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Price Levels across Russian Regions

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ABSTRACT Based on price levels (cost-of-living indices) across Russian cities that are published by the Russian Statistical Agency, regional price levels relative to the national average are computed over 2009–2015. Results obtained are compared with approximate estimates of regional price levels that are based on the cost of the fixed basket of goods and services for cross-region comparison of population's purchasing capacity (many publications use such estimates). This comparison makes it possible to conclude that the crude method provides an acceptable accuracy. Regional price levels obtained are applied to estimating real (i.e. comparable between regions) incomes per capita relative to the national average.

KEYWORDS: cost-of-living index, spatial price index, fixed basket of goods and services, real income

JEL CLASSIFICATION: D31; R10

1. Introduction

While comparing monetary well-being indicators – such as incomes per capita, wages, household consumption, etc. – between regions of a country, a problem of comparability of these indicators arises. The point is that prices for consumer goods and services differ across regions. For this reason, the same, say, income provides different consumption levels in different regions. In other words, purchasing power of the national currency in different regions is unequal. Therefore, it is necessary to represent regional indicators in monetary units with a uniform purchasing power. This leads to a problem of estimating regional price levels. These are computed, as a rule, relative to the national average price level and termed relative price levels, spatial (territorial, regional) price levels, cost-of-living indices (COLI). The latter term has received the widest acceptance; in particular, the Russian Statistical Agency, Rosstat, has accepted it.¹

No one (foreign) country enjoys official statistical data on regional consumer price levels. Therefore researchers are forced to manage with one or other approximate estimate (proxy). For instance, there is an unofficial spatial price index in the US – widely known as the ‘ACCRA Cost of Living Index’ – across a great number, about 300, of US cities (C2ER, 2015a). A non-profit institution, the Council for Community and Economic Research, publishes it since 1968. The index is the cost of a basket of about 70 goods and services relative to the city-sample average. Prices are collected by organizations that participate on a voluntary basis (therefore the sample size changes from period to period). In the UK, the Croner-Reward Group since 1973 published estimates of the amount of expenditure necessary to maintain each one of seven different baskets of goods and services associated with a particular standard of living across regions of the UK (Hayes, 2005). By 2015, these data no more published. As far as we know, there are no similar data sources in other countries. Therefore, more rough proxies of regional price levels are used in researches regarding such countries, e.g. housing prices (Beenstock & Felsenstein, 2007; Li & Gibson, 2014). It is not to be supposed that differences in regional price levels are peculiar to countries with vast territories only; they occur also in small countries like, e.g., Israel and Czech Republic (Beenstock & Felsenstein, 2007; Musil et al., 2012).

In regional researches of Russia, two approaches to meet the requirement in cross-regional comparability of monetary indicators can be distinguished. Gluschenko (2010) reviews a number of

¹ Nonetheless, the use of this term in the meaning named seems improper. Konüs (1939) introduced it in his article (published in Russian in 1924) that laid the groundwork for the economic theory of index numbers. He defined COLI as a ratio of the costs of consumer goods baskets that ensure the same want-satisfaction (in modern terms, utility) in different periods of time. The concept of COLI (in its original meaning) serves as a theoretical basis for methodologies of constructing consumer price indices in statistical agencies of many countries. Assigning the second meaning (spatial price index) to this term gives rise to ambiguity and sometimes causes confusion.

papers, indicating methods of adjustment for spatial price differences in relevant studies. The first approach (which is used by the Russian official statistics as well) consists in deflating nominal values with the use of regional consumer price indices (CPI). At first glance this would ensure comparability of indicators across both time and space. However, that is not the case. Regional CPIs are not comparable to one another, as the weights of commodities involved in CPI are region-specific. This is equivalent to comparison of different commodity baskets (that are of the same composition, but differ in the volumes of commodities). As Gluschenko (2006) finds, this method severely distorts inter-regional differences, even so that nominal incomes turn out to be a more exact 'estimate' of real incomes than that obtained with the use of regional CPIs.

The second approach is similar to that applied for other countries, namely, the use of the cost of some commodity basket as a proxy of regional price level. In particular, the cost of the staples basket or subsistence minimum (drawn from the official statistics) were taken as such proxies. Representativeness of these proxies is rather poor: they involve prices of 19 to 33 foods. Nevertheless, they fairly well worked during the economic recession, 1992–1998. But they yield progressively less exact estimates of real incomes in subsequent years, at least, since 2002 (Gluschenko, 2006). Beginning in 2002, the Russian official statistics publishes monthly data on the cost of the fixed basket of goods and services for cross-region comparison of population's purchasing capacity. This indicator is fairly representative, involving 83 goods and services; therefore it has found wide use in regional studies.

Along with the use of single statistical indicators as proxies of regional price levels, certain researchers in Russia and abroad made efforts to construct their own more complex estimates. For example, Surinov's (1999) estimate was a weighted average index of region-average prices of goods and services relative to the Moscow prices. The basket used was that applied for computing the Russian CPI with the national-average weights. He made his estimates for two periods, January 1997 and January 1998.

Since 2009, Rosstat started calculating COLI across individual cities of the country. Thus, Russia has become the first country in the world (and still the only one) where official statistical data on difference in price level across locations are available. However, the fact that the data are published by city presents a considerable inconvenience, since, as a rule, regions rather than cities are of interest for analysis (besides, statistical information across cities is very poor in Russia). This leads to the main purpose of this paper: to obtain price levels across regions (federating subjects) of the country through aggregation of official COLI across cities. The second purpose is to determine how far approximate estimates computed from the costs of the fixed basket deviate from the

regional price levels obtained. The importance of this purpose follows from the fact that such estimates are used in a great number of studies. Analysis of deviations from the more exact estimates makes it possible to judge the reliability of results obtained in these studies as well as satisfiability of further application of the approximate method. At last, the third purpose is to estimate real incomes in the Russian regions relative to the national average, applying the regional price levels obtained.

2. Methodology of Calculating Regional Price Levels

An official document, Rosstat (2012a), describes methodology of calculating city price levels (COLI). It defines COLI as an indicator that measures the relative cost of a basket of goods and services in individual cities as compared to its national-average value. It shows how much more expensive (or cheaper) is the same certain basket of goods and services with uniform volumes of their consumption in different Russian cities. That is, it correlates the cost of living in these cities with its national average.

The COLI methodology is closely related to the methodology of consumer price monitoring and computing CPI; see Rosstat (2014b). COLI covers the same cities that are chosen for consumer price monitoring. The basket of goods and services applied for computing COLI (275 items) is a part of the commodity set (more than 500 items), prices of which are monthly collected for CPI. However, while weights involved in calculation of regional CPIs are region-specific, uniform weights are used in COLI for all cities. These weights are assessed with the use of the same methodology as for CPI for Russia as a whole. They are shares of expenditures for individual goods and services in the total consumer expenditures for the set of goods and services forming the COLI basket, according to the yearly household budget survey over the country as a whole (for the previous year). Thus, the weights are updated yearly. In contrast to CPIs that are computed every month, COLI is at present an annual indicator.

COLI for city i is calculated as

$$S_i = \sum_{j=1}^m w_j \frac{p_{ij}}{p_{0j}}, \quad (1)$$

where p_{ij} = annual average price for good (service) j in city i , p_{0j} = annual average price for good (service) j on average over Russia, w_j = weight of j -th good (service), m – the number of goods and services in the basket. The annual average price is the arithmetic mean of prices observed in every

month of the year: $p_{ij} = \frac{1}{12} \sum_{t=1}^{12} p_{ij}(t)$; $p_{ij}(t)$ = average price in city i in month t .

Obviously, if Formula (1) would contain prices in region rather than in city, we had regional price level (regional COLI). According to the official methodology, Rosstat (2014b, pp. 56–57), regional average price is computed as the weighted average over cities that are monitored in the region; shares of city population in their total population, n_i , serve as the weights: $n_i = N_i / \sum_{k \in C(r)} N_k$, where N_k = population of city k , $C(r)$ = a set of region's r cities where statistical price monitoring is carrying out. As Rosstat calculates regional average prices monthly, we can conclude that it takes population as of January 1 of a relevant current year. Then the price level in region r relative to the national average can be calculated as follows:

$$S_r = \sum_{j=1}^m w_j \frac{1}{p_{0j}} \sum_{i \in C(r)} n_i p_{ij} = \sum_{i \in C(r)} n_i \sum_{j=1}^m w_j \frac{p_{ij}}{p_{0j}} = \sum_{i \in C(r)} n_i S_i. \quad (2)$$

As it is seen, it is simply weighted average of COLIs in region's cities.

To compute regional price levels, we use official publications on COLI by individual city, Rosstat (2012b, pp. 674-678; 2014a, pp. 580-582; 2016a). The main source of data on permanent population of cities as of January 1, 2009–2015, is the Database of Indicators across Municipal Units, Rosstat (2016b). In the case of missing data in this database, additional sources of official statistical information are involved, namely Rosstat (2016c, 2016d, 2016e, 2016f).

3. Regional Price Levels

Before turning to the regional price levels, let us consider COLI across cities. Table 1 reports a generalized pattern.

Table 1. Summary statistics of COLI across Russian cities

Indicator	2009	2010	2011	2012	2013	2014	2015
The number of cities	266	266	271	270	271	272	276
Minimal COLI, %	74.2	73.7	75.0	75.5	75.3	77.0	78.0
Maximal COLI, %	227.7	222.2	209.6	206.7	201.9	189.0	175.0
Maximum/minimum	3.1	3.0	2.8	2.7	2.7	2.5	2.2
Mean	99.8	101.6	101.3	101.1	100.3	100.7	100.2
Median	93.9	95.8	95.8	95.4	94.6	96.0	96.0
Standard deviation	20.9	20.2	18.9	18.7	18.1	16.6	15.4
Gini index, %	10.0	9.7	9.1	9.1	8.9	8.3	7.8

During the period of publicizing COLI, the city sample slightly changed (for the most part, due to additional cities in the Moscow and Leningrad Oblasts). Analysis suggests that this has had a minor effect on estimate of the price level in a relevant region, less than 1 percent point. The only

exception is the inclusion of Sochi; it has increased the price level in the Krasnodar Krai by 2 percent points. In 2015, the expansion of the sample is due to Crimean cities.

Most regions (66 of 85, i.e.. 78%) are represented by 2 to 4 cities. One city represents 10 regions, of which 3 are regions by themselves ('cities-regions' Moscow, Saint-Petersburg, and Sevastopol). The Moscow Oblast is represented by 15 cities; 8 regions are represented by 5 to 8 cities.

The same cities were at the opposite ends of the 'cost-of-living spectrum' during 2009–2015: Balashov, the Saratov Oblast, and Bilibino, the Chukci Autonomous Okrug.² However, the gap between them shrunk with time from 3.1 in 2009 to 2.2 in 2015. Considering the whole city sample, differences in the cost of living decrease in it, as narrowing of the distribution suggests (decrease of the standard deviation and cost-of-living inequality, measured by the Gini index, over time). This is due both to increase of price levels in 'cheap' cities and decrease in 'expensive' cities. The shift of the COLI distribution median suggests this fact. While the cost of living in 2009 did not exceed 94% of the national average in the half of the Russian cities, this figure increased to 96% in 2015. The distribution of COLI gives a more detailed pattern of differences in the cost of living within the whole city sample. Figure 1 plots its histogram (herefrom, $(x, y]$ is the interval within which an indicator under consideration, Z , lies: $x < Z \leq y$).

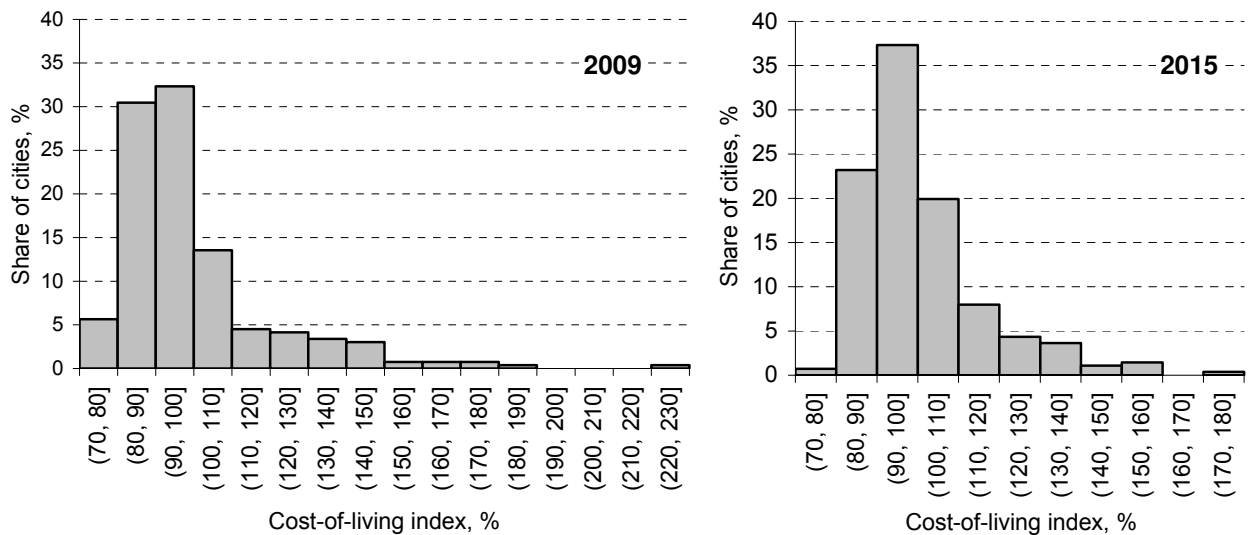


Figure 1. Histograms of the COLI distribution in 2009 and 2015.

² Interestingly, the difference in prices across US cities is every bit as great as in Russia. The maximal COLI among 265 US cities, 236.1% (New York, N.Y.) was three times higher than the minimal COLI, 77,8% (McAllen, TX) in 2015 (C2ER, 2015b).

As is seen Figure 1, the right-hand tail of the distribution became significantly shorter in 2015 than in 2009. No one city remained with a price level exceeding the national average by more than 75%. The number of cities with COLI higher than the national average by more than 40% halved, from 16 to 8. Cities with low cost of living became fewer in number as well. In 2009, there were 15 cities with COLI from 70% (to be more precise, from 74%) to 80%; in 2015, only 2 remained (with COLI equaling to 78% and 79%). The share of cities with COLI within (80%, 90%] decreased from 30.5% to 23.2%. At the same time, the share of cities with COLI within (90%, 110%] increased from 45.8% to 57.2%. Thus, there is a clear trend to price level convergence among Russian. Certainly, it will manifest itself at the regional level as well.

Table 2 tabulates regional price levels computed by Formula (2); horizontal lines in it separate federal districts (these are an administrative layer between federating subjects, i.e. regions, and the Russian Federation as a whole state).

Table 2. Price levels in the Russian regions, % to the national average

Region*	2009	2010	2011	2012	2013	2014	2015
Belgorod Obl.	82.1	83.4	84.4	83.6	84.4	87.3	86.7
Bryansk Obl.	89.4	90.3	90.7	90.1	90.9	94.9	94.6
Vladimir Obl.	94.7	96.7	97.1	97.0	96.7	99.2	99.5
Voronezh Obl.	94.3	96.0	95.6	91.7	89.4	91.9	92.8
Ivanovo Obl.	94.4	95.8	96.8	97.2	96.5	98.7	98.9
Kaluga Obl.	91.8	92.7	92.6	92.3	93.0	97.7	98.6
Kostroma Obl.	89.2	91.7	92.8	93.4	92.1	91.9	92.0
Kursk Obl.	88.4	88.4	87.8	87.3	85.8	86.6	86.6
Lipetsk Obl.	89.7	90.5	89.6	88.8	87.6	89.1	89.1
Moscow Obl.	104.6	106.6	106.3	105.8	107.4	108.1	107.8
Oryol Obl.	83.0	84.8	85.7	85.2	85.2	87.9	89.1
Ryazan Obl.	97.0	97.1	96.3	95.9	94.4	92.4	93.4
Smolensk Obl.	94.3	97.6	98.0	98.1	97.5	101.6	101.9
Tambov Obl.	86.3	87.6	88.9	89.2	87.2	88.3	89.5
Tver Obl.	100.5	100.3	99.6	100.9	99.9	99.5	99.6
Tula Obl.	89.9	91.4	90.6	90.9	90.3	92.6	94.6
Yaroslavl Obl.	92.3	93.9	94.6	96.0	96.5	98.1	100.1
Moscow City	124.0	126.7	126.1	127.5	128.9	126.0	127.0
Rep. of Karelia	97.3	100.6	102.8	102.5	102.8	104.3	105.3
Rep. of Komi	113.6	114.0	112.4	111.0	110.8	110.3	110.3
Arkhangelsk Obl.	107.5	111.3	111.8	110.8	109.9	108.6	109.7
Nenets A.O.	174.3	168.4	167.9	163.1	155.7	156.0	154.0
Arkhangelsk Obl. excluding A.O.	105.3	109.4	109.8	108.9	108.1	106.7	107.9
Vologda Obl.	102.5	104.2	105.6	105.4	104.4	104.3	104.4
Kaliningrad Obl.	105.0	103.7	101.8	101.8	99.7	100.1	101.1
Leningrad Obl.	98.6	102.5	101.1	101.7	102.2	102.4	102.1
Murmansk Obl.	125.2	127.0	123.5	122.3	118.6	120.0	119.7
Novgorod Obl.	91.9	94.9	93.7	93.3	93.4	92.9	92.5
Pskov Obl.	91.4	93.5	94.7	95.1	96.4	98.2	99.2

St. Petersburg City	107.3	108.7	107.8	108.1	109.0	108.0	108.0
Rep. of Adygeya	90.9	91.7	90.9	91.0	89.5	92.0	93.0
Rep. of Kalmykia	83.9	85.7	86.2	86.4	86.9	88.4	88.5
Krasnodar Krai	96.1	99.0	95.5	94.5	94.7	100.2	100.9
Astrakhan Obl.	89.2	90.0	90.8	90.2	89.8	91.0	93.0
Volgograd Obl.	90.6	92.0	91.8	91.9	90.4	89.5	92.5
Rostov Obl.	96.2	97.7	97.4	97.4	97.3	99.4	98.7
Rep. of Dagestan	87.8	89.8	90.8	91.7	91.3	90.3	91.4
Rep. of Ingushetia	89.7	92.1	90.3	89.3	86.2	84.0	85.8
Kabardian-Balkar Rep.	81.2	82.4	82.6	84.2	86.3	89.8	90.6
Karachaev-Cirkaasian Rep.	86.0	89.4	90.2	90.3	91.2	93.7	94.2
Rep. of Northern Ossetia	84.0	87.2	87.4	88.0	87.7	91.0	90.0
Chechen Rep.	90.8	96.9	97.6	97.2	94.7	97.1	98.9
Stavropol Krai	96.9	99.5	99.1	96.7	93.0	93.6	93.5
Rep. of Bashkortostan	87.2	90.4	91.0	89.6	89.4	91.1	92.7
Rep. of Mariy El	83.5	86.0	86.5	85.8	85.4	87.7	88.8
Rep. of Mordovia	83.9	87.9	89.1	89.1	88.0	89.5	89.4
Rep. of Tatarstan	83.2	86.6	87.1	87.7	90.2	91.9	91.0
Udmurt Rep.	85.0	87.8	88.5	88.9	89.8	92.3	92.7
Chuvash Rep.	86.4	88.2	88.6	87.9	87.6	88.5	88.5
Perm Krai	102.9	103.8	103.1	103.1	101.5	100.4	98.6
Kirov Obl.	95.0	96.1	97.8	96.5	96.8	95.1	94.9
Nizhni Novgorod Obl.	97.7	98.1	98.5	99.0	99.0	101.4	100.8
Orenburg Obl.	86.1	87.1	87.9	87.7	87.8	88.3	89.0
Penza Obl.	86.7	89.0	89.1	87.4	86.3	87.4	87.7
Samara Obl.	103.8	102.1	101.7	101.5	100.1	98.1	98.1
Saratov Obl.	86.7	88.3	88.3	88.1	88.8	88.4	88.6
Ulyanovsk Obl.	87.0	88.3	89.0	89.0	90.2	90.5	91.7
Kurgan Obl.	91.3	93.6	94.5	95.1	94.0	95.9	96.7
. Sverdlovsk Obl.	103.2	105.6	106.0	106.1	105.1	102.4	102.6
Tyumen Obl.	119.5	122.5	120.9	119.1	117.2	114.0	112.4
Khanty-Mansi A.O.	131.7	132.1	130.3	128.0	126.0	121.4	120.7
Yamalo-Nenets A.O.	134.2	146.1	140.4	138.0	134.3	132.0	127.6
Tyumen Obl. excluding A.O.s	102.5	104.2	104.7	103.5	102.7	100.9	99.8
Chelyabinsk Obl.	88.3	89.3	90.8	90.9	91.4	90.7	91.2
Rep. of Altai	107.2	108.9	103.3	104.7	104.1	110.0	110.0
Rep. of Buryatia	96.0	98.2	99.2	100.4	98.9	98.8	99.5
Rep. of Tuva	97.0	99.3	99.5	99.5	98.5	97.1	97.0
Rep. of Khakasia	94.2	97.0	96.3	95.3	97.1	97.0	93.9
Altai Krai	88.1	89.0	88.3	87.2	87.4	87.3	87.6
Transbaikal Krai	98.1	101.5	101.7	101.7	100.7	97.8	98.6
Krasnoyarsk Krai	105.4	106.9	105.8	107.5	108.1	104.4	104.1
Irkutsk Obl.	96.2	98.5	98.0	98.1	98.1	94.9	95.2
Kemerovo Obl.	85.2	87.2	86.9	87.7	89.7	88.7	87.9
Novosibirsk Obl.	101.1	103.0	101.8	101.7	102.5	101.3	101.1
Omsk Obl.	85.5	84.9	83.5	83.5	84.3	85.3	85.2
Tomsk Obl.	98.5	99.7	99.7	99.6	99.7	98.6	98.3
Rep. of Sakha (Yakutia)	131.5	130.5	130.1	131.2	129.1	127.6	125.4
Kamchatka Krai	167.9	170.4	166.3	166.0	161.1	164.0	159.0
Primorsky Krai	116.2	116.9	116.7	117.4	117.0	117.4	118.6
Khabarovsk Krai	131.7	133.4	133.4	134.2	131.7	128.5	130.4
Amur Obl.	105.8	108.1	109.3	110.0	107.5	108.8	109.4

Magadan Obl.	142.0	142.1	142.3	144.8	143.9	141.8	141.0
Sakhalin Obl.	144.0	143.1	141.6	139.0	135.2	135.8	131.1
Jewish Autonomous Obl.	108.3	110.7	111.8	113.8	114.7	111.0	112.0
Chukchi A.O.	199.1	192.7	183.3	184.3	180.9	170.4	160.6
Rep. of Crimea							89.2
Sevastopol City							84.0

* Obl. = Oblast, Rep. = Republic, and A.O. = Autonomous Okrug

Let us consider a general pattern of the regional price distribution, reported in Table 3. It should be noted that the results in it take into account only the Arkhangelsk and Tymen Oblasts excluding autonomous *okrugs*, and not these oblasts as a whole in order to avoid double counting.

Table 3. Summary statistics of the regional price levels

Indicator	2009	2010	2011	2012	2013	2014	2015
Minimal price level, %	81.2	82.4	82.6	83.5	84.3	84.0	84.0
Maximal price level, %	199.1	192.7	183.3	184.3	180.9	170.4	160.6
Maximum/minimum	2.5	2.3	2.2	2.2	2.1	2.0	1.9
Mean	100.8	102.5	102.1	102.0	101.3	101.6	101.3
Median	94.7	97.0	97.1	96.7	96.5	97.7	98.1
Standard deviation	21.0	20.3	19.3	19.1	18.2	17.1	16.0
Gini index, %	9.5	9.2	8.8	8.8	8.5	7.9	7.6

The maximal price level, as might be expected, is peculiar to the Chukchi A.O. However, the minimal price level occurs in diverse regions in different years. It was the Kabardian-Balkar Republic in 2009–2011, Omsk Oblast in 2012–2013, Republic of Ingushetia in 2014, and Sevastopol in 2015 (or, if one excludes the Crimea, again the Omsk Oblast). The gap between extreme values decreased with time, albeit not so fast as among cities. The dispersion of price levels, characterized by the standard deviation and Gini index, comes down almost in the same way as in the case of COLI. The median shifts to the national average level, and more profoundly at that than the median of the COLI distribution. In 2015, it was equal to 98%, i.e. almost a half of the Russian regions had price levels below the national average, and another half had these above the national average.

The histogram of the regional price level distribution is depicted in Figure 2. Comparing this figure with Figure 1, one can conclude that the trend to price level convergence among regions is even more pronounced than between cities, while its general features are similar. The right-hand tail of the distribution shortens as does that of the COLI distribution. The right-hand bound of the distribution that is due to the Chukchi A.O. changed from 199% to 161%. The left-hand tail of the distribution became thinner, however more profoundly than in the case of COLI. The regional price

distribution even has qualitatively changed its shape for this reason. The share of regions with price levels within (80%, 90%] became smaller by the factor 1.5 (from 34.9% to 21.2%); while the share of regions with price levels within (90%, 100%] became 1.4 times greater (43.5% as compared to 31.3%).

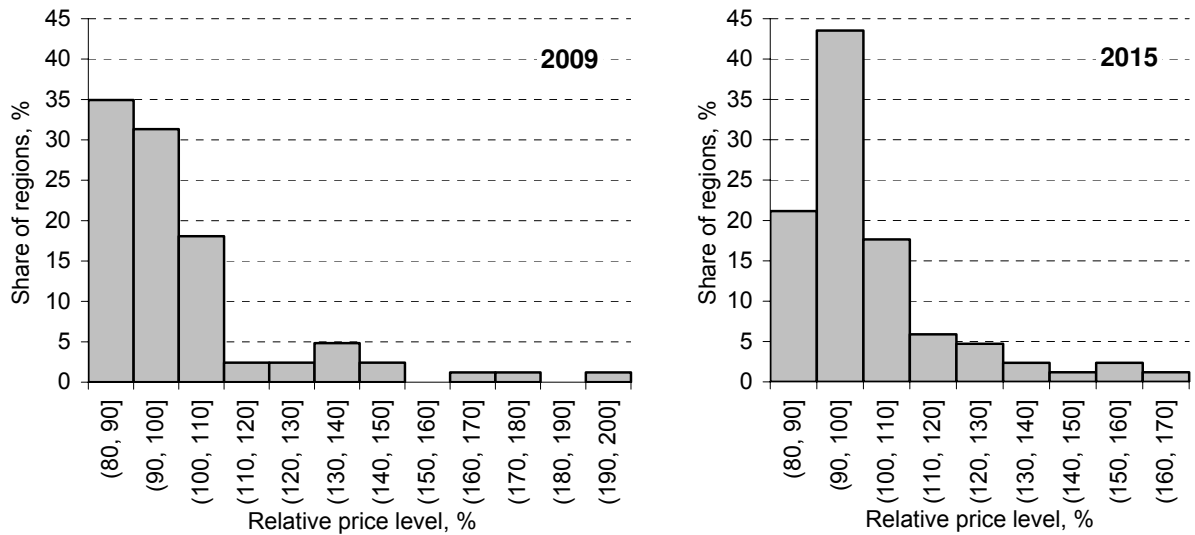


Figure 2. Histograms of the regional price level distribution in 2009 and 2015.

4. Accuracy of Approximate Estimates of Regional Price Levels

As mentioned in the Introduction, the most widespread method of estimating regional price levels in regional studies of Russia at present is the collation of the cost of the fixed basket of goods and services for cross-region comparison of population's purchasing capacity (herefrom, the fixed basket) in region r in a given period (month) t , $P_r(t)$, with the national average, $P_0(t)$. Then the way of computing a regional price level is very simple:

$$S'_r(t) = P_r(t)/P_0(t). \quad (3)$$

Such estimate is less exact as compared to the estimate computed from the official city COLIs. The first reason is the three times narrower commodity coverage: 83 items in the fixed basket (30 foods, 41 non-food goods, and 12 services) as compared to 275 in COLI (81 foods, 175 non-food goods, and 19 services). The second reason is that weights of commodities (more precisely, their volumes) in the fixed basket, as the description of the official methodology states (Rosstat, 2014, p. 58), do not aim at reflecting actual proportions of consumption of the goods and services covered; the weights are kept time-invariant. In contrast to this, the weights in COLI do correspond to actual proportions of population's consumer expenditures to goods and services covered by the COLI

basket; the annual updates of the COLI weights make it possible to take account of changes in these proportions over time.

Certainly, it would be too bold to say that the regional price levels based on the official COLI are ‘true’ (moreover, it is hardly possible to estimate true price levels in practice; any estimates always will be more or less approximate). But in any case they are closer to the true price levels than estimates based on the cost of the fixed basket. Therefore for brevity, we will call the former estimates ‘exact,’ and the latter estimates ‘approximate.’ A natural question arises: How close this approximation is? In other words, how great are deviations of approximate estimates of price levels from exact ones?

Having an answer to this question, we can judge, first, how reliable are results obtained in studies applying approximate estimates of regional price levels, and second, whether further application of such estimates is reasonable. What is the use of applying approximate estimates while more exact ones are available? Certainly, one may benefit from data presented in Table 2. But this is possible only if the time span under consideration falls within the period of 2009–2015. Covering earlier years, there is no other way as to use the approximate method. If the time span is beyond 2015, regional price levels for further years are to be calculated by Formula (2). Although such calculations are relatively simple, they are rather cumbersome, while the approximate method needs no additional computations except the transformation of the absolute costs of the fixed basket into relative ones, which is the essence of Formula (3). Need for the approximate estimates can also occur when monthly dynamics is of interest (being annual, the exact estimates are not applicable in this case).

Since the cost of the fixed basket is monthly while COLI is annual, respective price levels are to be transformed into the comparable form, computing annual approximate estimates. Two ways are possible here. The first is to compute the annual mean costs of the fixed basket as

$$P_r = \frac{1}{12} \sum_{t=1}^{12} P_r(t)$$
 and then use them in Formula (3). The second way is to calculate the mean of

monthly price levels over year as
$$S'_r = \frac{1}{12} \sum_{t=1}^{12} \frac{P_r(t)}{P_0(t)}$$
. A comparison has suggested that both methods

yield very close results. Representing price levels in percentage terms, the differences occur only in the second decimal place.

Appendix Table A1 reports approximate estimates of the annual price levels and discrepancies between them and exact estimates tabulated in Table 2. Table 4 below provides the general pattern of the approximate estimates.

Table 4. Summary statistics of the approximate estimates of regional price levels

Indicator	2009	2010	2011	2012	2013	2014	2015
Minimal price level, %	80.9	80.8	80.6	79.9	80.4	81.1	78.3
Maximal price level, %	196.5	187.1	174.0	179.6	175.0	167.1	167.6
Maximum/minimum	2.4	2.3	2.2	2.2	2.2	2.1	2.1
Mean	101.3	101.0	101.3	101.6	101.0	101.3	100.5
Median	94.2	93.4	94.7	94.7	94.9	95.8	95.2
Standard deviation	23.1	21.8	20.2	20.4	19.4	17.8	17.0
Gini index, %	10.7	10.2	9.6	9.7	9.3	8.4	8.2

No significant differences are seen from comparison of Tables 3 and 4. In general, both exact and approximate estimates give roughly similar pattern. The approximate estimates suggest a slightly greater price level dispersion among regions and somewhat slower convergence of price levels. The median of distribution of approximate price level – in contrast to the case of the exact estimates – does not manifest a trend of shifting towards the national average price level.

Summary statistics of discrepancies between exact and approximate estimates are tabulated in Table 5.

Table 5. Discrepancies between exact and approximate estimates of regional price levels, %

Indicator	2009	2010	2011	2012	2013	2014	2015	2009–2015
Minimum	-7.6	-10.0	-10.7	-10.5	-9.6	-8.2	-8.9	-10.7
Maximum	14.2	11.7	11.6	11.5	11.5	12.1	13.7	14.2
Mean	0.3	-1.6	-0.9	-0.5	-0.4	-0.3	-0.8	-0.6
Standard deviation	3.8	3.5	3.3	3.3	3.4	3.0	3.2	3.4
Mean absolute discrepancy	2.9	3.1	2.7	2.6	2.8	2.3	2.4	2.7
Standard deviation of absolute discrepancies	2.5	2.2	2.2	2.1	2.1	1.9	2.2	2.2

The discrepancies are computed as $(S'_r - S_r)/S_r$. Thus, a negative discrepancy corresponds to understatement and a positive one corresponds to overstatement of the price level in a relevant region by the approximate method. The absolute discrepancies does not take account of the deviation sign, being computed as $|S'_r - S_r|/S_r$. The mean discrepancy in all but one years and in the whole period of 2009–2015 is negative. Thus, the approximate method yield on average understated (albeit slightly) estimates of the price levels. The absolute discrepancy between the approximate and exact estimates equals on average about 3%. This may be deemed a fairly good accuracy.

At the same time, the range of discrepancies is rather wide, from -10.7% to 14.2%, which suggests significant disagreement between the estimates in some cases. A histogram of the discrepancy distribution in Figure 3 makes it possible to judge how frequent such cases are.

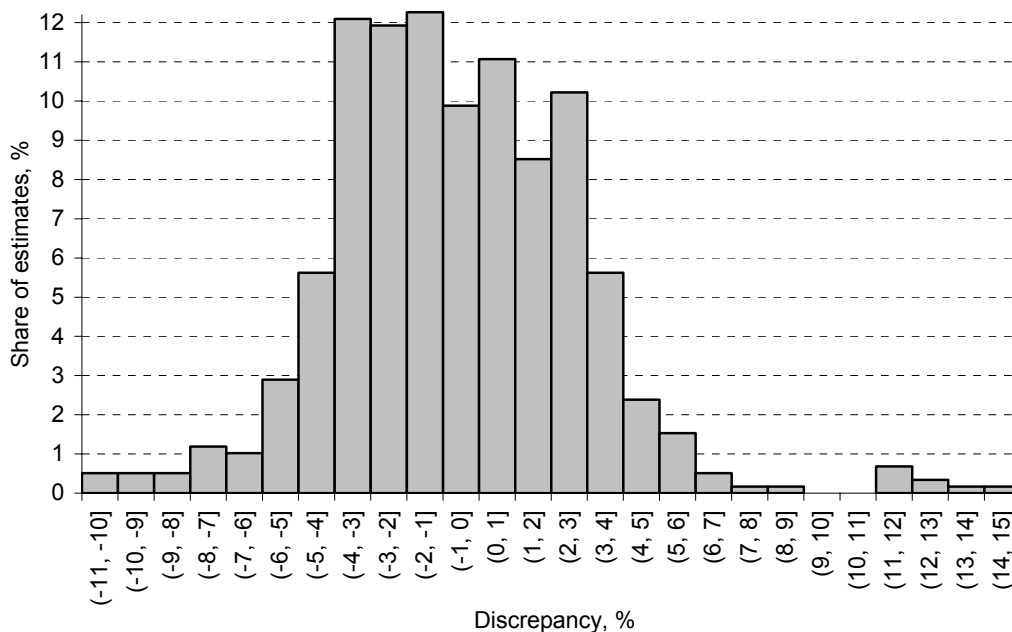


Figure 3. Histogram of the distribution of discrepancies between exact and approximate estimates of regional price levels over the whole period of 2009–2015.

It is seen from this histogram that relatively small mean absolute discrepancy is due to the small proportion of substantial discrepancies. The estimates can be deemed coinciding in 21% of cases, as discrepancies between them fall in the range of -1% to 1% (it is worth noting that COLI are published in integer percents since 2014). Absolute values of 89.6% of discrepancies do not exceed 5%. Thus, there are only 10.4% of substantial differences. The greatest and permanent overstatement of price level by the approximate estimate (from 11.5% to 13.7%) occurs in Moscow. Moscow forms almost entirely the right-hand tail of the distribution starting from 11% (only once, in 2009, the Yamalo-Nenets Autonomous Okrug came to be there, with the discrepancy equaling 14.2%). Different regions fall into the range of 6% to 9% in different years; only the Jewish Autonomous Oblast was there three times. The left-hand tail, from -11% to -8% , is due to the Transbaikal Krai and Republic of Ingushetia (in addition, the Nenets Autonomous Okrug in 2015). The approximate estimates are understated by 7% to 8% in the Republic of Crimea and Sevastopol which are present in the Russian statistics only since 2015.

In our view, it may be concluded in general that the approximate estimates of regional price levels give an acceptable degree of accuracy; they may be well used, should the need arise (particularly, taking into account, wherever possible, in which regions significant and permanent

disagreement with the exact estimates can be expected).

5. Real Incomes per Capita in Russian Regions

The term ‘real incomes’ means that they are denominated in a monetary unit with a uniform purchasing power. Its sense differs depending on whether a change in purchasing power of the monetary unit in time or across country’s locations is meant. In the former – most common – case, incomes are adjusted for inflation (typically, with the use of CPI). In the latter case, incomes are adjusted for differences in prices between locations. It is this meaning of the term ‘real incomes’ that is used in this paper.

Table 6 reports real annual incomes per capita in the Russian regions relative to the national average. They are computed from the official data, Rosstat (2016g), with the use of regional price levels presented in Table 2.

Table 6. Real incomes per capita in the Russian regions, % to the national average

Region*	2009	2010	2011	2012	2013	2014	2015
Belgorod Obl.	102.0	107.5	107.2	111.6	108.4	104.7	106.5
Bryansk Obl.	76.0	78.0	81.4	83.5	85.5	83.6	87.7
Vladimir Obl.	67.6	70.7	70.9	72.1	74.9	74.7	76.7
Voronezh Obl.	75.3	76.3	80.1	88.9	95.2	100.0	107.4
Ivanovo Obl.	58.6	61.2	64.6	71.0	72.5	74.4	75.3
Kaluga Obl.	86.3	88.1	91.2	96.8	96.2	92.1	89.6
Kostroma Obl.	71.0	76.6	75.6	73.1	73.6	75.7	80.5
Kursk Obl.	85.7	87.6	89.8	93.1	93.5	96.4	98.5
Lipetsk Obl.	95.6	92.9	90.3	96.1	97.9	102.1	102.6
Moscow Obl.	113.5	112.0	111.8	124.5	117.6	116.4	117.8
Oryol Obl.	77.9	81.5	83.3	85.0	82.6	81.9	84.7
Ryazan Obl.	73.1	75.4	73.9	79.3	81.0	85.7	85.2
Smolensk Obl.	79.1	78.6	78.4	80.3	79.1	77.2	78.2
Tambov Obl.	82.1	82.0	82.0	84.2	87.7	91.3	92.7
Tver Obl.	71.8	72.9	72.2	73.8	73.8	74.6	78.4
Tula Obl.	86.9	88.6	90.1	91.6	89.2	89.6	92.4
Yaroslavl Obl.	86.1	81.4	78.9	83.5	84.4	87.7	89.3
Moscow City	191.3	183.4	182.7	165.3	164.1	155.8	155.2
Rep. of Karelia	87.0	84.1	82.1	84.3	80.6	79.2	80.8
Rep. of Komi	104.7	103.0	102.4	104.9	102.1	100.7	99.9
Arkhangelsk Obl.	96.5	92.9	92.3	89.9	92.2	97.6	97.7
Nenets A.O.	166.7	163.7	156.6	164.6	164.1	153.5	152.7
Arkhangelsk Obl. excluding A.O.	92.3	89.0	88.8	85.9	88.4	94.6	94.8
Vologda Obl.	70.7	71.5	71.3	74.6	75.8	78.7	81.4
Kaliningrad Obl.	83.3	81.6	79.8	82.3	79.9	83.2	82.0
Leningrad Obl.	75.3	76.2	75.8	76.1	76.1	73.6	85.0
Murmansk Obl.	105.6	99.9	98.6	101.8	107.0	102.5	99.4
Novgorod Obl.	86.2	86.7	87.2	90.2	88.4	91.9	91.7
Pskov Obl.	74.1	72.2	72.1	73.8	71.2	71.5	70.7

St. Petersburg City	118.9	120.5	116.4	110.9	111.2	115.8	122.1
Rep. of Adygeya	68.8	70.7	75.6	80.8	79.8	86.3	79.7
Rep. of Kalmykia	49.1	47.8	49.3	50.8	50.2	50.5	53.2
Krasnodar Krai	84.7	90.0	94.8	98.8	105.0	103.5	102.9
Astrakhan Obl.	86.3	86.2	85.0	84.9	85.0	87.7	85.4
Volgograd Obl.	81.9	78.9	76.1	75.1	75.0	76.7	78.7
Rostov Obl.	78.8	79.1	79.1	80.1	83.2	84.6	88.7
Rep. of Dagestan	89.4	92.1	96.9	97.3	91.7	93.4	97.0
Rep. of Ingushetia	52.8	55.2	61.6	59.4	61.9	61.5	51.4
Kabardian-Balkar Rep.	72.8	72.3	73.6	70.2	68.4	66.6	68.5
Karachaev-Circassian Rep.	63.3	64.2	62.7	63.8	62.0	61.9	62.9
Rep. of Northern Ossetia	70.3	79.8	75.8	79.1	78.2	78.4	80.5
Chechen Rep.		65.2	69.2	67.7	70.0	73.4	75.1
Stavropol Krai	68.7	69.0	70.1	76.1	82.0	83.1	80.3
Rep. of Bashkortostan	109.4	102.1	100.7	102.2	103.1	102.7	99.3
Rep. of Mariy El	65.2	63.4	63.0	62.9	65.6	67.3	65.9
Rep. of Mordovia	67.2	67.8	64.5	63.2	63.3	64.9	64.6
Rep. of Tatarstan	113.1	112.2	111.8	117.9	111.9	116.9	114.2
Udmurt Rep.	77.0	78.0	78.6	80.9	80.1	82.7	88.9
Chuvash Rep.	65.7	66.1	65.6	67.4	67.2	67.9	69.2
Perm Krai	103.4	100.8	99.5	97.5	99.0	101.5	109.7
Kirov Obl.	70.1	73.2	72.2	74.7	71.8	77.0	78.2
Nizhni Novgorod Obl.	87.8	88.6	89.6	94.5	95.5	99.2	101.3
Orenburg Obl.	82.6	82.1	81.5	81.2	81.8	84.5	86.3
Penza Obl.	77.9	76.6	76.5	78.4	79.6	80.8	79.7
Samara Obl.	102.8	104.5	103.0	104.8	103.5	95.7	90.8
Saratov Obl.	71.6	72.6	71.4	69.8	69.6	73.1	75.2
Ulyanovsk Obl.	73.2	78.4	77.4	79.2	79.5	85.7	82.2
Kurgan Obl.	78.8	76.1	73.1	73.1	72.1	70.8	68.9
. Sverdlovsk Obl.	113.1	110.9	113.0	113.1	113.8	113.1	111.9
Tyumen Obl.	137.3	123.8	122.2	121.0	119.8	121.7	121.0
Khanty-Mansi A.O.	144.7	129.3	125.3	122.2	120.2	123.1	122.0
Yamalo-Nenets A.O.	177.2	156.5	160.3	164.0	166.7	167.1	163.5
Tyumen Obl. excluding A.O.s	102.2	95.5	95.3	94.3	92.9	94.6	96.6
Chelyabinsk Obl.	101.9	99.3	97.9	93.8	92.3	92.0	88.7
Rep. of Altai	61.2	65.6	64.5	58.8	54.7	56.1	54.7
Rep. of Buryatia	79.9	76.6	76.2	75.9	81.1	81.4	84.3
Rep. of Tuva	61.3	53.9	53.0	52.0	52.8	52.2	51.5
Rep. of Khakasia	67.3	69.6	71.1	72.4	71.0	68.3	72.8
Altai Krai	66.3	65.4	68.2	67.2	70.5	76.0	79.3
Transbaikal Krai	76.6	73.8	75.6	74.3	76.2	75.6	77.2
Krasnoyarsk Krai	95.5	90.1	91.6	90.2	88.9	85.6	85.3
Irkutsk Obl.	85.6	80.9	78.7	78.2	76.4	76.7	77.1
Kemerovo Obl.	95.4	92.8	92.2	90.9	84.7	82.0	81.1
Novosibirsk Obl.	88.5	83.3	86.2	87.7	85.1	82.2	77.8
Omsk Obl.	97.3	94.5	99.4	100.5	97.8	101.6	100.1
Tomsk Obl.	83.7	79.7	79.7	78.0	79.0	78.7	80.1
Rep. of Sakha (Yakutia)	95.3	93.3	94.8	94.2	94.2	96.6	99.9
Kamchatka Krai	84.8	83.6	83.8	82.4	84.7	81.3	82.2
Primorsky Krai	78.9	78.1	79.0	79.5	80.3	87.0	95.1
Khabarovsk Krai	89.6	88.9	85.7	82.5	86.1	88.9	95.6
Amur Obl.	73.8	69.9	78.3	85.4	88.6	88.6	89.8

Magadan Obl.	103.1	103.2	103.0	108.9	113.8	116.5	114.4
Sakhalin Obl.	116.5	113.3	109.7	101.4	114.1	118.6	123.3
Jewish Autonomous Obl.	74.6	73.1	71.1	69.8	68.7	71.2	71.2
Chukchi A.O.	99.9	104.4	113.0	113.4	112.4	121.1	118.1
Rep. of Crimea							60.2
Sevastopol City							64.9

* Obl. = Oblast, Rep. = Republic, and A.O. = Autonomous Okrug

The lowest real incomes in 2009–2014 were in the Republic of Kalmykia; in 2015, the Republic of Ingushetia occupied its place. The same occurred in the case of nominal incomes. The highest real incomes in 2009–2012 featured Moscow; in 2013–2015, the Yamalo-Nenets Autonomous Okrug held the lead. During the whole period of 2009–2015, the highest nominal incomes were in the Nenets Autonomous Okrug. However, it ranked below both Moscow and the Yamalo-Nenets Autonomous Okrug in real incomes because of higher price level. Table 7 reports summary statistics of nominal and real incomes in country's regions (computed without the Arkhangelsk Oblast as a whole and the Tymen Oblast as a whole to avoid double counting).

Table 7. Summary statistics of incomes per capita in the Russian regions, % to the national average

Indicator	2009	2010	2011	2012	2013	2014	2015
Nominal incomes							
Minimum	41.2	41.0	42.5	43.9	43.6	44.7	44.1
Maximum	290.6	275.7	262.9	268.4	255.6	239.5	235.1
Maximum/minimum	7.1	6.7	6.2	6.1	5.9	5.4	5.3
Mean	90.9	90.8	90.6	91.3	91.0	92.0	91.8
Median	78.1	77.5	77.2	79.5	79.6	82.1	83.0
Standard deviation	43.7	40.9	39.5	38.8	38.0	36.2	34.8
Gini index, %	21.6	20.1	19.6	19.3	19.2	18.4	18.2
Real incomes							
Minimum	49.1	47.8	49.3	50.8	50.2	50.5	51.4
Maximum	191.3	183.4	182.7	165.3	166.7	167.1	163.5
Maximum/minimum	3.9	3.8	3.7	3.3	3.3	3.3	3.2
Mean	87.5	86.3	86.5	87.5	87.8	88.7	88.9
Median	82.9	81.4	80.1	82.5	83.2	84.6	85.2
Standard deviation	24.4	22.2	21.7	21.5	21.5	20.9	20.9
Gini index, %	13.6	12.7	12.4	12.5	12.4	12.2	12.3

Comparison of statistics for nominal and real incomes suggests that interregional differences are significantly less in the case of real incomes. The difference in regional price levels smoothes over them to some degree (Figure 4 illustrates this phenomenon). Indeed, price levels in rich regions are on average higher than those in poor ones, the coefficient of correlation between nominal incomes per capita and regional price levels equaling 0.82 to 0.84. Nonetheless, cross-region

differences in real incomes are exorbitant, as the threefold gap between the highest and lowest real incomes evidences (although it was almost fourfold in 2009). Real incomes per capita do not exceed 85.2% of the national average in a half of the Russian regions.

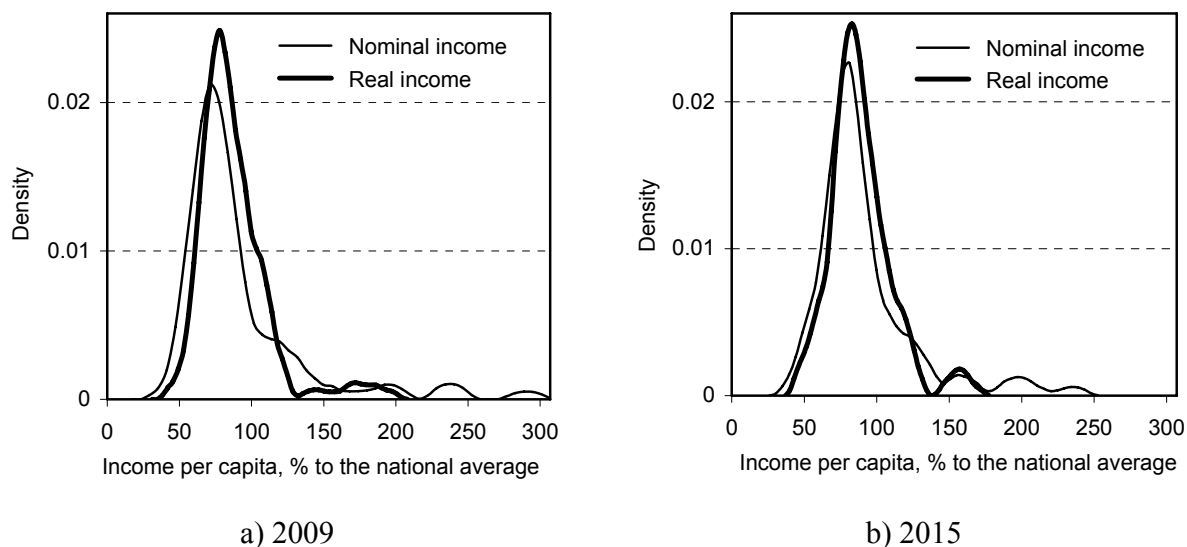


Figure 4. Real vs. nominal regional incomes: kernel estimates of the distributions

Convergence (albeit rather weak) of regions in both nominal and real incomes is observed. However, it is due for the most part to decrease of incomes in rich regions, which suggests distributions plotted in Figure 5.

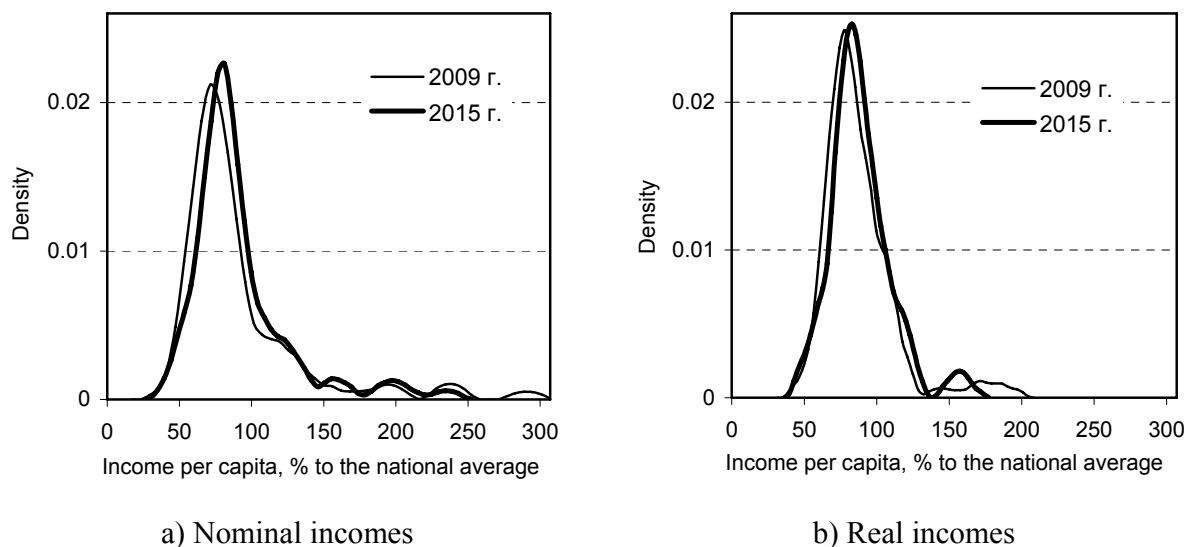


Figure 5. Kernel density estimates of distributions of regional incomes per capita

Comparing distributions for 2009 and 2015, we see that their right-hand tails become significantly shorter with time. Changes in the area of low incomes are minor, although some shift to higher incomes is in evidence in 2015 as compared to 2009.

6. Conclusion

Introducing regular computation of price levels across country's cities into the Russian statistical practice makes it possible to obtain more exact estimates of regional price levels. In turn, this provides a possibility for more adequate comparisons of monetary indicators between regions of the country. As this paper shows, computing regional price levels from official statistical data on COLI is relatively simple.

At the same time, a comparison with regional price levels computed with the use of the approximate method (from the cost of the fixed basket) suggests that this method provides an acceptable accuracy. Then it may be used in cases when there is no possibility to apply more exact estimates of price levels (although caution is needed for some regions).

Regional price levels obtained in this paper have been used for estimating real incomes per capita in the Russian regions relative to the national average. These estimates, first, shows one of application of the regional price levels and, second, make it possible to analyze the pattern of heterogeneity of the real income per capita distribution and its trends.

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Appendix

Table A1. Approximate estimates of regional price levels through the cost of the fixed basket / their deviations from the exact estimates through city COLI, %

Region*	2009	2010	2011	2012	2013	2014	2015
Belgorod Obl.	85.2/3.7	84.0/0.7	86.1/2.1	85.9/2.8	88.2/4.4	89.6/2.7	88.8/2.5
Bryansk Obl.	85.8/-4.1	86.3/-4.5	87.7/-3.3	87.8/-2.5	88.2/-2.9	93.2/-1.7	92.4/-2.4
Vladimir Obl.	94.3/-0.4	95.4/-1.3	96.9/-0.2	97.3/0.3	97.4/0.7	100.8/1.7	99.7/0.2
Voronezh Obl.	100.5/6.6	100.0/4.2	100.1/4.7	94.1/2.6	91.4/2.2	93.9/2.2	94.3/1.6
Ivanovo Obl.	91.4/-3.1	91.4/-4.6	93.0/-4.0	93.3/-4.0	93.3/-3.3	95.4/-3.4	95.2/-3.7
Kaluga Obl.	90.6/-1.2	89.9/-3.0	90.5/-2.3	90.1/-2.4	91.3/-1.8	98.5/0.9	99.8/1.2
Kostroma Obl.	87.6/-1.8	89.2/-2.7	92.0/-0.9	91.8/-1.7	92.8/0.8	90.6/-1.4	91.4/-0.6
Kursk Obl.	88.6/0.3	89.1/0.7	88.8/1.1	87.2/-0.1	85.1/-0.8	85.7/-1.1	85.1/-1.8
Lipetsk Obl.	86.8/-3.3	86.9/-4.0	87.6/-2.3	87.5/-1.5	86.4/-1.3	86.4/-3.1	86.4/-3.1
Moscow Obl.	109.6/4.8	109.5/2.7	109.0/2.6	110.1/4.2	108.2/0.8	110.5/2.2	109.8/1.8
Oryol Obl.	82.5/-0.6	82.3/-3.0	84.0/-1.9	83.1/-2.6	83.5/-2.1	87.6/-0.4	88.0/-1.2
Ryazan Obl.	96.9/-0.1	95.2/-2.0	95.7/-0.6	95.4/-0.5	95.5/1.1	92.2/-0.2	93.3/-0.2
Smolensk Obl.	90.4/-4.2	93.4/-4.3	94.7/-3.4	94.9/-3.2	95.3/-2.3	98.1/-3.4	98.3/-3.5
Tambov Obl.	91.2/5.7	89.4/2.0	90.7/2.1	91.0/2.0	89.9/3.1	90.0/2.0	89.9/0.5
Tver Obl.	98.9/-1.6	97.6/-2.7	97.3/-2.3	100.3/-0.6	100.0/0.2	98.8/-0.7	99.1/-0.4
Tula Obl.	89.5/-0.3	90.3/-1.1	91.3/0.7	91.4/0.5	90.7/0.4	93.7/1.2	93.5/-1.1
Yaroslavl Obl.	91.9/-0.4	92.9/-1.1	94.8/0.1	94.7/-1.3	94.3/-2.3	95.9/-2.2	96.1/-4.0
Moscow City	139.7/12.7	141.6/11.7	140.7/11.6	142.2/11.5	143.8/11.5	141.3/12.1	144.4/13.7
Rep. of Karelia	100.2/3.0	101.6/1.0	105.1/2.2	104.6/2.0	105.0/2.1	107.1/2.6	107.8/2.4
Rep. of Komi	118.4/4.2	118.6/4.0	117.4/4.4	115.0/3.6	114.1/2.9	111.4/1.0	109.9/-0.4
Arkhangelsk Obl.	110.1/2.4	112.4/0.9	114.3/2.2	113.5/2.4	113.8/3.6	110.8/2.1	110.4/0.7
Nenets A.O.	170.7/-2.1	162.3/-3.6	161.5/-3.8	158.9/-2.6	147.6/-5.2	145.5/-6.7	140.2/-8.9
Arkhangelsk Obl. excluding A.O.						109.6/2.6	109.3/1.3
Vologda Obl.	102.0/-0.5	101.2/-2.8	103.3/-2.2	103.9/-1.4	102.5/-1.8	102.3/-1.9	102.1/-2.1
Kaliningrad Obl.	108.3/3.2	104.6/0.9	102.5/0.7	103.0/1.2	102.9/3.3	100.7/0.6	100.7/-0.4
Leningrad Obl.	101.4/2.8	103.0/0.5	102.4/1.2	103.1/1.4	102.8/0.6	104.7/2.3	104.3/2.1
Murmansk Obl.	129.0/3.0	128.6/1.3	125.5/1.6	124.0/1.3	121.9/2.8	122.5/2.0	121.3/1.3
Novgorod Obl.	92.9/1.0	93.0/-1.9	91.7/-2.1	91.4/-2.1	90.5/-3.0	91.6/-1.3	90.3/-2.5
Pskov Obl.	90.9/-0.5	90.5/-3.2	92.1/-2.7	93.1/-2.1	94.1/-2.3	97.5/-0.7	97.6/-1.6
St. Petersburg City	106.2/-1.0	104.9/-3.5	105.8/-1.9	106.4/-1.5	105.7/-3.0	106.0/-1.9	108.1/0.0
Rep. of Adygeya	90.9/0.1	90.1/-1.7	89.8/-1.2	90.2/-0.9	89.3/-0.2	92.5/0.6	92.6/-0.4
Rep. of Kalmykia	86.3/2.9	87.6/2.3	88.5/2.7	90.8/5.1	91.2/5.0	92.1/4.1	91.5/3.4
Krasnodar Krai	98.0/1.9	100.4/1.5	96.0/0.6	95.7/1.2	95.7/1.0	102.9/2.7	103.6/2.7
Astrakhan Obl.	88.2/-1.1	87.9/-2.3	87.8/-3.3	87.1/-3.5	86.4/-3.8	88.7/-2.5	88.6/-4.7
Volgograd Obl.	92.0/1.6	91.7/-0.4	92.7/1.1	92.4/0.6	91.3/1.1	91.0/1.7	91.8/-0.8
Rostov Obl.	97.6/1.4	97.1/-0.6	97.6/0.2	99.2/1.8	99.9/2.6	101.4/2.1	100.8/2.1
Rep. of Dagestan	85.6/-2.4	86.0/-4.2	86.9/-4.3	87.9/-4.1	87.3/-4.4	86.1/-4.6	87.4/-4.4
Rep. of Ingushetia	85.4/-4.8	84.7/-8.0	80.6/-10.7	79.9/-10.5	80.4/-6.7	81.1/-3.5	85.7/-0.1
Kabardian-Balkar Rep.	82.0/0.9	81.4/-1.3	84.6/2.4	87.0/3.4	90.7/5.1	93.9/4.5	93.7/3.3
Karachaev-Circassian Rep.	86.5/0.6	89.6/0.2	91.1/1.0	90.8/0.5	91.1/-0.1	95.1/1.5	97.0/3.0
Rep. of Northern Ossetia	82.2/-2.1	84.5/-3.1	85.1/-2.6	86.4/-1.8	86.3/-1.6	91.2/0.2	89.9/-0.1
Chechen Rep.	83.9/-7.6	89.7/-7.4	92.1/-5.6	94.1/-3.2	90.5/-4.5	91.4/-5.8	94.6/-4.4
Stavropol Krai	98.4/1.5	100.1/0.6	101.2/2.1	100.4/3.9	95.9/3.1	96.5/3.1	95.9/2.6

Rep. of Bashkortostan	83.8/-3.9	85.4/-5.6	87.2/-4.1	86.8/-3.1	86.2/-3.6	90.1/-1.0	91.3/-1.5
Rep. of Mariy El	80.9/-3.1	82.3/-4.3	84.1/-2.8	83.4/-2.8	82.8/-3.0	86.8/-1.0	89.2/0.4
Rep. of Mordovia	82.1/-2.1	84.5/-3.8	87.8/-1.5	87.9/-1.4	86.1/-2.1	87.9/-1.8	86.7/-3.0
Rep. of Tatarstan	83.4/0.2	83.9/-3.1	85.6/-1.6	86.5/-1.4	88.4/-1.9	90.4/-1.7	89.4/-1.7
Udmurt Rep.	82.5/-3.0	84.8/-3.4	85.9/-3.0	86.6/-2.6	87.5/-2.6	90.9/-1.5	91.2/-1.7
Chuvash Rep.	83.7/-3.1	84.6/-4.1	86.1/-2.8	85.1/-3.2	85.0/-3.0	87.8/-0.8	86.8/-1.9
Perm Krai	102.1/-0.7	100.8/-2.9	101.2/-1.9	100.3/-2.7	98.6/-2.9	97.8/-2.6	95.9/-2.8
Kirov Obl.	89.9/-5.4	90.5/-5.9	94.0/-3.9	93.8/-2.8	94.3/-2.6	93.3/-1.9	93.7/-1.3
Nizhni Novgorod Obl.	94.2/-3.5	92.4/-5.7	94.0/-4.5	95.2/-3.9	94.9/-4.2	97.3/-4.0	96.7/-4.0
Orenburg Obl.	83.9/-2.5	83.3/-4.4	85.1/-3.2	84.5/-3.6	85.3/-2.8	86.3/-2.2	86.4/-2.8
Penza Obl.	84.8/-2.2	85.3/-4.1	87.7/-1.6	86.3/-1.4	83.4/-3.4	85.7/-1.9	89.4/2.0
Samara Obl.	105.6/1.7	101.6/-0.5	101.7/0.1	101.3/-0.2	99.5/-0.6	98.0/-0.1	97.5/-0.7
Saratov Obl.	83.1/-4.1	81.6/-7.5	81.6/-7.6	82.0/-6.9	82.6/-6.9	85.0/-3.8	85.6/-3.3
Ulyanovsk Obl.	84.1/-3.4	83.5/-5.4	86.1/-3.3	87.0/-2.3	90.1/0.0	89.0/-1.7	89.5/-2.3
Kurgan Obl.	88.1/-3.5	88.6/-5.3	91.6/-3.1	91.6/-3.6	90.7/-3.5	92.1/-3.9	93.5/-3.3
. Sverdlovsk Obl.	99.0/-4.1	99.9/-5.4	101.9/-3.9	101.6/-4.3	101.6/-3.4	98.4/-3.9	97.9/-4.6
Tyumen Obl.	124.3/4.0	122.1/-0.3	121.1/0.2	120.3/1.0	117.8/0.5	114.3/0.3	113.0/0.5
Khanty–Mansi A.O.	136.8/3.9	134.2/1.6	132.3/1.5	132.3/3.3	129.0/2.3	123.9/2.0	121.1/0.3
Yamalo–Nenets A.O.	153.3/14.2	148.8/1.8	143.8/2.4	141.5/2.5	135.6/1.0	134.4/1.8	131.2/2.8
Tyumen Obl. excluding A.O.s						95.8/-5.0	96.9/-3.0
Chelyabinsk Obl.	89.6/1.4	88.6/-0.9	91.3/0.6	91.5/0.6	92.1/0.7	91.2/0.5	90.7/-0.6
Rep. of Altai	105.8/-1.3	105.4/-3.2	99.0/-4.2	102.1/-2.5	104.4/0.3	109.9/0.0	110.4/0.4
Rep. of Buryatia	96.9/0.9	98.3/0.0	99.3/0.1	101.2/0.8	100.5/1.6	98.0/-0.8	95.7/-3.8
Rep. of Tuva	94.4/-2.6	94.1/-5.2	94.6/-5.0	94.9/-4.6	95.4/-3.2	92.7/-4.6	92.0/-5.1
Rep. of Khakasia	94.3/0.1	94.8/-2.3	94.8/-1.5	94.4/-1.0	96.2/-0.9	96.8/-0.2	94.2/0.3
Altai Krai	87.1/-1.1	85.8/-3.6	85.4/-3.3	84.8/-2.8	85.4/-2.2	87.1/-0.2	87.4/-0.3
Transbaikal Krai	92.2/-6.0	91.4/-10.0	91.4/-10.2	92.0/-9.5	91.0/-9.6	89.8/-8.2	90.1/-8.6
Krasnoyarsk Krai	104.6/-0.8	104.0/-2.8	104.5/-1.2	105.9/-1.5	106.1/-1.8	103.2/-1.1	102.4/-1.6
Irkutsk Obl.	95.4/-0.8	94.8/-3.8	95.6/-2.4	96.1/-2.0	95.6/-2.6	92.4/-2.6	92.0/-3.4
Kemerovo Obl.	81.9/-3.9	80.8/-7.4	82.4/-5.3	83.2/-5.1	85.0/-5.2	85.2/-3.9	84.4/-4.0
Novosibirsk Obl.	100.3/-0.8	99.6/-3.3	101.0/-0.8	101.0/-0.7	100.5/-2.0	99.3/-1.9	98.9/-2.2
Omsk Obl.	87.5/2.3	85.0/0.1	84.8/1.6	84.4/1.0	86.2/2.3	88.3/3.5	86.6/1.7
Tomsk Obl.	101.3/2.9	99.9/0.2	100.3/0.6	100.4/0.9	101.1/1.4	99.5/0.9	99.1/0.9
Rep. of Sakha (Yakutia)	136.6/3.9	132.4/1.5	130.1/0.0	131.0/-0.2	127.8/-1.0	125.3/-1.8	123.7/-1.4
Kamchatka Krai	180.7/7.6	180.0/5.6	173.0/4.0	171.3/3.2	167.4/3.9	165.9/1.2	167.6/5.4
Primorsky Krai	121.9/4.9	120.7/3.3	119.6/2.5	121.5/3.5	120.7/3.2	120.9/3.0	120.1/1.3
Khabarovsk Krai	133.1/1.1	131.8/-1.2	131.2/-1.7	134.9/0.6	133.2/1.2	128.7/0.2	127.6/-2.2
Amur Obl.	112.0/5.9	111.8/3.4	113.5/3.9	115.2/4.8	112.4/4.6	111.3/2.3	110.6/1.1
Magadan Obl.	147.1/3.6	145.1/2.1	145.6/2.3	149.2/3.1	151.5/5.3	146.4/3.3	145.1/2.9
Sakhalin Obl.	146.9/2.0	146.1/2.2	144.4/2.0	144.0/3.7	138.6/2.5	137.7/1.4	129.7/-1.1
Jewish Autonomous Obl.	115.0/6.2	113.7/2.7	116.2/3.9	120.3/5.7	124.1/8.2	118.5/6.8	117.4/4.8
Chukchi A.O.	196.5/-1.3	187.1/-2.9	174.0/-5.1	179.6/-2.6	175.0/-3.3	167.1/-2.0	157.9/-1.7
Rep. of Crimea							82.3/-7.7
Sevastopol City							78.3/-6.8

* Obl. = Oblast, Rep. = Republic, and A.O. = Autonomous Okrug