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Inward foreign direct investment and industrial restructuring: micro evidence – the Slovenian firms' growth model*

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Abstract

We examine the impact of inward foreign direct investment (FDI) on the growth of local firms in terms of employment and total factor productivity (TFP) for the Slovenian manufacturing sector in the 1994-2003 period. The theoretically predicted channels through which inward FDI affects the firm dynamics in a host country prove to be in general significant. First, there is evidence of the direct impact of foreign firms through so-called direct technology transfer as foreign-owned firms have higher growth of TFP compared to domestically-owned firms after controlling for other determinants. Secondly, the entry of foreign firms stimulates the reshuffling of the resources from less to more efficient local firms. The firm selection process is, namely, characterised by the least efficient firms experiencing a drop in their employment growth upon a foreign firm's entry. Thirdly, regarding the productivity spillover effects from foreign to local firms we provide indirect evidence that they mostly operate through vertical linkages rather than within the same industry. In general, it seems that not all firms are equally able to benefit from foreign firms' presence and that absorptive capacity plays an important role.

Key words*: foreign direct investment, firm growth, productivity spillovers, firm selection process, industrial restructuring*

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1. Introduction

Several recent empirical studies provide evidence that within-industry reallocations from less to more productive firms and the exit/entry process contribute significantly to average productivity growth and constitute an important mode of industrial restructuring (see Olley and Pakes (1996), Roberts and Tybout (1996), Pavcnik (2002), Tybout (2001)). At the same time, it is widely recognised that investment liberalisation is one of the most important triggers of the industrial restructuring process. In the article we aim to provide a deeper understanding of the role of incoming FDI in shaping and restructuring of domestic industries in a small transition country, such is Slovenia. For this purpose the article assesses the impact of inward FDI on domestic firm growth taking into an account the probability of firm survival based on the panel of Slovenian manufacturing firms in the last decade. Namely, knowing how the entry and presence of foreign-owned firms affect growth of domestic firms and probability of domestic firms exiting is an important task in assessing the role of inward FDI in the industrial restructuring of a host country.

As indicated in the theoretical literature (reviewed in, for example, Caves (1996), Aitken and Harrison (1999), Blomström and Kokko (1997, 1998)), there are two main opposing effects through which inward FDI can affect a domestic firm's growth and survival: competition effect and productivity spillover effects.

The entry of foreign firm (either through exports or FDI) namely disturbs the existing equilibrium in the host country and increases the intensity of competition. The competition also intensifies if the foreign firm was exporting prior to establishing local production in the host-country market since, by avoiding export costs, the foreign firm's competitive position is improved. The competition effect of inward FDI (foreign firm entry/presence) has clear implications for the exit and growth of domestic firms. By increasing competition in the host country, a foreign firm's entry and presence may lead to the crowding out of local firms. The entry of a foreign firm with lower marginal costs draws demand from domestic firms as the foreign firm has an incentive to increase production relative to its domestic competitors. Domestic firms are then forced to cut production and the least productive ones even to exit the market. As emphasised by Görg and Strobl (2003), regardless of the cost structure the increased production of foreign rivals will generally lead to a reduction of the output price which will shrink the price-cost margin and increase the probability of the exit of domestic firms and reduce the prospects for their future growth. The competition effect may also operate in the factor markets, whereby foreign firms may also crowd out domestic rivals by increasing factor prices in the economy. However, some local rivals might react to this intensified competition by investing in product and/or process upgrading.

On the other hand, foreign firms' activity in the host country may confer positive externalities on domestic firms which may result in a decrease in the unit costs of

local firms and consequently in an increase in their output.[3] However, several studies assert that local firms must have an ability to learn and take advantage of the technology employed in multinational enterprises (MNEs). This so-called absorptive capacity is often related to the skill intensity and learning experiences of the firm. A domestically-owned firm might benefit from the presence of foreign firms through the several potential channels: (i) through the backward and forward linkages (customer-supplier links) between MNEs and domestic firms, (ii) MNEs' training of local employees, (iii) demonstration effects, and (iv) competition from MNEs. Productivity spillovers may thus occur within the same industry (intra-industry spillovers), in vertically – upstream and downstream – related industries (inter-industry spillovers), or as a result of agglomeration (see Blomström and Kokko, (1997, 1998)). Since productivity is one of the key determinants of whether or not a firm exits and of the prospects for its growth, through spillover effects FDI also indirectly positively affects the domestic firm's survival and its growth performance.

The nature of these effects and the relative importance of the channels depend on a number of FDI characteristics. Therefore, the net effect of these two offsetting effects cannot be generalised and hence need to be tested empirically. As pointed out by Kosová (2004) to distinguish and estimate both effects separately two different measures of foreign firm entry and presence should be included in empirical model specification.

While there is a substantial body of empirical literature on spillover effects, evidence of the importance and mechanisms of competition effects is relatively rare. Moreover, most studies test the presence of productivity spillovers by estimating the production function on the level of firms or plants without controlling for the fact that FDI might have a significant impact on the exit of domestic firms. Since firms that are forced to exit the market due to increased foreign competition are less likely to benefit from the presence of an MNE these studies tend to overestimate productivity spillover effects. Several authors therefore argue that FDI's impacts and, in particular, the competition/selection effect are better analysed from the perspectives of industry and firm dynamics. Accordingly, that is the framework we have chosen for our empirical analysis. More specifically, we estimate firm growth model on firm-level data in Slovenian manufacturing sector in the 1994-2003 period[4]. The firm dynamics framework allow us to asses and characterize competition effect and the role of inward FDI in industry selection process more directly through its impact on the crowding out of local firms (increased probability of exiting and reduced growth).

[3] These externalities may appear since 'technology' is to some extent a public good, there is a belief that foreign firms may not be able to fully internalise their technological advantages and therefore their presence would lead to various types of 'productivity spillovers' to domestic firms.

[4] The reason for selecting the 1994-2003 period for the empirical analysis was the availability of data. The data for the year 2003 were the latest available at the time of the article formation.

At the same time this framework allows us to indirectly test also for the productivity spillover effects.

Despite the relatively numerous empirical studies on a firm's growth and survival the empirical evidence of the impacts of inward FDI or even of foreign competition generally on the growth and survival of local firms is very limited. The rare exceptions are studies by Görg and Strobl (2003) for Ireland, De Backer and Sleuwaegen (2003) for Belgium, and Kosová (2004) for the Czech Republic.

Görg and Strobl (2003) investigate whether the presence of multinational companies measured as an MNE's share of employment in an industry has any effect on the survival of plants in the same sector using plant-level data for the Irish manufacturing sector in the 1973-1996 period and employing a Cox proportional hazard model. They find that the presence of multinationals has a positive effect on the survival of Irish plants but this effect is significant only for plants that operate in high-tech sectors. Regarding foreign-owned plants, they provide evidence that foreign plants have higher hazards of exiting than indigenous plants and that the presence of multinationals has a negative effect on the survival of other foreign-owned plants in low-tech sectors.

On the contrary, De Backer and Sleuwaegen (2003) find evidence that inward FDI increases domestic exits by separately estimating exit and entry functions for Belgian manufacturing data. The crowding-out effect is stronger in the case of FDI than in the case of imports. Moreover, they find that increased foreign competition both through increased imports and inward FDI negatively affects the entry of domestic firms. However, the empirical results suggest that the importance of positive long-term structural effects measured by the relative number of foreign firms in related industries (defined as industries belonging to the same NACE-2 digit level) between foreign and domestic firms can moderate or even reverse crowding-out effects.

Kosová (2004) test the presence of static and dynamic crowding-out effects of domestic firms by foreign ones and technological spillover effects in survival and growth models using 1994-2001 firm-level panel data for the Czech Republic. She finds no evidence that foreign firms are expanding in Czech markets at the expense of domestic firms or that foreign expansion induces the excessive exit of domestic firms. In contrast, she provides evidence that foreign expansion, measured by the foreign sales growth rate, has a positive effect on both the growth and survival of domestic firms. These results, together with significantly higher exit rates of domestic firms around the time of foreign entry, suggest that crowding-out, and thus the adjustment of domestic firms to FDI inflows, is merely a one-time static effect realised upon foreign entry. So there is a shakeout of domestic firms when foreign firms enter but, subsequent to this initial entry effect, domestic firms benefit from the expanding foreign industry.

The rest of the article is organised as follows. In Section 2, the data and main descriptive statistics with respect to domestic- and foreign-owned firms are presented. Subsequent Section 3 specifies growth model to be applied to panel data on the Slovenian manufacturing firms and define the variables. Section 4 discusses main econometric problems dealt with in our empirical analysis. Further, Section 5 presents the results and implications of the empirical estimations. Finally, Section 7 concludes with the summary of the main findings of the empirical analysis.

2. The data

We analyse the firms' growth performance based on annual panel data on firms operating in the Slovenian manufacturing sector (NACE 15-37) in the 1994-2003 period[5]. One of the advantages of this dataset is that, unlike in most studies on FDI that restrict the sample to larger firms, our data cover the whole population of manufacturing firms as reporting is mandatory for all firms (business entities) registered in Slovenia. Originally, the dataset contained information on 9,711 firms operating between 1994 and 2003 but firms with a zero number of employees and a negative value of equity were dropped from our sample which gives 7652 firms in our final sample. The main descriptive statistics and the indicators of the importance of foreign firms in Slovenian manufacturing sector are presented in Tables 1 and 2. Foreign-owned firms are defined as firms in which foreign owners have at least 10% equity share.

Table 1: Average size, labour and total factor productivity, real average annual wage and export propensity of domestic and foreign firms in Slovenian manufacturing sector, 1994-2003

	Employment		Labour productivity 1000 SIT (1994 prices)		TFP dom. firm in y. 1994=100		Annual wage 1000 SIT (1994 prices)		Capital-intensity 1000 SIT (1994 prices)		Export propensity	
	Dom	For	Dom	For	Dom	For	Dom	For	Dom	For	Dom	For
1994	62	114	1963	2879	100	121	724	1275	4139	6459	0.16	0.47
1995	55	113	2032	2453	101	131	799	1105	4255	4170	0.15	0.45
1996	49	103	2232	3038	103	132	884	1254	4517	5792	0.15	0.48

[5] Financial data were obtained from the database of firms' financial statements collected by the Agency of the Republic of Slovenia for Public Legal Records and Related Services. The data on firms' formation, legal and organisational forms and termination of operation were obtained from the Business Register of Slovenia. Other data were provided by the Statistical office of Republic of Slovenia.

1997	44	93	2417	2924	101	143	985	1324	5748	6133	0.16	0.47
1998	41	108	2448	3362	100	150	1045	1440	4864	7398	0.16	0.50
1999	40	111	2711	3934	102	163	1139	1529	5141	7745	0.16	0.50
2000	36	150	2716	4129	101	170	1194	1676	5324	9330	0.16	0.54
2001	39	141	3070	4422	102	164	1281	1742	5627	8293	0.16	0.59
2002	38	139	3406	4107	102	148	1377	1752	8214	8089	0.16	0.55
2003	37	137	3542	4635	102	155	1477	1886	8159	10940	0.16	0.58

Source: Own calculations

Note: Summary statistics exclude firms with 0 employees and non-positive equity reported.

According to Table 1 there is a notable and persistent difference between domestic and foreign firms with respect to all characteristics seen in Table 1. As expected, throughout the whole period foreign firms demonstrated a higher average size, higher labour and total factor productivity (TFP) and higher capital intensity compared to domestic firms with the only exception of capital intensity in 2002. Foreign firms also pay higher average wages and are more export-oriented than their domestic rivals, selling around half of their output abroad. A slight convergence between domestic and foreign firms can be seen in terms of average labour productivity, which for domestic firms increases by approximately 80% versus the 60% increase in the average labour productivity of foreign firms within the 1994-2003 period. On the other hand, domestic firms have been unable to decrease the gap in total factor productivity. The average total factor productivity of domestic firms remains practically unchanged throughout the period, while foreign firms face an approximate 30% increase compared to the initial year 1994. The data suggest that if the constant returns to scale is an acceptable assumption then the value-added increase per employee (labour productivity) of domestic firms can be almost exclusively attributed to the improvement in the capital equipment of labour (on the assumption of constant returns to scale), while improvements in total factor productivity play an important role in foreign firms.

In Table 2 we report some indicators of the importance of foreign firms in the Slovenian manufacturing sector to motivate our expectations regarding the impacts of foreign firm entry and their presence on the performance of domestic firms. As can be seen in Table 2, the importance of foreign-owned firms increased during the period considered according to all measures as a share in the number of firms, employment, fixed assets and value added. At the end of our period, foreign firms accounted for approximately 18% of manufacturing employment and above 20% of both fixed assets and value added.

Table 2: The relative importance of foreign firms in Slovenian manufacturing sector according to the selected indicators, 1994-2003

	No of firms			*Empl*	*Fixed assets*	*value added*
	Domestic	Foreign	for. firm share	for. firm share	for. firm share	for. firm share
1994	3304	171	4.9	8.4	11.7	12.4
1995	3910	186	4.5	8.6	11.3	12.3
1996	4175	243	5.5	10.1	14.6	13.4
1997	4377	246	5.3	10.7	16.1	14.5
1998	4437	256	5.5	13.1	19.8	17.7
1999	4573	247	5.1	13.0	19.1	18.7
2000	4607	300	6.1	21.4	33.5	32.4
2001	4693	284	5.7	17.6	22.1	23.2
2002	4782	347	6.8	20.5	26.0	27.8
2003	4912	297	5.7	18.2	22.5	21.5

Source: Own calculations

Note: Summary statistics exclude firms with 0 employees.

The above-average performance of foreign firms satisfy the principal starting point of theories on MNEs, postulating that to be able to compensate for the inherent disadvantages of operating in foreign markets MNEs have to possess certain capabilities which give them some sort of competitive advantage over their domestic rivals. The question open to empirical testing is then whether foreign firms with their superior performance have a significant impact on the performance of local firms in the way the theory suggests.

3. Empirical model specification

Both the theoretical and empirical literature often studies firm growth and exits together as an outcome of a single economic process of industrial evolution. Our growth model specification follows Evans' (1987) approach where growth is modelled as a function of initial size:

$$S_{t+1} = G(\lambda_t, \gamma_t, \theta_t, \tau_t) \cdot S_t \cdot e_t, \qquad (1)$$

where S_t denotes the size of the firm. Among the set of factors that affect a firm's growth we include various factors proposed by the different theoretical and empirical studies.

Most of the recent studies adopt the framework of so-called firm and industry dynamics models which focus on the selection process among heterogeneous firms within a particular industry that operates through the entry and exit process and emphasise the importance of firms' learning process for the selection and evolution process within the industry. These models are thus also known as 'learning models' as the entrant typically does not know its own cost structure (efficiency), but its relative efficiency is discovered through the processes of passive (Jovanovic, 1982) or active learning (Erikson and Pakes, 1995) from actual market experience subsequent to entry.

The factors proposed by these theories can be classified into the following groups: (i) firm characteristics (λ_t); (ii) industry or product market characteristics (γ_t), (iii) factor prices (τ_t), and other exogenous factors (θ_t) that reflect conditions outside the domestic industry (τ_t and θ_t factors are both captured by the inclusion of annual dummies).

Through a logarithmic transformation of (1) we obtain the firm-growth rate equation

$$\ln S_{t+1} - \ln S_t = \ln G(\lambda_t, \gamma_t, \theta_t, \tau_t) + u_t, \qquad (2)$$

where u_t is a normally distributed error term with a mean zero.

Two versions of the firm growth model (2) are estimated: (i) the extensive growth model version where the firm's size is measured by its employment ($empl_t$) which gives firm's growth defined as the difference in the log values of the firm's number of employees ($lnempl_{t+1}$ - $lnempl_t$), and (ii) the intensive growth model where firm's growth is measured in terms of TFP growth ($lnTFP_{ijt+1}$-$lnTFP_{ijt}$).

For the functional form of G(·), we follow Evans (1987) approach and test a higher-order logarithmic expansion in two principal firm-specific variables (firm's size and age) until there is no evidence of further nonlinearity. Similarly as in several other studies third-order logarithmic expansion in firm's size, second-order logarithmic expansion in firm's age and a first-order logarithmic expansion in other variables was confirmed which yields the following regression equation of firm growth model:

$$\begin{aligned} growth_{ijt+1} = {} & \beta_0 + \beta_1 MNEentry_{jt} + \beta_2 MNEentry \cdot dTFPlow_{jt} + \beta_3 dTFPlow_{ijt} + \\ & \beta_4 entry_{jt} + \beta_5 hFDI_{jt} + \beta_6 hFDI \cdot lnWage_{ijt} + \beta_7 ReghFDI_{jrt} + \beta_8 BackFDI_{jt} + \\ & \beta_9 BackConc_{jt} + \beta_{10} ForFDI_{jt} + \beta_{11} ForConc_{jt} + \beta_{12} fdi_{ijt} + \beta_{13} HHI_{jt} + \beta_{14} plants_{ij} + \\ & \beta_{15} dexport_{it} + \beta_{16} dexmajor_{it} + \beta_{17} dprofit_{ijt} + \beta_{18} lnEmpl_{ijt} + \beta_{19} lnEmpl2_{ijt} + \\ & \beta_{20} lnEmpl3_{ijt} + \beta_{21} lnKint_{ijt} + \beta_{22} lnTFP_{ijt} + \beta_{23} lnWage_{ijt} + \beta_{24} lnAge_{ijt} + \\ & \beta_{25} lnAge2_{ijt} + \Sigma\beta_{26,t} dyear_t + \Sigma\beta_{27,j} dindustry_j + \Sigma\beta_{28,r} dregion_r + \\ & \Sigma\beta_{29,o} downertype_l + \eta_i + \varepsilon_{ijt} \qquad (3) \end{aligned}$$

where subscripts *i*, *j* and *t* refer to firms, industries and years, respectively. $growth_{ijt+1}$ denotes either firm's growth in terms of employment defined as the difference in the log values of the firm's employment ($lnEmpl_{ijt+1}$-$lnEmpl_{ijt}$) or firm's growth in terms of TFP ($lnTFP_{ijt+1}$-$lnTFP_{ijt}$). Ln in variable names denotes the natural logarithm of a particular variable, while 2 (sq) denotes that the variable enters the estimation in a squared form and 3 (cube) that the variable enters the model in its third power. All values of the financial variables are deflated using producer prices indices at the 2-digit NACE classification.

Firm characteristics

Among the principal firm characteristics that affect firm's growth the theories postulate firm's size, age and productivity. The size of a firm ($empl_{ijt}$) is measured by the number of employees. Age_{ijt} denotes a firm's age counting from the formation year according to the Business Register. As age enters our empirical models in a logarithmic form we start to count age with a value of 1 in order to prevent the dropping of observations in the first year of firm's operation, which would generate sample selection bias due to the relatively high infant mortality rates. We also test the robustness of the results by including an age variable in non-logarithmic form and the results are robust. Productivity is measured as total factor productivity (TFP_{ijt}) based on production function estimates. Firm dynamics models predict that smaller and younger firms grow faster and are less likely to survive than old and large firms. This predicted size-growth relationship sharply contradicts the Gibrat's traditional law of independence between the growth of a firm and its size. The productivity of the firm is expected to negatively affect the likelihood of exit and positively affects the firm's growth.

Further, we include capital-intensity $Kint_{ijt}$, measured by real fixed assets per worker. The capital intensity of a firm is expected to positively affect its ability to survive and grow. According to the Olley and Pakes (1996) model, the stock of physical capital affects the distribution of future plant productivity[6]. In this case, capital intensity may act as a proxy for other unobserved sources of efficiency leading to the higher likelihood of an exit and lower growth for low-capital-intensity plants.

$Wage_{ijt}$ is defined as the average yearly real wage per employee. Unfortunately, data on the skill structure of employees is not available; therefore we also use the wage variable as a proxy for the skill intensity of a firm. This implies we are assuming that wages for similar education level/qualification categories of workers are similar across firms and industries. The real wage is also used as a proxy for human capital in Mata and Portugal (2004). Skill intensity is expected to positively affect a firm's

[6] There is a relationship between a producer's underlying efficiency and the incentive to invest in capital. Essentially, efficient firms generate higher levels of investment and larger capital stocks.

survival ability and its growth potential as it can serve as a proxy for its absorptive and learning capacity, which is a key determinant of the course of the firm's life.

As we use a firm as a unit of observation we must control for the number of the firm i's subsidiaries ($plants_{ij}$) as the theory suggests that hazard and growth rates differ between a single-and multi-plant firm. Among the firms characteristics we additionally control for a firm's profitability by including the dummy variable $dprofit_{ijt}$ which equals 1 for firms with a positive net profit in year *t*. For testing the impact of the exporting we include two additional dummy variables**:** $dexport_{it}$ and $dexmajor_{it}$ are dummy variables for exporters. $dexport_{it}$ equals 1 for all exporters (positive sales in foreign markets), while $dexmajor_{it}$ takes the value of 1 in the case that export propensity – the share of a firm's output supplied to foreign markets in the firm's total sales – is greater than 70%.

Industry characteristics

Besides the time-invariant market characteristics that are captured in the set of industry dummies, we include the Herfindahl-Hirschman index HHI_{jt} to measure market concentration. HHI_{jt} is defined as the sum of the squares of the market shares of all firms within a particular industry at the 5-digit NACE level. The market share of firm *i* is defined as the share of its domestic market sales in total industry sales in the domestic market (all firms' local sales + imports in industry *j*). The expected effect of market concentration it is not so clear-cut. On one hand, the concentration ratio is expected to have a positive impact on the survival and growth of firms. The argument is that the price level is more likely to be elevated above the long-run average cost at the minimum efficient scale level of output in concentrated industries which may facilitate the survival of suboptimal scale firms which is what typical entrant firms are. On the other hand, firms in highly concentrated markets may be subjected to fierce aggressive behaviour by rivals which may reduce their chances of survival.

Our principal explanatory variables refer to the entry and presence of foreign owned firms to test for both direct and indirect effects of inward FDI measured by the extent of foreign affiliates' operations in the host country. Concerning the indirect impacts of inward FDI on domestic firm dynamics, we test for the presence and relative strength of two opposing effects as predicted by theory: the competition effect and productivity spillovers. To distinguish between these two effects two different measures of foreign firm entry and their performance are included in the regression model.

The competition effect is tested with the entry rate variables $MNEentry_{jt}$ and $entry_{jt}$ at the 3-digit level of the NACE classification. $MNEentry_{jt}$ denotes the foreign firm entry rate defined as the number of foreign entrants (greenfield and acquisitions) divided by the total number of firms operating in the industry j, and $entry_{jt}$ as an entry rate considering all entrants including domestic and foreign ones. Both measures exclude the firm for which the observation is taken. $MNEentry_{jt}$ tests the crowd-

ing-out effect which takes place upon foreign firms' entry, while $entry_{jt}$ serves as a controlling variable to control for the impact of a new firm entry in general. It is possible that all firm entries in a particular industry rather than foreign firm entries alone affect the exit decision and growth of incumbent firms so we therefore want to control for this possibility. As it is quite likely that MNEs are attracted to industries that offer favourable conditions which also stimulates domestic firm entry levels, estimates that do not control for this possibility may lead to an overestimation of the crowding-out effect of foreign firms' entry.

$MNEentry \cdot dTFPlow_{jt}$ is the interaction term between $MNEentry_{jt}$ and $dTFPlow_{ijt}$, where dTFPlow_{ijt} is a dummy variable equal to 1 for firms in the lowest quintile in terms of total factor productivity at 3-digit level of NACE and 0 for other more efficient ones. If the least efficient firms are more likely to be crowded out by the entry of a foreign firm this interaction term should have a negative effect on firm growth and survival (a negative sign in the growth equation).

The presence of horizontal (intra-industry) spillover effects is tested by the variable $hFDI_{jt}$ that measures the concentration of foreign firms in industry *j* as the foreign firms' share in total industry employment:

$$hFDI_{jt} = \frac{\sum_{i=1}^{n} empl_{ijt} \cdot fdi_{ijt}}{\sum_{i=1}^{n} empl_{ijt}}; \qquad (4)$$

where *n* denotes the number of all firms in industry *j* and $empl_{ijt}$ denotes the number of employees in firm *i*. fdi_{ijt} is a dummy variable for foreign ownership. It takes a value of 1 for 'foreign firms' considering a 10% ownership share threshold. The measure excludes the firm for which the observation is taken. The employment share of foreign firms is used in many studies testing the presence of horizontal spillover effects, among others (Barrios et al., 2005), (Keller and Yeaple, 2003), (Görg and Strobl, 2003). Instead of the employment share, other studies consider also foreign firms' share in the industry's output (Smarzynska, 2004), and the relative number of foreign firms (De Backer and Sleuwaegen, 2003). Some studies also take into account the share of foreign equity participation in foreign firms, including (Aitken et al., 1999) and (Smarzynska, 2004).

$hFDI \cdot lnWage_{ijt}$ is the interaction term between $hFDI_{jt}$ and $ln(Wage_{ijt})$. As described above, we use $ln(Wage_{ijt})$ as a proxy for a firm's absorptive capacity. If firms with a higher absorptive capacity are more able to take advantage of a foreign firm's presence in the industry, this term should have a positive sign in the growth equation and thus provide some support for the validity of our hypothesis that intra-industry spillover effects are stronger for local firms with a higher absorptive capacity (skill intensity).

$ReghFDI_{jrt}$ measures regional intra-industry foreign firm concentration in terms of employment share and tests whether any intra-industry spillovers are reinforced when domestically-owned firms are located close to foreign firms. More specifically, it is defined as:

$$\mathrm{Re}\,ghFDI_{jrt} = \frac{\sum_{i=1}^{m} empl_{ijrt} \cdot fdi_{ijt}}{\sum_{i=1}^{m} empl_{ijrt}}, \qquad (5)$$

where m denotes the number of firms within industry i and region r. We consider regions at the NUTS 3 level.

The inter-industry spillover effects are tested through two additional explanatory variables $BackFDI_{jt}$ and $ForFDI_{jt}$ measuring the concentration of FDI in backwardly- and forwardly-linked industries with industry j. $BackFDI_{jt}$ measures the extent of potential contacts between local suppliers and foreign firms (vertical connections between local suppliers and foreign affiliates – customers) and thus tests the presence of 'backward' inter-industry spillovers:

$$BackFDI_{jt} = \sum_{k;k\neq j} \alpha_{jk} \cdot hFDI_{kt}, \qquad (6)$$

where technical coefficient α_{jk} denotes the share of product j originating from domestic production that is used by industry k in its intermediate consumption (excluding final use and imports of intermediate products). This variable accounts for the impact of foreign affiliates on their upstream local suppliers, that is for the impact of the concentration of foreign firms in industries to which industry j supplies its output. Following Smarzynska (2004), inputs supplied within an industry are not included since this effect is accounted for by the variable measuring the horizontal spillovers - $hFDI_{jt}$.

The extent of potential contacts between local customers and foreign firms-suppliers (through forward linkages) is measured by $ForFDI_{jt}$:

$$ForFDI_{jt} = \sum_{k;k\neq j} \delta_{jk} \cdot hFDI_{kt}, \qquad (7)$$

where the technical coefficient δ_{jk} denotes the share of input k in the total intermediate consumption of industry j.[7] This variable accounts for the impact of foreign affili-

[7] Technical coefficients α_{jk} and δ_{jk} are obtained from the input-output table, more specifically from 'Use table for the domestic output at basic prices'. As the input-output table for the Slovenian economy is not available for all years in our 1994-2003 sample, the year 2000's I-O table was chosen as a base for the technical (input) coefficient calculation. $BackFDI_{jt}$ and $ForFDI_{jt}$ are constructed at the two-digit level of NACE which is the most detailed level of the I-O table available.

ates on their downstream local customers (the impact of the concentration of foreign firms in industries that provide inputs for industry *j*). A positive and statistically significant coefficient in the growth model would suggest there are indeed positive inter-industry externalities connected to the concentration of foreign-owned firms in vertically linked industries.

To control for the possibility that the general concentration of economic activity in interrelated industries rather than the concentration of foreign firm activity alone positively affects growth of local firms and that at the same time FDI is attracted to the prosperous industries, we include $BackConc_{jt}$ and $ForConc_{jt}$ as controlling variables and thus avoid any potential overestimation of vertical spillover effects. $BackConc_{jt}$ and $ForConc_{jt}$ are defined as backwardly- and forwardly-linked industries' share of total manufacturing employment weighted by technical coefficients α and δ.

To control for the industry-, time- and region-specific effects throughout our 1994-2003 sample period we include annual dummies $dyear_t$, industry dummies at the 3-digit level of NACE $dindustry_j$, region dummies at the NUTS level $dregion_r$, and dummies for ownership type $downertype_l$ discriminating among different types of ownership.

We test several other variables but due to insignificant coefficients in all empirical specifications we do not include them in our final empirical models. Among others, we test for the effect of the ratio of long-term debt to total assets, for the minimum efficient scale defined as the log of median employment size in industry *j* and industry growth with respect to the previous year defined as the growth of total employment within particular industry *j*.

4. Econometric issues

We estimate different empirical specifications of employment growth model (3) for the aggregate sample of domestic and foreign firms and for the sub-sample of domestically-owned firms separately. To test additional aspects of FDI impact on performance of the local firms we estimate also TFP growth equation. There are several potential econometric problems of estimating growth models. How we deal with most problematic ones is discussed below.

Since we use panel data the estimation techniques allow us to control for firm-specific effects that are constant over time and are not explicitly represented in the model. Two standard panel data models, fixed effects models (FEM) and random effects models (REM), will be estimated. As Hausman test rejects the null hypothesis of no correlation between the right hand side variables and the 'random effects' in our growth models, we report the results of fixed effects estimations on a sample of surviving firms (observation in the year of exit is treated as a missing value). For ro-

bustness purposes we estimate TFP growth model also by Prais-Winsten regression, where disturbances are assumed to be panel-level heteroskedastic with first-order autocorrelation AR(1)[8] within panels.

Selection bias

A potential concern in our model specification is the sample selection bias that generally refers to the situation where the dependent variable is not observed for a restricted, non-random sample. In the growth model it appears since small firms that have slow or negative growth are more likely to exit and thus disappear from the sample than are larger firms. The sample selection bias has long been recognised in growth models and properly dealt in most studies since Evans (1987) and Hall (1987). We correct for the sample selection bias by standard Heckman' selection model in which we control for the probability of survival. This procedure consists of two equations, a firm exit equation used as a selection equation in the first step and a firm growth equation in the second stage where Mill's inverse ratio enters as an additional regressor to control for the probability of a selection into the sample of firms for which growth is observed.

Endogeneity

Another potential econometric concern which may cause biased estimates when testing for the direct impact of foreign ownership on a firm's growth is the possibility that the foreign ownership dummy variable (fdi_{ijt}) might not be entirely exogenous. It is usually argued that foreign investors tend to acquire shares in the most successful and larger firms and that foreign ownership is thus not randomly distributed (see Djankov and Hoekman (2000), Evenett and Voicu (2001), Damijan et al. (2003)). In this case, fdi_{ijt} is potentially a choice variable that might be correlated with unobservables relegated to the error term. More specifically, fdi_{ijt} may be endogenous if the decision for FDI (in the form of foreign acquisitions) is correlated with unobservables that affect a firm's exit decision/growth. For instance, if foreign investors are more likely to acquire shares in more successful firms and therefore experience lower probability of exiting or higher growth *ceteris paribus*, then if we fail to control for this correlation our results will underestimate (overestimate) the effect of foreign ownership on the probability of exiting (growth).

To deal with this problem we instrument for fdi_{ijt} and employ instrumental variables models. We use a two-stage least squares fixed-effects (within) and a random-effects estimator for the growth model. The instruments employed are size, size squared, age, age squared, the ratio of net profits to sales, export propensity, total factor productivity and average wage. We use lagged values of these instruments for domestic

[8] Arellano-Bond test confirms that average autocovariance in residuals of order 1 is present.

firms, values of the instruments in the year before an acquisition takes place for firms that have been acquired by foreign investors and the first-year values for greenfield FDI. To avoid autocorrelation we drop the first-year observations for greenfield investments.

Total factor productivity estimates

There are additional potential econometric concerns related to the estimation of the firm's total factor productivity. Typically, total factor productivity is estimated as the residual in the production function estimates based on firm-level panel data. Simultaneity bias is usually referred to as the endogeneity of production inputs, caused by a correlation between unobservable productivity shocks and input levels causing the regressors and the error term to be correlated which makes OLS estimates inconsistent. Bias thus occurs when at least part of the TFP is observed by the firm early enough to allow the firm to change its factor input decision.

Several methods of controlling for simultaneity bias are proposed in the literature. Olley and Pakes (1996) developed an estimator that uses investment as a proxy for these unobservable productivity shocks. One of the drawbacks of Olley and Pakes' (1996) approach is that there must be a strictly monotonous relationship between the proxy (investment) and output for obtaining the consistent estimates. This means that observations with a zero investment have to be dropped from the sample. Further, Levinsohn and Petrin (2003) point out that an investment is associated with substantial adjustment costs which make the investment very lumpy and not respond smoothly to a productivity shock, thus violating the consistency condition. Therefore, Levinsohn and Petrin (2003) develop a similar two-step estimator which uses intermediate inputs as proxies, arguing that intermediates may respond more smoothly to productivity shocks and may respond more fully to the entire productivity term than investment. We follow this approach in the estimation of TFP. Using intermediate input proxies instead of investment also allows us to avoid truncating observations with a zero investment.

5. Empirical results

5.1. Firm employment growth

In Tables 3 and 4 we report the results for the employment growth model using various model specifications. Table 3 displays the results of fixed effects estimations considering only surviving firms (observation in the year of exit is treated as a missing value) for the aggregate sample of domestic and foreign firms (columns 1-3) and for the sub-sample of domestically-owned firms (column 4), whereas Table 4 represents the results from Heckman' selection model in which we control for the

probability of survival. To control for the possible enodogeneity of foreign ownership status in the estimates based on aggregate sample, we employ two-stage least squares fixed-effects (within) estimator (column 3, Table 3).

Based on all empirical specifications of employment growth model (Tables 3 - 4), the coefficient of *MNEentry* is negative but insignificant suggesting that in general foreign firm entry doesn't have significant impact on the employment growth of local firms within the same industry. The expectation that a foreign firm's entry does not affect the employment growth equally for all surviving firms is tested by the inclusion of the interaction term $MNEentry \cdot dTFPlow_{jt}$ (columns 2-4, Table 3). It turns out that this interaction term has a negative and highly significant impact, while $MNEentry_{jt}$ remains insignificant but positive which indicates that there is crowding out effect upon foreign firm entry but it is only significant for the least efficient firms from the lowest quintile in terms of total factor productivity, while there is no significant evidence that more efficient firms would suffer a negative impact on their growth. This result lends support to our prediction that the least efficient local firms experience the downsizing after a foreign firm entry.

The effect of intra-industry foreign firm concentration on local firms' growth (intra-industry spillovers) tested with *hFDI* is on average insignificant. But again after inclusion of the interaction term with real average wage variable (*lnWage*) that is used as a proxy for the absorptive capacity both coefficients of $hFDI_{jt}$ and $hFDI \cdot lnWage_{jt}$ become significant at 1% (column 2 - 4 in Table 3) supporting the intuition that firms are not equally able to benefit from the presence of MNEs within the same industry. It is confirmed that negative impact of horizontal MNE concentration on firm's employment growth is decreasing in firm's skill-intensity suggesting that the probability of net positive impact of foreign firm presence on the employment growth of local surviving firms within the same industry is higher for skill-intensive firms. However, there is no evidence that intra-industry effects would be intensified in the case of the local concentration of foreign firm activity where local is defined by being located in the same region (insignificant coefficient of the $ReghFDI_{jt}$).

Based on the fixed effects estimates considering only surviving firms (Table 3), the coefficients of variables that measure concentration of foreign firms' activity in vertically linked industries (*BackFDI* and *ForFDI*) are significant in all specifications, but with the opposite signs. The concentration of foreign firms' activity positively affects the growth in their upstream local suppliers (through backward linkages). This result is in line with recent findings of positive productivity externalities connected to the extent of foreign firm presence through backward linkages for several transition countries on the sample of larger surviving firms (for instance, Damijan et al. (2003) for Czech Republic, Poland and Slovenia, and Smarzynska (2004) for Lithuania).

Table 3: Fixed effects estimates of firm growth model for surviving firms

	FE	*FE*	*Instrumental variab. FE*	*FE*
	All firms	*All firms*	*All firms*	*Domestic firms*
	1	2	3	4
MNEentry	-0.059 (-0.49)	0.044 (0.35)	0.097 (0.75)	0.044 (0.33)
MNEentry·dTFPlow		-0.6** (-2)	-0.847*** (-2.67)	-0.696** (-2.23)
dTFPlow		-0.03*** (-3.52)	-0.023*** (-2.65)	-0.029*** (-3.36)
entry	0.021 (0.4)	0.018 (0.33)	-0.002 (-0.03)	0.046 (0.82)
hFDI	-0.051 (-1.48)	-0.73*** (-3)	-0.885*** (-3.02)	-0.662*** (-2.62)
hFDI·lnWage		0.096*** (2.84)	0.117*** (2.88)	0.086** (2.44)
ReghFDI	0.072 (1)	0.071 (0.98)	0.091 (1.24)	0.134* (1.75)
BackFDI	0.391** (2.07)	0.362* (1.9)	0.404** (2.05)	0.344* (1.72)
BackConc	3.66** (2.09)	3.307* (1.81)	3.074* (1.64)	3.906** (2.01)
ForFDI	-0.456** (-2.4)	-0.36* (-1.86)	-0.366* (-1.81)	-0.407** (-2)
ForConc	1.53 (0.96)	1.78 (1.09)	0.308 (0.18)	1.255 (0.73)
HHI	0.043 (0.94)	0.039 (0.84)	0.016 (0.32)	0.030 (0.61)
dexport	0.014** (2.02)	0.014** (2.03)	0.015** (2.11)	0.014** (1.98)
dexmajor	0.042*** (3.72)	0.043*** (3.73)	0.049*** (4.11)	0.050*** (4.11)
dprofit	0.078*** (9.19)	0.077*** (9.05)	0.076*** (8.75)	0.080*** (9.06)
fdi^{INS}	0.011 (0.63)	0.009 (0.53)	-0.037 (-0.51)	
lnEmpl	-0.584*** (-49.4)	-0.59*** (-49.5)	-0.579*** (-44.11)	-0.594*** (-48.54)
lnEmpl2	0.066*** (11.6)	0.066*** (11.6)	0.08*** (12.9)	0.069*** (11.35)
lnEmpl3	-0.004*** (-6.13)	-0*** (-6.1)	-0.006*** (-7.99)	-0.005*** (-5.91)
lnTFP	0.04*** (5.71)	0.023*** (2.98)	0.04*** (4.57)	0.023*** (2.76)
lnKint	0.04*** (14.4)	0.039*** (14.2)	0.044*** (14.57)	0.038*** (13.25)
lnWage	0.12*** (18.8)	0.108*** (14.8)	0.147*** (16.21)	0.104*** (13.85)
lnAge	-0.251*** (-11.7)	-0.25*** (-11.7)	-0.143*** (-2.65)	-0.253*** (-11.23)
lnAge2	0.131*** (8.25)	0.134*** (8.4)	0.074*** (2.59)	0.140*** (8.42)
R2	0.278	0.279	0.247	0.279
F test that a u_i=0	1.55*** (0.000)	1.55*** (0.000)	1.54*** (0.000)	1.5*** (0.000)
time dummies	INCL	INCL	INCL	INCL
N	32532	32348	28550	30476

Source: Own calculations

Notes: - t-statistics are in parentheses,

- ^{INS} denotes instrumented,

- ***, **, * denotes significance at 1%, 5% and 10%, respectively.

However, after correcting for the probability to exit (Table 4), the impact of foreign firm activity through backward linkages is no longer significant. The results suggest that some firms face an increased probability of exiting in response to the concentration of foreign firms in downstream industries, while the successful surviving firms are able to take advantage of the MNEs' presence in downstream industries through backward linkages. This leads us to suspect that the degree of linkages might be weaker in the case of MNEs compared to domestic firms, leading to a decrease in demand for intermediate products. As pointed out by Smarzynska (2004) and Saggi (2002), MNEs' entry to downstream sectors might lower the demand for domestically produced intermediates, particularly when it forces less productive domestic producers in this industry to exit. The demand for domestically produced intermediates might decrease either because they use inputs more efficiently or they rely more on imported intermediates (see Rivera-Batiz and Rivera-Batiz (1991)). In addition, some local suppliers might not be able to achieve the higher product standards or delivery conditions demanded by foreign firms.

Table 4: Heckman selection model of firm growth

	ALL FIRMS	*DOMESTIC FIRMS*
	1	*2*
plants	0.001 (0.78)	0.001 (0.89)
MNEentry	-0.07 (-0.49)	-0.067 (-0.5)
entry	0.011 (0.19)	0.013 (0.22)
hFDI	-0.02 (-0.87)	-0.016 (-0.7)
ReghFDI	0.038 (0.88)	0.059 (1.37)
BackFDI	0.298 (1.45)	0.217 (1.08)
BackConc	1.678 (0.87)	3.195 (1.67)
ForFDI	-0.43** (-1.96)	-0.507*** (-2.39)
ForConc	3.199* (1.82)	2.561 (1.49)
HHI	-0.01 (-0.41)	-0.019 (-0.82)
dexport	0.001 (0.19)	0.002 (0.4)
dexmajor	0.037*** (4.79)	0.039*** (4.88)
dprofit	0.092*** (10.14)	0.093*** (10.57)
fdi	-0.01 (-1.45)	/
lnEmpl	-0.8*** (-68.8)	-0.804*** (-72.29)
lnEmpl2	0.132*** (25.34)	0.140*** (27.45)
lnEmpl3	-0.01*** (-17.8)	-0.013*** (-19.75)
lnTFP	0.021*** (2.64)	0.024*** (3.09)
lnKint	0.028*** (8.39)	0.027*** (8.3)
lnWage	0.078*** (10.51)	0.075*** (10.4)
lnAge	-0.05*** (-2.48)	-0.059*** (-2.73)
lnAge2	-0.01* (-1.71)	-0.012 (-1.51)
Cons		-0.479*** (-2.61)

mills lambda	-0.38*** (-16.6)	-0.362*** (-16.18)
rho	-1	-1
sigma	0.382	0.362
lambda	-0.38	-0.362
Ind. dummies (2-digit)	INCL	INCL
time dummies	INCL	INCL
regional dummies	INCL	INCL
ownership dummies	INCL	INCL
N	33763	31839

Source: Own calculations

Notes: - t-statistics are in parentheses,
- the results of the first stage survival selection probit equation are not reported
- Huber/White/sandwich estimator of variance,
- ***, **, * denotes significance at 1%, 5% and 10%, respectively.

On the other hand the impact of foreign firms on the growth of their downstream local customers (through forward linkages) is negative which remains significant and practically unchanged also after correcting for the probability to exit (Table 4). We can conclude that the presence of foreign affiliates does reduce the employment growth of their downstream local customers. We provide further explanations of the nature of this negative impact through forward linkages based on TFP growth model in the next subsection.

The impact of foreign ownership on firm growth of surviving firms (Table 3) is positive but insignificant. After employing instrumental variables approach (column 3 in Table 3) or correcting for the selection bias (column 1 in Table 4) coefficient remains insignificant though the sign of coefficient of *fdi* variable is changed from positive to negative. This result confirms the expectation of the upward bias of *fdi* variable in growth model and/or that probability of exiting is higher for the foreign firms compared to domestic. However, due to insignificant coefficient we can not reject the hypothesis that there is no significant difference with respect to employment growth between foreign and domestic firms.

The results regarding the "standard" regressors in growth models are very similar, highly significant, and in line with theoretical predictions for all model specifications. Results confirm that size is negatively related to growth in a non-linear way that follows a U-shaped pattern similarly to that found by Könings and Xavier (2002) but with higher magnitudes of association between size and growth. The negative non-linear relationship is found also for the firm age with younger firms growing faster. Among other firm-specific characteristics, total factor productivity, capital-intensity, skill-intensity and profitability have all significant positive impact on firm growth. Conditioned on their survival, exporters, in particular those that sell more than 70%

of their output abroad have higher growth rates than those selling only in the domestic market (Table 3), while after correcting for the probability of survival (Table 4) only dummy variable for majority exporters remains significant.

5.2. Firm TFP growth

To test additional aspects of FDI impacts on performance of the local firms we estimate also TFP growth equation, where growth is measured as the difference in the log values of the firm's TFP ($lnTFP_{ijt+1}$-$lnTFP_{ijt}$). Results are presented in Tables 5 and 6.

In most TFP growth specifications, the most robust influence of foreign firms on TFP growth of local firms seems to be in case of foreign firm concentration in forwardly linked industries (at 10% significance in most empirical specifications), while the impact of *BackFDI* is not significant. The results suggest that although the concentration of foreign firms in forwardly linked industries has a negative impact on employment growth (Table 3-4) it has a positive impact on the TFP growth of local firms which may stimulate the rationalisation process within firms leading to the reduction in the number of employees. According to the literature, local firms may benefit from their upstream foreign firm suppliers through several potential channels such as through the increased availability of inputs, through their qualitative improvement and/or price reduction etc. Interestingly, the beneficial effect on the price decline of intermediates is also emphasised as an important channel of increased foreign competition (through imports) in the Bernard et al. (2003)'s model simulations. However, we would need more detailed data to test further for these different channels.

Table 5: Fixed effects and heteroskedastic panels corrected standard error estimates of firm TFP growth for surviving firms

	ALL FIRMS			DOMESTIC FIRMS	
	FE	*Instrumental variables FE*	*PCSE*[1]	*FE*	*PCSE*[1]
	1	2	3	4	5
MNEentry	0.2006* (1.82)	0.132 (1.15)	0.130 (1.38)	0.197* (1.68)	0.158 (1.57)
entry	-0.012 (-0.3)	-0.015 (-0.3)	-0.018 (-0.4)	-0.025 (-0.5)	-0.033 (-0.7)
hFDI	0.037 (1.17)	0.0306 (0.94)	0.031* (1.75)	0.035 (1.05)	0.026 (1.41)
ReghFDI	0.04 (0.6)	0.0691 (1.02)	0.018 (0.61)	0.068 (0.96)	0.022 (0.7)
BackFDI	0.1241 (0.71)	0.0471 (0.26)	0.124 (0.84)	0.222 (1.22)	0.195 (1.3)
BackConc	-2.506 (-1.6)	-3.367** (-2)	-1.759 (-1.23)	-1.307 (-0.77)	-0.613 (-0.41)
ForFDI	0.3124* (1.78)	0.2758 (1.51)	0.315** (1.99)	0.297* (1.63)	0.302* (1.87)
ForConc	6.6254*** (4.5)	6.5448*** (4.3)	7.163*** (5.14)	6.383*** (4.16)	6.440*** (4.43)

HHI	-0.002 (-0)	0.0178 (0.4)	0.001 (0.03)	-0.008 (-0.19)	-0.002 (-0.12)
plants			-0.001** (-2.19)		-0.001 (-1.39)
dexport	0.0026 (0.4)	0.002 (0.3)	0.001 (0.17)	0.005 (0.79)	0.003 (0.61)
dexmajor	-0.018* (-1.7)	-0.024** (-2.2)	-0.001 (-0.18)	-0.007 (-0.65)	0.004 (0.65)
dprofit	0.0217*** (2.77)	0.0116 (1.43)	0.024*** (3.25)	0.019** (2.32)	0.022*** (2.86)
fdi^{INS}	0.027* (1.67)	0.115* (1.74)	0.026*** (3.04)	/	/
lnEmpl	0.0691*** (6.37)	0.0893*** (7.34)	0.073*** (6.42)	0.070*** (6.31)	0.072*** (6.37)
lnEmpl2	-0.007 (-1.3)	-0.01* (-1.7)	-0.010* (-1.67)	-0.009 (-1.58)	-0.010* (-1.8)
lnEmpl3	0.0013** (2)	0.0014** (2.03)	0.002** (2)	0.001** (2.13)	0.002** (2.14)
lnTFP	-0.786*** (-122)	-0.777*** (-107)	-0.926*** (-56.07)	-0.794*** (-118.8)	-0.928*** (-52.09)
lnKint	0.0119*** (4.59)	0.0102*** (3.59)	0.010*** (3.26)	0.010*** (3.86)	0.008*** (2.62)
lnWage	0.0072 (1.23)	0.0228*** (3.12)	0.007 (0.97)	0.010* (1.66)	0.008 (1.02)
lnAge	-0.081*** (-4.1)	-0.072 (-1.5)	-0.023 (-1.39)	-0.060*** (-2.91)	-0.015 (-0.88)
lnAge2	0.033** (2.26)	0.0211 (0.79)	0.003 (0.5)	0.029** (1.93)	0.002 (0.27)
Cons	2.0253*** (9.29)	4.1204 (0)	-0.666*** (-4.15)	2.065*** (9.06)	-0.657 (-3.88)
rho	/	/	0.151	/	0.146
R2	0.3871	0.3516	0.45	0.3892	0.452
F test that a u_i=0	0.94 (0.99)	1.13*** (0.000)	/	0.94 (0.99)	/
industry dum.	/	/	INCL	/	INCL
time dummies	INCL	INCL	INCL	INCL	INCL
region dumm.	/	/	INCL	/	INCL
Owner. dumm.	/	/	INCL	/	INCL
N	32292	28527	32292	30435	30435

Source: Own calculations

Notes: 1- Prais-Winsten regression, heteroskedastic panels corrected standard error, common AR(1)
- t-statistics are in parentheses, - ^{INS} denotes instrumented,
- ***, **, * denotes significance at 1%, 5% and 10%, respectively.

Foreign firm entry measured by *MNEentry* and foreign firm presence within the same industry measured by *hFDI* both have a positive influence on firm growth, but in most models coefficients are insignificant. The results are more conclusive regarding the direct impact of foreign ownership on productivity. After controlling for endogeneity, selection bias, and autocorrelation, foreign firms prove to have on average higher productivity growth than domestic rivals. One conclusion is straightforward; there is no evidence that the presence of foreign-owned firms in the same or in the vertically related industries would negatively affect domestic firms' productivity.

Among other regressors, size of the firm has significant non-linear impact suggesting that larger firms have higher TFP growth. Profitability, capital-intensity and average wage tend to have positive impact on TFP growth but it is not confirmed in all specifications. The coefficient of lagged TFP is negatively related to TFP growth indicating strong convergence process in total factor productivity.

Table 6: Heckman selection model of firm TFP growth

	ALL FIRMS		DOMESTIC FIRMS
		Instrumental variables	
	1	2	3
MNEentry	0.155 (1.59)	0.132 (1.29)	0.198* (1.92)
entry	-0.02 (-0.52)	-0.01 (-0.3)	-0.038 (-0.87)
hFDI	0.014 (0.85)	0.036** (2.11)	0.006 (0.35)
ReghFDI	0.022 (0.72)	0.024 (0.89)	0.027 (0.82)
BackFDI	0.132 (0.89)	0.033 (0.19)	0.199 (1.29)
BackConc	-1.36 (-0.97)	-2.22 (-1.3)	-0.297 (-0.2)
ForFDI	0.253 (1.61)	0.306* (1.66)	0.232 (1.43)
ForConc	6.509*** (5.11)	6.149*** (3.99)	5.884*** (4.46)
plants	-0* (-1.63)	-0 (-1.4)	-0.0005 (-1.07)
HHI	0.013 (0.76)	0.004 (0.21)	0.013 (0.72)
dexport	-0 (-0.05)	-0 (-0.6)	0.001 (0.38)
dexmajor	0.004 (0.79)	-0.01 (-1.5)	0.009 (1.55)
dprofit	0.017*** (2.54)	0.016* (1.67)	0.016** (2.34)
fdi^{INS}	0.023*** (3.28)	0.113*** (4.34)	/
lnEmpl	0.052*** (6.15)	0.037** (2.1)	0.053*** (6.16)
lnEmpl2	-0.01*** (-2.66)	-0 (-0.4)	-0.010*** (-2.59)
lnEmpl3	0.002*** (3.6)	0.0009 (1.02)	0.002*** (3.25)
lnTFP	-0.85*** (-143)	-0.8*** (-45)	-0.854*** (-139.91)
lnKint	0.005** (2.14)	0.003 (0.7)	0.004 (1.51)
lnWage	-0 (-0.83)	0.002 (0.14)	-0.003 (-0.63)
lnAge	-0.03** (-2.15	-0 (-0.1)	-0.026 (-1.6)
lnAge2	0.027*** (4.53)	0.014 (1.05)	0.024*** (3.96)
Cons	-0.38*** (-2.8)	-0.34* (-1.9)	-0.372*** (-2.63)
mills lambda	-0.2*** (-10.8)	-0.22*** (-3.5)	-0.182*** (-9.69)
rho	-0.71		-0.664
sigma	0.276		0.275
lambda	-0.2		-0.182
Ind. dum. (2-digit)	INCL	INCL	INCL
time dummies	INCL	INCL	INCL
regional dummies	INCL	INCL	INCL
ownership dummies	INCL	INCL	INCL
N	33523	28527	31615

Source: Own calculations

Notes: - t-statistics are in parentheses,

- the results of the first stage survival selection probit equation are not reported
- ^{INS} denotes instrumented, - Huber/White/sandwich estimator of variance,
- ***, **, * denotes significance at 1%, 5% and 10%, respectively.

6. Conclusions

In the paper we test several theoretical predictions on inward FDI's impacts on the domestic firm performance and thus industry's structure. We estimate different empirical specifications of employment and total factor productivity growth model using annual panel data on Slovenian manufacturing firms for the 1994-2003 period and controlling for several of the econometric problems involved.

The theoretically predicted channels through which inward FDI affects the firm dynamics in a host country prove to be mostly significant for the Slovenian manufacturing sector in the last decade. First, there is evidence of the direct impact of foreign firms on a change in the population of firms in Slovenia's manufacturing sector. Not only do foreign entrants tend to be above-average productive but they also differ from their domestic rivals with respect to their TFP growth potential. Foreign-owned firms have higher growth of TFP after controlling for other determinants, while they do not differ significantly from domestic rivals with respect to their employment growth.

Secondly, we provide evidence that a foreign firm's entry stimulates the selection process and reallocation of resources among firms within the same industry based on their productive efficiency. The selection process is characterised by the least efficient firms experiencing a drop in their employment growth upon a foreign firm's entry. On the other hand, more efficient and more skill-intensive firms do not experience any pronounced crowding out with respect to the decreased employment growth.

Thirdly, we provide indirect evidence of productivity spillover effects from foreign to domestic firms operating mostly through vertical linkages rather than within the same industry. The concentration of foreign firms in backwardly-linked industries has positive impact on the growth of employment of local surviving firms and an insignificant one on the TFP growth of local firms. On the other hand, through forward linkages with local customers an MNE's activity increases total factor productivity growth of local firms but it has a negative impact on their employment growth. In general, it seems that not all firms are equally able to benefit from a foreign firm's presence and that absorptive capacity plays an important role.

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Ulazne direktne inozemne investicije i industrijsko prestrukturiranje: Mikro aspect – model rasta slovenskih poduzeća

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Sažetak

Izučava se utjecaj ulaznih izravnih inozemnih investicija (FDI) na rast domaćih (lokalnih) poduzeća s aspekta zaposlenosti i cjelokupne faktorske produktivnosti (TFP). Analiza je izvedena za sektor industrijskih poduzeća u Sloveniji od 1994. do 2003. godine. Teorija upućuje na zaključak, da su dinamičke promjene u poduzećima države u koju investicije ulaze putem mehanizama (channels) FDI značajne.

U svezi s teorijskom osnovom izvedene analize i evidencije upućuju na zaključak da poduzeća u stranom vlasništvu imaju izravan utjecaj na promjene u populaciji slovenskih industrijskih poduzeća. Poduzeća u stranom vlasništvu, uz analitičku neutralizaciju drugih mogućih utjecaja, iskazuju brži rast TEP u odnosu na poduzeća u domaćem vlasništvu. Pored toga, ulazak stranih poduzeća na nacionalno tržište dovodi do preusmjeravanja činitelja proizvodnje od manje na više učinkovita lokalna poduzeća. Proces selekcije između poduzeća dovodi do toga, da najmanje učinkoviti iskazuju opadanje zaposlenosti kao posljedicu ulaska stranih poduzeća.

Pored navedenih, nastaje i treći učinak povezan s ulaskom stranih poduzeća. On je povezan s širenjem utjecaja promjena u produktivnosti (productivity spillover effects) od stranih na domaća/lokalna poduzeća na neizravan način, te je utvrđeno da do ovoga učinka dolazi uglavnom preko vertikalnih poslovnih veza, a ne kako je očekivano pretežno horizontalno, dakle unutar iste djelatnosti.

Općenito se može tvrditi da strane investicije nemaju isti pozitivni utjecaj na sva poduzeća i da u tom kontekstu veliki značaj ima sposobnost apsorpcije – prilagodbe na promjene u poduuzetničkom sektoru.

Ključne riječi*: izravne inozemne investicije, rast poduzeća, učinci produktivnosti na okruženje, proces selekcije između poduzeća, prestrukturiranje industrijskog sektora.*

JEL klasifikacija*: F21, F23, L11, L25, C23*

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