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Abstract

This paper surveys three studies on the internal labor market of one Russian firm spanning the years 1997 to 2002 and focusing on three different issues. The studies use unique personnel data that were collected by us and that include the work history of each employee as well as annual averages of monthly wages and total compensation. Since the three studies are part of a larger project on internal labor markets in Russia and Ukraine during transition, the paper starts off with a general assessment of how the analysis of personnel data from transition countries can contribute to the general literature on internal labor markets. After short descriptions of the investigated firm and the personnel data at our disposal, the motivation and the pertinent results of the three studies are presented. While the first study looks at the question how the costs of a financial crisis are spread over the workforce and whether incumbent employees are sheltered from negative shocks in the economy, the second study is tied to the discussion of wage determination in Russia and analyzes the narrower question whether local labor market conditions are an important factor in the wage determination process of the firm at hand or whether stable internal labor market structures are of primary concern for its human resource managers. The third study contributes to the literature on the labor market experience of women in transition by analyzing the evolution and the determinants of the gender earnings gap in the firm.

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1. Introduction

The allocation and organization of labor in firms is a key aspect of modern economic life. Improvements in labor productivity are to a large extent the result of increased division of labor as Adam Smith has already argued in *An Inquiry into the Nature and Causes of the the Wealth of Nations* (see Smith, 1976 reprint). With increased knowledge, the coordination of disparate specialized workers becomes a major task of economic organization (Hayek, 1945, p. 520). Workers who perform specialized tasks in the production process have to be organized as “teams” that fabricate a good.¹ Achieving an efficient allocation and coordination of specialized workers in a team productive process is often unworkable using standard external market arrangements, because it requires an exceedingly complicated system of contracts, which usually involve side-payments among joint input owners (cf. Alchian and Demsetz, 1972). A superior, because less complicated and less costly, organization structure than a decentralized pricing system entails that someone, the principal, has residual control. This principal hires the team of workers, assigns them to positions in the firm in which they are most productive, and monitors and rewards their performance (Rosen, 1988). Such a structure prevails in modern labor markets, where most labor market participants spend their careers in firms that foster long-term employment relations (Farber, 1999).

¹ The coordination between specialists of the team can be achieved by external market arrangements or within firms. Depending on coordination costs and the capability to allocate rewards among team members in line with their productivity one or the other of these alternative contracting forms prevails. This idea can be traced to Ronald Coase, who, rather than dwelling on aspects of team production, proposed in his influential 1937 article “On the Nature of Firms” (Coase, 1937) that firms exist whenever using markets to form contracts is more costly. Arrow (1974) added that organizations evolve when markets fail or where markets do not exist. Williamson (1975, 1979) later formalized Coase’s cost argument. He showed that differential transaction costs are crucial for the allocation of economic activity between the firm and the market.

The employment relationship has a special contractual nature, which stems from the inevitable incompleteness of an employment contract.² While formal rules set standards concerning the quantity and quality of work and define work conditions (Doeringer and Piore, 1971), implicit agreements, informal rules, and customary law shape relational contracts as a result of contractual incompleteness. Implicit contractual terms relating, for example, to performance or specific investments are typically not verifiable in court, so that relational contracts have to be self-enforcing, which can be brought about by the repeated game structure of employment relationships (Bull, 1987; MacLeod and Malcomson, 1989). The personnel policy of a firm reflects the explicit and implicit rules of the relational contract. The question of how wage and job dynamics are driven by the interaction between external market factors and underlying economic conditions (e.g., labor market pressures, incentives, sorting, and labor market institutions) on the one hand and firms' personnel policies on the other hand, is at the heart of labor economics.

A better general understanding of labor market outcomes requires more insight into what happens inside firms, how personnel policies affect labor market careers and whether and how such policies are adapted to changes in external conditions. Although the employment relation is one of the most important contractual relationships in economic life, most research areas in labor economics treat the firm as a black box and reduce the employment relationship to a few key variables as, e.g., to a wage profile.

Modern labor economics had surprisingly little to say about the complex activities inside firms until the emergence of personnel economics - defined as the use of economics to address

² Incompleteness can result from bounded rationality (Simon, 1951) and transaction costs (Grossman and Hart, 1986).

questions relating to internal labor markets, incentives, compensation, promotion, performance evaluation, recruitment, turnover, and other human resource practices - as an important subfield of labor economics (see Lazear, 1999; Gibbons and Waldman, 1999a). The interest in the internal workings of firms was particularly sparked by studies of personnel records by Lazear (1992) and especially by Baker, Gibbs, and Holmstrom (1994a, b). They focused on career and wage dynamics in a large U.S. service sector firm and generated evidence that is inconsistent with simple models of learning and incentives and difficult to reconcile with standard labor market models. Although early theoretical contributions to the literatures on human capital, selection and sorting, and incentives are capable of explaining single findings, none of these models is consistent with the collage of evidence that has emerged from the subsequent empirical literature which explored whether the findings of Baker *et al.* (1994a, b) hold for other firms operating in different advanced market economies, different industries and during different periods (see Ariga, Ohkusa, and Brunello, 1999; Seltzer and Merrett, 2000; Flabbi and Ichino, 2001; Treble *et al.*, 2001; Dohmen and Pfann, 2004; Dohmen *et al.*, 2004; Dohmen, 2004; Gibbs *et al.*, 2004; and Lin, 2005.)

The broad picture that has emerged in the literature indicates that career paths are important for the allocation of workers to jobs, and that job mobility is a major determinant of wage dynamics. Several stylized facts concerning compensation and promotion policies and their effect on workers' career and wage dynamics emerge from existing empirical work: First, promotion fast tracks exist, i.e. workers who are promoted quickly from one level to the next are more likely to be promoted again (see Baker *et al.* 1994a, Ariga *et al.* 1999, Seltzer and Merrett 2000, Dohmen *et al.* 2004, Gibbs and Hendricks 2004). Second, nominal wage cuts, even after a demotion, are rare (Dohmen, 2004; Bewley, 2004). Third, wage increases are serially correlated

and predict promotions (e.g., Dohmen *et al.* 2004). Fourth, the wage premium that workers receive upon promotion to a higher job level is large compared to pay raises without promotion but typically amounts to only a fraction of the difference between average wages of adjacent levels. This is a universal finding in all personnel data sets that have been analyzed in the studies mentioned in the previous paragraph. Dohmen (2004) shows how such wage dynamics arise in a formal salary system, in which part of the rewards of a promotion comes in the form of contractually promised future wage increases. Such backloading of wages helps fostering long-term employment relationships. Fifth, within-job wage growth is limited by pay ranges so that upward job mobility is crucial for sustained wage growth (see Dohmen, 2004). Sixth, demotions are much less frequent than promotions (see, e.g., Baker *et al.* 1994a; Treble *et al.*, 2001). In addition, Dohmen, Kriechel, and Pfann (2004) as well as Hamilton *et al.* (2004) find that promotion rates increase during corporate expansion and fall during downsizing. Seventh, promotions and wage increases are more likely with higher performance evaluations. Finally, studies typically find no evidence of very strict and distinct ports of entry and exit as predicted by Doeringer and Piore (1971), but workers are typically hired into lower levels of the firm hierarchy.

These findings have motivated theorists to develop models that amalgamate several theoretical concepts, including, e.g., human capital accumulation, job assignment, and learning, in order to explain the pattern of evidence (e.g., Demougin and Siow, 1994; Bernhardt, 1995; Gibbons and Waldman, 1999b and 2002; Dohmen, 2005). Dohmen (2005) analyzes job mobility and wage dynamics when workers are assigned to limited job slots in a corporate hierarchy. The model derives a dependence relation between changes in the size of the workforce and internal job mobility rates. It yields predictions that are consistent with the empirical evidence found in

Dohmen *et al.* (2004). Since the model focuses explicitly on the impact of changes in economic conditions on internal labor market careers, it is especially relevant in the context of transition.

Empirical work that uses personnel data to test these new theories or that provides further stylized empirical facts, from which new theoretical work can originate, is still rare. In a project, financed by the Deutsche Forschungsgemeinschaft, personnel data from Russian and Ukrainian firms were collected for the transition period 1990 to 2006. These data provide additional data points that help in the solution of thus far unresolved puzzles in the literature.

The analysis of the personnel files from the Russian and Ukrainian firms makes scientific progress possible in several other respects as well. First, we can examine whether the stylized facts that were uncovered for firms from advanced western economies hold true for a firm in transition, and the data allow us to assess in what respects the internal economics of the firm differ from the functioning of western internal labor markets. Second, the personnel data of a firm operating during the transition from a centrally-planned to a market economy are extremely well suited for shedding light on the question of whether and how changes in external labor market conditions affect explicit personnel administrative rules, as well as procedures and implicit agreements that govern the organization of labor in the firm. This is relevant for the more fundamental issue of whether such rules and custom, e.g., formal salary systems, constrain the allocation of workers, i.e. affect their career and wage dynamics beyond labor market factors or whether administrative rules simply reflect underlying wage and promotion dynamics and thus play no additional role. Third, we can analyze turnover, internal job mobility and wage dynamics during periods of reorganization and restructuring.

Most of the raised important research topics in the field of personnel economics in transition have not yet been studied since the mentioned data sets have only become available at the time of writing. Our review here, therefore, reports on three studies that were undertaken with a more limited data set of one Russian firm for the period 1997 to 2002, which relates to late transition in Russia, but also encompasses the Russian financial crisis in 1998. These studies are (1) Thomas Dohmen, Hartmut Lehmann and Mark Schaffer (2008) “Wage policies of a Russian Firm and the financial crisis of 1998: Evidence from personnel data – 1997 to 2002;” (2) Thomas Dohmen, Hartmut Lehmann and Mark Schaffer (2009) “Wage determination and wage inequality inside a Russian firm in late transition: Evidence from personnel data – 1997 to 2002;” and (3) Thomas Dohmen, Hartmut Lehmann and Anzelika Zaiceva (2008) “The gender earnings gap inside a Russian firm: first evidence from personnel data – 1997 to 2002.”

The paper has the following structure. In the next section we describe the firm in some detail. This is followed by a description of the personnel data that are analyzed from different angles in the three papers mentioned above. The following three sections then present the main findings of these three papers sequentially, while a concluding section provides an assessment of what have we learned thus far about internal labor markets in Russia.

2. The analyzed firm

Our firm operates in one of the central Russian oblasts in the “machine building and metal works” sector and produces equipment for gas and oil production and smith-press equipment. It was part of the military industrial complex before transition but has converted its production portfolio completely to products for the civilian economy. The firm operates in a product market

that is characterized as follows: 6.2% of its output is destined for export, mainly to countries of the Commonwealth of Independent States (CIS), so the vast majority of its products is for the Russian market. In this market it has more than 5 competitors, among them firms from the EU.

The firm was founded in the 1950s and privatized in 1992. By 2002 employees and managers owned 53.1% of the shares, while former employees and other Russian nationals owned 21.5% and 25.4% respectively. From interviews with the CEO it, however, transpires that top management has a decisive majority and that employees have no voting rights. Also, while there is collective bargaining on paper at this firm, trade union officials follow the directives of top management. Finally, dividend payments to the workforce are very small relative to annual compensation. These facts imply that corporate governance structures neither give employees influence over wage setting nor do they confound the relative structure of wages in the firm over time.

How representative is our firm in the manufacturing sector? Two hostile takeover attempts tell us that the firm must have been performing well. In terms of profits and employment our firm is certainly not representative of its sector or of the Russian economy as a whole as figure 1 and the last column of table 1 demonstrate. While in the sector profits fall substantially they are stable and predominantly rising in the firm. Employment in the sector was characterized by a large fall in the reported period while it is stable and even slightly rising. Also the Chief Executive Officer (CEO) can be found in the list of Russia's top 1000 managers as he has successfully converted his firm from military to civilian production. So, all in all, our firm is part of a small but important part of Russian industry that has managed transition well; and is not representative of the industrial sector at large.

3. The personnel data

The construction of the personnel data proceeded as follows. We created an electronic file based on records from the personnel archive of the firm, and constructed a year-end panel data set for the years 1997 to 2002.³ We have records of all employees who were employed at any time during this period.⁴ The data contain information on individuals' demographic characteristics such as gender, age, marital status and number of children, on their educational attainment, retraining and other skill enhancement activities before joining the firm and during tenure at the firm. We also know the exact date when each employee started work at the firm as well as his/her complete working history before that date. We can trace each employee's career within the firm. In addition we also know whether someone worked full-time or part-time. For those who separated from the firm we can distinguish between voluntary quit, transfer to another firm, individual dismissal, group dismissal and retirement.

In Russian firms the workforce is often divided into five employee categories: administration (i.e., management) which we label "managers"; accounting and financial specialists whom we label "accountants"; engineering and technical specialists (including programmers) whom we subsume under the term "engineers"; primary and auxiliary production workers, whom we label "production workers"; and finally, service staff.⁵

³ We have also wage data for all months in 2003 except for December. However, since we also lack data on yearly bonuses for 2003, we do not use the compensation data for 2003 in this paper.

⁴ Information for top managers is missing for reasons of confidentiality.

⁵ Only production workers are subdivided into levels, primary production workers having eight and auxiliary production workers having six levels.

For the years 1997 to 2002 we have monthly wages averaged over the year, and information on the three types of bonuses paid to the workforce: (1) a monthly bonus amounting to a fixed percentage of the wage; (2) an extra annual bonus whose level depends on “the results of the year” (i.e., a form of profit sharing); (3) an annual bonus labeled “other bonus”. While production workers never receive a monthly bonus, the bonus labeled “other bonus” is paid to production workers only. Wages are reported by the firm as the employee's average monthly wage in rubles for the year (or fraction of the year, if not employed for the full 12 months), with no adjustment for inflation. The monthly bonus is reported as a percentage of the average monthly wage, and the corresponding ruble figure is recovered by applying the percentage to the nominal monthly wage. The other two bonuses are reported in nominal rubles. The inflation rate in Russia during this period was irregular and sometimes quite high - the price level more than doubled between the start of the financial crisis in July 1998 and April 1999, and was 0-2% per month before and after - and so some care is required to construct appropriate deflators. Because nominal average monthly wage and the nominal monthly bonus are averages for the year, they are deflated into 1997 constant rubles using an annual average CPI, i.e., the average price level for the year relative to the average price level in 1997. The other two bonuses are paid around the end of the year, and so these are converted into 1997 constant rubles using the CPI price level for December of the corresponding year, i.e., the December price level in that year relative to the average 1997 price level.

Table 2 shows that bonuses are only a relatively small fraction of total compensation. We can also see that in 1998, the year of the crisis, the “extra bonus”, which is a payment in the form of profit sharing, is not paid to the workforce and that wages make up 90% of total compensation

even though profits remained positive even in 1998 albeit at a lower level than any other year. In 2002, on the other hand bonuses make up nearly a quarter of total compensation.

4. Wage policies of a Russian firm and the Financial Crisis of 1998

4.1 Introduction

The paper “Wage policies of a Russian Firm and the financial crisis of 1998: Evidence from personnel data – 1997 to 2002” permits to shed light on crucial, but largely unresolved questions about the functioning of internal labor markets in general. For example, do firms adapt their wage policy to changes in labor market conditions? And if so, are all workers affected in the same way, or are incumbent workers shielded from external labor market shocks as early theoretical work on internal labor markets suggests (e.g. Dunlop, 1957, and Doeringer and Piore, 1971)?

In particular, we investigate how the firm adjusts employment, wages and other components of pay in response to the crisis, and study how the burden of the crisis is spread across the workforce. This analysis is important for two reasons. First, despite some attempts in the literature to assess the costs of economic crises on workers and on households (see, for example, Fallon and Lucas, 2002), we know virtually nothing of how these costs are distributed among employees inside firms. Second, although several studies have explored to what extent internal labor markets cushion incumbent workers from external labor market shocks (e.g., Baker et al., 1994, Lazear, 1999; Lazear and Oyer, 2004), it is still not well understood how workers’ welfare is affected by firm performance over the business cycle. Evidence on the degree to which firms are disciplined by external labor market conditions is mixed. What emerges in the empirical literature suggests (1) that hiring wages track industry wages, but (2) that differences in hiring

wages are persistent; indicating that market induced variations in marginal productivity are not fully reflected in wages of incumbent workers.

Since shocks have been small in most industrialized economies, the empirical literature has found it difficult so far to establish a direct link between shocks to (external) labor market conditions and changes of firms' personnel policies. Clearly, there is much insight to be gained by assessing how firms react to larger exogenous macroeconomic shocks, such as the financial crisis that occurred in Russia in 1998. This crisis led to a substantial devaluation of the Ruble, a collapse of a large part of the private banking sector, a surge in inflation and interest rates, and liquidity problems, which adversely affected demand in the goods market.

It is, however, important to note that the Russian financial crisis in 1998 had negative effects on economic aggregates only in the short term unlike the still ongoing worldwide financial crisis, the effects of which have been long-term and strongly spilling over into the real economy. In contrast, in the longer term the crisis of 1998 produced beneficial side effects insofar as the real depreciation of the Ruble and a large fall of real wages were important ingredients in an economic process that generated sustained growth of the Russian economy between 1999 and 2008. While our firm had some problems in the immediate aftermath of the crisis since economic activities in Russia came nearly to a standstill for a few weeks after August 1998, in the longer term because of the ongoing oil boom and because of a temporary increased competitiveness due to the real depreciation of the Ruble the profit situation of the firm improved to such an extent that profit levels were higher in 2002 than before the crisis (figure 1). Nevertheless one needs to keep the assertion by Fallon and Lucas (2002) in mind that even if financial crises have depressing effects for the whole economy only in the short-term, the consequences of such crises

for the workforce might be negative in the long-term. The results of our analysis seem to confirm this assertion.

4.2 The most pertinent results

Our results show that changes in economic conditions strongly influence the personnel policies of our firm. Real wages and real compensation fell substantially in the aftermath of the financial crisis as figures 2 and 3 attest. Employment levels at the firm, on the other hand, remained rather stable (see table 1), pointing to a policy that relies on “price” rather than “quantity” adjustment in response to an adverse shock, which seems to be typical for the Russian economy (Boeri and Terrell, 2002). These welfare losses were, however, not spread evenly across all employees. In fact, employees at the top of the earnings distribution tend to take the highest real wage cuts in relative terms as table 3 shows for the 5 employee categories: employees who found themselves in the lower part of the wage distribution in 1997 have a relatively higher real wage growth than those who were located in the upper part of the distribution (accountants are the only exception). We show in the paper that this pattern is in part driven by external labor market conditions that limit the scope for cutting wages of employees at the bottom end of the firm’s wage distribution.

The findings on real wage changes also contribute to the literature on wage rigidity. So far, this literature has documented compelling evidence that managers intentionally refrain from cutting nominal wages (Bewley, 1999). The resulting nominal rigidity is borne out in personnel data (e.g., Baker et al., 1994; Wilson, 1996 and 1999; Altonji and Devereux, 2000; Dohmen, 2004). Clearly, nominal rigidity brings about real rigidity when there is zero inflation. In fact, Fehr and Goette (2005) provide evidence from personnel records showing that nominal rigidity even persists in a low growth environment with very low inflation, where it limits a firm’s

discretion to adjust real wages downwards. This indicates that motives for not cutting wages are strong and important. However, it is less clear that real rigidity would also stem from strong intentions for preserving real wages. Our evidence suggests that such intentions are weak: although the firm is reluctant to cut nominal wages, it does not refrain from substantially cutting real wages, taking advantage of a high-inflationary environment. The firm is able to cut real wages because outside opportunities in the local labor market are substantially reduced after the onset of the financial crisis. That local labor market conditions are an important driving force of wage and employment policies of our firm is the main focus of the second paper to which we now turn.

5. Wage determination and wage inequality inside a Russian firm in late transition

5.1 Introduction

The complementary study “Wage determination and wage inequality inside a Russian firm in late transition: evidence from personnel data – 1997 to 2002” has a more restricted focus on the debate within the transition literature related to Russian labor markets. This literature, in particular the literature on wage formation and wage inequality in Russian labor markets, has left many controversial issues unresolved. One of the more fundamental issues is the question of which considerations drive managers in the wage determination process. Are Russian wages, for example, formed mainly by institutional factors related to industrial relations and internal labor markets as stressed by Clarke (2002) and Kapelyushnikov (2002) among others, or are managers in their wage decisions mainly led by the interplay of conditions in local labor markets, labor market institutions and considerations to achieve an optimal level of turnover of the workforce?

Clarke (2002) takes recourse to two general strands of the literature on wage determination, the industrial relations institutional literature and the early literature on internal labor markets (e.g. Dunlop, 1957, and Doeringer and Piore, 1971). Both these strands point to the protection of the workforce in the firm from shocks that occur in the outside labor market by maintaining a stable and “fair” relative wage structure also in times of economic hardship. The second approach to the analysis of Russian wage formation extends standard models of wage determination in capitalist economies to Russia, and assigns an important role to local labor market conditions in the wage formation process. No matter how much bargaining power of workers and employers is assumed in the models underlying the studies, i.e. independent of whether both agents are assumed to have substantial bargaining power as in the studies of Brainerd (2002), Luke and Schaffer (2000) and Commander et al. (1996), whether employers decide unilaterally over wage levels and structure (Lehmann et al., 1999), or whether the assumption of competitive labor markets is maintained (Commander et al., 1995), local labor market conditions are assumed to have a major impact on the decision making process as well as on outcomes.

This study provides new evidence on the issue of wage formation and differentiation in Russia. If the “industrial relations school” is right, then firms that have increasing profits should attempt to maintain real wage levels as much as is feasible in times of inflation and reverse real wage losses when inflation subsides. And local labor market conditions should play a very subordinate role, if any. We are fortunate to have personnel data for the years 1997 to 2002, a period that includes an episode of high inflation in the aftermath of the August 1998 financial crisis. Given our longitudinal personnel data and the profit situation of the firm we are able to provide direct evidence on the validity of the prediction put forth by Clarke and others from the “industrial relations school” of Russian wage formation.

To see whether and how important labor market conditions affect wages, we need information about the local labor market in which the firm operates. The information we use is taken from regional Goskomstat data and from a sample of 33 industrial firms in the same region where the firm is active. We also interviewed the director general of the firm (CEO), after we had analyzed the personnel wage data, to get confirmation or clarification on the motives of management regarding its wage policies.

5.2 Results

The main results in the final analysis provide little evidence for the prediction put forth by Clarke and others of the “industrial relations school”; our results rather show that local labor market conditions are one of the main driving forces determining management’s wage policies in this Russian firm. In the firm at hand, top management, in particular the CEO, unilaterally determine wages in spite of official bargaining between management and trade union representatives.

The evolution of average wages in the firm, the region, the sector and the economy as a whole is shown in figure 4. Here we can clearly see that the average wage in our firm was far higher than in the three aggregates added in the figure. We can also make out that after the large drop in the average wage in 1999 it remains roughly constant throughout the period while average wages in the sector and in the economy at large grow at a steady pace and overtake the average wage in the firm by 2003. It is also noteworthy that while the average regional wage also grows it remains well below the firm’s average wage throughout the reported years.

From the interview with the CEO it transpired that before the financial crisis in 1998, labor turnover was very high in the firm. This turnover was driven by voluntary quits as employees saw better opportunities outside the firm. However, as of 1996 orders for the firm's products showed a very robust upturn and the firm was in desperate need of qualified production workers, engineers, etc. To attract these qualified employees and to retain them, top management offered real wages far above the regional and sector averages. After the financial crisis of August 1998 outside opportunities in the local labor market were substantially reduced as we can show with the help of turnover patterns in the firm and in the local labor market (see below). This enabled top management to extract rents from the firm's employees through the erosion of real wages and real total compensation via the high inflation that manifested itself during and after the financial crisis. It curbed earnings most for those who earned the highest rents, resulting in a tremendous compression of real wages that was still in place at the end of the reported period as the declining Gini coefficients in table 4 attest. While nominal wages are never cut in this firm, long lasting real earnings losses were very substantial, and this despite a very strong profit performance after the crisis (see figure 1).

The firm was in a position to extract rents from its employees because of a fall in outside opportunities in the local labor market after 1999. These falling outside opportunities can be shown by the evolution of turnover patterns in the period that includes the year of the financial crisis as well as by the dynamics of wage differentials between average wages in the firm and average wages in a sample of industrial firms in the oblast. Table 5 shows that between 1998 and 2001 separations fall greatly in our firm while hiring stays roughly constant. The same pattern can be observed for the sample of industrial firms in the region (see table 6). Differences between average wages in the firm and average wages in the sample of industrial firms in the oblast

become smaller or disappear between 1999 and 2002 showing that the rents of the employees in our firm are strongly diminished or eliminated (see table 7). However, it is also clear that at the bottom end of the firm's wage distribution there are smaller rents before the crisis and the firm seems to pay wages closer to the opportunity cost for employees at that end of the distribution throughout the reported period.

In summary, our analysis provides strong evidence for the hypothesis that top managers take local labor market conditions into account when deciding on wage levels. In times of very high labor turnover they are willing to pay higher than average real wages to attract and retain skilled workers. On the other hand, being reluctant to cut nominal wages, they relentlessly cut real wages when market conditions make this possible. All in all, our evidence clearly shows that market forces strongly influence the wage policies of our firm and that considerations for a stable internal labor market as mooted by Clark (2002) are of less concern.

6. The evolution of the gender earnings gap inside a Russian firm

6.1 Introduction

The gender wage gap has attracted much attention by researchers studying labor markets in transition. This research has mainly focused on the question whether transition has brought a worsening of women's position in the labor market or whether they have benefited from the liberalization of the economic system. In other words, most of the studies analyzing the gender wage gap (GWG) in transition countries try to compare the GWG just before the transition to the gap in the early years of transition. As stressed by Jurajda (2005), there are predominantly two countervailing forces determining the dynamics of the GWG pre-and post-transition. On the one

hand, a dramatic widening of the wage distribution, as happened for example in Russia and Ukraine will increase the gap since women are above all located in the lower part of the wage distribution (Brainerd, 2000). On the other hand, if low skilled women leave the employment state on a large scale, as was observed for East Germany by Hunt (2002) and for Slovenia by Orazem and Vodopivec (2000), the gap will be reduced.

The paper “The gender earnings gap inside a Russian firm: evidence from personnel data” by Dohmen, Lehmann and Zaiceva (2008) is the first study to our knowledge that uses a panel of personnel data to investigate the determinants of the gender earnings gap (GEG) and of its dynamics within a firm in a transition economy.⁶ Recent work with matched employer-employee linked data has shown that firm specific effects constitute an important determinant of the GWG (see e.g. the evidence for the United States by Bayard et al., 2003; for Spain by Amuedo-Dorantes and de la Rica, 2006; and for Germany Heinze and Wolf, 2006). This implies, of course, that studies of the GWG that only use household survey data can only provide very limited insight into the causes of the GWG, a point vigorously made in Jurajda (2005).

But even with linked employer-employee data there might arise a problem of identification of the key parameters of the model underlying the analysis of the GWG since unobserved heterogeneity plays an important role when the amount of information on workers and firms is rather limited (Kunze, 2008). Studies based on personnel data might provide an interesting contribution to the literature by reducing unobserved heterogeneity since the workforce within one firm can be considered relatively homogeneous (Kunze, 2008). An interesting study in this context is Barnet-Verzat and Wolff (2008) who analyze the GWG within

⁶ We look at the gender earnings gap and not at the gender wage gap because we do not have precise information on hours worked in our data. We, however, use only full-time workers in this study in order to minimize biases that might arise because of differences in the hours worked by men and women.

a French firm over deciles and link this analysis to the glass ceiling effect. To this purpose they have at their disposal personnel data from an aerospace technology firm for 1000 managers and engineers in charge of development studies and production. These workers obviously form a rather homogeneous group resulting in a small GWG, ranging between 1% at the lowest decile to 10% at the highest decile. At any rate, while personnel data can never be truly representative of an industry or an economy, they provide a very detailed look at internal labor markets that can shed additional light on the reasons for the discrepancy in pay between men and women (Ransom and Oaxaca, 2005).

In this paper, we study gender differentials of the whole workforce as well as of various employee categories. In Russia, like in other CIS countries, bonuses make up a substantial part of total compensation. We, therefore, analyze wage and compensation differentials at the mean of the wage and compensation distributions as well over the entire distributions. This first study on the Russian GEG with personnel data is predominantly a descriptive exercise, which wants to show the main patterns of gender differentials across employee groups and over time. We, however, also make a first attempt here to get at the determinants of the observed patterns and trends of the GEG in this Russian firm between 1997 and 2002.

6.2 The main findings on the evolution of the gender earnings gap

Our main findings can be summarized as follows. First, we document a decrease in both gender wage and compensation gaps over 1997-2002 by around 18 percentage points, which is broadly in line with panel estimation results in Kazakova (2007) who employs household survey data for the entire Russian economy from the same period. After having performed several decompositions at the means and quantiles of the wage distribution as well as across time we find

that at best one third of the total gap is explained by the differences in observed productivity characteristics between men and women. We also find that, contrary to the early years of transition (see Brainerd, 2000), although the largest contribution to the reduction of the gap is due to a narrowing of the residual wage distribution, the joint contribution of gender-specific effects has the most weight. Regarding quantile analysis, we show that the GEG has roughly an inverted U-shape profile across the wage distribution⁷, that differences in observable characteristics explain little and that the two highest deciles exhibit lower gender wage differentials. The latter result together with an insignificant GEG for managers is in line with the theoretical model of Lazear and Rosen (1990), which postulates that at particularly high levels of ability there exists no GEG, and point towards the existence of segregation within the firm. Our analysis also shows that the fall in the gender earnings differential between 1997 and 2002 is predominantly driven by a reduction in the differential in the lower part of the distribution. This in turn is explained by increased returns to women characteristics and a slight worsening of men's characteristics at the bottom of the distribution over the analyzed years.

Since the largest earnings differentials are observed for production workers, in the second part of the paper we focus on this group of employees and explore the reasons behind the GEG, in particular segregation, in more detail. For these workers we observe job levels that are linked to their jobs, which we use in our analysis. We find that neither wage arrears, nor benefits or job security reasons seem to explain the existence of earnings differentials within this firm.

However, two striking results emerge. First, the gender earnings gap is almost completely explained by the job levels. For workers we have information on 6 auxiliary levels and 8 primary

⁷ The inverted U-shape is given for the years 1997 to 2001. In 2002, the GEG is larger at the higher quantiles than at the lower quantiles due to a large reduction of the GEG at the lower quantiles. Thus in 2002, there seems some evidence of a glass ceiling effect.

levels only for the year 2002. We should, therefore, understand our analysis as a largely descriptive exercise. Comparing Machado-Mata decompositions of gender earnings differentials at the quantiles with and without conditioning on job levels leads to the same conclusion: earnings differentials across job levels are large and little of the earnings differential is explained by characteristics, while earnings differentials within job levels are much smaller and virtually entirely explained by observed characteristics at all quantiles (see figure 5). Of course, we are aware of the endogeneity of job levels in the determination of earnings and consequently do not suggest that job levels have a causal impact on the gender earnings differential. Nevertheless, our descriptive exercise points to the remarkable fact that there is such a large earnings differential in spite of a seemingly gender neutral wage policy of top management in this firm, which arises because women are in overwhelming numbers placed in low paying job levels (cf. Ransom and Oaxaca, 2005).

The second striking result is that female workers are concentrated in low-level jobs and are underrepresented (or even absent) in high-level jobs. This can be clearly seen in table 8. Female workers find themselves located above all in the lowest categories of auxiliary job levels and are completely absent from the highest categories in the primary job levels. It is also apparent that only in the job level primary 4 can we observe a statistically significant gender earnings gap (in the level primary 5 it is significant at the 10% level), while in all other job levels average pay is the same for female and male production workers. So, women finding themselves in the same job levels as men for the most part do not seem to be discriminated against in terms of pay.

Thus, females self-select or are selected into lower paid jobs and segregation seems to be a potential reason behind the GEG in this internal labor market. However, in order to gain further insights into the driving forces of this apparent segregation, we need to take a closer look at

promotion dynamics for men and women as well as hiring decisions and entry-level jobs, issues that will be pursued in future by analyzing the data for this firm spanning the years 1990 to 2006.

7. Conclusions

Having a rich personnel data set of one Russian firm for the years 1997 to 2002 at our disposal, we trace out the evolution of wages, total compensation and employment in three studies, covering a period that included an episode of high inflation during and in the aftermath of the financial crisis of 1998. The observed evolution points to “price” rather than “quantity” adjustment within the firm during the crisis as employment remained stable but real wages and real compensation fell substantially. Our evidence thus shows that the firm did not refrain from substantially cutting real wages, taking advantage of a high-inflation environment.

The downward adjustment of earnings led to persistent welfare losses among employees since real wages and real compensation levels had not recovered to pre-crisis levels by 2002, even though the firm’s financial situation was then better than before the crisis. The firm, which was a high-wage firm prior to 1998, made use of the high inflation that manifested itself during and in the aftermath of the financial crisis in order to extract rents from employees. These welfare losses were, however, not spread evenly across all employees, since the firm curbed earnings most for those who earned the highest rents, resulting in a tremendous compression of real wages.

The firm was in a position to extract rents from its employees because of a fall in outside opportunities in the local labor market as evidenced by dramatically falling separation rates after 1999. At the bottom end of the firm’s wage distribution there are, however, smaller rents before

the crisis and the firm seems to pay wages closer to the opportunity cost for employees at that end of the distribution throughout the reported period.

Our analysis provides strong evidence for the hypothesis that top managers take local labor market conditions into account when deciding on wage levels. In times of very high labor turnover they are willing to pay higher than average real wages to attract and retain skilled workers. On the other hand, being reluctant to cut nominal wages, they relentlessly cut real wages when market conditions make this possible. All in all, our evidence clearly shows that market forces strongly influence the wage policies of our firm and that considerations for a stable internal labor market are of less concern.

We have also analyzed the size of the gender earnings gap and its determinants and development over time. The estimates of the gender earnings gap at the firm level are very similar in magnitude to estimates of the gender gap in the economy at large. Moreover, the development of the gender earnings differential over time also mirrors developments in the Russian economy. Observed characteristics that are related to individual productivity only explain a small fraction of the gender earnings gap. The narrowing of the gap at the firm level which is more pronounced at the lower part of the earnings distribution is to a minor degree driven by gender differences in separation patterns. In particular, men who are in the lower part of the earnings distribution but have relatively favorable observed characteristics are more likely to separate, most likely because they face better outside alternatives. Women in the lower end of the earnings distribution have lower separation rates. This is likely the result of an increase in the rewards to female characteristics, which is particularly prevalent in the lower part of the

distribution. Our estimates indicate that this increase in the rewards for women is the main driving force behind the falling gender earnings gap.

Equally important, our analysis reveals that the gender earnings gap is largely driven by job assignment rather than by earnings differentials within a particular job level. For production workers, we have shown that earnings differentials conditional on the job level are small and in general statistically insignificant to start with and almost entirely explained by observed characteristics related to productivity.

The three studies that we have surveyed in this paper look at the internal labor market of one Russian firm in late transition by analyzing its wage and employment policies as well as its gender earnings gap. This analysis will be complemented in future work when we will look at the internal labor markets of several firms in Russia and Ukraine throughout the entire transition period, employing even richer personnel data sets. The three presented studies, however, nicely set the stage for this future more comprehensive research, where we intend to cover all the issues sketched in the introduction.

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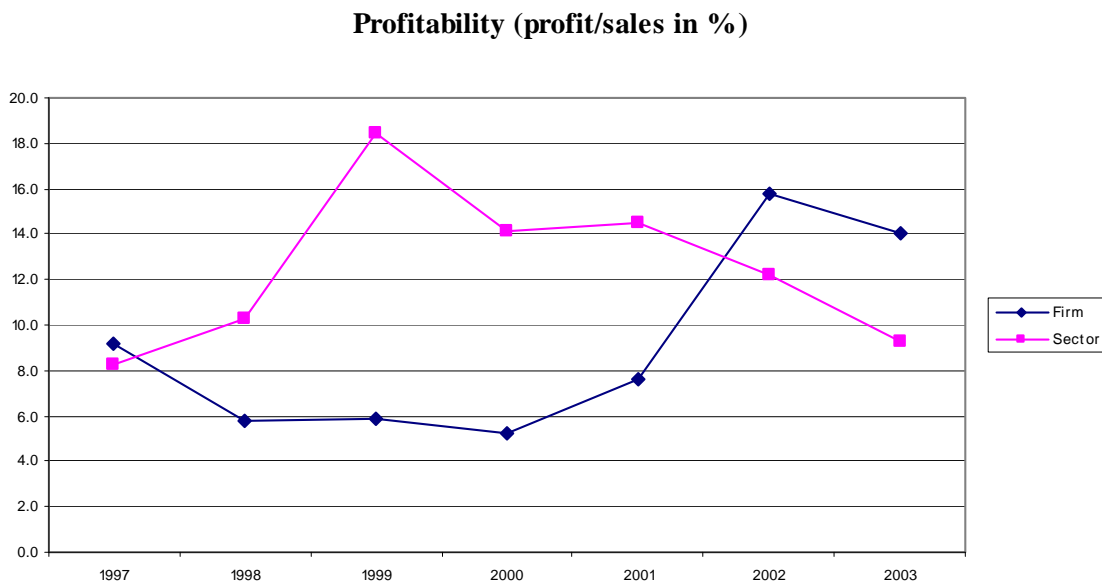
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FIGURES

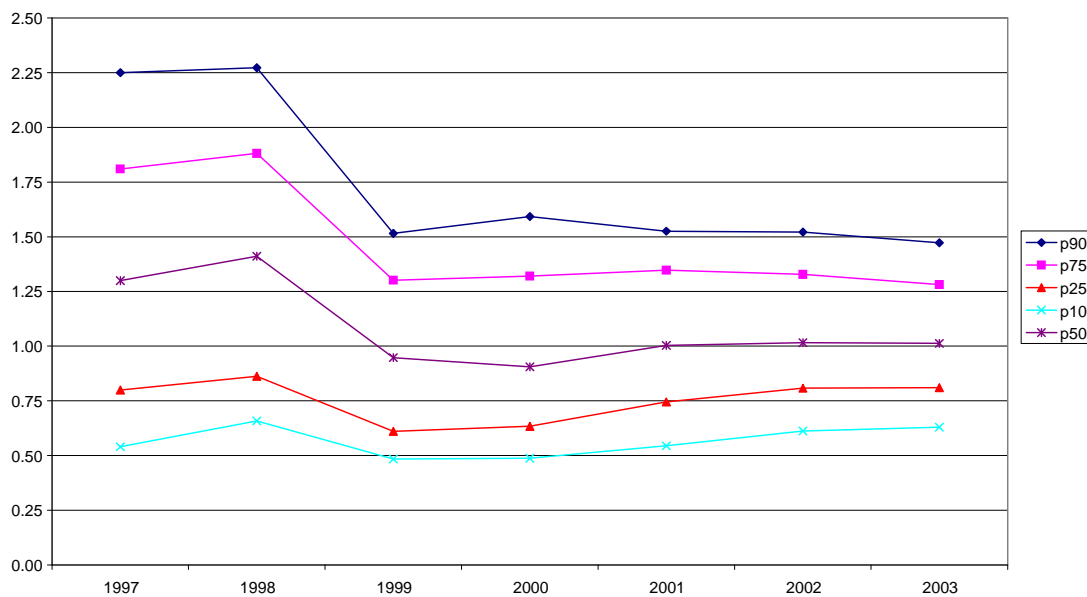
Figure 1



Notes: The figure shows the percentage of profits relative to sales for the firm and the average percentage of profits to sales for the machine building and metal working sector.

Source: Rosstat, authors' calculations.

Figure 2 Distribution of basic real wage in rubles - all employees



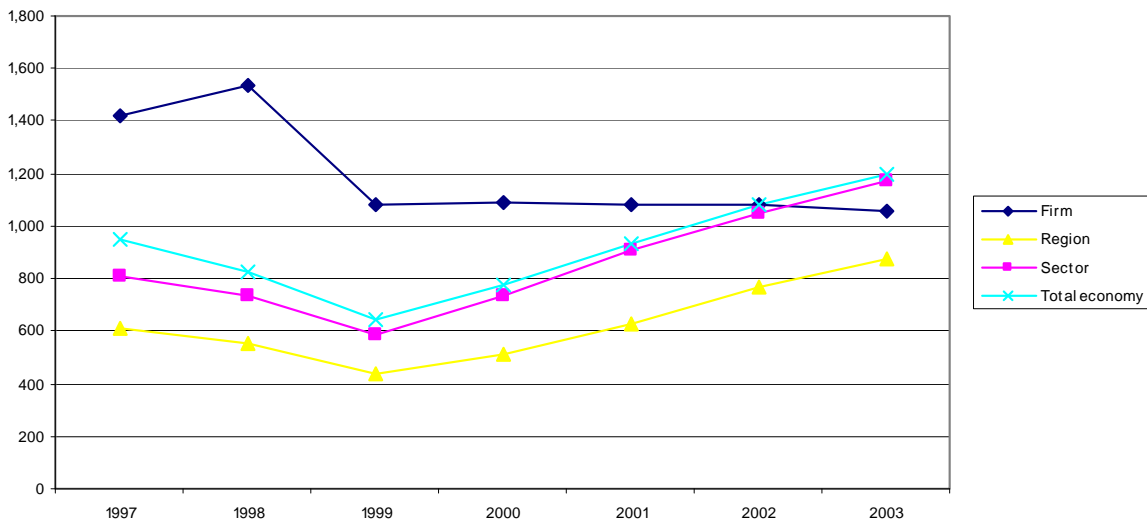
Source: personnel data base, own calculations.



Source: personnel data base, own calculations.

Figure 4

Real Monthly Wage in Thousand 1997 Rubles

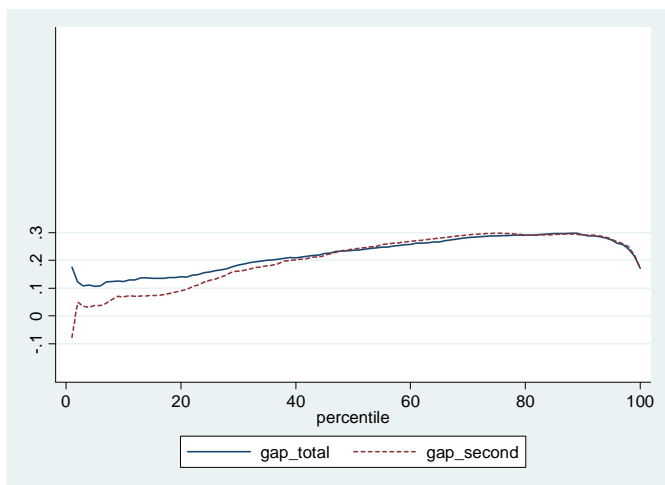


Notes: The figure shows average real monthly wages in thousands of 1997 rubles for the firm, the region in which the firm is located, the machine building and metal working sector and the entire Russian economy.

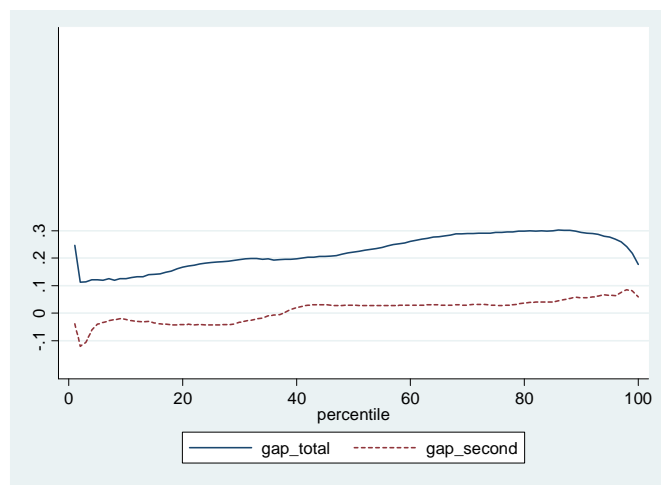
Source: Rosstat, own calculations.

Figure 5 - Machado-Mata decompositions for workers

Without levels:



With levels:



Notes: Machado-Mata (2005) decomposition results for workers are reported. “Gap_total” is the total simulated earnings differential between males and females, “gap_second” is the part of the earnings differential due to the difference in coefficients. The left panel shows the results without workers’ job levels and the right panel shows the results with workers’ job levels included in the regressions.

TABLES

Table 1: Composition of Workforce (in %), 1997 to 2002

Year	Service staff	Engineers	Production workers	Accountants	Managers	Total	Absolute number of employees
1997	7.1	24.8	62.1	2.2	3.8	100	3032
1998	7.0	24.4	62.6	2.1	3.8	100	3081
1999	6.9	24.6	62.6	2.1	3.8	100	3077
2000	7.0	24.4	62.8	2.1	3.8	100	3110
2001	6.9	24.0	63.2	2.0	3.8	100	3175
2002	6.9	23.7	63.6	1.9	3.8	100	3221

Notes: The table shows the composition of the workforce in terms of the five employee categories in percentages. The absolute number of employees is displayed in the rightmost column.

Source: Personnel records of the firm, authors' calculations

Table 2 Distribution of components of average real monthly compensation

Year	Monthly Wage	Monthly Bonus	Extra Bonus	Other Bonus	Average monthly compensation
1997	0.830	0.080	0.051	0.039	1.635
1998	0.916	0.059	0.000	0.025	1.559
1999	0.870	0.066	0.043	0.021	1.131
2000	0.854	0.066	0.042	0.038	1.165
2001	0.797	0.081	0.098	0.025	1.315
2002	0.776	0.095	0.088	0.041	1.395

Notes: Monthly bonus is a fixed percentage of the wage, which is not paid out to workers. Extra bonus is a premium paid out to all employees, which depends on the results of the year. Other bonus is paid out to workers only, for special effort and overtime. Monthly wage and monthly bonus are deflated into 1997 constant rubles using an annual average CPI, extra bonus and other bonus are converted into 1997 constant rubles using the CPI price level for December of the corresponding year. Average monthly compensation is given in thousand of 1997 rubles.

Table 3: Real wage growth 1997-2002 by employee category

	Service staff	Engineers	Production workers	Accountants	Managers
	(1)	(2)	(3)	(4)	(5)
Tenure in years	-0.143**	0.013	-0.027**	-0.239	-0.025
	[0.069]	[0.011]	[0.013]	[0.157]	[0.024]
Tenure squared/100 in years	0.982*	-0.082	0.141*	1.683	0.093
	[0.553]	[0.066]	[0.075]	[1.089]	[0.142]
Tenure cube /1000 in years	-0.209	0.015	-0.019	-0.335	-0.008
	[0.134]	[0.012]	[0.013]	[0.231]	[0.025]
Age in years	-0.234	-0.02	0.046	-0.532	0.914*
	[0.148]	[0.033]	[0.055]	[1.170]	[0.468]
Age squared/100 in years	0.55	0.042	-0.103	1.08	-1.978*
	[0.348]	[0.076]	[0.132]	[2.834]	[1.029]
Age cube /1000 in years	-0.042	-0.003	0.007	-0.071	0.141*
	[0.027]	[0.006]	[0.010]	[0.225]	[0.075]
Basic professional	0.058	-0.460***	-0.018		
	[0.050]	[0.146]	[0.023]		
Secondary general	0.004		-0.001		
	[0.052]		[0.019]		
Secondary professional	0.057	-0.012	0.028	0.172	-0.066
	[0.063]	[0.026]	[0.024]	[0.447]	[0.068]
Higher incomplete	-0.029		0.053	-0.011	
	[0.235]		[0.103]	[0.813]	
Higher	0.125	-0.005	-0.039	0.337	-0.025
	[0.163]	[0.026]	[0.047]	[0.483]	[0.068]
1 if female	-0.036	0.006	-0.111***	-0.29	-0.015
	[0.041]	[0.011]	[0.021]	[0.427]	[0.028]
1 if single	-0.247	0.031	0.139		
	[0.230]	[0.075]	[0.087]		
1 if divorced or widowed	-0.101*	-0.016	-0.025	-0.441**	0.002
	[0.056]	[0.029]	[0.026]	[0.192]	[0.028]
1 if 1 child	-0.066	-0.028	0.232***	0.067	-0.013
	[0.051]	[0.035]	[0.073]	[0.166]	[0.020]
1 if more than 1 child		-0.012	0.219***		
		[0.039]	[0.074]		
Position in employee category specific wage distribution:					
1st decile	0.617***	0.403***	0.674***	0.466	0.419***
	[0.085]	[0.022]	[0.032]	[0.294]	[0.041]
2nd decile	0.287***	0.213***	0.270***	0.264	0.278***
	[0.080]	[0.022]	[0.029]	[0.275]	[0.047]
3rd decile	-0.037	0.161***	0.202***	-0.003	0.254***
	[0.082]	[0.022]	[0.034]	[0.363]	[0.043]
4th decile	0.259***				
		0.085***	0.137***	0.052	0.103**
	[0.088]	[0.022]	[0.030]	[0.286]	[0.043]
6th decile	-0.083	-0.087***	0.086**	0.107	-0.147***
	[0.083]	[0.023]	[0.035]	[0.310]	[0.045]
7th decile	-0.314***	-0.140***	-0.033	-0.175	-0.116***
	[0.084]	[0.022]	[0.031]	[0.262]	[0.043]
8th decile	-0.550***	-0.186***	-0.162***	-0.043	-0.123***
	[0.085]	[0.023]	[0.034]	[0.344]	[0.039]
9th decile	-0.621***	-0.189***	-0.086***	0.042	-0.158***
	[0.084]	[0.022]	[0.030]	[0.274]	[0.050]
10th decile	-0.761***	-0.287***	-0.241***	-0.096	-0.268***
	[0.084]	[0.023]	[0.032]	[0.295]	[0.044]
Constant	4.054*	0.224	-1.018	8.929	-14.044**
	[2.070]	[0.438]	[0.733]	[16.054]	[7.005]
Observations	151	611	934	36	92
R-squared	0.83	0.75	0.53	0.69	0.9

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Evolution of earnings inequality measured by Gini coefficients

	(1)	(2)	(3)	(4)	(5)	(6)
Panel a: Wages						
Year	Entire workforce	Service staff	Engineers	Workers	Accountants	Managers
1997	0.2801	0.2474	0.2294	0.2507	0.1912	0.1367
1998	0.251	0.1484	0.2239	0.2003	0.1417	0.1082
1999	0.2453	0.0853	0.1954	0.1854	0.1267	0.1202
2000	0.2456	0.0649	0.1786	0.1945	0.1705	0.072
2001	0.2189	0.055	0.1679	0.1792	0.1583	0.0438
2002	0.1995	0.1618	0.1437	0.1725	0.1409	0.0482
Panel b: Total compensation						
Year	Entire workforce	Service staff	Engineers	Workers	Accountants	Managers
1997	0.2928	0.2416	0.2293	0.2456	0.1903	0.1488
1998	0.2547	0.1474	0.2248	0.2015	0.1423	0.1077
1999	0.2444	0.0855	0.1964	0.1823	0.131	0.1202
2000	0.2464	0.0669	0.1792	0.1972	0.1787	0.073
2001	0.2271	0.0684	0.1681	0.1778	0.1696	0.0447
2002	0.2211	0.162	0.1455	0.1845	0.1454	0.0484

Source: Personnel data base, own calculations.

Table 5 Hiring and Separation Rates (in %) 1997 – 2002 in our firm

<i>Year</i>	<i>In</i>	<i>Out</i>	<i>Total</i>
1998	10.9	12.6	23.5
1999	11.5	11.2	22.7
2000	11.2	9.8	21.0
2001	10.2	7.5	17.7

Source: Personnel data base, own calculations.

Table 6 Hiring and Separation Rates (in %) 1998 – 2001 in sample of regional firms

<i>Year</i>	<i>In</i>	<i>Out</i>	<i>Total</i>
1998	10.9	12.6	23.5
1999	11.5	11.2	22.7
2000	11.2	9.8	21.0
2001	10.2	7.5	17.7

Source: CERT Russian regional data base, own calculations.

Table 7: Differences between average wages in firm and average wages in sample of industrial firms in the region in 1997 rubles: 1998-2002

<i>Year</i>	<i>Service workers</i>	<i>Engineers</i>	<i>Workers</i>	<i>Accountants</i>	<i>Managers</i>
1998	100	133	379	792	1468
1999	346	391	803	805	1898
2000	123	-28	261	223	1056
2001	81	-82	195	279	805
2002	-61	-24	119	150	551

Source: Personnel records of the firm, CERT Russian regional data base, own calculations.

Table 8 – Earnings and segregation into levels of production workers by gender for 2002

	Males		Females	Gap
Auxiliary 1	n.a.		0.459	n.a.
			(0.118)	
Auxiliary 2	n.a.	[1.00]	0.642	n.a.
			(0.218)	
Auxiliary 3	0.738	[1.00]	0.726	0.012
	(0.172)		(0.143)	(0.029)
Auxiliary 4	0.796	[0.85]	0.795	0.001
	(0.154)		(0.159)	(0.059)
Auxiliary 5	1.028	[0.90]	1.020	0.008
	(0.147)		(0.128)	(0.021)
Auxiliary 6	1.260	[0.83]	1.267	-0.007
	(0.475)		(0.335)	(0.324)
Primary 1	0.466	[0.67]	n.a.	n.a.
	(0.075)			
Primary 2	0.803	[0]	0.857	-0.054
	(0.205)		(0.146)	(0.065)
Primary 3	1.053	[0.04]	1.143	-0.090
	(0.248)		(0.207)	(0.056)
Primary 4	1.284	[0.04]	1.131	0.153***
	(0.223)		(0.343)	(0.056)
Primary 5	1.429	[0.08]	1.326	0.103*
	(0.148)		(0.153)	(0.062)
Primary 6	1.605	[0.03]	n.a.	n.a.
	(0.153)			
Primary 7	1.622	[0]	n.a.	n.a.
	(0.167)			
Primary 8	1.630	[0]	n.a.	n.a.
	(0.035)			

Notes: "Auxiliary" and "primary" refer to the hierarchical job levels of production workers in the firm. The table reports unconditional means (and their standard deviations) of monthly wages in each level by gender, differences of these means (and their standard errors) across gender and the proportion of women in each level [in square brackets]. * difference is significant at 10%; *** difference is significant at 1%.