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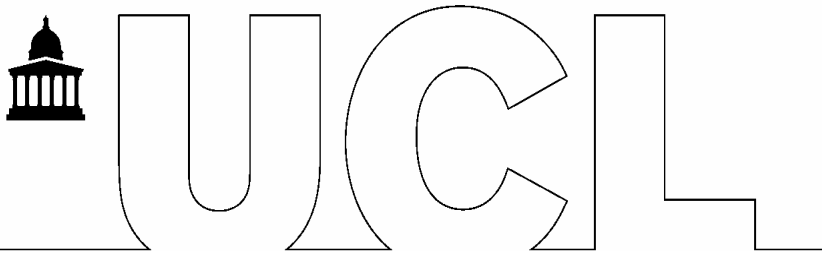

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NATURE AND DETERMINANTS OF PRODUCTIVITY GROWTH OF FOREIGN SUBSIDIARIES IN CENTRAL AND EAST EUROPEAN COUNTRIES

Boris Majcen*, Slavo Radoševic** and

Matija Rojec***

* Institute for Economic Research, Ljubljana (majcenb@ier.si)
** UCL-School of Slavonic and East European Studies (s.radosevic@ssees.ucl.ac.uk)
*** University of Ljubljana and Institute of Macroeconomic Analysis and Development (matija.rojec@gov.si)

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Centre for the Study of Economic and Social Change in Europe
UCL School of Slavonic and East European Studies
Gower Street
London, WC1E 6BT
Tel: +44 (0)20 7679 8519
Fax: +44 (0)20 7679 8777
Email: csesce@ssees.ucl.ac.uk

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Boris Majcen

Institute for Economic Research, Ljubljana

e-mail: majcenb@ier.si

Slavo Radoševic

University College London, School of Slavonic and East European Studies

e-mail: s.radosevic@ssees.ucl.ac.uk

Matija Rojec

University of Ljubljana and Institute of Macroeconomic Analysis and Development

e-mail: matija.rojec@gov.si

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NATURE AND DETERMINANTS OF PRODUCTIVITY GROWTH OF FOREIGN SUBSIDIARIES IN CENTRAL AND EAST EUROPEAN COUNTRIES

Abstract

The paper examines the determinants of productivity growth in foreign manufacturing subsidiaries in five Central and East European (CEE) countries by analysing patterns of control, nature of firms' capabilities and firms' market orientation. Building on the so called 'developmental subsidiaries' perspective we show that productivity growth is determined jointly by corporate governance, production capability and market orientation variables. CEE subsidiaries have relatively strong autonomy over control of their business functions, but within a dominantly production oriented mandate. Majority foreign equity share has a significant and positive impact on subsidiaries' productivity growth. These results present very strong regional characteristic.

INTRODUCTION

One of the key drivers of catch-up in the European Union (EU) new member states is the narrowing of the productivity gap between them and the older member states. So far, foreign direct investment (FDI) has been an important vehicle for the increased productivity of these economies. The impact of FDI is mainly direct, i.e. through higher productivity of foreign subsidiaries, be they greenfields or acquisitions, rather than through growth of productivity in indigenous enterprises (Hunya, 2000; Holland et al.., 2000, Jindra, 2006). Indirect effects of FDI as captured by econometric research suggest that horizontal spillovers are either absent or negative (Damijan et al., 2003; Konings, 2001; Jensen, 2002; Gorg and Greenaway, 2002). Vertical spillovers seem to be present (Damijan et al., 2003; Smarzynska-Javorcik, 2004) although wider evidence is needed.

This economic perspective on FDI has advanced our understanding of the effects and role of FDI in central and east European economies (CEEE). However, research on spillovers suffers from definitional problems, i.e. what is being measured, and from poor proxies (Harris and Robinson, 2004). We also know very little about the micro-mechanisms through which FDI exerts its influence in these economies. To advance our understanding of the micro elements of FDI requires new concepts and new types of data (Meyer, 2003). In this paper, we try to address some of these deficiencies by looking at the micro level issues of FDI through a large-scale company survey of FDI subsidiaries in central and eastern Europe (CEE).

This paper explores factors that explain productivity changes in foreign subsidiaries in the manufacturing sectors of five CEEE (Estonia, Hungary, Poland, Slovakia, Slovenia). Specifically, we try to find answers to: What factors determine productivity growth in foreign subsidiaries? What types of subsidiaries in terms of competencies are present in CEE? What is the strategic, marketing and operational control of foreign parent companies? How do competency and control issues affect the productivity growth of subsidiaries? Our investigation of these issues should complement existing economic perspectives and help to explain the rather inconclusive evidence from existing national level studies.

In conceptual terms, we approach the issue of productivity growth in FDI subsidiaries by building on the 'developmental subsidiaries' perspective (Birkinshaw and Hood, 1998, Birkinshaw et al., 1998, Birkinshaw, 2001). In addition, our empirical research should contribute to the emerging literature that bridges the gap between international business and growth theories (Ozawa and Castello, 2001).

This paper reports the results of a study based on a questionnaire survey of 433 foreign subsidiaries in the manufacturing sectors of the five CEE countries mentioned above. The first section of the paper briefly reviews the relevant literature and outlines our conceptual approach. The second section describes the sample and its features. The third section presents a descriptive analysis. The fourth and fifth sections respectively describe the econometric model used to explore the determinants of productivity growth in foreign subsidiaries, and interprets the results. The conclusions are presented in the sixth section.

FDI AND PRODUCTIVITY GROWTH THROUGH SUBSIDARIES UPGRADING: A LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

The impact of FDI on productivity growth has been of concern to the literature on FDI and growth, and to the international business literature. The *literature on FDI and growth* explores this link primarily at the micro level through estimates of direct (compositional) and spillover effects (see Navaretti and Venables, 2004 for a review). The main conclusions of this literature in relation to CEE countries are that: (i) foreign subsidiaries are deepening trade linkages by having disproportionately high export and import shares; (ii) the direct effects of FDI are significantly higher productivity in the acquired companies/greenfields compared to domestic firms. Foreign subsidiaries are the main profit generators in CEE countries with higher relative shares in investments and research and development (R&D) than domestic firms; (iii) FDI plays a dual role in industry and market restructuring by building new sectors (electronics, automotive), and introducing market seekers (food, banking, telecoms); (iv) the effects of FDI are still localised on acquired or newly erected plants. The extent of spillovers from FDI is still very limited, non-existent or even negative (Holland et al., 2000, Hunya, 2000, Resmini,

2000, Rojec, 2000, Konings, 2001, Meyer, 1998, Damijan et al., 2003). The judgement made by Holland et al. (2000, p. 46) is that 'FDI inflows have improved the overall growth potential of the recipient economies, but primarily through productivity improvements within the foreign affiliates themselves, rather than through increased capital investment, or technology spillovers to domestic firms'.

As pointed out in the introduction, definitional and proxy problems in the research on spillovers call for an international business perspective linked to growth through the role of subsidiary. The *literature on subsidiary development* is recent in origin and is focused on the process through which the subsidiaries of multinational companies' (MNCs) enhance their resources and capabilities, and by so doing add value to the MNC as a whole (for a review and conceptual analysis of subsidiary evolution see Birkinshaw and Hood, 1998). The literature on subsidiary strategy (White and Poynter, 1984; Bartlett and Ghoshal, 1989; Young et al., 1988; Birkinshaw and Hood, 1998) has advanced our understanding of how MNCs operate. Heterogeneity in the role of subsidiaries has led to a view of MNCs as a 'differentiated network of subsidiaries' (Bartlett and Ghoshal, 1989) which operate as 'quasi firms' (Tavares, 1999) while the multinational enterprise (MNE) itself can be treated as an 'interorganisational network' (Roth and Morrison, 1992).

This paper builds on the literature on subsidiary development by introducing the notion of subsidiary upgrading and linking it to productivity issues. Our focus is on productivity growth and its determinants in foreign subsidiaries, from the host country perspective. This perspective departs from the usual focus of the international business literature, which looks at the MNC network. The host country perspective focuses on the micro basis of growth and hence could be defined as Porterian (Porter et al., 2002). The approach that comes closest to our perspective is that of Young et al. (1988) and 'developmental subsidiaries' in a regional development context. We focus on subsidiary autonomy and resource development (Penrose, 1959). Our interest in the FDI subsidiary as a source growth focuses our inquiry on the outcomes of subsidiary behaviour rather than on the processes of building up behaviour or internal, corporate venturing (Burgelman, 1983). In addition, we abstract from the drivers of subsidiary evolution such as the gaps between subsidiaries' capabilities and their charters (Birkinshaw and Hood, 1998).

As the literature on subsidiary development suggests 'the subsidiary is a semiautonomous entity capable of making its own decisions but constrained in its action by the demand of head office managers and by the opportunities in the local environment' (Birkinshaw and Hood, 1998, p. 780). This brings to the fore issues such as subsidiary' competencies and autonomy (or, *vice versa*, of foreign parent company's control) as f productivity growth factors. Types of competencies will affect the scope of productivity improvements. Subsidiaries that are strong in R&D and operate in growing high tech sectors are likely to record higher productivity rates than those that operate in low-tech areas and base their competitiveness only on production quality. In addition, degree of autonomy of subsidiary may also affect the scope for productivity growth. In subsidiaries that are tightly controlled in all their functions and are very dependent on the parent, local managers will not have the freedom to exploit the opportunities for productivity growth. Autonomous subsidiaries are more likely to be centres of excellence and highly productive enterprises.

Increases in productivity at subsidiary level have their equivalent in different forms of upgrading. Our conceptual model is based on two forms of upgrading of subsidiaries, and on several dimensions of the integration of subsidiaries into the MNC network. A subsidiary can upgrade its position through:

(i) *functional extension* (sales, manufacturing, finance), i.e. by adding new mandates or functions;

(ii) *expansion of lines of business* (for example, colour TV and audio-visual (AV) equipment), i.e. new lines of business (products);[2]

(iii) *value added expansion* by extending scale of the existing mandate through increases in sales and exports.

This upgrading occurs through several dimensions each of which captures a different aspect. These dimensions of upgrading and integration are:[3]

(i) product flows (export, import, or local sales or purchases in total sales);

(ii) knowledge flows (changes in control of R&D, patents and licensing function);

(iii) capital flows (changes in equity).

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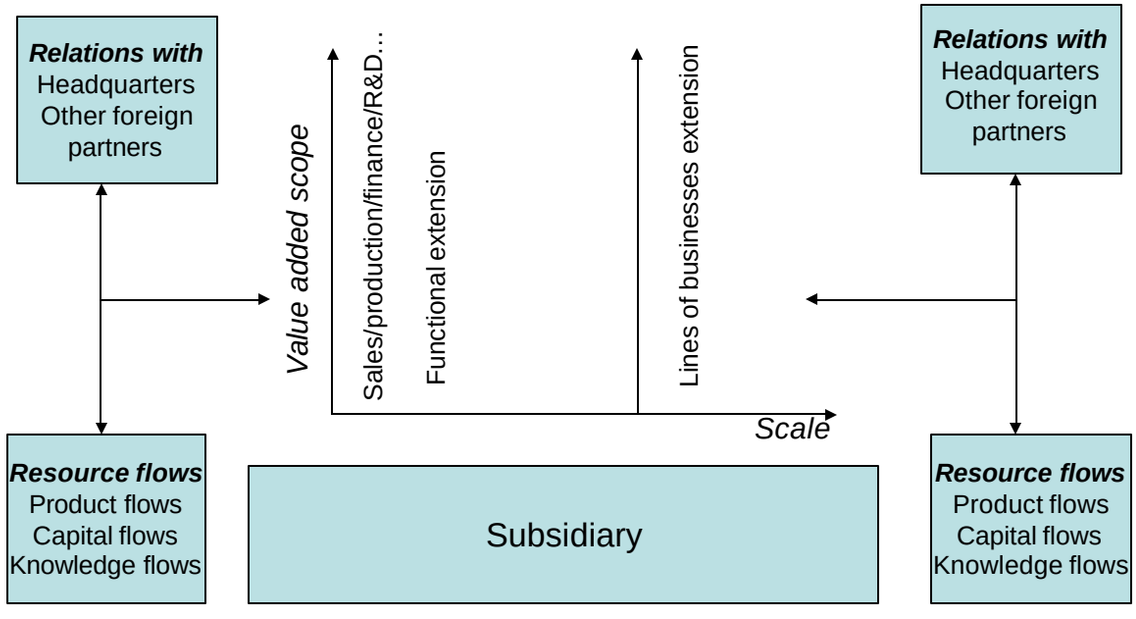
[2] Functional and lines of businesses extension extend the value scope of the subsidiary.

These dimensions can be analysed in terms of their intensity and direction (from headquarters to subsidiary; from subsidiary to headquarters; from subsidiary to subsidiary, etc.). Figure 1 illustrates this conceptual approach.

FIGURE 1

Mechanisms of Productivity Growth via Subsidiary Upgrading:

A Conceptual Model



The mechanisms of productivity growth at subsidiary level include introduction of new functions and new lines of businesses (LOB) (scope / x-axis), as well as expansion of the existing functions through sales and exports (scale / y - axis). In its relations with the parent and other companies a subsidiary employs different resources whose flow is dependent on its competencies and degree of autonomy. The subsidiary's upgrading is also dependent on relations with its local environment.

We next discuss the relevance of this model for productivity growth in foreign subsidiaries and propose several hypotheses.

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[3] Randay and Li (1998) show that each flow is somewhat independent from the others.

First, following Szalavetz (2000) we distinguish between the static and dynamic modernisation effects of FDI. Static modernisation effects are those that are designated by the parent company to production capability in the subsidiary[4]. This is reflected in the degree of the subsidiary's autonomy over operational functions and should produce efficiencies similar to those in the parent company. Dynamic effects occur when the subsidiary expands the range of functions under its control (functional upgrading).

Second, the different degrees of autonomy of different subsidiaries reflect the differences in the tasks designated to them by their parent companies. Subsidiaries differ in the extent to which they are production units only, and in the extent to which they are business organisations. The more subsidiaries within the MNC network are specialised the narrower will be the range of business functions they control. Equally, the range of inherited capabilities can determine the degree of functional control of the subsidiary.

Third, increased autonomy in the corporate function portfolio develops within the subsidiary from operational to marketing capabilities and then to strategic autonomy, which demonstrates the dynamic effect of industrial integration. Szalavetz (2000, p. 369) points out that 'the quality of the transferred technology depends not only on the recipient's absorption capabilities but also (or maybe even more) on its marketing capabilities'. However, this probably depends in great part on the market orientation of the subsidiary. For exporters, a shift from production only to autonomous control of marketing functions is very difficult for a subsidiary. Marketing for exporting incurs significant upfront costs and also bigger margins. For local market seeking FDI the marketing function is an essential part of the mandate. However, it could be expected that the only corporate function that exporters acquire will be production. This situation in CEE countries' subsidiaries is akin to the partial participation or production only participation of local firms from emerging markets in transnational value chains (Craig and Douglas, 1997). Marketing capabilities are linkage capabilities and thus may be crucial for breaking dependence on the parent company.

Fourth, responsibility for strategic functions, especially product development and strategic management, are much more difficult to acquire. Autonomy in this area denotes

[4] For a distinction between production and technology capability see Bell and Pavitt, 1993.

very independent subsidiaries, which potentially could operate as centres of excellence within the MNC network.

Within the conceptual approach outlined, on an empirical level our main objective is to identify productivity growth in foreign subsidiaries and to explore its determinants. To this end, we analyse the magnitude of productivity growth and other changes, the relationships of sample subsidiaries with their headquarters, and the competence profiles of subsidiaries. Specifically, we analyse the following parameters, which define the position and upgrading of subsidiaries in foreign parent companies' networks and which represent the potential determinants of productivity growth: (i) selected firm specific variables of foreign subsidiaries (foreign equity share, company size, type of product, time since foreign investor's engagement); (ii) the division of control between subsidiaries and their foreign parent companies in various business functions; (iii) structure of sales and purchases of subsidiaries; (iv) who is the initiator of changes in the subsidiaries; (v) the main areas of competitiveness of foreign subsidiaries. Our interest in the main is focused on control and resources related to the determinants of productivity growth of CEE subsidiaries.

SAMPLE

The above conceptual framework was tested via the 'Questionnaire for foreign investment enterprises'.[5] Questionnaires were sent to 2,203 foreign manufacturing subsidiaries in Estonia, Hungary, Poland, Slovakia and Slovenia. 433 questionnaires were returned representing a 19.7% response: 153 were from Poland, 80 from Hungary, 78 from Slovakia, 72 from Slovenia and 50 from Estonia. The highest proportion of sample subsidiaries is in electrical and optical equipment (16.4%) and basic metals and products (14.1%), followed by food, beverages and tobacco (10.2%), non-metal mineral products (9.0%), chemicals and man-made fibres (8.5%), rubber and plastic products (6.9%), etc.

The other main characteristics of the sample are: (i) that representativeness of the sample in terms of the number of firms is relatively low, but quite high in terms of employment; representativeness among countries is diverse; (ii) that most of the

subsidiaries included in the sample are medium sized; the share of large firms is highest in Poland and Hungary, mainly due to their bigger country size; (iii) most of the sample subsidiaries were established in 1993 or before; (iv) that majority-foreign owned companies prevail; (v) that the share of subsidiaries producing intermediate products is much higher than that producing final products.

DESCRIPTIVE ANALYSIS

In the descriptive analysis we explore the characteristics of the sample subsidiaries that will be used as variables in our model. They relate to the magnitude of changes, to the relationships of sample subsidiaries with their headquarters, and with local and foreign environment, and to the competence profile of subsidiaries.

Changes and Upgrading of Activities in Sample Subsidiaries after the Engagement of Strategic Foreign Investors

We classified changes at subsidiary level into five categories: changes in value of sales, changes in share of exports, and changes in productivity level, technology level and quality level (Table 1). The main conclusion is that *the magnitude of changes* (increase) following the engagement of strategic foreign investors is similar across all dimensions. The similarity is greatest for productivity, technology and quality changes, indicating that technological improvements in CEE countries are still strongly focused around quality, training and organisational improvements, i.e. around production capability. Although changes in sales value and exports were somewhat lower, and especially exports, they were still within the range of 'increase'.

[5] See questionnaire on http://www.iwh-halle.de/projects/productivity-gap/.

TABLE 1

Magnitude of Changes since the Registration of a Company as Foreign Subsidiary*

Countries	Value of total sales	Share of exports	Level of productivity	Level of technology	Level of quality
Total**	0.50	0.45	0.56	0.55	0.56
Slovenia	0.61	0.57	0.57	0.51	0.46
Hungary	0.59	0.39	0.61	0.56	0.56
Poland	0.46	0.35	0.54	0.58	0.58
Estonia	0.69	0.46	0.56	0.56	0.56
Slovakia	0.26	0.57	0.54	0.51	0.60

* Magnitude of changes ranges from: -1=considerable reduction, -0.5=reduction, 0=no change, 0.5=increase and +1=considerable increase.

** Weighted average.

In analysing the magnitude of changes and the upgrading of activities of foreign subsidiaries, the issue of *who initiates the changes* is of special relevance. Our data enable us to analyse, who initiates what kinds of changes. We distinguish between functional upgrading (organisation and business functions), product diversification (number of lines of businesses) and sales upgrading (sales and exports) (see Figure 1). There is no doubt that it is the subsidiaries themselves and not their foreign parents that are the major initiators of changes. This is true for all the three areas of change, but especially so in the area of organisation and business functions. Foreign parent companies most frequently initiate changes in product diversification (number of lines of businesses) (Table 2). This may suggest that subsidiaries enjoy autonomy regarding how they organise business and production, but within a mutually agreed product mandate.

TABLE 2

Who Gives Initiative for Changes?*

Countries	Organization and business functions	Number of lines of business	Sales and exports
Total**	0.38	0.48	0.43
Slovenia	0.37	0.43	0.43
Slovakia	0.38	0.61	0.54
Hungary	0.30	0.46	0.46
Poland	0.44	0.50	0.39
Estonia	0.33	0.31	0.31

* Indicators are calculated by giving individual answers the following weights: 0=only subsidiary, 0.33=mainly subsidiary, 0.66=mainly foreign parent, 1=only foreign parent. The nearer is indicator to 0 the more initiatives have been undertaken by FIEs themselves and *vice versa*.

** Weighted average.

Relationships of Sample Subsidiaries with their Headquarters and the Local and Foreign Environment

The control of various business functions between a subsidiary and its foreign parent company and the structure of sales and supplies reflects the relationships of sample subsidiaries with their headquarters and the local and foreign environment.

TABLE 3

Foreign Parent Company's Control of Subsidiary's Business Functions

Business functions	Control indicator*					
	Total**	Slovenia	Slovakia	Hungary	Poland	Estonia
Operational management	0.253	0.111	0.199	0.212	0.370	0.262
Process engineering	0.353	0.278	0.245	0.396	0.426	0.338
Supply & logistics	0.247	0.194	0.278	0.237	0.268	0.232
Accounting and financial operations	0.145	0.083	0.140	0.124	0.165	0.220
Operational control	**0.250**	**0.167**	**0.216**	**0.242**	**0.307**	**0.263**
Distribution. sales	0.306	0.319	0.454	0.323	0.201	0.366
Advertisement	0.336	0.333	0.460	0.340	0.282	0.310
After sale services	0.256	0.305	0.362	0.270	0.181	0.232
Marketing	0.373	0.403	0.515	0.352	0.295	0.379
Market research	0.391	0.463	0.563	0.376	0.287	0.352
Marketing control	**0.332**	**0.365**	**0.471**	**0.332**	**0.249**	**0.328**
Determining product price	0.363	0.315	0.490	0.335	0.355	0.310
Investment finance	0.389	0.269	0.475	0.307	0.412	0.506
Product Development	0.501	0.454	0.643	0.490	0.475	0.447
Strategic management and planning	0.500	0.398	0.580	0.468	0.532	0.482
Strategic control	**0.438**	**0.359**	**0.547**	**0.400**	**0.444**	**0.436**
OVERALL CONTROL	**0.340**	**0.297**	**0.411**	**0.325**	**0.333**	**0.342**

* Indicators are calculated by giving individual answers the following weights: 0=only subsidiary, 0.33=mainly sobsidiary, 0.66=mainly foreign parent, 1=only foreign parent. The nearer is indicator to 1 the higher is the control of foreign parent and *vice versa*.

** Weighted average.

Table 3 presents a *pattern of decision-making and control* in various areas of business operations in subsidiaries. Thirteen different subsidiary business functions are classified according to who undertakes them, i.e. only subsidiary, mainly subsidiary, only foreign parent, or mainly foreign parent company. Based on our conceptual approach we grouped the business functions into operational, marketing and strategic functions. Increased autonomy of the subsidiary in the corporate function portfolio develops from operational to marketing and then to strategic autonomy. Therefore, we should expect that foreign parent companies exercise limited control in operational functions, higher control in marketing and the greatest control in strategic functions. Table 3 fully confirms our expectations. Foreign parent companies have the least control in operational functions and the most in strategic functions. Foreign parent companies retain the highest level of control in two strategic functions, i.e. product development and strategic development and planning whole in marketing market research and marketing are important for foreign parent companies.

Market orientation of subsidiaries is a very important variable for understanding the autonomy/control of business functions and the patterns of upgrading. It also indicates the integration of subsidiaries in their foreign parent companies networks. Overall, the sample subsidiaries export 51.8% of their sales. However, there are big country differences (Table 4). On the one hand, Slovenia, Slovakia and Estonia have distinctively export oriented subsidiaries, while Poland has domestic market oriented subsidiaries and Hungary stands somewhere between. Export orientation is closely related to sales to the foreign parent company. Slovenian and even more so Slovakian subsidiaries make most of their total sales to their foreign parent companies.

TABLE 4

Subsidiaries' Sales Structure; %

Countries	Sales to			
	Other domestic buyers	Foreign parent	Other foreign buyers	Other domestic subs.of foreign parent
Total*	44.6	30.5	21.3	3.3
Slovakia	31.7	47.5	16.9	2.5
Slovenia	28.1	37.1	35.8	0.5
Hungary	43.3	27.7	24.4	3.5
Poland	62.6	20.8	12.0	4.5
Estonia	35.9	29.2	30.6	4.4

* Weighted average.

TABLE 5

Subsidiaries' Purchases Structure. %

Countries	Purchases from			
	Other domestic suppliers	Other foreign suppliers	Foreign owner	Other domestic subs. of foreign owner
Total*	34.44	28.0	27.6	7.2
Slovakia	1.62	36.08	32.70	23.01
Poland	40.47	17.83	33.98	6.66
Estonia	36.57	30.10	24.84	5.43
Slovenia	41.3	34.6	23.5	0.5
Hungary	45.29	32.03	17.88	1.18

* Weighted average.

Structure of suppliers is another variable explaining autonomy/control of business functions of foreign subsidiaries and their integration in their foreign parent companies' networks and the local economies. Unlike the situation in sales, where foreign parent companies dominate, in supplies other domestic suppliers and other foreign suppliers are more important than foreign parent companies (Table 5). It seems that subsidiaries have more autonomy in supplies than in sales. Overall, subsidiaries purchase more supplies from abroad than at home. It seems that subsidiaries in those countries whose sales are the most local-market oriented (Poland and Hungary), are also more local-market oriented in terms of supplies. More exports are obviously linked to more imported

supplies, and *vice versa*. Also, country size is relevant here. Smaller countries offer smaller possibilities for both sales and supplies.

Competence Profile of Foreign Subsidiaries

Increased competitiveness is the key to reducing productivity gap. In this context we explore the importance of individual areas of competitiveness for the overall competitiveness of subsidiaries. The most important area of competitiveness for subsidiaries is quality control, closely followed by management capabilities and trained labour force, with R&D and licences further behind. The former three areas are assessed as 'very important' or 'important'. This reinforces the view that CEE subsidiaries base their market position more on developed production, and much less on technology capabilities.

TABLE 6

Areas of Competitiveness of Subsidiaries

Areas of competitiveness	Importance*					
	Estonia	Slovenia	Poland	Slovakia	Hungary	Total**
Quality control assistance	0.801	0.861	0.811	0.822	0.895	0.836
Management	0.765	0.767	0.791	0.770	0.780	0.778
People and training	0.791	0.726	0.676	0.679	0.675	0.698
Patents. licences. R&D	0.536	0.576	0.579	0.520	0.419	0.532

* Importance of areas of competitiveness ranges from 0=not important, 0.25=little important, 0.50=important, 0.75=very important to 1=extremely important.

** Weighted average.

MODEL

We have shown that industrial integration through FDI has led to considerable increases in productivity, technology and quality. Our data also provide a number of determinants that might influence productivity growth in subsidiaries (level of foreign

parent control, sales structure, foreign equity share, etc.). This section develops a model for assessing the determinants of productivity growth and interpreting results. The main features and operational characteristics of foreign subsidiaries explored in the descriptive analysis, are used as dependent and independent variables.

The model is used to assess the determinants of productivity growth in foreign manufacturing subsidiaries in five CEE countries. Based on the conceptual framework presented in Figure 1, which builds on the 'developmental subsidiary' perspective, we explore the relevance of control (corporate governance) and resource-based variables as determinants of subsidiaries' productivity growth. Corporate governance variables go beyond equity proxy by extending to the real control of individual business functions. Competence proxies encompass production and technology related variables.

We define the firm's productivity growth A_{it} as:

(1) $$A_{it} = G_i(BF_{it}, F_i, CS_i, X_i, M_i, COMP_i, d_j, d_t)$$

where BF_{it} captures variables for the control of business functions, and F_i through M_{it} are the other control variables - F_i is a dummy for majority or minority foreign ownership, CS_i is a dummy of the firm size, and $COMP_i$ captures variables denoting the importance of areas of competitiveness. With X_i *and* M_i, which refer respectively to export propensity (exports to foreign parent company or other foreign firms to sales ratio) and import propensity (ratio of imports from foreign parent company or other foreign firms to the material costs) of the firm, we tested for alternative sources of productivity growth in foreign subsidiaries. In addition, we allow for sector and country specific effects by including respectively dummy variables d_j and d_t. Using all these control variables we try to isolate the possible impact of the control of business functions variables on the' productivity growth of the subsidiaries.

As the alternative answers regarding the changes in productivity have a logical order (great decrease, decrease, no change, increase, great increase), an ordered probit model was used. Estimation of the model is based upon maximum likelihood where the implied probabilities enter the likelihood function. The interpretation of the coefficients is in terms of the underlying latent variable model – a positive coefficient means that the corresponding variable increases productivity or, in terms of the effects on the respective probabilities – the probability that the observed value is 1 will increase, while the

probability that the observed value of the answer is 0 will decrease (the effect on intermediate categories is ambiguous).

Spearman correlation coefficients between the variables of control for business functions show that all 13 variables are significantly correlated with each other and therefore not suitable for use in the model. We therefore created four group indicators for foreign parent company's control and used them as variables in the model. First, we used an overall indicator of parent company's functional control, calculated as the unweighted average of the indicators for 13 individual business functions (see note 1 to Table 8). Second, we grouped individual business functions into three groups, i.e. i operational, marketing and strategic business functions, as proposed in Table 3. These three groups define operational, marketing and strategic control of the parent companies. They are calculated as the unweighted average of the indicators for parent company' control of individual business functions in a particular group (see notes 2, 3 and 4 to Table 8). Since Spearman correlation coefficients for the three groups of business functions also show significant correlation (see Table 7), we use them alternatively in the regression model.

The creation of group indicators for foreign parent's control thus provides us with four alternative group variables, which represent the key alternative variables in our model. Their main intention here is to find whether there is an interdependent relationship between the level of the foreign parent company's control (or alternatively, the level of the subsidiary's autonomy) of the individual group variable and the change in subsidiary's productivity. A dummy variable was included in the model to separate majority from minority foreign-owned subsidiaries, in order to discover whether majority foreign ownership results in higher productivity growth, because it facilitates the transfer of more complex technology and management skills to local firms. Majority versus minority foreign ownership could also be an alternative proxy variable for foreign parent control in performing business functions in that a logical expectation would be that foreign parent companies with majority equity share will exhibit greater control over the most important business functions of subsidiaries. This is confirmed in Table 7, where all group indicators for foreign parent company's control show significant correlation with foreign equity share. This is taken into account in the model.

TABLE 7

Spearman's correlation coefficients for business functions' group variables and for foreign equity dummy

	Foreign equity dummy	Overall autonomy	Operational control	Marketing control	Strategic control
Foreign equity dummy	1.0000				
Overall control	0.3762*	1.0000			
Operational control	0.1992*	0.7416*	1.0000		
Marketing control	0.3093*	0.8981*	0.4403*	1.0000	
Strategic control	0.3970*	0.8989*	0.6670*	0.6807*	1.0000

***** **I**ndicates significance at 5 per cent level.

An ordered probit model was used to test the model. We tested whether the subsidiary's productivity growth is a function of:

- overall functional control: variable *f1*
- operational control: variable *f2*
- marketing control: variable *f3*
- strategic control: variable *f4*
- company size: dummies *dq22 and dq23*
- foreign equity share: dummy *dumq5*
- share of exports/purchases to/from foreign parent company/other foreign buyers/sellers: variables *q10a_sal, q10b_sal, q11_a, q11_b*
- importance of areas of competitiveness: variables *q12a_a – q12a_d*
- sector dummies: dummies *dumh, dumhm and dumlm*
- country dummies: dummies *dumsvlk, dumpol, dumhun, dumest*

Several of the above dummies need some further explanation. For company size we constructed two dummies - for medium and large subsidiaries, small ones being the control group. For equity share variable we constructed a dummy for subsidiaries with majority foreign equity share, with subsidiaries with foreign equity share of 50% or below acting as the control group. For sector dummies we grouped subsidiaries according to the technology intensity of the sector they belonged to (high, medium high, medium low), subsidiaries in low technology intensity sectors acting as the control group. For

country dummies we grouped subsidiaries within each particular country, with the group of Slovenian subsidiaries being the control group.

Five alternative models are used in the estimation procedure. The differences between them are that: (1) in the first one we use only foreign equity share as a measure of foreign control/subsidiary autonomy, (2) in models 2, 3, 4 and 5 variables related to type of control – overall, operational, marketing and strategic – are used with and without equity shares.

RESULTS AND DISCUSSION

In this subsection the variables denoting foreign control over various groups of business functions (corporate governance), competencies and strategy are used in order to test for their possible relation with the productivity growth of foreign manufacturing subsidiaries in five CEE economies. Based on equation (3), we estimated the following model:

$$a_i = b_i + \alpha_j f_{ji} + dF_i + \chi_k CS_{ki} + \phi_l X_{li} + \gamma_m M_{mi} + \eta_n COMP_{ni} + \theta_o dums_{oi} + \psi_p dumc_{pi} + e_i \quad (4)$$

where b_t is a constant term (a residual that accounts for alternative sources of productivity growth not accounted for in the model), α_j represents the impact of four alternative group variables of foreign parent's control, d measures the difference in productivity growth rates between subsidiaries with majority and minority foreign equity share, χ_k measures the difference in productivity growth rates between different sized subsidiaries, ϕ_l represents the impact of sales to foreign parent company or other foreign firms, γ_m represents the impact of purchases of intermediate inputs from foreign parent company or from other foreign sellers, η_n represents the impact of different areas of competitiveness, θ_o and ψ_p are parameters of sector and country dummies, while e is the error term.

The results obtained are presented in Table 8. After controlling for other possible determinants of productivity growth, three of four group business functions' control variables (model 2-5) are significantly and positively related to productivity growth. This means that the level of control of business functions by foreign parent companies or,

alternatively, the level of autonomy of subsidiaries in business functions is found to be one of the determinants of differences in productivity growth between subsidiaries. The higher the foreign parent's overall control of business functions, as well as marketing and especially strategic functions, the higher the productivity growth in subsidiaries. Foreign parent companies seem to seek control of strategic and marketing functions and leave operational control to the subsidiaries. This is as expected, since control of operations has no significant impact on productivity growth. We presume that this control pattern means maintenance of a basically production oriented mandate in subsidiaries for products shipped to parent or other foreign buyers.

****

Table 8 – see Annex

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The situation changes if we introduce into the model the foreign equity share dummy. In the basic model, which does not contain any variables for business function' control, foreign equity share proves to have a significant and positive impact on subsidiaries'' productivity growth, i.e. productivity growth in majority foreign owned subsidiaries is significantly higher than in minority foreign owned subsidiaries. Also, introducing a foreign equity share dummy in models with overall, operational, marketing and strategic control (models 2, 3, 4 and 5) makes control of these business functions irrelevant for productivity growth, while majority foreign equity share becomes significantly and positively related to the productivity growth.

Insignificance of business functions' control for productivity growth in the presence of a foreign equity share dummy in the model suggests that foreign equity share in fact determines the control of business functions. In other words, the level of overall foreign control, as well as the level of foreign control of management and strategic business functions is positively correlated to the level of foreign equity share.[6] The only exception is operational control, where foreign parent companies are not interested in exerting control.

[6] This is confirmed by a statistically significant correlation between foreign equity share dummy and the business functions control variables in Table 7.

The model also points to the type of competencies that form the basis for productivity growth as well as to the role of market orientation of subsidiaries. Within the group of variables related to competitiveness the only variable, which proved to be significant for productivity growth was 'quality control' – the higher the importance of quality control for the competitiveness of subsidiary, the higher the change in productivity. Moreover, this variable has the highest coefficient of all the variables in all the equations. CEE subsidiaries seem to be mainly production oriented i.e. basing their competitive advantage on production, rather than technological or marketing capability. The importance of other areas of competitiveness like patents and licences, people and training and management, do not exert a significant impact on changes in productivity. In model 3 with the operational control variable the 'quality' coefficient is much higher when compared to 'quality' coefficients in other models. This suggests that quality issue is of greater importance in those subsidiaries where foreign parent operational control is important. The 'quality' coefficient is much less significant in model 4 (10% significance) which incorporates the marketing control variable. This suggests that for subsidiaries where foreign parent marketing control is important quality is still important though relatively less so. This provides some ground for the hypothesis that upgrading from production based capabilities to capabilities where non-production functions play a role is not trivial. This suggests that upgrading is a non-linear process i.e. it is an activity in which firms face thresholds in terms of necessary capabilities.

Subsidiaries with a higher proportion of sales to foreign parent companies or to other foreign buyers experience higher and statistically significant changes in productivity levels. In the case of closer integration of subsidiaries in foreign parent companies' networks (measured by the share of subsidiary sales going to the foreign parent company), the parent company seems to be keen to increase the subsidiary's productivity level. So, export oriented subsidiaries may expect higher productivity increases than local market oriented subsidiaries.

Subsidiary size dummies show that large subsidiaries (with more than 250 employees) show a significantly higher average change in productivity compared to small and medium sized subsidiaries. Large subsidiaries are likely to receive more assistance from the parent company as they are more important in terms of sales and exports.

Subsidiaries in high tech sectors exhibit significantly lower changes in productivity than subsidiaries in low tech sectors. We explain this result by the existing development level of the CEE economies, which offers more scope for productivity growth in low and medium high tech than in high tech sectors, and by the fact that subsidiaries in the CEE are most often located in low value added segments of high tech sectors. For example, in these segments quality would seem far from sufficient for productivity increases, and weaknesses in other non-production related functions like product development and marketing, may be factors that inhibit productivity growth. When compared to the EU15 economies, the CEE countries exhibit a high share of employment in high and medium-high tech sectors, but the R&D intensity of their business enterprise sector is disproportionately low (Srholec, 2006). This suggests that the CEE subsidiaries may face limits to further upgrading which acquired competencies in quality may not be able to overcome. Case study research on these issues reported in McGowan et al. (2004), Radosevic and Sadowski (2004) and Günter (2005) is quite consistent with this conclusion.

The model does not show any significant differences in the average change of subsidiary productivity between five CEE countries in the sample. This suggests that production oriented subsidiaries that are controlled through majority foreign equity share and are highly dependent on foreign parents or foreign buyers have strong regional characteristics.

CONCLUSIONS

The intention of the paper was to assess the determinants of productivity growth in manufacturing foreign subsidiaries in five CEE countries. Empirical analysis shows that industrial integration through FDI has led to considerable increases in productivity, technology and quality. The models suggest the following conclusions about productivity growth and control in foreign subsidiaries:

a/ CEE subsidiaries have relatively strong autonomy in business functions, but within a dominantly production oriented mandate. This basically confirms Birkinshaw and Hood's (1998) proposition that subsidiaries are autonomous entities constrained by the

demands of head office managers and constrained by the opportunities offered by their local environment.

b/ The level of the foreign parent companies' overall control and the level of their control of marketing and strategic functions are significant and positive determinants of productivity growth in foreign subsidiaries. The higher the foreign parent's control overall, and especially its control of marketing and strategic functions, the higher the productivity growth in subsidiaries. Foreign parent companies seem to seek control of strategic and marketing business functions and leave operational control to the subsidiaries.

c/ Introduction of a foreign equity share dummy in the model makes control of business functions irrelevant for productivity growth, while majority foreign equity shares becomes significantly and positively related to productivity growth. This suggests that foreign equity share determines the control of business functions. The level of overall foreign control, as well as the level of foreign control of management and strategic business functions is positively correlated to the level of foreign equity share.

d/ The model points to a strong explanatory role of the types of capabilities acquired by subsidiaries. The highest coefficient for quality control suggests that CEE subsidiaries are mainly production oriented, i.e. basing their competitive advantage on production, not technological or marketing capability.

e/ Subsidiaries with a higher proportion of sales to foreign parent companies or to other foreign buyers, experience higher changes in productivity level. This again points to the close orientation towards the parent, which is reinforced by production oriented mandates.

The model points to some other determinants of subsidiaries' productivity growth:

f/ Large subsidiaries have significantly higher average changes in productivity compared to small and medium sized subsidiaries. This can be explained by economies of scale as well as by lower transaction costs and higher resource commitments in large subsidiaries.

g/ Subsidiaries in high tech sectors exhibit significantly lower changes in productivity than subsidiaries in low tech sectors. We explain this result by the existing development level of CEE economies, which offers more scope for productivity

growth in medium high than in high tech sectors, and by the fact that subsidiaries in CEE are most often located in low value added segments of high tech sectors.

The winning combination as far as productivity growth in subsidiaries is concerned seems to be when foreign parent companies leave operational management to subsidiaries. When subsidiaries have a production-oriented mandate and focus on quality they are dependent on the parent company for strategic and marketing functions. Our results confirm Szalavetz's (2000) proposition on the relevance of marketing capability of subsidiaries for further upgrading.

Within the production oriented mandate, in which quality seems to be paramount feature, high productivity growth is ensured when subsidiaries are left to their own devices. This further reinforces the view of MNCs as a network of differentiated subsidiaries that operate within given mandates. In CEE, these mandates seem to be mainly production oriented. Subsidiaries are main initiators of change, especially in the organisation of business functions, i.e. they control 'how' things will be done but have significantly less control over strategic issues such as what lines of business will be pursued, i.e. in issues related to 'what'.

Our research suggest that the capabilities (resources),, and in particular quality, as proxies for production capability are as important as corporate governance or control variables in understanding what drives productivity growth. Corporate governance or control variables have to be understood in relation to the resources that subsidiaries possess. They operate in tandem with strategic or market-oriented variables. At the theoretical level, our analysis suggests that we might gain a better understanding of productivity growth at subsidiary level by combining the managerial and resource based theories of the firm (for a similar argument see Filatotchev et al., 2003).

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Table 8: Ordered probit estimates

VARIABLE	MODEL 1: BASIC	MODEL 2: WITH OVERALL CONTROL		MODEL 3: WITH OPERATIONAL CONTROL		MODEL 4: WITH MARKETING CONTROL		MODEL 5: WITH STARTEGIC CONTROL	
	With foreign equity share	With foreign equity share	Without foreign equity share	With foreign equity share	Without foreign equity share	With foreign equity share	Without foreign equity share	With foreign equity share	Without foreign equity share
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Overall control[1]		.1844791 (0.585)	*.6186036 (2.000)						
Control of operational functions[2]				-.2743104 (-1.277)	.0859709 (0.248)				
Control of marketing functions[3]						.2002000 (0.846)	*.4500981 (2.017)		
Control of strategic functions[4]								.2211600 (0.751)	*.5735962 (2.137)
Foreign equity share	**.1839030 (3.187)	**.5705463 (3.035)		**.6477939 (3.756)		**.5386167 (2.986)		**.5047218 (2.750)	
Dummy – medium size firm	.2142131 (1.386)	.2867031 (1.743)	.2810135 (1.740)	.2415895 (1.534)	.2448223 (1.563)	.2347025 (1.447)	.2201845 (1.380)	.2377095 (1.499)	.2365474 (1.517)
Dummy – large size firm	**.5892459 (3.782)	**.4685705 (2.825)	**.4520574 (2.748)	**.5599301 (3.494)	**.5532246 (3.486)	**.4752426 (2.918)	**.4439310 (2.752)	**.5527797 (3.440)	**.5412322 (3.394)
Exports to foreign owner	**.2945145 (3.817)	**.2942468 (3.510)	**.2626725 (3.192)	**.2882156 (3.651)	**.2619774 (3.372)	**.3052286 (3.744)	**.2800631 (3.388)	**.2687787 (3.330)	**.2433951 (3.066)
Exports to other foreign firms	**.2823293 (3.173)	**.2457816 (2.577)	*.2185576 (2.325)	**.2610607 (2.866)	**.2348398 (2.613)	**.2732635 (2.940)	**.2526623 (2.749)	**.2306515 (2.501)	*.2131464 (2.336)
Imports of intermediate products from foreign owner	.0016579 (0.812)	.0017599 (0.812)	.0013664 (0.634)	.0013658 (0.656)	.0008698 (0.421)	.0015103 (0.710)	.0011403 (0.539)	.0018687 (0.895)	.0014714 (0.708)
Imports of interm. products from other foreign firms	-.0018311 (-0.744)	-.0008958 (-0.339)	-.0019704 (-0.411)	-.0017124 (-0.669)	-.0019268 (-0.763)	-.0011637 (-0.456)	-.0014937 (-0.593)	-.0008197 (-0.316)	-.0011770 (-0.459)
Quality control1	**.8524258 (2.657)	*.7737608 (2.079)	*.7386333 (2.013)	**1.150881 (3.376)	**1.069824 (3.186)	+.6599708 (1.880)	+.6482672 (1.869)	**.9183251 (2.795)	**.8849372 (2.719)
Patents and licences	.2951882 (1.346)	.4223717 (-0.187)	.3836029 (1.628)	.3158370 (1.401)	.2582437 (1.162)	.3634729 (1.570)	.3151093 (1.378)	.3723247 (1.639)	.3332305 (1.484)
People and training	-.0751099 (-0.221)	-.0689664 (-0.187)	-.0114290 (-0.031)	-.0743122 (-0.211)	-.0007116 (-0.002)	-.0697949 (-0.196)	.0063633 (0.018)	-.0305169 (-0.086)	.0357369 (0.102)
Management	-.1926731	-.3333197	-.3992478	-.4332002	-.4923687	-.2678460	-.3737457	-.2482529	-.2965685

	(-0.562)	(-0.887)	(-1.073)	(-1.205)	(-1.385)	(-0.744)	(-1.050)	(-0.698)	(-0.840)

VARIABLE	MODEL 1: BASIC	MODEL 2: WITH OVERALL CONTROL		MODEL 3: WITH OPERATIONAL CONTROL		MODEL 4: WITH MARKETING CONTROL		MODEL 5: WITH STARTEGIC CONTROL	
	With foreign quity share	With foreign equity share	Without foreign equity share	With foreign equity share	Without foreign equity share	With foreign equity share	Without foreign equity share	With foreign equity share	Without foreign equity share
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Sector dummy – high technology intensity	**-.6275304 (-2.842)	**-.6924582 (2.905)	**-.6257386 (-2.656)	**-.7044164 (-3.065)	**-.6088539 (-2.686)	**-.7112166 (-2.999)	**-.6430712 (-2.742)	**-.6750524 (-2.942)	**-.6146038 (-2.706)
Sector dummy – medium high technology intensity	-.1167426 (-0,728)	-.1725871 (-0.983)	-.1676355 (-0.968)	-.1384447 (-0.833)	-.1179877 (-0.720)	-.1697245 (-0.991)	-.1541562 (-0.912)	-.1540274 (-0.911)	-.1543055 (-0.922)
Sector dummy – medium low technology intensity	.1789337 (1.127)	.0922732 (0.539)	.1190285 (0.707)	.1209771 (0.742)	.1499411 (0.935)	.0989393 (0.585)	.1191298 (0.716)	.1189671 (0.726)	.1412034 (0.873)
Country dummy – Slovakia	-.1647625 (-0.769)	-.1841794 (-0.818)	-.1187294 (-0.532)	-.2096895 (-0.970)	-.0821049 (-0.387)	-.1585505 (-0.710)	-.0837332 (-0.379)	-.2043373 (-0.916)	-.1736421 (-0.782)
Country dummy – Poland	-.2236847 (-1.286)	-.1843626 (-1.011)	-.1345237 (-0.747)	-.2080813 (-1.148)	-.1826290 (-1.018)	-.1483719 (-0.803)	-.0610286 (-0.337)	-.2502127 (-1.414)	-.2226904 (-1.268)
Country dummy – Hungary	-.1600520 (-0.779)	-.0417469 (-0.192)	.0321013 (0.149)	-.0837546 (-0.398)	-.0222494 (-0.107)	-.0202234 (-0.094)	.0694891 (0.329)	-.1572690 (-0.745)	-.1028766 (-0.492)
Country dummy – Estonia	-.3460657 (-1.482)	-.2881158 (-1.148)	-.2046647 (-0.836)	-.3134937 (-1.277)	-.2116450 (-0.886)	-.2110037 (-0.856)	-.1024256 (-0.427)	-.3195559 (-1.319)	-.2606278 (-1.099)
Pseudo R^2	0.0852	0.0857	0.0726	0.0941	0.0755	0.0856	0.0732	0.0855	0.0757
Number of obs.	371	328	332	357	361	340	344	350	354

Notes:

(i) Dependent variable: productivity growth.

(ii) Z-statistics in parentheses.

(iii) ****, *** and + indicate significance at 1%, 5% and 10% level, respectively.

1/ Control of subsidiary - overall: Average value of foreign parent company's control of all 13 business functions (see Table 3).

2/ Operational control: Average value of foreign parent company's control of 4 operational business functions (see Table 3).

3/ Marketing control: Average value of foreign parent company's control of 5 marketing business functions (see Table 3).

4/ Strategic control: Average value of foreign parent company's control of 4 strategic business functions (see Table 3).

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