Employer Size Effects in Russia

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Abstract

As early as 1911, Henry L. Moore documented that the wages of female textile workers in Italy were higher in larger establishments. In the last thirty years a large number of studies have demonstrated the presence of employer size-wage effects (at both the plant and firm level) in numerous different countries and across different time periods.   This paper analyzes the labor market effects of employer size in Russia during the years 1994-98. Using the Russian Longitudinal Monitoring Survey, a four year nationally representative panel of the Russian population, I investigate the relationship between enterprise size and the characteristics of employees, wage levels and wage growth, on-the-job training, tenure and turnover. My findings indicate that employer size effects in Russia exhibit similar characteristics to those observed in the U.S. and a variety of other countries.

Introduction

Employer size-wage effects are pervasive, spanning countries with widely divergent institutional structures and at different states of economic development. Studies based on U.S. data are most extensive (see Oi and Idson, 1999), though detailed empirical analyzes have also been carried out for Japan (Hashimoto and Raisian, 1985; Idson and Ishii, 1992), South Korea (Park, 1981), Germany (Schmidt and Zimmermann, 1991; Winter-Ebmer, 1994), France (Abowd, et al., 1994), England (Francis, et al., 1992; Main and Reilly,1993), Italy (Loveman and Sengenberger, 1991), Sweden (Edin and Zetterberg, 1992), Canada (Simpson, 1984), Austria (Oosterbeek and van Praag, 1993), India (Little, et al., 1987), Ghana (Teal, 1996) Guatemala (Funkhouser, 1997), Peru (Schaffner, 1995), Columbia (Cortes, et al., 1987), and Zimbabwe (Velenchek, 1997). Studies have also documented that jobs in larger firms are more durable and that there are distinct differences in the characteristics of employees, in addition to numerous other empirical regularities. This paper attempts to contribute to this literature by investigating the labor market effects of employer size in Russia during the years 1994-98. The empirical analysis focuses on the relationship between enterprise size and characteristics of employees, wage levels, wage growth, on-the-job training, tenure and turnover.

Besides adding to the list of country studies showing that the size-wage effect is indeed ubiquitous, why is it interesting to study employer-size wage effects in Russia? The Russian setting provides us with certain advantages. Firm size at the time of liberalization was largely determined by central planners' decisions that had a strong political element. As such, size can be taken as exogenous with respect to productivity (Svejnar, 1999). It may well be that size in Russia tends to be correlated with low productivity characteristics such as state ownership, age, certain products and technologies, communist grandiosity, need for restructuring, and so forth, so that we might expect that the simple correlation between wages and size in Russia will be negative. In fact, given that we can only control (imperfectly) for some of these characteristics, we may be hard pressed to find a positive profile no matter what we statistically take into account. Furthermore, many of the newer, smaller firms (de novo firms) in Central and Eastern Europe tend to pay higher wages (Svenjar, 1999), so that if this is true in Russia then it further calls into question whether or not a positive size profile in wages will be evident.

One way of thinking about this is that the standard menu of explanations for the employer-size wage effect are concerned with explaining the long-run market equilibrium in which employer size is an endogenous variable, yet Russia is evidently not as of yet in such an equilibrium. Hence, the wage structure may provide information on the 'true' wage-size profile once endogeneity in the size distribution is removed. As such, the quasi-experimental setting may provide additional leverage to assess possible explanations for employer size effects.

The paper is organized as follows. Section 1 discusses reasons for the observed effects of employer size on selection of employees, wages, training, and employment durability. Section 2 reports the results of the empirical analysis which focuses on the relationship between enterprise size and characteristics of employees, wages, wage growth, on-the-job training, tenure and turnover. Section 3 summarizes the results and suggests directions for future research.

1. Why are there Employer Size Effects?

Explanations for a positive association between employer size and wages may be grouped into those emphasizing the presence of rents and efficiency wages and those that focus on differential productive attributes of employees. Does the size-wage premium reflect true size effects accruing to workers lucky enough to secure employment in large firms, i.e. a treatment effect such as might be expected from on-the-job training, rent sharing, or efficiency wage payments? Alternatively, to what extent are they the result of selectivity in hiring and hence reflect the worker's pre-employment productive attributes (e.g., education, intelligence, dexterity, and so forth), in which case large firm workers would simply be reaping the returns to their higher productivity and firm size simply represents a sorting of the better workers into higher productivity employment settings? Of course, hiring selectivity by large firms may be predicated on their desire to provide higher levels of on-the-job-training with resulting treatment effects, so that the two sources of wage differentials are also conceptually connected.

There are a number of reasons why the returns to selecting high quality workers will be greater in large than in small firms. Large firms have higher (and more frequent) investments in physical capital, resulting in higher levels of complementary investments in skilled labor both at the point of hire and through a process of recurrent on-the-job training (Hamermesh, 1980). Furthermore, large firms have an inherent advantage over small firms in creating long-term

employment relationships due to their lower failure rates and their ability to provide employees with a greater opportunity for career growth within the firm. The resulting longer expected duration of employment with the firm raises the expected value of on-the-job training investments (Idson, 1996). As such, large employers will seek to hire workers with a strong capacity for learning and will be willing to pay a higher price for these talents than would smaller firms.

The size-wage differential may therefore be sustained even in a competitive equilibrium because the higher returns to large firms from employing more able workers results in unit labor costs that may be the same or lower than that in small firms. That is, large firms may cost minimize by paying a wage premium in order to attract higher quality labor (assuming that the supply of quality labor to large firms is upward sloping) and as a device to protect their search and on-the-job training (OJT) costs. Similarly, rents resulting from efficiency wage payments in large firms may similarly be cost minimizing to the extent that direct monitoring is more costly (Oi, 1983; Garen, 1985).

As noted above, a largely exogenous size distribution of business firms represents a potentially fruitful environment to investigate select explanations of size effects. Specifically, if firms tend to grow large due to some unobservable productivity attributes, such as extraordinary talent in the upper managerial ranks (Oi, 1983)[1], then selection of a complementary high quality labor force and resulting higher wages in larger firms would ultimately be derivative from at least partly unobservable attributes of the enterprise that generated the existing size distribution. Alternatively stated, the size-wage effect may be less reflective of true size effects than some unobservable enterprise attributes that are correlated with size. This effect may be less pronounced in the Russian setting due to the largely exogenous size distribution. Although, unobservable productivity factors among workers may still be present if managers react to size-specific advantages (such as a comparative advantage at creating internal labor market, economies of scale in the provision of on-the-job training, and so forth; see Idson, 1996) and disadvantages (such as monitoring difficulties, see Garen, 1984) in the organization of production and hiring of employees (in addition to the possible use of incentive wage profiles to stimulate productivity, resulting in steeper wage profiles). Studying the size-wage effect in

Russia may therefore provide insights into the productivity hypothesis (Idson and Oi, 1999). In subsequent work we will use information from the Registry of Industrial Firms to directly measure productivity by establishment size and relate this to the size-wage structure.

2. Empirical Analysis

The empirical analysis uses the Russian Longitudinal Monitoring Survey (RLMS), a four year nationally representative panel (1994-98) of Russian households. The RLMS has currently gone through two phases, each phase consisting of a different sample of households each member of which was interviewed. Phase I had four rounds of interviews conducted during 1992 and 1993; Phase II involved four rounds, Rounds V-VIII, each fielded in the fall of 1994, 1995, 1996, and 1998 respectively. The survey contains detailed information on demographic and employment characteristics by occupation and job location of men and women. Although the RLMS began in 1992, our analysis is restricted to the 1994-98 period because information on employer size only became available in Phase II of the survey.

The measurement of employer size is a thorny issue. The question used from the RLMS to create the employer size variable is: "How many people work in your enterprise? If you don't know exactly, estimate." It is not obvious if respondents believe that this question refers to establishment (plant) size or to firm (company) size. Furthermore, some people may be responding in reference to the department where they work (i.e., kindergartens or shops that belong to a firm). Regardless, respondents have only the imperfect knowledge regarding exactly how many people work at their plant, much less at their firm in the case of multiplant firms. The most that can be said is that this problem pervades employer size studies in all countries and should not necessarily be more problematic in Russia than in other countries. In ongoing research with John Earle and Klara Sabirianova I will be using data on enterprise size from a survey of industrial firms to create an alternative measure of employer size that will hopefully be subject to less measurement error. Furthermore, we will use this data to analyze the employer size effect in connection with firm and regional performance (privatization and ownership, productivity, profitability, hiring policy, local labor conditions, etc.), and to look at the size-

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[1] Oi (1983) develops an explanation of the size-wage effect that is predicated on the Lucas (1967) model of the size distribution of firms where larger firms are a reflection of higher quality top managers.

turnover relationship based on more accurate measures of job mobility than those available in the RLMS.

Employee Characteristics

As has been found in the U.S. and a wide array of other countries, we see in the first two rows of Table 1a that, on average, both wages and the length of employment (tenure) increase with enterprise size. Furthermore, the size patterns in employee attributes are largely consistent with those found in the U.S. (see Barth, et al., 1987) with the exception of the inverted U-shaped education profile which generally increases monotonically with firm size in U.S. data. The decline in percentage female is stronger than in the U.S., possibly due to traditional gender employment patterns across industries which have different average size firms, suggesting that size effects may systematically differ by gender. In fact, higher training investments found in large firms would tend to predict a decline in female employment, though labor force participation for women tends to be very high and continuous in Russia (although work schedules for women tend to be more flexible, patterns that may be at variance with the relatively regimented work schedules of larger firms). Declining starting age is similarly consistent with higher desired training investments in larger firms. We do see, though, in the last two rows that on-the-job training in the current profession is lower in the smallest size firms, but does not appear to exhibit a pattern by size for enterprises larger than 25 employees (similarly, there appears to be no size pattern in training outside of the current profession).

Wage Arrears

One problem with using reported earnings data is that wage arrears have plagued the Russia economy during this period (see Earle and Sabarianova, 1998; Desai and Idson, 2000). As such, an estimate of outstanding wage debt must be taken into account in order to get a measure of contracted wages. Making this correction may not be particularly important when studying employer size effects on wages if wage arrears do not systematically vary with enterprise size, but if arrears are greater (smaller) in larger enterprises, then this will act to downwardly (upwardly) bias estimates of the size-wage effect if we simply use reported wages.

The RLMS asks a series of questions concerning wage arrears. My measure of the *incidence* of wage arrears is a dummy coded =1 for an affirmative response to the question:

> "At the present time, does your place of work owe you any
> money, which for various reasons was not paid on time?"

Household members who said that they were currently owed unpaid wages were then asked:

> "How much money in all have they not paid you?"

The *amount* of outstanding wage arrears is then calculated from this question and converted into constant December 1995 rubles.

We see in Table 1b that both the likelihood of having some portion of wage withheld, and the real ruble amount withheld conditional on facing arrears, was higher in larger enterprises. In the analysis of size-wage effects that follows I approximate the contracted monthly wage by using responses to the question:

> "How much money in the last 30 days did you
> receive from your primary workplace after taxes?"

This measure of actual pay will understate contracted wages by the wage arrears incurred during the past 30 days. I therefore approximate contracted wages as actual wages paid plus an estimate of the monthly outstanding wage obligations by the employer, the latter calculated as the cumulated nonpayments divided by the number of months for which these wages were owed.[2] (This wage variable was used in Table 1a and all subsequent tables.)

Wage Levels

Given documented differential labor market treatment of men and women (…) and the strongly declining employment share of women with enterprise size, we estimate all relationships that follow separately for men and women. Table 2a reports estimates of the effect of enterprise size on wage levels. We see that the positively sloped size-wage effect is evident in Russia for both men and women, and is generally similar in magnitude to U.S. effects (see Mellow, 1983; Brown and Medoff, 1989, Idson and Oi, 1999). Unstandardized size effects, reported in columns

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[2] This procedure will admittedly be subject to measurement error in that we do not know the amount of the outstanding cumulated debt which was incurred in the past 30 days.

(1), are similar for men and women, although slightly stronger for women than for men; men in enterprises of 1,000 or more employees earn, on average, 42 percent[3] more than workers in establishments with less than 25 employees, while for women the comparable earnings differential is 45 percent. When controls for the standard group of suspects are introduced in columns (2), we see that the largest size effect falls by 11 percent for men resulting in a 36 percent standardized effect. For women, the large size effect falls by 33 percent, resulting in a 28 percent standardized effect. These finding are consistent with greater selectivity by large firms along the dimension of observable productivity attributes for women relative to that occurring for men, suggesting the possibility of greater rents associated with the size-wage effect for men than for women. In fact, these patterns of possible greater selectivity of women (than men) by large firms is consistent with the combination of weaker full-time labor force attachment by women and a greater desire of large firms to create long term employment relationships with attendant higher levels of on-the-job training (see Idson).

The systemic variation in employee attributes by enterprise size seen in Table 1 suggests that the distribution of employees across different size enterprises is nonrandom, and that sorting by size may be dictated by both observable and unobservable attributes. As such, the size-wage effects reported in Table 2a may suffer from selectivity bias. Furthermore, the differential effects of standardization for men and women suggest that selectivity corrections may operate differently by gender. Table 2b reports estimates of the size-wage effect using a full information maximum-likelihood Heckman sample selection procedure, which provides consistent estimates of β and α below. Specifically, the following treatment effects model is estimated (see Barnow, Cain, and Goldberger, 1981):

$$\ln W_{it} = X_{it}\beta_i + \alpha_i S_{it} + \varepsilon_{it} \tag{1}$$

$$S_{it} = 1 \quad \text{if} \quad Z_{it}\gamma_i + \nu_{it} > 0 \tag{2}$$

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[3] These calculations use the formula $e^{\beta}-1$, where β is the estimated coefficient.

where S is the treatment (i.e., enterprise size) dummy variable[4], X is the vector of explanatory variables in the wage regression, Z is the regressor vector for the employer size selection variable which are thought to determine whether the worker is employed in a large firm or not (i.e., assigned treatment or not), and ε and ν are the errors in the wage and selection equations, respectively, where $\varepsilon \sim N(0, \sigma)$ and $\nu \sim N(0, 1)$.

The system is identified by inclusion in the selection (but not the wage regression) regression variables that may affect the allocation of workers across different size firms but which may not directly affect wages. Specifically, in addition to many of the variables in the wage regression, the selection regression additionally includes a dummy indicating that the respondent had been divorced (current marital status is included in the wage regression) and a dummy indicating that the individual is a smoker (a dummy for the presence of any current health problems is included in the wage regression); details are available on request. The logic behind these identifying assumptions is that larger firms have a greater interest than smaller firms in selecting workers with attributes that signal a greater likelihood that the worker will remain with the firm, thereby facilitating long-term employment relationships and concomitant on-the-job training and career growth.

Looking at the results we observe an intriguing pattern of selectivity - significant selection effects are present for both men and women as evidenced by the significant coefficients on the truncated mean terms (λ). As is well-known (Heckman, 1979), the sign of the estimated coefficient on the truncated mean term is determined by the covariance of the errors in the selection and wage regressions, i.e. $cov(\varepsilon,\nu)$. The negative coefficient on λ for men indicates negative selection for men, a finding consistent to that found by Idson and Feaster (1990) for U.S. males. This means that a random reallocation of workers across different size firms would actually increase the size-wage effect, resulting in the larger selectivity corrected estimate of the size-wage effect in (2) than that found from simple cross-sectional estimates in (1). For women we find positive selection, with the result that the selectivity corrected size wage effect in (2) is smaller than the simple OLS estimates in (1), although it is surprising that the selectivity

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[4] In the results reported in Table 2b large firm in the first stage probit is defined as the top size category of 1,000 or more employees (results for the first stage probits are available on request). Similar results were found when we defined large as greater than or equal to 500 employees (see Idson and Feaster, 1990, for a selectivity analysis of employer size effects using an ordered probit selection criteria).

corrected estimate for women is significantly negative. While only speculative, this pattern of selection would be consistent with larger enterprises awarding many jobs to men based on factors other than those related to productivity, possibly due to party loyalty or simple cronyism. For women, on the other hand, to get these jobs their weaker political ties and networking meant that they needed to demonstrate, on average, greater productive ability.

Wage Growth

Evidence on the relationship between size and wage growth is uneven; cross-sectional studies in the U.S. (Pearce, 1990) tend to find steeper profiles in larger firms, longitudinal studies finding flatter or similarly sloped profiles (Holtmann and Idson, 1995). Cross-sectional patterns are evaluated by introducing a series of interactions between the enterprise size dummies and job tenure. These results, reported in the first two columns of Table 3, weakly confirm the U.S. finding of steeper wage growth for men in larger enterprises, yet for women no enterprise pattern in wage growth is evident. In other words, for men it seems that wages rise with seniority at a faster rate in larger enterprises than in smaller enterprises, yet for women the returns to seniority do not seem to differ by enterprise size.

We additionally assess the relationship between size and wage growth by using a longitudinal measure of wage changes, i.e. wage changes for the same individual across survey years for those people who remained with the same firm across survey years. The dependent variable is thus the change in (ln)wages between adjacent survey years, i.e. (percentage) wage growth between 1994 and 1995, between 1995 and 1996, and between 1996 and 1998. Furthermore, the regressors are all measured at the point of the initial year for each wage change. Initial year wage levels are included as a regressor in order to capture the effect of general convexity in wage growth profiles (size-wage growth profiles are generally found to be flat when year 1 wage levels are not included). We see (in the last two columns of Table 3) that year-to-year wage growth does not exhibit a size profile for men, yet women exhibit a monotonic increase in wage growth with enterprise size, albeit only a significantly higher rate of growth in the largest size enterprise. These differential cross-sectional and longitudinal patterns in wage growth by gender are somewhat unexpected. It may be the case, though, that since the transition began larger firms have upgraded their new hiring of women relative to men thereby acting to

flatten the cross-sectional size pattern in wage growth for women relative to that for men. Future work will evaluate this possibility by looking at changes over time in relative wages by gender in different size enterprises.

On-the-Job Training

Given the higher physical capital intensity of larger firms we would expect higher complementary investments in human capital through on-the-job training. Furthermore, longer expected duration of the employment relationship yields higher expected returns from specific human capital investments to both employers and employees, leading to higher optimal investment levels. Evidence of a positive association between employer size and on-the-job training (OJT) has been found in the United States (see Barron, et al., 1987; Holtmann and Idson, 1991). It is particularly important to understand the relationship between enterprise size and training as any sources of post-secondary training in the nascent labor markets of transitional economies are potentially vitally important to skill formation and productivity growth. The RLMS provides two measures of OJT for the years 1995, 1996 and 1998 (see Earle and Sabirianova, 2000 for additional analysis of these training measures):

> "During the last 3 years were you or are you studying
>   additional courses in your current profession, field?"

and

> "In the course of the last 3 years were you or are you
>   studying only courses where you studied some other
>   profession, field, foreign languages"

The former question (TRAIN1) may be interpreted as training which is directed toward increasing productivity on the current job, while the latter question (TRAIN2) is less likely to be productivity enhancing in the current job. I would therefore predict that workers in larger firms are more likely to take TRAIN1 type courses, although not necessarily more likely to take TRAIN2 type courses.[5]

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[5]Although for these latter courses there may still be a positive size effect to the extent that these courses enhance productivity through promotions or simply facilitate job reassignment within the same firm.

Table 4 reports probit estimates of the relationship between enterprise size and the likelihood that an employee engaged in additional training. We observe positive size effects on the incidence of training related to the current job (TRAIN1) for both men and women, although the effect for women occurs in the 500-999 size group but not the 1,000+ category. As for more professionally general training (TRAIN2), for men we observe a higher incidence in larger enterprises, although the effect is relatively constant between the two largest size groups. No effect is observed for women, possibly indicating their lower likelihood of undertaking costly job search. In fact, the significantly negative effect in the 500-999 category may reflect this posited behavior, especially when viewed in conjunction with the higher levels of current job-related training in this size category, shown in column (3).

Tenure

Jobs in larger firms are more durable, with average current (not completed) tenure increasing monotonically with size in the U.S. (see Rebitzer, 1986). We see in Table 1a that on average, employees in large firms (1,000 or more employees) have been employed with their current employer for nearly five more years than workers in firms with 1-24 employees. Table 5 reports estimates of the relationship between enterprise size and tenure for men and women. We see that average tenure for men exceeds that of women in all size enterprises, and that the size-tenure effects is positive and significant for both men and women with a stronger effect for men than for women. Since tenure is measured as years employed by the current enterprise, we see that men in enterprises of size 1,000 or more employees had, on average, approximately six and one-half years more tenure than men in enterprises of less than 25 employees; women in the largest enterprises had approximately three more years of tenure then women in the smallest size enterprises. We also see that the vector of controls explains approximately 29 percent of the average large size tenure differential, while for women the controls account for approximately 39 percent of the average size-tenure differential.

Turnover

Consistent with higher average tenure levels in larger enterprises, studies have shown (Brown and Medoff, 1989; Idson, 1996) that both voluntary (quits) and involuntary (layoffs) turnover is lower in larger plants and firms. Unfortunately the RLMS does not include an

employer identifier which makes it difficult to determine whether or not a respondent has changed employers across survey years. One approach to approximating turnover would be to code a change of employer based on a decrease in tenure over adjacent surveys, although problems of measurement error in tenure including possible confusion relating to tenure with the employer versus on a particular job assignment make this a questionable approach. As an alternative, I use the following question asked in the 1996 and 1998 RLMS to code an employer change dummy:

> "Tell me, please, did you change your place of work
> or profession by comparison with December of last year?"

The results of this analysis are reported in Table 6. We see in columns (1) that for men and women, the likelihood of changing employers is smaller in larger enterprises, although the relationship is not monotonic. When we control for individual attributes, region of residence, industry of employment, and other relevant factors the inverse size-turnover relationship persists for men even though the largest enterprise size effect falls by approximately 29 percent. For women the largest enterprise size effect fall to a level of insignificance, but the 500-999 enterprise size category remains significantly negative (as do the other intermediate size categories). Hence, we do observe significant variations in turnover by size, and more so for men, the greatest inhibitions to turnover appear in the 500-999 group. It is not clear why the 1000+ group does not have the strongest negative effect on turnover, as in the U.S., but it might be the case that employment contractions during the transition (i.e., during this period of analysis) among the largest firms may have increased layoffs above their normal levels (relative to those at smaller enterprises) thereby acting to mitigate an otherwise significantly negative relationship to turnover likelihood.

Changes over Time

Have any of these relationships between labor market outcomes and enterprise size changed over time? Although the time period for my analysis is rather short, possibly too short to allow for much change in established practices, changes over time may contain some useful information. Specifically, if large firm workers were earning higher wages under the Soviet

regime due to rents (not, though, relating to efficiency wage payments), then the introduction of market forces should act to reduce the size-wage effect over the course of the transition. It might, though, be the case that any rents were dissipated by 1994, so that over the 1994-98 period we would not see a decline, yet this would still mean that the size-wage effect evident in 1994 would not be due to rents per se. If, on the other hand, the size-wage effect was predicated on productivity difference between large and small firm workers, then there is no reason to expect a decline over time. In fact, depending on the rate of adoption of technology and growth rates in different size firms over the period, we might predict either an increase or a decrease in the size-wage effect over time.[6]

My evidence on changes over time in size effects is only very preliminary at this juncture. I have run specifications similar to those reported in the text, but included interactions of the year and enterprise size dummies in order to evaluate changes over the 1994-98 period in the various size effects. No significant change is found in the size-wage profile for either men or women, yet I do find evidence that the positive relationship between size and tenure weakened over time for men but not for women. This latter result would be consistent with larger firms reacting to market pressures by dismissing male workers who may have been earning rents, or might simply reflect a relative decline in large firms that employ a disproportionate share of male workers. The relationship between wage growth and enterprise size does not seem to exhibit a trend. There is evidence that while there is no overall trend in on-the-job training (TRAIN1) over the 1995-98 period, for men TRAIN1 did significantly increase in larger firms relative to that in smaller firms (no pattern in found for women). Further analysis of trends in size effects, especially broken down by sector, region, and skill groups, is an important direction for future analysis.

3. Conclusions and Directions for Future Research

The empirical analysis demonstrates that employer size effects on wages, tenure, and training are clearly in evidence in Russia during the transition, and are present for both men and women. Given the largely exogenous size distribution in Russia, these findings suggest that it may well be the case that size per se causes variations in selectivity of employee and personnel practices within the firm that produce size effects, rather than larger firms possessing certain

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[6] See Idson and Oi (2000) for evidence that the size-wage effect has increased over time in the U.S. due to skill-

unobserved attributes, such as more talented managers who built up the larger enterprise and therefore structure work in conjunction with costs and benefits associated with these unobservables.

In future work I plan extend this analysis with firm-specific data in the ways noted in the paper, in addition to moving the empirical work in two main directions. First, the selectivity corrected size-wage effects will be estimated using an ordered probit selection criteria estimated by maximum likelihood jointly with the wage equations (see Idson, Munasinghe, and Barr, 2000). Second, fixed effects estimates will be estimated, both using the RLMS and the potentially superior information on mobility in establishment based data, and compared to the cross-sectional estimates in order to further investigate the presence of true size effects on wages (see Krueger and Summers, 1988; Gibbons and Katz, 1992).

The relationship between enterprise size and enterprise age needs to be addressed in detail. Studies in the U.S. (Brown and Medoff, 1997) indicate a positive relationship between age and wages, and a persistently positive and significant size-wage effect even when controls are present for firm age. In the RLMS initial regressions (available on request) of wages on enterprise age reveal a significantly negative relationship, at variance with the U.S. patterns. Enterprise age, though, in Russia no doubt reflects very different factors than in the United States. In the U.S. it has been speculated that older firms have survived, on average, due to productivity related factors that allow them to survive in relatively competitive markets, therefore forming the basis for the observed positive age-wage effect.

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biased technical change.

Table 1a
Enterprise Size Patterns (1998)

	1-24 (625)	25-99 (784)	100-499 (745)	500-999 (212)	1000+ (377)
Monthly Wage	475,537	488,733	593658[a]	693,658[a]	667,524[a]
Tenure	5.51	7.46[a]	8.81[a]	10.86[a]	10.29[a]
Employment Distribution	22.79	28.58	27.16	7.73	13.74
Percentage Female	61.26	59.94	50.74[a]	47.17[a]	46.68[a]
Age	37.31	38.79[a]	40.83[a]	42.08[a]	39.70[a]
Starting Age	31.63	30.89	31.93	31.05	29.24[a]
Education	12.57	12.89[b]	12.87[b]	13.14[a]	12.95[a]
OJT, Current Profession	8.03	13.79[a]	15.46[a]	14.62[a]	13.53[a]
OJT, Other Profession	4.01	3.45	4.31	2.84	3.99

Notes: Sample sizes are listed in parentheses below each enterprise size category.
Superscripts a and b denote significant differences at the 1% and 5% levels between the value for the variable in a given size group and the 1-24 size group.

Table 1b
Wage Arrears Patterns by Enterprise Size

	Incidence of Nonpayment		Amount of Nonpayment	
	(1)	(2)	(1)	(2)
25-99	0.1089[a]	0.0252	0.3159[a]	0.1777[a]
	(0.017)	(0.020)	(0.078)	(0.072)
100-499	0.1476[a]	0.0635[a]	0.5032[a]	0.2078[a]
	(0.018)	(0.021)	(0.077)	(0.074)
500-999	0.1237[a]	0.0607[b]	0.6089[a]	0.2552[a]
	(0.026)	(0.030)	(0.098)	(0.096)
1000 +	0.2000[a]	0.1323[a]	0.6285[a]	0.2977[a]
	(0.021)	(0.027)	(0.088)	(0.096)
R^2	0.0477	0.1076	0.0742	0.2654

Notes: Regression estimates of enterprise effects are reported with robust standard errors in parentheses.

The incidence regressions are estimated by maximum likelihood probit (slopes estimates are reported). The dependent variable is a dummy=1 if the respondent experienced wage nonpayment during the survey year.

The amount regressions are estimated by OLS for the subset of respondents who indicated that they experienced wage nonpayment during the survey year. The dependent variable is the log of the cumulative real ruble amount owed.

Superscripts a and b denote significance at the 1% and 5% levels. All regressions additionally contain a constant and three year dummies. Specifications (2) additionally include a gender dummy, tenure and a quadratic in experience, six education dummies, seven region dummies, twenty industry dummies, and eight occupation dummies.

Table 2a
Size-Wage Level Patterns

	Men (3,101)		Women (4,207)	
	(1)	(2)	(1)	(2)
25-99	0.0620	0.0691	0.0746^c	0.0447
	(0.059)	(0.053)	(0.041)	(0.035)
100-499	0.2150^a	0.1814^a	0.2392^a	0.1460^a
	(0.059)	(0.053)	(0.043)	(0.038)
500-999	0.3478^a	0.2526^a	0.3764^a	0.2481^a
	(0.074)	(0.066)	(0.066)	(0.062)
1000 +	0.3476^a	0.3083^a	0.3684^a	0.2469^a
	(0.063)	(0.060)	(0.055)	(0.053)
R^2	0.0530	0.2796	0.0584	0.2963
F-statistic	11.77	8.49	18.67	8.09

Notes: All regressions additionally contain a constant and three year dummies. Specifications (2) additionally include a gender dummy, tenure and a quadratic in experience, six education dummies, seven region dummies, twenty industry dummies, and eight occupation dummies. Superscripts a, b and c denote significance at the 1%, 5% and 10% levels, respectively. The F-statistic is for a test of joint significance of the employer size dummies.

Table 2b
Selectivity Corrected Size-Wage Effects

	Men		Women	
	(1)	(2)	(1)	(2)
1000 +	0.1928[a]	0.7306[a]	0.1744[a]	-0.5741[a]
	(0.045)	(0.177)	(0.044)	(0.177)
λ	-	-0.3123[a]	-	0.4102[a]
		(0.097)		(0.096)

NOTES: see notes to Table 2a
All regressions additionally include a constant, three year dummies, a gender dummy, tenure and a quadratic in experience, six education dummies, seven region dummies, twenty industry dummies, and eight occupation dummies. Specifications (1) are not corrected for selection, specifications (2) are selectivity corrected effects. The last row reports the estimated coefficient on the truncated mean term (λ).

Table 3
Size-Wage Growth Patterns

	Cross-Sectional		Longitudinal	
	Men	Women	Men	Women
25-99	0.0871	0.0562	0.0118	0.0627
	(0.064)	(0.047)	(0.082)	(0.047)
(25-99) x tenure	-0.0018	-0.0010	-	-
	(0.007)	(0.004)		
100-499	0.1645[a]	0.0722	-0.0680	0.0635
	(0.065)	(0.050)	(0.084)	(0.054)
(100-499) x tenure	0.0038	0.0082[b]	-	-
	(0.007)	(0.004)		
500-999	0.1520[c]	0.1751[b]	0.0363	0.0821
	(0.087)	(0.087)	(0.096)	(0.087)
(500-999) x tenure	0.0126	0.0074	-	-
	(0.008)	(0.007)		
1000 +	0.2141[a]	0.2430[a]	-0.0070	0.1258[c]
	(0.076)	(0.070)	(0.090)	(0.076)
(1000 +) x tenure	0.0113[c]	0.0017	-	-
	(0.007)	(0.004)		
tenure	-0.0008	0.0026	0.0018	-0.0020
	(0.006)	(0.003)	(0.003)	(0.002)
R^2	0.2818	0.2978	0.30221	0.2414
F-statistic	2.20[c]	2.11[a]	-	-

NOTES: see notes to Table 2a.
The dependent variable for the cross-sectional estimates is log monthly wages. The dependent variable for the longitudinal estimates is the change in log monthly real wages for adjacent years (1994-95, 1995-96, and 1996-98). F-statistic is for a test of joint significance of the interaction terms.

Table 4
Size-Training Patterns

	Men		Women	
	Train1	Train2	Train1	Train2
25-99	0.0310	0.0848	0.1303	-0.1697[c]
	(0.110)	(0.146)	(0.088)	(0.105)
100-499	0.1705	0.1861	0.1083	0.0484
	(0.110)	(0.138)	(0.097)	(0.115)
500-999	0.1616	0.4196[a]	0.3360[b]	-0.8114[a]
	(0.151)	(0.176)	(0.141)	(0.276)
1000 +	0.3446[a]	0.3407[b]	0.0908	-0.0054
	(0.128)	(0.166)	(0.129)	(0.150)
R^2	0.0991	0.1174	0.1809	0.1087
F-statistic	9.49[b]	7.88[c]	6.31	13.86[a]

Notes: All regressions are estimated by ML probit (slope estimates are reported) and include a constant, two year dummies, tenure and a quadratic in experience, six education dummies, seven region dummies, twenty industry dummies, and eight occupation dummies. Superscripts a, b and c denote significance at the 1%, 5% and 10% levels, respectively. The F-statistic is for a test of joint significance of the employer size dummies.

Table 5
Size-Tenure Patterns

	Men		Women	
	(1)	(2)	(1)	(2)
25-99	2.0202^a	1.2773^a	1.9245^a	0.7224^b
	(0.415)	(0.372)	(0.399)	(0.339)
100-499	3.6024^a	2.0903^a	3.4785^a	1.4398^a
	(0.436)	(0.407)	(0.440)	(0.373)
500-999	4.9229^a	2.9951^a	4.8332^a	2.7392^a
	(0.639)	(0.571)	(0.676)	(0.590)
1000 +	6.4263^a	4.5464^a	4.9456^a	3.0298^a
	(0.558)	(0.517)	(0.568)	(0.525)
R^2	0.0561	0.3101	0.0391	0.3325
F-statistic	40.96^a	20.60^a	29.14^a	10.88^a

Notes: All regressions are estimated by OLS and include a constant and three year dummies.
Specifications (2) additionally include a quadratic in experience, six education dummies, seven
region dummies, twenty industry dummies, and eight occupation dummies.
Superscripts a and b denote significance at the 1% and 5% levels. The F-statistic is for a test of
joint significance of the employer size dummies.

Table 6
Size-Turnover Patterns

	Men		Women	
	(1)	(2)	(1)	(2)
25-99	-0.0496[c]	-0.0355	-0.0779[a]	-0.0512[a]
	(0.029)	(0.029)	(0.016)	(0.175)
100-499	-0.1161[a]	-0.0802[a]	-0.0757[a]	-0.0523[a]
	(0.026)	(0.028)	(0.016)	(0.019)
500-999	-0.1406[a]	-0.1139[a]	-0.0794[a]	-0.0563[c]
	(0.026)	(0.030)	(0.020)	(0.024)
1000 +	-0.0989[a]	-0.0707[c]	-0.0572[a]	-0.0313
	(0.027)	(0.033)	(0.019)	(0.025)
R^2	0.0201	0.0992	0.0200	0.0973
F-statistic	26.60[a]	11.47[b]	28.17[a]	10.17[b]

Notes: All regressions additionally contain a constant and three year dummies and are estimated by ML probit (slope estimates are reported). Specifications (2) additionally include tenure and a quadratic in experience, six education dummies, seven region dummies, twenty industry dummies, and eight occupation dummies. superscripts a, b and c denote significance at the 1%, 5% and 10% levels, respectively. The F-statistic is for a test of joint significance of the employer size dummies.

References

Abowd, John, Francis Kramarz, and David N. Margolis. "High Wage Workers and High Wage Firms." Working Paper, March 1994.

Baron, J., D.A. Black and M.A. Loewenstein (1987), "Employer Size: The Implications for Search, Training, Capital Investment, Starting Wages, and Wage Growth", *Journal of Labor Economics* 5: 76-89.

Barnow, B., G. Cain, and A. Goldberger. "Issues in the Analysis of Selection Bias." Department of Economics, University of Wisconsin, Madison, 1981.

Barth, J., J. Cordes, and S. Haber. "Employee Characteristics and Firm Size: Are There Systematic Empirical Relationships?" *Applied Economics* (April 1987): 55-567.

G. Becker, *Human Capital*, 2nd edition, The University of Chicago Press, 1975.

Brown, Charles, and Medoff, James. "The Employer Size-Wage Effect." *Journal of Political Economy* 97 (October 1989): 1027-59.

_____. "Firm Age and Wages." Working Paper (1997).

Cortes, M., Berry, A., Ishaq, A. "Success in Small and Medium Size Enterprises: The Evidence from Columbia." World Bank, Oxford University Press, 1987.

Desai, Padma, and Todd Idson. Work Without Wages: Russia's Nonpayment Crisis, MIT Press (forthcoming 2000).

Earle, John S. and Klara Sabirianova. "Understanding Wage Arrears in Russia." Working Paper, (September 1998).

_____. "Job Training in the Russian Restructuring Process," Working Paper (January 2000).

Edin, Per-Anders, and Johnny Zetterberg. "Interindustry Wage Differentials: Evidence from Sweden and a Comparison with the United States," *American Economic Review*, 82 (December 1992): 1341-49.

Funkhouser. "The Importance of Firm Wage Differentials in Explaining Hourly Earnings Variation in the Large-Scale Sector in Guatemala." *Journal of Development Economics*, 513 (1997): 1-17.

Robert Gibbon, and L. Katz. "Does Unmeasured Ability Explain Inter-Industry Wage Differentials?," *Review of Economic Studies* (1992): 515-35.

Hashimoto, Masanori, and John Raisian. "Employer Tenure and Earnings Profiles in Japan and the United States," *American Economic Review* (September 1985): 721-35.

Heckman, James. "Sample Selection Bias as a Specification Error." *Econometrica*, vol. 47, no. 1, January 1979: 153-162.

Holtmann, A. and T. Idson. "Employer Size and On-the-Job Training Decisions," *Southern Economics Journal*, No. 2, October 1991: 339-55.

Holtmann, A. and T. Idson. "Information, Employer Size, Training, and Wage Growth." *Eastern Economic Journal* 21 (Spring 1995): 187-96.

Idson, Todd. "Establishment Size Differentials in Internal Mobility," *The Review of Economics and Statistics*, 71, November 1989: 721-24.

_____. "Employer Size and Labor Turnover." In Research in Labor Economics, Volume 15, edited by Solomon Polachek, JAI Press, 1996.

_____, and Daniel Feaster. "A Selectivity Model of Employer Size Wage Differentials," *Journal of Labor Economics*, 8, January 1990: 99-122.

_____, and Hisako Ishii. "A Comparison of Employer Size Effects on Wages and Tenure for Men and Women in Japan and the United States," 1992 Proceeding of the Industrial Relations Research Association.

_____, and Walter Oi. "Employer-Size Wage Effects: The Productivity Hypothesis," *American Economic Review Papers and Proceedings*, May 1999.

_____, and Walter Oi. "Skill-Biased Technical Change and Trends in Employer Size Effects." Working Paper, March 2000.

_____, Lalith Munasinghe, and Tavis Barr, "A Bivariate Selectivity Model of Employer Size and Union Wage Effects." Columbia University Working Paper, April 2000.

Alan Krueger and L. Summers. "Efficiency Wages and the Inter-Industry Wage Structure," *Econometrica*, March (1988): 259-93.

Lehmann, Hartmut, Jonathan Wadsworth, and Alessandro Acquist. "Grime and Punishment: Employment, Wages and Wage Arrears in the Russian Federation." Working Paper, October 1997.

Little, Ian, M.D., Mazumdar, D., Page, J.M. Jr. (1987) "Small Manufacturing Enterprises: A Comparative Analysis of India and Other Economies," World Bank, Oxford University Press.

Loveman, G. and Sengenberger, W. (1991) "The Reemergence of Small-Scale Production: An International Comparison." *Small Business Economics* 3(1): 1-37.

Mellow, Wesley. (1983) "Employer Size, Unionism, and Wages." in <u>Research in Labor Economics</u> JAI Press: 253-90.

Main, B. and B. Reilly. "The Employer Size-Wage Gap: Evidence for Britain," *Economica* 60 (1993): 125-42.

Oi, Walter and T. Idson "Firm Size and Wages." in <u>Handbook of Labor Economics</u>, chapter 33, vol. 3B, 1999.

Oosterbeek, Hessel, and Praag, Mirjam van, "Firm Size, Selection and Wages." Working Paper. University of Amsterdam (1993).

Park, Funkoo. "The Analysis of Wage Difference by Firm Size." Monograph. Korea Development Institute (Winter 1981).

Pearce, James E. "Tenure, Unions, and the Relationship between Employer Size and Wages." *Journal of Labor Economics* 8 (April 1990): 251-269.

Rebitzer, James. (1986) "Establishment Size and Job Tenure." *Industrial Relations*: 292-302.

Schaffner, Julie Anderson. "Premiums to Employment in Larger Establishments: Evidence from Peru." Working Paper, Stanford University (July 1996).

Schmidt, C. and K. Zimmermann. "Work Characteristics, Firm Size, and Wages," *The Review of Economics and Statistics* 73 (1991): 705-710.

Simpson, Wayne. "An Econometric Analysis of Industrial Training in Canada." *Journal of Human Resources* (Fall 1984): 435-51.

Svejnar, Jan. "Labor Markets in the Transitional Central and East European Economies." in <u>Handbook of Labor Economics</u>, Chapter 42, vol. 3B, 1999.

Teal, Francis. "The Size and Sources of Economic Rents in a Developing Country Manufacturing Labour Market," *The Economic Journal* 106 (July 1996): 963-76.

Velenchik, Ann. "Government Intervention, Efficiency Wages, and the Employer Size Wage Effect in Zimbabwe," *Journal of Development Economics*, 1997.

Winter-Ebmer, Rudolf. "Does Layoff Risk Explain the Firm-Size Wage Differential?" Applied Economics Letters, 2 1995: 211-14.