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Tuuli Juurikkala and Olga Lazareva

Non-wage benefits, costs
of turnover, and labor attachment:
Evidence from Russian firms



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All opinions expressed are those of the authors and do not necessarily reflect the views of the Bank of Finland.

Tuuli Juurikkala and Olga Lazareva¹

Non-wage benefits, costs of turnover, and labor attachment: Evidence from Russian firms

Abstract

Just as in established market economies, many Russian firms provide non-wage benefits such as housing, medical care or day care to their employees. Interpreting this as a strategic choice of firms in an imperfect labor market, this paper examines unique survey data for 404 large and medium-size industrial establishments from 40 Russian regions. We find strong evidence that Russian industrial firms use social services to reduce the costs of labor turnover in the face of tight labor markets. The strongest effect¹ is observed for blue-collar workers. We also find that the share of non-monetary compensation decreases with improved access to local social services.

Keywords: Non-wage benefits, labor turnover, labor attachment, Russia

JEL codes: J32, J33, J42, J63, M52, P31

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Tuuli Juurikkala and Olga Lazareva

Non-wage benefits, costs of turnover, and labor attachment: Evidence from Russian firms

Tiivistelmä

Samaan tapaan kuin vakiintuneissa markkinatalouksissa monet yritykset Venäjällä tarjoavat työntekijöilleen palkan ohella luontoisetuja, kuten asunnon ja terveydenhoito- tai lasten päivähoitopalveluita. Tässä tutkimuksessa tarkastellaan luontoisetujen tarjontaa strategisena päätöksenä epätäydellisillä työmarkkinoilla. Aineistona on yli 400 suurta ja keskiuurta teollisuusyritystä Venäjän 40 alueella. Tulokset osoittavat, että venäläiset teollisuusyritykset tarjoavat sosiaalipalveluita vähentääkseen työvoiman vaihtuvuutta ja siitä johtuvia kustannuksia, joutuessaan kilpailemaan työvoimasta. Tämä vaikutus on merkittävämpi työntekijöiden kuin toimihenkilöiden pitämisessä. Lisäksi havaitaan, että luontoisetujen osuus yritysten kokonaispalkinnassa on pienempi niillä alueilla, joissa ulkopuolisten palveluiden tarjonta on runsaampaa.

1 Introduction

While provision of non-wage, or fringe, benefits for workers is a widespread phenomenon, the motivations for providing non-wage benefits have been discussed mostly in the context of developed market economies. Previous literature examines such explanations as tax benefits (e.g. Woodbury and Hamermesh, 1992), heterogeneous worker preferences for benefits and imperfections of outside markets for services (Dye and Antle, 1984), economies of scale in services provision, and efforts to reduce turnover in the face of rising costs of labor turnover (Rice, 1966). Atrostic (1982) shows that non-pecuniary job characteristics are an important determinant of labor supply. Woodbury (1983) and Olson (2002) test the degree of substitution between wage and non-wage benefits, finding that wages and wage supplements are easily substituted for each other, and that having firm-provided health insurance reduces wages by approximately 20%, an estimate close to the market value of insurance.

In the planned Soviet economy, however, industrial firms were also charged with supplying a great variety of non-wage benefits.² In particular, they shouldered the obligation of supporting social assets such as housing, medical facilities and daycare services. Despite a law on transfer of social assets to municipalities in the mid-1990s and generally heavy restructuring of the Russian economy, many firms actively continue to provide social services. The shift, instead, has been away from keeping assets within the firm to other forms of employee support (for a detailed survey, see Haaparanta et al., 2003).

In this paper, we test whether social service provision has transmuted from an obligation imposed on firms into a strategic tool for attracting and attaching employees in a tight labor market. Using survey data of 404 large and medium-size industrial establishments in Russia, gathered in 2003, we examine the interaction between labor market tightness, social service provision, and employee turnover.³ We believe Russia provides a good case for test-

² For Russia-specific discussion, see Stryk and Kosareva (1994), Commander and Schankerman (1997), Leksin and Shvetsov (1998) and (1999), Starodubrovskaya (2002). For an early survey of enterprise and social benefits in various Central and Eastern European countries after communism, see Rein et al. (1997), and Svejnar (1999).

³ In companion papers (e.g. Haaparanta and Juurikkala 2004, Juurikkala and Lazareva 2006), we also analyze the role of the public sector and the so-called Russian-style fiscal federalism, as well as the effect of firms capable of capturing public sector decision-making as the determinants of social service provision. See also Zhuravskaya (2000), Sonin (2003), Makrushin et al. (2003), and Slinko et al. (2005) for analyses of these relationships.

ing the role of non-wage benefits in a developing economy with imperfect labor markets and large regional heterogeneity.

The idea that non-wage benefits can be used by firms to reduce labor turnover is hardly new. However, the attachment mechanism treated in the majority of related papers is specific to the pension plans and health insurance that constitute the bulk of non-wage benefits to workers in developed economies. In a framework similar to bonding or efficiency-wage models, the pension plan is a form of deferred payment that imposes a separation penalty on the worker (i.e. all or part of a worker's contributions are forfeited if they quit before vesting), and hence limits turnover (Rice, 1966; Even and Macpherson, 1996; Gustman et al., 1994). Alternatively, firms offering pension plans may be seen to attract saver-types who are less likely to quit (Ippolito, 2002). Empirically, Decressin et al. (2005) show on a large US dataset that health benefits do indeed diminish worker churning.

Non-wage benefits in Russian firms, in contrast, are mostly services and facilities provided or subsidized by the employer. These include housing, day care, recreation, and medical services. Consumption of these services is immediate rather than deferred, though they may still carry a separation penalty. A worker who quits is likely to incur fixed costs for arranging new housing, day care or medical care. Oyer (2005) also finds that in the United States, the fact that it is costly for workers to match with firms that offer the benefits they value has an effect on firms' decisions about which benefits to offer. These matching costs are the higher the lower the number of alternative providers of these services in the region.

Commander and Schankerman (1997) were among the first ones in the Russian context to point out that any restructuring of firm-provided social benefits depends crucially on the availability of alternative providers. In this framework, social benefits represent an in-kind compensating differential for the quality of local social infrastructure.⁴ Russia, with its huge disparities in the level of development of regional labor markets and markets for social services, provides a good ground for testing this hypothesis. The attachment effect of benefits should be especially important, as the social sector in the country is still heavily regulated and subsidized, and thus a difficult market to enter for potential new service providers.

⁴ For the general theory on compensating differentials, see Rosen (1986). Compensating differentials for local-specific amenities in Russia have been tested in Berger et al. (2003), who find that workers in Russia are compensated for the local climate, environmental conditions, and crime rates.

Two previous studies explain service provision by the labor market distortions arising during transition process.⁵ Grosfeld et al. (2001) demonstrate that the Russian labor market is segmented into a pool of low-productivity workers and a dynamic segment of mobile, high-productivity workers. They argue that less productive workers engage in contractual relationships similar to risk insurance contracts, whereby the employee accepts lower wages in exchange for security and social services. Risk in this setting may be related to the non-payment of wages which was widespread in Russian firms during the 1990s. The theoretical model in Grosfeld et al. also incorporates the fixed cost for searching out new service providers incurred by a worker who quits a benefits-providing firm.

Another important feature of the Russian labor market is its high local level concentration due to the high geographic concentration of industrial production inherited from the Soviet period. Analyzing worker attachment in Russia, Friebel and Guriev (2005) argue that non-monetary forms of compensation, combined with an inherited monopsonistic or oligopsonistic local labor market structure, can obstruct workers' ability to migrate and thus tie them to their current location. Andrienko and Guriev (2004) find support for the attachment hypothesis by estimating that interregional migration in Russia is low and constrained by lack of liquidity. Only around 2% of the population changed their residence within the borders of Russia per year during the 1990s. The figure decreased to 1.4% in 2002, which is quite low compared to the US internal migration rate of 13.7% in March 2002–March 2003.⁶

In this paper, we focus on the role of non-wage benefits in reducing the costs of labor turnover as these costs are estimated to be quite substantial for the Russian firms. According to Gimpelson and Lippoldt (2001), the total turnover was 46% in 1998. In the mid-1990s, the turnover of unskilled workers was high, while firms apparently hoarded white-collar labor. Brown and Earle (2003) similarly find that labor flows in the Russian industrial sector increased in magnitude during the 1990s, particularly job destruction and separation. Total worker flows were nine percentage points higher in 1999 than in 1990. The churning rate (worker flows less the absolute value of employment change) was 30–40% during the 1990s. A survey of 304 Russian industrial enterprises in 2003 (Gimpelson, 2004) also finds that 77% of firms experienced a deficit of managers and professionals or highly qualified workers or both, indicating tight labor markets.

⁵ For a recent survey of the Russian labor market in transition, including wage formation, see the World Bank report, "The Russian Labor Market: Moving from Crisis to Recovery" (2003).

⁶ Sources: Goskomstat, U.S. Census Bureau, and authors' calculations

Little empirical evidence has been offered previously to establish a link between the tightness of the labor market, non-wage benefits and employee turnover. While our unique firm-level data may allow us to establish this relationship, we must first overcome the challenges of estimating the value of heterogeneous fringe benefits to employees, especially in the absence of outside markets for services. We thus construct survey questions to obtain a measure of benefits comparable across firms and ask the manager of each firm about the necessary wage increase needed to compensate employees for forgone services.

We find strong evidence that Russian industrial firms attempt to use social services to reduce costs of labor turnover in the face of tight labor markets. Further, we show that the share of non-monetary compensation decreases with improved access to regional social infrastructure. There is also evidence that the negative effect of benefits on turnover and churning is weaker in the regions with more developed social infrastructure. Finally, we note that the link between non-wage benefits and employee turnover is weakened by a firm's high monopsony power in the local labor market.

The relationship between labor market tightness, benefits provision and worker turnover is the strongest for blue-collar workers.⁷ The observed difference between white-collar and blue-collar workers can be explained by either wealth constraints (blue-collar workers are more constrained in their access to alternative services providers) or by differences in firm-specific human capital (which may lead to misjudging of turnover costs for white-collar workers).

Our findings shed light on the mechanisms of employee compensation formation in an imperfect labor market, and emphasize the importance of considering non-wage benefits when estimating, for example, returns to human capital, where researchers tend to look only at monetary wages. In Russia, there are substantial differences, both between and within firms, as to what part of worker compensation comes in the form of non-wage benefits.

The rest of the paper is organized as follows. Section 2 provides a brief description of our data and the evolution of the provision of benefits from planned to market economy. This foundation is essential for understanding the nature of non-wage benefits in a post-communist economy. In section 3, we test the effect of tightness of the labor market and density of regional infrastructure on the amount of non-wage benefits provision, and then establish the

⁷ Gentry and Peress (1994) explore the role of tax incentives in providing fringe benefits using US regional data. They find that the effect of tax incentives is positive and significant for blue-collar workers but not for white-collar workers, even though the share of workers getting benefits is higher among white-collar workers.

connection between benefits provision and labor turnover. The final section concludes with the discussion of major results and their implications.

2 Social service provision by Russian firms: Background and survey evidence

2.1 The data

In this paper, we analyze the role social benefits play in the employment strategies of industrial enterprises through survey data collected in 2003 from 404 medium and large establishments in 40 regions of Russia. In the survey we examined the extent of social service and infrastructure provision by the firms and the firms' own assessments of the quality of public infrastructure and the regulatory environment. Background information on ownership, investment, performance, competition, and financing decisions of the firms was also gathered. For the firms in our final sample, we conducted face-to-face interviews with the general manager and managers responsible for social and infrastructure affairs. Quantitative information was obtained for 2002 and earlier years in some questions.

In constructing our sample, we concentrated on the industrial sector, and within it manufacturing firms for which energy production is not a regular line of business. The source of information for the population of firms is the enterprise registry maintained by Goskomstat (State Committee of the Russian Federation on Statistics). We set a minimum size limit of 400 employees after our pilot interview rounds indicated that smaller firms were unlikely to provide infrastructure or social services. Our sampling technique included a combination of clustering by region and systematic sampling by size.

Our sample is quite representative of the Russian manufacturing sector. Compared to the population of Russian firms, the majority of industries are adequately represented in terms of the share of the firms, as are the federal districts.⁸ The fact that we surveyed medium and large enterprises explains the bias towards metallurgical firms regarding the distribution of industrial employment. The size distribution of our final sample is close to the population with the median establishment having 784 employees and the average over 1,600 employees.

Only 5% of the firms in the sample were established during the 1990s. Most firms were formerly state-owned and privatized during 1991–1994. As in many previous surveys, our

sample is biased towards better-performing firms as they tend to be more willing to participate.

In addition to survey data, we utilize Goskomstat enterprise registry data and selected information on the municipalities and regions where the firms are located. We also use the Russian Longitudinal Monitoring Survey, a major annual household survey, for an additional test with individual-level data.⁹

2.2 Social service provision by firms, 1990–2003

In the planned economy of the Soviet Union, firms were often made responsible for providing social services to their employees. Most firms maintained considerable physical assets for this purpose, including apartment houses, dormitories, health clinics, and day care centers. According to Leksin and Shvetsov (1998, 1999), in 1992 not more than one third of the total housing stock in Russia was privately owned (mostly individual houses). The rest was considered public housing and included municipal housing and departmental (*vedomstvennoe*) housing that existed within branch ministries and was managed by enterprises. In the early 1990s, some 70% of large and medium-sized enterprises offered medical services while over 75% of large enterprises and 50% of medium-sized enterprises provided day care.

Fundamental legislation requiring divestiture of housing and the main part of social assets was adopted in 1992 and 1993. The transfer of social assets was supposed to be completed by the end of 1997, and indeed the majority of assets were actually transferred (Leksin and Shvetsov 1998, Commander and Schankerman 1997). Roughly 80% of the housing stock, medical services, day care, sports facilities and children's summer camps, as well as 60–70% of recreation facilities became municipal property during 1993–1997.

Of the 404 firms we surveyed in 2003, over 90% reported having social assets in 1990 and over 90% still provided or supported at least one social service in 2003, although the scale of firm participation in social service provision has diminished significantly during the last decade (see Table 1). Generally, firms either retained some of their social assets (although on a more modest scale) or had replaced those assets with other forms of support such as subsidies to the employees to acquire services. This type of support had gained importance espe-

⁸ See Haaparanta et al. (2003) for detailed analysis of sample representativeness.

⁹ For the description of the RLMS data and the data itself, go to <http://www.cpc.unc.edu/projects/rlms/>.

cially in supporting leisure activities. In housing, not only subsidies but also giving out loans or guaranteeing them for the employees had become relatively common.

A study by the Urban Institute (2004) on regional housing markets notes that the Russian population still faces a widespread lack of housing. In 2003, the quantity of housing space per person was a mere 19.3 m². Barriers to development of Russia's housing market include the vagueness of rules on distribution and ownership rights for land plots for construction, underdeveloped infrastructure (water, heating, sewage, etc.), bureaucracy, and red tape. These barriers have been created mainly at the regional level, where the authorities have substantial influence over licensing and other major phases in the construction process. Similar entry barriers are present for other social services, which as a rule are still heavily regulated and subsidized in Russia. Federal housing subsidies officially were ended at the start of 2006, but in practice the reform has yet to be fully implemented (see e.g. BOFIT Russia Review 2/2006).

3 Empirical results

In this section, we analyze the determinants of social benefit provision by the firms and its effect on turnover and churning. More precisely, we test two main hypotheses:

- non-wage benefits are used by firms to reduce the costs of labor turnover, which vary with the tightness of labor market, and
- availability of alternative social service providers reduces the use of non-wage benefits by firms and the effect of these benefits on turnover.

In the first subsection, we establish the link between the tightness of the local labor market, density of regional social infrastructure, and the use of non-wage benefits. Here, we distinguish between four occupational groups within the firms (managers, professionals, skilled workers, and unskilled workers) and examine for the existence of group-specific differences in how workers are compensated.

In the second subsection, we look into whether the firms actually succeed in reducing labor turnover through service provision. We also test the importance of labor market concen-

tration for the attachment strategies. Finally, we confirm our finding of the effect of non-wage benefits on employee turnover using individual-level RLMS data.

3.1 Tight labor markets and non-wage compensation

We use the following survey question asked from the general managers as a measure of the share of social benefits in worker's total compensation or the importance of services for the workers:

If you stopped social services provision to employees, by what percentage approximately would you need to raise the wage for each group of workers (managers, professionals, skilled and unskilled workers) to keep them in the firm?

This measure is the “value of fringes” comparable across firms. Under the assumption of heterogeneous preferences often used in the literature on non-wage benefits, even if all workers receive an identical package of social services, some workers value it more than others. Measured in this way, the share of non-wage benefits in total compensation is our dependent variable.

Our major explanatory variable is the tightness of the labor market, which is measured by the following question asked from the personnel managers:

How much time approximately (in weeks) would you need to fill a vacancy for each group of workers (managers, professionals, skilled and unskilled workers)?

These two variables are measured separately for four groups of employees: managers, professionals, skilled workers, and unskilled workers. The descriptive statistics on the variables by four employee groups are presented in Table 2. In line with survey results of Gimpelson (2004), these statistics suggest Russian manufacturing firms faced a rather tight labor market. In accordance with the Labor Code, employees must notify the employer two weeks in advance if they plan to terminate their employment voluntarily. This is less than the average search time in our sample. An average firm in our sample would need more than a month to find a new manager, professional, or skilled worker. The median time needed is two to

three weeks. Add to this the time and cost of training a new employee. Thus, a large share of the surveyed firms faces indeed high costs of labor turnover.

As the evidence in Table 2 suggests, Russian firms differ extensively as to the amount of social services they provide. For between a third and half of the firms, the value of these benefits to workers is positive. The average value of the benefits in these firms is quite high: from 17% for managers to 20% for skilled workers, with the figure reaching as high as 100% of the wage in some firms. We also measure non-wage benefits in terms of the costs of social services provision as a share of the wage bill. Table 2a shows that about a third of the firms in the sample spent less than 1% of their wage bill on social services, another third of the firms spent 1–5%, and the rest spent over 5%.

We further provide supporting evidence from individual-level RLMS data for years 2000–2003 (around 10,000 individuals surveyed each year). According to this data (Table 3), the majority of employees enjoyed at least some social services at work in recent years. This share is somewhat higher for white-collar than for blue-collar workers, while according to the firm survey data the value of the benefits was larger for blue-collar workers, although the difference is not big.¹⁰ We also find that skilled workers with longer tenure are more likely to receive benefits, which indicates that the social benefits may also be a form of deferred compensation similar to pension plans.

In Table 4, we present tobit results from regressing our dependent variable for four groups of employees on the tightness of the labor market and social infrastructure index. Table 5 presents the results of an otherwise similar, but pooled, regression, weighted by the share of each group of workers in the firm. We consider tightness of the labor market as exogenous to the firm.¹¹ Hence, we need to control for the level of wages in a firm as our measure of labor market tightness is likely to be affected by the wage the firm offers. We take the data on wages from the Goskomstat enterprise registry, which provides this information separately for white-collar and blue-collar workers.

We find that the shortage in the labor market for a given group, measured by the time needed to find employees, has a positive and significant effect for both high-skilled and low-

¹⁰ Oyer (2005) reports results from the National Longitudinal Survey of Youth in the US. During 1986–2000, employers provided 15.1% of respondents with meals, 7.2% with child care, 56.2% with dental insurance, and 75.8% with medical insurance. The figures for meals and child care are comparable with those of the RLMS from Russia (see Table 3), whereas more employees had employer-provided medical care in the US than in Russia.

skilled blue-collar workers.¹² There may be several explanations as to why service provision reacts to the tightness of the labor market for blue-collar workers but not for managers and professionals, while the costs of turnover of a manager and a high-skilled worker differ little. First, it may mean that these groups of workers have different preferences for the structure of compensation. Grosfeld et al. (2001) argue that less productive workers are more likely to choose a kind of an insurance contract with a high share of social services. However, both our survey and RLMS data indicate that amount of benefits received by white-collar workers is comparable to what blue-collar workers receive.¹³

The second explanation pertains to wealth constraints. White-collar workers with higher incomes should have better access to outside services. Indeed, as private markets for such services as housing, medical care and day care are still largely underdeveloped in Russia, we would expect low-cost alternative providers of such services to be quite scarce. This argument, however, should only apply to managers, not professionals as RLMS data indicate that the average salary of professionals in the industrial sector does not differ significantly from that of skilled blue-collar workers. Even so, our tightness measure is significant for the latter but not the former.

A possible third explanation relates to the differences in firm-specific human capital. If white-collar workers have higher firm-specific human capital than blue-collar workers, then we simply mis-measure the costs of turnover of white-collar workers for the firm as these costs would include not only the time needed to find a worker but also the costs for the worker to accumulate firm-specific human capital. This would explain why, even when both groups of workers receive benefits almost equally, our tightness measure is significant only for blue-collar workers. Note that in the pooled regression, which comprises differences both within and between groups of workers, the tightness variable is highly significant.

To test our hypothesis that the amount of benefits provided by firms depends on the density of regional infrastructure, we include a measure of the general quality of the regional social infrastructure in the regressions in Table 4 and 5. The measure is constructed as a first principal component based on the following regional level variables: residential area per cap-

¹¹ Low supply of certain groups of workers in Russian economy can be explained by external reasons, i.e. the massive switch of occupations by manufacturing workers during the sharp industrial decline in the first half of 1990s (see Sabirianova, 2002).

¹² As a robustness check, we also tested whether regional unemployment or the regional wage level (i.e. the workers' outside options) had any effect and found no connection.

¹³ Since Russia has adopted a flat 13% personal income tax rate, differences in marginal tax rates do not affect preferences.

ita, number of places at pre-school institutions per child, number of hospital beds per 1,000 inhabitants, and number of swimming pools per 1,000 inhabitants.¹⁴ These variables are chosen so as to reflect the four dimensions of social infrastructure included in our survey: housing, day care, health care, and recreational activities. The components of the index vary considerably among regions. Notably, the amount of residential area per capita ranges from 6.7 to 28.4 square meters and the number of hospital beds per 1,000 inhabitants varies from 41 to 332.

In practice, this is a measure of either the congestion of regional facilities (the lower the index, the more congested the facilities) or access to services (the higher the index, the greater the accessibility). The regression results confirm our hypothesis to the extent that access to local social infrastructure matters particularly for blue-collar workers in the structure of compensation, i.e. the greater the access to local social services, the lower the share of workers' compensation in the form of non-wage benefits. In the pooled regression, the index of social infrastructure is again highly significant.

In accordance with earlier studies, economies of scale appear to matter in service provision. The more employees the firm has, the more services per employee are provided. Again, the effect is significant only for blue-collar workers.

Finally, an interesting observation from the regression results is that the level of wage is not related to the value of non-wage benefits. This result contradicts the finding of Olson (2002) and others that wages and fringe benefits are substitutes. In line with the regional infrastructure analysis above and with the compensating differentials literature, an explanation might be that social services represent non-monetary compensation for the local-specific amenities, in particular, for the quality of the local social infrastructure.

3.2 Non-wage compensation and labor turnover

In order to prove that firms use non-wage compensation to attach workers, and thereby reduce their turnover costs, we need to show that a higher share of social benefits in total compensation is related to lower employee turnover. We regress the turnover measures on the share of non-wage services in employee compensation. Our turnover measures include the hiring rate, separation rate, quit rate, turnover rate, and churning rate. All rates are calculated

¹⁴ The data are for 2003 and taken from Goskomstat's Russian Regions database.

as in Davis et al. (1996) and Burgess et al. (2000) such that worker flows are relative to the average number of employees in the current and previous year (i.e. 2002 and 2001).

Since the survey asked only for the total employee turnover not divided by groups, we use the ratio of the total costs of the social services to the total wage bill as a measure of the share of non-monetary benefits in total compensation (descriptive statistics are reported in Table 2a). Our regression results presented in Table 6 suggest that the higher the share of social services in total compensation, the lower the labor turnover. This result applies to hiring, separation, and quit rates, as well as to the turnover and churning rates. The effect of fringe benefits on the employee churning rate, which is essentially the excessive turnover unrelated to the growth or decline of the firm, is the most significant. We thus find evidence that Russian industrial firms have managed to reduce the volatility they face in the labor market through non-wage benefits provision.

To explore how the local labor market structure affects this result, we measure the firm's monopsony power in the local labor market (share of the firm's employment in the population of municipality) and interact it with our measure of the share of wage benefits in compensation. The results in Table 6 show that where a firm has higher-than-average monopsony power, the negative effect of social benefits on turnover is reduced (the coefficient for churning is not significant). Logically, the firm with the highest monopsony power does not need to attach the workers by means of non-wage benefits as there are no other employers in a locality.

Finally, we test the found negative relationship between non-wage benefits provision and labor turnover on individual-level data from RLMS. The data allow us to regress the probability that a person quits the firm in the next year on the binary variable for the receipt of social services from the firm separately for the four groups of employees. We run a random effects panel probit for the three years of data (2000–2002) for which the information on social services received by respondent is available. Only the employees of industrial sector firms are included in this estimation.

The results are presented in Table 7. In accordance with our previous findings for firm-level data, the receipt of social services from the firm reduces the probability that the worker will quit the firm. However, the result here is only significant for high-skilled blue-collar workers, i.e. those who are the most difficult to replace according to our firm survey data. We also interact the social services dummy with the regional social infrastructure index

to check that local infrastructure is actually an underlying mechanism of labor attachment. For blue-collar workers, this term has positive and significant coefficient. Thus, in regions with well-developed social infrastructure, non-wage benefits do not fulfill their attachment function; in infrastructure-poor regions, the attachment power of non-wage benefits is the strongest.

The test on individual-level data further confirms our major result that the firms use non-wage benefits to attach workers and thereby reduce labor turnover. The effect of this attachment mechanism is the strongest for blue-collar workers.

4 Policy implications and concluding remarks

The literature on the attachment effect of non-wage benefits has traditionally focused on pension plans and health insurance and the quit penalty they impose on workers. In this paper, we show that other types of non-wage benefits such as in-kind provision of social services may also have an attachment effect. The strength of this effect depends on the level of development of social services provision in the locality, i.e. the availability of alternative service providers. This effect is emphasized in Russia, where, relative to countries with more developed service markets such as the US or the EU-15, the social sector remains heavily regulated and subsidized, creating significant barriers to entry.

Our paper also contributes to the literature on the evolution of labor markets in transition. It is well established that labor turnover has been generally high during Russia's economic transition. At the same time, it has been argued that firms try and actually manage to tie their employees to themselves by providing part of their compensation through non-monetary means, such as social services. However, no strong empirical support has been provided yet for this hypothesis.

Analyzing a unique data set of large and medium-sized industrial establishments from 2003, we find strong evidence that Russian industrial firms attempt to use social services to reduce the costs of labor turnover in the face of tight labor markets. The effect is the strongest for blue-collar workers. We also find that the use of non-monetary compensation declines with improved access to local social infrastructure. In this sense, social services provided by firms can be viewed as a non-monetary compensating differential for poorly developed local infrastructure. We also show that the link between non-wage benefits and employee turnover is weakened by the high monopsony power of a firm. In general, given the high share of blue-

collar workers in manufacturing, the tightness of the labor market for these workers, and the low level of development of markets for social services, the use of social benefits in compensating Russian industrial workers has been quite pervasive.

Our findings shed light on the mechanisms of the employee compensation formation in an imperfect labor market. They emphasize the importance of taking into account non-wage benefits, for example, in estimation of the returns to human capital, where researchers tend to look only at wages. In Russia, as shown here, there are substantial differences among and within firms as to what part of worker compensation comes in the form of non-wage benefits. Although the compensation packages offered by Russian firms are partially a historical legacy, our data suggest many shared features with e.g. the US labor market.

Non-wage forms of compensation can, and do, attach workers to the firms, especially in the regions with poor social infrastructure. To the extent that they impede labor mobility, they also reinforce regional disparities in incomes and living standards. Our results thus provide an argument in favor of fostering the development of the local social infrastructure, both through government policies and involvement of private businesses. This would encourage a more flexible labor market as employees would have greater access to social services and be less tied to their current employer.

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Table 1. Social service provision: results from firm survey

<i>Percent of 404 firms total:</i>	Housing	Medical care	Day care	Recreation
Had assets in 1990	78.5	76.7	69.8	38.2
Have assets in 2003*	39.5	78.5	11.9	25.9
Have or provide support in some form(s) in 2003	55.7	90.8	26.0	73.3
Have on balance	34.2	67.1	10.4	20.8
Support assets transferred to the municipality	5.0	4.0	6.7	0.3
Give financial assistance to the employees in acquiring services	22.0	42.1	8.9	58.7
Support otherwise	11.4	8.2	3.0	4.5

*Answers from the general manager, otherwise from the social manager. Source: Haaparanta et al. (2003)

Table 2. Descriptive statistics by employee categories

	Managers	Professionals	High-skilled workers	Low-skilled workers
Average share in firm's employment, %	7.81	14.38	64.00	13.85
Average number of weeks needed to replace an employee	5.18 (9.64)	4.34 (8.71)	5.99 (11.63)	1.57 (2.76)
Percent of firms that need to raise wages in order to keep employees if it stops providing social benefits	35.93	44.35	51.80	45.86
Average wage increase needed, % (conditional on being non-zero)	17.36 (18.61)	17.76 (17.96)	20.30 (19.73)	18.31 (17.02)

Standard deviations in parentheses

Table 2a. Social costs as a share of the wage bill

Social costs as share of wage bill	Percent of firms
0%	6.6
<1%	22.5
1-5%	36.0
5-10%	21.4
10-20%	9.5
>20%	4.0
N firms	378

Table 3. Percent of employees receiving social services at work, by employee categories (RLMS individual-level data, industrial employees only)

Employee category	1999-2000	2001	2002	2003	of which, 2003:				
					medical	recreational	childcare	food	transport
Managers	78.4	69.5	67.7	53.6	33.9	47.3	3.8	19.6	18.2
Professionals	80.4	80.5	78.7	72.1	50.3	54.9	13.1	21.0	12.5
Skilled workers	69.4	76.9	70.4	65.4	39.2	46.3	10.5	24.2	9.6
Unskilled workers	79.2	72.4	71.4	60.6	35.8	38.6	8.8	17.1	10.7

Table 4. Tightness of the labor market and importance of social services for different employee categories, tobit

Dependent variable: Wage increase needed to compensate different occupational groups if the firm stopped social service provision	Managers	Professionals	High-skilled workers	Low-skilled workers
Log of how many days it would take to find a new... ...manager	0.282 (0.595)			
...other professional		1.064 (0.716)		
...high-skilled worker			1.815** (0.776)	
...low-skilled worker				2.446** (0.965)
Index of the quality of regional social infrastructure ¹	-1.709 (1.139)	-2.655** (1.202)	-3.579*** (1.373)	-2.754** (1.203)
Log of employment in 2002	0.301 (0.978)	1.501 (0.990)	2.053* (1.142)	1.762* (0.998)
Average wage of white-collar employee in a firm	-0.458 (1.230)	-0.343 (1.258)		
Average wage of blue-collar employee in a firm			1.260 (1.862)	0.871 (1.650)
Constant	-3.469 (15.158)	-11.717 (15.832)	-34.552 (21.479)	-29.550 (18.721)
Observations	323	334	332	334

Industry and regional dummies included. Marginal effects reported: unconditional expected value, dF/dx . Standard errors in parentheses.

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

¹ First principal component built on the following regional level variables in 2003. Number of places at pre-school institutions per child, residential area per capita, number of hospital beds per capita, and number of swimming pools per 1,000 inhabitants.

Table 5. Tightness of the labor market and importance of social services for different employee categories, pooled data, weighted tobit

Dependent variable: Wage increase needed to compensate different occupational groups if the firm stopped social service provision	
Log of how many days it would take to find a new employee	1.072*** (0.411)
Index of the quality of regional social infrastructure	-1.537** (0.762)
Log of employment in 2002	3.547*** (0.509)
Average wage in a firm	-1.046 (1.083)
Manager	-5.572*** (2.124)
Professional	0.036 (1.665)
Skilled worker	3.839*** (1.305)
Constant	-17.095 (12.964)
Observations	1239

Observations in a pooled regression are weighted by the number of employees in each skill group (managers, professionals, skilled and unskilled workers). Industry and regional dummies included. Marginal effects reported: unconditional expected value, dF/dx. Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 6. Labor turnover in 2002 and social services, OLS

	Hiring rate ¹ , percentage	Separation rate, percentage	Quit rate per- centage	Turnover rate, percentage	Churning rate, percentage
Social costs as a share of the total wage bill	-0.229** (0.092)	-0.212** (0.103)	-0.160* (0.083)	-0.423** (0.170)	-0.393*** (0.151)
Log of employment in 2002	-0.899 (2.154)	-12.867*** (4.517)	-3.070** (1.328)	-13.779*** (3.865)	0.545 (2.554)
Share of firm's employment in local population	-0.557 (0.581)	1.254 (0.811)	-0.442 (0.346)	0.568 (1.028)	-1.369* (0.826)
Share of social costs*share of employment	0.037 (0.028)	0.045 (0.039)	0.031 (0.020)	0.088* (0.051)	0.067 (0.044)
Constant	17.817 (15.301)	106.163*** (30.563)	29.260*** (9.609)	125.846*** (27.242)	22.058 (18.794)
Observations	240	239	236	239	239
R-squared	0.20	0.36	0.24	0.33	0.19

Industry and regional dummies included. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1% ¹ Hiring rate= $\text{hiring}_{2002} / ((\text{empl}_{2001} + \text{empl}_{2002}) / 2) * 100$

Separation rate= $\text{separations}_{2002} / ((\text{empl}_{2001} + \text{empl}_{2002}) / 2) * 100$

Quit rate= $\text{quits}_{2002} / ((\text{empl}_{2001} + \text{empl}_{2002}) / 2) * 100$

Turnover rate= $(\text{hiring}_{2002} + \text{separations}_{2002}) / ((\text{empl}_{2001} + \text{empl}_{2002}) / 2) * 100$

Churning rate= $((\text{hirings}_{2002} + \text{separations}_{2002}) / ((\text{empl}_{2001} + \text{empl}_{2002}) / 2)) - ((\text{empl}_{2002} - \text{empl}_{2001}) / ((\text{empl}_{2001} + \text{empl}_{2002}) / 2)) * 100$

Table 7. Probability of quitting the firm and receipt of social services, by employee categories (RLMS individual-level data, industrial employees only, random effects panel probit estimates for 2000-2002)

Dependent variable is equal to 1 if person quits the firm next year, 0 otherwise					
	Managers	Professionals	High-skilled workers	Low-skilled workers	Pooled workers
Receipt of social services	-0.151	0.271	-0.297**	0.276	-0.073
	(0.455)	(0.194)	(0.125)	(0.377)	(0.093)
Index of the quality of regional social infrastructure	0.135	0.000	0.065	0.233	0.034
	(0.197)	(0.088)	(0.063)	(0.189)	(0.045)
Infrastructure index*Social services	0.324	-0.237	0.280**	-0.529	0.083
	(0.430)	(0.204)	(0.131)	(0.452)	(0.097)
Age	-0.006	-0.014*	-0.007	-0.026*	-0.009**
	(0.026)	(0.008)	(0.005)	(0.015)	(0.004)
Education (years)	-0.010	0.014	0.023	0.071	0.020
	(0.085)	(0.031)	(0.025)	(0.076)	(0.017)
Tenure	-0.017	-0.010	-0.043***	0.016	-0.024***
	(0.023)	(0.010)	(0.008)	(0.019)	(0.005)
Log employment	-0.123	-0.165***	-0.041	-0.221**	-0.087***
	(0.109)	(0.042)	(0.028)	(0.096)	(0.021)
2001 dummy	-0.493	0.231	0.021	0.280	0.063
	(0.454)	(0.187)	(0.129)	(0.375)	(0.096)
2002 dummy	-0.122	0.222	0.063	0.300	0.128
	(0.436)	(0.184)	(0.125)	(0.374)	(0.093)
Manager					-0.239
					(0.209)
Professional					-0.197
					(0.151)
Skilled worker					-0.007
					(0.136)
Constant	0.481	-0.172	-0.804*	-0.199	-0.502
	(2.087)	(0.630)	(0.436)	(1.199)	(0.339)
Observations	122	636	1054	159	1971
	82	367	652	116	1127

Standard errors in parentheses; industry dummies included.

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

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