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ABSTRACT

Polarization or Upgrading? Evolution of Employment in Transitionary Russia

This paper discusses the structural change in the Russian employment and explores whether the evolution of employment over 2000-2012 followed the scenario of progressive upgrading in job quality or brought about the polarization of jobs in terms of their quality. Jobs are defined here as occupation-industry cells and their quality is measured through relative earnings and education levels. 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 5 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

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1. Introduction[1]

The idea of this paper follows well-known debate in the economic literature. We look at the structural change in Russian employment and try to answer a simple but important question. Specifically, did the evolution of employment from 2000 to 2012 follow the scenario of progressive upgrading or did it instead bring the polarization of jobs in terms of their quality? The first possibility, *upgrading*, assumes the reallocation of workers from lower quality to higher quality jobs. The expected outcome here is that over time, the supply of 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, Murphy, 1992). On the other hand, the alternative scenario expects U-type employment change in which there is an increase in both "bad" and "good" jobs relative to the downsizing observed in medium quality employment. This case suggests a *polarization* of employment where both tails in the job quality distribution rise while the centre of the distribution falls (Autor, Levy and Murnane 2003; Goos and Manning 2007; Goos, Manning and Salomon 2009; Fernández-Macías, Storrie and Hurley 2012). The underlying reason for this type of job development is that middling jobs in the centre of the distribution tend to consist mostly of routine and repetitive tasks that can be easily computerized and thus eliminated. This scenario can be termed routine biased technological change (RBTC). Both hypotheses explain employment change as a function of technology development (via skills) but identify signs and affected zones differently.

Our paper first examines changes in Russian employment in the context of the SBTC and RBTC hypotheses. Several aspects make the Russian case interesting, some of which we refer to here. First, the Russian economy is quite large, a fact sufficient enough to attract research interest. Second, in the 2000s, Russia experienced fast economic growth when the GDP almost doubled, and this was associated with a rapid rise in real earnings. Third, commodity exports spearheaded this growth, which could have an ambiguous impact on various parts of job quality distribution. Fourth, the economic structure went through deep transformation marked by rapid contraction in the agricultural and manufacturing sectors amid simultaneous growth in the service sector. Finally, fifth, this was the period of explosive expansion of tertiary education. Though all of these changes in general were far from being unique to one country, they occurred

[1] This paper is a contribution to the project European Jobs Monitor: Global Changes in the Structure of Employment initiated by the European Foundation for the Improvement of Living and Working Conditions (Eurofound). The authors thank John Hurley for detailed and very useful comments. We acknowledge the support from the NRU HSE Basic Research Program.

with impressive speed and magnitude and were all concentrated in a relatively short time interval. Some of them can be considered the components of the SBTC, while others would point to the RBTC scenario. This ambiguity makes empirical testing even more interesting.

The empirical approach taken in this paper follows the general methodology accepted for the European Jobs Monitor: Global Changes in the Structure of Employment project (Fernandez-Macias, 2012; Fernández-Macías et al., 2012). The key conceptual issue concerns "job" and "job quality" definitions. Jobs are defined as occupation-industry cells, while their quality is measured as a function of relative earnings and education levels. In the study's first stage, we utilised detailed micro-data from a few complementary large-scale surveys to rank all jobs according to earnings and educational criteria and then divided these distributions into 5 quintiles. The first quintile represents the lowest quality jobs, while the fifth quintile represents the best quality jobs. In the second stage, we explored the dynamic changes in job quality and socio-demographic characteristics of workers in different quintiles.

Overall, the paper contains six sections in addition to the introduction and conclusions. Section 2 gives an overview of how the Russian labour market evolved over the period under study and describes 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. In Section 5, we compare major characteristics of "good" and "bad" jobs, while Section 6 examines job quintiles through the lenses of sectoral decompositions. Section 7 introduces social and demographic profiling of quintiles. In the conclusions, we discuss the main findings as well as caveats and constraints related to the study.

2. The Labour Market Developments

This section presents an overview of the major labour market developments in Russia.[2] The period under study was characterized by remarkable heterogeneity and macroeconomic volatility.

The country experienced a few drastic macroeconomic shocks in the 1990s and 2000s. For example, the years 1992, 1994, 1998, and then 2008 were marked by large decreases in output. 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 much milder employment reductions that totalled less than 15% within the same period. In other words, on average, each percentage point decrease in GDP resulted in a corresponding decline in employment of only 0.3–0.35 percentage points. This contrasted

[2] A detailed account of these developments is given in (Gimpelson and Kapeliushnikov, 2012).

strongly with initial expectations as well as the overall growth of employment in most of the Central and Eastern European (CEE) countries, where the elasticity was close to 1.

The financial crisis of 1998 marked the bottom line in the prolonged post-socialist economic decline. Afterwards, 1999 marked the first year in a 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 had increased almost 95% compared to 1998. As a result, these 10 consecutive years of economic boom positively affected all major labour market indicators. 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 2008-2009. It brought the GDP down by 8% (y-to-y) in 2009 and halted the expansion of employment. As an outcome of the crisis, unemployment went up again but modestly and for a relatively short period. Though the post-crisis (2010-2012) period was characterized by dampened growth, the employment-to-population ratio stayed high while the unemployment rate remained low. This macro performance of the labour market was largely driven by the combination of two major factors. On the one hand, ongoing demographic change associated with aging and a more highly educated population led to a decrease in the natural rate of unemployment; on the other hand, low wage floors might have also contributed to keeping the labour force employed.

A comparison of major employment indicators in the years 2000 and 2012 will be provided in greater detail in Section 4 of this paper. Here, it is sufficient to say that this evolution was accompanied by major improvements in aggregate outcomes in terms of wages and use of skills. One can say that the powerful tide of petrodollars shifted 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 one-fifth in 2000 to over 30% in 2012. This made Russia one of the world leaders in terms of having a formally educated labour force (though this says 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 sectoral and occupational compositions. Available data support the hypothesis that the economy has experienced a non-trivial sectoral reallocation of labour, and because occupational mixes vary across industries, we can expect to see large cross-occupational reallocation as well. These expectations turn out to be valid because goods-producing occupations lost workers, while trade- and services-related occupations expanded their shares (we discuss these trends in further detail later). The sub-

period 2000-2008 was marked by more intensive employment reshuffling than the second sub-period of 2008-2012. Though we have no fully comparable LFS data for the pre-2000 period, there is strong evidence suggesting that the reallocation across occupations was even more intensive then (Sabirianova, 2002).

These observations outline the general context for job reallocation in Russia from 2000 to 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 job structure utilised for this paper was the Labour Force Survey (LFS), known in Russia as the Population Survey on Employment Issues (PSE), administered by the official statistical agency (Rosstat). The survey was conducted annually from 1992-1998, quarterly from 1999 to August 2009, and monthly afterwards, sampling the adult population aged 15-72 years in all Russian regions. The annual number of observations totalled 540,000 in the initial period, 270,000-300,000 in 1997-2008, and was finally increased to approximately 800,000 in Sept 2009 and beyond. The PSE is routinely used to estimate employment and unemployment within the ILO-defined framework and is the basic source by which to construct data series on occupations.

Our analysis focuses on the period of 2000-2012. A few reasons motivated the choice of this time frame. In most of the 1990s, Rosstat used "Soviet-type" occupational and industrial classifications that were not ISCO- and ISIC/NACE-compatible. In addition, shifting from the quarterly to the monthly survey regime (in 1999), Rosstat introduced multiple methodological innovations that inhibited comparability over time. The year 1999 was not only the first one during which the new methodology (including the sampling frame) was applied but was also the first post-crisis year as well. To minimize measurement error caused by this volatility, we fixed the year 2000 as the base and divided the total period into two sub-periods of 2000-2008 and 2008-2012. The year 2008 marked the border between the economic boom observed in the first sub-period and the new crisis/post-crisis sub-period. For the chosen period, the occupational (OKZ) and industrial (OKVED) classifications applied by Rosstat were fully harmonized with standard ISCO-88 and ISIC, respectively.

For our analysis, we combined 2-digit coding of occupations (yielding 33 occupational groups) with 1-digit industries (17 industries). For the manufacturing sector, however, we used 2-digit coding, and this added 14 industries. This level of disaggregation yielded 990 (33x30) cells, of which 635 were not empty. Non-empty cells varied from 0.00004% (unskilled workers in tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harnesses and

footwear ISCO-91/ISIC-19)[3] of the total sample to 6.9% (sales persons in wholesale and retail trade ISCO 52/ISIC-7)[4] in 2012.

Using the PSE as the data source is far from ideal. Its main drawback is the lack of earnings data necessary to rank selected job cells on earnings-based quality. To overcome this constraint, we applied two alternative approaches to ranking jobs.

The first approach measured job "quality" using educational information from the PSE. It assumes that the educational credentials of workers in an occupation-industry-defined cell characterize the quality of this job. We call it the educational or education-based criterion. Information on respondents' education levels contained in the PSE can be converted into estimates of the duration of schooling[5]. The new indicator varied from 8.6 years (ISCO-6/ISIC-3) to 16 years (ISCO-22/ISIC-10) in 2012. For robustness, we used two education-based rankings accounting for average duration of schooling by occupation-industry cells at the beginning (2000) and at the end (2012) of the period. The second and primary approach was earnings based. We reconstructed earnings for each occupation-industry cell using alternative data sources and then imputed them to particular PSE-based job cells.

Most of the earnings-related information came from another Rosstat-administered source called the Survey on Earnings by Occupations (SEO, abbreviated in Russian as OZPP). It is conducted bi-annually, in October, and contains earnings data for approximately 750,000 workers from all regions of Russia. Unfortunately, the SEO can provide only a partial solution to the earnings data problem. Below, we explain how we tried to remedy it.

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 of 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 – drawn from personnel and accounting records instead of simple personal

[3] Figures after ISCO\ISIC relate to numbers of relevant groups in the classifications.

[4] This job cell is also one of the two largest in the EU, accounting for around 5% of the total workforce.

[5] We measured the duration, converting levels of education attained (in the Russian classification) into years of schooling according to the following scale: less than basic secondary = 6 years; incomplete secondary = 9 years; complete secondary = 11 years; vocational = 12 years; technical college = 13 years; incomplete higher education = 14 years; higher education = 16 years; postgraduate = 19 years.

interviewing. This procedure minimizes measurement errors generated by recall biases, incomplete knowledge, deliberate misinformation, etc. Average earnings from the SEO are very close to the official estimates provided by Rosstat. In October 2007, for instance, 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 used data for 2007. This time point divided the period under consideration by almost half. First, using the same occupation-industry job cells (as we did for the PSE), we ranked all jobs according to the average monthly wage earned. In the second step, we imputed these rankings to the PSE-based job cells for 2000, 2008 and 2012. Comparing distributions of workers by job types/cells over time, we observed changes in the composition of employment in terms of job quality as measured by earnings.[6]

As we have already mentioned above, the distribution of workers by job cells provided by the SEO was censored because some sectors (A, J, and L) were not observed. To remedy this, we reconstructed earnings for missing job types using an additional external data source, namely the Russian Longitudinal Monitoring Survey (RLMS), a nationally representative panel study of Russian households free from any industry-occupation censoring.[7] The initial RLMS sample included approximately 5,000 households (approximately 12,000 respondents) from 160 residence locales 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, respectively, and *cov* relates to the mean value averaged across the 11 industries covered by the SEO:

$$W_{i,j} = W^{SEO}_{i,\text{cov}} \times \frac{W^{RLMS}_{i,j}}{W^{RLMS}_{i,\text{cov}}} \qquad (1)$$

Using this formula, we reconstructed earnings for most of the job cells that were missing in the SEO but were present in the PSE. However, even after introducing this correction, some job cells

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

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

remained empty. They tended to be marginal in terms of employment (altogether, these cells account for 0.3% of the total employment), so we could safely exclude them from our analysis without any significant loss of information. Additionally, when occupational classifications in the CEO and the RLMS deviated from those in the PSE, we aggregated neighbouring groups and used the higher level of aggregation (for instance, subgroups ISCO-61 and ISCO-62 were merged in ISCO-60 – "Skilled agricultural workers").

The SEO contains various wage setting characteristics. It records total monthly earnings, hours actually worked, as well as data on wage composition. The latter includes three components: the basic and fixed within the contractual portion of earnings (the "basic or tariff-based part"), the variable part in the form of various premiums and bonuses (not rigidly fixed within individual labour contracts), and the "Northern" regional supplements. We controlled the robustness of the job ranking estimates using not only average earnings but also basic wage (without premiums and bonuses) and mean hourly wage.

Are the selected criteria consistent? Yes, they are. As shown in Table 1, the education-based rankings were strongly inter-correlated (nearly 0.8). For instance, this consistency among the job-education/skill hierarchies over time suggests that job ranking did not change much during the period under consideration. Alternative earnings-based measures displayed even higher degrees of association (correlations ranging from 0.90 to 0.99). However, the education-based and earnings-based job quality measures had somewhat weaker correlations (approximately 0.45 to 0.5). What follows from this is that all educational and earnings measures are mutual substitutes, although rankings based on these factors can potentially diverge.

[Table 1]

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

[Tables 2, 3 and 4]

Let us sum up this section. We classified all LFS respondents along the occupation-industry dimension and called these cells "jobs". We then introduced five alternative job quality measures, of which two were education-based and three were earnings-based, and used them to rank all job cells in 2000 by quintiles (with the "worst" jobs belonging to the first quintile). These quintiles contained the ranked jobs weighted by employment in those jobs so that each quintile represented 20% of employment in the start period. We then explored what happens with

employment in each of the quintiles over the period 2000-2012 as well as across two sub-periods (before and after the crisis) within the whole period. We are now well-equipped to address the question of where jobs were created and where they were destroyed.

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

[Tables 5 and 6]

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). Industries that shed employment included those with low-educated and low-paid labour (A and O) as well as those with skilled and well-paid labour (D). Employment gains were also observed in industries with contrasting levels of education and pay.

Changes in occupational composition were also not straightforward. The most highly skilled and paid occupations were concentrated in ISCO groups 1 and 2, which gained 3.9 pp (ISCO1: Managers) and 3.8 pp (ISCO2: Professionals), respectively. On the other hand, the least-skilled and lowest-paid occupations experienced significant employment losses (the ISCO 9 group of unskilled workers decreased by 3.1 pp, group 6 of agricultural workers – by 2.9 pp). At the same time, the occupational group of semi-skilled workers (ISCO 8) with relatively "good" characteristics shrank by 2.9 pp, while the group 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 observed 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

probably enhanced job quality. This means that the proportion of "lousy" jobs decreased while the proportion of "good" jobs rose.

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

As Fig. 1-a suggests, the annual outflow from the lowest quintile (containing the "worst" jobs) included almost 350,000 workers. Meanwhile, the inflow into the upper quintile was even larger, upwards of 570,000. The three middle quintiles were also net recipients, though to a lesser degree (with an annual net gain of 35,000-150,000). In the pre-crisis sub-period (2000-2008), the outflow from the lowest quintile and the inflow into the upper one were 1.5-2 times larger than in the second post-crisis sub-period (2008-2012). Therefore, higher growth rates were associated with the acceleration of economic restructuring while the crisis events of 2008-2009 caused the deceleration. At the same time, annual net employment gain decreased from 720,000 over the first sub-period to 230,000 over the second, but the direction of reallocation did not change. That is, "bad" jobs were destroyed, while "good" ones were created.

[Fig. 1]

Fig. 2-a incorporates 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 either end of the distribution were impressive. The segment of bad jobs shrank (in employment) by 8 pp, while the proportion of good jobs expanded by 8 pp. Observed changes appear to increase quality without any visible symptoms of polarization.[8]

[Fig. 2]

The analytical methodology applied above assumes that the ranking of relative job quality (in this case, based on the average duration of schooling by job cells) remains stable over time. If a job was "bad" in 2000, in 2012 it remained 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 extent to which the relative quality of jobs may change over time is driven by various factors. If the educational content of some job cells shifts (for example, technology makes particular occupations require more/less educational rigor), relative rankings are likely to shift as well.

[8] The EU-based studies suggest that there are differences in the observed patterns of employment contingent upon what type of ranking 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.

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

Surprisingly, moving to wage-based rankings yielded similar results (Fig. 1-c – 1-e). The bottom quintile lost approximately 320,000-340,000 per annum, while the upper quintile gained on the order of 550,000-680,000.[9] These estimates are close to those presented earlier in both absolute and relative terms. The bottom segment lost 7-8 pp, the upper gained 8-10 pp, and the middle quintiles changed little (Fig. 2-c – 2-e).

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

5. "Best" and "Worst" Jobs: Comparative Analysis

In this section, we explore the difference between the "best" (the top quintile) and the "worst" (the bottom quintile) jobs. This comparison can use the educational ranking scale as well as the pay-based one. The next interesting question concerns the association between job quality measures and the net employment change by occupation-industry cells. Did all highly ranked job cells benefit from employment gains while low-ranked jobs suffered from employment losses? Or did this regularity not hold? We can then face the mixed scenario in which there is rapid employment growth in some low-quality jobs and simultaneous employment shrinkage in some high-quality jobs.

Indeed, in purely mathematical terms, the upgrading of job structure assumes that employment in "good" cells grows faster than that in "bad" cells. However, this pattern can be universal as well as selective. The former case means that all (or almost all) good cells expand fast, while all (or almost all) bad cells tend to downsize. In the latter case, expansion and

[9] As we explained below (Section 5), this paradoxical result can be driven by the combination of the low correlation between education-based and wage-based rankings for numerous low populated occupation-industry cells and the high correlation among a few voluminous occupation-industry cells.

downsizing form mixed patterns and can be observed in good quintiles as well as in bad ones. According to which of these scenarios does the Russian labour market evolve?

Because all five alternative quality rankings produced almost identical results, we will further use only two of them. One is based on average schooling duration in 2000, and the other is based on the 2007 average monthly earnings. Tables 7-8 present characteristics of the "worst" 10 and the "best" 10 job cells selected according to the educational criteria, and Tables 9-10 show tails according to the earnings criteria. Because estimates for very small cells are of little value, the tables contain relatively sizable cells only – employing at least 10,000 individuals in 2000.

[Tables 7, 8, 9 and 10]

The least-educated jobs varied strongly in size, but two accounted for over 1 million employees in 2000. The 10 worst jobs included mostly unskilled workers from various industries, among which agriculture dominates. Almost all of them lost employment rapidly in 2000-2012, with cumulative losses over the decade totalling 40-80% of initial employment.

The 10 best-educated jobs were composed mainly of professionals in various industries. Although in terms of employment they were generally smaller than the least-educated jobs, two of them were rather large, with employment exceeding 200,000 in 2000. The cells with the highest educational credentials usually gained employment, whereas three lost employment.

The least-paid industry-occupation cells were large in size. These included the same groups with the lowest educational characteristics discussed above. Low-wage jobs were concentrated in agriculture. In most cases, their employment declined strongly, but three jobs kept growing. This finding invalidates the positive linear relationship between earnings and employment by occupation-industry cells.

The 10 best-paid job cells looked less ambiguous. All but one aggressively expanded employment during 2000-2012, with cumulative increases approaching 150-200% in a few cases. However, the highest-wage jobs were small in size compared to the lowest-paid ones. In occupational terms, they are composed of managers and administrators of all sorts (from ISCO-1); in the industry domain, they are more likely to be employed in mining (sector C).

Tables 11-12 look at the same issue from a different angle. They present various characteristics of 10 job cells having the least and highest employment growth rates. As we can see, low wage and low education were associated with more intensive job destruction. However, employment-generating cells included not only high-wage and high-education cells, but low-wage and low-education ones as well.

[Tables 11 and 12]

In general, as Fig. 3 suggests, there is a positive association between the rate of employment growth and the quality criteria that we applied. The linear trends in both graphs are positively sloped. Employment tends to increase more in "better" occupation-industry cells where educational attainment and pay levels are higher. One extra year of schooling is associated with an increase in employment growth rates by 15% as well as one extra log-point of earnings – with an increase of 50-60%. However, the association between job rankings and employment growth rates is not very strong.

[Fig. 3]

What has been outlined above leads to the conclusion that the whole rightward shift in the job distribution was mostly driven by changes in several large cells located at the extreme quintiles. Overall, there were seven sizable cells (over half a million employed persons in each) in the bottom quintile, which jointly accounted for approximately 15% of the total employment in 2000 but which lost approximately 40% of their workforce during the period 2000-2012. The upper quintile had four large cells with over half a million employed persons each, which jointly accounted for 7% of the total employment in 2000 and which increased their workforce by 30% during the same period. This result suggests that while downsizing in the bottom quintile was selective and driven by a few large cells, expansion in the upper quintile was more uniform across cells regardless of their initial size.

Table 13 contains a few characteristics of five occupations, four of which were sufficiently representative to enable cross-country comparisons. The fifth occupation consisted of service workers in the "O: Other community, social and personal service activities" category. In Russia, they are all located in the middle quintiles (2-4), regardless of which rating is applied, and can therefore be considered semi-skilled and mid-waged. Clerks in "L: Public Administration" are an exception because they belong to the fourth education-based quintile and the first earning-based quintile. In other words, these workers are skilled but low paid. There are a few reasons behind this divergence. First, this is a predominantly female job cell. Second, public administration workers have shorter working hours and are moved to the second quintile if hourly wage-based ranking is applied. Third, non-pecuniary remunerations widespread in this sector partially compensate for lower wages. Finally, fourth, we cannot exclude some underestimation of actual wages paid when we impute them on the basis of the RLMS data (see above).

[Table 13]

Meanwhile, the size of two of the five job cells (associate professionals in the healthcare sector and clerks in public administration) did not change much over 2000-2012. This can reflect relatively low pay in these occupations. In the other three job cells, employment

increased markedly. A two-fold increase was observed in the cell containing workers who provided personal services. However, the largest absolute increase (of approximately 1 million workers) was observed in the job cell consisting of shop and market sales workers. These gains likely reflect initial under-development of services in addition to overdevelopment of industry and mistakes in central planning. Market-oriented reforms opened ways to correct accumulated distortions, and the subsequent correction process took a long time, going through the 1990s and well into the 2000s. This may explain the fast expansion of employment in the trade sector (G), making its proportion even larger than in some developed countries.[10]

Upon comparisons with other countries, some peculiar features of the Russian employment structure come to light. While clerks in public administration are usually relatively well paid, in Russia, they are not. Furthermore, while service workers providing personal services tend to be low paid, in Russia, they belong to middle-paid jobs. These features suggest that prior to the transition, the "premature welfare state" (J. Kornai) coexisted with the underdeveloped sector of private services - a combination that was characteristic of centrally planned economies.

To see the variation in employment growth across quintiles, we can estimate job creation and job destruction rates using the conventional methodology (Fig. 4). (So far, we have used net employment change, which might have hidden the actual volume of reallocated labour.) Both rankings (education and earnings based) produced almost identical results. The move from lower to higher quintiles shows a monotonic decrease in the number of jobs destroyed annually, while the number of created jobs almost monotonically increased. In 2000-2012, over 400,000 positions in the lowest quintile were destroyed annually versus 30,000-50,000 in the upper one. Meanwhile, in the upper quintile, approximately 600,000 jobs were created annually versus less than 100,000 in the lowest quintile. The middle quintiles created and destroyed almost equal numbers of positions. As a result, the extreme quintiles were the most active in workers' reallocation. Annually, they reallocated approximately 500,000-650,000 workers, many more than jobs within the middle quintiles did.

[Fig. 4]

In relative terms, the job creation rate was 2.1%, while the destruction rate was 1.3%, resulting in an annual job turnover rate equal to approximately 3.4% for all positions (Table 14). The destruction affected approximately 4% of "bad" jobs and only 0.3% of "good" ones. This

[10] There are other reasons for such fast growth in this sector. Among them are a relatively easy entry for newly created firms into this sector (compared to other sectors) against the background of bad business climate as well as growing informality (Gimpelson and Kapeliushnikov, 2014).

was mirrored by the creation story, with less than 1% of "bad" and almost 4% of "good" ones. In the post-crisis (after 2008) sub-period, gross turnover was 1.5 times less intensive than before the crisis, which suggests a remarkable slowdown in employment reallocation. However, again, there are no clear signs of employment polarization: the available job creation and job destruction data suggest quality upgrading.

[Table 14]

6. 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 relied on the 2007 wage-based rankings only. However, we will also refer to the 2000 education-based rankings when these criteria bring widely diverting outcomes.

Gender. Fig. 5-a presents average absolute employment increases for men by job ranking quintiles. On average, during 2000-2012, the number of men in the earnings-defined bottom quintile decreased by 206,000 annually. Meanwhile, the upper quintile gained 382,000 per annum. The third and fourth quintiles grew as well, although at very slow rates comparatively, while the second quintile shrank slightly.

[Fig. 5]

As for women, we also observed rapid loss of employment in the lowest quintiles and gains in the upper part of the distribution (Fig. 5-b). Annual average losses at the bottom were 114,000, and gains at the top were 172,000.[11]

Cumulative losses in relative terms were 4.4 pp for males in the bottom quintile, while the upper quintile added 5.1 pp. (Fig. 6-a). Cumulative increases in female employment (compared to men) were smaller in the lowest and highest quintiles. In the former, this was a 2.9

[11] The education criterion provided 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 one. Exactly the same gender asymmetry in terms of education is typical for the EU, both at the aggregate level and within most member states (see other Chapters in this book). In the EU countries, however, educational outperformance is observed usually only for young women compared to young men, whereas in Russia, it is observed over the whole age scale.

pp change, and in the latter - 2.3 pp. In other words, the number of men undergoing job reallocation exceeded that of women by two times.[12]

[Fig. 6]

Age. Figures 5-c – 5-e provide estimates for three age groups, including youth (15-29 years old), prime age (30-49) and older ages (50-72).

Estimates for youth varied markedly across the two sub-periods (Fig. 5-c). The differences can be partially explained by deep demographic changes caused by reduced birth rates in the 1990s. In the first (pre-crisis) sub-period, the total number of youth employed grew by approximately 250,000 per year. In the second (post-crisis) sub-period, this age group shrank even faster (262,000 per year, on average). This age-related recomposition could have seriously affected reallocation across the job quality spectrum. In the first sub-period, the bottom quintile lost approximately 137,000 per year while the top one gained 254,000. In the second sub-period, however, the speed of change decelerated sharply. The bottom quintile kept losing, although at the smaller rate of 90,000 annually, while the top quintile stopped gaining anything.

For the prime age group, no visible difference by sub-periods was observed (Fig. 5-d). (The size of this age group was in stable decline throughout the entire period.) While the bottom quintile lost annually an average of 220,000 prime-age workers, the top quintile enjoyed almost symmetrical gains. The second and third quintiles also experienced employment declines, while the fourth quintile stagnated.

For older-age workers, the reallocation picture was completely different (Fig. 5-e). The absolute size of this demographic group kept increasing during the whole period, adding over half a million workers annually. This massive influx affected the entire distribution of jobs and added almost equally to all quintiles except the bottom one. However, even the bottom quintile that accumulated the "worst" jobs showed some signs of growth during the second sub-period.

These multi-directional changes for different age groups are better understood when relative estimates are used (Fig. 6-b). We can then easily see that the major contribution to shrinkage of the bottom quintile came from prime-age workers. These workers accounted for two-thirds of the total contraction of "bad" jobs. The rest was explained 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. Of greatest interest, however, is what happened in the middling section of the job quality distribution. As Fig. 6-b suggests, the outflow of prime-age and young (although to a lesser extent) workers from the three middle quintiles was

[12] At the same time, the contributions of men and women to the overall recomposition of employment were quite similar when the educational scale was applied.

compensated by the inflow of old age workers. In fact, the latter age group "saved" the middling jobs from deep contraction.

Occupations. We divided all workers into four aggregate occupational groups: skilled white collars (ISCO 1-3); low-skilled white collars (ISCO 4-5); skilled blue collars (ISCO 7-8), and low-skilled blue collars (ISCO 6 and 9). 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 more likely, when some did, did others move in the opposite direction? Figures 5-f – 5-i shed some light on this question.

Unsurprisingly, skilled white collar workers were concentrated within the two upper quintiles. Their input increased by 190,000 per year in the fourth quintile and by 433,000 in the fifth one (Fig. 5-f). Their numbers in other quintiles did not change. These observations indicate that the massive inflow of skilled white collars in 2000-2012 (approximately 650,000 per annum) was nearly fully absorbed by "good" jobs in the upper quintiles with little leakage downward.[13]

The access of low-skilled white collars to jobs looked different (Fig. 5-g). Most of them landed in jobs in the middle quintiles, while accession to the upper quintiles was practically closed. Changes in the bottom quintile were modest but positive.

As for the skilled blue collar workers, their absolute employment level tended to decrease (Fig. 5-h). This decrease began after the crisis and was substantial in volume, with an annual outflow of approximately 170,000. However, although the first four quintiles lost skilled blue collars (the largest annual outflow of approximately 100,000 individuals was in the "worst" first quintile), the fifth one gained approximately 120,000 per year.

This pattern has a simple explanation. In particular, many Russian 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 do!)

The findings for low-skilled blue collars seem to be quite straightforward (Fig. 5-i). In 2000-2012, this category downsized fast (at the rate of a quarter of a million per year) and mostly in the bottom quintile. The other quintiles experienced little change.

[13] However, the picture varies depending on whether the education- or the wage-based ranking was applied. The discrepancy can be explained by the fact that the large public (state-funded education, health care and public administration) sector absorbs better educated professionals but tends to pay lower wages (partially because of the high concentration of women, as the gender wage gap coexists in that sector).

In sum, 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 an influx of skilled white collars (Fig. 6-c).

Industry-related variation. We now start the overview of sectoral patterns by looking at Agriculture (sector A in ISIC). This sector typically consists of the least-skilled and least-paid labour (Fig. 7-a). The restructuring here caused a fast outflow of workers from the bottom quintile. The annual loss in agriculture amounted to over 300,000 workers in "bad" jobs, and this contraction occurred at high speed through both sub-periods. Other quintiles remained practically unaffected. As a result, the agricultural sector (through its contraction) made a heavy contribution to the improvement of job composition in the economy at large.

[Fig. 7]

Manufacturing (D) and Construction (F) occupy intermediate positions in terms of skill and pay levels. However, changes to their job structures took different directions (Fig. 7-b – 7-c). In construction, job gains were strongly skewed towards the top quintile where employment grew persistently, while in the other quintiles, it did not. However, the fast 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 materialized mostly in three central quintiles, while the bottom and top ones remained virtually stagnant. As a result, Russian manufacturing experienced a type of "job polarization", though in a weak form – without any visible employment growth at the tails of the job distribution.

In Market Services, we observed a slight contraction at the bottom and expansion up along the ranking. Higher-quality quintiles tended to expand more (Fig. 7-d). The second quintile gained 80,000 employees per annum, while the fifth one added approximately 350,000.

Non-Market Services (the public sector made up of Education (M) and Healthcare (N) and Public administration) followed another pattern (Fig. 7-e) in which employment increased in all quintiles, although the top one gained less than the others.

Fig. 8 shows the relative contributions of different sectors to the general change in job composition. For convenience, we divided the sector of market services into two subsectors, namely i) Trade and ii) Other Market Services. The shrinkage of the bottom quintile can largely be explained by employment reduction in agriculture. This explains the 6.5 pp reduction of total 7.6 pp. The contributions from Manufacturing and Other Market Services were much more modest (-0.1 pp and -0.6 pp, respectively).

[Fig. 8]

Employment in middling jobs was destroyed more actively by Manufacturing, while it was created by Market Services. As for the jobs in the top quintile, the expansion here was due to Other Market Services (3.7 pp), the 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 was much slower here than in other industries.

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

Technological advancement. Technological level by industry varies within a broad range. Based on R&D expenditures, manufacturing industries can be divided into high tech, medium-high tech, low-medium tech and low tech.[14] 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.[15] These classifications help to better understand whether the ongoing structural change is driven by the technological progress or is neutral to it. Related estimates are presented in Figs. 9-10.

[Fig. 9 and 10]

[14] *High technology manufacturing:* office machinery and computers; radio, television and communication equipment and apparatuses; medical, precision and optical instruments, watches and clocks. *Medium-high technology manufacturing:* chemicals and chemical products; machinery and equipment n.e.c.; electrical machinery and apparatuses n.e.c.; transport equipment. *Low and medium-low technology manufacturing:* 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; coke, refined petroleum products and nuclear fuel; rubber and plastic products; basic metals and fabricated metal products; other nonmetallic mineral products (Felix, 2006).

[15] *High-technology knowledge-intensive services:* post and telecommunications; computers 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 defence; compulsory social security; sewage and refuse disposal, sanitation and similar activities; activities of organizational membership n.e.c.; other service activities; activities of households as employers of domestic staff; extra-territorial organizations and bodies (Ibid).

The previously mentioned contraction of employment in Manufacturing affected all industries, regardless of their technological levels, and is reflected in all quality quintiles (Fig. 9). (The only visible exception is the top quintile of low-tech industries, which expanded little during 2000-2012). Major losses were concentrated in the middling quintiles of medium-tech industries. In other words, the positive structural changes in job composition that we have documented here were not associated with reallocation of labour from low- and medium-tech manufacturing into high tech.

A similar story applies to Market Services (Fig. 10). In the top quintile, we observed no growth driven by 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 approximately 250,000 employees annually in "good" jobs, and knowledge-intensive services added 140,000.

Therefore, Manufacturing hardly experienced any structural shift towards "good" jobs, and while a shift was present in Market Services, it affected mostly less knowledge-intensive industries. As Fig. 9-b suggests, the contribution of high-tech manufacturing to the compression of the bottom quintile and the expansion of the top quintile was almost negligible. The same can be said about high-tech knowledge-intensive services (Fig. 10-b). Meanwhile, the contribution of less knowledge-intensive services to the reduction in the bottom quintile and expansion of the top quintile was considerable.

In summary, for any part of the Russian economy (except Manufacturing), we found no evidence suggesting polarization or total degradation of job composition. In most cases, we observed enhancement of the employment structure and, in some sectors, expansion in the middle and flattening on the tails. As the main providers of middling jobs, manufacturing industries were replaced by the Trade and Other Market Services sectors. Meanwhile, the impact of technologically advanced industries on structural change remained minimal.

7. 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.

In the bottom quintile, "bad" jobs were largely (by two-thirds) populated by women (Table 15), and this was mirrored at the top quintile.

[Table 15]

Jobs in the first quintile were much more likely to have attracted young people (younger than 20) and those older than 60. Both age groups lag in earnings behind the prime age. Other quintiles were more diffuse with regard to age. Job quality showed no association with the

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

Higher quintiles appeared to have a larger proportion of workers with higher education and a smaller proportion of those who are less educated. In the bottom quintile, over 10% of workers had an educational attainment less than lower secondary school, while in the upper quintile, this percentage was less than 2%. As for university graduates, the corresponding proportions were 10% and 50%. In general, the higher the quintile, the higher is the share of well-educated workers.

Lower quintiles had a higher share of short-tenured employees, while workers in higher quintiles tended to have longer tenures. In the first quintile, approximately 15% of workers had tenures shorter than 1 year, and 30% had tenures longer than 20 years. For the upper quintiles, the corresponding figures were 10% and 36%.

The occupational composition also differed markedly across quintiles. The lower quintiles have attracted mostly blue collar workers, while the upper quintiles contained mostly white collar workers. The fraction of low-skilled workers in the first quintile was close to 40% and was almost zero in the fifth quintile. The proportion of the ISCO 1 group in the first quintile was under 0.5% but accounted for 60% of employment in the upper quintile.

Half of all "bad" jobs were agricultural, and the contribution of the public sector was close to 40%. A few industries (Mining, Transportation, and Finance) generated no "bad" jobs at all. Among the main providers of employment for the "good" (best-paid) jobs were Construction, Transportation, Manufacturing, Trade and Real Estate.

Table 16 presents unconditional probabilities for different demographic groups to be assigned to particular quintiles. According to the wage-based criterion, women are more likely than men to be in the two lowest quintiles, while men enjoy higher likelihoods of being in the two highest.

[Table 16]

Youth is concentrated in the low quintiles. Every second worker in the 20 years old and younger age group was employed in the lowest quintile jobs. Aged workers (over 60 years) also faced higher likelihoods of finding themselves in these jobs. If we exclude the youngest age group, the probability of being in the lowest quintile increases with age monotonically. At the same time, the chances of landing in the best jobs are almost equal for all age groups except the youngest one.

Rural residents are more likely to have been assigned to lower quintiles, while urban residents were more likely to be assigned to the top. Longer tenure considerably improved the prospects of being in good jobs.

The likelihood of entering the least-paid job segments declined with educational attainment. Those with lower secondary or even less education were over 50% more likely to be close to the bottom quintile. In contrast, for those with higher education, this risk was less than 3%. Upon turning our attention to the highest-paid jobs, the contingent probabilities related to education distribution appear to be reversed. Specifically, for the least educated, approximately 7% of workers were in the highest-paying jobs, while for university graduates, the proportion exceeded 40%.

Managers and professionals have had higher-than-average chances to be in the highest-paid jobs. Associate professionals and clerks have been dispersed across intermediate quality jobs. The bulk of craft workers and operators have had good chances (greater than 70%) of occupying high positions in the earnings distribution (the fourth and fifth quintiles). Finally, the risk of being in jobs in the lowest quintile was 50% for low-skilled workers and almost 100% for skilled workers in agriculture. These groups have been completely denied access to "good" jobs.

Industry-specific risks have also been predictably distributed. Agricultural workers have found their way to the low quintiles. In some industries (Mining, Electricity, Gas and Water Supply, Finance and some others), workers did not occupy "bad" jobs at all. Those employed in Mining, Construction, Finance and Real Estate and Transportation tended to land in the highest-paid jobs.

Findings emerging from the simple bivariate analysis are supported by simple econometrics. We estimated an ordered probit model in which the quintile distribution of the PSE respondents was on the left-hand side. Correspondingly, the dependent variable took on values from 1 to 5 (Table 17). Major individual demographic characteristics are placed in the right-hand side (RHS) of the equation. All coefficients are statistically highly significant in the expected directions.

[Table 17]

Compared to women, men are more likely to have belonged to higher-earnings quintiles while controlling for other factors. The effect of age is clearly non-linear. The strongest positive effect of age on the earnings-based quintiles can be found in the 20-29-year-old age group and then dwindles monotonically. However, it remained positive compared to the reference age, even in the oldest age group. The outlying position of the youngest group can be explained by the fact that most individuals of that age tend to continue education, so the transition to full-time work happens later for them. Being married and living in a city enhanced the chances of being in the higher quintiles. Having better education and belonging to the first two ISCO groups (all other factors being equal) emerged as strong predictors of being well paid. On the contrary, having less skill or being an agricultural worker raised the likelihood that one received low wages. Finally,

newcomers (with job tenure less than 1 year) are too early in their careers to have competed for high-wage quintile jobs.

8. Conclusions

This paper investigated changes in the composition of jobs in the Russian economy during the period of 2000-2012. Using five alternative criteria of job quality (two were education-based and three were earnings-based), we found that during this period, job structure did not demonstrate any signs of polarization. The ongoing structural change can be characterized as a progressive upgrade when the proportion of "bad" jobs decreases while the proportion of "good" ones tends to increase. This conclusion holds for both sub-periods examined, though the rate of change decelerated in the second one. In relative terms, the cumulative compression of the bottom quintile totalled 7-8 pp versus the expansion of the top by 8-10 pp. In the middling part of the ranking scale, the changes were minor. All of these findings are robust to any of the quality criteria applied.

A relatively modest but positive correlation linked employment growth rates in particular occupation-industry cells to job quality rankings. This means that drastic changes in the tails of the job quality distribution were driven by a relatively small number of the largest job cells experiencing voluminous shifts. Large cells near the bottom quintiles lost employment fast, but large cells near the top gained just as fast. These trends, however, were not universal, as employment in many small cells on both poles changed in the opposite (to the pattern just described) directions.

According to the education-based criterion, the contraction in the bottom and the expansion in the top quintiles were accounted for equally by male and female employment. However, when based on the earnings-based criterion, the contribution of males to employment was twice 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 contributions of both the youth and the older groups to structural job change were also significant but of less magnitude 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 highly skilled white collar workers.

Shrinking agricultural employment was 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 perhaps not), under these conditions, the "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 like "job polarization" was observed. Finally, the contribution of high-tech manufacturing and services was small because their proportion of total employment remained negligible.

We further estimated the incidence of getting “bad” and “good” jobs for workers belonging to different social and demographic groups. When job quality was based on the earnings-based criterion, the following were more likely to have secured good jobs: males, older, educated, married, urban residents, long tenured, managers, professionals and skilled workers, and those employed in mining, construction, financing and transportation and communications.

The key conceptual issue at hand is how has the Russian economy managed to avoid the polarization trend observed in many developed and transitioning countries? What explains this persistent upgrading? Can it be a statistical artefact based on simple mis-measurement? Indeed, one can dispute the expansion of “good” jobs as well as the compression of “bad” ones. We address these reservations below.

When ranking occupation-industry cells according to the earnings-based criterion, we used data covering large and medium-sized firms only (while earnings for 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 industries where the fraction of employment outside large and medium-sized firms is large. In fact, comparing our main wage data source (the SEO) to 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 even larger because no official estimates account for informal activity, which is even lower paid but is nevertheless more widespread in the same sectors. Therefore, by imputing to such workers “invisible” (to the SEO) higher wages, we erroneously inflated the upper quintile.

This caveat warrants direct attention. First, it does not relate to the education-based estimates because level of education was measured properly for all workers. Second, there are no grounds for disputing the collapse in the lowest quintile. Finally, even when Trade and Construction are completely excluded, the upper quintile expanded by approximately 4 pp. Therefore, the upgrading scenario holds.

Another caveat relates to the issue of migrant labour. During the period under study, the Russian labour market experienced a large inflow of low-productive and low-educated temporary migrant workers from the CIS countries. Most of them tended to land in the least-skilled and poorly paid jobs. The PSE on which our estimates are based does not cover migrant workers. If “bad” jobs that became vacant due to the outflow of Russian workers are taken by

migrants, then our conclusion about the drastic contraction of the bottom quintile can be erroneous because it is based on statistical mis-measurement.

Unfortunately, there are no reliable data on migration to Russia. Most of the labour 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). When making the very strong assumption that the number of migrants tripled during 2000-2012 and that all of them were in the "bad" job quintile, our estimates of the compression should decline from 7 pp to 3 pp. However, even in this case, our general conclusion remains valid.

We believe that despite all of the data limitations and drawbacks, there were no signs of polarization. Instead, we observed a trend for upgrading. What could be behind this trend?

Although there could be multiple factors at work, we consider the structural shift from the production of tradable to non-tradable goods to be the primary one. This includes the large-scale downsizing in agriculture and manufacturing and the expansion of construction, the public sector, trade, financial intermediation, etc. The case of the agricultural sector is particularly salient. Most of the agricultural jobs are low skilled and poorly paid. During the period 2000-2012, the agricultural employment shrunk drastically in absolute as well as relative terms, thus collapsing the first quintile 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 observed an enormously rapid rise in real earnings, with annual growth rates reaching 10-15%. On the one hand, this growth was driven by a 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. Rising incomes might shift consumption towards higher quality goods and services. "Good" jobs could emerge as a reaction to this consumption demand shift.

Second, there could be an endogenous supply side effect associated with the very fast expansion of tertiary education. According to the Russian Census data, during the period of 2002-2010, the fraction of workers having tertiary-A education increased from 26% to 36%, while the fraction of workers having tertiary-B remained stable at a level of 36-37%. This means that 3 of every 4 Russian workers were holders of 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 labour. As a consequence of this endogenous shift in labour demand, we can see the expansion in skilled and well-paid employment. However,

here, we should be careful: If such supply side effects were the case, then there would presumably be employment growth for well-educated workers across all (or most) industries. In reality, it was limited by a few industries.

Third, the skill-biased technological change (SBTC) also could be at work here. The SBTC complements human capital accumulation and demands a highly educated workforce (the modern IT-sector is an illustration) (Acemoglu, 1998; Autor et al., 2003; Card, Di Nardo, 2002). Generating demand for such workers, it stimulates creation of well-paid jobs. Rapid IT expansion in Russia in the 2000s could serve as an argument supporting this explanation. However, in general terms, technological regress rather than progress is a more relevant characteristic of the development seen in many technologically sensitive sectors of the Russian transition economy (Sabirianova Peter, 2003). In the 1990s, production capacities aged and depreciated, R&D expenditures dwindled, and technological backlogs increased. In the 2000s, these negative trends were not reverted, although they became weaker. The fact that the most technologically advanced industries employed little labour force also speaks against the SBTC hypothesis.

Finally, job upgrading could be driven by organizational change biased towards highly skilled labour (SBOC). Cross-national differences in technologies are among the standard powerful predictors of variability in job (and skills) structures. The IT- and pre-IT-based economy are structurally different in this regard. However, different institutional foundations (such as contrasting market economies with centrally planned ones) 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 on both dimensions – the technological as well as the institutional. In fact, the SBOC was an important component to the systemic plan-to-market transition. This transformation radically increased and modified flows of information and created 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 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 probably 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 sub-period 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 individuals. 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 the 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 moves into the period of close to zero output growth rates. This makes a dramatic rise in consumption similar to that observed in the 2000s impossible. The further fast growth in the supply of educated labour is also hardly probable because its stock is already extremely large. There were also a few preconditions for a rapid technological spurt. Finally, industrial and occupational employment gradually became more similar to those observed in developed countries, and therefore, the room for further employment shifts in this direction gets smaller.

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

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Appendix: Tables and Charts

Table 1
Correlation matrix for five alternative measures of job quality*

	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 rate 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 rate in 2007, OZPP)	0.459	0.455	0.990	0.899	1

* N =635, all coefficients are significant at 1%.

Table 2
Educational attainment and average monthly wages by sectors, 2000-2012

Sectors	Mean years of schooling*			Average monthly wages, thousand Rubles**		
	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

* The LFS (PSE) based estimates
** Rosstat.

Table 3
Educational attainment by occupations, 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

* The LFS based estimates.

Table 4
Average monthly wages by occupations, 2005, 2007, 2009 and 2011, thousands 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

* The OZPP (SEO) based estimates.

Table 5
Composition of the employed population aged 15-72 by sectors, 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	-

* The LFS based estimates.

Table 6

Composition of the employed population aged 15-72 by occupations, 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	-

* The OZPP based estimates.

Table 7

Characteristics of 10 "worst" (schooling based) jobs*

Rank	Sector	Occupation	Mean years of schooling, 2000	N 2000, thousand	N 2012, thousand	Cumulative employment growth rate, %
8	A. Agriculture	OKZ-60 (Skilled agricultural workers)	10.2	3999	2303	-42.4
10	A. Agriculture	OKZ-92 (Agricultural, fishery and related labourers)	10.5	1395	520	-62.7
14	A. Agriculture	OKZ-93 (Labourers in mining, construction, manufacturing and transport)	10.6	58	21	-63.9
15	A. Agriculture	OKZ-94 (Common elementary occupations)	10.7	445	364	-18.1
16	60401. Food and beverages and tobacco	OKZ-60 (Skilled agricultural workers)	10.7	22	39	75.6
20	60414. Other manufacturing	OKZ-93 (Labourers in mining, construction, manufacturing and transport)	10.7	37	13	-66.5
23	D. Manufacturing	OKZ92 (Agricultural, fishery and related labourers)	10.8	22	32	43.3
24	60402. Textiles, and textile	OKZ-93 (Labourers in mining, construction, manufacturing and transport)	10.8	20	4	-77.8
31	L. Public administration	OKZ-94 (Common elementary occupations)	11.0	584	371	-36.5
33	60407. Chemical, rubber and plastics	OKZ-93 (Labourers in mining, construction, manufacturing and transport)	11.0	40	7	-82.6

* Cells with more than 10 000 workers only.

Table 8
Characteristics of 10 "best" (schooling based) jobs*

Rank	Sector	Occupation	Mean years of schooling, 2000	N 2000, thousand	N 2012, thousand	Cumulative employment growth rate, %
617	60405. Pulp, paper, printing and publishing	OKZ-24 (Other professionals)	15.7	63	108	71.5
618	60413. Motor vehicles, trailers and other transport equipment	OKZ-21 (Physical, mathematical and engineering science professionals)	15.7	178	218	22.2
619	K. Real estate, renting and business activities	OKZ-21 (Physical, mathematical and engineering science professionals)	15.8	610	818	34.1
620	N. Health and social work	OKZ-22 (Life science and health professional)	15.8	906	1296	43.0
621	J. Financial intermediation	OKZ-21 (Physical, mathematical and engineering science professionals)	15.8	44	112	154.7
622	60407. Chemical, rubber and plastics	OKZ-21 (Physical, mathematical and engineering science professionals)	15.8	57	53	-7.0
623	L. Public administration	OKZ-22 (Life science and health professional)	15.8	36	17	-54.3
624	60406. Coke, refined petroleum and nuclear fuels	OKZ-21 (Physical, mathematical and engineering science professionals)	15.8	20	27	34.3
625	M. Education	OKZ-21 (Physical, mathematical and engineering science professionals)	15.9	52	62	19.3
626	K. Real estate, renting and business activities	OKZ-22 (Life science and health professional)	16.0	32	24	-25.7

* Cells with more than 10 000 workers only.

Table 9
Characteristics of 10 "worst" (wage based) jobs*

Rank	Sector	Occupation	Average monthly wage, 2007, thousand Rubles	N 2000, thousand	N 2012, thousand	Cumulative employment growth rate, %
2	A. Agriculture	OKZ-94 (Common elementary occupations)	2.3	444.7	364.4	-18.1
3	A. Agriculture	OKZ-92 (Agricultural, fishery and related labourers)	2.4	1394.7	520.5	-62.7
6	A. Agriculture	OKZ-42 (Customer service clerks)	2.9	26.0	9.1	-64.8
9	A. Agriculture	OKZ-60 (Skilled agricultural and fishery workers)	3.0	3999.0	2303.1	-42.4
10	A. Agriculture	OKZ-41 (Office clerks)	3.1	94.4	30.2	-68.0
12	A. Agriculture	OKZ-51 (Personal and protective services workers)	3.4	44.0	53.4	21.4
14	M. Education	OKZ-94 (Common elementary occupations)	3.9	756.7	775.5	2.5
15	A. Agriculture	OKZ-74 (Other craft and related trades workers)	4.0	50.9	21.7	-57.3
16	M. Education	OKZ-81 (Stationary plant and related operators)	4.1	19.2	30.8	60.4
18	A. Agriculture	OKZ-34 (Other associate professionals)	4.2	272.3	114.7	-57.9

* Cells with more than 10 000 workers only.

Table 10
Characteristics of 10 "best" (wage based) jobs*

Rank	Sector	Occupation	Average monthly wage, 2007, thousand Rubles	N 2000, thousand	N 2012, thousand	Cumulative employment growth rate, %
619	C. Mining and quarrying	OKZ-31 (Physical and engineering science associate professionals)	26.5	78.3	65.1	-16.9
620	E. Electricity, gas and water supply	OKZ-12 (Corporate managers)	26.9	68.2	195.8	187.2
622	60410. Basic metals and fabricated metals	OKZ-12 (Corporate managers)	27.5	72.5	113.6	56.7
623	I. Transport and storage and communication	OKZ-12 (Corporate managers)	28.1	212.4	446.1	110.0
625	J. Financial intermediation	OKZ-12 (Corporate managers)	29.4	49.4	155.6	215.3
626	C. Mining and quarrying	OKZ-24 (Other professionals)	29.5	29.2	53.4	82.8
628	F. Construction	OKZ-12 (Corporate managers)	30.3	217.8	667.6	206.5
629	K. Real estate, renting and business activities	OKZ-12 (Corporate managers)	32.3	138.8	441.3	218.0
630	C. Mining and quarrying	OKZ-21 (Physical, mathematical and engineering science professionals)	35.7	88.1	105.1	19.4
633	C. Mining and quarrying	OKZ-12 (Corporate managers)	41.8	41.1	119.6	190.8

* Cells with more than 10 000 workers only.

Table 11
Characteristics of 10 sectoral-occupational groups with the largest job losses over 2000-2012

Rank-1*	Rank-2**	Sector	Occupation	Mean years of schooling, 2000	Average monthly wage, 2007, thousand Rubles	N 2000, thousand	N 2012, thousand	Cumulative employment growth rate, %
184	98	O. Other community, social and personal services	OKZ-71 (Extraction and building trade workers)	11.7	7.4	508.6	30.5	-94.0
171	89	O. Other community, social and personal services	OKZ-53 (Housing workers)	11.7	7.2	195.2	17.3	-91.1
84	41	O. Other community, social and personal services	OKZ-93 (Labourers in mining, construction, manufacturing and transport)	11.3	5.6	47.4	4.5	-90.4
33	223	60407. Chemical, rubber and plastics	OKZ-93 (Labourers in mining, construction, manufacturing and transport)	11.0	10.0	40.2	7.0	-82.6
58	443	60411. Machinery, nec	OKZ-93 (Labourers in mining, construction, manufacturing and transport)	11.1	14.0	54.6	10.4	-80.9
158	344	60413. Motor vehicles, trailers and other transport equipment	OKZ-93 (Labourers in mining, construction, manufacturing and transport)	11.6	12.1	38.1	7.7	-79.7
145	50	O. Other community, social and personal services	OKZ-81 (Stationary plant and related operators)	11.5	5.9	86.2	18.6	-78.4
24	73	60402. Textiles, and textile	OKZ-93 (Labourers in mining, construction, manufacturing and transport)	10.8	6.7	19.5	4.3	-77.8
48	115	A. Agriculture	OKZ-82 (Machine operators and assemblers)	11.0	7.8	68.6	15.6	-77.2
220	226	O. Other community, social and personal services	OKZ-72 (Metal, machinery and related trades workers)	11.9	10.1	119.2	28.1	-76.4

* Ranking by mean years of schooling in 2000.
** Ranking by average monthly wage in 2007.

Table 12
Characteristics of 10 sectoral-occupational groups with the largest job gains over 2000-2012

Rank-1*	Rank-2**	Sector	Occupation	Mean years of schooling, 2000	Average monthly wage, 2007, thousand Rubles	N 2000, thousand	N 2012, thousand	Cumulative employment growth rate, %
236	573	F. Construction	OKZ-75 (Transport and communication workers)	11.9	19.4	12.4	36.2	193.1
166	60	K. Real estate, renting and business activities	OKZ-94 (Common elementary occupations)	11.7	6.4	129.5	380.5	193.8
531	583	60404. Wood and of wood and cork	OKZ-12 (Corporate managers)	14.1	20.7	17.6	52.8	200.2
552	628	F. Construction	OKZ-12 (Corporate managers)	14.9	30.3	217.8	667.6	206.5
595	625	J. Financial intermediation	OKZ-12 (Corporate managers))	15.5	29.4	49.4	155.6	215.3
597	629	K. Real estate, renting and business activities	OKZ-12 (Corporate managers)	15.5	32.3	138.8	441.3	218.0
346	314	G. Wholesale and retail trade	OKZ-82 (Machine operators and assemblers)	12.4	11.7	42.7	138.0	223.3
183	311	K. Real estate, renting and business activities	OKZ-71 (Extraction and building trade workers)	11.7	11.6	64.8	217.1	234.9
382	394	F. Construction	OKZ-51 (Personal and protective services workers)	12.6	12.9	13.9	60.3	333.9
367	290	K. Real estate, renting and business activities	OKZ-51 (Personal and protective services workers)	12.5	11.2	112.2	651.6	480.7

* Ranking by mean years of schooling in 2000.
** Ranking by average monthly wage in 2007.

Table 13
Characteristics of 5 occupations selected for cross-county comparisons

Sector	Occupation	Mean years of schooling, 2000*	Mean years of schooling, 2012**	Average monthly wage, 2007, thousand Rubles***	N 2000, thousand	N 2012, thousand	Cumulative employment growth rate, %
N. Health and social work	OKZ-32 (Life science and health associate professionals)	12.7 (4)	13.1 (4)	10.3 (3)	1965.9	1991.4	1.3
L. Public administration	OKZ-41 (Office clerks)	12.8 (4)	13.7 (4)	6.5 (1)	184.1	181.3	-1.5
G. Wholesale and retail trade	OKZ-52 (Models, salespersons and demonstrators)	12.3 (3)	12.4 (3)	8.9 (2)	3863.3	4963.4	28.5
60401. Manufacturing of food products and beverages	OKZ-82 (Machine operators and assemblers)	12.0 (3)	12.2 (3)	11.9 (3)	103.2	134.9	30.8
O. Other community, social and personal service activities	OKZ-51 (Personal and protective service workers)	12.2 (3)	12.3 (3)	10.7 (3)	353.4	728.4	106.1

* Quintiles by mean years of schooling in 2000 in parentheses.
** Quintiles by mean years of schooling in 2012 in parentheses.
*** Quintiles by average monthly wages in 2007 in parentheses.

Таблица 14
Job reallocation by job quality quintiles, 2000-2012, %

		Ranking by mean years of schooling in 2000				Ranking by average monthly wage in 2007			
		Job destruction rate	Job creation rate	Gross reallocation rate	Net employment change	Job destruction rate	Job creation rate	Gross reallocation rate	Net employment change
2000-2008	1 quintile	-4.6	0.9	5.5	-3.7	-4.6	1.0	5.6	-3.7
	2 quintile	-1.9	2.8	4.7	0.9	-1.3	2.3	3.6	0.9
	3 quintile	-1.3	2.8	4.1	1.6	-1.3	2.1	3.4	0.8
	4 quintile	-0.9	2.2	3.1	1.3	-1.3	2.9	4.2	1.6
	5 quintile	-0.3	4.4	4.8	4.1	-0.5	4.9	5.3	4.4
	Total	-1.7	2.7	4.4	1.1	-1.7	2.7	4.4	1.1
2008-2012	1 quintile	-2.5	0.6	3.1	-1.9	-2.3	1.0	3.3	-1.4
	2 quintile	-1.9	1.0	2.8	-0.9	-1.1	0.9	2.0	-0.2
	3 quintile	-1.0	1.1	2.1	0.0	-1.5	1.6	3.1	0.1
	4 quintile	-1.1	1.7	2.8	0.7	-1.2	1.7	2.8	0.5
	5 quintile	-0.5	2.7	3.2	2.3	-0.7	2.2	2.9	1.6
	Total	-1.2	1.6	2.8	0.3	-1.2	1.6	2.8	0.3
2000-2012	1 quintile	-3.8	0.7	4.5	-3.1	-3.7	0.8	4.6	-2.9
	2 quintile	-1.6	1.9	3.5	0.3	-1.1	1.7	2.9	0.6
	3 quintile	-1.0	2.1	3.2	1.1	-1.1	1.6	2.7	0.5
	4 quintile	-0.7	1.8	2.5	1.1	-1.0	2.2	3.2	1.2
	5 quintile	-0.2	3.6	3.8	3.5	-0.3	3.8	4.1	3.4
	Total	-1.3	2.1	3.5	0.8	-1.3	2.1	3.5	0.8

Table 15
Socio-demographic profiles of job quintiles (wage based) in 2012, % (ranking by average monthly wage in 2007)

Groups	Q1 (2000)	Q2 (2000)	Q3 (2000)	Q4 (2000)	Q5 (2000)	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

Table 16
Distribution of employed individuals by job quintiles (wage based), 2012, % (ranking by average monthly wage in 2007)

Groups	Q1 (2000)	Q2 (2000)	Q3 (2000)	Q4 (2000)	Q5 (2000)	Total
By gender						
males	11.0	11.7	15.0	24.9	37.5	100
females	14.8	27.3	23.8	17.4	16.7	100
By age						
less than 20	45.3	31.2	10.1	7.9	5.6	100
20-29	8.8	23.3	18.8	22.7	26.3	100
30-39	10.1	19.8	19.3	21.7	29.1	100
40-49	12.7	18.5	20.0	20.6	28.3	100
50-59	16.4	16.5	19.7	20.7	26.8	100
60 and more	26.6	14.4	18.8	18.8	21.5	100
By educational attainment						
university	2.6	10.4	18.7	26.2	41.9	100
technical college	9.6	23.2	24.3	22.2	20.8	100
vocational (secondary)	15.3	21.4	17.5	20.8	25.0	100
upper secondary	24.4	25.6	16.6	14.8	18.6	100
lower secondary	41.1	21.1	14.3	10.1	13.5	100
primary	55.4	20.2	11.2	5.9	7.3	100
By marriage status						
married	12.9	17.7	19.1	21.5	28.9	100
not married	12.8	22.7	19.9	20.6	24.0	100
By residence						
urban	7.2	19.4	19.6	23.5	30.3	100
rural	31.5	19.3	18.5	13.5	17.2	100
By tenure						
less than 1 year	15.0	26.4	17.2	17.3	24.2	100
1-3	12.2	24.6	17.5	20.0	25.7	100
3-5	11.2	22.0	18.7	21.1	27.0	100
5-10	10.0	19.1	18.5	22.2	30.2	100
more than 10 years	9.8	15.0	22.9	23.6	28.7	100
By occupations						
Legislators, senior officials and managers	0.0	0.0	0.1	11.0	88.9	100
Professionals	0.1	4.0	25.2	29.9	40.7	100
Technicians and associate professionals	4.8	26.9	24.0	33.8	10.5	100
Clerks	19.4	22.8	45.1	12.6	0.0	100
Service workers	11.0	61.3	18.8	8.2	0.7	100
Skilled agricultural workers	96.5	1.9	0.8	0.8	0.0	100
Craft workers	3.4	6.3	18.0	40.0	32.3	100
Plant and machine operators and assemblers	10.9	2.2	21.4	17.6	47.8	100
Elementary occupations	46.9	35.7	15.7	1.6	0.1	100
By sectors						
Agriculture	88.2	4.9	2.2	0.0	4.7	100
Mining and quarrying	0.0	0.0	1.4	7.3	91.3	100
Manufacturing	0.5	14.5	18.5	43.7	22.8	100
Electricity, gas and water supply	5.3	5.2	20.9	44.8	23.8	100

Construction	0.1	8.2	6.7	4.2	80.8	100
Wholesale and retail trade	0.0	53.9	10.0	17.5	18.6	100
Hotels and restaurants	0.0	68.1	6.1	17.6	8.2	100
Transport and communications	0.0	4.9	18.3	12.7	64.1	100
Financial intermediation	0.0	2.0	14.3	3.1	80.5	100
Real estate	8.1	1.3	23.8	21.5	45.3	100
Public administration	11.1	22.3	10.4	46.9	9.3	100
Education	25.1	31.9	38.3	4.7	0.0	100
Health and social work	24.8	4.3	44.5	23.3	3.0	100
Other service activities	14.9	9.0	49.9	24.3	1.9	100

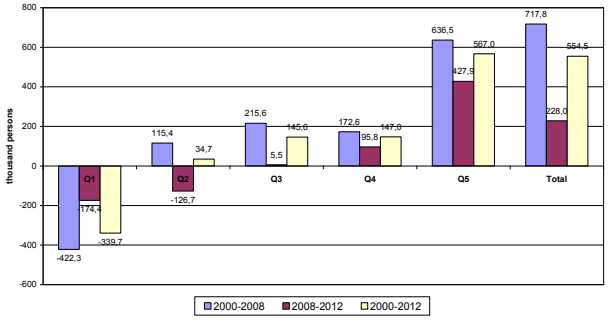
Table 17
Ordered probit for earnings based quintiles, coefficients and SE

	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.	511573	
LR chi2(18)	151080.21	
Log likelihood	-742073.1	
Pseudo R2	0.0924	

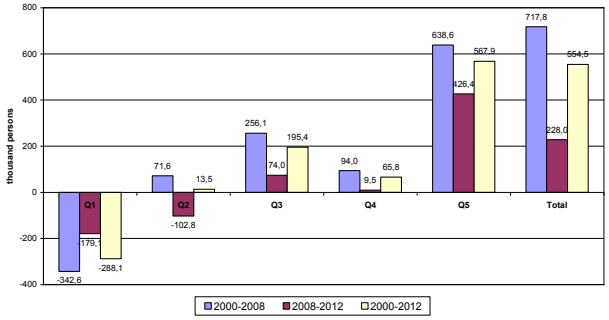
Notes: *** p<.01; ** p<.05

Fig. 1
Absolute annual average changes in the number of workers per job quintiles, 2000-2012, the total economy

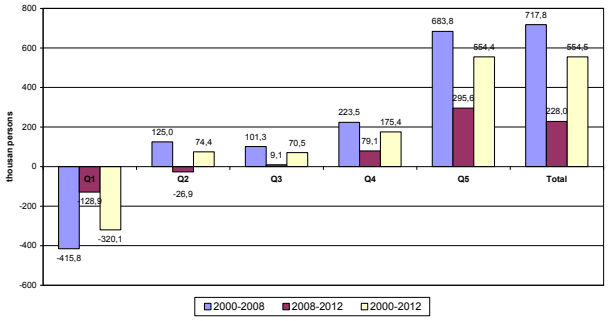
A) Job ranking – by mean years of schooling in 2000



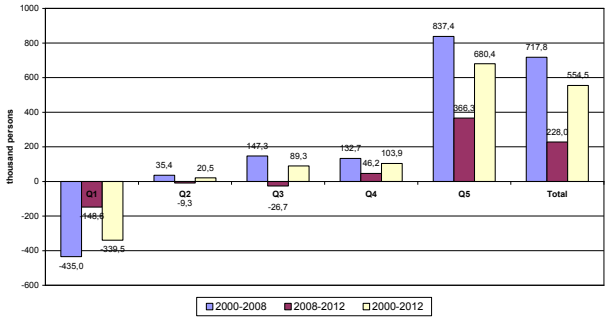
B) Job ranking – by mean years of schooling in 2012



C) Job ranking – by average monthly wage in 2007



D) Job ranking – by basic wage in 2007



E) Job ranking – by mean hourly wage in 2007

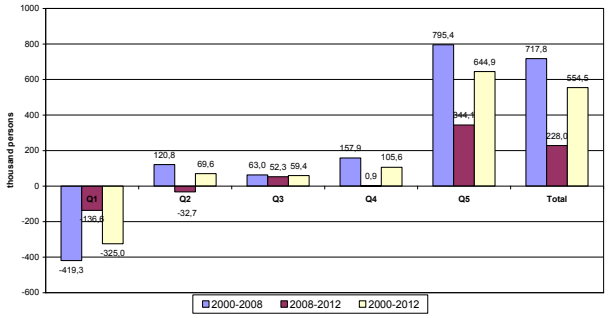
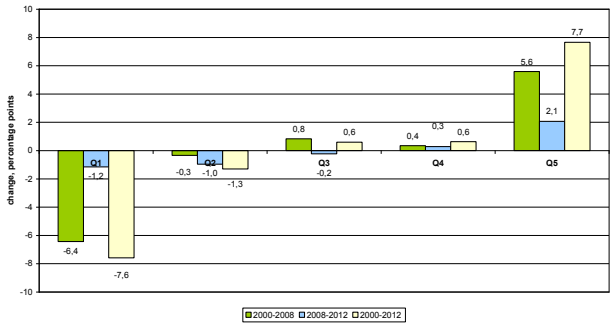
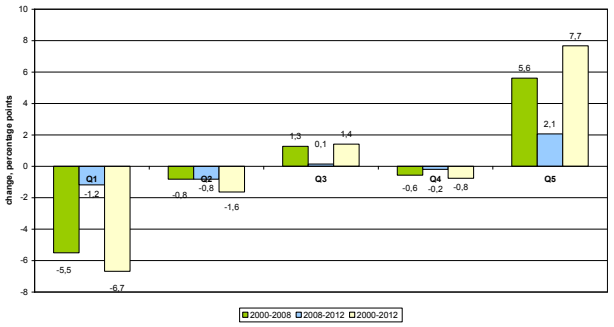


Fig. 2
Changes in job structure by quintiles, 2000-2012, percentage points

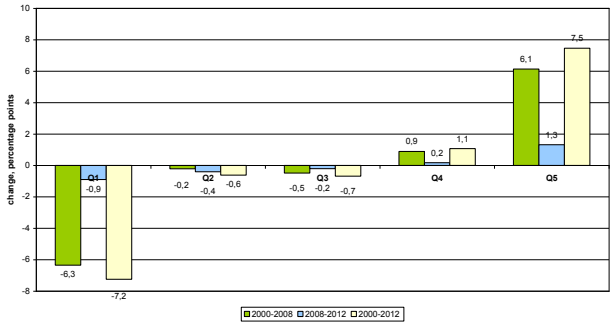
A) Job ranking – by mean years of schooling in 2000



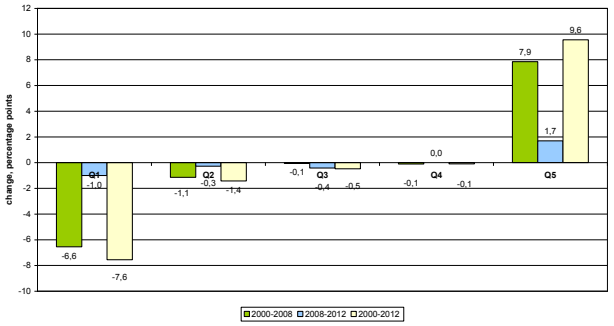
B) Job ranking – by mean years of schooling in 2012



C) Job ranking – by average monthly wage in 2007



D) Job ranking – by basic wage in 2007



E) Job ranking – by mean hourly wage in 2007

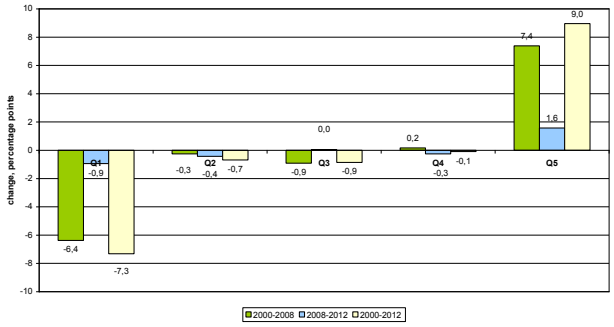
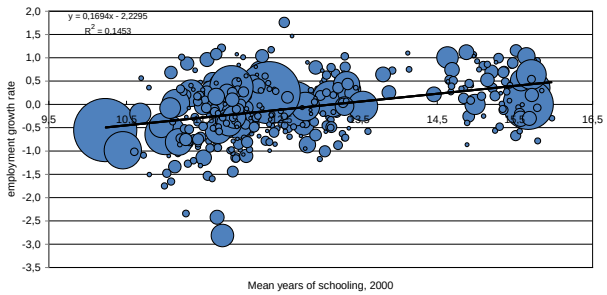


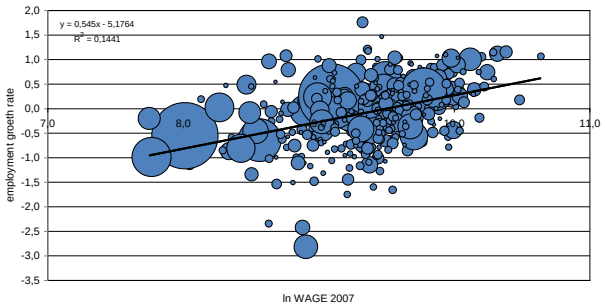
Fig. 3
Employment growth by measures of job quality and size of occupational-sectoral cells

A) Correlation between average years of schooling (2000) and employment growth rates (2000-2012)*



* Cells with fewer than 10K workers are excluded.

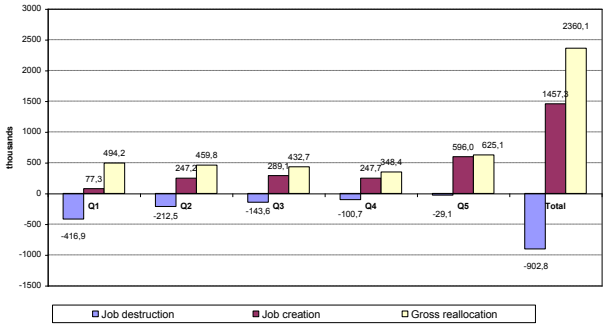
B) Correlation between average monthly wage (2007) and employment growth rates (2000-2012)*



* Cells with fewer than 10K workers are excluded.

Fig. 4
Job reallocation by quintiles, thousands

A) Job ranking – by mean years of schooling in 2000



B) Job ranking – by average monthly wage in 2007

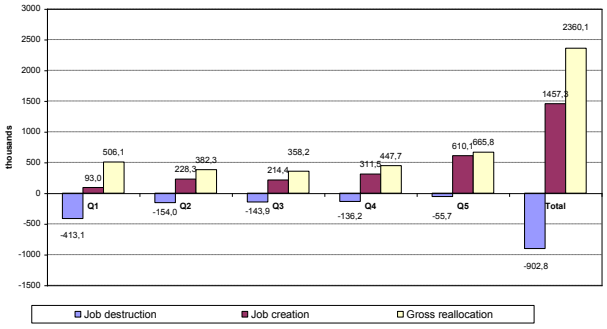
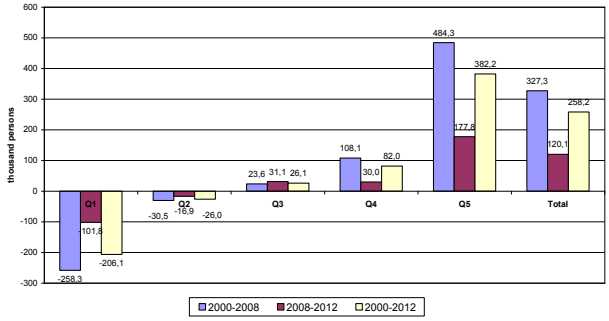
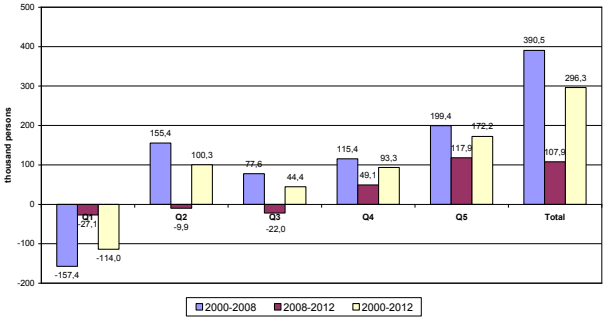


Fig. 5
Absolute annual average changes in the number of workers per job quintiles by socio-demographic groups, 2000-2012 (job ranking – by average monthly wage in 2007)

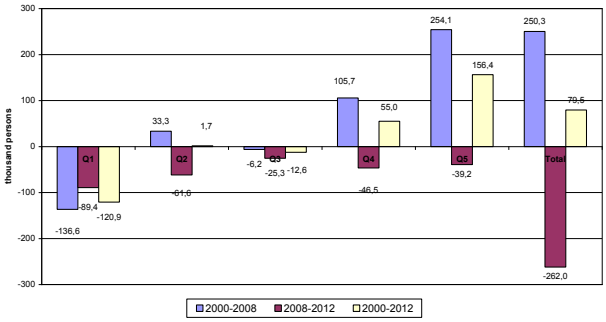
A) Males



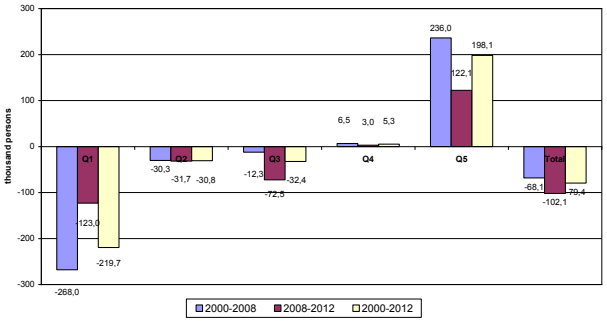
B) Females



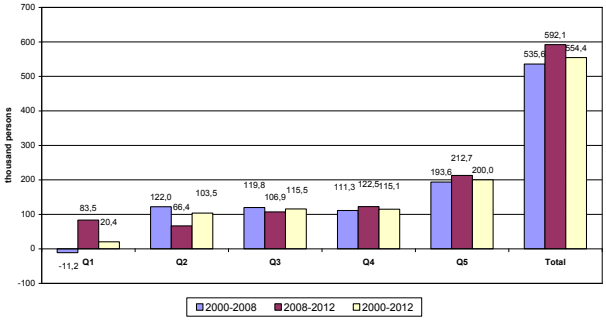
C) Young persons 15-29



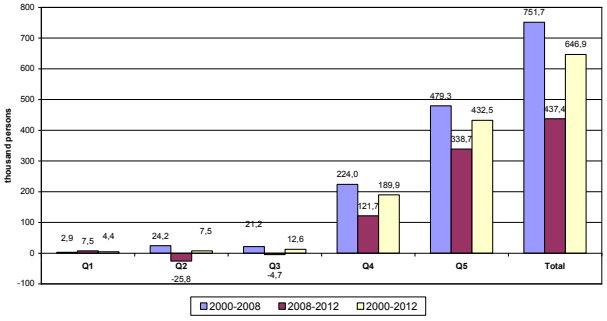
D) Prime-age workers 30-49



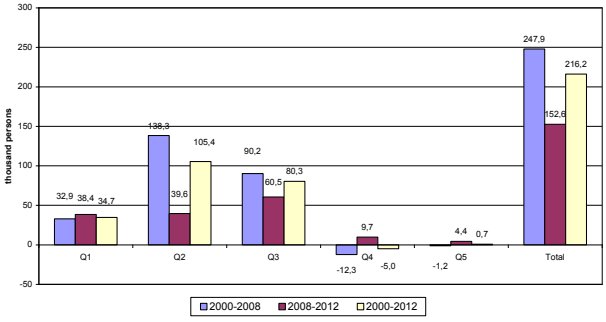
E) Old persons 50 and more



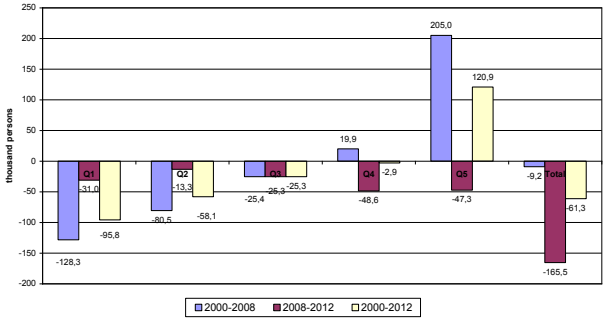
F) High-skilled white collars



G) Low-skilled white collars



H) High-skilled blue collars



I) Low-skilled blue collars

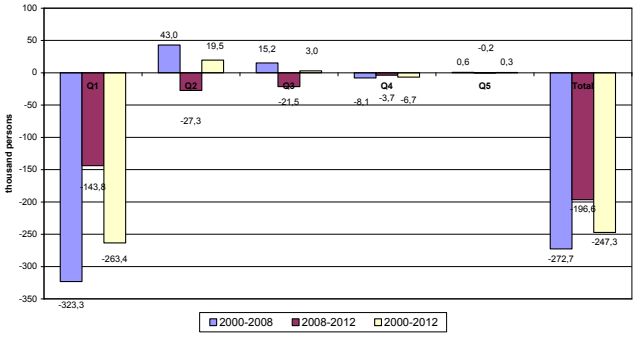
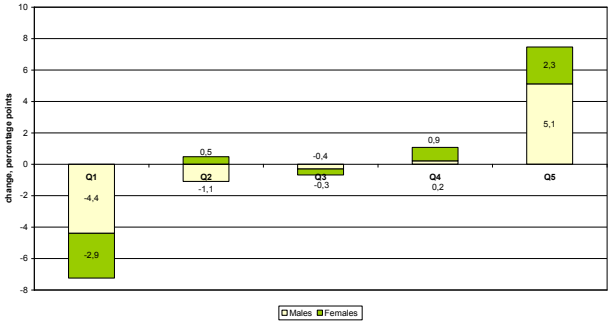
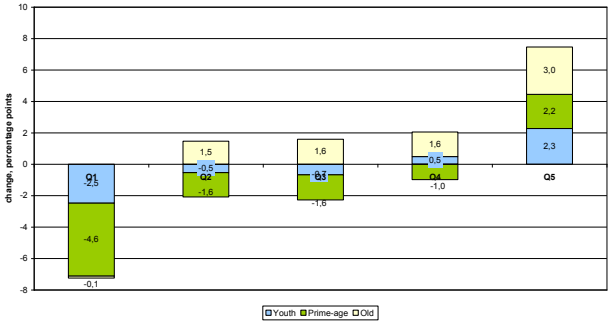


Fig. 6
Changes in job structure by quintiles and socio-demographic characteristics, 2000-2012, percentage points (job ranking – by average monthly wage in 2007)

A) Gender



B) Age



C) Occupational groups

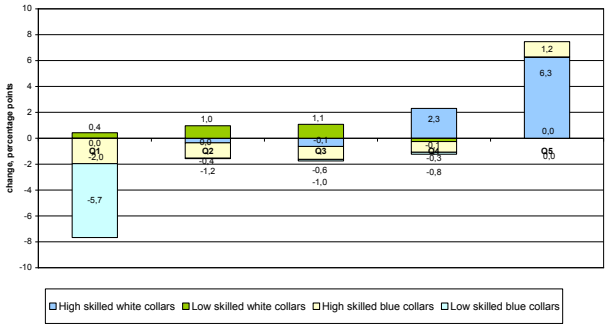
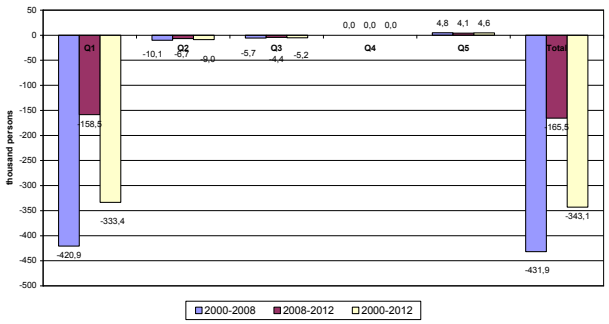
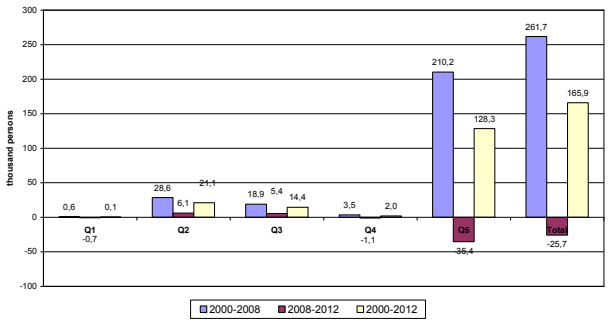


Fig.7 Absolute annual average changes in the number of workers per job quintiles by sectors, 2000-2012, thousands (job ranking – by average monthly wage in 2007)

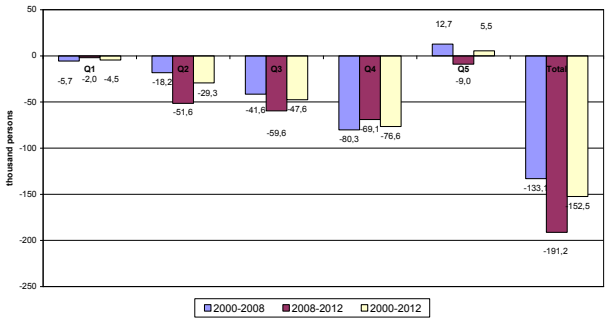
A) Agriculture



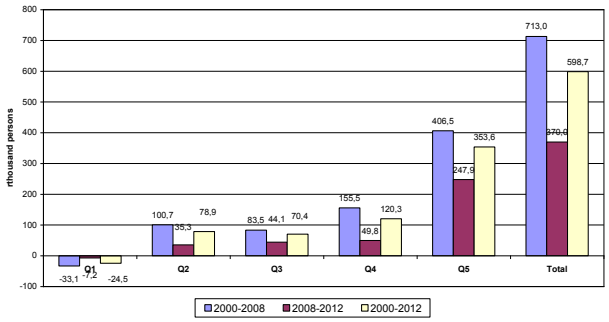
B) Construction



C) Manufacturing



D) Market services



E) Public sector

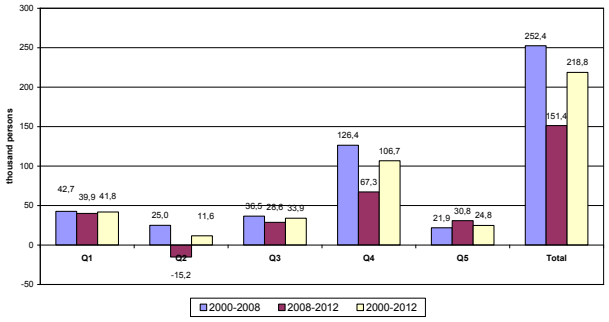


Fig. 8
Changes in job structure by quintiles and sectors, 2000-2012, percentage points (job ranking – by average monthly wage in 2007)

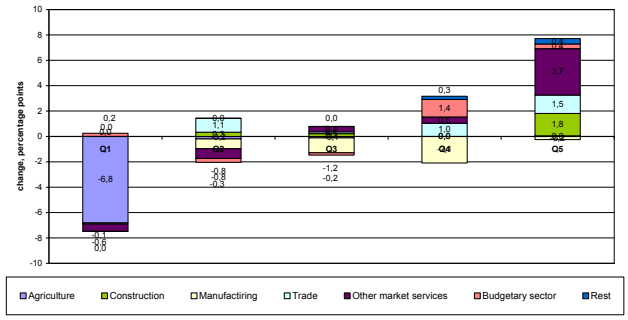
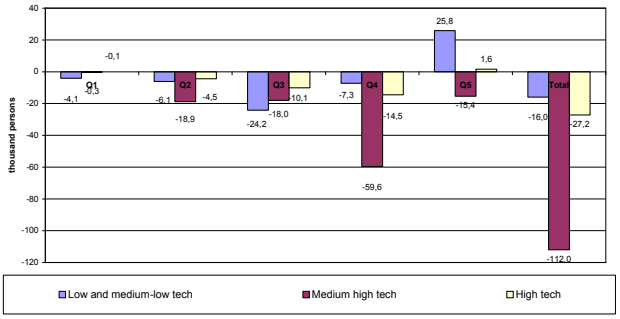


Fig. 9
Manufacturing industries with different technological levels, 2000-2012 (job ranking – by average monthly wage in 2007)

A) Absolute annual average changes in the number of workers per job quintiles, thousands



B) Changes in job structure by quintiles, percentage points

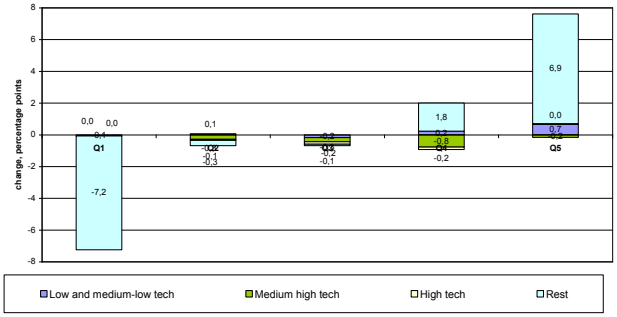
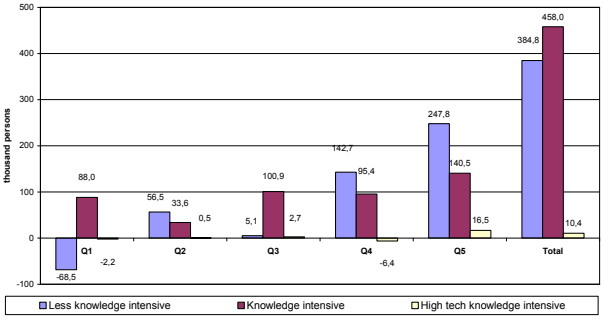


Fig. 10
Services with different levels of knowledge intensity, 2000-2012 (job ranking – by average monthly wage in 2007)

A) Absolute annual average changes in the number of workers per job quintiles, thousands



B) Changes in job structure by quintiles, percentage points