGADAN OBL.	61
36.9	NOVGOROD OBL.	62
36.68	AMUR OBL.	63
36.5	MORDOVIAN REP.	64
36.3	ADYGEI REP.	65
36.18	PERM OBL.	66
36.17	KABARDINO-BALKARIAN REP.	67
35.42	BURYAT REP.	68
35.18	KARELIAN REP.	69
35.15	MARIY-EL REP.	70
34.87	NORTH-OSSETIAN REP.	71
34.63	KHAKAS REP.	72
33.96	IVANOVO OBL.	73
33.38	CHITA OBL.	74
32.33	PSKOV OBL.	75
32.11	TUVA REP.	76

SOURCE: GOSCOMSTAT 1995

RI: it is the regional index

MAP 1



* The lighter the color the higher the value of the RI.

GROUP 1: 32 < RI < 37.8

GROUP2: 37.8 < RI < 40.1

GROUP 3: 40.1 < RI < 44.35

GROUP 4: 44.35 < RI < 68.8

NOTE: the regions plotted on the map are given in Table 2.

TABLE 2

N	REGION
1	Karelia Republic
2	Komi Republic
3	Nenets Autonomous Area
4	Archangelsk Region
5	Murmansk Region
6	Vologda Region
7	St. Petersburg (Federal City)
8	Leningrad Region
9	Pskov Region
10	Novgorod Region
11	Bryansk Region
12	Vladimir Region
13	Ivanovo Region
14	Kaluga Region
15	Kostroma Region
16	Moscow (Federal City)
17	Moscow Region
18	Orel Region
19	Ryazan Region
20	Smolensk Region
21	Tver Region
22	Tula Region
23	Yaroslavl Region
24	Mariy-El Republic
25	Mordovia Republic
26	Chuvash Republic
27	Kirov Region
28	Nizhny Novgorod Region
29	Belgorod Region
30	Voronezh Region
31	Kursk Region
32	Lipetsk Region
33	Tambov Region
34	Kalmyk Republic
35	Tatarstan Republic
36	Astrakhan Region
37	Volgograd Region
38	Penza Region
39	Samara Region
40	Saratov Region
41	Ulianovsk Region
42	Adygei Republic
43	Daghestan Republic
44	Kabardino-Balkar. Republic
45	Karachai-Cherkess Republic
46	Northern Ossetia Republic
47	Ingush Republic
48	Chechen Republic
49	Krasnodar Territory
50	Stavropol Territory
51	Rostov Region
52	Bashkortostan Republic
53	Udmurt Republic
54	Kurgan Region
55	Orenburg Region
56	Perm Region
57	Komi-Perm Autonomous Area
58	Sverdlovsk Region
59	Chelyabinsk Region
60	Altai Republic
61	Altai Territory
62	Kemerovo Region
63	Novosibirsk Region
64	Omsk Region
65	Tomsk Region
66	Tyumen Region
67	Khant-Mansi Autonomous Area
68	Yamalo-Nen Autonomous Area
69	Buryat Republic
70	Tyva Republic
71	Khakass Republic
72	Krasnoyarsk Territory
73	Evenki Autonomous Area
74	Taimyr Area
75	Irkutsk Region
76	Ust-Orda Buryat Area
77	Chita Region
78	Agin-Buryat Autonomous Area
79	Sakha (Yakutiya) Republic
80	Jewish Autonomous Region
81	Primorskiy Territory
82	Khabarovsk Territory
83	Amur Region
84	Kamchatka Region
85	Koryak Autonomous Area
86	Magadan Region
87	Chukot Autonomous Area
88	Sakhalin Region
89	Kaliningrad Region

Source: Governmental Statistical Committee of Russia (Goskomstat)

FIGURE 1

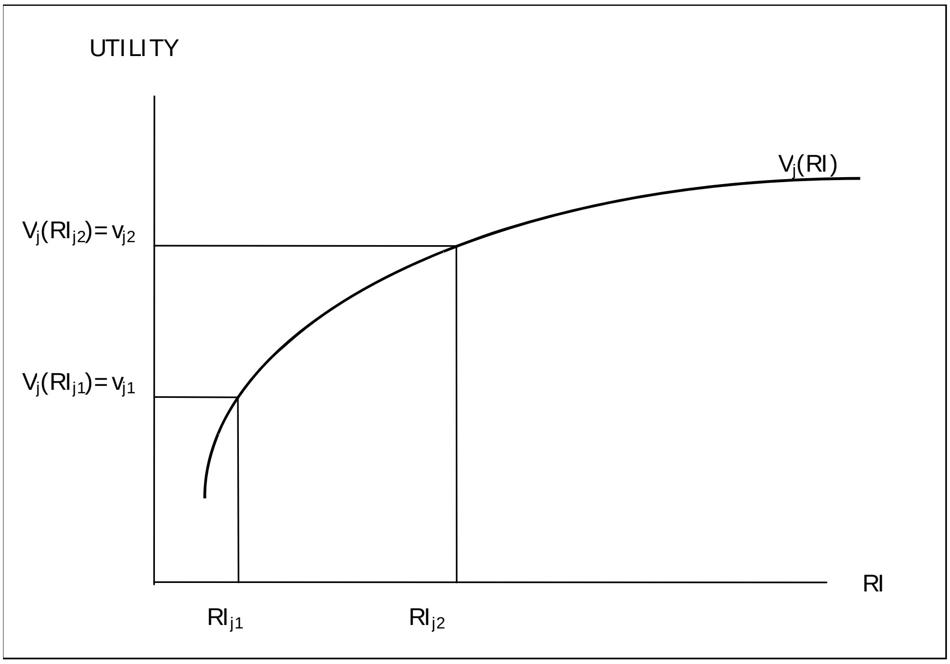
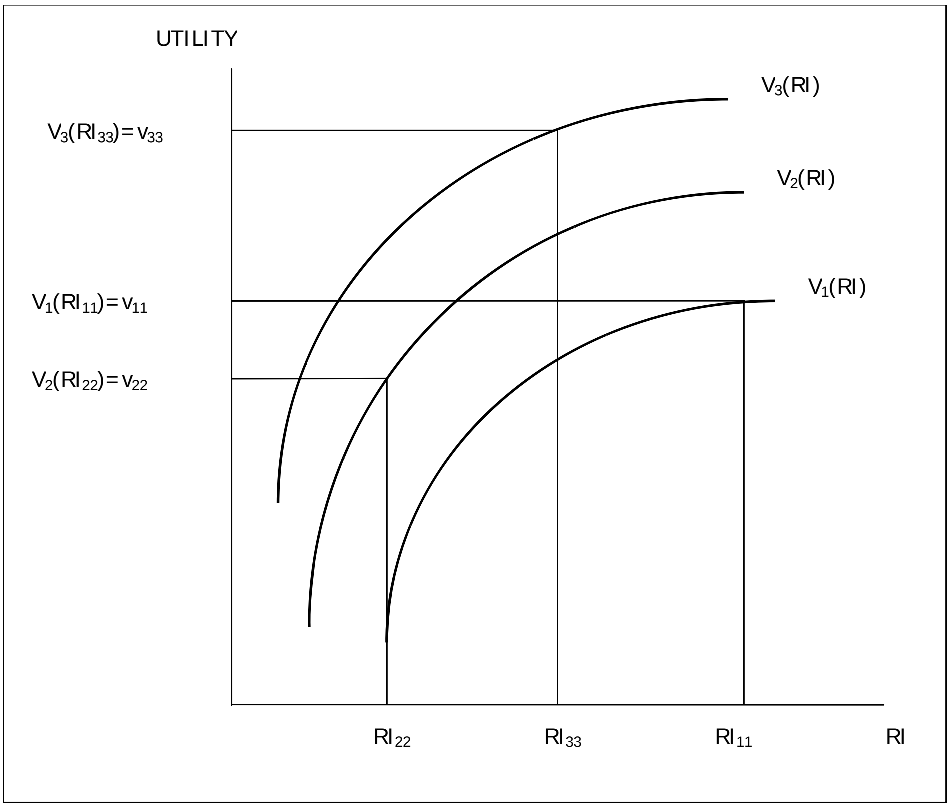


FIGURE 2



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