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EARNINGS INEQUALITY AND INFORMAL EMPLOYMENT IN RUSSIA²

In this paper I investigate the impact of informality on earnings inequality in Russia using RLMS-HSE data for 2000-2010. I find that during the whole period earnings inequality was substantially higher in the informal sector. Informality increases earnings polarization, thereby widening both tails of the distribution. Changes in the earning distribution of the formal sector were mainly generated by changes in the distribution of hourly earnings. In the informal sector, reduction of inequality occurred via two channels: Differences in hourly rates and working hours both declined. Changes in the structure of informality and conditional wage differentials did not have a significant impact on the overall earnings inequality, with the exception of decline in irregular employment.

Keywords: earnings inequality, informal economy, decomposition, recentered influence functions

JEL-classification: C21, D63, J31, J42.

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1. Introduction

In recent years, there has been a growing interest in earnings inequality in transition economies following evidence of a rapidly increasing earnings dispersion during the early reform period. Previous studies of the rise in earnings inequality have identified several causes of this trend, such as the rise of returns to education, the development of the private sector, and the failure of labor market institutions (e.g. Rutkowski, 1996; Brainerd, 1998; Milanović, 1999; Mitra and Yemtsov, 2006). Less attention has been paid to the expansion of the informal economy. Meanwhile, the share of the informal sector has grown in many post-communist countries since the start of the transition. Informality can be one of the ‘unnoticed’ important sources of earnings inequality. Only a few papers explicitly relate inequality and informality in the context of transition. Rosser et al (2000) find a positive relationship between income inequality and the size of the informal sector in transition countries. Krstic and Sanfey (2007, 2011) report the significant impact of informality on earnings inequality in Serbia and in Bosnia and Herzegovina.

Russia has also witnessed considerable growth of informal economy. The share of informally employed workers rose from 13 to 18 percent of total employment between 1999 and 2008 (Gimpelson and Zudina, 2011). Buehn and Schneider (2012) provide evidence that the underground economy in Russia is large compared to other transition economies, exceeding 40 percent of official GDP in 1999-2007.

Understanding of the nature of informality has developed over time, causing changes in the expected effects of the informal sector on inequality. According to the traditional paradigm, labor markets are segmented and workers are rationed out of the formal sector due to excessive regulation (Harris and Todaro, 1970). In this view, informality is involuntary and the incomes of informal workers are only marginally higher than those in unemployment. Wages in the formal sector are driven up above the market-clearing level because of minimum wages, trade unions, or efficiency wages. The pay gap between the sectors pushes up overall inequality, while within the informal sector inequality can be quite modest. Some authors later criticized the traditional view of the informal sector, arguing that markets are integrated and a majority of informal jobs reflect a voluntary choice. They better fit worker preferences and their skill endowments, and offer better earnings prospects (De Soto, 1989; Maloney, 2004). In the case of competitive markets, this means that in the long run the formal-informal wage gaps should be equal to compensating wage differentials in one of the sectors. This model suggests the smallest impact of informality on overall inequality. Recent developments combine these two views into a dual theory of the informal sector,

where a voluntary upper-tier segment coexists with an involuntary lower-tier segment (Fields, 2005). In this model, the contribution of informality comes largely from larger inequality within the highly heterogeneous informal sector, while between-sector inequality can be small.

My primary objective in this paper is to investigate the impact of expanding informality on earnings inequality. The analysis in this paper can shed light on the functioning of labor market institutions in transition and emerging economies. Previous empirical literature has studied how various labor market institutions (employment protection regulation, minimum wages, trade unions) affect wage differentials. The overall conclusion is that stronger labor market institutions are associated with lower earnings inequality (e.g. DiNardo et al, 1996; Fortin and Lemieux, 1997). However, this inequality-reducing effect is likely to exist only in the formal sector. In the informal sector, non-compliance is higher and many workers are out of the reach of legislation (no work contracts, flexible working hours, wages below the legal minimum, etc.). On the other hand, some regulations may have positive spillover effects, resulting in wage compression in both sectors. For example, in Brazil minimum wage increases between 1984 and 2002 were found to have decreased wage inequality in the formal and informal sectors (Lemos, 2009).

This paper contributes to the existing literature in a number of ways. First, using the data from the Russia Longitudinal Monitoring Survey (RLMS-HSE) for 2000-2010, I provide an accurate measurement of the earnings gaps and earnings inequality for different groups of informal workers in Russia. Second, I decompose earnings into hours of work and hourly earnings, and study the relative importance of these two explanations. Third, unlike most studies that have focused on the formal-informal wage gap at the mean, I compare the shapes of the distributions and estimate the gaps along the distribution. The decomposition technique proposed by Firpo, Fortin, and Lemieux (2007) is applied to identify the contribution of informality to changes in earnings inequality compared to that of other covariates.

The paper is organized as follows. Section 2 describes the sample and provides descriptive findings. Section 3 uses Lorenz curves and more formal methods to decompose earnings inequality into inequality of hours and that of hourly earnings. An analysis of overtime changes in equality shows the contributions of different informality groups. Section 4 presents the methodology of unconditional quantile regressions and decompositions based on this kind of regression. Then, this methodology is applied to study the effects of informality through the whole distribution and the impact of informality on overtime changes in inequality. The final section presents concluding comments

2. Data description

The data used in this paper come from the 2000-2010 waves of the Russia Longitudinal Monitoring Survey (RLMS-HSE)^{3, 4}. The RLMS-HSE is a well-known panel survey of Russian households based on a national probability sample. Together with a number of standard demographic variables at the individual and household level, the RLMS-HSE contains detailed information about the labor market experience of individuals. It has been previously used by a number of researchers to analyze informal employment relationships in the Russian labor market (Slonimczyk, 2012; Lehmann et al, 2012; Zudina, 2013).

The sample used in this paper includes full-time as well as part-time workers who report having a main job or are involved in other income-generating activities, which are mostly irregular. The earnings variable is based on actual labor incomes received in the last 30 days either from one's main job or from irregular activities. They are taken net of taxes and social security contributions. I eliminate observations with missing data in key variables, including age, education, earnings, and hours worked. Furthermore, I exclude individuals who report earnings that are more than two times larger than the 99.5 percentile of the distribution for a respective year. These restrictions leave 53,965 observations in the baseline sample.

The literature provides no widely accepted definition for the informal sector. The definition in this paper is similar in many respects to that employed by Slonimczyk (2012), which covers:

1. workers employed in the corporate sector without a work contract,
2. workers employed outside the corporate sector in private unincorporated units that do not constitute separate legal entities,
3. people involved in remunerated irregular activities.

The first subgroup includes those who work at informal jobs in registered firms and organizations. I classify a respondent in this group if he or she gives a positive answer to the question *'At this job do you work at an enterprise or organization? I mean any organization or enterprise where more than one person works, no matter if it is private or state-owned. For example, any establishment, factory, firm, collective farm, state farm, farming industry, store, army, government service, or other organization'* and a negative answer to the question *'Are you employed in this job officially, in other words, by labor book, labor agreement, or contract?'* Work contracts

³ Russia Longitudinal Monitoring survey (RLMS-HSE) has been conducted since 1992 by the National Research University 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 RAS.

⁴ The round of 2001 is excluded for consistency purposes because the question on work contracts was not asked in this round.

give the right to receive state-mandated benefits, such as paid annual leave, sick leave payments, severance pay, and pension. Those who give a negative answer to the former question fall into the second subgroup, which essentially consists of own-account professionals, the self-employed, and their employees. Finally, the third subgroup covers those who claim not to have a main job, but who report incomes from remunerated irregular activities. Involvement in such activities is identified by the following question: *‘In the last 30 days did you engage in some additional kind of work for which you were paid or will be paid? For example, sewing someone a dress, giving someone a ride in a car, assisting someone with apartment or car repairs, purchasing and delivering food, looking after a sick person, selling purchased food or goods in a market or on the street, or doing something else that you were paid for?’* For this subgroup, the data do not allow one to make a distinction between salaried employees and the self-employed. For this reason, I do not consider salaried employees and the self-employed separately in this paper.

Table 1 presents the employment shares of each subgroup in the sample. Changes in economic conditions hardly had any effect on the size of the informal sector as a whole. Despite strong economic growth in 2000-2007, the share of informal workers stayed roughly stable (about 20 percent of total employment). The response to the crisis of 2008 was rapid but shallow and transient. Informal employment shrank somewhat in 2008 and bounced back to pre-crisis levels in 2009.

Table 1. Percentages of formal and informal employment

	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010
Formal	80.3	80.8	80.2	78.7	80.0	79.9	80.1	82.8	79.2	81.4
Informal employment	19.7	19.2	19.8	21.3	20.0	20.1	18.9	17.2	20.8	18.6
Employed without contract in the corporate sector	3.1	3.8	4.7	5.1	5.5	6.0	4.9	5.3	6.2	5.6
Self-employed and their employees	6.8	6.1	5.8	7.4	6.6	6.4	7.9	6.7	7.7	8.2
Employed in irregular activities	9.8	9.3	9.3	8.8	8.0	7.8	6.2	5.1	6.9	4.8
Observations	3,521	4,426	4,600	4,879	4,675	5,774	5,693	5,844	5,770	8,788

Principal changes occurred *within* the informal sector: The share of irregular workers steadily declined while both types of ‘regular’ informality expanded over the period. This trend may indicate the diminishing role of informality as a survival strategy, since irregular activities are most likely to be used by households to cope with the shocks of the transition period. These changes in the structure of informal employment are very important because irregular activities were the most common form of informal work in Russia at the beginning of the period.

On the other hand, the cumulative share of ‘regular’ informal employment increased from 9.8 percent in 2000 to 13.8 percent in 2010. This rise in informal employment has come about despite the improved business climate over the period. Slonimczyk (2012) has found that the introduction of a flat-rate personal income tax in 2001 had an adverse effect on the share of informal employees, decelerating the rate of growth of informal employment. However, this tax reform failed to break an upward trend in informality.

A more general conclusion by Slonimczyk (2012) is that informal employment in Russia is sensitive to changes in the tax system. This equally relates to social security contributions that are not balanced with the benefits. High and regressive social security contributions discourage firms from hiring low-skilled labor on a formal basis. Additionally, the incentive for workers to join the formal economy is lowered by the ease in gaining access to social benefits. In Russia, health insurance is universally provided to both the unemployed and non-employed. The minimum contribution period to qualify for labor pension is as low as five years. Muravyev and Oshchepkov (2013) claim that minimum wages hikes in the 2000s have been associated with increased informality. Thus, excessive regulation is likely to be blamed for the growth of the informal sector in Russia.

Table 2 summarizes the demographic characteristics and key indicators of human capital for both formal and informal workers. The numbers in the table generally support the view of the informal sector as a disadvantaged segment of the labor market. It employs higher proportions of rural inhabitants and ethnic minorities. Informal workers tend to be younger and less educated. The informal sector lags behind in human accumulation, reflected in a lower increase in the share of university graduates over the period. Finally, the proportion of men is higher among informal workers. The latter seems to be the only characteristic that may drive up earnings in the informal sector.

Table 2 shows the mean monthly earnings and working hours for formal and informal workers. Monthly earnings are used instead of hourly wages due to the irregular working time arrangements in the informal sector and due to the fact that working hours in both sectors are often constrained. For this reason, I think that monthly wages reflect earning opportunities in the informal sector better than hourly wages (in the next section I come back to differences in working hours and hourly wages). As expected, there is a substantial earnings gap of about 20 percent in favor of formal workers. However, part of this gap can be attributed to lower working hours for informal workers.

Table 2. Descriptive statistics

	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010
Formal employment										
Average age, years	39.8	39.7	39.8	39.8	39.9	40.2	40.1	40.0	40.6	40.4
Females, %	53.9	53.5	54.7	54.6	53.7	55.2	55.2	54.7	55.3	54.9
Ethnicity - % of Russians	86.9	86.4	86.5	86.0	87.0	87.0	87.0	85.2	87.2	88.3
Rural, %	19.1	18.0	19.0	18.3	19.6	20.6	20.8	20.6	20.7	22.3
University degree, %	24.6	26.0	25.9	26.6	27.1	27.6	28.0	28.9	30.2	32.0
Average monthly earnings, rubles	1851	3677	4487	5417	6767	8191	9948	13136	13142	14650
Average monthly working hours	167.4	167.5	167.6	167.8	168.6	173.0	174.4	172.6	171.4	171.8
Informal employment										
Average age, years	36.0	35.7	35.8	36.0	36.2	36.3	36.9	37.3	37.9	37.3
Females, %	45.3	45.5	45.0	44.6	44.6	44.4	44.3	45.7	46.5	43.1
Ethnicity - % of Russians	83.9	79.5	80.3	81.3	78.9	80.2	82.6	79.0	82.5	82.0
Rural, %	23.0	26.3	31.4	25.5	29.0	27.0	29.5	27.0	28.1	28.3
University degree, %	11.7	12.2	10.8	11.7	10.6	10.6	11.3	12.4	12.6	14.3
Average monthly earnings, rubles	1654	3226	3684	4726	5396	6683	8319	10821	10348	12579
Average monthly working hours	140.7	137.5	137.1	141.6	145.8	152.9	158.9	155.1	153.2	160.1

For a closer look at earnings and working hours, I break these into groups of informal workers. Figure 1 plots the average earnings and working hours in each group divided by the respective averages for formal workers. The informal sector shows a heterogeneous structure. We observe that those employed in irregular activities are very different from both formal workers and two other groups of informal workers. They are often employed part-time and monthly earnings are only half of those of formal workers. On the contrary, the two other groups of informal workers have many common features with formal workers. The group of self-employed and their employees enjoyed up to 20 percent premium in the beginning of the period, but this advantage faded out in the mid-2000s. The earnings gap for those employed without a contract in the corporate sector fluctuated around zero during the whole period. However, both groups of informal workers tended to have longer working hours.

To address the question of how much change there has been in the distributions of formal and informal earnings over the period, I plot kernel density functions for 2000 and 2010 (Figure 2), and for all years of the period calculate two measures of earnings dispersion, specifically the Gini

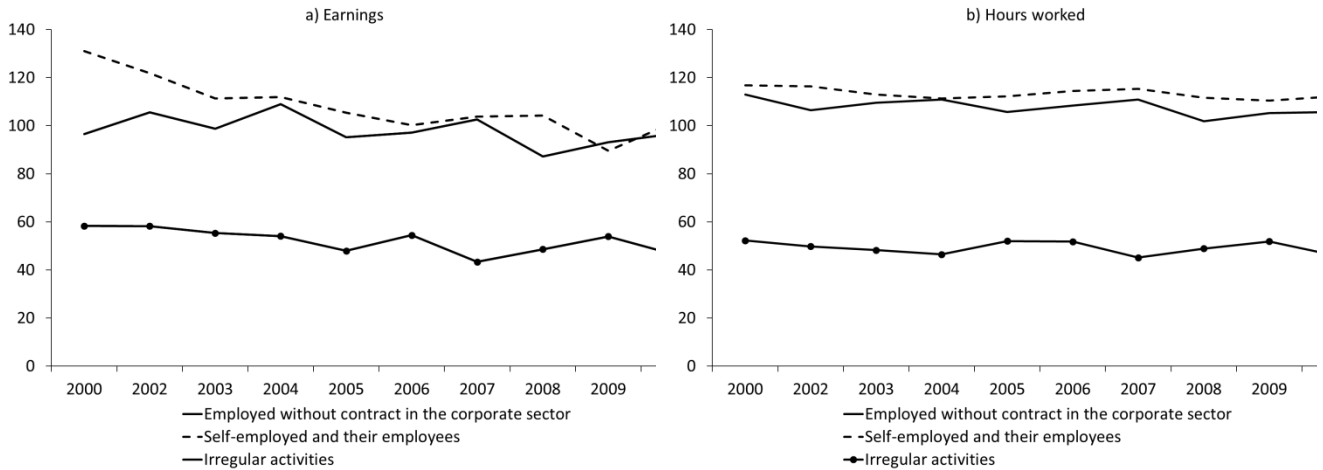


Figure 1. Average earnings and working hours by types of informality, in percent (100=formal employment)

coefficient and the variance of log-earnings (Table 3). Standard errors were calculated by the bootstrap method. The general picture that emerges is that during the whole period earnings inequality has been significantly higher in the informal sector – by 20-25% if measured by the Gini coefficient and by 100-120% if measured by log-variance. By these two indicators, the changes in inequality over the period are statistically significant for both sectors.

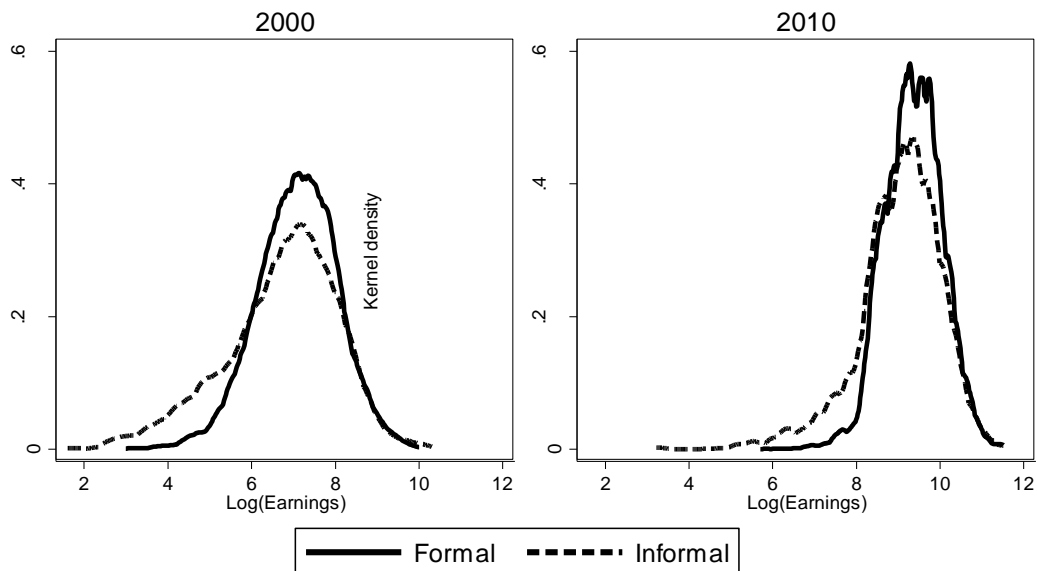


Figure 2. Kernel density estimates of log earnings

A comparison of kernel-densities suggests that in both sectors earnings are more dispersed among those with lower incomes than among those with higher incomes. The upper tails of the two distributions almost coincide. However, the distribution for the informal sector is broader with more mass at the lower part, reflecting a larger proportion of low wage earners in this sector. Therefore, the major pay differences between the sectors are at the bottom of the distribution that is among low-wage earners. One possible reason for this result is the existence of a minimum wage that is enforced in the formal sector but not in the informal sector. Other reasons include a prevalence of part-time work and a higher proportion of poorly educated workers in the informal sector.

Earnings inequality declined substantially between 2000 and 2010, both in the formal and informal sectors. Changes in inequality measures indicate that the pace of decline was remarkably similar between the sectors. The Gini coefficient suggests a contraction in earnings inequality within a range between 20 and 25 percent. The variance of log-earnings almost halved in both sectors. This measure is more sensitive to the differences in earnings values in the tails of the distribution, while the Gini coefficient puts more weight on differences in the middle of the distribution.

Table 3. Inequality measures

	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010
Gini coefficient										
Formal employment	0.480 (0.007)	0.434 (0.006)	0.435 (0.006)	0.417 (0.005)	0.407 (0.005)	0.394 (0.004)	0.373 (0.003)	0.386 (0.004)	0.370 (0.004)	0.367 (0.003)
Informal employment	0.559 (0.015)	0.539 (0.015)	0.529 (0.010)	0.508 (0.009)	0.492 (0.012)	0.487 (0.010)	0.465 (0.008)	0.478 (0.010)	0.461 (0.009)	0.443 (0.008)
Employed without contract in the corporate sector	0.446 (0.028)	0.451 (0.031)	0.450 (0.019)	0.434 (0.017)	0.431 (0.021)	0.403 (0.013)	0.390 (0.013)	0.391 (0.013)	0.409 (0.016)	0.394 (0.014)
Self-employed and their employees	0.456 (0.023)	0.449 (0.028)	0.466 (0.020)	0.433 (0.012)	0.443 (0.020)	0.427 (0.017)	0.413 (0.012)	0.442 (0.017)	0.402 (0.013)	0.392 (0.011)
Employed in irregular activities	0.636 (0.022)	0.608 (0.019)	0.585 (0.014)	0.581 (0.017)	0.524 (0.016)	0.576 (0.015)	0.516 (0.014)	0.565 (0.021)	0.545 (0.021)	0.529 (0.015)
Variance of logs										
Formal employment	0.915 (0.026)	0.747 (0.022)	0.753 (0.020)	0.685 (0.018)	0.645 (0.018)	0.583 (0.014)	0.517 (0.011)	0.540 (0.012)	0.500 (0.014)	0.473 (0.009)
Informal employment	1.819 (0.102)	1.628 (0.094)	1.526 (0.072)	1.512 (0.080)	1.299 (0.079)	1.263 (0.065)	1.158 (0.061)	1.150 (0.062)	0.996 (0.051)	1.008 (0.052)
Employed without contract in the corporate sector	0.922 (0.135)	0.725 (0.079)	0.881 (0.089)	0.799 (0.075)	0.759 (0.069)	0.632 (0.045)	0.576 (0.044)	0.657 (0.066)	0.625 (0.048)	0.576 (0.043)
Self-employed and their employees	0.758 (0.083)	0.780 (0.076)	0.811 (0.071)	0.712 (0.045)	0.721 (0.062)	0.643 (0.049)	0.655 (0.042)	0.705 (0.051)	0.573 (0.046)	0.549 (0.030)
Employed in irregular activities	2.021 (0.143)	1.897 (0.130)	1.766 (0.099)	1.852 (0.140)	1.542 (0.129)	1.649 (0.104)	1.374 (0.110)	1.503 (0.127)	1.332 (0.108)	1.456 (0.123)

Note: Bootstrapped standard errors in parentheses (500 replications).

A closer inspection of inequality measures reveals that the higher inequality within the informal sector is mainly driven by those employed in irregular activities. Two other informal subgroups demonstrate levels of earnings dispersion that are surprisingly similar to those in the formal sector. The Gini coefficients are on average larger by 5-8%, but these differences are not statistically significant. Higher inequality is observed only at the tails of the distribution, which is reflected in larger values of log-variance for these groups.

3. The role of hours and hourly rates

The earnings distribution is generated from the joint distributions of hourly wages and workings hours. I first compare Lorenz curves for the formal and informal distributions of earnings, hours, and wages in 2000, and then investigate the changes that happened over the period. Lorenz curves are especially attractive in distribution comparisons because they are mean independent and allow for contrasting the shapes of the distributions.

A Lorenz curve graphs the cumulative percentage of earnings (hours, hourly wages) against the cumulative percentage of the corresponding population (ordered in increasing size of variable). The 45° line on such graph reflects a situation of perfect equality. Figure 3 shows that there is more inequality in the informal sector across all three distributions.

The most sizeable inter-sectoral differences are evident in the Lorenz curve for hours. A considerable proportion of informal workers has very low working hours. For the informal sector there are two main peaks in the hours density. The first peak occurs at 30 hours per month. It corresponds to the typical duration of working time in irregular activities. The second peak is found at about 170 hours per month. This duration is common to workers without a contract in the corporate sector, as well as to the self-employed and their employees. On the contrary, in the formal sector the Lorenz curve nearly approaches the 45° line, suggesting that a majority of formal workers works the same number of hours (about 170 hours per month).

The Lorenz curves of hourly wages are similar at the bottom part but diverge at around 30% of the cumulative population of informal workers. There is more inequality in the central and especially in the top part of the informal sector distribution. In the informal sector inequality measures are inflated by a relatively small fraction of workers with high hourly wages.



Figure 3. Lorenz curves for 2000

Figure 4 plots the changes in the positions of the Lorenz curves hours and hourly wages between 2000 and 2010. In the formal sector the changes in the earnings distribution are generated almost exclusively by the changes in the distribution of hourly earnings, while the distribution of working hours hardly changed over the period. Hourly wages are more evenly distributed in 2010 in all parts of the wage scale.

In the informal sector the contraction of inequality goes through two channels: Differences in both hourly rates and the hours of work declined. In the hours distribution, larger reductions occurred at the bottom of the distribution. It is caused by a declining share of part-time workers. Given that the overall share of informal workers has not changed much over the period, these changes in the hours distribution suggest that informal workers had a larger share of total hours worked in 2010. This shift describes an additional dimension of expanding informality on the Russian labor market.

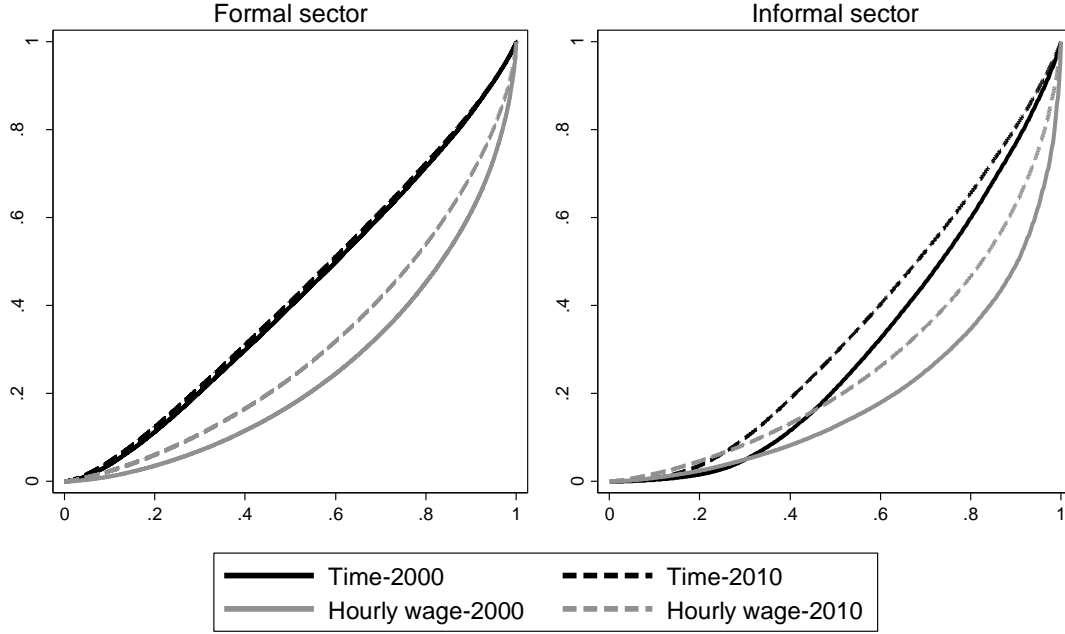


Figure 4. Lorenz curves: 2000 vs 2010

As a next step, I present a graphical depiction of the relative contribution of hours and hourly rates given by the Lorenz curves in a more formal way. The disadvantage of the Lorenz curves comes from the fact that the orderings of workers are different for hours and for hourly wages. Therefore, the graphs above ignore the relationship between hours and hourly rates at the individual level. This interaction may have an important impact on overall earnings inequality. It may have an inequality-reducing effect if workers with higher hourly wages tend to work shorter hours, or an inequality-enhancing effect if the relationship goes in the opposite direction.

These factors are taken into account in the methodology coined by Doiron and Barrett (1996). Their suggestion is to breakdown total earnings-inequality into the contributions of hours, wages, and their interaction. The decomposition is straightforward for the variance of log-earnings:

$$Var(\ln mw) = Var(\ln h) + Var(\ln hw) + 2Cov(\ln h, \ln hw), \quad (1)$$

where h denotes hours, hw denotes hourly wages, and mw is the total earnings. The covariance term describes the interaction between hours and hourly wages.

The decomposition is compared for formal and informal employment in Table 4. The results are presented in absolute values and in percentages. They confirm conclusions derived from an analysis of the Lorenz curves that differences in hours have a larger contribution to earnings inequality in the informal sector. Informal inequality in monthly earnings is two times larger in the informal sector and this ratio remains quite stable over the period in question. For the number of

hours, informal inequality is 8-11 times higher than inequality in the formal sector, while for hourly earnings inequality is only 30-40 percent higher. As a result, the inequality in hours explains a larger fraction of the total variance.

Table 4. Decomposition of inequality: variance of logs

Year	Formal employment				Informal employment			
	Monthly earnings	Hourly wages	Hours	Interaction	Monthly earnings	Hourly wages	Hours	Interaction
2000	0.915	0.944	0.183	-0.212	1.819	1.267	1.693	-1.140
2005	0.645	0.679	0.117	-0.152	1.299	0.900	1.277	-0.878
2010	0.473	0.509	0.127	-0.163	1.008	0.738	1.068	-0.799
Change over 2000-2010	0.441	0.435	0.056	-0.049	0.811	0.528	0.624	-0.341
As percent								
2000	100	103	20	-23	100	70	93	-63
2005	100	105	18	-24	100	69	98	-68
2010	100	108	27	-34	100	73	106	-79
Change over 2000-2010	100	98	13	-11	100	65	77	-42

Another interesting difference that shows up in the decomposition is the relative contribution of the interaction between hours and hourly earnings. The sign of the covariance term is negative for both sectors. Therefore, this component has an equalizing effect, implying that workers with lower hourly rates generally work longer hours. This effect is much stronger in the informal sector. For formal workers it comprises 25-35% of the total variance in log monthly earnings, while in the informal sector the corresponding proportion goes up to 70-80%.

Table 4 also provides the changes in inequality between 2000 and 2010. There has been substantial inequality compression in both sectors. The signs of the changes are similar for both sectors. The common trend across sectors is for shrinking variation in hourly earnings and number of hours, as well as moderation in the equalizing effect of the interaction between hours and hourly rates. However, the magnitude of the changes is very different. In the formal sector most of the reduction can be explained by declining inequality of hourly earnings, while changes in the variance of hours and in the covariance term are of minor importance. For the informal sector, changes in the distribution of hours have the largest contribution to the reduction of the total variance, but the shrinking dispersion of hourly earnings is also highly significant. The decline in the interaction component was much larger in the informal sector. Changes in the correlation between hours and

hourly earnings may reflect a shift from the demand side. More workers from the informal sector who initially involuntarily worked short hours found jobs with longer hours.

Table 5. Decomposition of inequality within subgroups of informal workers: variance of logs

Year	Employed without contract in the corporate sector				Self-employed and their employees				Employed in irregular activities			
	MW	HW	H	Cov (HW, H)	MW	HW	H	Cov (HW, H)	MW	HW	H	Cov (HW, H)
2000	0.931	1.078	0.221	-0.368	0.793	1.009	0.202	-0.418	2.022	1.462	2.080	-1.520
2005	0.762	0.698	0.171	-0.107	0.724	0.729	0.193	-0.198	1.546	1.114	1.861	-1.429
2010	0.579	0.564	0.267	-0.252	0.533	0.576	0.207	-0.249	1.451	1.115	1.871	-1.535
2000-2010	0.352	0.513	-0.045	-0.116	0.260	0.433	-0.005	-0.169	0.571	0.347	0.209	0.015
As percent												
2000	100	116	24	-40	100	127	26	-53	100	72	103	-75
2005	100	92	22	-14	100	101	27	-27	100	72	120	-92
2010	100	97	46	-43	100	108	39	-47	100	77	129	-106
2000-2010	100	146	-13	-33	100	167	-2	-65	100	61	37	3

The diversity of driving forces behind declining inequality in the informal sector may be an indication of structural shifts and/or heterogeneity within the informal sector. I test this hypothesis in the remaining part of this section. Table 5 decomposes the log-earnings variance for the subgroups of informal workers into three components of Equation (1). On average, the inequality of both monthly and hourly earnings among those employed without a contract in the corporate sector and among the self-employed and their employees is 10-20 percent higher than in the formal sector. On the contrary, for hours the inequality is on average higher by 40-50 percent. However, a higher dispersion of hours in these two informal subgroups is almost completely offset by the larger negative interaction component. The compression in subgroup inequalities in 2000-2010 can be attributed to a decline in the variance of hourly earnings. Changes in two other components have a positive sign for both subgroups, meaning that their impact was inequality-enhancing. The absolute value of changes in the covariance term is especially large, suggesting that workers with higher (lower) hourly earnings have increased (decreased) their labor supply. This finding implies a further ‘regularization’ in the ‘regular’ segment of the informal sector: At the end of the period, hourly earnings are more equally distributed and the interaction between hours and hourly earnings is closer to that observed in the formal sector.

The subgroup of those employed in irregular activities evidently stands apart from formal workers and two other informal subgroups. In this subgroup both a higher inequality of hours and a

higher inequality of hourly rates contribute to the higher total variance of monthly earnings. The negative interaction component is large in absolute terms, but not enough to overbalance a higher inequality in hours and hourly earnings. It is noteworthy that over time the reduction in the hours inequality, though smaller compared to the decline in the inequality of hourly earnings, played an important role in improving overall inequality. This finding means that an analysis of differences in inequality should account for a specific pattern of hours determination in this subgroup.

What we call ‘irregular’ employment is likely to offer more flexible working arrangements than other types of formal and informal employment. Other types of employment offer a limited number of jobs with part-time working arrangements and flexible hours, while more workers gain a higher utility from being able to choose their working schedule. They may opt for irregular work that provides them target income while working distantly or part-time. Many of those who work short hours are mothers with small children or pensioners. For some workers irregular work is a deliberately chosen strategy of job search. They treat it as a temporary job that leaves them time for an active job search. The RLMS data gives some empirical evidence of this hypothesis. Those in irregular employment report applying somewhere or asking someone for a job in last 30 days 5-6 times more frequently than formal workers and 3 times more frequently than other informal workers. Of course, some workers end up in irregular activities if they are only able to find a seasonal job or a job with daily payments. These findings on the differences in hourly distributions and their interactions with hourly earnings require further study.

Tables 4 and 5 were informative about the changes in within-group inequality, but they still lack insight into the role of between-group differentials and changes in the shares of different subgroups of workers. To answer this question, I decompose the 2000-2010 change in the variance of the log of monthly earnings into within- and between-group components and compositional using the methodology of Juhn et al (1993).

The variance of logs in year t ($Var(Y_t)$) can be broken down into population subgroups using the following formula:

$$Var(Y_t) = \sum_{j=1}^K f_{jt} Var(Y_{jt}) + \sum_{j=1}^K f_{jt} (\bar{Y}_{jt} - \bar{Y}_t)^2 \quad (2)$$

where $Y_t = \ln(mw_t)$, f_{jt} is the fraction of workers in subgroup j in year t ($j=1, 2, \dots, K$), $Var(Y_{jt})$ is the variance of earnings in group j in year t , \bar{Y}_{jt} is the average earnings in group j in year t , \bar{Y}_t is the average earnings of all workers in year t .

The change in variance over time can then be decomposed into shifts in the sectorial composition (changes in fractions of population subgroups), and changes in within- and between-group inequality:

$$\begin{aligned} \Delta Var(Y_t) = & \sum_{j=1}^K f_{j0} (Var(Y_{j1}) - Var(Y_{j0})) + \sum_{j=1}^K f_{j0} ((\bar{Y}_{j1} - \bar{Y}_1)^2 - (\bar{Y}_{j0} - \bar{Y}_0)^2) \\ & + \sum_{j=1}^K (f_{j1} - f_{j0}) Var(Y_{j1}) + \sum_{j=1}^K (f_{j1} - f_{j0}) (\bar{Y}_{j1} - \bar{Y}_1)^2 \end{aligned} \quad (3)$$

The first two terms in Equation (3) reflects changes in within- and between-group variance, respectively. The third and the fourth term account for compositional effects. The compositional effects will decrease the variance if employment shifts either towards groups with low within-group variance or towards groups with average wages closer to the mean.

Table 6. Decomposition of changes in inequality (2000-2010): variance of logs

	All workers	Formal employment	Informal employment		
			Employed without contract in the corporate sector	Self-employed and their employees	Employed in irregular activities
Total change (2000-2010)	0.527	0.350	-0.004	0.022	0.159
1. Within-group	0.438	0.354	0.011	0.017	0.056
2. Between-group	-0.016	0.002	0.000	0.012	-0.029
3. Compositional effects	0.105	-0.006	-0.015	-0.007	0.132
As percent:					
Total change	100	66	-1	4	30
1. Within-group	83	67	2	3	11
2. Between-group	-3	0	0	2	-6
3. Compositional effects	20	-1	-3	-1	25
Employment share – 2000		80.3	3.1	6.8	9.8
Employment share – 2010		81.4	5.6	8.2	4.8

The results of decomposition are presented in Table 6. The changes in inequality in 2000-2010 are mainly explained by narrowing inequality within the groups (83 percent of total reduction). Changes in the composition of employment stand for another 20 percent of total reduction. However, the gaps in average wages across the groups remained roughly unchanged and had an insignificant impact on total inequality.

Formal employment has the largest contribution to the reduction of the total variance mostly due to the decline in dispersion of within-group earnings. This is not surprising, as this group composes 80 percent of total employment. In fact, the contribution of formal employment (66 percent of total reduction) is relatively small compared to the share of this group in total employment.

An especially striking impact was made by the subgroup of those in irregular employment. Their contribution to the reduction of total inequality is equal to 30 percent, which is much larger than their employment share. For this subgroup, the shrinking within-group dispersion is coupled with a decrease in the relative share of this subgroup. The latter change is at least twice as important as changes in inequality within the group. Workers from this subgroup moved towards groups with a lower earnings dispersion and average earnings closer to the overall mean. In the meantime, the average earnings in irregular activities further decreased by 2010 compared to the initially low relative level at the beginning of the period. Absent this decrease, the subgroup of the irregularly employed would have had an even larger effect on total inequality.

4. Differences in observable characteristics

4.1 Methodology

Up to this point I ignored the fact that formal and informal workers differ in their observable characteristics and that these differences are likely to affect the level of inequality in each sector. In this section I adopt the Firpo-Fortin-Lemieux (FFL) method (Firpo et al, 2009; Fortin et al., 2011) to decompose the differences in inequality between the formal and informal sectors. The FFL method extends the well-known Oaxaca-Blinder approach for decomposing the differences along the entire distribution and applying it to statistics other than the mean (Blinder, 1973; Oaxaca, 1973). The FFL method allows one to divide the differences in inequality into two main sources attributed: 1) To differences in observable characteristics (the composition effect); and, 2) to differences in the returns to these characteristics (the wage-structure effect). Composition and wage-structure effects can be further decomposed into the contributions of individual covariates, as in the standard Oaxaca-Blinder decomposition.

The procedure is based on computing the recentered influence function (RIF) for the quantile $q(\tau)$, or other distributional statistics of interest, and using this variable instead of the outcome variable (earnings) in the regression equation. FFL defines the RIF as $RIF(y; \nu) = \nu(F_Y) + IF(y; \nu)$, where ν is some parameter of the distribution and $IF(y; \nu)$ is the influence function that comes from statistics theory (Hampel, 1974). Following FFL, the RIF for the variance is given by $RIF(Y, \sigma^2) = \sigma^2 + [(Y - \mu)^2 - \sigma^2] = (Y - \mu)^2$. The RIF for quantile $q(\tau)$ has a more complicated form $RIF(y; q_\tau) = q_\tau + \frac{\tau - 1\{y \leq q_\tau\}}{f_Y(q_\tau)}$, where f_Y is the marginal density function of Y and $I\{\cdot\}$ is an

indicator function of whether the particular earnings observation y is at or under $q(\tau)$. In empirical applications, the RIF for each observation is obtained by estimating the sample quantile \hat{q}_τ and the density $\hat{f}_y(\hat{q}_\tau)$ using kernel functions.

FFL demonstrates that the RIF-regression for any distributional statistics ν ($E[RIF(Y;\nu)|X]$) can be modeled by a linear regression model:

$$E[RIF(Y;\nu)|X] = X\gamma_\nu \quad (4)$$

The coefficients of Equation (4) are estimated by OLS and represent the mean marginal effects of explanatory variables on considered parameters of the earnings distribution.

Using the estimates from Equation (4), it is possible to compute an Oaxaca-Blinder decomposition for changes over time as follows:

$$\hat{\nu}_{2010} - \hat{\nu}_{2000} = \underbrace{(\bar{X}_{2010} - \bar{X}_{2000})\hat{\gamma}_{2000,\nu}}_{\text{Composition effect}} + \underbrace{\bar{X}_{2010}(\hat{\gamma}_{2010,\nu} - \hat{\gamma}_{2000,\nu})}_{\text{Wage structure effect}} \quad (5)$$

In reality, the decomposition is more complicated, because Equation (5) produces consistent estimates of composition and wage structure effects only in cases of linear specification for Equation (4). The linearity assumption might not hold in all situations (Barsky et al, 2002). To overcome this problem, FFL suggest using a reweighting procedure based on DiNardo et al (1996). The idea of reweighting is to construct the distribution of incomes that workers would have earned in 2000 had they had the same characteristics as in year 2010. The reweighting factor is defined as:

$$\psi = \frac{1 - p(X)}{p(X)} \times \frac{P}{1 - P} \quad (6)$$

where $p(X)$ is the probability of being in 2010 given workers' individual characteristics ($p(X)$ is estimated as predictions from probit or logit models for the joint sample of 2000 and 2010) and P is the actual fraction of 2010 observations in the joint sample of 2000 and 2010. These weights are used to compute a reweighted value for each observation in 2000.

I then estimate the counterfactual mean (\bar{X}_{2000}^w) and counterfactual coefficients ($\hat{\gamma}_{2000,\nu}^w$) from the regression of $RIF(Y_{2000}; q_\tau)$ on the reweighted sample. By adding and subtracting $\bar{X}_{2000}^w \hat{\gamma}_{2000,\nu}^w$, it is possible to compute the so-called reweighted-regression decomposition of the overall change as:

$$\hat{\nu}_{2010} - \hat{\nu}_{2000} = [\bar{X}_{2010} \hat{\gamma}_{2000,\nu}^w - \bar{X}_{2000}^w \hat{\gamma}_{2000,\nu}^w] + [\bar{X}_{2000}^w \hat{\gamma}_{2010,\nu}^w - \bar{X}_{2000}^w \hat{\gamma}_{2000,\nu}^w] \quad (7)$$

Unfortunately, this decomposition contains a specification and a reweighting error. The composition effect is divided into the “pure” effect, which is estimated as $(\bar{X}_{2010}^w - \bar{X}_{2000}^w) \hat{\gamma}_{2000,\nu}^w$ and a

specification error. Similarly, the wage structure effect is divided into the “pure” effect: $\bar{X}_{2010} (\hat{\gamma}_{2010,v} - \hat{\gamma}_{2000,v}^w)$ and a reweighting error.

In practice, the estimation procedure goes into four steps:

1. The reweighting factor is computed using the joint sample of 2000 and 2010. These weights are applied to the 2000 data to get the counterfactual sample.
2. The Oaxaca-Blinder decomposition is applied to the sample of 2010 and actual sample of 2000 to obtain an estimate of the actual change in the inequality index of interest.
3. The Oaxaca-Blinder decomposition is applied to the actual sample of 2000, and the counterfactual sample of 2000 to obtain the pure composition effect. The wage structure of this decomposition gives the specification error.
4. The Oaxaca-Blinder decomposition is applied to the sample of 2010 and the counterfactual sample of 2000 to obtain the pure wage-structure effect. The composition of this decomposition gives the reweighting error.

Finally, standard errors were estimated by bootstrapping the whole decomposition procedure.

4.2 Empirical results

I start by investigating the cross-sectional impact of covariates on the inequality of monthly earnings in each sector for two periods: 2000/02⁵ and 2010. The analysis employs RIF-regressions for the 10th, 50th, and 90th quantiles, as well as the variance. The list of covariates includes gender, marital status, working time (log), a dummy variable for Russian nationality, age, education, settlement type, and dummy variables for macro-regions. In the second part, I apply the decomposition analysis to quantify the relevance of various covariates in affecting the observed changes in overall earnings inequality. The focus in all estimations is made on the impact of informality.

Table 7 reports the results of the RIF-regressions with the dummy variable for the informal sector. OLS estimates are presented for comparison. The OLS estimates suggest that the gap was positive in the beginning of the 2000s. On average, informal workers received higher wages than formal workers with the same observable characteristics. Were informality status to be set exogenously, the average premium for informal work would be equal to 6 percent. The pattern changed dramatically over the period. In 2010 informal workers had lower earnings than

⁵ The samples for 2000 and 2002 were pooled because of relatively small sample sizes in the beginning of the period.

comparable workers from the formal sector. The premium for taking an informal job reversed the sign and turned into a penalty of approximately 5 percent.

The RIF estimates give more information about the earnings structure in general and about the formal-informal earnings gap in particular. They provide the evidence that the informal sector is highly heterogeneous: the gap is negative for some groups and positive for other groups. The gap has always been negative at low earnings levels and it somewhat widened over the period from 11 to 14 percent, but this change is not significant. At high earnings levels informal workers enjoyed positive premiums in both periods. However, their advantage also became less strong over the 2000s, as it went down from 23 to 14 percent. In 2000-2002, employment in the informal sector was beneficial for a median worker as well, who gained a positive premium of about 6 percent. By the end of the period, this gain vanishes or even becomes negative.

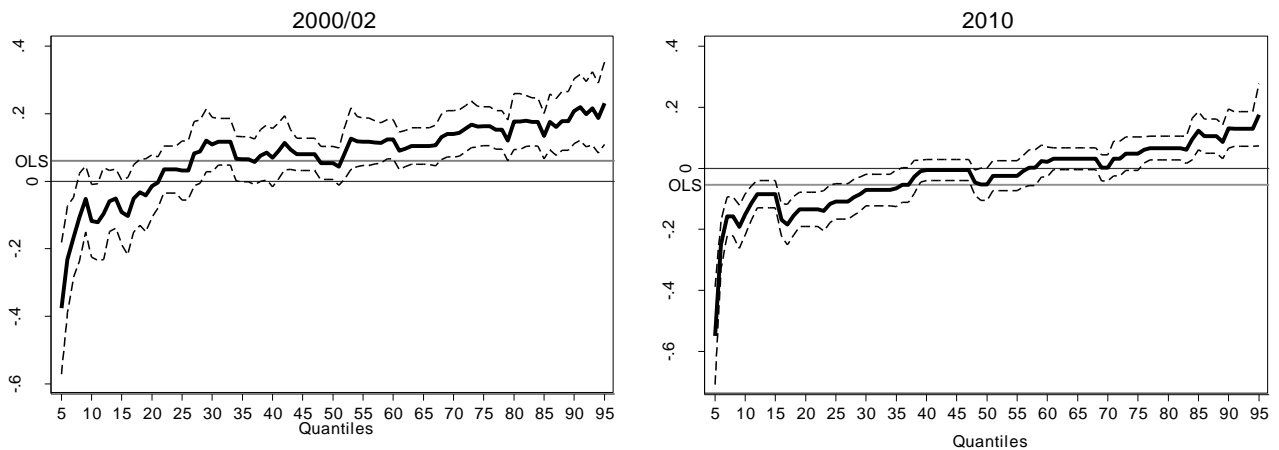


Figure 5. RIF estimates of the informality premium

Figure 5 sums the RIF estimates of informality premium for all quantiles of the distribution. It reveals that in 2000/02 the premium was significantly positive for all quantiles above the 30th quantile. In 2010 it was positive only for the highest 25 quantiles of the distribution. This means that contrary to widely shared beliefs, in the beginning of the 2000s employment in the informal sector was financially more attractive than work in the formal sector, especially for middle- and high-skilled workers. The informal sector has never been a desired employer for low-skilled workers. However, they had the lowest relative losses between 2000/02 and 2010. Over time, informality premiums declined mostly for middle- and high skilled workers. Finally, formal employment has become a better-paid option for a majority of skill workers.

Table 7. RIF regressions for 2000/02 and 2010

	OLS				10th quantile				Median				90th quantile				Variance			
	2000/02		2010		2000/02		2010		2000/02		2010		2000/02		2010		2000/02		2010	
	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Informal sector	0.060**	0.026	-0.054**	0.018	-0.117**	0.055	-0.152**	0.035	0.054**	0.025	-0.053*	0.027	0.208**	0.049	0.131**	0.033	0.293**	0.054	0.267**	0.033
Working time (ln)	0.534**	0.014	0.495**	0.012	0.863**	0.039	0.707**	0.027	0.260**	0.011	0.294**	0.015	0.215**	0.020	0.150**	0.017	-0.961**	0.029	-0.982**	0.022
Male	0.404**	0.020	0.340**	0.014	0.172**	0.040	0.211**	0.024	0.375**	0.018	0.499**	0.020	0.507**	0.036	0.314**	0.026	0.224**	0.041	0.112**	0.025
Married	0.080**	0.021	0.035**	0.014	0.177**	0.043	0.036	0.024	0.056**	0.020	0.043**	0.021	0.031	0.036	0.060**	0.025	-0.143**	0.043	0.006	0.026
Russian	-0.027	0.028	-0.070**	0.020	0.001	0.058	-0.070**	0.033	0.018	0.026	-0.056*	0.030	-0.047	0.048	-0.111**	0.038	0.062	0.057	0.035	0.037
Age (< 25 years)																				
25-39 years	0.170**	0.029	0.164**	0.021	0.167**	0.064	0.111**	0.036	0.152**	0.028	0.143**	0.032	0.183**	0.050	0.236**	0.035	0.062	0.060	-0.017	0.038
40-60 years	0.132**	0.029	0.064**	0.020	0.071	0.065	-0.004	0.037	0.131**	0.027	0.043	0.032	0.111**	0.047	0.175**	0.033	0.049	0.060	0.040	0.038
60+	-0.279**	0.047	-0.228**	0.032	-0.309**	0.113	-0.227**	0.067	-0.202**	0.042	-0.362**	0.048	-0.311**	0.061	-0.120**	0.045	0.140	0.096	0.011	0.058
Education (secondary)																				
Low secondary or less	-0.214**	0.038	-0.140**	0.028	-0.474**	0.097	-0.175**	0.060	-0.083**	0.035	-0.127**	0.043	-0.127**	0.056	-0.142**	0.042	0.405**	0.078	0.089*	0.052
Low secondary + vocational	-0.245**	0.053	-0.058	0.038	-0.292**	0.125	-0.000	0.077	-0.192**	0.048	-0.117**	0.058	-0.227**	0.078	-0.137**	0.053	0.217**	0.109	-0.079	0.070
Secondary + vocational	-0.031	0.031	0.008	0.022	-0.016	0.065	0.014	0.042	-0.005	0.030	0.031	0.033	-0.179**	0.051	-0.094**	0.037	-0.100	0.063	-0.084**	0.040
College	0.112**	0.028	0.105**	0.020	0.167**	0.057	0.140**	0.038	0.084**	0.027	0.124**	0.031	0.042	0.048	-0.007	0.034	-0.120**	0.058	-0.112**	0.037
University	0.413**	0.029	0.370**	0.020	0.323**	0.053	0.311**	0.033	0.293**	0.027	0.424**	0.030	0.443**	0.057	0.338**	0.040	0.073	0.060	-0.024	0.037
Settlement (rural)																				
regional capital	0.520**	0.028	0.397**	0.018	0.620**	0.068	0.344**	0.033	0.446**	0.026	0.533**	0.027	0.233**	0.041	0.313**	0.029	-0.356**	0.058	-0.063*	0.032
town	0.515**	0.030	0.249**	0.019	0.500**	0.071	0.221**	0.038	0.379**	0.028	0.310**	0.029	0.514**	0.050	0.161**	0.029	-0.039	0.062	-0.085**	0.035
urban-type settlement	0.333**	0.047	0.255**	0.031	0.486**	0.096	0.248**	0.052	0.267**	0.044	0.351**	0.046	0.103	0.073	0.143**	0.055	-0.330**	0.096	-0.112**	0.056
Region (Center)																				
North-West	0.201**	0.034	0.126**	0.024	0.051	0.060	0.090**	0.033	0.183**	0.031	0.223**	0.035	0.349**	0.073	-0.043	0.056	0.210**	0.070	-0.037	0.045
South	-0.244**	0.034	-0.255**	0.022	-0.109	0.074	-0.071*	0.038	-0.193**	0.031	-0.319**	0.033	-0.274**	0.057	-0.419**	0.038	-0.133*	0.069	-0.158**	0.040
Volga	-0.322**	0.028	-0.358**	0.019	-0.088*	0.050	-0.178**	0.032	-0.267**	0.027	-0.419**	0.029	-0.452**	0.049	-0.519**	0.035	-0.196**	0.058	-0.121**	0.035
Urals	-0.060	0.036	-0.234**	0.025	-0.100	0.071	-0.153**	0.044	-0.040	0.035	-0.248**	0.038	0.044	0.073	-0.443**	0.042	0.085	0.074	-0.104**	0.046
Siberia	-0.253**	0.035	-0.346**	0.023	-0.241**	0.073	-0.302**	0.044	-0.132**	0.033	-0.342**	0.034	-0.262**	0.061	-0.420**	0.040	0.048	0.071	0.036	0.042
Far East	-0.158**	0.047	-0.093**	0.035	-0.482**	0.111	-0.105*	0.060	-0.031	0.042	-0.040	0.051	-0.116	0.081	-0.186**	0.071	0.215**	0.097	-0.030	0.064
Constant	3.933**	0.084	6.413**	0.068	1.039**	0.220	4.563**	0.150	5.411**	0.070	7.311**	0.088	6.868**	0.123	9.247**	0.104	5.829**	0.172	5.551**	0.126
R ²	0.39		0.34		0.20		0.20		0.21		0.23		0.09		0.11		0.19		0.22	
N	7951		8772		7951		8772		7951		8772		7951		8772		7951		8772	

Note: ** p<0.05, * p<0.1.

These developments are most likely the result of the rapid economic growth that Russia experienced in 2000-2007. Growing revenues in the private formal sector and improving budget conditions fueled earnings increases in the formal sector. Many of Russia's formal sector workers are employed in state-funded establishments and have salaries below those in the private sector (Gimpelson and Lukiyanova, 2009). Public-sector workers shared the benefits of economic growth, as additional budget revenues were poured into their salary bills. The reform of income tax in 2001 and the social security reform of 2005, which lowered the rates of mandatory contributions from 35.6 to 26 percent, provided an additional stimulus to formalization. The costs of being formal dropped significantly in 2000-2010. Employers in the formal sector increased the earnings of their employees and got the chance to attract more productive informal workers into formal-sector jobs.

The RIF results in Table 7 are also interesting for inequality coefficients. They show that informality has an unequalizing effect. The estimates imply that growth in the share of informal workers by 10 percentage points would lead to an increase of log-variance by 2.7 percent in 2000/02 and 4.5 percent in 2010⁶. The results also indicate that informality increases inequality in both tails of the distribution. In 2000/02, a 10-percentage-point increase in informality would increase the 50-10-log wage differential by 0.017 and the 50-10-log wage differential by 0.015. However, these numbers are relatively small if expressed in percentages: 1.2 and 1.4 percent, respectively, while for 2010 they are equal to 1.1 and 2.0 percent, respectively. The stronger effect for variance in both years is explained by a higher prevalence of informal workers in the lowest decile of the distribution and, especially, among workers with extremely low earnings. Informality contributes to the polarization of the labor market, widening the top and the bottom of the distribution. Note that in both years the effect was stronger for the upper part of the distribution. Moreover, the unequalizing effect of inequality increased for the upper part of the distribution over time.

The findings of earning penalties for low-skilled workers and premiums for high-skilled workers are generally consistent with Fields' two-tier theory of the informal sector (Fields, 2005). This model implies the coexistence of a voluntary entry upper-tier segment with an involuntary lower-tier segment. Therefore, the distribution of informal earnings can be the mix of two (or more) distributions for different segments.

⁶ These numbers are obtained by multiplying the change in the informality rate (0.1) by the coefficient of the informal sector dummy variable in Table 7 and then by dividing this number by the value of variance in a respective year. For 2001/02 it yields: $(0.293 \cdot 0.1) / 1.069 \cdot 100\% = 2.7\%$.

Table 8. RIF regressions for 2000/02 and 2010: informality groups

	10 th quantile		Median		90 th quantile		Variance	
	2000/02	2010	2000/02	2010	2000/02	2010	2000/02	2010
Employed without contract in the corporate sector	0.094 (0.100)	-0.097* (0.053)	0.018 (0.049)	-0.070 (0.045)	0.094 (0.096)	0.046 (0.054)	0.023 (0.108)	0.094* (0.052)
Self-employed and their employees	0.155** (0.060)	-0.017 (0.043)	0.136** (0.037)	0.028 (0.037)	0.261** (0.082)	0.164** (0.046)	0.136* (0.080)	0.137** (0.044)
Employed in irregular activities	-0.521** (0.106)	-0.592** (0.099)	-0.013 (0.039)	-0.228** (0.052)	0.213** (0.070)	0.193** (0.059)	0.606** (0.083)	0.899** (0.068)
R ²	0.20	0.21	0.21	0.23	0.09	0.11	0.19	0.23
N	7951	8772	7951	8772	7951	8772	7951	8772

Note: Other covariates are the same as in Table 7. Standard errors are reported in brackets. ** p<0.05, * p<0.1.

In Table 8 I test the hypothesis that different informal groups have separate earnings distributions by running RIF regressions. It turns even after controlling for the productivity and job characteristics of those employed without a contract in the corporate sector and stays similar to formal sector workers. That is, working side-by-side with formal workers, they receive similar earnings through the whole distribution. Employers keep wages similar, but save on social security and taxes, offer lower fringe benefits, and no job protection. The group of the self-employed and their employees used to enjoy higher earnings in all quantiles at the beginning of the period, but by the end of the period the premiums remain only with upper income workers. However, even low skilled workers in this group are not penalized for informality in 2010.

Table 9. Decomposition of changes in inequality: composition and wage-structure effects

	50-10				90-50				Variance			
	Composition effect		Wage structure effect		Composition effect		Wage structure effect		Composition effect		Wage structure effect	
	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Informal sector	0.002	0.002	0.002	0.021	0.001	0.002	0.000	0.017	0.003	0.004	-0.013	0.012
Working time	0.060**	0.013	-1.463*	0.878	0.010**	0.003	-0.109	0.429	0.101**	0.020	1.315**	0.557
Demography	0.003	0.004	-0.078	0.151	0.001	0.002	-0.176	0.138	0.001	0.004	-0.056	0.084
Education	0.007	0.005	-0.001	0.072	-0.005	0.005	0.007	0.058	0.004	0.005	0.031	0.049
Settlement type	-0.005	0.004	-0.254**	0.126	-0.015**	0.005	-0.068	0.102	-0.017**	0.006	-0.134**	0.054
Region	0.006	0.005	0.054	0.060	0.003	0.003	0.065	0.054	0.006	0.005	0.028	0.039
Constant			2.122**	1.031			0.539	0.584			-0.778	0.550
Total	0.073**	0.015	0.382**	0.048	-0.005	0.009	0.257**	0.042	0.098**	0.023	0.393**	0.025
Reweighting error	-0.012	0.015			-0.004	0.007			-0.011	0.012		
Specification error	0.032	0.053			-0.038	0.048			0.001	0.030		
Index change (2000/02-2010)	0.476**	0.039			0.212**	0.040			0.481**	0.025		

Note: Standard errors are computed bootstrapping the whole decomposition procedure (300 replications). ** p<0.05, * p<0.1.

Again, those employed in irregular activities have a very specific distribution, with the largest gap between the top and the bottom. Low-income workers in this group are significantly underpaid, while high-income workers have the largest advantage among all informality groups.

Another interesting observation about this group is that over the given period the coefficients changed only for middle-income workers. An irregular worker in the middle of the distribution was paid on par with formal workers in 2000/02, but had a penalty of 25 percent in 2010. The middle of the distribution for the informal sector was probably the major source of movement for the formal sector. Those middle-income workers who stayed in the informal sector probably had inferior unobservable skills.

The results for the decomposition of changes in the three inequality indicators (the 50-10 and 90-50 log-earnings differentials and variance of logs) are reported in Tables 9 and 10. As informality is of major interest in this paper, other variables are grouped into several categories: demography (includes gender, age, nationality, and marital status), education, settlement type, and region. I start describing the findings with some general remarks. The wage structure effect explains most of the decline in inequality. However, most of the structure effect cannot be related to any specific variable: Changes in the coefficient of working time and/or in the constant is the only significantly positive coefficient. Differences in returns to settlement types are also important, but this factor had an inequality-enhancing effect. Therefore, changes in wage structure effects are likely to be explained by institutional factors, such as rising minimum wages, tax and social security reforms, and pay reform in the budget sector. The composition effect is significant for the 50-10th differential and for variance, but not for the 90-50th differential. The specification and the reweighting error are not significant for any inequality indicator.

Table 10. Decomposition of changes in inequality: informality groups

	50-10				90-50				Variance			
	Composition effect		Wage structure effect		Composition effect		Wage structure effect		Composition effect		Wage structure effect	
	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Without contract in the corporate sector	0.002	0.003	-0.005	0.011	-0.001	0.003	0.001	0.015	0.000	0.003	-0.004	0.007
Self-employed and their employees	0.000	0.002	0.001	0.020	-0.002	0.004	-0.013	0.015	-0.003	0.003	-0.011	0.010
Irregular activities	0.025**	0.008	0.020	0.014	0.010**	0.005	-0.007	0.006	0.030**	0.009	-0.005	0.010
Working time	0.051**	0.023	-0.889	1.003	0.007*	0.004	-0.638	0.406	0.092**	0.041	0.901	0.600
Demography	0.003	0.005	0.034	0.161	0.001	0.004	-0.348*	0.181	0.001	0.005	-0.055	0.100
Education	0.006	0.006	0.018	0.099	-0.004	0.005	-0.013	0.072	0.003	0.008	0.028	0.056
Settlement type	-0.004	0.005	-0.157	0.140	-0.015**	0.006	-0.214**	0.100	-0.016**	0.007	-0.144**	0.061
Region	0.006	0.006	0.020	0.066	0.003	0.004	0.085	0.073	0.006	0.005	0.025	0.043
Constant			1.357	1.148			1.343**	0.570			-0.349	0.592
Total	0.089**	0.033	0.398**	0.097	0.000	0.011	0.197**	0.051	0.112**	0.055	0.385**	0.027
Reweighting error	-0.007	0.057			-0.003	0.043			-0.008	0.036		
Specification error	-0.005	0.082			0.018	0.070			-0.009	0.043		
Index change (2000/02-2010)	0.476**	0.038			0.212**	0.040			0.481**	0.025		

Note: Standard errors are computed by bootstrapping the whole decomposition procedure (300 replications). ** p<0.05, * p<0.1.

The informality dummy variable does not have significant coefficients in any decomposition in Table 9. In other words, changes in the share of the informal sector and in returns to informality had no impact on overtime changes in inequality. However, this conclusion alters if one looks into detailed informality groups. The composition effect of irregular activities has a significantly positive coefficient for all the considered measures of inequality. The effect is quite strong. The contraction of irregular employment accounts for 5 percent of the total reduction in the 50-10th and 90-50th log-earnings differentials and for 6 percent of the total variance reduction. It is appealing that the equalizing effect was evenly distributed through the income ranges. Note that the composition effects of working time generally retain significance in the specification with detailed informality groups, but become smaller in magnitude. This means that contraction of irregular employment did not work solely through changing the distribution of working time. These changes in the structure of informality had a separate inequality-reducing effect. At the same time the wage structure effect of irregular employment is not significant. This is not surprising. The results in Table 7 suggest that the returns to this type of informality have not changed much. Changes in shares and returns to other informality types appear to be neutral to changes in overall inequality.

5. Conclusion

The informal sector plays an important role in labor market adjustment in many low- and middle-income transition economies. However, little is known about the formal-informal earnings gaps beyond the mean and generally about the impact of informality on earnings inequality. This paper employs various decomposition techniques to study the formal-informal differences in earnings inequality using data from the Russian Longitudinal Monitoring Survey for 2000-2010. New results complement the existing literature on informality in Russia in several ways.

First, I find that during the whole period earnings inequality was substantially higher in the informal sector. The decomposition of earnings inequality into inequality of working hours and inequality of hourly earnings shows that in the formal sector the inequality of monthly earnings is almost completely determined by the distribution of hourly wages. Higher inequality in the informal sector is explained both by larger within-sector differences in working hours and a higher dispersion of highly earnings. The distributions of formal and informal hourly earnings are much closer than the distributions of hours.

Second, informality increases earnings polarization, widening both tails of the distribution. My estimates imply that growth the share of informal workers by 10 percentage points would lead to an increase in inequality of 1 to 5 percent. This effect is not large, but nevertheless robust across different inequality measures and is stronger for the upper part of the distribution.

Third, standard measures of returns to informal employment at the mean fail to capture the important within-group heterogeneity found in the data. This finding illustrates the importance of distributional analysis, demonstrating that, contrary to widely shared beliefs, in the beginning of the 2000s employment in the informal sector was financially more attractive than work in the formal sector for middle- and high-skilled workers. The situation changed dramatically over the period in question: In 2010 this indicator was positive only for the top 25 quantiles of the distribution. At the same time, low-skilled workers had significantly lower earnings in the informal sector over the whole period.

Forth, earning inequality declined in both sectors between 2000 and 2010. The analysis in this paper shows that the underlying force was a contraction of the share of workers employed in irregular activities. This result is important, since in the beginning of the period irregular activities were the most common form of informal work in Russia.

Some of the limitations of this paper are well-known. I focus on monetary remuneration and do not account for other cash or non-pecuniary advantages attached to a particular sector. Another problem concerns unobserved heterogeneity and selection issues that are ignored in this analysis. The issue of finding convincing instruments for informality and ways to account for non-monetary components of compensation will be the subject of future research.

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