FOREIGN TAKEOVERS AND WAGE DISPERSION IN HUNGARY

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Abstract

This study tests FDI technology spillover models with the assumption that learning takes time against wage bargaining models by estimating the wage-premium of a foreign takeover. The technology spillover theory predicts a larger wage growth in firms taken over by foreign investors than in local firms. However, this wage growth should be confined to high-skilled workers or workers with a high level of education. Wage bargaining models also predict such a wage growth. But it should be confined to workers who are organized in trade unions, i.e. workers with low or medium level of education or skill. We apply Hungarian employee-employer matched data from 1992 until 2001, and reject the FDI technology spillover model in favor of the wage bargaining model when differentiating the wage premium by education or occupation, both by applying Mincer wage regressions and the nearest-neighbor matching method.

JEL Code: E24, F16, F23.

Keywords: FDI, foreign takeover, cross-border M&A, Mincer wage regression, employee-employer matched data, nearest-neighbor matching.

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1 Introduction

International technology transfer has been viewed as a major channel through which less developed countries catch up to the rich (Grossman and Helpman, 1991). More recently, industrial countries become aware that technology transfer – whether legal or not - in the sectors of their comparative advantage may actually deteriorate their welfare (Samuelson, 2004). Whether viewed as a curse or blessing, investigating existence and extent of international technology transfer is of interest to both sides.

One channel of technology transfer is foreign direct investment (FDI). According to theory, workers learn a superior technology in foreign affiliates and transmit this knowledge to local competitors through worker turnover or spin-offs. Since it is impossible to directly measure knowledge transmission embodied in workers, theory provides an indirect measure: multinational enterprises (MNEs) are willing to pay an extra amount of wages to discourage worker turnover and prevent thereby leakage of superior technology to local competitors. The wage premium measures then the economic value of the local competitor's productivity gain from potential technology-spillover effects (Fosfuri et al., 2001, Glass and Saggi, 2002).[2]

Recent extensions have specified this insight: Malchow-Møller et al. (2007) and Urban (2007) argue that learning foreign technology takes time. Then MNEs can offer contracts where higher wages are paid by the MNE than by indigenous firms after learning and lower wages before. Hence, econometric estimates need to take the wage-premium time-profile into account to avoid inconsistent estimates. Some evidence for faster wage growth of workers in foreign affiliates compared to local firms is found in Malchow-Møller et al. (2007) for

[2] An alternative investigation estimates the productivity of local firms in dependence of their share of workers with MNE experience. See Görg and Strobl (2005) for Ghana and Balsvik (2006) for Norway.

Denmark. Moreover, Csengödi et al. (2008) find that the wage premium rises over time after a takeover took place in Hungary.[3]

However, there is an alternative explanation for this time profile. Görg et al. (2007) develops a bargaining model where a rising wage premium is explained without the threat of a technology transfer from foreign affiliates to local firms. Because of their bargaining power, workers simply get a share of the rents that result from the faster productivity growth of the foreign affiliate.

The purpose of our paper is to test technology spillover models against such a bargaining model to exclude that the wage premium profile is caused by factors other than a potential technology transfer. We discriminate the two models by the prediction that the wage premium should materialize among high-skilled or well-educated workers if the technology spillover is the explanation for the wage premium, because they have the largest absorptive capacity for new technology. Instead, the wage premium should materialize among low- and medium-skilled or less-educated workers if the bargaining model is the explanation, because rent sharing is the more likely the better organized a group of workers is. However, less-skilled workers are typically better organized while high-skilled workers fear to undermine future promotion opportunities when threatening the management with a strike, for example.

To pursue this test, we resort to the natural experiment of a foreign takeover. The further is the takeover event in the past the more time have (tenured) workers had to experience the foreign technology. Hence, we estimate monthly gross wages of employees during the last ten years in Hungary, investigate the wage premium by the number of years before and after a foreign takeover, and differentiate this wage premium further by either education or (broad) occupation groups. Methodologically, we follow Brown et al. (2006a, 2006b) by applying the

[3] In a similar fashion Møen (2005) finds on Norway that technical staff in R&D intensive firms pay for the knowledge they accumulate on the job through lower wages early in their career.

preprogram test of Heckman and Hotz (1989) to control for self-selection effects. And we follow Girma and Görg (2007) and Csengödi et al. (2008) by applying the nearest-neighbor matching method of Rosenbaum and Rubin (1983) to establish causality.

Our main result is that the foreign-firm wage premium grows over the years after a foreign takeover only of workers with low or medium levels of education and for blue-collar and white-collar low-skilled workers but not for workers with a high level of education or white-collar high-skilled workers. Hence, we reject the FDI technology spillover model in favor of the wage bargaining model on Hungarian data.

Our paper relates directly to similar estimations of the wage premium of foreign takeovers differentiated by skill or education. Görg and Girma (2007) shows for the UK that US affiliates pay a significant wage premium directly after takeover for high skilled workers, but the wage premium emerges only two years after takeover for unskilled workers. Results on Portugal are ambiguous: while Almeida (2007) presents a significant and positive 2% wage premium for low-educated and a 4% premium for higher educated workers of firms that have been taken over by foreign investors, Martins (2004) reports an insignificant wage premium. Heyman et al. (2006) finds a wage premium for top managers but not for other employees in Sweden. Moreover, this positive wage premium emerges not only after foreign acquisition but after *any* acquisition. Pesola (2006) finds for Finland that local firms compensate the years of experience at a foreign affiliate only of workers with university degree. Instead, Andrews et al. (2007) does not find that foreign-owned firms appear to reward more highly-skilled occupations or more highly qualified individuals, applying difference-in-difference methods to German employee-employer matched data.

The difference in the results is likely to be due to the choice of country in the analysis. Hungary is an interesting country to investigate FDI technology spillover effects because of

three reasons: First, Hungary was first completely isolated from Western technology and suddenly opened up to foreign investors by large-scale privatization and FDI liberalization. Second, the Hungarian workforce is relatively educated such that there is a large absorptive capacity for foreign technology. Third, Hungary has a firm-based collective bargaining system. Hence, the environment is fertile to firm-level rent-sharing and technology spillovers. This is in contrast to studies of Martins (2004) and Almeida (2007) on Portugal, Heyman et al. (2006) on Sweden, Pesola (2006) on Finland, and Andrews et al. (2007) on Germany, where wages are much more inflexible or the scope for technology spillovers limited.

The rest of the paper is structured as follows: Section 2 presents a short overview of the existing theory on the foreign wage premium and derives our empirical hypotheses; section 3 describes our estimation equation; section 4 describes the data and the construction of a full and a matched sample; section 5 contains our results; and section 6 concludes.

2 Theory

The theoretical literature addressing foreign-firm wage premia offers several potential explanations for the observation that foreign firms pay higher wages than domestically-owned ones for the same type of worker.

One type of model considers the wage premium as a means to hinder, or reduce knowledge spillovers. Fosfuri et al. (2001) and Glass and Saggi (2002) assume foreign-owned firms to have a technology superior to domestically-owned firms. Workers of foreign-owned firms might spill over the superior knowledge to local competitors when they transit, thereby reducing the competitive edge of the foreign-owned firm. Wage premia give a disincentive to worker mobility and therefore reduce the knowledge spillover occurring from worker

turnover. However, if learning from foreign technology takes time rather than occurs instantly (Malchow-Møller et al., 2006; Urban, 2007), foreign-owned firms will pay lower wages before and higher after the appropriation of its technology. Overall, expected life-time income of an employee must be equal irrespective of being employed in a foreign-owned or a domestically-owned firm.

Differentiating the wage premium by skills, however, high-skilled workers should benefit most in the case when technology spillovers explain the wage premium. High-skilled workers have the largest absorptive capacity to learn new technologies, whereas less-skilled workers have little potential for learning and transferring technology, if any at all.

Another type of model explains the foreign-firm wage premium by rent sharing of owners and employees in a bargaining game (Görg et al., 2007). Foreign-owned firms have firm-specific assets giving rise to a productivity advantage. Since the resulting rents are shared with the workers, the return to human capital is larger there than in domestically-owned firms. Hence, workers accumulate more human capital by on-the-job training over time in foreign-owned firms.

In the model of Görg et al. (2007), the wage rise is restricted only to those workers taking part in the training on the job. But, more generally, rent sharing models explain wage premia of all types of workers, regardless of their skills, if they only have bargaining power.[4,5] Contrary to the technology spillover explanation, the wage premium should be largest among those

[4] Empirical evidence for rent sharing within MNEs is provided by Budd et al. (2005).

[5] Of course, the wage premium may be an econometric artefact, as well. For example, it may rest on some sort of self-selection of workers along unobservable characteristics. An example of this type of explanation is the model in Mody et al. (2003). MNEs are assumed to have a superior technology in screening investment projects. Hence, they will end up acquiring the most productive indigenous firms. If productivity of domestic firms is based on unobservable worker characteristics, then MNEs appear to the econometrician as if they acquire firms that pay an inexplicable wage premium. Although not formally developed, efficiency wage theories such as Shapiro and Stiglitz (1984) suggest that some firms might pay higher wages than others to set work incentives in the presence of shirking. Presumably, MNEs are more likely to be the firms that play the high-wage strategy and attract the more productive workers.

workers which have the largest bargaining power. If anything, the bargaining power is largest among workers which are organized in trade unions. Those are typically not the high-skilled but the low- and medium-skilled workers. High-skilled workers fear to loose future promotion opportunities if they engage into strikes and other activities to increase their rent.

Since we have data on foreign takeovers in Hungary, we consider them as a natural experiment: The further is the takeover event in the past the more time have workers had to experience the foreign technology. Hence, we study how the wage premium evolves over time from the takeover event onwards. The FDI technology spillover and the bargaining model have distinctive predictions on the wage-premium time-profile after the takeover of a domestic firm by a foreign investor when differentiated into highly educated and low or medium educated workers:

Hypothesis A: *Technology spillover model when knowledge absorption takes time*. Right after a domestically-owned firm is acquired by a foreign investor, highly educated workers face an immediate wage decline that is followed up by a wage increase at a later time. The time pattern is weaker if existent at all for workers with medium or low education or skill (Malchow-Møller et al., 2006, and Urban, 2007).

Hypothesis B: B*argaining model with learning*. After a domestically-owned firm is acquired by its new foreign owner, a gradual built-up of a wage premium can be seen for the same (type of) low- and medium educated workers. The time pattern is weaker if existent at all for highly educated workers (Görg et al., 2007, and Budd et al., 2005).

We will discriminate the two hypotheses by comparing the time profiles of the wage premium among workers with different education or skill levels.

3 Estimation methodology

We investigate the wage premium of employees in firms that were domestically owned and have been acquired by foreign investors. We follow in the methodology both the pre-test technique of Heckman and Hotz (1989), applied to Hungarian privatizations by Brown et al. (2006a, 2006b), and a matching methodology such as in Girma and Görg (2007) and Csengödi et al. (2008). For this purpose, we employ two different samples of employee-employer matched data on Hungary - the full sample and the matched sample the description of which is postponed to the following section.

We estimate Mincer-wage regressions augmented by foreign ownership dummies including the following variables:

$$Wage_{ijt} = \beta_1' Ownerhip_{jt} + \beta_2' Wor\ker_{ijt} + \beta_3' Firm_{jt} + d_j \cdot D_j + d_t \cdot D_t + \varepsilon_{ijt}. \quad (1)$$

The **dependent variable** is the log-employee-monthly gross wage of worker *i* in firm *j* at time *t*, $Wage_{ijt}$. As we focus on foreign takeovers rather than foreign-owned firms per se, and the **variable of interest** is the time profile of wage-differentials, we apply a set of foreign ownership dummy variables ($Ownership_{jt}$), one with value 1 in the year of the ownership change, another one with value 1 for observations when ownership change will occur later in the sample, and still others when an ownership change occurred 1, 2, 3, and 4 or more years, ago[6]. To avoid large breaks in the composition of takeover firms, we require that they are at least for four subsequent time periods in the sample to be included in the takeover dummies. We also add ownership-change variables for foreign firms that become domestically owned and for foreign-owned firms without ownership change separated by the length of their stay in the sample.

[6] Such a trajectory investigation was applied to firm-productivity changes of 4 former socialist countries including Hungary after privatization in Brown et al. (2006a) and Brown et al. (2006b).

Worker characteristics, $Worker_{ijt}$, are gender, a 4th order polynomial in total work experience, education and broad occupation categories. **Firm characteristics**, $Firm_{jt}$, are firm size classes in terms of employment, average labor productivity and capital intensity. Details are given in the data section below. In addition, there are **dummy variables**, D_t and D_j, for industry, region, and year. Sometimes, we use also firm-fixed effects instead of industry-fixed effects, or a very detailed occupation-fixed effect vector instead of dummies for broad occupation classes. These control variables are identical to Csengödi et al. (2008).

To discriminate hypothesis A from B, we split our samples by three education or alternatively by three broad occupation groups[7] and apply firm- and occupation-fixed effect estimators with firm-by-year clustered standard errors for each sub-sample, respectively.

The three education categories are:

- Low education: workers with primary school or vocational training as highest degree;
- Medium education: workers with finished secondary school degree at highest;
- High education: workers with a college or university degree.

Alternatively, the three broad occupation categories[8] are:

- Blue-collar workers: workers in jobs requiring basic physical skills or experience;
- White-collar low-skilled: workers employed in mainly administrative, routine based white-collar non-managerial positions;
- White-collar high-skilled: professionals with decision making competence except for strategic decision making (non-managerial position[9]).

[7] For a more detailed description of the education and broad occupation categories see Table 2 in the following data section.
[8] The three broad occupation categories are taken from Kertesi and Köllő (2001).
[9] We follow Csengödi et al. (2008) in excluding the top managers (employees with strategic decision making competence) from the analysis both if the sample is split by education groups, or by broad occupation groups.

A similar differentiation of the wage premium by skill or education group is undertaken by Heyman et al. (2006) for Sweden and Girma and Görg (2007) for the UK.

4 Data description

Since we apply our estimates both on the full sample and a matched sample, we first describe the full sample and then the matched one.

4.1 The full sample

We use data from the years 1992 to 2001 of Hungarian manufacturing firms and their employees based on the Hungarian Labor Office's Structure of Earnings Survey (SES)[10,11]. SES is a 5-6% sample of the total Hungarian registered workforce employed full time by companies with at least 20 full-time workers. Data collection occurs every year in May since 1992 on a random basis.[12] If an employee is observed its employer is observed, too. While the SES is a representative sample of workers, it is not representative among firms, because small firms may drop out of the sample if none of its workers is drawn.

The reason behind it is that many in that position might be foreigners, who were previously employed at the acquiring firm in the home country. Since those workers are not affected by technology spillovers through foreign acquisitions, theory requires excluding those foreign managers. As we can not unambiguously identify them in our sample, but find a very large standard deviation of wages in the occupation group of top management after foreign takeover, we exclude this group alltogether.

[10] The authors are grateful to the Institute of Economics of the Hungarian Academy of Sciences for providing this dataset.

[11] A study of the foreign-firm wage premium on all sectors of Hungary is Earle and Telegdy (2007), which, however, does not analyze foreign takeovers.

[12] There are also data available for 1986 and 1989, but we do not apply them, because Hungary was not a market economy at this time.

The SES data contain information on employee-level about gender, education, age and occupation (classified by HSCO-93[13]) in addition to the monthly gross earnings and other wage components. There are also firm-level information in the SES like the number of total employees in a firm, industry (2 digit NACE classification), location, and number of the firm's blue- and white-collar workers. Merging employers' profit and loss account data with the SES data using firm-identifiers, we obtain the called-up share of capital, the equity share of different types of owners (foreign, domestic private or state ownership), capital stock, income and cost structure information of employers, too.[14] Unfortunately, the data collection methodology of SES does not allow us to follow individuals across years, but we are able to follow firms across years. Hence, we construct a panel of (SES-sampled) firms.

The dependent variable in our analysis is the monthly gross earnings of an employee. It includes the monthly gross wage, ordinary allowances (overtime or nightshift allowances) and 1/12 part of the unordinary premium received in the previous year[15].

The right-hand-side variables of our interest are the ones identifying ownership and the (future or past) change in ownership to capture the time profile of the foreign-wage premium. Following Heyman et al. (2007) and Csengödi et al. (2008), we consider a firm to be foreign owned if the share of foreign owners in the called up share of capital exceeds 50%. We choose this threshold of 50%, because our objective is to test technology spillover theories and a foreign-owned firm is only willing to transfer its cutting-edge technology to the foreign subsidiary if it has at least majority control over this plant.[16]

[13] The Hungarian Standard Classification of Occupations (HSCO 93) – a classification introduced by the Cental Statistical Office in Hungary in 1993 – differentiates between more than 600 occupation categories.
[14] Hardly any foreign takeovers of state-owned firms occured in our sample. Privatization of manufacturing occured by and large before our sample period. Brown et al. (2006b) report that about three quarters of all manufacturing firms were privatized by 1994.
[15] See Kertesi and Köllő (2001) for more details on the dependent variable.
[16] In addition, our results stay robust even when defining foreign ownership by a 10% ownership share of foreign capital. Results on this threshold are available from the authors upon request.

There are 3 types of foreign-owned firms in our dataset. A firm might enter the sample as domestically owned and turn its ownership into foreign in a latter year. These firms are called "foreign takeovers of domestic firms" [17]. A firm might enter as foreign owned, but its foreign participation rate drops below the foreign-ownership threshold in a subsequent year. These firms are called "domestic takeovers of foreign-owned firms". A firm might enter the dataset as a foreign owned one and its foreign participation rate stays above the 50% threshold value throughout its sample life. We call them "unclassified firms".

Unfortunately, we cannot be sure whether the firms of the latter type are greenfield investments, although many of them probably are. Particularly, if a firm of the last type is small, it may not have been sampled before, although it existed. But then, this firm may have experienced an ownership change outside the sample and thus may be a foreign takeover. Moreover, we know for some years whether a worker was previously employed in a firm. We find frequently foreign-owned firms that enter our sample but employed already at least one worker in previous years. Hence, there may be additional takeovers among those firms that we observe as foreign-owned throughout their sample life. Vice versa, instead, we can be sure about all cases that we identify as foreign takeovers.

In case of 7 firms (3856 observations), we identified multiple ownership changes. Following Görg and Girma (2007) and Heyman et al. (2007), we exclude them from the analysis.[18] The variable definitions are all summarized in Table 1.

[17] Originally, the firm identifier changed if a completely new owner took over a company, but stayed the same if the foreign owner had previously a minority stake. However, Gábor Kőrösi (Institute of Economics of the Hungarian Academy of Sciences) figured out firm identifier changes that occured when existing plants changed ownership. We use this information for detecting takeovers.

[18] An unreported regression on a sample including observations of employees in firms with multiple ownership changes shows that this hardly affects our estimates.

Table 1: Data description

Variable name:	Data definition	Data source
Gross wages	Logarithm of monthly gross earnings including monthly gross basic wage as reported in the month May of each year, ordinary allowances (e.g. overtime or nightshift allowances) and 1/12th of the annual unordinary premium received in the previous year, deflated by consumer price index	SES
Foreign ownership	50% of called up equity share is held by foreign investors; robustness check changes threshold value to 10%	PLA
Year of ownership change	A firm is domestically owned on January 1 and foreign owned on December 31 of a year	PLA
x years before ownership change	x th, x={1 year, 2 years, 3 years, 4 or more years}, time lag of foreign ownership dummy	PLA
x years after ownership change	x th, x={1 year, 2 years, 3 years, 4 or more years}, time forward of foreign ownership dummy	PLA
Dummies for ownership change from foreign to domestic	The same set of dummy variables as above except for that ownership change of a firm goes from foreign to domestic	PLA
Unclassified firms	Firms that enter the dataset as foreign-owned and stay foreign-owned throughout sample life; primarily Greenfield investments but also unidentifiable foreign takeovers when takeover year is outside the sample; dummy variables by year after entry into dataset	PLA
EDUCATIONx	x=1: dummy with value 1 if employee has successfully attended vocational school as highest degree; x=2: Dummy with value 1 if employee holds as highest degree one from secondary school; x=3: Dummy with value one if employee attained successfully higher education; education lower than vocational training is left out category	SES
EXPERIENCE^x x=1,…,4	Age minus years spent in school minus common entry age into school (6 years) to the power of x	SES
4-digit occupation code	HSCO-93 code with 539 categories available from 1994 onwards	SES
White-collar high-skilled	High-skilled workers not in managerial positions with HSCO-93 code 1110-1134, 1211, 1212, 1221, 1311, 1312, 1342, 1346; professionals, workers with high education but without strategic decision making competence	SES
White-collar low-skilled	Employees with HSCO-93 codes of 1001 – 4299 except white-collar high-skilled workers; Office management: mainly administrative or routine based tasks which require secondary or technical school qualification. There is large work dependency and lack of individual decision making.	SES

Table 1 cont.

Blue-collar	Occupations where knowledge and experience is necessary to operate machines or to drive vehicles; physical skills and experiences are needed related to material and non-material services; required is a knowledge of materials and tools used and instruments applied in the course of the working process, or knowledge of single stages of production.	
Male	Gender dummy with value 1 if male	SES
Log average labor productivity of firm	Logarithm of deflated value added per employee	PLA
Log capital-intensity	Logarithm of deflated book value of fixed assets per employee	PLA
Firm size categories	Dummy variables for the firm size classes with 21-50, 51-300, 301-1000, 1001-3000, and more than 3000 employees	PLA
Region dummies	Each of 7 NUTS 2 regions of Hungary are divided up into country side, cities, and county capitals in addition to the region Budapest; region code based on plant location information	Fazekas (2000)
Industry dummies	NACE 2-digit code	PLA

Abbreviations: SES is "Structure of Earnings Survey" of the Hungarian Public Employment Service: a 6-7% sample of Hungarian employees from 1992 until 2001 (we used only observations of employees employed by manufacturing firms with at least 20 employees); PLA is Profit and Loss Account Data of the Hungarian Tax and Financial Control Office: yearly balance-sheet and tax declaration information of firms whose employees are sampled in the SES dataset – ECOSTAT Ltd provided great help in collecting firm data and constructing the merged dataset.

Our 10-year panel contains 346674 full-time employee observations of 7198 different firms all together. The number of the sampled firms increases from 2189 to 2925 over the years, the number of employee observations in a year from 30093 to 37473. This reflects both the growth of the Hungarian manufacturing sector as well as the increasing significance of inward FDI. Table 2 shows the decomposition of firm types within our sample in each year.

Table 2: Domestic and foreign-owned firms and number of ownership changes in the sample

Year	# indigenous firms	# foreign-owned firms	# new foreign takeovers of domestic firms	# new domestic takeovers of foreign firms	# new unclassified firms with foreign ownership
1992	1950	239	28	8	205
1993	2110	426	22	3	183
1994	2197	513	31	9	114
1995	1968	583	25	10	121
1996	1821	613	25	21	73
1997	1779	653	18	12	85
1998	1817	681	12	25	81
1999	1885	728	27	17	96
2000	2076	843	26	20	139
2001	2093	832	-	-	100
Total	-	-	214	125	-

Source: SES database and own calculations.

Firms stay on average 5.6 years out of the maximum of 10 in the sample. In our dataset, there are 214 foreign takeovers of domestic firms (6958 employee observations in the year of takeover), and 125 domestic takeovers of foreign-owned firms (2117 employee observations in the year of ownership change). Foreign takeovers are more or less evenly spread over the sample period and we do not expect any disturbances of our results from particular events or the sample window.

4.2 The matched sample

Constructing a matched control group based on the nearest neighbor matching method, we extract the treatment group, i.e. all firms one year before a foreign takeover, and the unmatched control group, i.e. the group of domestically-owned firms that are not taken over by foreign investors during their sample life. Then, we run a logit estimation on this firm sample where we estimate the probability that a firm is going to be taken over by foreign investors during the following year:

$$Takeover^{*}_{j,t+1} = \gamma' z_{jt} + D_t + D_k + \upsilon_{jt}, \qquad Takeover_{j,t+1} = 1[Takeover^{*}_{j,t+1} > 0]. \tag{2}$$

$Takeover_{jt}$ is a dummy variable with value one if firm j is taken over by a foreign investor in year t, and zero otherwise. The **selection variables**, z_{jt}, in the baseline logit equation are log-employment, log-average labor productivity, log-capital intensity, the export share, the export share interacted with log-employment in addition to industry-, and year dummies, D_k and D_t, respectively.[19] The estimates of the takeover probability from specification (2) are reported in Table 3.

Table 3: Logit estimates of propensity score

Dependent variable: Foreign takeover dummy	Logit baseline (1)	Logit modification (2)
Log average labor productivity of firm	0.25*	0.24
	(1.66)	(1.62)
Log capital-intensity	0.26**	0.24**
	(2.38)	(2.05)
Export share	4.00***	4.00***
	(2.75)	(2.74)
Log employment	0.65***	0.65***
	(4.96)	(4.93)
Exportshare*log employment	-0.59***	-0.58***
	(-2.07)	(-2.06)
Log capital intensity* log labor productivity	-	-0.08
		(-0.95)
Pseudo R^2	0.09	0.09
Observations	14 827	14 827

Notes: t-values are in parenthesis. *** denotes 99% significance level, ** 95%, 90%; Industry and year dummies included.

Next, we create a matched control group by nearest-neighbor matching with replacement such that we match to each firm in the treatment group the firm from the unmatched control group

[19] These are similar to the ones used by Heyman et al. (2007) and Görg and Girma (2007) and identical to the ones used in Csengödi et al. (2008).

with the closest probability of being taken over. When several nearest neighbors exist, we include all of them, adjusting the matching weights accordingly. If a firm from the control group is several times a nearest neighbor, then matching weights are also adjusted accordingly. [20] Each employee observation obtains the sum of all matching weights of the firm to which a worker belongs at a time.

Table 4: Balancing test

Covariate	Sample	Mean treatment group	Mean control group	Per-cent bias	Percent bias re-duction	Mean-diff. t-stat (p-value)
Log average labor productivity of firm	Unmatched	-0.39	-0.78	50.3		-5.82 (0.00)
	Matched	-0.39	-0.40	1.1	97.9	-0.08 (0.94)
Log capital-intensity	Unmatched	-0.49	-1.31	61.4		-6.05 (0.00)
	Matched	-0.49	-0.54	4.2	93.2	-0.32 (0.75)
Export share	unmatched	0.32	0.21	34		-3.15 (0.00)
	matched	0.32	0.35	-9.1	73.3	0.61 (0.54)
Log employment	Unmatched	5.38	4.54	71.5		-6.75 (0.00)
	Matched	5.38	5.27	9.1	87.3	-0.56 (0.58)
Exportshare*log employment	unmatched	1.76	1.06	40.4		-1.00 (0.32)
	matched	1.76	1.86	-6.2	84.7	-0.41 (0.68)
Log employment* log average labor productivity	Unmatched	-1.88	-3.52	42.8		-3.66 (0.00)
	Matched	-1.88	-1.64	-6.2	85.4	0.34 (0.74)

Notes: Balancing of industry and year dummies is not reported; All dummies have a percent bias below 20. Mean-diff. is mean-difference test with standard deviations differing between treatment and control group; All unreported mean-difference tests on industry- and year dummies are insignificant.

Matching estimators are biased unless the conditional independence assumption holds, i.e. the outcome in the treatment and the no-treatment case are independent of unobservable characteristics of the participation decision. Under this assumption the selection variables are

[20] Formally, we construct the matching weights as follows. First, define the estimated propensity scores $\hat{p}_i$ of the treatment group and $\hat{p}_j$ of the control group from the logit regression. Then, form the set of nearest neighbours $C_i = \left\{ \arg\inf_j \left| \hat{p}_i - \hat{p}_j \right| \right\}$ for each observation in the treatment group T, $i \in T$. Thereafter, denote the number of observations in the set C_i by $|C_i|$. Next, we obtain the matching weight as: $weight_j = \sum_{i \in T} \frac{1[j \in C_i]}{|C_i|}$ for all observations j in the control group, $j \in NT$, $weight_j = 1$ for all observations in the treatment group, $j \in T$, and $weight_j = 0$, otherwise.

balanced between the treatment and matched-control group (Rosenbaum and Rubin, 1983). Lack of balancing points at violation of the conditional independence assumption or other misspecifications of the propensity score estimates. We employ three different balancing tests. The first one is the standardized difference between treatment and matched-control group of all selection variables each at a time (see, e.g., Caliendo and Kopeinig, 2008). Although there is no significance level on this statistic available, Rosenbaum and Rubin (1985) call the standardized difference large if it exceeds 20%. The second test is a mean-difference t-test with standard deviations differing in treatment and matched-control group. These two tests are reported in Table 4 and balancing cannot be rejected.

A third test is the one of Hotelling that checks balancing within each quintile over all variables jointly. Again, balancing cannot be rejected according to the test results in Table 5.

Table 5: Hotelling's T-squared test by propensity score quintile

Quintile	T-squared statistics	F-test statistics	p-value
First	27.72	0.62	0.85
Second	66.20	1.49	0.20
Third	26.82	0.65	0.82
Fourth	24.72	0.68	0.79
Fifth	32.32	1.08	0.43

Overall, the balancing tests ensure that our matched sample does not violate the conditional independence assumption which is required later for the matching estimates.

5 Results

We first investigate in the following subsection the time profile of the wage premium after foreign takeovers on the full sample. Thereafter, we apply the same analysis to the matched sample.

5.1 Results on the full sample

First, we estimate wage regressions on the three subsamples of employees with low-education, medium-education and high-education, respectively. Columns (1)-(3) of Table 6 present the results of wage regressions with occupation-fixed effects[21] while columns (4)-(6) contain firm-fixed effect regression results.

One dummy called "before ownership change" takes value one if an employee observation belongs to a firm that will be taken over by foreign investors at a later year in the sample. [22] Another dummy – called "year of ownership change" – marks all employees in firms that experience an ownership change from domestic to foreign. Dummies called "one-, two-, three-, and four or more years after takeover" indicate observations of previously domestically owned firms (and their employees) that were taken over by foreign investors one-, two, three, and four or more years ago.

Regardless of the education group of workers or type of fixed effect, we face more or less the same pattern of wage-evolution. Before firms are taken over by foreigners, their wages are not significantly different from other domestically-owned firms (indicated with the letter A in Table 6). In the year of takeover (indicated with B), a significant wage hike shows up and disappears right after the year of the takeover (indicated with C). In the years after foreign takeover, there is a gradual build-up of a wage premium that turns to be significantly higher 4 or more years after takeover (indicated with D) than the wage level that the same type of workers earns in domestically-owned firms. A formal Wald test indicates that the wage premium is significantly larger 4 or more years after foreign takeover (D) compared to the

[21] The occupation code HSCO 93 is not available during the years 1992 and 1993 and observations over these two years are thus left out of the analysis when applying occupation fixed effects.
[22] The dummy variable „before ownership change" relates only to one year before takeover in all firm-fixed effect specifications to avoid a dummy variable trap. In all other cases, it relates to all observations of employees in firms before being taken over by foreign investors.

first year after foreign takeover (C) regardless of the education group.

Table 6: Wage regressions by education group on full sample

Dependent variable: gross monthly wages	Occup.FE low education	Occup.FE medium education	Occup.FE high education	Firm-FE low education	Firm-FE medium education	Firm-FE high education
	(1)	(2)	(3)	(4)	(5)	(6)
before ownership change (A)	-0.00	-0.02	0.02	-0.00	0.02	0.04
	(-0.05)	(-0.73)	(0.50)	(-0.11)	(0.90)	(0.95)
year of ownership change (B)	0.09**	0.12**	0.21***	0.11**	0.18**	0.24**
	(2.15)	(1.99)	(3.07)	(2.41)	(2.47)	(2.41)
1-year after ownership change (C)	0.04*	0.03	0.06**	0.07**	0.08***	0.11***
	(1.58)	(1.12)	(2.08)	(3.57)	(4.89)	(3.48)
2-years after ownership change	0.09***	0.03	0.05	0.11***	0.10***	0.10***
	(3.74)	(1.26)	(1.36)	(5.28)	(3.52)	(2.77)
3-years after ownership change	0.11***	0.12***	0.13***	0.13***	0.15***	0.09*
	(6.74)	(4.71)	(3.29)	(5.72)	(5.25)	(1.92)
4- or more years after ownership change (D)	0.13***	0.15***	0.21***	0.16***	0.20***	0.18***
	(8.61)	(8.14)	(6.90)	(6.89)	(6.28)	(4.13)
Ho: (A)=(B)	3.64*	3.49*	5.48**	8.07***	5.46**	4.30**
	(0.06)	(0.06)	(0.02)	(0.00)	(0.02)	(0.04)
Ho: (A)=(C)	2.14	3.48*	2.73*	15.18***	9.43***	2.39
	(0.14)	(0.06)	(0.10)	(0.00)	(0.00)	(0.12)
Ho: (C)=(D)	10.24***	17.17***	12.41***	23.28***	19.97***	4.25**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.04)
R^2	0.52	0.51	0.54	0.63	0.59	0.60
Observations	166 438	78 027	24777	208 029	97 477	31 108

Notes: clustered t-values are in parenthesis. *** denotes 99% significance level, ** 95%, * 90%. Occup.FE controls for 539 occupation dummies. Wald-test on parameter constraints: Probability of insignificance of Ho in parenthesis. Additional control variables include firm size categories, year dummies, 2-digit industry dummies and region dummies, EDUCATION1, EDUCATION2, EDUCATION3, EDUCATION4, EXPERIENCE1, EXPERIENCE2, EXPERIENCE3, EXPERIENCE4, white-collar managerial and non-managerial, male, log average labor productivity of firm, log capital intensity. Dummy variables for unclassified firms and for domestic takeovers of foreign owned firms are always included.

Hence, we cannot discriminate our two hypotheses from this estimate alone.

Takeover target firms might have unobservable characteristics that bias wages upward. However, the same characteristics may render these firms attractive to foreign investors (self-selection effect). In this case, we would find wage premia of takeover firms in our estimates, although there is no causal effect from the takeover on wages itself. In order to check for this self-selection effect, one can apply the preprogram test of Heckman and Hotz (1989), examining whether the coefficient on the "before ownership change" dummy is significantly different from zero. For if it is significantly positive, takeover firms have paid already higher wages before takeover, indicating the existence of such unobservable characteristics. However, this coefficient is not significant in any specification and such self-selection effects are thus absent.[23]

The significant wage hike in the year of foreign acquisition can be considered as a restructuring that takes place immediately after takeover. It is well described by a substantial change in the workforce: labor productivity rises immediately, as well, presumably because the unproductive workforce is laid off; parallel to the reduction of the overall workforce a significant increase can be observed in the share of new workers (from 9% to 24%) in the year of takeover, while the share of workers with college or university degree rises from 10% before to 17% after the acquisition; If there is rent sharing, the profit increase resulting form the cut in employment will be shared with the remaining workers. Productivity of the workers might fall temporarily – and so do their wages – right after the restructuring took place because new technologies and processes are put then into practice and have to be learnt first. When new processes have become established, resulting productivity gains materialize fully

[23] We also checked in unreported regressions by means of an appropriate Wald test that the observations before takeover can be pooled together regardless of whether there are one-, two-, three-, or four and more years before takeover. Hence, we do not have any signs that rents are shifted to the old workforce before the takeover takes place (asset stripping). See Aghion et al. (1994) for managerial incentives to support or delay company restructuring and to engage into actions that shift ressources from the company into private pockets.

and wages rise again accordingly through rent sharing.[24] More details on explaining this wage hike is given in Csengödi et al. (2008) and will not be considered further in this study, since it does not help discriminating the two hypotheses on technology spillovers and wage bargaining.

In Table 7 we report both occupation- and firm-fixed effect estimation results of wage regressions when splitting the sample along the three broad occupation groups: blue collar workers, white-collar low-skilled workers, and white-collar high-skilled workers. Astonishingly, the gradually built-up long-run wage premium observed 4 years or more after the ownership has changed from domestic to foreign, exists only in the case of blue-collar and low-skilled white-collar workers. Instead, high-skilled white-collar workers do not experience a rise in the wage premium during the years after takeover according to a Wald test that compares the wage premium one year after ownership change (C) with the one 4 or more years after ownership change (D). This holds irrespective of whether applying occupation- or firm-fixed effect estimations. Hence, we have a first indication that hypothesis B rather than hypothesis A holds, favoring the bargaining model over the technology spillover model. To obtain, however, the causal effect of the foreign takeover on the wage premium, we need to apply matching techniques.

5.2 Results on the matched sample

In this subsection, we redo the estimates of Tables 6 and 7 on the matched sample. To incorporate the fact into the estimates that sometimes several identical nearest neighbors exist or one control group observation serves as nearest neighbor for several treatment observations, we use the matching weights as weights in all the following regressions.

[24] Brown et al. (2006b) reports gradual productivity gains after Hungarian privatization to foreign investors. We have found similar gradual productivity gains of foreign takeovers in unreported production function estimations on our sample.

Table 7: Wage regressions by occupation group on full sample

Dependent variable: gross monthly wages	Occup.FE Blue collar workers (1)	Occup.FE White-collar low-skilled workers (2)	Occup.FE White-collar high-skilled workers (3)	Firm-FE Blue collar workers (4)	Firm-FE White-collar low-skilled workers (5)	Firm-FE White-collar high-skilled workers (6)
before ownership change (A)	-0.00 (-0.06)	-0.02 (-0.68)	0.02 (0.25)	-0.01 (-0.67)	0.03 (0.96)	-0.03 (-0.45)
year of ownership change (B)	0.09** (2.21)	0.15** (2.19)	0.07 (0.72)	0.10** (2.10)	0.22*** (2.57)	0.15 (0.14)
1-year after ownership change (C)	0.04* (1.66)	0.03 (1.27)	0.11 (1.41)	0.05** (3.18)	0.11*** (6.45)	0.12* (1.68)
2-years after ownership change	0.07*** (2.58)	0.05 (1.48)	0.20** (2.39)	0.08*** (3.26)	0.13*** (4.99)	0.20*** (2.78)
3-years after ownership change	0.11*** (6.50)	0.13*** (4.55)	0.20** (2.49)	0.09*** (5.28)	0.16*** (6.49)	0.10 (1.16)
4- or more years after ownership change (D)	0.13*** (8.72)	0.19*** (8.41)	0.22*** (4.58)	0.12*** (6.58)	0.24*** (9.77)	0.14* (0.06)
Ho: (A)=(B)	3.70* (0.05)	4.00** (0.05)	0.21 (0.65)	6.61** (0.01)	5.25** (0.02)	3.67* (0.06)
Ho: (A)=(C)	2.51 (0.11)	3.84* (0.05)	0.95 (0.33)	13.19*** (0.00)	8.78*** (0.00)	4.87** (0.00)
Ho: (C)=(D)	12.69*** (0.00)	22.51*** (0.00)	1.78 (0.18)	16.95*** (0.00)	36.09*** (0.00)	0.09 (0.77)
R^2	0.53	0.60	0.42	0.65	0.65	0.81
Observations	191 952	77 220	6225	237 560	98 635	7 255

Notes: clustered t-values are in parenthesis. *** denotes 99% significance level, ** 95%, * 90%. Occup.FE controls for 539 occupation dummies. Wald-test on parameter constraints: Probability of insignificance of Ho in parenthesis. Additional control variables include firm size categories, year dummies, 2-digit industry dummies and region dummies, EDUCATION1, EDUCATION2, EDUCATION3, EDUCATION4, EXPERIENCE1, EXPERIENCE2, EXPERIENCE3, EXPERIENCE4, white collar managerial and non-managerial, male, log average labor productivity of firm, log capital intensity. Dummy variables for unclassified firms and for domestic takeovers of foreign owned firms are always included.

Occupation-fixed effect estimations by education group (specification (1)-(3) in Table 8) show results that are different from the ones obtained on the full sample. Now, there is no longer a gradual increase in the wage premium of workers with a high level of education when comparing the wage premium in the first year after takeover (C) with the wage premium 4 or more years after takeover (D). Still, the previously observed gradual built-up of a significant long-term wage premium of low- and medium educated workers is conserved on the matched sample. Hence, we have evidence for rejecting hypothesis A in favor of hypothesis B. According to hypothesis B, there is a productivity increase of a firm after a foreign takeover. Those workers who are organized in trade unions, i.e. the workers with a low or a medium education level, obtain a share of the resulting rents through larger wages. Were technology spillover effects the reason for the wage increase, then workers with high levels of education would have benefited the most, instead.

The result that there is a gradual increase of the wage premium after takeover for workers with low and medium education levels, but not for workers with high education levels is also robust to including either occupation or firm fixed effects into the wage regressions (specifications (4)-(6) in Table 8). Moreover, when using broad occupation groups instead of education groups in Table 9, the gradual increase of the wage premium is found for blue collar- and low-skilled white-collar workers, but not for high-skilled white-collar workers.

A small caveat applies to the estimates of column (2) in Table 8, because wages of the medium educated workers seem to be significantly lower in takeover target firms compared to their control group before takeover. However, this effect disappears in column (5) when applying firm fixed effects.

Table 8: Wage regressions by education group on matched sample

Dependent variable: gross monthly wages	Occup.FE low education	Occup.FE medium education	Occup.FE high education	Firm-FE low education	Firm-FE medium education	Firm-FE high education
	(1)	(2)	(3)	(4)	(5)	(6)
before ownership change (A)	-0.01	-0.07**	-0.07	-0.02	0.00	0.03
	(-0.33)	(-2.05)	(-1.31)	(-1.24)	(0.04)	(0.70)
year of ownership change (B)	0.04	0.04	0.13**	0.07**	0.15***	0.23***
	(1.23)	(0.96)	(1.96)	(1.70)	(2.74)	(2.83)
1-year after ownership change (C)	0.01	-0.03	-0.02	0.02	0.04*	0.06
	(0.23)	(-0.94)	(-0.36)	(0.94)	(1.73)	(1.43)
2-years after ownership change	0.05	-0.03	-0.03	0.05**	0.05*	0.05
	(1.62)	(-0.92)	(-0.54)	(2.03)	(1.81)	(1.25)
3-years after ownership change	0.07***	0.02	0.04	0.08***	0.10***	0.10*
	(2.34)	(0.55)	(0.61)	(2.95)	(3.06)	(1.92)
4- or more years after ownership change (D)	0.07***	0.07*	0.08	0.10***	0.16***	0.12**
	(2.67)	(1.82)	(1.28)	(3.12)	(4.27)	(2.20)
Ho: (A)=(B)	1.59	3.82*	8.08***	6.69***	9.40***	6.60**
	(0.21)	(0.05)	(0.00)	(0.01)	(0.00)	(0.01)
Ho: (A)=(C)	0.32	1.64	2.23	4.95**	3.37*	0.37
	(0.57)	(0.20)	(0.14)	(0.03)	(0.07)	(0.55)
Ho: (C)=(D)	4.34**	6.16**	2.35	9.86***	13.91***	1.95
	(0.04)	(0.01)	(0.13)	(0.00)	(0.00)	(0.16)
R^2	0.60	0.61	0.61	0.60	0.52	0.46
Observations	20 057	14 396	5 418	24 626	17 753	6 498

Notes: clustered t-values are in parenthesis. *** denotes 99% significance level, ** 95%, * 90%. Occup.FE controls for 539 occupation dummies. Wald-test on parameter constraints: Probability of insignificance of Ho in parenthesis. Additional control variables include firm size categories, year dummies, 2-digit industry dummies and region dummies, EDUCATION1, EDUCATION2, EDUCATION3, EDUCATION4, EXPERIENCE1, EXPERIENCE2, EXPERIENCE3, EXPERIENCE4, white collar managerial and non-managerial, male, log average labor productivity of firm, log capital intensity. Dummy variables for unclassified firms and for domestic takeovers of foreign owned firms are always included.

Table 9: Wage regressions by broad occupation group on matched sample

Dependent variable: gross monthly wages	Occup.FE Blue collar	Occup.FE White-collar low-skilled workers	Occup.FE White-collar high-skilled workers	Firm-FE Blue collar	Firm-FE Blue-collar high-skilled workers	Firm-FE White-collar high-skilled workers
	(1)	(2)	(3)	(4)	(5)	(6)
before ownership change (A)	-0.03	-0.05	0.02	0.01	0.00	-0.02
	(-1.12)	(-1.40)	(0.18)	(0.34)	(0.09)	(-0.24)
year of ownership change (B)	0.03	0.09*	0.08	0.09**	0.19**	0.16
	(0.86)	(1.65)	(0.88)	(1.96)	(2.51)	(1.58)
1-year after ownership change (C)	-0.01	-0.01	0.10	0.03	0.07	0.11
	(-0.34)	(-0.33)	(1.11)	(1.13)	(1.56)	(1.21)
2-years after ownership change	0.01	-0.00	0.16*	0.04	0.08	0.17
	(0.37)	(-0.14)	(1.79)	(1.38)	(1.64)	(1.50)
3-years after ownership change	0.03	0.06	0.23**	0.09**	0.1%***	0.16
	(1.08)	(1.42)	(2.02)	(2.53)	(2.53)	(1.21)
4- or more years after ownership change (D)	0.05	0.11***	0.18*	0.10***	0.19***	0.19
	(1.56)	(2.67)	(1.66)	(2.66)	(3.07)	(1.18)
Ho: (A)=(B)	1.90	4.31**	0.39	4.70**	7.46***	4.08**
	(0.17)	(0.04)	(0.53)	(0.03)	(0.01)	(0.04)
Ho: (A)=(C)	0.58	1.53	0.87	1.69	3.27*	3.38*
	(0.45)	(0.22)	(0.35)	(0.19)	(0.07)	(0.07)
Ho: (C)=(D)	2.90*	7.47***	0.45	7.78***	12.44***	0.50
	(0.09)	(0.01)	(0.50)	(0.01)	(0.00)	(0.48)
R^2	0.61	0.71	0.56	0.61	0.63	0.71
Observations	25 576	14 295	698	25 576	14 295	698

Notes: clustered t-values are in parenthesis. *** denotes 99% significance level, ** 95%, * 90%. Occup.FE controls for 539 occupation dummies. Wald-test on parameter constraints: Probability of insignificance of Ho in parenthesis. Additional control variables include firm size categories, year dummies, 2-digit industry dummies and region dummies, EDUCATION1, EDUCATION2, EDUCATION3, EDUCATION4, EXPERIENCE1, EXPERIENCE2, EXPERIENCE3, EXPERIENCE4, white collar managerial and non-managerial, male, log average labor productivity of firm, log capital intensity. Dummy variables for unclassified firms and for domestic takeovers of foreign owned firms are always included.

According to Dehejia (2005), our results based on the matched sample can be considered robust if a slight change in the logit selection equation does not affect our results. So we constructed another matched sample based on propensity scores that were estimated with a slightly modified logit estimation in order to carry out the robustness check. As one can see in the table of Appendix 1, there is still a gradual built-up of the wage premium of low- and medium educated workers of firms that have been taken over by foreign investors, regardless of applying occupation- or firm-fixed effect estimators. Again, both with occupation- or firm-fixed effects, the wage premium increases during the years after takeover, supporting the bargaining model and rejecting the technology spillover model.

A final test rejecting the technology spillover model investigates the initial drop in wages after takeover by comparing the wage before takeover (A) with the wage in the first year after takeover (C). Whenever a Wald test rejects equality of these two coefficients in one of the specifications reported in the Tables 6-9, the wage one year after takeover is larger, not smaller than the wage before takeover. Hence, there is no wage drop immediately after takeover which is inconsistent with the spillover model but consistent with the wage bargaining model.

6 Conclusion

We have tested an FDI technology spillover model against a wage bargaining model on an employee-employer matched dataset from Hungary over the last decade by investigating the wage premium profile before and after a foreign takeover differentiated by education or broad occupation group. An FDI technology spillover model predicts that wages drop right after a foreign takeover and rise above the previous level for all workers that increase their productivity through on the job-learning. Hence, such a wage pattern should be more likely to

be observed the higher is the qualification of a worker, since the technology absorption capacity rises with the level of qualification. The alternative bargaining model predicts, instead, that wages rise parallel to the improvement of the productivity of the acquired firm. In contrast to the spillover model, a wage rise in the course of a foreign takeover is expected among those workers who are organized in trade unions. Those are, however, usually the less-qualified workers.

When investigating the time profile of the foreign-firm wage premium before and after a takeover, we find a rise in the wage premium 4 and more years after takeover compared to one year after takeover for workers with low- and medium levels of education and for blue-collar and white-collar low-skilled workers. However, we do not find a significant wage rise among either workers with a high level of education or among white-collar high-skilled workers. Moreover, there is no initial wage drop after takeover. Hence, we reject the technology spillover model in favor of a wage bargaining model.

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APPENDIX 1

Table A1: Wage regressions by education group on modified matched sample

Dependent variable: gross monthly wages	Occup.FE low education	Occup.FE medium education	Occup.FE high education	Firm-FE low education	Firm-FE medium education	Firm-FE high education
	(1)	(2)	(3)	(4)	(5)	(6)
before ownership change (A)	-0.06**	-0.09***	-0.09*	0.00	0.02	0.01
	(-2.55)	(-2.66)	(-1.60)	(0.06)	(0.74)	(0.25)
year of ownership change (B)	0.05	0.07	0.15**	0.13**	0.20***	0.23***
	(1.10)	(1.63)	(2.27)	(2.37)	(4.13)	(3.56)
1-year after ownership change (C)	-0.02	-0.06	-0.05	0.06***	0.07***	0.02
	(-0.77)	(-1.57)	(-1.02)	(2.72)	(2.69)	(0.59)
2-years after ownership change	0.01	-0.06*	-0.08	0.08***	0.06**	-0.00
	(0.27)	(-1.82)	(-1.63)	(3.11)	(2.54)	(-0.06)
3-years after ownership change	0.04*	-0.00	-0.01	0.14***	0.12***	0.04
	(1.90)	(-0.13)	(-0.21)	(4.33)	(3.79)	(0.72)
4- or more years after ownership change (D)	0.05**	0.03	0.03	0.14***	0.17***	0.06
	(2.03)	(0.85)	(0.47)	(4.13)	(4.62)	(1.00)
Ho: (A)=(B)	4.12**	9.93***	14.45***	7.57***	18.14***	11.85***
	(0.04)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Ho: (A)=(C)	2.63	1.89	0.92	9.77***	4.74**	0.08
	(0.11)	(0.17)	(0.34)	(0.00)	(0.03)	(0.77)
Ho: (C)=(D)	5.03**	4.91**	1.66	10.96***	11.79***	0.57
	(0.03)	(0.03)	(0.20)	(0.00)	(0.00)	(0.45)
R^2	0.67	0.62	0.63	0.64	0.51	0.47
Observations	19 908	13 660	5 160	24 280	16 783	6 227

Notes: clustered t-values are in parenthesis. *** denotes 99% significance level, ** 95%, * 90%. Occup.FE controls for 539 occupation dummies. Wald-test on parameter constraints: Probability of insignificance of Ho in parenthesis. Additional control variables include firm size categories, year dummies, 2-digit industry dummies and region dummies, EDUCATION1, EDUCATION2, EDUCATION3, EDUCATION4, EXPERIENCE1, EXPERIENCE2, EXPERIENCE3, EXPERIENCE4, white collar managerial and non-managerial, male, log average labor productivity of firm, log capital intensity. Dummy variables for unclassified firms and for domestic takeovers of foreign owned firms are always included.

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