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Polarization or upgrading? Evolution of employment in transitional Russia ☆

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Abstract

This paper discusses the structural changes in Russian employment and explores whether the evolution of employment from 2000 to 2012 followed the scenario of progressive upgrading in job quality or brought about the polarization of jobs in terms of quality. Jobs are defined in this study as occupation-industry cells, and their quality is measured through relative earnings and education level. Using detailed micro-data from a few complementary large-scale surveys, we rank all jobs according to the earnings and educational criteria and divide these distributions into five quintiles. At the next stage, we explore dynamic changes in job quality and socio-demographic characteristics of workers in different quintiles. The paper rejects the polarization scenario and confirms the upgrading hypothesis.

JEL classification: J31, J62.
Keywords: job polarization, job upgrading, job quality, employment restructuring, Russia.

1. Introduction

The idea of this paper follows a well-known debate in the economic literature. We look at the structural changes in Russian employment and attempt to answer a simple but important question. Did evolution of employment from 2000 to 2012

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follow the scenario of progressive upgrading or did it bring about the polarization of jobs in terms of quality? The first option, *upgrading*, assumes the reallocation of workers from low-quality towards better or high-quality jobs. The expected outcome here is that over time, the demand for high-skilled and well-paid "good" jobs relative to low-skilled and poorly paid "bad" jobs tends to increase. This scenario is often associated with the skills biased technological change (SBTC) hypothesis (Katz and Murphy, 1992). The alternative scenario expects a U-type employment change when both "bad" and "good" jobs demonstrate a relative rise (in terms of employment) against the downsizing of medium-quality employment. This case suggests the *polarization* of employment when both tails in the job quality distribution rise and the middling part of the distribution falls (Autor et al., 2003; Goos and Manning, 2007; Goos et al., 2009; Fernández-Macías et al., 2012). The underlying reason for such development is that middling jobs assume usually mostly routine and repetitive tasks that can be easily computerized; therefore, these jobs are outsourced. This scenario can be referred to as a routine biased technological change (RBTC). Both hypotheses explain changes in employment through the impact of technology (via skills) but identify signs and affected zones differently.

Our paper makes the first attempt to look at changes in Russian employment through the prism of the SBTC versus the RBTC hypothesis. There are a few reasons why the Russian case is of interest. First, the Russian economy is quite large, and this is enough in itself to attract research interest. Second, in the 2000s, the Russian economy experienced rapid economic growth when the GDP almost doubled, and this was associated with a rapid rise in real earnings. Third, this growth was commodity export-led, which could have an ambiguous impact on various parts of job quality distribution. Fourth, the economic structure experienced a deep transformation marked by a rapid contraction in agricultural and manufacturing employment and simultaneous growth in the service sector. Fifth and finally, this was a period of explosive expansion of tertiary education. Though all of these changes in general were far from being unique to one country, they were of impressive speed and magnitude and were all concentrated in a relatively short time interval. Some changes can be considered to be components of the SBTC, while others indicate the RBTC scenario. This ambiguity makes empirical testing even more interesting.

The issue of changing jobs relates to an ongoing discussion regarding the fate of the middle class. The polarization scenario assumes that job distribution hollows out in the middle. Employment tends to concentrate closer to the poles, while medium-quality jobs contract. If we consider a large middle class as a foundation for social and political stability, polarization brings obvious risks. In Russia, the discussion concerning the evolution of the middle class is also popular and concerns its criteria, scale, composition, and so on. Without delving into the debate, we may note here that looking at this issue through the prism of job structure has an advantage in that it does not rely on the characteristics of particular individuals.

The link between this discussion and our findings depends on where (or into which job cells) we place the prospective members of the middle class. To this extent, the latter can be associated with the central part of the job quality distribution, and we can say that in Russia in 2000–2012, the middle class did not shrink,

and its fraction remained stable. Moreover, the contraction of groups located in the lower part of the distribution and the expansion of those located in the upper part were quite visible. This process was not associated with the divergence of the job structure towards the poles, and there was little evidence for increasing risks of instability. Assuming that the Russian middle class occupies not middling jobs but those above the middle, we can suggest its expansion. In any case, the social structure became more, not less, robust.

The empirical approach taken in this study follows the general methodology suggested in (Fernández-Macías, 2012; Fernández-Macías et al., 2012). The key conceptual issue concerns "job" and "job quality" definitions. Jobs are defined as occupation-industry cells, and their quality is measured through relative earnings and education levels. At the first stage of the study, using detailed micro-data from a few complementary large-scale surveys, we rank all jobs according to earnings and educational criteria and divide these distributions into 5 quintiles, where the first quintile represents the lowest-quality jobs, while the fifth quintile represents the highest-quality jobs. At the second stage, we explore dynamic changes in job quality and socio-demographic characteristics of workers in different quintiles.

The paper consists of 6 sections, an introduction and a conclusion. Section 2 gives an overview of how the Russian labor market evolved over the period under study and its major institutional properties. Section 3 presents the major data sources used in the study and the construction of key variables. Section 4 discusses the general evolution of the job structure and major characteristics of "good" and "bad" jobs. Section 5 looks at job quintiles through the lens of sectoral decompositions. Section 6 introduces social and demographic profiling of quintiles. Section 7 evaluates the robustness of our main results. In the concluding section, we discuss the main findings, as well as caveats and constraints related to the study.

2. Labor market developments[1]

The period under study was characterized by remarkable heterogeneity and macroeconomic volatility. Russia experienced a few drastic macroeconomic shocks in the 1990s–2000s. The years of 1992, 1994, 1998, and 2009 were marked by large output falls. The transformational recession in the 1990s was accompanied by a 40% cumulative decline in GDP between 1991 and 1998. However, this "great contraction" in output was associated with a much milder employment reduction that was less than 15% total within the period. In other words, on average, each percentage point of GDP reduction caused an employment decline of only 0.3–0.35 percentage points. This contrasted strongly with initial expectations and actual employment evolution in most Central and Eastern Europe (CEE) countries, where the elasticity was close to 1.

The year of 1999 became the first in the decade-long economic recovery that was boosted initially by the deep devaluation of the national currency and supported later by the rise in world oil and commodity prices. By 2008, the Russian GDP was almost 95% higher than in 1998. As a result, these ten consecutive years of the economic boom positively affected all major labor market indicators.

[1] A detailed account of these developments is given in (Gimpelson and Kapeliushnikov, 2013).

Employment levels rose, while the unemployment rate decreased from an all-time record high of 14.6% (in early 1999) to a quite modest 6.2% in 2008.

The next strong negative hit arrived with the global crisis in 2008-09. It decreased the GDP by nearly 8% (y-o-y) in 2009 and halted the expansion of employment. As an outcome of the crisis, unemployment increased again but only modestly and for a relatively short period. Though the post-crisis (2010–2012) period was characterized by the dampened growth, the employment-to-population ratio stayed high, while the unemployment rate remained low. Two major factors were at work here. On the one hand, ongoing demographic change associated with aging and educational upgrading of the population led to lowering of the natural rate of unemployment; on the other hand, low wage floors may have contributed to keeping the labor force in employment.

The comparison of major employment indicators in the years 2000 and 2012 will be given in more detail in Section 4 of the paper. This evolution was accompanied by major improvements in aggregate outcomes in terms of wages and use of skills. One can say that powerful tide of petrodollars lifted all boats, shifting Russia closer to the group of high-income countries. The skill composition of jobs was not stagnant either. The fraction of employees with tertiary education increased from around $^1/_5$ in 2000 to over 30% in 2012. This made Russia one of the world leaders in terms of formal education of the labor force (though saying little about the quality of the education).

Persistence of high employment and low unemployment rates might cause an illusion of relative stability and hide important changes in the composition of employment. Two employment dimensions are salient in the given context. The first is the sectoral composition of workforce, and the second is the occupational one. Available data supports the hypothesis that the economy has experienced a non-trivial sectoral reallocation of labor, and because occupational mixes vary across industries, we can expect to see large cross-occupational reallocation as well. Goods-producing occupations lost workers, while trade and services related occupations expanded their shares (we discuss these trends in more detail later). The subperiod of 2000–2008 was marked by a more intensive employment reshuffle than the second subperiod of 2008–2012. Though we have no fully comparable Labour Force Survey (LFS) data for the pre-2000 period, there is strong evidence that reallocation across occupations then was even more intensive (Sabirianova, 2002).

These observations outline the general context for job reallocation in Russia over 2000–2012 and suggest that its speed and scale are likely to be significant, though its particular patterns are not a priori clear.

3. Data and empirical methodology

The main source of data on jobs exploited in the paper is the Labour Force Survey (called in Russia the Population Survey on Employment Issues) administered by the official statistical agency (Rosstat). In 1992–1998, the survey was conducted annually; from 1999 to August 2009, quarterly; and afterwards, monthly. It samples the adult population aged 15–72 in all Russian regions. The annual number of observations equaled 540 thousand in the initial period, 270–300 thousand in 1997–2008, and was finally increased to approximately 800 thousand in September 2009 and onwards. The LFS is routinely used to estimate employment

and unemployment within the ILO-defined framework and is the basic source to construct data series on occupations.

Our analysis focuses on the period of 2000–2012. Throughout most of the 1990s, Rosstat used "Soviet-type" occupational and industrial classifications that were not ISCO and ISIC/NACE compatible.[2] In addition, shifting from the annual to the quarterly survey regime (in 1999), Rosstat introduced multiple methodological innovations that inhibited comparability over time. The year of 1999 was not only the first when the new methodology (including the sampling frame) was applied but was the first post-crisis year as well. To minimize mismeasurements caused by this volatility, we fix the year of 2000 as the base and divide the total period into two subperiods of 2000–2008 and of 2008–2012. The year of 2008 marked the borderline between the economic boom observed in the first subperiod and the new crisis/post-crisis subperiod. For the chosen period, the occupational (OKZ) and industrial (OKVED) classifications applied by Rosstat are fully harmonized with standards of ISCO-88 and ISIC, correspondingly.

For our analysis, we combine 2-digit coding of occupations (that gives 33 occupational groups) with 1-digit industries (17 industries). For the manufacturing sector, however, we use 2-digit coding, which adds 14 industries. This level of disaggregation provides us with 990 (33×30) cells, of which 635 are not empty.

The LFS as the data source is far from the ideal. Its main drawback is its lack of earnings data necessary for ranking selected job cells by earnings-based quality. To overcome this constraint, we apply two alternative approaches to ranking jobs.

The first approach measures job quality using educational information from the LFS. It assumes that the educational credentials of workers in an occupation-industry defined cell characterize the quality of this job. We call it educational or education-based criterion. The information on educational levels achieved by respondents contained in the LFS can be converted into estimates of the duration of schooling.[3] For robustness, we use two education-based rankings accounting for average duration of schooling by occupation-industry cells at the beginning (2000) and end (2012) of the period.

The second and main approach is earnings-based. We reconstruct earnings for each occupation-industry cell using alternative data sources and then impute them to particular LFS-based job cells.

Most earnings-related information comes from another Rosstat-administered source called the Survey on Earnings by Occupations (SEO and abbreviated in Russian as OZPP). It is conducted bi-annually in October and contains earnings data for approximately 750 thousand workers living in all Russian regions. Unfortunately, it provides only a partial solution to the earnings data problem, and we use an additional data set to remedy it (see Appendix).

The SEO contains various wage-setting characteristics. It records total monthly earnings, hours actually worked, and data on wage composition. The latter

[2] ISIC represents the International Standard Industrial Classification of all economic activities, and ISCO represents the International Standard Classification of Occupations. These standards are suggested by the UN Statistical Division for use in all countries.

[3] We measure the duration converting levels of education attained (in the Russian classification) into years of schooling using the following converter: lower than basic secondary — 6 years, incomplete secondary — 9, complete secondary — 11, vocational — 12, technical college — 13, incomplete higher — 14, higher — 16, and postgraduate — 19 years.

includes three components: the basic and fixed in contracts part of earnings (we call it the "basic or tariff-based part"), the variable part in the form of various premiums and bonuses (not rigidly fixed in individual labor contracts), and (so-called Northern) regional increments. We controlled for robustness of the job ranking estimates using not only average monthly earnings but also basic wage (without premiums and bonuses) and mean hourly wage.

The selected criteria are consistent. As Table 1 reports, the education-based rankings are strongly intercorrelated (nearly 0.8). Inter alia, this consistency of job-education/skill hierarchies over time suggests that job rankings did not change significantly during the period under consideration. Alternative earnings-based measures display an even higher degree of association (with correlations of the order of 0.90–0.99). However, education- and earnings-based job quality measures have somewhat weaker correlations (approximately 0.45–0.5). Consequently, all educational measures and earnings measures are mutual substitutes, though education-based and earnings-based rankings can potentially diverge.

Tables 2–4 present estimates of earnings and educational attainment across aggregated industries and occupations. All rankings considered here remain stable over time, thus allowing the assumption that the same (or a similar) distribution could be observed at the beginning of the period in 2000 (for which comparable earnings data does not exist). High correlations (0.7–0.8) between relative earnings by occupations for different years (2005, 2007, 2009 and 2011) support this assumption.

Let us summarize this section. We classify all LFS respondents along the occupation-industry dimension and call these cells "jobs". Then, we introduce 5 alternative job quality measures, of which 2 are education-based and 3 are earnings-based, and use them to rank all job cells in 2000 by quintiles (with the "worst" jobs belonging to the first quintile). These quintiles are made of

Table 1
Correlation matrix for 5 alternative measures of job quality (N = 635).

	Measure-1 (mean years of schooling in 2000, LFS)	Measure-2 (mean years of schooling in 2012, LFS)	Measure-3 (average monthly wage in 2007, OZPP)	Measure-4 (mean basic wage in 2007, OZPP)	Measure-5 (mean hourly wage in 2007, OZPP)
Measure-1 (mean years of schooling in 2000, LFS)	1	0.783	0.434	0.520	0.459
Measure-2 (mean years of schooling in 2012, LFS)	0.783	1	0.428	0.491	0.455
Measure-3 (average monthly wage in 2007, OZPP)	0.434	0.428	1	0.894	0.990
Measure-4 (mean basic wage in 2007, OZPP)	0.520	0.491	0.894	1	0.899
Measure-5 (mean hourly wage in 2007, OZPP)	0.459	0.455	0.990	0.899	1

Note: All coefficients are significant at 1% (2-tailed).

the ranked jobs weighted by employment in those jobs so that each quintile represents 20% of employment in the starting period. Then, we explore what happens with employment in each of the quintiles over the period 2000–2012 as well as across two subperiods (before and after the crisis) within the whole period. Now, we are well equipped to address the question as to where jobs were created and where they were destroyed.

Table 2
Educational attainment and average monthly wages by sector, 2000–2012.

Sectors	Mean years of schooling[a]			Average monthly wages, thousand rubles[b]		
	2000	2008	2012	2000	2008	2012
Agriculture	10.9	11.5	11.7	1.0	8.5	14.1
Fishing	12.2	12.2	12.4	2.8	19.5	29.2
Mining and quarrying	12.6	12.8	12.9	5.9	33.2	50.4
Manufacturing	12.5	12.7	12.9	2.4	16.1	24.5
Electricity, gas and water supply	12.7	12.9	13.1	3.2	19.1	29.4
Construction	12.5	12.6	12.7	2.6	18.6	26.0
Wholesale and retail trade	12.7	12.8	12.9	1.6	14.9	21.6
Hotels and restaurants	12.2	12.4	12.5	1.6	11.5	16.6
Transport and communications	12.4	12.6	12.7	3.2	20.8	31.4
Financial intermediation	14.2	14.8	14.9	5.2	41.9	59.0
Real estate	14.2	13.8	14.0	2.5	21.3	30.9
Public administration	13.4	13.9	14.1	2.7	21.3	35.7
Education	13.9	14.1	14.1	1.2	11.3	19.0
Health and social work	13.1	13.5	13.6	1.3	13.0	20.6
Other service activities	12.6	13.1	13.2	1.5	13.5	21.0
Private households	11.2	11.4	11.6	–	–	–
Extra-territorial organizations	12.4	14.4	14.6	–	–	–
Total	12.6	13.0	13.2	2.2	17.3	26.6

Sources: [a] The LFS-based estimates; [b] Rosstat.

Table 3
Educational attainment by occupation, 2000–2012.

Sectors	Mean years of schooling		
	2000	2008	2012
Agriculture	10.9	11.5	11.7
Fishing	12.2	12.2	12.4
Mining and quarrying	12.6	12.8	12.9
Manufacturing	12.5	12.7	12.9
Electricity, gas and water supply	12.7	12.9	13.1
Construction	12.5	12.6	12.7
Wholesale and retail trade	12.7	12.8	12.9
Hotels and restaurants	12.2	12.4	12.5
Transport and communications	12.4	12.6	12.7
Financial intermediation	14.2	14.8	14.9
Real estate	14.2	13.8	14.0
Public administration	13.4	13.9	14.1
Education	13.9	14.1	14.1
Health and social work	13.1	13.5	13.6
Other service activities	12.6	13.1	13.2
Private households	11.2	11.4	11.6
Extra-territorial organizations	12.4	14.4	14.6
Total	12.6	13.0	13.2

Source: LFS.

Table 4
Average monthly wages by occupation, 2005, 2007, 2009 and 2011 (thousand rubles).

Occupations	2005	2007	2009	2011
Legislators, senior officials and managers	15.2	24.1	33.5	41.6
Professionals	9.4	14.8	20.1	25.0
Technicians and associate professionals	7.2	11.4	15.1	19.0
Clerks	5.7	8.8	12.2	14.8
Service workers	5.7	8.9	12.0	14.6
Skilled agricultural workers	6.5	10.2	18.0	16.1
Craft workers	9.4	14.6	18.7	23.1
Plant and machine operators and assemblers	10.0	14.8	8.4	23.5
Elementary occupations	3.9	6.2	14.6	10.5
Total	8.7	13.6	18.1	22.7

Source: The OZPP-based estimates.

The pattern when jobs are generated in the upper and the bottom quintiles while the middling quintiles tend to downsize can be a visible manifestation of job polarization. Expansion of the upper quintile with simultaneously shrinkage of the bottom quintile would signal the scenario of progressive job upgrading. Of course, scenarios of more complex and controversial evolution are not excluded either. One scenario occurs when different segments of the economy produce different job change patterns. To better understand potential heterogeneity in evolution of job structures, we look also at particular demographic, occupational and industry-specific segments.

4. General evolution

Tables 5 and 6 present the evolution of employment by aggregate occupations and industries in 2000–2012.

Table 5
Composition of the employed population aged 15–72 by sector, 2000–2012 (%).

Sectors	2000	2008	2012	Change 2000–2012 (pp.)
Agriculture	14.2	8.4	7.2	–7.0
Fishing	0.3	0.2	0.2	–0.1
Mining and quarrying	2.0	1.9	2.0	0.0
Manufacturing	19.5	16.4	15.0	–4.5
Electricity, gas and water supply	2.7	3.0	3.3	0.6
Construction	5.1	7.6	7.4	2.3
Wholesale and retail trade	12.3	15.2	16.1	3.8
Hotels and restaurants	1.4	2.1	2.1	0.7
Transport and communications	8.4	9.2	9.4	1.0
Financial intermediation	1.3	1.9	2.0	0.7
Real estate	3.3	6.3	6.6	3.3
Public administration	7.4	7.6	7.5	0.1
Education	9.1	9.1	9.2	0.1
Health and social work	6.7	7.4	8.0	1.3
Other service activities	6.2	3.6	3.8	–2.4
Private households	0.0	0.1	0.0	0.0
Extra-territorial organizations	0.0	0.0	0.0	0.0
Total	100	100	100	–

Source: The LFS-based estimates.

Table 6
Composition of the employed population aged 15–72 by occupation, 2000–2012 (%).

Occupations	2000	2008	2012	Change 2000–2012 (pp.)
Legislators, senior officials and managers	4.4	7.0	8.3	3.9
Professionals	15.6	18.5	19.4	3.8
Technicians and associate professionals	15.2	15.2	15.1	–0.1
Clerks	3.4	2.9	2.8	–0.6
Service workers	11.8	13.8	14.6	2.8
Skilled agricultural workers	6.3	4.1	3.4	–2.9
Craft workers	16.3	14.8	13.4	–2.9
Plant and machine operators and assemblers	13.5	12.5	12.5	–1.0
Elementary occupations	13.5	11.2	10.4	–3.1
Total	100	100	100	–

Source: OZPP.

Main employment losses were recorded in "A: Agriculture" (–7 pp), "D: Manufacturing" (–4.5 pp) and "O: Other community, social and personal service activities" (–2.6 pp), while major gains were concentrated in "G: Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods" (+3.8 pp), "K: Real estate, renting and business activities" (+3.3 pp) and "F: Construction" (+2.3 pp).[4] Industries that shed employment include those with low-educated and low-paid labor (A and O) as well as those with high-skilled and well-paid labor (D). Employment gains also affect industries with contrasting levels of education and pay.

Changes in occupational composition are also not straightforward. The most high-skilled and best-paid occupations are concentrated in ISCO groups 1 and 2, which gained 3.9 pp (ISCO1: Managers) and 3.8 pp (ISCO2: Professionals). However, the least-skilled and lowest-paid occupations experienced significant employment losses (the ISCO 9 group of unskilled workers decreased by 3.1 pp and group 6 of agricultural workers by 2.9 pp). At the same time, the occupational group of semiskilled workers (ISCO 8) with relatively "good" characteristics shrank by 2.9 pp, while the group of trade workers (ISCO 5) with relatively "bad" characteristics gained 2.8 pp.

Though the question on the prevailing direction of structural change remains open so far, we observe a massive reallocation. Given impressive economic growth and a significant increase in real wages during the period under study, one can expect that the reallocation was job quality enhancing. This means that the fraction of "bad" jobs falls, while in contrast, the fraction of "good" jobs rises.

We start our analysis by applying educational criteria to generate job quality rankings.

As Fig. 1a suggests, the annual outflow from the lowest quintile (containing the "worst" jobs) included almost 350 thousand workers. Meanwhile, the inflow into the upper quintile was even larger and made approximately 570 thousand. Three middling quintiles were also net recipients, though to a lesser degree (with the annual net gain of 35–150 thousand). In the pre-crisis subperiod (2000–2008), the outflow from the lowest quintile and the inflow into

[4] Capital letters attached to the titles of economic activities are standard ISIC codes.

the upper one were 1.5–2 times greater than in the second post-crisis subperiod (2008–2012). Therefore, high growth rates were associated with the acceleration of economic restructuring, while the crisis events of 2008–2009 caused the deceleration. However, although annual net employment gain decreased from 720 thousand over the first subperiod to 230 thousand over the second, the direction of reallocation did not change: "bad" jobs were destroyed while "good" ones were created.

Fig. 2a uses relative measures for painting the same reallocation picture. As we can see, all changes affected the extreme quintiles, while the middling part remained quite stable. In 2012, as in 2000, each of the three middling quintiles accumulated approximately 20% of the total employment. Changes at the either end of the distribution were impressive. The "bad" jobs segment shrank (in employment) by 8 pp, while the "good" jobs fraction expanded by 8 pp. Changes

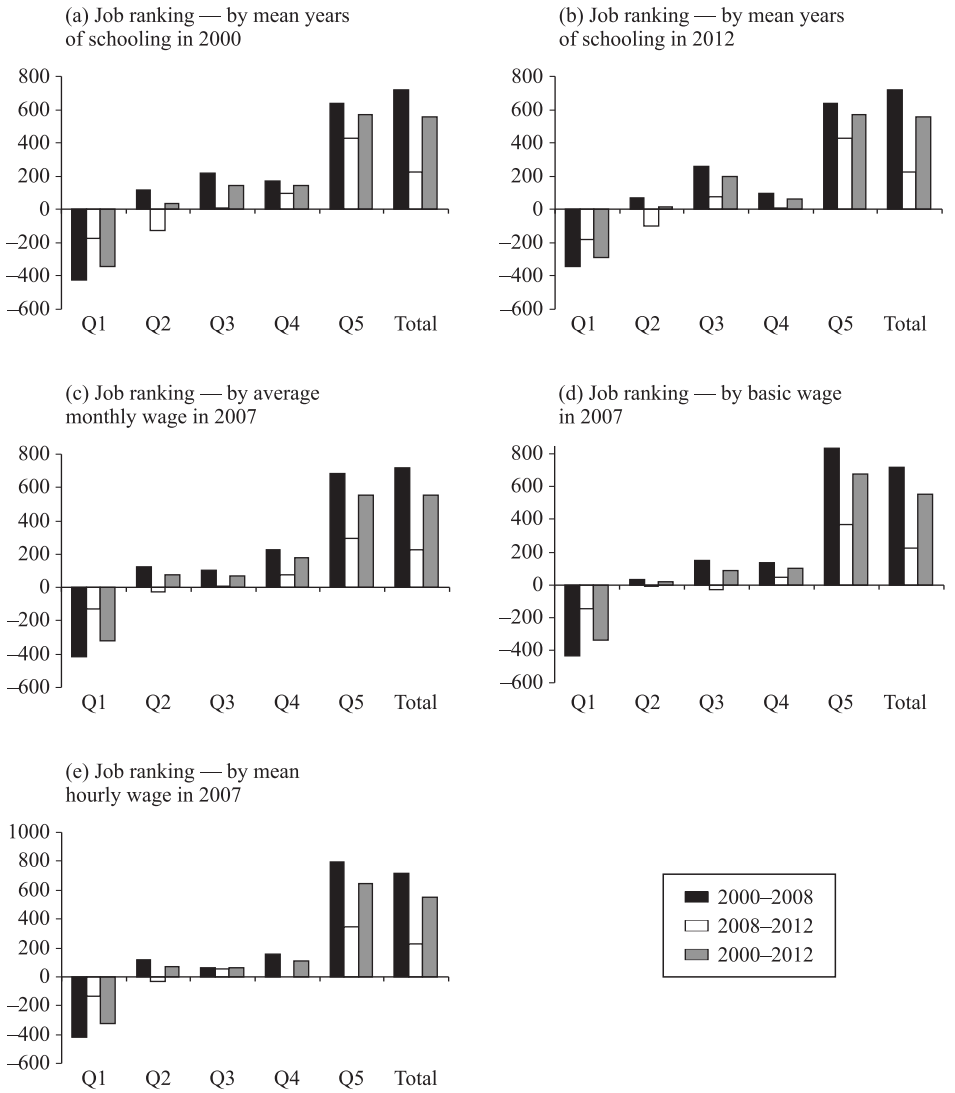

Fig. 1. Absolute annual average changes in the number of workers per job quintiles, 2000–2012, total economy (thousand persons).

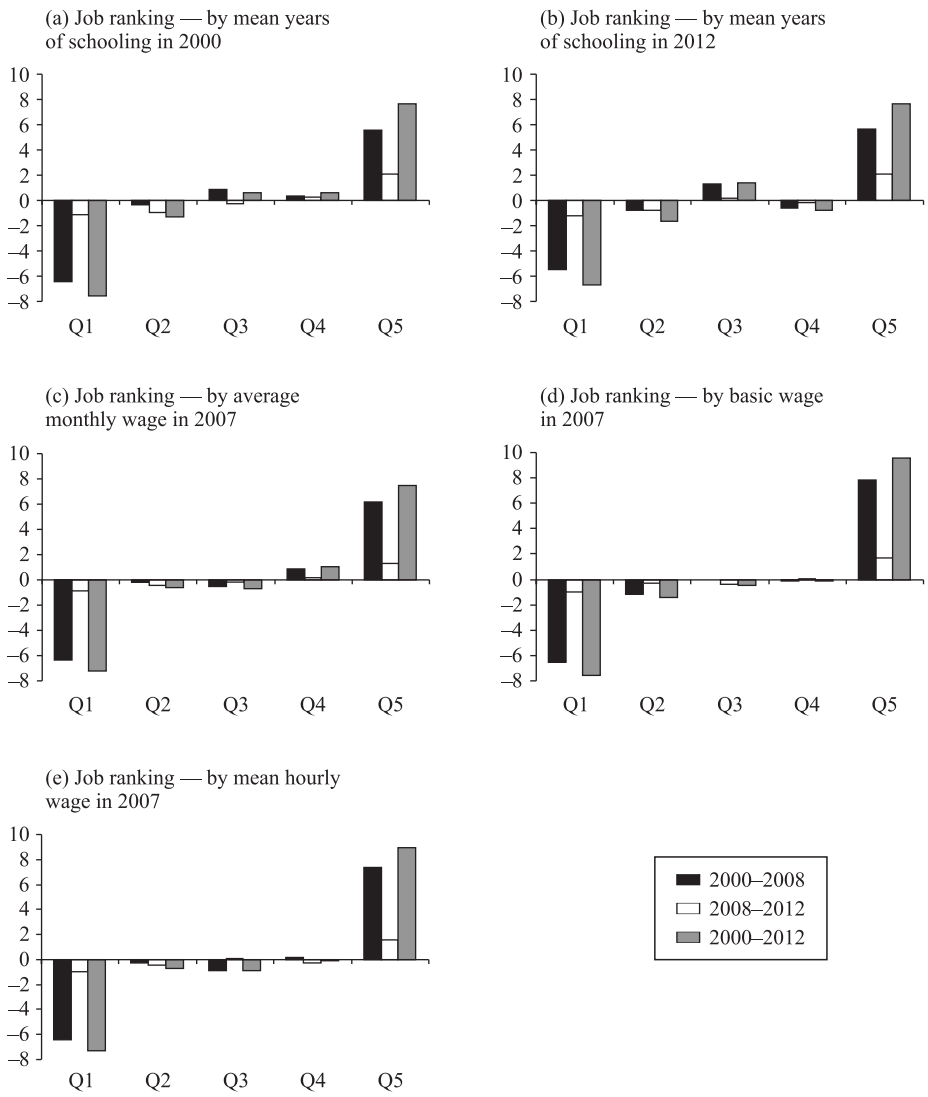

Fig. 2. Changes in job structure by quintiles, 2000–2012 (percentage points).

that we observe appear to be quality enhancing without any visible symptoms of polarization.[5]

The analytical methodology applied above assumes that ranking of relative job quality (in this case, based on the duration of schooling averaged by job cells) seems to be stable over time. If a job was "bad" in 2000, in 2012, it remains as "bad", as it was before. The same is also true in relation to "good" jobs. In other words, the relative quality of jobs in the ranking is fixed. Of course, this is our assumption because the relative quality of jobs may change over time driven by

[5] The EU-based studies suggest that there are differences in the observed patterns of employment contingent upon what type of rating is applied. Education-based rankings are more likely to indicate monotonic upgrading, while wage-based rankings are more likely to indicate mixed upgrading/polarisation pattern (Fernández-Macías et al., 2012).

various factors. If the educational content of some job cells shifts (for example, technology makes particular occupations more/less educationally requiring and intensive), relative rankings are likely to shift as well.

To test whether this ranking is inter-temporarily robust, we re-estimate it (the duration of schooling as the quality criteria) with 2012 as the base year. Expectedly, the results are almost identical given the high correlation between these two rankings. Fig. 1b documents that absolute increases by quintiles are similar to what we observed using the 2000-based ranking. Structural reallocation was extremely intensive before the 2008–2009 crisis but slowed down afterwards. Again, all changes (with opposite signs but of similar magnitude) were concentrated in the extreme quintiles, while the middling quintiles remained stable (Fig. 2b).

Surprisingly, moving to wage-based rankings, we obtain similar results (Figs. 1c–1e). The bottom quintile lost approximately 320–340 thousand per annum, while the upper quintile gained on the order of 550–680 thousand. These estimates are close to those presented earlier in both absolute and relative terms. The bottom segment lost 7–8 pp, the upper segment gained 8–10 pp, and the middle segments changed little (Figs. 2c–2e).

Summing up these exercises, one can suggest that, in the 2000s, the Russian economic growth was job quality enhancing. "Bad" jobs (given the selected criteria) were progressively destroyed, and "good" jobs were created instead.

5. Sectoral dimensions

While the economy at large shifts from "bad" to "better" jobs, some segments may move in the opposite direction. Presenting the anatomy of changes in the job structure, for the sake of brevity, we rely on the 2007 wage-based rankings. However, we will refer to the 2000 education-based rankings as well when these criteria bring widely diverting outcomes.

Gender. Fig. 3a presents average absolute employment increases for men by job rating quintiles. On average, during 2000–2012, the number of men in the earnings-defined bottom quintile decreased by 206 thousand annually. Meanwhile, the upper quintile gained 382 thousand per annum. The third and fourth quintiles grew as well, though at a very slow rate, while the second quintile shrank slightly.

As for women, we also observe a rapid loss of employment in the lowest part and gains in the upper part of the distribution (Fig. 3b). Annual average losses at the bottom were 114 thousand, and gains on the top were 172 thousand.[6]

Cumulative losses in relative terms made 4.4 pp for males in the bottom quintile, while the upper quintile added 5.1 pp. (Fig. 4a). Cumulative increases in female employment (compared to men) were smaller in the lowest as well as in the upper quintiles. In the former, this caused a change of 2.9 pp and in the latter

[6] The education criterion provides very similar results but with reversed gender asymmetry. If men gained relatively more in terms of earnings, women benefited more on the educational scale. This reflects the fact that Russian men have a positive gender earnings gap but a negative educational gap. Exactly the same gender asymmetry in terms of education is typical for the EU, both at the aggregate level and within most member states. However, in EU countries, educational outperformance is observed usually only for young women compared to young men, while in Russia it is observed over the entire age scale.

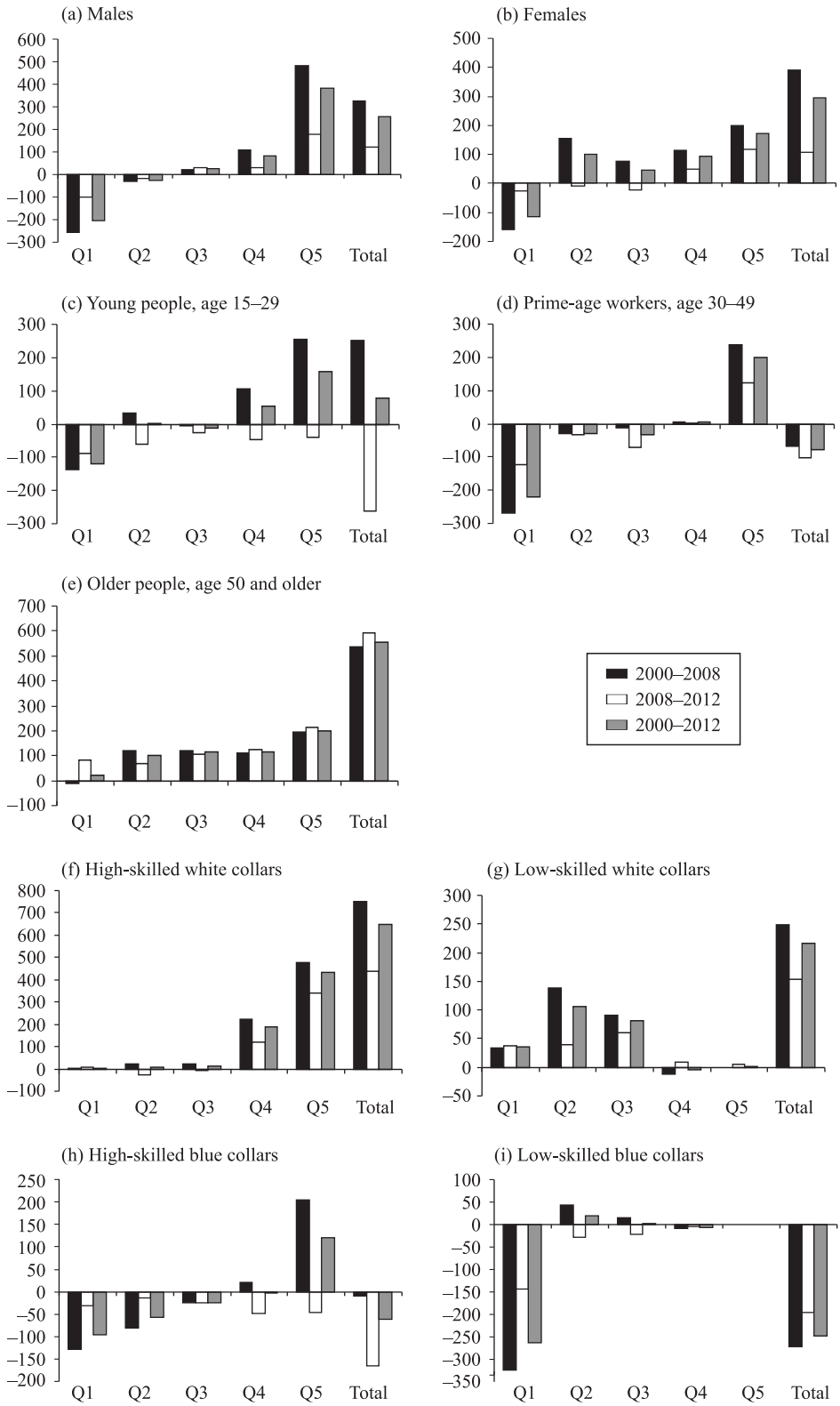

Fig. 3. Absolute annual average changes in the number of workers per job quintiles by socio-demographic groups, 2000–2012 (thousand persons; job ranking — by average monthly wage in 2007)

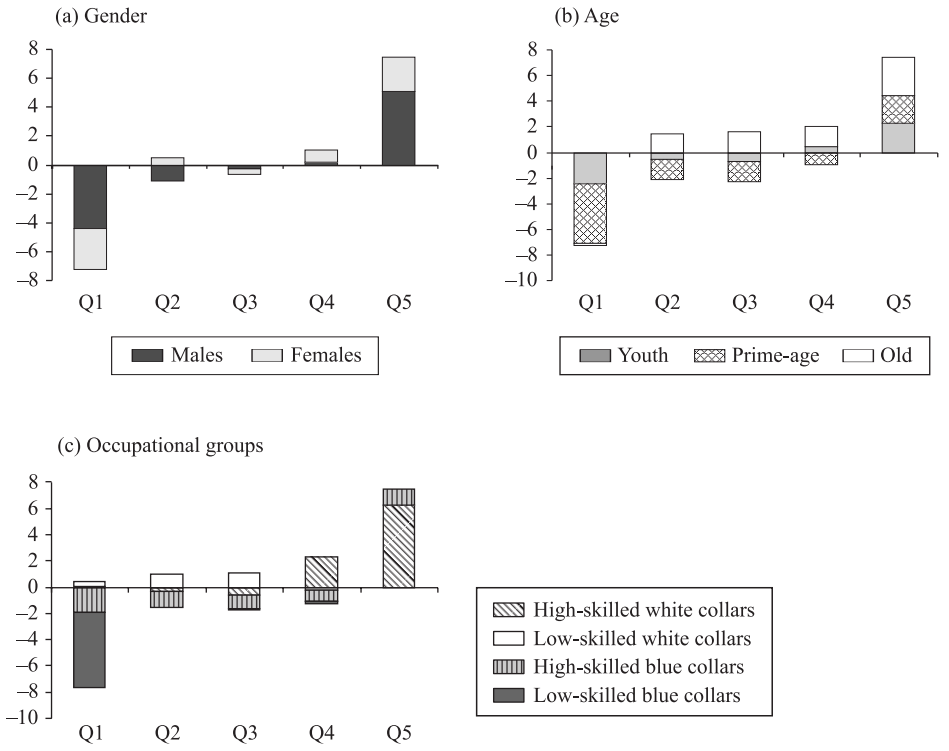

Fig. 4. Changes in job structure by quintiles and socio-demographic characteristics, 2000–2012 (percentage points; job ranking — by average monthly wage in 2007).

a change of –2.3 pp. In other words, the contribution of men into job reallocation exceeds that of women by two times.[7]

Age. Figs. 3c–3e provide estimates for three age groups: youth (15–29 years old), prime age (30–49) and older ages (50–72).

Estimates for youth vary markedly across two subperiods (Fig. 3c). The differences are partially explained by deep demographic changes caused by reduced birth rates in the 1990s. In the first (pre-crisis) subperiod, the total number of youth employed grew by approximately 250 thousand per year. In the second (post-crisis) subperiod, this age group shrank even faster (on average by 262 thousand per year). This age-related recomposition could seriously affect reallocation across the job quality spectrum. In the first subperiod, the bottom quintile lost approximately 137 thousand per year, while the top gained 254 thousand. In the second, the speed of change decelerated sharply. The bottom kept decreasing, however, in a smaller quantity of 90 thousand per year, while the top stopped gaining.

For the prime age group, no visible difference by subperiods is observed (Fig. 3d). (The size of this age group was in stable decline during the whole period.) The bottom quintile lost annually on average 220 thousand prime-age workers, while the top enjoyed almost symmetrical gains. The second and third quintiles also experienced employment declines, while the fourth quintile stagnated.

[7] At the same time, the contributions of men and women into the overall recomposition of employment were quite similar if the educational scale is applied.

For older-age workers, the reallocation picture was completely different (Fig. 3e). The absolute size of this demographic group kept increasing along the whole period, adding over half a million of workers annually. This massive inflow affected the entire distribution of jobs. It added almost equally to all quintiles except the bottom quintile. However, even the bottom quintile that accumulated the "worst" jobs showed some signs of growth in the second subperiod.

These multi-directional changes for different age groups are better understood if relative estimates are used (Fig. 4b). We can easily see that the major contribution into the shrinkage of the bottom quintile comes from prime-age workers. They explain two thirds of the total contraction of "bad" jobs. The rest was contributed to by youth, while the older-age group contributed little to this contraction. At the same time, all age groups added almost equally to the expansion of "good" jobs. The most interesting is, however, what occurred in the middling section of the job quality distribution. As Fig. 4b suggests, the outflow of prime age and young (though to a lesser extent) workers from three middling quintiles was compensated by the inflow of older-age workers. In fact, the latter age group saved middling jobs from a deep contraction.

Occupations. The question we are trying to address here is the following: how were particular occupational groups affected by the general trend towards "better" jobs? Did they all fit the trend or, most likely, when some fit the trend, did others move in the opposite direction? To answer this, we divided all workers into 4 aggregate occupational groups: high-skilled white collars (ISCO 1–3); low-skilled white collars (ISCO 4-5); high-skilled blue collars (ISCO 7–8), and low-skilled blue collars (ISCO 6 and 9). Figs. 3f–3i shed some light on this.

Unsurprisingly, high-skilled white-collar workers are concentrated in the two upper quintiles. Their inflow increased by 190 thousand per year in the fourth quintile and by 433 thousand in the fifth one (Fig. 3f). Their numbers in other quintiles did not change. This means that the massive inflow of high-skilled white collars in 2000–2012 (approximately 625 thousand per annum) was nearly fully absorbed by "good" jobs in the upper quintiles with little leakage downward.

Access to jobs looked different (Fig. 3g). Most of low-skilled white collars landed in middling jobs, while accession to the upper quintiles was practically closed. Changes in the bottom quintile were modest but positive.

As for high-skilled blue-collar workers, their absolute employment level tended to decrease (Fig. 3h). This decrease began after the crisis and was voluminous, with an annual outflow of approximately 170 thousand. However, if the first 4 quintiles lost high-skilled blue collars (the largest annual outflow of approximately 100 thousand workers was in the "worst" first quintile), the fifth gained approximately 120 thousand per year.

This pattern has a simple explanation. Many Russian high-skilled blue-collar workers benefit strongly from additional pecuniary compensations for working in hazardous conditions or in unfriendly climate zones (according to Table 4, Russian skilled and semiskilled workers earn nearly as much as highly skilled professionals).

Findings for low-skilled blue collars seem to be quite straightforward (Fig. 3i). In 2000–2012, this category downsized quickly (at the rate of a quarter of million per year) and mostly in the bottom quintile. The other quintiles experienced little change.

In summary, if the shrinkage of the bottom quintile was driven mostly by outflow of blue-collar workers (both low- and high-skilled), the expansion at the top was almost exclusively due to the inflow of high-skilled white collars (Fig. 4c).

Industry-related variations. We begin the overview of sectoral patterns by looking at Agriculture (sector A in ISIC). This sector typically comprises the least skilled and paid labor (Fig. 5a). The restructuring caused here a rapid outflow of workers from the bottom quintile. The annual loss in agriculture amounted to over 300 thousand workers in "bad" jobs, and this contraction occurred at high speed during both subperiods. Other quintiles remained practically unaffected. As a result, the agricultural sector (through its contraction) made a heavy contribution into improvement of job composition in the economy at large.

Manufacturing (D) and Construction (F) occupy intermediate positions in terms of skill and pay levels. However, changes in their job structures took different directions (Figs. 5b–5c). In construction, job gains were strongly skewed

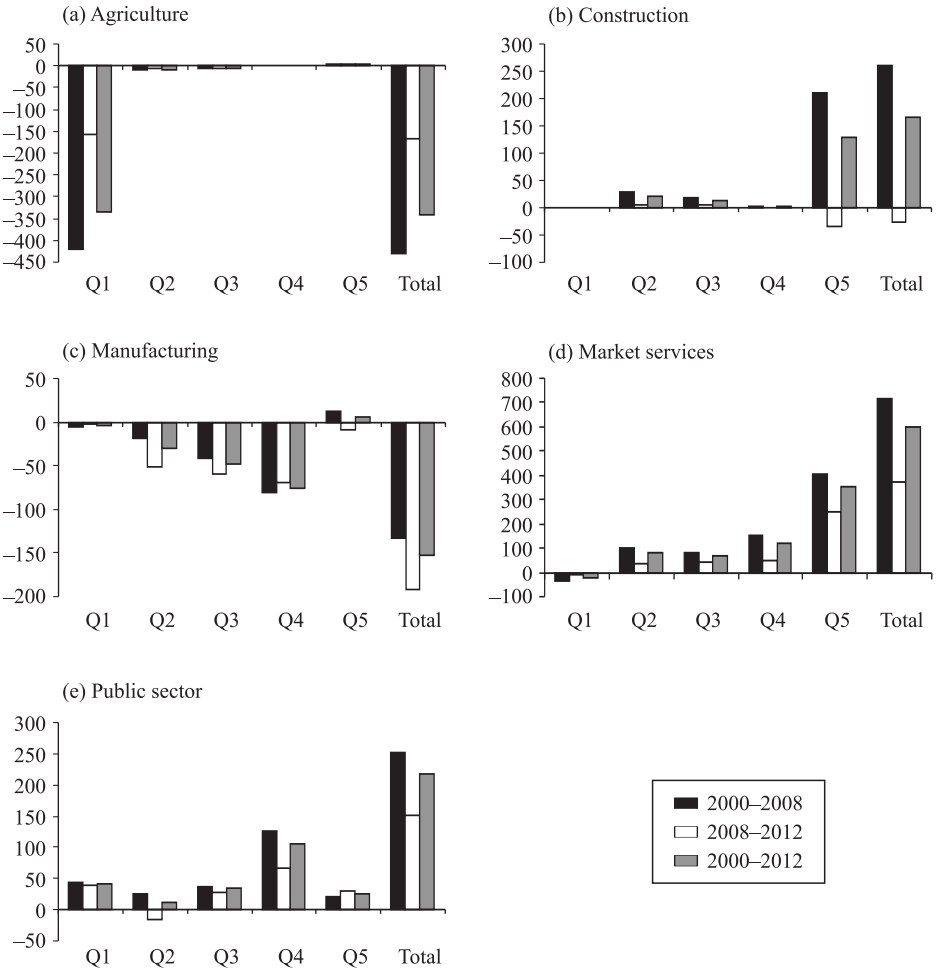

Fig. 5. Absolute annual average changes in the number of workers per job quintiles by sectors, 2000–2012, (thousand persons; job ranking — by average monthly wage in 2007).

towards the top quintile, where employment grew persistently, while in the other quintiles, it did not. However, the rapid increase in "good" jobs in the pre-crisis period turned into a slight decrease after the crisis.

Manufacturing (unlike Construction) lost jobs monotonically as a consequence of ongoing deindustrialization. These losses were materialized mostly in three central quintiles, while the bottom and the top quintiles remained virtually stagnant. As a result, the Russian manufacturing experienced a type of "job polarization", though in a weak form without any visible employment growth at the tails of job distribution.

In Market services, we observe slight contraction at the bottom and expansion up along the ranking. Higher-quality quintiles tend to expand more (Fig. 5d). The second quintile gained 80 thousand employees per year, while the fifth added in size approximately 350 thousand.

Non-market services (the public sector made of Education (M) and Healthcare (N) and Public administration (L)) followed another pattern (Fig. 5e), gaining employment in all quintiles, though the top gained less than others.

Fig. 6 shows relative contributions of different sectors into general change in job composition. For convenience, we divide the sector of Market services into two subsectors, namely (i) Trade and (ii) Other market services. The shrinkage of the bottom quintile is largely explained by employment reduction in Agriculture. This explains a 6.5 pp reduction of a total of 7.6 pp. Contributions of Manufacturing and Other market services are much more modest (–0.1 pp and –0.6 pp, correspondingly).

Employment in middling jobs was destroyed more actively by Manufacturing, while it was created by Market services. As for top quintile jobs, the expansion here was due to Other market services (3.7 pp), Public sector (0.4 pp), Construction (1.8 pp) and Trade (1.5 pp). The impact of Manufacturing appeared to be slightly negative, reflecting the fact that the creation of "good" jobs occurred here much slower than in other industries.

Summing up this part of the discussion, we can argue that liquidation of "bad" jobs was driven mostly by Agriculture and the expansion of "good" ones, mostly by Market services.

Technological advancement. Technological level by industries varies within the broad range. Based on R&D expenditures, manufacturing industries can be di-

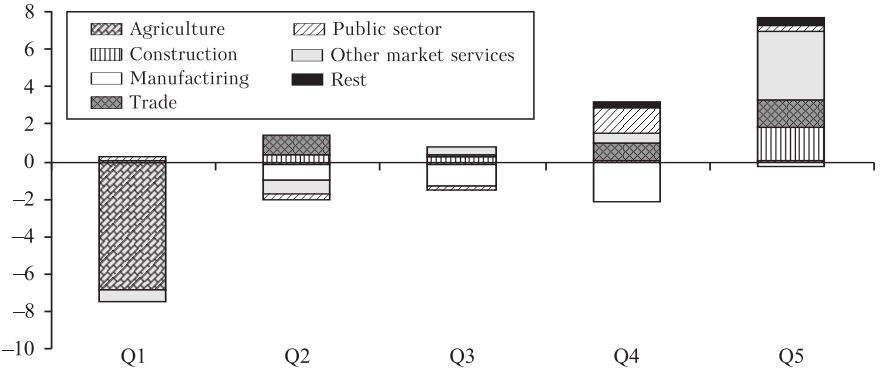

Fig. 6. Changes in job structure by quintile and sector, 2000–2012 (percentage points; job ranking — by average monthly wage in 2007).

vided into high tech, medium-high tech, medium-low tech and low tech.[8] Market services can be knowledge-intensive (the high tech knowledge-intensive services as a special segment can be further singled out) and knowledge-non-intensive.[9] These classifications help better understand whether the ongoing structural change is driven by the technological progress or is neutral to it. Related estimates are presented in Figs. 7–8.

The contraction of employment in Manufacturing that we mentioned earlier affects all industries regardless of their technological level and is reflected in all quality quintiles (Fig. 7). (The only visible exception is the top quintile of low tech industries that expanded little from 2000–2012). Major losses were concentrated in the middling quintiles of medium tech industries. In other words, positive structural changes in the job composition that we document here were not associated with reallocation of labor from low and medium tech manufacturing into high tech.

A similar story applies to Market services (Fig. 8). In the top quintile, we observe no growth driven by the expansion of high tech knowledge-intensive services, though in other segments of the market services, the number of "good" employment positions increased. Less knowledge-intensive services gained annually approximately 250 thousand employees in "good" jobs, while knowledge-intensive services added 140 thousand.

Therefore, Manufacturing hardly experienced any structural shift towards "good" jobs, while in Market services this shift, though present, affected mostly less knowledge-intensive industries. As Fig. 7b suggests, the contribution of high tech manufacturing into compression of the bottom quintile and expansion of the top quintile was almost negligible. The same can be said about high tech knowledge-intensive services (Fig. 8b). Meanwhile, the contribution of less knowledge-intensive services into reduction on the bottom and creation on the top was considerable.

In summary, for any part of the Russian economy (except manufacturing) we have no evidence suggesting polarization or total degradation of job composition. In most cases, we observe enhancement of the employment structure and, in some sectors, expansion in the middle and flattening on the tails. As the main provider of middling jobs, manufacturing industries have been replaced by Trade

[8] *High technology manufacturing:* man. of office machinery and computers; man. of radio, television and communication equipment and apparatus; man. of medical, precision and optical instruments, watches and clocks. *Medium-high technology manufacturing:* man. of chemicals and chemical products; man. of machinery and equipment; man. of electrical machinery and apparatus; man. of transport equipment. *Low and medium-low technology manufacturing:* man. of food products, beverages and tobacco; textiles and textile products; leather and leather products; wood and wood products; pulp, paper and paper products, publishing and printing; man. of coke, refined petroleum products and nuclear fuel; man. of rubber and plastic products; basic metals and fabricated metal products; man. of other nonmetallic mineral products (Felix, 2006).

[9] *High technology knowledge-intensive services:* post and telecommunications; computer and related activities; research and development. *Knowledge-intensive services*: water transport; air transport; post and telecommunications; financial intermediation; real estate, renting and business activities; education; health and social work; recreational, cultural and sporting activities. *Less knowledge-intensive services:* hotels and restaurants; land transport; transport via pipelines; supporting and auxiliary transport activities; activities of travel agencies; public administration and defense; compulsory social security; sewage and refuse disposal, sanitation and similar activities; activities of membership organization n.e.c.; other service activities; activities of households as employers of domestic staff; extra-territorial organizations and bodies (Felix, 2006).

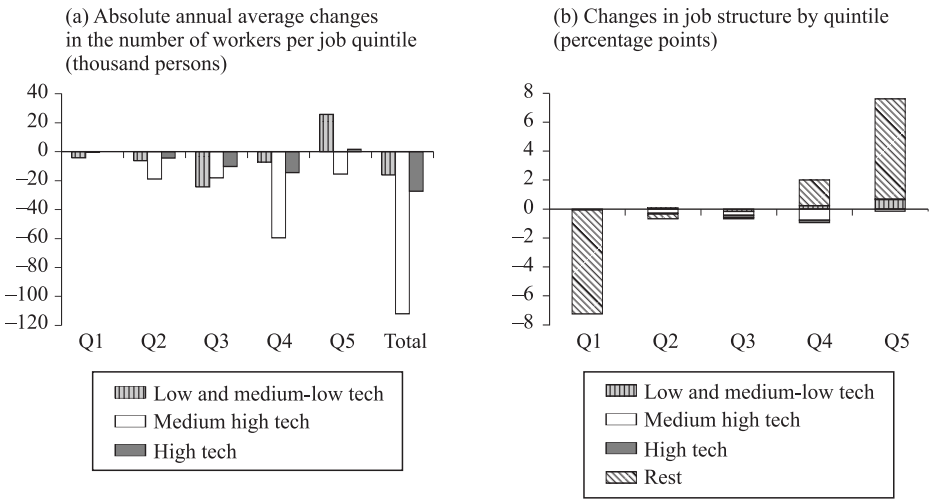

Fig. 7. Manufacturing industries with different technological levels, 2000–2012 (job ranking — by average monthly wage in 2007).

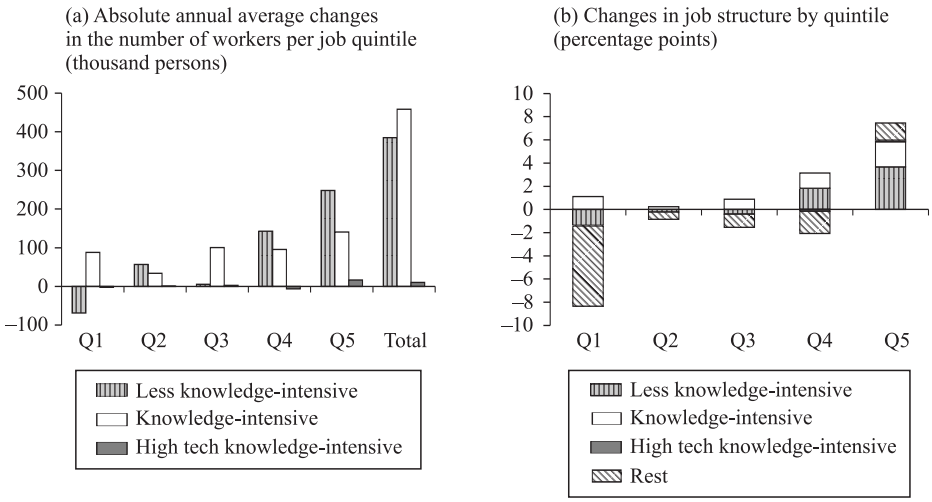

Fig. 8. Services with different levels of knowledge intensity, 2000–2012 (job ranking — by average monthly wage in 2007).

and Other market services sectors. Meanwhile, the impact of technologically advanced industries in structural changes remained minimal.

6. Demographic profiles of "good" and "bad" quintiles

In this section, we look at the demographic composition of the quality quintiles using a wage-based measure.

"Bad" jobs from the bottom quintile are largely (by $^2/_3$) populated by women (Table 7). This is mirrored at the top.

Jobs in the first quintile are much more likely to attract young people (younger than 20) and those older than 60. Both age groups lag in earnings behind the prime age. Other quintiles have little in terms of age specificity. Job quality shows no

Table 7
Socio-demographic profiles of job quintiles, 2012 (%; ranking by average monthly wage in 2007).

Groups	Q1	Q2	Q3	Q4	Q5	Total
By gender						
Males	43.6	30.7	39.5	59.8	69.9	51.0
Females	56.4	69.3	60.5	40.2	30.1	49.0
By age						
Less than 20	2.5	1.1	0.4	0.3	0.1	0.7
20–29	15.5	27.2	22.0	24.3	21.8	22.6
30–39	20.5	26.5	25.9	26.6	27.8	26.0
40–49	23.7	22.9	24.8	23.2	24.8	23.9
50–59	28.2	18.8	22.5	21.6	21.8	22.1
60 and more	9.5	3.4	4.5	4.1	3.6	4.6
By educational attainment						
University	6.3	16.4	29.3	37.6	46.7	30.2
Technical college	19.5	31.4	33.0	27.5	19.9	26.2
Vocational (secondary)	23.2	21.6	17.7	19.1	17.9	19.6
Upper secondary	37.8	26.3	17.1	13.9	13.6	20
Lower secondary	11.9	4.1	2.8	1.8	1.8	3.7
Primary	1.2	0.3	0.2	0.1	0.1	0.3
By marriage status						
Married	67.2	61.4	66.2	67.9	71.0	67.1
Not married	32.8	38.6	33.8	32.1	29.0	32.9
By residence						
Urban	43.2	76.9	77.9	85.3	85.4	76.8
Rural	56.8	23.1	22.1	14.7	14.6	23.2
By tenure						
Less than 1 year	15.3	15.0	9.8	9.0	9.7	13.1
1–3	17.1	19.2	13.6	14.2	14.2	15.1
3–5	14.5	15.8	13.4	13.9	13.8	13.9
5–10	22.5	23.8	23.1	25.3	26.7	24.2
More than 10 years	30.6	26.3	40.1	37.6	35.5	33.7
By occupations						
Legislators, senior officials and managers	0.0	0.0	0.1	4.3	27.0	8.3
Professionals	0.2	4.0	25.3	27.4	29.0	19.4
Technicians and associate professionals	5.7	21.0	18.8	24.2	5.8	15.2
Clerks	4.3	3.3	6.6	1.7	0.0	2.8
Service workers	12.5	46.4	14.2	5.7	0.4	14.7
Skilled agricultural workers	25.2	0.3	0.1	0.1	0.0	3.4
Craft workers	3.6	4.4	12.5	25.4	15.9	13.5
Plant and machine operators and assemblers	10.6	1.4	13.8	10.4	21.9	12.5
Elementary occupations	37.9	19.2	8.4	0.8	0.0	10.4
By sectors						
Agriculture	49.2	1.8	0.8	0.0	1.2	7.2
Mining and quarrying	0.0	0.0	0.1	0.7	6.8	2.0
Manufacturing	0.6	11.2	14.4	30.9	12.5	15.0
Electricity, gas and water supply	1.4	0.9	3.6	7.1	2.9	3.3
Construction	0.0	3.1	2.6	1.5	22.1	7.5
Wholesale and retail trade	0.0	44.8	8.3	13.3	11.0	16.1
Hotels and restaurants	0.0	7.5	0.7	1.8	0.6	2.1
Transport and communications	0.0	2.4	8.9	5.6	22.1	9.4
Financial intermediation	0.0	0.2	1.5	0.3	6.0	2.0
Real estate	4.2	0.5	8.2	6.7	11.0	6.6
Public administration	6.5	8.7	4.1	16.8	2.6	7.6
Education	18.1	15.3	18.4	2.1	0.0	9.3
Health and social work	15.5	1.8	18.5	8.8	0.9	8.0
Other service activities	4.5	1.8	9.9	4.4	0.3	3.8

association with the marital status of workers. Employment in "bad" jobs is, as expected, biased towards rural residents who make up to 60% of the bottom quintile but less than 15% of the upper one.

Higher quintiles have larger fractions of workers with higher education and smaller fractions of those with lower education. In the bottom quintile, over 10% of workers have an educational attainment less than lower secondary, while in the upper quintile, this fraction is under 2%. As for holders of university level diplomas, the corresponding shares are 10% and 50%. In general, the higher the quintile, the higher the share is of well-educated workers.

The occupational composition also differs markedly across quintiles. The lower quintiles attract mostly blue collars, while the upper ones attract mostly white collars. The fraction of low-skilled workers in the first quintile is close to 40% and in the fifth is almost zero. The fraction of the ISCO 1 group in the first quintile is under 0.5% but accounts for 60% of employment in the upper quintile.

Half of all "bad" jobs are agricultural, and the contribution of the public sector is close to 40%. A few industries (Mining, Transportation, Finance) generate no "bad" jobs at all. Among main providers of employment to the "good"—meaning best paid—jobs are Construction, Transportation, Manufacturing, Trade and Real estate.

Findings emerging from the simple bivariate analysis can be supported by simple econometrics. We estimate an ordered probit model where the quintile distribution of the LFS respondents is on the left-hand side. Correspondingly, the dependent variable takes values from 1 to 5 (Table 8). Major individual de-

Table 8
Ordered probit for earnings-based quintiles, coefficients and standard errors (SE).

	Coef.	SE
Males	0.717***	0.003
Age under 20	ref.	ref.
Age 20–29	0.521***	0.017
Age 30–39	0.468***	0.018
Age 40–49	0.419***	0.018
Age 50–59	0.358***	0.018
Age 60 and more	0.057***	0.019
University	0.927***	0.005
Technical college	0.406***	0.004
Vocational	0.211***	0.005
Upper secondary	ref.	ref.
Lower secondary	–0.290***	0.008
Primary	–0.581***	0.028
Married	0.020***	0.003
Urban	0.503***	0.003
Tenure less than 1 year	ref.	ref.
Tenure 1–3 years	0.462***	0.008
Tenure 3–5	0.435***	0.007
Tenure 5–10	0.489***	0.007
Tenure 10–20	0.580***	0.007
Tenure more than 20 years	0.640***	0.006
Number of obs.	511 573	
LR chi^2 (18)	151 080.21	
Log likelihood	–742 073.1	
Pseudo R^2	0.0924	

Note: *** $p < 0.01$.

mographic characteristics comprise the right-hand side of the equation. All coefficients are statistically highly significant and have expected signs.

Compared to women, men are more likely to belong to higher earnings quintiles other things being controlled for. The effect of age is clearly non-linear. The strongest positive effect of age on the earnings-based quintiles is in the 20–29 age group and then dwindles monotonically. However, it remains positive compared to the reference age even in the oldest age group. The outlying position of the youngest group is explained by the fact that most of individuals of that age tend to continue education and the transition to full-time work happens for them later in life. Being married and living in a city enhances the chances of being in the higher quintiles. Having a better education and belonging to the first two ISCO groups (other things being equal) emerge as strong predictors for being paid well. On the contrary, being low-skilled or being an agricultural worker raise likelihood of low pay.

7. How robust are our estimates?

Though all our exercises provide outcomes in favor of upgrading, not polarization, some doubts still remain. Our conclusions depend on data of less-than-superior quality. If middling jobs are those for which we rely heavily on wage imputations, a high risk of biased estimates cannot be totally excluded. This caveat deserves to be addressed explicitly.

In ranking occupation-industry cells according to the earnings-based criterion, we use data covering large and medium-sized firms only (while earnings to unobservable cells are imputed). The wage ranking here may deviate significantly from the wage ranking in the total economy because small firms tend to pay less. This is likely in those industries where the fraction of employment outside large and medium-sized firms is large (Construction, Trade, etc.). In fact, comparing our main wage data source (the SEO) with official aggregate data (where small firms are partially accounted for), we see serious deviations in Construction and Trade. These two industries have a heavy concentration of small firms. The actual deviation can be larger because no official estimates account for informal activity, which is even lower paid but is more widespread in the same sectors. Therefore, imputing to such workers "invisible" (to the SEO) higher wages, we erroneously inflate the upper quintile and can distort the whole distribution.

First, this objection does not relate to the education-based estimates because the level of education is measured properly for all workers. Second, the collapse in the lowest quintile seems indisputable. Third and finally, even if Trade and Construction are completely excluded, the upper quintile expands by approximately 4 pp. Therefore, the upgrading scenario holds.

Another caveat relates to the issue of migrant labor. During the period under study, the Russian labor market experienced a large inflow of low productive and low educated temporary migrant workers from the CIS countries. Most of them land in the least-skilled and poorly paid jobs. The LFS on which our estimates are based does not cover migrant workers. If "bad" jobs that become vacant due to an outflow of Russian workers are taken by migrants, then our conclusion about the drastic contraction of the bottom quintile may be erroneous because it is based on statistical mismeasurement.

Unfortunately, there is no reliable data on temporary migration to Russia. Most of the labor migrants work illegally and informally. A realistic guess for the stock estimate would be 4–4.5 million migrant workers or 5.5–6% of the total employment (close to the official estimates provided by Rosstat) in 2012. If we were to take the strong assumption that the number of migrants tripled over 2000–2012 and that all of them were in the "bad" job quintile, then our estimates of the compression should decline from 7 pp to 3 pp. However, even in this case, our general conclusion remains valid.

8. Conclusions

This paper investigates changes in the composition of jobs in the Russian economy for the period of 2000–2012. Using five alternative criteria of job quality (two are education-based and three are earnings-based), we find out that during the period under study, the job structure did not demonstrate any signs of polarization. The ongoing structural change could be characterized as a progressive upgrading when the fraction of "bad" jobs decreased, while the fraction of "good" jobs tended to increase. This conclusion holds for the both subperiods, though the rate of change decelerated in the second one. In relative terms, the cumulative compression of the bottom quintile equaled 7–8 pp against the expansion on top by 8–10 pp. In the middling part of the ranking scale, the changes were minor. These findings are robust to any of the quality criteria applied.

According to the education-based criterion, the contraction in the bottom and expansion in the top quintiles were accounted for equally by male and female employment. However, according to the earnings-based criterion, the contribution of male employment is twice as large as that of women. Representation of prime-age workers in the bottom quintile dwindled, and in the top quintile, it rose more sharply than in other age groups. The contribution of youth and the older group into structural job change was also significant but was smaller in size than that of the prime-age group. As for the occupational characteristics of workers, the compression at the bottom was accounted for largely by blue-collar workers, and the expansion at the top was mainly attributable to high-skilled white-collar workers.

Shrinking agricultural employment is the major industry-level reason for the reduction in "bad" jobs. Industry-level drivers for the expansion of "good" jobs were Market services and Construction. Surprisingly or not, under these conditions, deindustrialization of the Russian economy (as significant contraction in the manufacturing employment) had little effect on the aggregate job quality distribution. Manufacturing lost employment predominantly in the three middling quintiles. As a result, it was the only sector where something such as "job polarization" was observed. Finally, the contribution of high tech manufacturing and services was small because their fraction in total employment remained negligible.

We estimate the incidence of "bad" and "good" jobs for workers belonging to different social and demographic groups. If the quality of jobs is ranked by the earnings-based criterion, then men, older, educated, married, urban residents, managers, professionals and skilled workers employed in mining, con-

struction, finance, transportation and communications have better chances to secure "good" jobs.

The key conceptual issue is how the Russian economy has managed to avoid the polarization trend observed in many developed countries. Instead, we observe the robust trend of upgrading. A similar story is documented for other medium-income countries in Central and Eastern Europe, where the upskilling has been driven by a rapidly growing supply of skilled labor and rapid contraction in agriculture (Hardy et al., 2016). What could be behind this in Russia?

Though multiple factors could be at work here, we consider the structural shift from the production of tradable goods to the production of nontradables as the main shift. This includes the large-scale downsizing in agriculture and manufacturing and the expansion of construction, public sector, trade, financial intermediation, and so on. The case of the agricultural sector is salient. Most of the agricultural jobs are low-skilled and poorly paid. During the period of 2000–2012, agricultural employment shrunk drastically in absolute as well as relative terms, thus collapsing the first quintile of employment. Low-skilled manufacturing jobs were located in the first quintile, and their decline also contributed to its contraction.

A more complex answer is needed to explain the expansion on the top. A few potential factors could be at work here.

First, the period under study saw an enormously rapid rise in real earnings, as annual growth rates reached 10–15%. On the one hand, this growth was driven by general recovery after the prolonged transformational recession when earnings lost almost two thirds of their real value. On the other hand, it was triggered by world oil prices that benefited Russia. Rising incomes might shift consumption towards higher quality goods and services. "Good" jobs in production of nontradables could emerge as a reaction to this consumption demand shift.

Second, there could be an endogenous supply side effect associated with the rapid expansion of tertiary education. According to the Russian Census data, during the period of 2002–2010, the fraction of workers with a tertiary-A level of education increased from 26% to 36%, and the fraction of workers with a tertiary-B level of education remained stable at the level of 36–37%. Thus, 3 of every 4 Russian workers have a tertiary education. It is easy to assume that such an increase in the supply of well-educated workers can make them much more available for firms and therefore stimulate demand for their labor. As a consequence of this endogenous shift in labor demand, we can see the expansion in skilled and well-paid employment.

Third, the skill-biased technological change (SBTC) could also be at work here. The SBTC is a complement to the human capital accumulation and demands a highly educated workforce (the modern IT sector is an illustration) (Acemoglu, 1998; Autor et al., 2003; Card and Di Nardo, 2002). Generating a demand for such workers, it stimulates the creation of well-paid jobs. Rapid IT expansion in Russia in the 2000s could serve as an argument supporting this explanation. However, the fact that the most technologically advanced industries employ a small labor force speaks against the SBTC hypothesis.

Finally, job upgrading could be driven by organizational change biased towards highly skilled labor (SBOC). Cross-national differences in technologies are among standard powerful predictors of variation in job (and skills) structures.

The IT-based economy and the pre-IT-based economy are structurally different in this regard. However, different institutional foundations (here, we contrast market economies with those that are centrally planned) can also demand different occupations and skills and therefore ultimately affect the economy-wide composition of jobs. The Russian development in the 1990s–2000s is a story of intertwined movement in both dimensions — the technological as well as the institutional. In fact, the SBOC was an important component in the systemic plan-to-market transition. This transformation radically increased and modified flows of information and created a large and growing demand for workers who absorb and process all types of data. These are multiple white-collar occupations such as managers, lawyers, accountants, journalists, economists, and many others, who are employed in a variety of sectors. The demand for these skills was extremely low under the central planning and sharply jumped with the start of the transition. The opposite side of the same trend is in falling demand for many blue-collar occupations.

The aforementioned drivers could work (and most likely did) simultaneously, complementing each other, and their joint impact resulted in the fast expansion of the "good" jobs segment.

How can the Russian job structure develop in the future? The rate of structural change decreased in the post-crisis subperiod and is likely to slow down further for a few reasons. First, the long period of depopulation is approaching. By 2030, the size of the economically active population is expected to decrease by 8–12 million persons. In the 2000s, structural change occurred under conditions of growing total employment; now, it will have to adapt to declining total employment. In this new setting of coming depopulation, the scope for further expansion of top quintile jobs seems to be more limited. Second, many drivers of structural change discussed above are close to exhaustion. Agricultural employment has already downsized so much that there remains little scope for further and easy contraction. Third, the Russian economy is in a deep recession with likely prospects of long-term stagnation. This makes a rise in consumption similar to that observed in the 2000s impossible. The further rapid growth in the supply of educated labor is also hardly probable because its stock is already extremely large. Additionally, there are few preconditions for a rapid technological spurt. Finally, industrial and occupational employment gradually has become more similar to those observed in developed countries, and therefore, the room for further employment shifts in this direction becomes smaller.

Deceleration of the upgrading process does not mean that chances for the polarization scenario are likely to increase. The polarization hypothesis has emerged in relation to countries that are located close to the technological frontier. A hollowing of the middle is driven by advanced technological developments when deep automatization and computerization kill effectively medium-quality routine jobs. Russia is not that close to this frontier and needs many years to catch up. The current economic recession, accompanied by the self-isolation foreign and trade policy, is not the most fertile environment for large-scale technological improvements along the entire job distribution.

In summary, we can conclude that the upgrading trend is likely to slow down if not halt altogether. Whether and when the upgrading trend will be replaced by a polarizing trend remains to be seen.

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Appendix

The SEO covers large and medium-sized firms only and leaves out some categories in wage and salary employment (as well as all self-employed). The excluded group includes all subcontractors, part-timers, top managers, and all those working in small businesses with fewer than 15 employees. The survey also does not cover such sectors as Public administration (L), Agriculture (A), and Finance (J). Among the advantages of the survey is the nature of the earnings information, which is drawn from personnel and accounting records instead of simple personal interviewing. This procedure minimizes measurement errors generated by recall biases, incomplete knowledge, deliberate misinformation, and so on. Average earnings from the SEO are very close to the official estimates provided by Rosstat. In October 2007, the difference between the SEO-based average wages and the official estimate was less than 3%.

Unfortunately, the first SEO was conducted in 2005 only, and comparable estimates for earlier years do not exist. However, assuming that earnings-based job quality ratings are relatively stable over time, we use data for the year of 2007. This time point divides the period under consideration almost by half. First, using the same occupation-industry job cells (as we did for the LFS), we rank all jobs according to the average monthly wage earned. In the second step, we impute these rankings to the LFS-based job cells for 2000, 2008 and 2012. Comparing distributions of workers by job types/cells over time, we observe changes in composition of employment in terms of job quality measured by earnings.[10]

As we have already mentioned above, the distribution of workers by job cells provided by the SEO is censored because some sectors (A, J, and L) are not observed. To remedy this, we reconstruct earnings for missing job types using one more external data source, the Russian Longitudinal Monitoring Survey (RLMS), which is the nationally representative panel study of Russian households free from any industry-occupation censoring.[11] The initial RLMS sample included approximately 5 thousand households (approximately 12 thousand respondents) from 160 residences in 35 regions.

The imputation algorithm for earnings in missing cells ($W_{i,j}$) is given by the simple formula (1), where *W* stands for wage in job type, *SEO* and *RLMS* indicate data sources used for calculation of wages, *i* and *j* are occupation and industry, correspondingly, and *cov* relates to the mean value averaged for 11 industries covered by the SEO:

$$W_{i,j} = W^{SEO}_{i,\,\mathrm{cov}} \times \frac{W^{RLMS}_{i,j}}{W^{RLMS}_{i,\,\mathrm{cov}}} \tag{A1}$$

Using this formula, we reconstruct earnings for most of the job cells that are missing in the SEO but are present in the LFS. Even after this correction is introduced, some job cells remain empty. However, these tend to be marginal in terms of employment (altogether, these cells account for 0.3% of the total employment), and we can safely exclude them from our analysis without any significant loss of information. Additionally, if occupational classifications in the CEO and the RLMS deviated from those in the LFS, we aggregated neighboring groups and used the higher level of aggregation (for instance, subgroups ISCO-61 and ISCO-62 were merged in ISCO-60 — "Skilled agricultural workers").

[10] In 2007, average earnings varied across occupation/industry cells from 2.3 thousand rubles (ISCO-92/ISIC-13) to 41.8 thousand (ISCO-13/ISIC-3).

[11] The RLMS-HSE is conducted by the NRU Higher School of Economics and ZAO "Demoscope" together with Carolina Population Center, University of North Carolina at Chapel Hill, and the Institute of Sociology of the Russian Academy of Sciences. See more at http://www.hse.ru/en/rlms/.