Should I Stay or Can I Go ? — Attaching Workers Through In-kind Payments[1]

Guido Friebel[2] and Sergei Guriev[3]

May 2002

[1]This paper was awarded a Gold Medal at the Annual Conference of the Global Development Network, Tokyo, 2000. It builds on and replaces CEPR Discussion Paper No. 2368 entitled "Why Russian Workers Do not Move: Attachment of Workers through In-kind Payments". We are grateful to Gérard Roland for his continuous encouragement and advice; to Lee Alston, Dan Berkowitz, Micael Castanheira, John Earle, Allison Garrett, Roman Inderst, Joep Konings, Stas Kolenikov, Patrick Legros, Meg Meyer, Espen Moen, Viktor Polterovitch, Michael Raith, Asa Rosén, Klara Sabirianova, Etienne Wasmer and Katia Zhuravskaya for their comments and support. We also acknowledge the comments of colleagues at seminars in Caen, Carnegie-Mellon, CERGE-EI Prague, Cergy-Pontoise, DELTA Paris, Dortmund, ECARES Brussels, KUL and LICOS Leuven, NES and CEFIR Moscow, SITE and IIES Stockholm, Toulouse, Urbana-Champaign, WZB Berlin, and conferences in Bejing, Bristol, Moscow, Sinaia, Seattle, Tokyo and Voronezh. We thank Dmitry Kvassov, Sergei Golovan and Daniil Manaenkov for excellent research assistance. We acknowledge the support of the European Union's TACIS programme, the Wallander Foundation, the EU's TMR programme, and are particularly grateful for the hospitality of IDEI. We would also like to thank the organizers of the Russian Longitudinal Monitoring Survey (RLMS). All errors are ours.

[2]SITE, Stockholm School of Economics, CEPR and WDI. Email: Guido.Friebel@hhs.se

[3]Corresponding author. New Economic School and CEFIR, Moscow, CEPR and WDI. Address: New Economic School, Nakhimovsky pr. 47, Moscow 117418 Russia. Phone: (+7-095) 129-3844. Fax: (+7-095) 129-3722. Email: sguriev@nes.ru

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Abstract

Sometimes, economies suffer massive changes that affect the productivity of fixed capital in different sectors. In a world of perfect markets, workers would swiftly reallocate from the declining sectors (or regions) to the more profitable ones, but there are many exogenous obstacles to migration.

We point to an additional, endogenous, obstacle that has not been considered before. Firms may devise "attachment" strategies to keep workers from moving out of a local labor market. By providing non-monetary compensation, firms make it difficult for the workers to raise the cash needed for migration. We show, first, that the feasibility of attachment depends on the inherited structure of local labor markets. Attachment can only be equilibrium when there are few firms. It collapses beyond a certain number of firms. Second, attachment is beneficial for both employers and employed workers, but it hurts the unemployed.

Russia in transition is an interesting testing ground for our theory. Here, there is little migration, and workers' compensation shifts to non-monetary forms. We investigate two predictions of our theory. First, outmigration should be lower in more concentrated local labor markets. Second, in-kind payments should be more frequent in more concentrated local labor markets. An econometric analysis of matched household-firm data finds evidence that is in line with these predictions.

Key Words: Transition; Russia; Labor tying; Market disintegration.

JEL Classification Numbers: J42, M42, O15, P31

1 Introduction

Sometimes, economies are hit by massive shocks: trade liberalization, economic integration or secession, a collapse in the terms of trade, war, the fall of communism. These events have one thing in common — they dramatically affect the productivity of capital in different sectors. Formerly profitable enterprises, sometimes entire industries, decline, while others grow. When industries are localized, resources ought to reallocate across regions. In particular, one would expect a large relocation of workers. In a perfect world, this reallocation should be swift, but there are important obstacles slowing it down, for instance, underdeveloped housing markets, social norms, risk aversion.[1]

In this paper, we argue that there may also be strong *endogenous* forces slowing down labor reallocation. Firms may devise "attachment" strategies to keep workers from moving out of a local labor market. In the presence of sunk costs of investment, firms want to benefit as much as possible from their depreciating capital. Labor is needed to match the capital. Firms can attach workers by compensating them using non-monetary forms of payment. When capital markets are imperfect, workers must have cash to finance the costs associated with migration, but when they are compensated through in-kind payments or fringe benefits they are forced to consume. Hence, they cannot save the cash needed for migration and must stay in the local market.

The main results of our paper are: First, attachment can only exist up to a certain threshold number of employers in a local labor market. Thus, more labor market competition dissolves attachment, and, indirectly, increases the speed of labor reallocation. This result points to a new channel through which competition, here, in the labor market, affects creative destruction. Second, we show that attachment hurts the unemployed. Third, our theory generates empirically testable predictions that are corroborated by the evidence we find from matched worker/firm data from Russia.

We would like to stress that attachment of labor is *not* a practice that is unique to Russia in transition. Throughout economic history, numerous labor market practices existed that reduced the mobility of workers: company towns, the truck system, labor tying in rural economies. The work of Alston and Ferrie (1993, 1999) on post-bellum paternalism in the southern states of the US provides a particularly interesting example. They carefully document the attachment strategies of farmers in the southern states. When slaves were freed after the civil war, rural employers had to cope with high turnover rates. Southern landlords had to limit competition among themselves and prevent Northern capital

[1] Cf. Aghion and Blanchard (1994) for a theory of the speed of labor reallocation, Jurajda and Terrell (2001) for an empirical analysis, and Roland (2000) for a survey of related literature.

from moving to the South. As a response, the farmers created a web of social control mechanisms, in-kind payments, services and protection from racist violence. They also exerted political power to keep the influence of the North out of their labor market. During World War I and following restrictive immigration legislation in the 1920s, immigration from outside of the US to the North was low and outmigration of former slaves became a threat. Then, landlords used state legislation prohibiting emigrant agents in conjunction with paternalistic benefits to limit out-migration. This strategic behavior prevailed until production became less labor-intensive, and long-term investments of workers and farmers in the fertility of the soil became less important.

Industrial firms in Russia are experiencing a transition similar to the one of rural firms in the southern states of the US. Kornai (1992) has argued that dependance of workers on the party and their firm was a constituting element of socialism. The collapse of communism frees the individual from party dominance. Workers should then move to where they are most productive, not where Stalin wanted them (or their parents) to be. Indeed, the productivity of many regionally concentrated industries has shifted dramatically; some regions enjoy massive growth rates, output in others has declined by more than 50% compared to pre-transition levels (Berkovitz and DeJong, 1999). However, the level of internal migration in Russia is very low. According to the official statistics (Goskomstat, 2000), the rate of interregional migration is around one percent. This number is not only low in international comparison, but also low compared to the pre-transition level of roughly four percent. To summarize the set of observations on Russia, many workers receive their compensation, fully or in part, in non-monetary forms, and it appears that firms and regional governments are colluding to hold back their workforce.[2]

Model: Our theory of attachment, outlined in Section 2, reconciles these observations. We show that first, attachment can be an equilibrium outcome only if there are few firms in the local labor market. It collapses beyond a certain degree of competition. Second, attachment is beneficial for both employers and employed workers, but it hurts the unemployed. We derive these results in a model in which workers are subject to a productivity shock that may make migration worth their while. Our labor market has a given amount of jobs, job-specific matching frictions, and worker/firm matches only survive one period. Whenever an employer opens a vacancy, it faces uncertainty about whether or not it may be able to fill it. It is the uncertainty about finding a matching worker in the second period that provides the rationale for paying non-monetary wages in the first period — employers like to retain workers in the local market to keep labor supply thick.

[2]These and other facts are further developed in Section 3.

Notice that in our model, employers cannot bind workers to the firm as matches are dissolved after each period. There is an important distinction between this attachment to a market and ties to a specific firm that have been analyzed before:[3] An employer's benefit from attaching workers must be shared with its competitors. We show that this creates an externality leading to the collapse of the attachment equilibrium when the number of local employers, N, increases above a certain threshold. A current employer internalizes only $1/N$ of the benefits of attaching the worker, but it fully bears the costs. It must compensate each worker for the forgone option to migrate to make her accept an attachment contract. This premium is independent of N, but the attachment benefits for the current employer are decreasing in N. At a certain number of firms, the costs outweigh the benefits and attachment ceases to be an equilibrium outcome.

The welfare consequences of attachment are straightforward. In attachment equilibrium, employed workers cause a negative externality on the unemployed. Every worker who accepts an attachment contract makes it harder for the unemployed to find a job in the second period. We can also show that total welfare in the local economy only increases if there is substantial labor shortage.

In our model, it is the presence of matching frictions that makes attachment desirable for employers. There may be many more reasons why employers prefer more rather than less labor supply. It is important to notice that our theory does not hinge on the precise motive for attachment. Efficiency wages could lead to similar results regarding attachment as the ones we generate in a matching model.[4] It should also be clear that we do not intend to contribute to the search literature. Rather, we have tried to setup a simple model that can generate predictions on how competition between employers — via the form of labor contracts — affects geographical mobility and worker welfare.

Russia: In Section 3, we present evidence that corroborates our theory. We provide some background and then investigate data from the Russian Longitudinal Monitoring Survey (RLMS)[5] to test the two main predictions of the model. First, controlling for personal, firm-level and regional characteristics, the propensity of workers to leave a region should be an increasing function of competitiveness of the local labor market. We find that higher labor market concentration reduces geographical mobility, a result that appears to be robust against various specifications, and of significant magnitude. An increase in labor market concentration by one standard deviation can reduce the propensity of an individual to leave by up to 4 percent points. Second, controlling for regional and personal characteristics,

[3]See Salop and Salop (1976) for a model where firms use backlogged wages to reduce worker turnover.

[4]The Appendix contains a sketch of a model based on efficiency wages.

[5]For more information on the RLMS, see Zohorri et al. (1998).

and the financial situation of firms (another important potential determinant of in-kind payments), in-kind payments should be more frequent in more concentrated local labor markets. Using a subset of the RLMS that has been matched with firm data,[6] we find corroborating evidence; a one-standard-deviation increase in market concentration increases the probability of in-kind payments by at least 3 percent points. We also discuss why we believe that our theory is better suited than alternative explanations to understand the regression results.

Implications and literature: Regional disintegration in Russia has attracted much interest in the economics profession. Blanchard and Shleifer (2000) argue that Russia performs poorly in comparison to China since weak central institutions fail to obstruct rent-seeking behavior of regional and local governments. If Tiebout competition were feasible, efforts to recentralize as the ones undertaken by the Putin administration would not be necessary. However, workers who live in concentrated labor markets cannot vote with their feet. It is most likely exactly these workers who are subject to the least efficient local governments. Hence, by undermining Tiebout competition, attachment contributes to regional disintegration. Berkovitz and DeJong (1999) have shown that Russia has "internal borders" that regional governments erect to pursue their particular political interests. Our model shows that labor markets are subject to similar internal borders as product markets.[7]

There are also some implications for the understanding of structural change. We show that the initial conditions concerning the structure of the labor market may matter for the speed at which reallocation of labor takes place. This is an important observation for transition economies, in particular the former Soviet Union, in which labor markets are notoriously concentrated. Moreover, attachment also causes an externality on the growth of new enterprises in other regions, since they face a thinner labor supply in the presence of attachment contracts. Hence, attachment causes an obstacle to restructuring, cements labor market segmentation, and may perpetuate the inefficient structure of the economy.

The main theoretical literature we relate to is the one on "labor tying" in developing countries. Bardhan (1983) argues that employers benefit from tying because it ensures labor supply in peak times. At the same time, the provision of consumption credits and homesteads for workers can be understood as an implicit insurance contract for risk-averse workers against seasonal fluctuations. Some authors have however raised doubts that tying

[6]We thank Klara Sabirianova for providing us with these unique data.

[7]This is also in line with Ericson's (1999) concept of the Russian economy as a "post-soviet industrial feudalism". Our attachment mechanism shows why pseudo-feudal structures in Russia have emerged and how they can be sustained. It also stressed that one should be most worried about the welfare of those who are not included in these pseudo-feudal arrangements – the unemployed.

is good for workers.[8] Our framework is different as we consider imperfect competition in the labor market and involuntary unemployment both of which are important problems in transition and developing economies. Our theory provides a simple explanation why tying may be bad for some, albeit not all workers. It is individually rational for *employed* workers to accept an attachment contract, but the *unemployed* are worse off under attachment. In our model, a sufficient amount of competition, then, has an important role to play: it makes attachment collapse, and protects unemployed from welfare losses due to attachment. These effects are absent in models of labor tying that either assume labor market monopsony (Bardhan, 1983) or perfect competition (Mukherjee and Ray, 1995).

2 The Model

We consider a local economy with N identical firms. Firms and workers live two periods. First-period labor supply is a continuum of workers, normalized to L_1. Second-period labor supply, L_2, is endogenous.

There is also a geographically distant labor market labelled the "central" labor market, which is competitive. In order to find a job there, workers incur costs of migration and search, T. The workers' productivity in the central market is subject to a shock: with probability p, the wage w^m net of the costs of migration exceeds R, the productivity of a worker in the local labor market:

$$w^m - T > R. \tag{1}$$

With probability $1-p$, the wage in the central market is low (for simplicity we assume that it is zero) so that migration does not pay off.

Costs of migration must be paid upfront. Thus, at the beginning of the second period, the worker needs at least T units of cash. Workers who are unemployed in the first period receive a wage of nil and cannot migrate. The ability of migration of workers who *have* a job in the first period depends on the contract they agreed upon with their first-period employer. If they agreed on a standard cash contract, they have enough cash to migrate (we assume that the cash wage exceeds T in equilibrium), and receive utility w^c. If they agreed on a contract specifying compensation in non-monetary form that provides utility w^a, they cannot migrate. This is what we call an attachment contract. Contracts cover only the current period.

[8] See, for instance Schaffner (1995) who argues that landlords subject workers to "servility", and restrict their information to maintain servile relationships.

We first present the timing, then discuss worker/firm matching, bargaining and second-period labor supply. We then establish our proposition on the effect of competition on the feasibility of attachment, and discuss welfare implications.

2.1 Timing

1. First period:

   (a) Workers and firms are randomly matched. In each period, a worker is at maximum matched with a firm once, i.e., if workers do not find a match, they remain unemployed for the first period.

   (b) Any worker/firm match bargains individually over wages. Assuming that bargaining is efficient, the joint surplus is maximized by agreeing either on a cash or an attachment contract.

   (c) First-period production takes place, workers and firms receive their payoffs. Unemployed get nil.

2. Second period:

   (a) All matches dissolve.[9] Workers migrate or not, depending on whether migrating would pay off for them, and whether or not they have the cash needed. The remaining workers (including those who were unemployed in the first period) are matched according to the same matching technology.

   (b) Workers and firms bargain about the second-period wage. At this stage, we can constrain our attention to cash wages, since workers and firms live only two periods.

   (c) Second-period production takes place, workers and firms receive their payoffs.

2.2 Matching, bargaining and second-period labor supply

We assume that matching takes place according to a standard matching function (see Petrongolo and Pissarides, 2001). The number of successful matches between workers and firms, M, is determined by a matching function with constant returns to scale:

[9] In principle we can also, at the cost of a more complicated model, assume that the first period matches are only destroyed with a certain probability. This would allow to handle both market-specific and firm-specific attachment.

$$M = M(L, J) = J\beta(L/J) \tag{2}$$

Denoting $l = L/J$, the number of workers per job, $\beta(l)$ is the probability of a firm to fill a vacancy, and $\gamma(l) = \beta(l)/l$ denotes the probability to find a job for any given worker. According to the assumptions above, $\beta(l)$ is an increasing function (approaching 1 as l goes to infinity), and γ is a decreasing function (approaching 0 as l goes to infinity). Thus, $M(L, J) \leq L$ and $M(L, J) \leq J$. We also assume that $\beta(l)$ is concave.[10]

We assume that frictions are job-specific in order to have a matching technology that is independent of N. This is a simplifying assumption that allows us to concentrate on the effect of labor market concentration on attachment rather than on the efficiency of matching.[11]

After matches have been formed, firm and worker bargain. Without loss of generality, we assume that worker and firms have equal bargaining power. Let $q \leq M(L_1, J)$ be the number of workers with attachment contracts in the local economy; the number of workers with cash contracts is $M(L_1, J) - q$. With probability p, workers who are not attached leave the region. Hence, second-period labor supply is:

$$L_2 = L_1 - p\left(M(L_1, J) - q\right). \tag{3}$$

In what follows, we will for simplicity normalize the amount of jobs J to 1, and write $M(L)$ rather than $M(L, J)$.

2.3 Equilibrium

We now analyze how the number of attached workers q depends on N, the number of competitors in the market. In the second period, given equal bargaining power, the wage is $w_2 = R/2$, unemployed workers receive nil. The payoff of migrating workers is $w^m - T$. There are $\beta(L_2)$ employed workers; the firm's profit is thus $\frac{1}{N}\beta(L_2)R/2$.

Consider now the expected payoffs when firm and a worker of mass dl bargain (at $t = 1b$).

[10]This holds, for instance, if M is a Cobb-Douglas function: $M = AJ^{1-\sigma}L^{\sigma}$ hence $\beta(l) = Al^{\sigma}$. Another standard specification comes from the urn-ball model in Petrongolo and Pissarides (2001): $M = J(1 - e^{-L/J})$, hence $\beta(l) = 1 - e^{-l}$.

[11]If matching were firm-specific, at a given number of jobs, a decrease in N should make it easier for firms and workers to match. Burdett et al. (2001) study the impact of the labor market structure on matching. However, their model does not allow to carry out comparative statics with regard to N in the case of multi-unit firms.

1. Payoffs if negotiations break down are as follows:

   - the firm receives 0 + the second-period payoff of $\frac{1}{N}\beta(L_2)R/2$ (notice that we neglect the firm's first-period profits from other matches, since those do not depend on the outcome of the bargaining with the given worker);
   - the worker receives 0 + the second-period payoff of $[\gamma(L_2)R/2\,]\,dl$ (the worker is unemployed and hence cannot migrate);
   - the sum of payoffs when negotiations break down is thus:

$$\frac{1}{N}\beta(L_2)R/2 + [\gamma(L_2)R/2]\ dl. \tag{4}$$

2. Payoffs if the firm and worker agree on an attachment wage w_1^a:

   - firm: $(R - w^a)\,dl + \frac{1}{N}\beta(L_2)R/2$;
   - worker: $w^a dl + [\gamma(L_2)R/2]\,dl$;
   - sum of payoffs:

$$Rdl + \frac{1}{N}\beta(L_2)R/2 + [\gamma(L_2)R/2]\,dl. \tag{5}$$

   Subtracting (4) from (5), and given equal bargaining power, the attachment wage is:

$$w^a = \frac{1}{2}R \tag{6}$$

3. Payoffs if the firm and worker agree on a cash wage w^c:

   - firm: $(R - w^c)\,dl + \frac{1}{N}\beta(L_2 - pdl)R/2$;
   - worker: $w^c dl + [(1-p)\gamma(L_2)R/2 + p(w^m - T)]\,dl$;
   - sum of payoffs:

$$Rdl + \frac{1}{N}\beta(L_2 - pdl)R/2 + [\gamma(L_2)R/2]\,dl + p\,[w^m - T - \gamma(L_2)R/2]\,dl \tag{7}$$

   Subtracting (4) from (7) yields the cash wage (given equal bargaining power):

$$w^c = \frac{1}{2}\left[R - \frac{1}{N}\beta'(L_2)pR/2 - p(w^m - T - \gamma(L_2)R/2)\right] \tag{8}$$

Notice that the attachment wage exceeds the cash wage. The worker is compensated for the forgone option to migrate in the future.

The sum of utilities under attachment contract (5) is larger than the one when the match breaks up (4). Thus, any match will result in employment. Remains the question when worker and firm agree on an attachment rather than a cash contract. Comparing (5) and (7), we obtain that attachment occurs whenever:

$$\frac{1}{N}\frac{R}{2}p\beta'(L_2) > p\left[w^m - T - \frac{R}{2}\gamma(L_2)\right]. \tag{9}$$

Substituting for L_2 into condition (9) yields:

$$N < \frac{\beta'(L_2)}{\frac{w^m-T}{R/2} - \gamma(L_2)} = \frac{\beta'\left(L_1 - p\left[M(L_1) - q\right]\right)}{\frac{w^m-T}{R/2} - \gamma\left(L_1 - p\left[M(L_1) - q\right]\right)}. \tag{10}$$

For a given N, the number of attached workers q solves (10), leading without further proof to the main proposition.

Proposition 1 *The number of attached workers decreases with N. In particular:*

- All workers are attached, that is $q = M(L_1)$, if:

$$N < N^* = \frac{\beta'(L_1)}{\frac{w^m-T}{R/2} - \gamma(L_1)}. \tag{11}$$

- A proportion $0 < q < M(L_1)$ of workers are attached if $N \in (N^*, N^{**})$ where:

$$N^{**} = \frac{\beta'(L_1 - pM(L_1))}{\frac{w^m-T}{R/2} - \gamma(L_1 - pM(L_1))} > N^*. \tag{12}$$

  Here, q decreases from $M(L_1,)$ to 0 as N increases from N^* to N^{**}.

- No workers are attached, that is, $q = 0$, if $N > N^{**}$.

The intuition for Proposition 1 is as follows (see also Figure 1). Given efficient bargaining, any worker/firm match chooses the contract that maximizes their joint surplus. Inspection of (9) shows that the value of attachment (the LHS) increases in the impact the attachment of workers has on the firm's probability to fill a vacancy in the second period, $p\beta'\left(L_1 - p\left[M(L_1, J) - q\right]\right)$, and in R. Each firm internalizes only $1/N$ of this attachment benefit, as matches are destroyed in the beginning of the second period (attachment is market- not firm-specific). However, a worker only accepts an attachment contract when she is, through the first-period wage, compensated for the value of the forgone option to

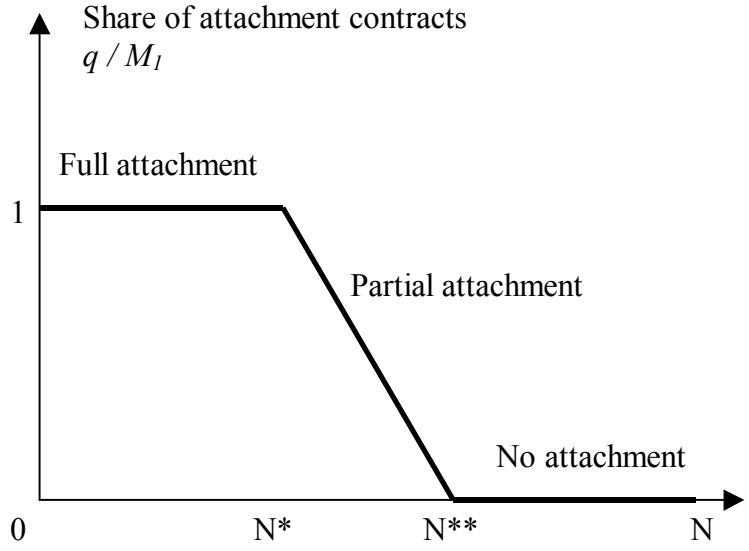

Figure 1: Share of attachment contracts in the first period q/M_1 in equilibrium as a function of number of employers in the local labor market N.

migrate, $p(w^m - T - \frac{R}{2}\gamma(L_2))$. When N increases, the LHS decreases, while the RHS is constant. Ultimately, the cost of attachment dominates the benefits for the individual firm. This free-riding effect makes attachment collapse.[12]

2.4 Welfare

Because we assume efficient bargaining and equal allocation of bargaining power between worker and firm in a match, it is clear that firms and workers who are employed in the first period cannot lose from attachment. However, the unemployed of the first period suffer from attachment. A proportion p of the attached workers would migrate in the case of cash contracts. Under attachment, they stay, and reduce the probability of the unemployed to find a job in the second period. Thus, the fact that employed workers accept attachment

[12]The equilibrium in Proposition 1 is unique for given N. This follows from concavity of $\beta(l)$. If $\beta(l)$ were convex and $\gamma(l)$ declined sufficiently slowly with l, $N^* > N^{**}$. Then, the structure of the equilibrium would be as follows: (i) if $N < N^{**}$, there exists a unique equilibrium with full attachment $q = M(L_1, J)$; (ii) if $N \in (N^{**}, N^*)$, there exist at least three equilibria: a stable equilibrium with full attachment $q = M(L_1, J)$, a stable equilibrium without attachment $q = 0$, and at least one unstable equilibrium with partial attachment with q solving (10); (iii) if $N > N^*$, there exists a unique equilibrium without attachment $q = 0$.

contracts imposes an externality on the unemployed.

How does the local economy as a whole fare under attachment? Consider the sum of the utilities (for clarity, we here drop the assumption that J is normalized to 1):

$$S = RM(L_1, J) + RM\left(L_1 - p\left[M(L_1, J) - q\right], J\right) + (w^m - T)p\left[M(L_1, J) - q\right]$$

The derivative with respect to q is

$$\partial S/\partial q = -p(w^m - T) + pR\beta'\left(L_1 - p\left[M(L_1, J) - q\right]\right) \tag{13}$$

From (13) we conclude that attachment decreases welfare if and only if unemployment in the second period is sufficiently high: $L_2/J > l^*$ where

$$\beta'(l^*) = \frac{w^m - T}{R}. \tag{14}$$

This result reveals the welfare implications of attachment. On one hand, attachment is beneficial to the local economy as it increases matching efficiency. On the other hand, attachment is costly because potentially mobile workers forgo the option to earn high wages outside. The former effect is more important if there is worker shortage in the second period (L_2/J is low). Vice versa, if there is high unemployment (L_2/J is high), the marginal worker has a small effect on efficiency of matching, but the cost of attachment is even higher (each worker's local expected payoff is very low).[13]

Comments. One may wonder why firms from the central labor market would not be able to finance workers' migration from the local labor market. If workers and firms could write enforceable debt contracts, this would be possible. However, as workers have no collateral, and slavery-like contracts cannot be enforced, such contracts would be infeasible: the worker would default on the debt, once she arrived in the central labor market. Entry of firms would be a second possibility. However, while the capital costs of incumbent firms is sunk, new entrants would have to pay a fixed cost, which, if high enough, would prevent firms from entering.

Finally, it is important that matching frictions are not the only reason why firms would like to attach workers. One can construct an alternative model, where greater local labor supply makes it *cheaper* rather than *easier* for firms to fill their vacancies. Appendix I contains the sketch of such a model.

[13]The formally more correct expression of a social planner's problem would be to maximize welfare by choosing whether or not to ban attachment. Our results show that banning attachment increases welfare if there is high unemployment in the second period.

3 Russia

We first present facts on the Russian labor market, then discuss data and our regression results, and potential alternative explanations and counterarguments.

3.1 Facts

Demonetization of workers' compensations: In the Soviet Union, firms provided a wide range of non-monetary benefits to their workers, including hospitals, housing, rest houses, child care, catering and education. While according to presidential decrees all assets related to the provision of such services had to be transferred to municipalities, firms have not discontinued the provision of social services. In concentrated local labor markets, firms own up to 85% of the social assets (Healey et al., 1998). A survey of 93 enterprises in Tratch et al. (1996) reports that firms even invest in new types of facilities to provide fringe benefits. Even more striking, a survey of 200 firms by Biletsky et al. (1999) shows that in-kind substitutes for wages are on the rise. In 1991, 3% of the firms provided in-kind payments. This figure increased to 27% by 1998. In-kind payments are a novel phenomenon, but the provision of fringe benefits could be attributed to behavioral inertia of paternalistic managers. However, a VCIOM (1997) survey among managers of 142 enterprises indicates that the provision of fringe benefits follows the strategic patterns we have highlighted in our model: Only 37% of the respondents continued to run the social assets of their firm because of "Soviet traditions", while 51% responded that social assets were used in order to retain workers.[14]

Low mobility across regions, labor market segmentation: Given the huge productivity differences across regions, one should expect massive reallocation of workers across regions. Heleniak (1999), for instance, estimates the potential for migration from the Russian North only, at 2 mln. people. But, workers do not relocate as Table 1 in Appendix II shows. Inter-regional labor reallocation is much lower in Russia than in any other transition economies. Data reinforce this observation (Goskomstat, 2000): During the decade of transition, internal migration in Russia was rather constant, at a level of 1%. This is a surprisingly low number, since pre-transition levels were in the range of 4-5%.

Soviet-style industrialization resulted in geographical concentration of industrial activity, and local employment was oftentimes concentrated in one or very few large plants.

[14] A number of papers look at the demonetization of worker compensation in Russia. Grosfeld et al. (2001) relate the segmentation of the Russian labor market with respect to skills to the provision of fringe benefits. Earle and Sabirianova's (2002) investigate wage arrears as an equilibrium outcome between firms in a given local labor market. Both papers do not look at migration.

Goskomstat (2000) data show that since the outset of transition, labor market segmentation has steadily increased. Consider the ratio of unemployed over vacancies by a) the larger, so-called "economic regions", b) the administrative regions (the "oblasts"). In the Central Region it was roughly 8 in 1993, increasing to 13 in 1996, and dropping to 8 in 1997, while for the Eastern Siberian Region, we find the ratio growing from 18 in 1993 to 76 in 1997. More striking, even *within* economic regions and across the smaller oblasts the ratios vary dramatically. Table 2 presents the respective figures for four administrative regions, and Moscow, all of which belong to the Central Region, the most developed and densely populated economic region. The difference between, for instance, Moscow and Ryazan has increased between 1993 and 1997, and by 1997, the ratio was 48 times higher in Ryazan than in Moscow.

Scope for migration: Why are workers from Ryazan, a town situated barely 200 kilometers away from Moscow, not moving to the capital? The obvious answer to this question is: because migration may not be worth the costs. It is hard to estimate the real costs of migration, but we have tried to do so and to compare it with the benefits of internal migration. Monthly salaries in rubles were collected from 28 Russian towns and cities for up to ten occupations as well as rents and transportation prices. The source of this information are job advertisements in newspapers in October 2000. The full list is available on request; Table 3 reports the data for Moscow and Ryazan. A simple back-of-the-envelope calculation (explained in Appendix II) indicates that there is scope for migration, in particular for qualified workers. However, the associated costs are substantial and they must be paid upfront.

3.2 Empirics

Our model implies two empirical predictions. First, more competition in a local labor market should involve more migration. Second, more competition in a local labor market should reduce the frequency of non-monetary compensation for workers.

In the absence of micro-migration data, we use the "Russian Longitudinal Monitoring Survey" (RLMS),[15] a representative data set on Russian households. The RLMS is not a panel data set, but interviews in Round VI (winter 1995/96) and Round VII (winter 1996/97) were conducted in the same dwellings. In case surveyed persons had moved, interviewers were supposed to find out about their new residence, provided they had not left the community. Former respondents who had left the community were not followed up. We look at individuals in working age who were employed in Round VI.

[15]For more information on the RLMS, see: http://www.cpc.unc.edu/projects/rlms.

For both hypotheses the main independent variable is a labor market competition index: *CR4* represents the percentage of the labor force employed by the largest four employers on the respective local labor market, constructed from Goskomstat data. A larger *CR4* is tantamount to more concentration (less competition) on the labor market.

Does higher labor market concentration involve less migration? Here, we look at the dependent variable '*Move*'. *Move* takes a value of nil if an individual interviewed in Round VI happened to live in the same community in Round VII. The variable takes a value of one, if the interviewers were not able to find an individual in the same community he or she dwelled in during Round VI. Since $Move = 1$ also entails non-respondents and people who passed away between Rounds VI and VII. It hence represents an imperfect measure for regional mobility.[16]

We also use a host of control variables from the RLMS: personal characteristics, job characteristics, household characteristics, proxies for the subjective well-being of individuals (for instance, satisfaction with life, intention to change job or to move away from a community). Moreover, we use information about the economy of the so-called 38 'Primary Sampling Units' (PSUs), the communities where people were surveyed. We have deflated all nominal variables by a local CPI that uses price information of 25 basic goods from the RLMS, and weighs them according to the Goskomstat methodology. Appendix III lists the variables we have looked at. Table C contains the descriptive statistics of the most important variables.

Table A presents the results of different probit specifications for *Move*. We have run regressions with all potentially interesting personal, household and job characteristics, but we present only those variables that are jointly significant. Reported are the marginal effect of a change in the respective independent variable on an individual's likelihood to move (computed at the average value of the respective variable). The first specification includes dummies for the PSUs and provides a useful benchmark. Since PSUs and *CR4* are perfectly correlated, we replace, in spec. 2, the PSU dummies with the respective *CR4*, and control for the eight large economic regions, including a special dummy for Moscow.

Comparing spec. 1 and spec. 2, we note that the results of the two specifications differ only slightly. The positive sign of monthly household income (the first variable), deflated by the local consumer price index (CPI), is in line with our theory that highlights the importance of liquidity constraints on moving decisions. It should be noted that controlling for personal and job characteristics, individuals with higher income should be less willing to leave. Thus, the positive sign we find suggests that the liquidity effect of a higher income

[16] According to Goskomstat, the mortality rate in Russia was roughly 1.5% in 1995. Thus we believe that the sample distortion due to non-respondents is more substantial than the one due to mortality.

dominates the income effect.[17] Longer tenure in the firm makes workers less mobile, a fact that can be reconciled with the presence of relation-specific human capital. Education, measured in years, influences moving decisions positively. Older and married persons tend to move with lower probability, while men have a higher propensity to move. Individuals living in rented flats are more likely to migrate.[18] Having children in the age between 7 and 18 has a negative impact on moving decisions.

The major lesson from spec. 2 is that as predicted by our theory, higher labor market concentration as measured by *CR4* has a negative impact on individuals' moving decisions, the magnitude of which is substantial: when *CR4* increases by one standard deviation (.29), an individual's probability to move decreases by 4 percent points. Given that in our sample, $Move$ equals 1 holds for only 18% of the surveyed individuals, the impact of labor market concentration is important.

Does higher local labor market concentration increase the probability of in-kind payments? The dependent variable to investigate this prediction is binary information about whether or not a person received in-kind payments.[19] Specification 1 in Table B shows that while most personal characteristics have no significant impact, *CR4* has a significant positive impact on the occurrence of in-kind payments – in line with our theory.

One could argue that firms that are more cash-constrained may be forced to pay wages in non-monetary forms, and that firm liquidity is correlated with *CR4*. We have received access to unique matched worker/firm data for a subset of individuals from the RLMS. We use two proxies for the financial constraints a firm is subject to: (i) *cash_cl*, defined as the ratio of cash holdings of firms at the time of the survey (end 1995), divided by its current liabilities at the same date, and (ii) *cash_sales*, defined as the ratio of cash holdings over annual sales. While these variables restrict the sample to less than 1000 individuals, and one should thus take the results with a grain of salt, the results of the regression, the second and third columns in Table C, are very much in line with our theory. Both *CR4* and

[17]It would have been preferable to look at the *stock* of household savings, but such information is not available in the RLMS. We report regressions with household income rather then individual salaries since we believe the latter to be a better measure of liquidity. Nonetheless, we have also run regressions with monthly salary; the respective coefficient is positive and significant as well.

[18]This can be interpreted as a sign that people who move more often prefer to live in rented flats, rather then in their own flats (or company dormitories). However, the fact of renting an apartment is also a potential proxy for the cash individuals hold, since in Russia, flats rented on the market are usually of higher quality and more expensive.

[19]Unfortunately, we do not know the magnitude of these payments. Neither do we have information about the potential provision of social services that are considered to be of a larger magnitude than inkind payments.

cash_cl have the signs one would expect, and they are statistically significant, *cash_sales* has the expected sign but is not significant. The influence of *CR4* on *inkind* slightly increases under the inclusion of these variables, but the main point is that concentration influences positively the probability of in-kind payments — providing additional support for our theory. The above regression also shows that personal characteristics have a negligeable effect on the occurrence of non-monetary compensation.

Additional regressions: First, as a checkup, we have included *cash_cl* and *cash_sales* into the regressions for the *move* variable and found that *CR4* remains significant (Spec. 3,4 in Table A). Second, we have also tried to control for liquidity on a more aggregated level. We have used the ratio of per-capita monetary income deflated by the minimum living standard in the region (oblast), and the deflated per-capita bank deposits in the region. Third, we have regressed *Move* on the in-kind variable, and in-kind on *CR4*. Fourth, in order to control for potential size effects, we have also run regressions for small and large towns separately, and taken out Moscow and St. Petersburg from the sample. The results of these regressions (available on request) are similar to the ones discussed above.

3.3 Alternative explanations

The fact that *CR4* affects by the same time negatively the likelihood of outmigration *and* positively the likelihood of in-kind payments corroborates our theory. There are a number of alternative explanations and counter-arguments that are discussed below.

First, our theory is not the only one that would predict migration to decrease in labor market concentration. The observed impact of labor market concentration on mobility could be due to firms' higher market power in more concentrated labor markets. Put simply, when wages are smaller, workers find it more difficult to finance the costs of migration. Empirically, and as reported above (Table B), we can distinguish ours from this explanation since the latter does not predict anything concerning the impact on labor market competition on the *composition* of wages, but only on its level.

Second, assume that higher rates of labor market concentration are correlated with higher product market concentration. Then, when *CR4* is high, there are more rents that can be shared between managers and workers, which *ceteris paribus* makes current employment more attractive. In order to control for this explanation, we have regressed wages on *CR4* and relevant controls.[20] We have found that the effect of *CR4* on salaries is negative, significant and quite large: in different specifications, individual wage decreases by .4 to .5% when *CR4* increases by .01, indicating that this explanation can be rejected.

[20]Regression results are available on request.

Third, there may be economies of scale in the provision of fringe benefits like hospitals, housing, schools etc. Then, a higher *CR4* can be an indicator for better provision of fringe benefits that compensate for potentially lower monetary wages. One could, in principle, test this theory: Our theory predicts both low outflows and low inflows from concentrated local labor markets. The alternative explanation would predict low outflows and *high* inflows. Population changes on the local level are not available, but survey evidence suggests that workers are not very keen to move into local labor markets with high concentration, while many want to leave, but do not have the financial means to do so.[21] Motivated by the above argument, we have looked at the impact of living standard proxies that are not highly correlated with *CR4*. In spec. 5 (Table A), the additional independent variables are first, the availability of bank services; second, the quality of telecommunication services; and third, the quality or roads in the PSUs. While these variables matter, they reduce magnitude and significance of *CR4* only marginally.

Fourth, the mobility variable is of rather low quality. $Move = 1$ contains both non-respondents and migrants. A direct identification is impossible, but something can be done. In Round VI, people were asked whether they intended to move in the course of the following 12 months. An individual's intention to move in Round VI is a good predictor for having $Move = 1$ in Round VII: the respective probability is 42% for those who intended to move vs. 15% for the rest of the sample. We have thus, for spec. 6 in Table A, removed individuals from the sample who did *not* intend to move, but had $Move = 1$ in Round VI, because they are more likely non-respondents.[22] The respective regression attributes a lower magnitude to *CR4*, but it remains significant, and the explanatory power more than doubles, compared to spec. 5. We have also run a regression for the subsample of individuals who intended to move in Round VI (Table A, spec.7). In this subsample, the coefficient for *CR4* is significant and very large (.29), but we would not want to overinterpret the result, since the sample size shrinks to 292 individuals.

[21] In a survey of students, disabled, unemployed and retired individuals residing in Russian North, 54 to 68% (for various categories) responded that they would be willing to leave the region but only 3-11% said that they would have sufficient financial means to cover the migration costs fully or partially [Heleniak (1999)].

[22] If these individuals are not counted as migrants, the share of those who leave goes down to 4%, which is comparable to the official national average for gross outgoing mobility (2.1%). Moreover, our dataset is biased in favor of migration as we look at the potentially most mobile category of people. Also, our dataset covers non-registered mobility which is supposed to be quite large.

4 Concluding remarks

We have presented a theory of attachment in which low migration arises endogenously due to the strategic behavior of oligopsonistic firms. We have shown that attachment emerges in concentrated local labor markets. It is beneficial for firms and employed workers but imposes a negative externality on the unemployed. Our theory fits Russia where many local labor markets are oligopsonistic, worker compensation is demonetized, and migration is low. An analysis of household and firm data shows that a) higher labor market competition decreases the outflow of workers; b) higher labor market competition increases the occurrence of in-kind payments. Both results are in line with our theory.

We have pointed to a number of implications for the Russian economy, but believe that our theory is of a more general nature. In particular, it points to a path dependency with respect to the structure of labor markets. Regional disparities in economies facing large shocks may sustain because few firms dominate a labor market, and not only because of exogenous frictions.

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Appendix I: An alternative model

Assume that matching is efficient, i.e. all the jobs are filled whenever $L_t \geq J$, but the wage in the second period $w_2(L_2)$ decreases with the unemployment rate: $w_2'(L_2) < 0$. The function $w_2(L_2)$ is a reduced form that can, for instance, be obtained in an efficiency wage setting. Higher wages provide rents to workers that they lose when caught shirking. The higher unemployment, the more workers will be afraid of being caught shirking, since the probability of finding a new job in the same period will be decreasing in unemployment. Thus the threat of firing workers has more bite when unemployment is higher, which allows firms to offer lower efficiency wages. Another interpretation of $w_2'(L_2) < 0$ is that the bargaining power of workers decreases with unemployment.

Assume for simplicity that there is no worker shortage in the second period ($L_1 - pJ > J$). Then in the second period each of the remaining $L_2 = L_1 - p(1-q)$ workers gets a job with probability $1/L_2$. Then the condition (9) for attachment to maximize the joint surplus takes the following form

$$\frac{-w_2'(L_2)}{N} p > p\left[w^m - T - w_2(L_2)/L_2\right], \tag{15}$$

The left-hand side is the firm's benefit of attaching a marginal worker, while the right-hand side is the value of the option to migrate in the second period ($w_2(L_2)/L_2$ is the second period payoff of an attached worker). This condition can be rewritten as

$$N < \frac{-w_2'(L_2)}{w^m - T - w_2(L_2)/L_2}. \tag{16}$$

Introducing $N^* < \frac{-w_2'(L_1)}{w^m - T - w_2(L_1)/L_1}$ and $N^{**} = \frac{-w_2'(L_1-p)}{w^m - T - w_2(L_1-p)/(L_1-p)}$ we then obtain a structure of equilibria very similar to the one described in Proposition 1 (if $N^* < N^{**}$), or in footnote 10 (if $N^* < N^{**}$).[23] In both cases there is a unique equilibrium with attachment $q/J = 1$ for $N < \min\{N^*, N^{**}\}$ and a unique equilibrium without attachment for $N > \min\{N^*, N^{**}\}$.

Another alternative is to allow firms to create or liquidate vacancies. In Friebel and Guriev (2000) we have built such a model and found similar results. If labor markets are concentrated, attachment emerges in equilibrium since it provides incentives to create rather than liquidate jobs.

[23] A sufficient condition for $N^* < N^{**}$ and therefore for uniqueness of equilibria for a given N is convexity of $w_2(l)$: $w_2''(l) > 0$. The intuition for this is that the higher unemployment, the smaller the effect of each additional unemployed on the wage rate.

Appendix II: Tables

Country	1993	1994	1995	1996	1997
Bulgaria	—	—	0.30	0.02	0.01
Poland	—	0.14	0.20	0.12	0.26
Romania	—	—	0.08	0.22	0.01
Slovenia	—	0.17	0.18	0.29	0.01
Estonia	—	0.03	0.16	0.14	0.27
Russia	0.01	0.00	0.00	0.05	0.00

Table 1: Fraction of excess job reallocation resulting from employment shifts between regions. Source: Faggio and Konings (1999), calculations for Russia by Konings.

	1993	1994	1995	1996	1997
Bryansk oblast	58	158	58	62	84
Vladimir oblast	18	28	34	46	38
Moscow City	4	3	3	2	1
Ryazan oblast	24	28	48	42	48
Tula oblast	6	15	18	31	32

Table 2: Ratio of unemployed over vacancies in the Central economic region, Goskomstat, own calculations.

	Ryazan	Moscow	Moscow, deflated	Difference, Ryazan rubles
Policeman	500-1200	2400-2600	1807-1958	607-1458
Secur. guard	700-1500	2900-3400	2184-2560	684-1860
Car mechanic	1500-2300	5000	3765-3765	1465-2265
Painter	1000-1500	5400-6000	4066-4518	2566-3518
Accountant	1100-1250	4200-6000	3163-4518	1913-3418
Driver	1500-2000	4150-5800	3125-4367	1125-2867
Foreman	2000-4000	8300-10000	6250-7530	2250-5530

Table 3: Salary differentials between Moscow and Ryazan, October 2000.

Comment to Table 3: We report monthly salaries in current rubles, at an exchange rate of 28 rubles/USD. Official statistics estimate consumer prices to be 32.8 per cent higher in Moscow than in Ryazan: the minimum living standard (calculated as the cost of 25 goods basket) is 664 rubles in Ryazan and 882 rubles in Moscow. The last column represents

the differences in monthly income deflated by the regional CPI. Costs of moving are first, rent differences. The monthly rent for a one-room flat (bottom range) is 900 roubles in Ryazan, 2000-3000 roubles in Moscow. A Moscow City passport costs approximately. 2000 roubles for half a year. The fixed cost of moving (train ticket and shipment of furniture) amounts to 2000 roubles. If a worker migrating to Moscow finds a job immediately, he or she would be able to break even within couple of months. However, taking into account the opportunity costs of job search, and assuming a 6 months search-period, a painter would break even after one and a half year (6 months of searching plus one year of earning a real wage three times higher than in Ryazan). There appears to be scope for migration, but the associated costs must be paid upfront, requiring a substantial amount of cash.

Appendix III: Empirical analysis

List of variables

1. Personal characteristics: *male* (dummy, equals one if male); *married* (dummy, equals one if the person is married); *edyrs* (years spent on education); *age* (age in years); *i6adpdjb* (has another job)

2. Life satisfaction: *wantmove* (dummy, equals one if person wants to move in the coming year); *i6econrk* (economic rank); *i6satlif* (life satisfaction)

3. Household characteristics: *hhincome* (household income); *aprent* (dummy, equals one if the person rents his/her housing); *hhsize* (size of the household); *nkids7* (number of children aged below 7 in the household); *nkids7-18* (number of children aged 7-18 in the household); *numwork* (number of working adults in the household)

4. Job characteristics: *wgmln* (the last monthly monetary wage in million roubles); *jobsyr* (number of years spent in the firm); *inkind* (dummy, equals one if person received in-kind payments in the last month); *arr* (dummy, equals one if person had wage arrears in the last month); *boss* (has subordinates)

5. Employer characteristics: *cash_cl* (firm's liquid assets over current liabilities as of Dec 31, 1995), *cash_sales* (firm's liquid assets as of Dec 31, 1995 over annual sales for 1996)

6. Geographical characteristics: *PSU* (primary sampling unit, 38 communities represented in the sample); *CR4* (labor market concentration ratio at the PSU level: the

share of four biggest employers in the total employment in the PSU); *region* (regional dummies for eight regions: Moscow and StPetersberg, Central and Central Blacksoil region, North and Northwest, Volga, East Siberia and Far East, North Caucasus, Western Siberia, Urals); *mon2min* (average per capita monetary income deflated by minimum living standard in the oblast, 1995); *dep2min* (average per capita savings deflated by minimum living standard in the oblast, 1995)

7. Move (dummy, equals one if person is not found in the same community next year)

8. Community characteristics: *c6bank* (availability of bank offices); *c6telphp* (phone lines per 100 people); *c6roads* (quality of roads); *c6electr* (electricity); *c6waters* (water supply); *pschool* (availability of schools); *phealth* (availability of healthcare); *garbg* (availability of centralized garbage collection)

Table A: Probit (dF/dx) estimations for Move

Move	Spec.1	Spec.2	Spec.3	Spec.4	Spec.5	Spec.6	Spec.7
hhincome	.021*	.031***	.003	.003	.033***	.006*	-.016
	(.011)	(.012)	(.006)	(.005)	(.013)	(.004)	(.052)
jobsyr	-.001*	-.002**	-.001	-.001	-.001	-.001**	-.135**
	(.001)	(.001)	(.000)	(.000)	(.001)	(.000)	(.006)
edyrs	.003	.006**	-.002	-.001	.005*	.000	-.007
	(.002)	(.003)	(.001)	(.001)	(.003)	(.001)	.15
age	-.002***	-.002**	-.001*	-.001**	-.002***	-.001***	-.003*
	(.001)	(.001)	(.000)	(.000)	(.001)	(.000)	.002
male	.061***	.058***	.007	.004	.058***	.011***	.101**
	(.008)	(.009)	(.007)	(.006)	(.009)	(.004)	.044
married	-.027	-.030*	.004	.003	-.031*	.004	-.008
	(.018)	(.017)	(.007)	(.006)	(.018)	(.006)	(0.088)
aprent	.374***	.255***	.021	.018	.317***	.297***	.477***
	(.060)	(.085)	(.025)	(.022)	(.075)	(.065)	(.080)
nkids7-18	-.0115	-.016*	.003	.001	-.014	.000	.021
	(.010)	(.009)	(.004)	(.004)	(.010)	(.004)	.046
PSU dummies	sign.						
reg.dummies		sign.	sign	sign	sign.	sign.	sign.
CR4		-.123***	-.037**	-.035**	-.109**	-.034**	-.293**
		(.043)	(.017)	(.016)	(.047)	(.014)	(.120)
cash_cl			-.256*				
			(.114)				
cash_sales				-1.095**			
				(.043)			
c6bank					.020	-.008	.214
					(.045)	(.014)	(.142)
c6telphp					-.001	-.000	-.003*
					(.001)	(.000)	.002
c6roads					-.035**	-.010	-.149**
					(.016)	(.007)	.067
Observations	3819	3819	828	806	3252	2857	292
Log likelihood	-1461	-1552	-93.5	-87.4	-1262	-355	-160
Pseudo R^2	.135	.082	.140	.163	.102	.238	.183

***1%; **5%; *10%; standard errors in parentheses, adjusted for clustering at the PSU level (Spec. 1,2,5-7) or at the firm level (Spec. 3,4)

Table B: Probit (dF/dx) estimations for Inkind

Inkind	Spec. 1	Spec. 2	Spec. 3	Spec. 4
hhincome	.003	.003	.004	.000
	(.009)	(.015)	(.022)	(.012)
jobsyr	-.000	.000	.001	-.000
	(.000)	(.001)	(.001)	(.000)
edyrs	-.005***	-.004	-.005	-.004**
	(.002)	(.002)	(.003)	(.002)
age	-.000	.000	-.000	-.000
	(.001)	(.001)	(.001)	(.001)
male	.016	-.001	.001	.013
	(.009)	(.011)	(.016)	(0.10)
married	-.027	-.001	-.001	-.004
	(.018)	(.018)	(.025)	(.012)
aprent	.003	.001	.001	.044*
	(.010)	(.025)	(.036)	(.024)
nkids7-18	-.015***	.015*	.020*	.016*
	(.005)	(.009)	(.012)	(.006)
regional dummies	sign.	sign.	sign.	sign.
CR4	.093**	.101**	.148**	.064**
	.029	(.049)	(.067)	(.032)
cash_cl		-.393**		
		(.132)		
cash_sales			-.914	
			(.689)	
c6bank				.037***
				(.011)
c6telphp				.009
				(.023)
c6roads				.000
				(.000)
Observations	3910	948	891	3318
Log likelihood	-1062	-272	-269	-869
Pseudo R^2	.062	0.152	0.140	.079

*** 1%; ** 5%; * 10%; S.E. in parentheses, adjusted for clustering at the PSU level (1,4) or at the firm level (2,3)

Table C: Descriptive statistics

Variable	Obs	Mean	Std.dev.	Min	Max
move	4961	.17	.38	0	1
hhincome, def	5302	.46	.55	0	6.18
jobsyr	4101	8.62	8.67	1	44
edyrs	5288	12.19	2.78	0	27
age	5302	43.83	12.32	20	60
male	5302	.49	.49	0	1
married	5286	.72	.45	0	1
aprent	5285	.054	.23	0	1
nkids7-18	5302	.73	.88	0	7
CR4	5302	.59	.29	.07	1
inkind	4036	.084	.28	0	1
cash_cl	1134	.08	.32	0	1.89
cash_sales	849	.009	.024	0	.42
c6bank	5119	1.06	.24	1	2
c6telphp	4489	35.99	22.91	.2	98
c6roads	5122	1.87	.66	1	4
wantmove	5302	.087	.28	0	1