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Gender Segregation Within Firms: Causes and Consequences

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Abstract

In this chapter we study the sources of gender segregation within firms and their effect on the gender wage gap. Compared to numerous papers devoted to gender segregation, this research is based on unique personnel data from one Russian industrial firm for the period from 2002 to 2006. We show that the emergence and the fixing of segregated employment structures can be explained, first, by initial job assignments and, secondly, by gender differences in promotion paths for male and female workers. Estimates of the gender wage gap allow us to conclude that it is largely driven by a gender segregation of job positions and hierarchical levels, rather than by workers' characteristics.

1. Introduction^{1,2}

Gender segregation occurs when there is an unequal distribution of male and female workers across sectors, industries, occupations or jobs. Traditionally, gender segregation is researched at the level of the labour market as a whole and this market-wide approach dominates the literature (for example, Anker 1998; Blau et al. 1998). At the same time it is obvious that segregation arises at the level of actual jobs and is based on the specifics of employees' and employers' behaviour. This is a reason for looking inside the firm, which will help us understand the mechanism for the emergence of gender segregation and its effect on the work environment of male and female employees.

Economic theory explains the existence of gender segregation as a consequence of employers' behaviour in several ways. First, gender segregation is treated as the result of underinvestment in the human capital

of female workers in comparison with investments in the human capital of male workers due to the expectation that the period of return on female human capital is shorter (Barron et al. 1993; Becker and Lindsay 1994). As a result, women and men occupy jobs that have different requirements for professional characteristics of workers.. Secondly, discriminatory practices in hiring and career promotion lead to a situation in which male and female workers are concentrated in different jobs and levels within the internal labour market (Becker 1971; Coate and Loury 1993; Baldwin et al. 2001; Ransom and Oaxaca 2005)

Of course, factors which cause and support gender segregation within firms do not only relate to labour demand issues. However, this research is carried out having an internal labour market in mind and it is focused on the behaviour of employers. Accordingly, we consider demand-side factors that explain the existence of gender segregation: a) the firm's policy for hiring, which is not gender neutral; and b) differences in career paths within firms for male and female workers. The latter can be traced to different speeds and directions of promotion. For instance, women can be more involved in horizontal labour mobility, in contrast to men who are more likely to participate in vertical labour mobility. Moreover, Lazear and Rosen (1990) argue in their research that more able women are passed over in favour of less able men. Women with the same ability as men have a lower probability of promotion and earn less. As a result it is possible to observe a different speed and a diverging direction for the career paths of men and women.

Gender segregation within firms can also be explained by the concepts of a 'glass ceiling' and 'glass walls' (Wirth 2001). According to the 'glass ceiling' model, there are constraints on women's promotion, so that when they finish their careers they are at lower hierarchical levels than men. In contrast, men do not have any limitations on their career within a firm. The 'glass walls' model describes a practice of hiring women, in which they are initially given job assignments without any prospect of further career promotion, resulting in vertical segregation for them. Women are concentrated at lower hierarchical levels in contrast to men who dominate the higher hierarchical positions. This phenomenon is widespread in Russian enterprises, as argued in some recent research by Roshchin and Solntsev (2006) and Maltseva and Roshchin (2006).

Our analysis of gender segregation within the firm allows us not only to identify the factors that affect the probability of career promotion for male and female workers, but also to estimate the effect of existing gender differences on employment structures and career promotion.

There are numerous Russian studies pointing to the same evidence: on average, women earn less because they are concentrated in low-paid job slots. So, segregation is a main source of gender differences in wages (see, for example, Ogloblin 1999; Bayard et al. 2003; Groshen 2001; and Oshchepkov 2007).

As a result, studying the scale and the causes of gender segregation and estimating its effects on earnings are very important for the design of any labour market policy that wants to overcome gender disproportions in career opportunities and wages as well. Most studies devoted to gender segregation issues explore national data or matched employer-employee databases. At the same time, there are some studies on gender segregation that use personnel data from within firms (for instance, Blau and DeVaro 2007; Baldwin et al. 2001; Ransom and Oaxaca 2005). Using this type of data allows us to look at the place where segregation arises and can help answer several questions about the influence of hiring and promotion policies on segregation. Which positions are initially intended for female or male workers? What are the promotion paths inside the firm? Who – men or women – are likely to move along them? Do the promotion paths differ for workers of a different gender? Are there job positions which are inaccessible to women? In addition to enabling us to study these questions, the firm-level data also allows us to test the role of gender segregation in the generation of gender earnings differences.

Unfortunately, there exist only a small number of empirical studies that are devoted to gender segregation within the internal labour market. This can be explained by the difficulty of obtaining access to proper information about issues of employment, wages and other types of payments at the firm level.

Amongst this scanty literature, for instance, there is the paper by Ransom and Oaxaca (2005). They use firm-level data about the personal staff of a big retail company. They found that segregation within the firm appeared to be due to initial assignments, when particular jobs were initially given to either male or female employees. They also argued that male workers had more labour mobility within the firm than female workers. Data on the personnel of one Russian manufacturing enterprise were used as a basis for the research carried out by Friebel and Panova (2007). They concluded that male workers are more likely to get a promotion than female workers.

The effect on the gender wage gap of the unequal distribution of male and female workers between different job levels is studied in a paper by Dohmen, Lehmann, and Zaiceva (2008). The authors show that the

most significant gender wage gap is observed among production workers and it depends directly on job segregation: female workers are concentrated in low-paid job slots. At the same time differences between male and female wages for workers who occupy equal job positions are negligible. Their paper has one more very interesting characteristic: it is based on information about the personnel and wages of a Russian manufacturing firm (1997–2002) and the data used in that paper are very similar to the data we have explored in this research.

We have had access to a unique data set about the personnel of a Russian manufacturing enterprise that is located in Siberia. The data are completely disaggregated and they provide excellent information about gender segregation since all job positions are fully determined within the firm. In other words, the analysis at the firm level allows us to look at the level where segregation arises because job titles have been sufficiently disaggregated not to cover more than one kind of job position.

2. Some facts about the firm

The data we use in this research come from a manufacturing enterprise located in one of the largest cities in Western Siberia. The firm was set up during the Second World War as the successor to a plant evacuated from Central Russia. At the very beginning of the 1990s, the firm took part in the privatization process (1992–1994). Several affiliated firms were established by it in that period. During the privatization process, the workers, managers and the new affiliated firms became the owners of the firm. By the middle of the first decade of the new century the firm confronted many problems: wage arrears; incomplete portfolios of orders from customers; huge financial losses; and tax debts. In 2004, the production output (in physical units) was only 53.2 per cent of the level in 2000 (Table 5.1).

In spite of decreasing output, the number of employees per year was not cut, on average, during the period from 2001 till 2005 and it was even higher than in 2000. On the one hand, this situation could demonstrate an ineffective personnel policy which led to the emergence of excessive employment at the firm. On the other hand, the situation of over-employment can partially be explained by specific features of the production process. The firm has two essential peculiarities. The first one is a unique and narrow specialization which leads to a high level of dependence on delivering the product quality and reliability required by all the firm's more than 400 clients. In the domestic market the firm has only four or five competitors. The second specific characteristic of

Table 5.1 Main economic indicators of the firm's performance (in %)

Indicator	2000	2001	2002	2003	2004	2005	2006	2007	2008
Production output (Natural units)	100.0	72.6	69.4	88.7	53.2	67.7	91.9	80.6	
Number of employees (Annual averages)	100.0	105.7	111.6	121.4	115.3	98.9	110.2	110.5	107.1
Average monthly wage	100.0	150.9	181.3	230.4	231.4	325.2	508.0	656.3	844.4

Notes: Data are taken from the annual firm's official reports; all indicators are given as a percentage of the year 2000.

the firm is connected to the high level of firm-specific human capital required of its workforce – professional skills and qualifications accumulated in a specific job and increasing with tenure. Obviously, the firm's top management was expecting an upturn in economic activity and an increase in consumers' orders. So, they were trying to hoard qualified workers, in particular those with high levels of firm-specific human capital.³

The basic method used by the firm's top management for preventing labour force turnover was to increase nominal wages as of 2000. According to data from Table 5.1, the dynamics of average monthly wages were diametrically opposed to the dynamics of production. In the period 2000 to 2004, while production output fell almost two-fold, the average wage of employees more than doubled.

The efforts of the firm's management were, however, not enough to keep the firm on an even keel. The enterprise was confronted with a series of conflicts between owners by the middle of the 2000s. At the same time, the enterprise was near bankruptcy by 2005. In that year the owner of the firm changed. The new owner began restructuring the enterprise in 2006. In the years 2006 to 2007, production increased, the number of orders from customers rose, all economic and financial indicators improved, and the debt owed to the state budget and wage arrears were liquidated. Wage growth in the two years was larger than production growth (see Table 5.1) but, thanks to the improvement in the financial indicators, the larger wage growth did not burden the enterprise

budget too much. Nevertheless, at his interview, the head of the HRM department expressed his anxiety about wage developments insofar as the high level of monthly wage growth was a result primarily of salary growth for workers employed in the non-production sector of the enterprise. At the same time, the wages for workers' which they offered were not competitive in the local labour market. They were too low relative to the qualification requirements of the firm and to the heavy physical nature of the work demanded by the enterprise.

3. Data and measurement issues

The database at our disposal includes information about the firm's personnel for the period 2002–2006. The data has information on every worker employed at the enterprise in this period:

general information: gender, date of birth, educational level;
career within firm: dates of hiring and separations, start and end dates for each position within the firm, title of position;
wage information: types and size of payments (wages, premia, bonuses and so on).

Unfortunately, there was much inconsistent information in the initial data so we had to make many corrections. For instance, we cleaned the data by recoding job titles to exclude any cases where the same job has several different codes. There was also a problem of missing values in the variable 'education'. In a pooled sample, this variable was missing in more than half the cases. To rectify this problem we calculated the mean level of education for each job title and imputed those means for those observations where the variable 'education' was missing.

To investigate the problem of gender segregation one has to have information about the hierarchical structure of employment in the firm. Our data do not contain such information. In this situation, we followed the paper by Friebel and Panova (2007), where the hierarchical structure for a Russian enterprise is presented on the basis of information from the HRM department. The firm's hierarchy, in this case, includes 12 job titles located at five levels. Our discussions of this hierarchical structure with heads of HRM departments from different Russian enterprises led us to the conclusion that the hierarchical structure presented by Friebel and Panova is typical of Russian enterprises, especially if we look at those firms that go back to Soviet times.

In contrast to Friebel and Panova (2007), we not only have information about ‘white collar’ workers but also about ‘blue collar’ workers. So, we created a hierarchical structure that consists of 14 titles for positions that are combined into seven hierarchical levels (see Figure 5.1). The additional two job titles and levels are ‘workers’ and ‘apprentices’.

Each job title combines several positions which are very similar to each other in terms of titles and, thus, the functions required in the job. At the same time, we can separate job positions which belong to the production and non-production sector of the firm. For instance, engineers concerned with organizing labour, engineers engaged in certificating, and other similar work were given the job title ‘planning engineer’, whilst an engineer-mechanic, a constructor, a technician were all given the title ‘engineer’. Unfortunately, initial data does not allow us to separate production workers into disaggregated positions in terms of qualification. That is why all production workers’ positions were combined in the one job title ‘worker’. In their turn, all 14 job titles were aggregated to seven job levels. Hierarchical levels were defined mostly on the base of such criteria as the level of administrative and financial responsibility for any employee who possesses a job title within the level.

Our sample consists of 1545 workers (388 women, 1157 men) who were employed at this firm at any time in the period 2002–2006. Usually, the employment structure is analysed using information at a point in time. This standard presentation of the employment structure allows

Level	Title				
1. Top-management	1. Top-manager				
2. Heads of departments	2. Head of production department	3. Head of non-production department			
3. Supervisors	4. Supervisor of production department		5. Head of bureau		
4. High-qualified workers	6. Engineer	7. Foreman	8. Planning engineer	9. Economist	
5. Middle-qualified workers			10. Technician	11. Accountant	12. Planning technician
6. Production workers	13. Worker				
7. Apprentices	14. Apprentice				

Figure 5.1 Firm’s hierarchy

us to trace changes that have occurred during a period. But, in this case, we can't take into account all cases of hires and separations that could take place between two moments in time. This can lead to some inaccuracy in the measurement of gender segregation. For instance, if some job titles were held during a year mostly by female workers who left the firm by the end of year, the picture of gender segregation will be increased.

To avoid this problem, we use (like Baker et al. 1994; Friebel and Panova 2007) information about episodes of workers' careers within the firm to describe its employment structure. Each episode covers the length of time a worker stays in any job position. For our sample, we have 1804 episodes, among which 481 episodes cover women's labour mobility and 1323 cover the mobility of men. Information about the length of each episode of the worker's career has been used to calculate the number of person-days for each job title and then for each job level. This became the basis for measuring the gender employment structure.

To analyse the gender wage gap, we have constructed variables of average annual earnings for each individual. We define earnings as all types of payments received by workers: not only wages, but premia and bonuses as well. We justify this choice as follows. On the one hand, earnings are the real reward for workers' efforts. On the other hand, experts estimate that, on average, at least one third of the earnings received by Russian workers are not strictly fixed (Gimpelson et al. 2007, p. 52). Average annual earnings were inflated to the 2006 price level using the official annual CPI (Consumption Price Index) for the region where the firm operates. When analysing the gender earnings gap we have used a pooled sample for the whole period from 2002 to 2006, in which every individual was treated as an independent observation. This pooled sample consists of 2855 observations.

4. Gender employment structure within the firm and its formation

The distribution of female and male workers across job titles and job levels is given in Table 5.2. It shows an inequality in the distribution of male and female workers between job titles and levels. Segregation exists at every level of the hierarchy. For instance, it is natural that in industrial enterprises 'production workers' predominate among all employees. But while 70 per cent of male workers are employed at this level, among women only every second worker is. A considerable

number of workers are also employed in the jobs of the fourth level ('high-qualified workers'). Again we can see the segregation: 23 per cent of all female workers are employed at this level and only 15 per cent of male workers. The biggest differences in the distribution of male and female workers among the job titles are at the level 'middle-qualified workers'. Every fifth women is employed at this level whilst among men it is not very common (only about 1.5 per cent of all male workers of this firm work have any job title at this level). The proportion of men employed with the job title 'accountant' is especially low (0.03 per cent). At the same time, the smallest proportion of women (0.07 per cent) is found with the title and at the level of 'top management'. The size of the gender earnings gap depends on the earnings differences between male and female workers at those titles and levels at which their presence is particularly unequal.

The internal labour market of this firm is characterized by vertical segregation – a situation in which women are under-represented in managerial positions. In our firm's hierarchy these positions are represented by the job titles of the top three levels: 'top management', 'heads of department', and 'supervisors'. During 2002–2006, 12.41 per cent of all male workers were employed at these levels but only 5.45 per cent of all female employees. Moreover, we can observe an obvious divide in the 'spheres of authority': men are employed in managerial positions in production divisions whilst women are the heads of non-production departments. At the very peak of the career ladder of this firm, women are almost absent: only 0.07 per cent of all female workers were employed in the job positions of 'top managers' while for male workers this figure is 3.67 per cent.

Gender differences in the employment structure within the firm can also be shown by the concentration of male and female workers in different job titles and levels. It should be noted that the high concentration of men at some levels and in some jobs may be connected to the small number of women in some enterprises. It does not necessarily reflect the existence of gender segregation.

Measuring the percentage of women at each level or title allows us to identify the jobs which are 'mostly women'. As Table 5.2 demonstrates, the highest concentration of women is observed in the job titles: 'accountant' (99.07 per cent); 'planning technician' (79.82 per cent); 'technician' (74.76 per cent); and 'economist' (about 70 per cent). The smallest proportion of women is in the following job titles: 'top manager' (0.77 per cent), 'supervisor' (0.96 per cent) and 'head of production department' (2.78 per cent). There are only three job levels where the

Table 5.2 Gender employment structure within the firm, 2002–2006 (in %)

Level	Female	Male	% of female	Title	Female	Male	% of female
1. Top management	0.07	3.67	0.77	Top manager	0.07	3.67	0.77
2. Heads of departments	2.88	6.42	14.74	Head of production department	0.38	5.13	2.78
				Head of non-production department	2.50	1.29	42.70
3. Supervisors	2.50	2.32	29.30	Supervisor of production department	0.03	1.13	0.96
				Head of bureau	2.47	1.19	44.42
4. High-qualified workers	22.76	15.31	36.44	Engineer	7.24	7.73	26.53
				Foreman	4.46	5.40	24.14
				planning engineer	1.80	0.64	51.99
				Economist	9.27	1.54	69.94
5. Middle-qualified workers	19.66	1.40	84.41	Technician	9.39	1.09	76.79
				Accountant	7.40	0.03	99.07
				planning technician	2.88	0.28	79.82
6. Production workers	51.93	70.16	22.21	Worker	51.93	70.16	22.21
7. Apprentices	0.21	0.71	10.03	Apprentice	0.21	0.71	10.03
Total, %	100	100			100	100	
Total, person-days	1366,223	3541,387	27.84				

Notes: Pooled sample. Employment structure is measured using information about the number of person-days per level / title.

percentage of women exceeds their share in total employment (28 per cent): 'supervisors' (29.3 per cent); 'high-qualified workers' (36.44 per cent); and 'middle-qualified workers' (84.41 per cent).

It has already been emphasized that the unequal distribution of male and female workers within the firm's internal labour market can have two sources. The first is linked to a hiring process which is not gender neutral. In this case, employers prefer to hire either women or men for a particular job. The second source of segregation is connected to different directions and degrees of labour mobility for male and female workers within a firm. Here, various career ladders can be observed.

Table 5.3 presents the gender differences in the hiring process. The start of each episode in our sample corresponds to the process of filling a vacancy. It can be done either by hiring a new employee or by the promotion of a worker who already works at the firm. Out all episodes for all workers, we identified the percentage of those that were the first

Table 5.3 Access to the job levels

Level	Share hired from outside, %	Share of women among hired, %	Share of promoted, %	Share of women among promoted, %	Total	Share of women, %
1. Top management	35.56	12.50	64.44	0.00	45	4.44
2. Heads of departments	21.24	8.33	78.76	22.47	113	19.47
3. Supervisors	33.33	5.56	66.67	30.56	54	22.22
4. High-qualified workers	38.23	40.58	61.77	39.91	361	40.17
5. Middle-qualified workers	42.77	71.83	57.23	70.53	166	71.08
6. Production workers	48.40	13.04	51.60	21.94	998	17.64
7. Apprentices	97.01	9.23	2.99	0.00	67	8.96
Total, episodes	815	181	989	315	1,804	26.66

Notes: Pooled sample, 2002–2006. Observation is an episode of the worker's intra-firm career. An episode is considered a filling of a vacancy.

episodes in the careers of the employees in the firm. The total share hired from outside in 2002–2006 is 45.17 per cent for this firm. The more intensive hiring process is at the lowest two levels, which can be considered the ‘ports of entry’ for this firm. It is noteworthy that 97 per cent of vacancies for ‘apprentices’ are filled by applicants from the external labour market. This share is also fairly high for ‘production workers’ (48.4 per cent) and a little less for ‘middle-qualified workers’ (42.77 per cent). In contrast to this, about 80 per cent of vacancies at the level of ‘heads of departments’ were filled through promotions within the firm.

The share of female workers at the firm is not very high, so it is not surprising that hiring at most levels entails hiring male workers. There is only one job level – ‘middle-qualified workers’ – which is filled primarily by women (about 72 per cent of all episodes among newly hired personnel). The proportion of women who are hired for jobs at the level ‘high-qualified workers’ (40.58 per cent) is also relatively high. These are the levels at which the most female workers are employed. In contrast to women, men are more likely to be hired at almost all hierarchical levels. So, we can conclude that the preconditions for gender segregation already exist when employees enter this internal labour market.

It is interesting to note that female workers only obtain top management positions as a result of being hired in the external labour market. However, their presence among the newly hired is not very high (12.5 per cent). During the period under analysis no woman took a top management position after promotion from within the firm.

As we have mentioned earlier, a rather high concentration of women is observed among ‘supervisors’. Our calculations suggest that the main way for woman to get the job at this level is to be promoted while there is very little opportunity for them to be hired to any job of this level. The promotion of female workers from within the firm is also a way to fill the jobs at the level ‘middle-qualified workers’: 70.53 per cent of all episodes of promotions to this level are linked to women’s careers.

More detailed information about access to job titles is presented in Table 5.4. We have already noticed that at three levels of the firm’s hierarchy (‘heads of departments’, ‘supervisors’, ‘high-qualified workers’) it is possible to see the ‘male’ and ‘female’ job paths, where women are more likely to be employed in non-production jobs whilst men work in production division jobs. Table 5.4 shows that this structure comes about because of hiring practices and promotion from within the firm. For instance, the share of women among employees newly hired as a ‘planning engineer’ is 66.67 per cent and to jobs with the

Table 5.4 Access to the job titles

Title	Share hired from outside, %	Share of women among hired, %	Share of promoted, %	Share of women among promoted, %	Total	Share of women, %
Top manager	35.56	12.50	64.44	0.00	45	4.44
Head of production department	21.52	0.00	78.48	6.45	79	5.06
Head of non-production department	20.59	28.57	79.41	59.26	34	52.94
Supervisor of production department	39.13	0.00	60.87	7.14	23	4.35
Head of bureau	29.03	11.11	70.97	45.45	31	35.48
Engineer	38.82	30.51	61.18	30.11	152	30.26
Foreman	20.99	29.41	79.01	28.13	81	28.40
Planning engineer	41.67	66.67	58.33	57.14	36	61.11
Economist	51.09	48.94	48.91	68.89	92	58.70
Technician	40.00	57.14	60.00	61.90	105	60.00
Accountant	57.58	94.74	42.42	100.00	33	96.97
Planning technician	35.71	90.00	64.29	77.78	28	82.14
Production worker	48.40	13.04	51.60	21.94	998	17.64
Apprentice	97.01	9.23	2.99	0.00	67	8.96
Total, episodes	815	181	989	315	1,804	26.66

Notes: Pooled sample, 2002–2006. Observation is an episode of the worker's intra-firm career. An episode is considered a filling of a vacancy.

title 'economist' it is about 50 per cent. At the same time, more than 66 per cent of hirings as 'engineer' are hirings of men. Women have never been hired as 'head of production department' or 'supervisor of production department' but they can occupy these positions through promotion (in 59.26 per cent and 45.45 per cent of cases, respectively, vacancies for these jobs were filled through promotion).

Table 5.5 Intra-firm mobility rates, %

History of episode	Women	Men	Total
The same position	42.20	33.33	34.89
Promoted	19.33	12.77	16.24
Separated	38.46	53.89	48.78
Total, %	100	100	100
Total, episodes	481	1,323	1,804

Notes: Pooled sample, 2002–2006. Observation is an episode of the worker's intra-firm career, which can be ended by staying at the same position, or promotion/demotion, or separation.

Table 5.6 Career opportunities for women

Level	1	2	3	4	5	6	7	Total, episodes
1. Top management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
2. Heads of departments	0.00	0.00	0.00	66.67	33.33	0.00	0.00	6
3. Supervisors	0.00	27.27	0.00	36.36	18.18	18.18	0.00	11
4. High-qualified workers	0.00	30.30	3.03	27.27	15.15	24.24	0.00	33
5. Middle-qualified workers	0.00	12.50	0.00	25.00	29.17	33.33	0.00	24
6. Production workers	0.00	0.00	15.79	47.37	36.84	0.00	0.00	19
7. Apprentices	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Total, episodes								93

Notes: Figures in this matrix are the probabilities for female workers who moved between the job titles during 2002–2006 to move from one level to another or to stay at the same level. Observation is an episode of the worker's intra-firm career.

Table 5.5 presents calculations that reflect the possible ways an episode of a worker's career within the firm might be ended: lack of mobility; changing job title (promotion or demotion); or separation. We can see that the degree of mobility within the firm is not high: only 16.24 per cent of all episodes finished due to a worker's promotion or

demotion. Most of these moves (48.78 per cent) were the last one in a worker's career in the firm. There are also some gender differences in the amount of labour mobility within the firm: more than a half of all episodes in male workers' careers are likely to end with separation. In contrast to men, female workers have longer relations with the firm: only 38.46 per cent of their careers' episodes will end with separation. If an employee does not leave the firm, he or she either moves to another position or stays in the same one. Here, we also observed some gender differences: women are more likely to stay in the same position or to change position but the mode in the male mobility distribution consists in separations.

To analyse the career paths for male and female workers we have calculated the probabilities of moving from one level to another (Table 5.6 for women and Table 5.7 for men). The probabilities are not calculated for the period from one fixed date to another, but for changes of episodes in workers' careers within the firm. The matrices, therefore, are not transition matrices in the common sense. When calculating these probabilities, we took only cases of workers' mobility between job titles into account. So, we ignored those episodes when a worker stays at his or her job title.

The data presented in Tables 5.6 and 5.7 lead us to the following conclusions

1. There is an essential diversity in career path directions for male and female workers: women have no access to the highest hierarchical job titles or levels through promotion within the firm but male workers have clear potential career ladders (in terms of probability) within the firm.
2. There are considerable differences in the size and direction of labour mobility between hierarchical levels for male and female workers: women have a lower probability of moving to primarily 'male' job titles or levels.
3. Labour mobility within the firm is characterized by both promotions and demotions for all employees (both male and female workers).

As noted, women do not have access to the highest jobs. Does this mean that during the period we analysed women have not been present at the top levels of the firm's hierarchy. So, does a 'glass ceiling' exist in this firm and are there some constraints on women accessing managerial positions? ⁴

Table 5.7 Career opportunities for men

Level	1	2	3	4	5	6	7	Total, episodes
1. Top management	0.00	75.00	0.00	12.50	0.00	12.50	0.00	8
2. Heads of departments	33.33	8.33	8.33	41.67	4.17	4.17	0.00	24
3. Supervisors	0.00	25.00	0.00	37.50	12.50	25.00	0.00	8
4. High-qualified workers	4.26	31.91	10.64	21.28	4.26	27.66	0.00	47
5. Middle-qualified workers	0.00	15.00	25.00	35.00	0.00	25.00	0.00	20
6. Production workers	0.00	10.81	5.41	54.05	24.32	0.00	5.41	37
7. Apprentices	0.00	0.00	0.00	0.00	0.00	100.00	0.00	21
Total, episodes								165

Notes: Figures in this matrix are the probabilities for female workers who moved between the job titles during 2002–2006 to move from one level to another or to stay at the same level. Observation is an episode of the worker's intra-firm career.

On the one hand, women employed at this firm cannot get jobs at the highest levels of the firm's hierarchy through promotions within the firm. On the other hand, women have been hired into these top jobs at times. Apparently this situation can be explained by the particular history of the enterprise. In the period we are looking at, the ownership of the enterprise changed several times. It is likely that women who were hired at the top management level came to the enterprise as members of a new management team. In Russian enterprises, women more often occupy managerial positions in accounting, human resource management and in the legal department. Specialists in these areas are not required to possess a lot of firm-specific human capital; instead, mainly general human capital is demanded from such specialists. Besides, in the Russian context, the feature most appreciated by the head of an enterprise is absolute loyalty from top managers. Detailed knowledge of the particular nature of the enterprise's production activity, and an understanding of the details of the enterprise's performance can only be gained through long tenure. Consequently, only employees who have been working at the enterprise for a long time are considered to possess this knowledge and these skills. Since

male workers make up the largest part of the employees at a manufacturing enterprise (and have been being the biggest percentage for the years studied at this firm), they are most likely to be considered the most appropriate group to fill top level vacancies by promotion from within the firm.

5. Gender earnings differences

5.1. Methodology

To estimate the gender segregation effect on the gender earnings gap we have used several approaches. The first one uses Ordinary Least Squares regression and estimates several specifications of a modified Mincerian equation:

$$\ln W_i = \beta_0 + \beta_1 MALE_i + \beta_2 X_i + \beta_3 Z_i + \varepsilon_i,$$

where the dependent variable is a natural logarithm of real monthly earnings for individual i ; $MALE_i = 1$ if an employee i is a man; X_i is a vector of individual characteristics (age, square of age, tenure and its square, educational level); and Z_i is a vector of dummy variables of a worker's status within the firm's hierarchy (job level).

The coefficient on the variable $MALE$ has a key meaning for all specifications. It demonstrates the average percentage by which men's earnings exceed women's earnings (all other things being equal). Adding to the equation additional determinants of earnings allows us to get a more accurate estimate of this coefficient. For instance, if controlling for job titles and levels reduces the magnitude of the coefficient on the variable $MALE$, this confirms the hypothesis that gender segregation has an impact on the gender earnings gap.

To study the factors which might explain the gender earnings gap, researchers have traditionally explored the decomposition method that allows the contribution of different determinants to the size of the gender earnings gap to be measured. On the basis of this method we can observe gender differences in returns to characteristics of workers' human capital to characteristics and their jobs

For the decomposition of the gender earnings gap, we base our analysis on the traditional Oaxaca-Blinder method (Oaxaca 1973; Blinder 1973):

Here the first summand amounts to that part of the gap that is due to gender differences in the characteristics of workers ('explained part

of gap'), while the two last summands measure the contribution to the differences in returns to these characteristics ('unexplained part of gap'). In the literature there is a heated discussion about which β^* to use, that is, which vector of coefficients to use that measures the non-discriminatory returns to characteristics. Following Neumark (1988), we use for β^* a benchmark that is obtained from a pooled model over both gender groups.

5.2. Effect of gender segregation on gender earnings differences

To answer the question about the effect of gender segregation on gender earnings differences, we have to pay attention to the size of average earnings of both gender groups employed with the same job titles (see Table 5.8). On average, male workers in the firm earn more than female workers. At the job levels where the most women are employed, the earnings difference is high. For instance, half of all women in this firm work at the level 'production workers', and the earnings gap at this level is 30 per cent in favour of men. The situation is the same at the level of 'high-qualified workers' (22.7 per cent) and 'middle-qualified workers' (23.2 per cent).

Despite generally higher average earnings for male workers, there are some job titles in the firm's employment structure which give women workers higher earnings. For example, the difference in average monthly earnings as a 'head of non-production department' is 23.6 per cent in favour of women. As a 'planning technician' the gap is even larger, at 65.7 per cent. But, as already mentioned, a relatively small proportion of all employees (both women and men) is employed in these jobs. At the same time, the concentration by gender in these job titles is very high. For those job titles which are broadly spread across all employees or for those job titles where male and female workers are presented in equal numbers, male average earnings exceed the earnings of women by a large amount.

Following the methodology described above, we have estimated the gender earnings gap and the effect of gender segregation on gender earnings differences in different ways. The gender earnings gap is on average equal to 35.7 per cent (Table 5.A1, the first specification). If we control for age, level of education, and tenure, the gender earnings gap increases to 39.2 per cent (Table 5.A1, the second specification). All control variables, as well as our keyword parameter MALE, are significant at the 1 per cent level. As an additional result, we also have a positive return for tenure. Recent studies devoted to estimating the returns on

Table 5.8 Gender earnings differences

Level	Gender gap	Title	Gender gap
1. Top management	0.043	1. Top manager	0.043
2. Heads of departments	-0.216	2. Head of production department	0.279
		3. Head of non-production department	-0.236
		4. Supervisor of production department	-0.017
3. Supervisors	0.227	5. Head of bureau	0.201
4. High-qualified workers	0.160	6. Engineer	0.234
		7. Foreman	0.244
		8. Planning engineer	0.159
		9. Economist	0.148
5. Middle-qualified workers	0.232	10. Technician	0.399
		11. Accountant	0.056
		12. Planning technician	-0.657
6. Production workers	0.300	13. Worker	0.300
7. Apprentices	0.168	14. Apprentice	0.168

Notes: Pooled sample, 2002–2006. Earnings are inflated to the 2006 price level on the base of the regional CPI and calculated as a year's average. The gender gap is calculated

$$\text{as } gap = 1 - \frac{w_f}{w_m} .$$

human capital in Russia found extremely low or even negative returns on firm-specific human capital (see, for instance, Maltseva 2009). In contrast to these results, for this firm, we observed a positive return for an additional year of tenure equal to 3.7% per cent.

Adding dummy variables for job levels to the estimated equation reduces the gender earnings gap to 29.3 per cent (Table 5.A1, the third specification). This result seems to suggest that women are in fact concentrated in lower-paid jobs, since the dummies on the job levels absorb part of the gender earnings gap.

Our estimates also show that the following rule holds for the firm: the higher the job level at which the worker is employed the higher the earnings she or he has and, vice versa, if employees have the lowest

earnings they will be associated with the lowest job levels (all other things being equal). There is the only one exception to this general rule: workers employed at the job level 'production workers' earn more than their colleagues in the upper level of 'middle-qualified workers'.

To find out how much the existing gender earnings gap can be explained by gender differences in workers' characteristics and their distribution among job levels, we follow the Oaxaca-Blinder decomposition method. The results in Table 5.9 show that worker characteristics, such as age, educational level, tenure, and employment at a particular job level within the firm's hierarchy, explain about 18 per cent of the total wage gap of 35.7 per cent. However, differences between male and female workers regarding the level of education and tenure have no statistically significant effect on the gender wage gap. It is noteworthy that the bulk of the gender wage gap is not explained by the variables that we included into the estimated equation. It means that, for men and for women, the characteristics of their human capital and their assignment to particular job levels command different prices in this internal labour market.

The results confirm the hypothesis that gender segregation between levels has an influence on earnings differences. If female and male workers were allocated equally across the existing job levels, the gender earnings gap would fall. In other words, the earnings gap between men and women who are the same age and have the same educational level and tenure is above all determined by the job level at which he or she is employed. But, let us recall that women and men work at different job levels and women are concentrated in low-paid jobs.

Of course, the gender earnings gap varies between different job levels. Figure 5.2 demonstrates the raw and the adjusted size of the earnings gap. The raw gap is just the average difference in the earnings of males and females, while the adjusted gap is the coefficient on the variable *MALE* obtained by estimating the earnings equation with controls for age, tenure and educational attainment. It should be noted that the seventh hierarchical level is missing in Figure 5.2 since it only has 22 observations.

We can see that women employed in the first two hierarchical levels gain in terms of earnings. Male workers employed in top manager positions with the same age, educational level and tenure earn about 8 per cent less than female workers. Gains in earnings received by women are even more pronounced for the job level 'heads of departments'. In this case, men's earnings are about 35 per cent less than their female counterparts. Therefore, earnings for these two levels reduce the total

Table 5.9 Oaxaca-Blinder decomposition of gender earnings gap, 2002–2006

Explained part	Total gap		Unexplained part	-0.357*** (0.033)	
	Coeff.	S.E.		Coeff.	Std. error
Age	0.023***	0.008	Age	0.778*	0.048
Tenure	-0.002	0.006	Tenure	-0.075	0.386
Education	-0.010	0.008	Education	-0.241***	0.059
Job level	-0.075***	0.019	Job level	-0.164	0.193
			Constant	-0.591	0.424
Total	-0.064**	0.021	Total	-0.293***	0.030
N	2855				

Notes. Pooled sample. *** – significant at 1%; ** – significant at 5%; * significant at 10%

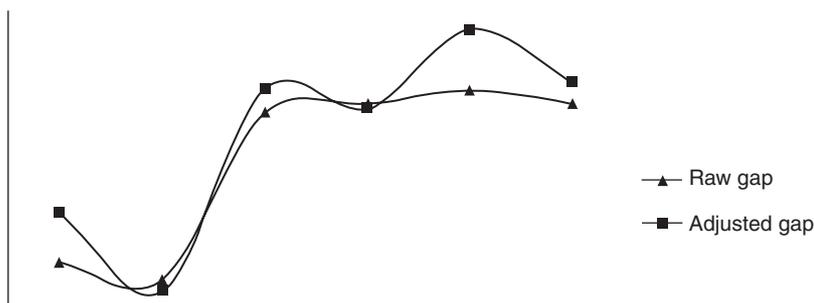


Figure 5.2 Gender earnings gap across levels

Notes: The raw gap is the coefficient on the male dummy in the regression of \ln earnings on this dummy. The adjusted gap is the coefficient on the male dummy in the regression of \ln earnings on this dummy with controls for age, education and tenure.

gender gap although this attenuation effect is in practice very modest: only 3 per cent of women are employed in these top job slots on the firm’s hierarchical ladder.

The earnings of men employed at other job levels are higher than the earnings of women. This evidence is corroborated by the findings in Dohmen, Lehmann and Zaiceva (2008), where the authors stress that for high-paid workers the reward system is more gender neutral than for low-paid workers.

As noted, two thirds of all employees of the firm are concentrated at two levels – ‘production workers’ and ‘middle-qualified workers’. So, the gender earnings gap at these levels dominates the gender earnings gap for the whole workforce. Figure 5.2 shows that men employed at these levels earn much more than women. The highest gender earnings gap in favour of men is observed at the level ‘middle-qualified workers’. There is a considerable proportion of women employed at this level but the adjusted gender earnings gap is about 54 per cent, which implies that men at this level earn roughly 79 per cent more than women (all other things being equal).

We now test the hypothesis that the contribution of the explained variables to the gender gap depends on the level which a given employee belongs to. In addition, we want to see how far the size of the gender gap depends on the fact that the levels include different job titles. To understand this interdependence, we decomposed the gender earnings gap for six levels – without and with job titles within each level. The control variables were again age, educational level and tenure (Table 5.10).

We obtained significant results for the levels ‘middle-qualified workers’ and ‘production workers’. In the first case, the factors of our model explain more than two thirds of the total earnings gap in favour of men. But, at this job level, female workers have advantages in terms of their human capital endowment since the explained part leads to a reduction in the gender earnings gap.

The explained part for the gender earnings gap at the level ‘production workers’ is not very high at 25 per cent. It can be explained by the fact that this level is not homogenous and includes workers with very different levels of qualification. That is why the bulk of the gap must be explained by some other characteristics that we cannot take into account due to a lack of data. Unfortunately, our data do not allow us to identify job titles within this group. But, we can do this for the level ‘middle-qualified workers’. If we control for job title at this level, the size of the explained gap is increased from 62.4 per cent to 74.4 per cent. It means that the size of the gap at this job level depends not only on the employees’ human capital but on the distribution of men and women across the job titles within this level.

The results in Table 5.10 also show that segregation within the level ‘middle-qualified workers’ produces gains in earnings for women. We can conclude this because the positive contribution of endowments to reducing the gap increases when controls for job titles are included into the equation. At the same time, the return on the same characteristics is

Table 5.10 Oaxaca-Blinder decomposition of gender earnings gap across levels, 2002–2006

Level	Total gap	Explained part without titles		Explained part with titles	
		Coeff.	Share of total	Coeff.	Share of total
1. Top management	0.250* (0.125)	0.168 (0.129)	0.671		
2. Heads of departments	0.311* (0.121)	−0.040 (0.061)	0.128	0.111 (0.094)	0.359
3. Supervisors	−0.255* (0.108)	0.079 (0.070)	0.308	−0.158 (0.099)	0.619
4. High-qualified workers	−0.283*** (0.054)	−0.015 (0.019)	0.053	0.033 (0.026)	0.115
5. Middle-qualified workers	−0.330** (0.109)	0.206** (0.063)	0.624	0.246** (0.078)	0.744
6. Production workers	−0.286*** (0.042)	0.071*** (0.018)	0.250		

Notes. Pooled sample, 2002–2006. Standard errors are in parentheses. *** – significant at 1%; ** – significant at 5%; * – significant at 10%

different for men and women employed at this level, and it is men who gain in this situation. As a result, we can see that women earn much less than men at this job level.

6. Conclusions

Our research into the sources and consequences of the gender segregation of the employment structure within our firm led us to the following findings.

The internal labour market of the firm we have analysed is characterized by stable gender segregation consisting of an unequal distribution of male and female workers across job titles and hierarchical levels. The largest numbers of male and female workers are concentrated at the two levels ‘production workers’ and ‘high-qualified workers’. But, while two thirds of men are employed as ‘production workers’, only half of the female workforce is employed at this job level. In contrast, about 23 per cent of all women and only 15.31 per cent of all men are employed

at the level of 'high-qualified workers'. The biggest differences in the distribution of male and female workers across job levels are observed at the level 'middle-qualified workers': 20 per cent of all women and only 1.4 per cent of all men are employed at this level. Therefore, we can observe an unequal distribution of male and female workers in job titles and hierarchical levels within the firm, which comes about because of both employment concentration and segregation.

Vertical segregation also takes place within the internal labour market. Only 5.45 per cent of women worked in managerial positions (in contrast to 12.41 per cent of all men), and the share of women at the 'top management' level is only 0.77 per cent. From this we can infer that a 'glass ceiling' really does exist in the internal labour market of this firm. Nevertheless, we should note that women are more widely represented at middle-management positions as 'heads of non-production departments'. There is a clear division of the 'spheres of authority' in the internal labour market of this firm: men are employed in managerial positions in production units and women head non-production departments.

The high level of gender segregation within this firm arises from two causes. The first is connected to a non-neutral hiring policy by the firm with respect to gender, since the employer prefers either women or men for specific jobs. So, the gender segregation employment structure is created at the entry points to the internal labour market. Women are almost never hired into the jobs and levels where men dominate. On the other side, men are not hired into levels with a high concentration of women (for instance, 'middle-qualified workers'). So, we can conclude that the preconditions for the existence of gender segregation already arise at the entry points to this internal labour market. The second cause is gender differences in the career paths within the firm. Men and women have different degrees and directions of labour mobility within the firm, so we can observe career ladders that vary by gender. As we established with our analysis, during the period on which we reported no female worker received the job title 'top management' because of promotion from within the firm: they got this job title only due to hiring from the external labour market.

The analysis of gender differences in earnings demonstrates that male workers earn on average more than female workers. On average, the gender wage gap is equal to 35.7 per cent. When controlling for age, level of education and tenure, the gender earnings gap increases to 39.2 per cent, which, of course, implies that female workers have slightly better characteristics on average than their male counterparts. At the job levels where most of the women are employed the gender earnings gap is particularly

high. These are the levels of 'production workers', 'high-qualified workers', and 'middle-qualified workers' (an earnings gap of respectively, 30.0 per cent, 22.7 per cent, and 23.2 per cent). While, in general, we observed large earning gains for male workers, there are some job titles within the firm's employment structure which give women higher earnings than male workers who are employed in the same job positions, namely 'head of non-production departments', 'supervisor' and 'planning technician'. However, only a relatively small fraction of all employees (both women and men are employed in these job.

Our estimates allow us to conclude that gender segregation in this internal labour market has a real effect on the gender earnings gap: women earn less than men because they are concentrated in low-paid jobs and levels. Women gain on men at the top level of the firm's hierarchy, so we also have confirmation that for high-paid workers the reward system is more gender neutral than for low-paid workers. Unfortunately, women's presence in top jobs titles and levels is practically negligible in this firm.

Decomposition of the total gender earnings gap of 35.7 per cent reveals that it is almost unexplained by workers' characteristics such as age, tenure, educational level and employment in a particular level. This implies that for men and women the characteristics of their human capital and their assignments to hierarchical levels command different prices in this internal labour market.

Since the gender earnings gap varies between different job levels, we looked at the contribution of workers' characteristics to the gap at each job level. Human capital elements explain more than 60 per cent of total gap at the levels 'top managers' and 'middle-qualified workers'. The difference in these characteristics between male and female workers acts in favour of women, reducing the gender earnings gap. We can conclude the same for the levels of 'supervisors' and 'production workers' but unexplained elements in these cases obviously dominate.

The variables included in the model explain the total gender earnings gap better if we control for job titles within the levels. For instance, within the level 'middle-qualified workers' their characteristics explain 62 per cent of gap. Segregation across the job titles works in favour of women in this case. But the effect of the unexplained part (differences in returns on characteristics and unobservable parameters) seems to be stronger. So gender differences in earnings are most likely determined by other, unobserved, factors that we cannot capture with the methods we used.

Appendix

Table 5.A1 Determinants of monthly earnings, OLS, 2002–2006

	(1)	(2)	(3)
Gender (1=male)	0.357*** (0.033)	0.392*** (0.030)	0.293*** (0.030)
Tenure		0.037*** (0.004)	0.033*** (0.004)
Tenure-squared		-0.001*** (0.000)	-0.001*** (0.000)
Age		0.060*** (0.008)	0.049*** (0.007)
Age-squared		-0.001*** (0.000)	-0.001*** (0.000)
<i>Education (Higher is omitted)</i>			
Primary		-0.705*** (0.120)	-0.395* (0.128)
School		-0.263*** (0.055)	-0.009 (0.065)
Started professional		-0.417*** (0.034)	-0.102* (0.052)
College		-0.453*** (0.036)	-0.210*** (0.040)
<i>Level (Top management is omitted)</i>			
Heads of departments			-0.487*** (0.078)
Supervisors			-0.849*** (0.086)
High-qualified workers			-0.982*** (0.071)
Middle-qualified workers			-1.100*** (0.087)
Production workers			-1.030*** (0.081)
Apprentices			-1.580*** (0.277)
Constant	8.61*** (0.0395)	7.44*** (0.214)	8.56*** (0.177)
N	2855	2855	2855
R-sq	0.044	0.196	0.268

Notes: Pooled sample. Robust standard errors are in parentheses. *** – significant at 1%; ** – significant at 5%; * significant at 10%.

Notes

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2. We thank Vladimir Gimpelson, Irina Denisova, Hartmut Lehmann, Anna Lukyanova, Sergey Roschchin and the participants of the ESCIRRU workshops at DIW Berlin and the NRU HSE for their very useful comments, suggestions and help.
3. The strategy of labour hoarding has been observed at other Russian enterprises in the 1990s. In 1995–1998 from 57 to 68 per cent of manufacturing enterprises according to their managers' opinion had excessive levels of employment (Kapeliushnikov 2001, p. 204). Almost 40 per cent of such enterprises, according to their managers, applied the strategy of labour hoarding because they expected that the demand for their product would increase (*ibid.*, p. 217).
4. The concepts of 'glass ceiling' and 'glass walls' have been considered in detail by Maltseva and Roshchin (2006): these authors also give estimates of the scale of vertical gender segregation in the Russian labour market.

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