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Foreign firms and their perception of regions in the Czech Republic: manufacturing industry versus producer services

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Abstract

The paper aims to grasp the character of spatial perceptions of foreign firms from some specific points of view in order to find out possible main factors influencing their location decisions in the Czech Republic. Particularly it tries to find out whether there are some significant differences in perception of Czech regions between foreign firms in manufacturing industry and firms in producer services and in localization factors important for these two industries. Mental maps were used to depict the spatial preferences of foreign investors and consequently the regression analysis was applied to explore which variables can explain the variation in the final rating of regions.

Key words: Foreign firms – Czech Republic – location decisions – mental maps – regression analysis

1. Introduction

Foreign investments are of great importance particularly in countries undergoing a far-reaching economic transformation. This is also the case of the Czech Republic where economic transformation has been taking place in larger context of the post-communist transformation that has opened the national economy to free inflows of foreign investment (Dostál, 1998; Pavlínek, Smith, 1998; Pavlínek, 1998, 2002). Suitable types of foreign direct investment and mainly its allocation in terms of sectors and territories within a country are very important factors and have significant consequences not only for economical situation of the country concerned, but above all for further development of regions receiving investment or, on the contrary, for regions neglected by foreign investors. The effect of foreign direct investment can also initiate the emergence of a "dual economy" and deepen differences between economically expanding and lagging behind regions.

It is obvious that behind location decisions there is always lack of information or a distorted view of potential locations and regions for investment. In this context, the research into perceptions and subjective evaluation of location factors becomes the key direction of research activities (Törnqvist, 1979; Dostál, 1984; Pellenbarg

and Meester, 1984). Spatial images, their contents, differences caused by the characteristics of entrepreneurs and various spatial characteristics should be thoroughly investigated and then used for defining aims and objectives of local, regional and national economic and regional policy.

The aim of this paper is to grasp the character of spatial perceptions and spatial images of foreign firms from some specific points of view in order to find out possible main factors influencing their location decisions in the Czech Republic. Particularly it tries to find out whether there are some significant differences in perception of Czech regions between foreign firms in manufacturing industry and firms in producer services and in localization factors important for these two industries.

The article is structured as follows: Firstly, data collection and applied methodology are explained. Secondly, ratings of regions are considered in Part 3. Then ratings of regions are examined as affected by the field of economic activity – for manufacturing industry and producer services. In Part 5 explanatory analysis is made with the help of multiple regression analysis to identify systematic factors accounting for the variation of the total rating across 70 micro-regions. Finally, comparison of the general regression model with regression models for firms in manufacturing industry and producer services is done. The concluding part enumerates main lessons to be drawn from these analyses indicating importance of regional differences in quality of human resources in context of some other factors that influence the perception by foreign investors of regions in the Czech Republic.

2. Data collection and methodology

In order to obtain data on spatial perception of foreign investors in the Czech Republic, a survey questioning firms with foreign participation was done. The set of studied firms was selected from a database of the Business Monitor Ltd. (Foreign companies in emerging markets, 2004). Firms were selected proportionally according to the population size of 70 territorial units (districts of state administration) forming micro-regional level of the country to avoid a significantly uneven representation of foreign firms in each region. When drafting our questionnaire we were led by the desire to gather as extensive information as possible, but at the same time we were constrained by the necessity to have a simple and concise questionnaire. A map of 70 micro-regions was the main part of the questionnaire and it was accompanied by questions specifying a short profile of the firm and of the respondents.

The Czech Republic was thus divided into seventy regions. The firms of foreign investors were asked to rate individual regions in the set of the 70 regions in terms of their high or low suitability for locating their firm (branch) in the Czech Republic. In brief, this part of our research was a sort of game in which entrepreneurs were asked to act as if they had to start and locate their firm in the Czech Republic again. So, they could freely rank the regions (districts) according to their know-

ledge, experience, references or prejudices, and place particular districts on a scale ranging from "evidently unsuitable" location through "unsuitable", "rather unsuitable", "satisfactory" and suitable" to "the most desirable" location.

A pilot testing revealed, however, a low response rate and a frequent misunderstanding or improper filling out of the questionnaire. Consequently, the final questionnaire was prepared in bilingual form (in the Czech and English languages), shortened and made easier to follow. Nevertheless, the response did not rise significantly. Despite the fact that such a low response rate is quite usual in this type of surveys (see Meester, 2004), it can be assumed that similar surveys are considered in the Czech entrepreneurial environment as a novelty and most of the entrepreneurs or their management personnel still do not tend to be communicative in this kind of research. In spite of all these obstacles, the response rate of 16% (useful response of 13.4% based on 155 questionnaires) can be considered as representative. The representativeness has also been proved by statistical testing, using the classical T-test in the SPSS program. The final distribution of respondents was always compared to the relative distribution of the questionnaires sent, to the relative distribution of the foreign firms in the database and also with the distribution of population in the seventy regions of the Czech Republic. The final respondent set does not show any significant difference on the level of 5% with any one of the above listed groups. Thus, the final file of the 155 respondents can be considered as representative both from the point of view of the geographical distribution of Czech population and the used database of foreign firms.

The data obtained from these questionnaires were transferred into numerical form, linked with a database on the responding firms and then processed by statistical and GIS analyses. The results of these analyses are presented in the following parts.

3. Rating of regions

The questionnaire was based on evaluation of individual Czech regions (districts) according to their high or low suitability for location of a firm or branch of a foreign investor. The first aim was to find out the general pattern of location preferences of foreign entrepreneurs. For each region the average and the total rating of all respondents were calculated. In the following maps, resulting spatial patterns of evaluation are indicated by isopleths (lines connecting equally evaluated places) for the whole Czech Republic. Such isopleths are called isopercepts when relating to environmental perception (Meester, 2004).

Average ratings of regions are shown in Figure 1. It is clear that the highest ratings are found for the capital city of Prague and its surroundings and basically also for districts of the whole Central Bohemia. The area of high rating includes also Hradec Králové and Pardubice region in Eastern Bohemia. The other places of high rating are the other large regional agglomerations of the country – Brno, Plzeň,

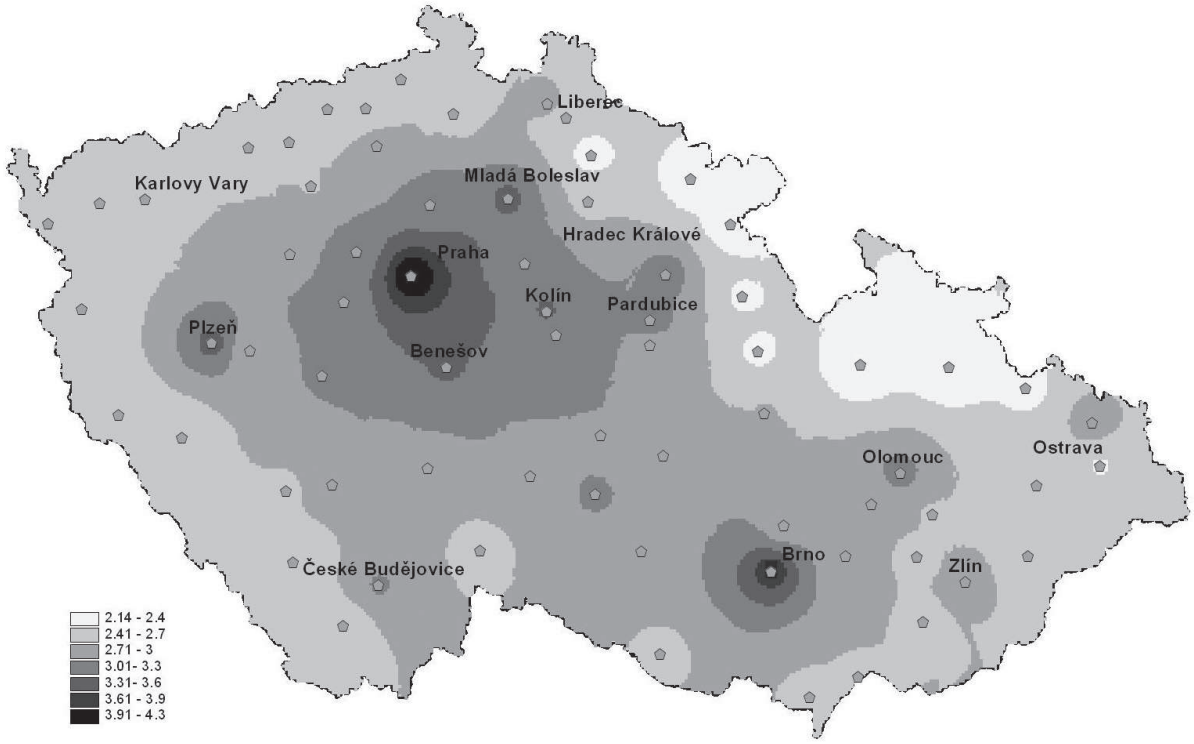

Fig. 1 Average rating of Czech regions by foreign firms (n = 155) – general picture. Legend: 1 – evidently unsuitable location, 6 – the most desirable location

Zlín, Jihlava, České Budějovice, Olomouc, Ostrava and Liberec. Low ratings can be found in the periphery of the Czech Republic, mainly in the Jeseník and Trutnov regions.

The main feature of the mental map of foreign investors is therefore the clear preference for the central part of the country and also for the largest agglomerations of regional centers, with the exception of regional agglomerations of Karlovy Vary and Ústí nad Labem. Another important trait is that the areas of higher evaluation are spread along the main transport routes – the highway to Brno and Olomouc and the speedways to Liberec via Mladá Boleslav, to Hradec Králové and its junction to Pardubice and in the southern direction along the road to České Budějovice.

4. Rating of regions affected by characteristics of firms

One of the main aims of the investigation of foreign entrepreneurs' preferences is to find out whether and how some characteristics of firms are affecting their perception of Czech regions as potential regions for location of their branches. During the survey we recorded some data on the respondents' characteristics. The characteristics were (i) the current place of business in the Czech Republic, (ii) the size of the firm expressed in number of workers, (iii) type of activity, or (iv), whether the firm has branches in other national economies besides the Czech Republic.

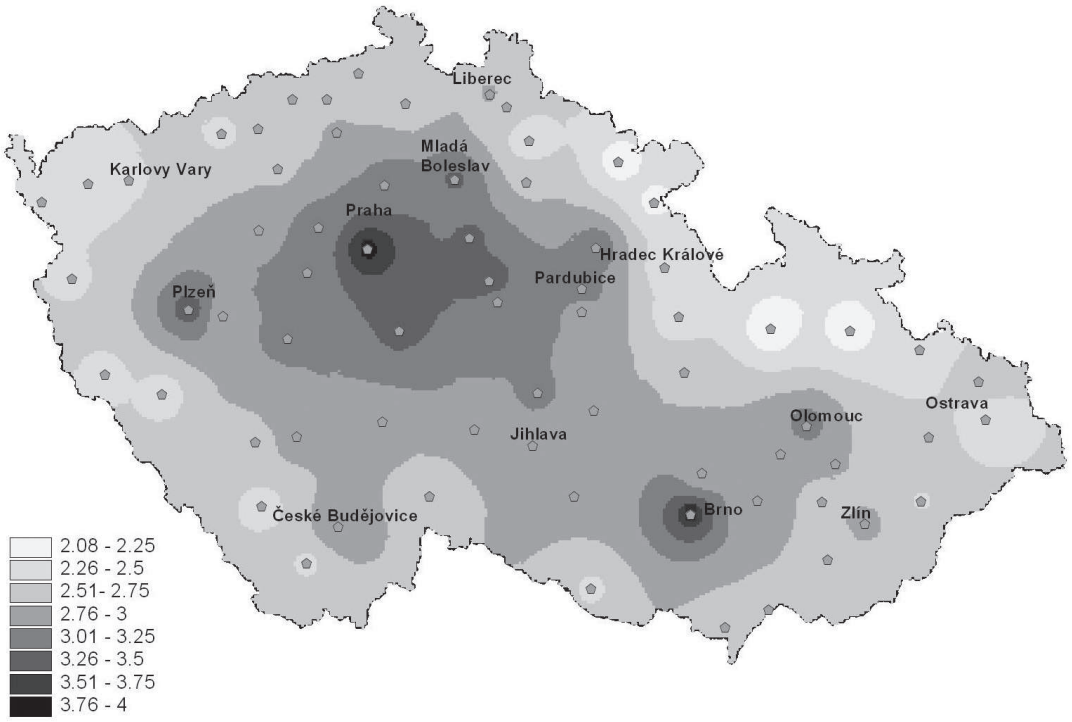

Fig. 2 Average rating of Czech regions by foreign firms according to the type of activity – manufacturing industry (n = 97). Legend: 1 – evidently unsuitable location, 6 – the most desirable location

The answers were encoded which ensured sufficient number of respondents in more categories. In our examination of the impact of some characteristics on the rating of regions, we used the analysis of variance (ANOVA). For each characteristic, a separate ANOVA test was performed.

The results of these tests indicate that the majority of firms' characteristics tend to influence the rating of regions only in part, including the type of industry of the firm. It appears that the current location of the firm in the Czech Republic has the strongest impact on the rating of regions. Another important characteristic appears to be the firm's activity at foreign markets – firms located also in other countries or branch offices only in the Czech Republic. Other characteristics tend to have significant effects only in a small number of regions.

Despite these facts, the aim of this analysis is to compare the perception of Czech regions by the firms in manufacturing industry and producer services and to reveal whether these two industries may accentuate different location factors. At first, cartographic presentation of ratings of regions according to particular characteristics of firms reveals some significant results. The differences between foreign firms in manufacturing industry and producer services are presented in Figures 2 and 3.

Czech statistics on foreign investment inflows indicate that the manufacturing industry received the highest share of the total FDI flows during the transformation period (up to 2001). The perception map of foreign firms from this sector again shows the spatial pattern of preferences with clear high scores for Prague, Brno and

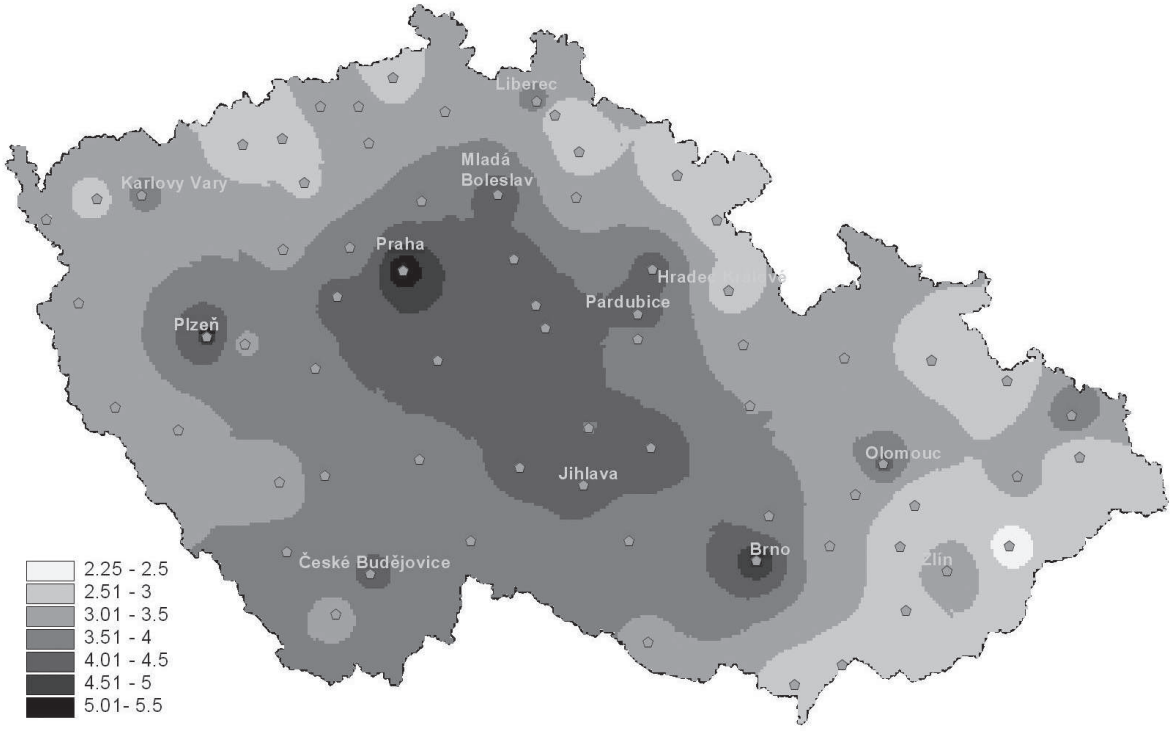

Fig. 3 Average rating of Czech regions by foreign firms according to the type of activity-producer services (n = 20). Legend: 1 – evidently unsuitable location, 6 – the most desirable location

larger regional agglomerations (except Ostrava). Ratings are decreasing from the central part of the country to the Czech periphery. It is surprising that areas alongside the German border do not have high ratings, although these regions were considered in the 1990s as favorable destination of many foreign (above all German) firms from the manufacturing industry (Blažek, 2003). Results of our investigation show that even the regions close to the Austrian border are considered as more attractive locations.

The entrepreneurs from the quaternary sector (i.e. producer services) also tend to prefer the Prague agglomeration, its surroundings and large regional cities. Generally, the central part of the country is preferred, whereas the ratings decrease towards peripheral regions. It is interesting to note that there are low preferences in this category of firms for the Moravian part of the country, where only the Brno agglomeration is given high ratings. The similarity to the perception map of manufacturing industry can be explained by the fact that producer services serve mainly to the headquarters of particular industrial companies and thus should be located in the proximity of their headquarters (Mladá Boleslav, Hradec Králové, Pardubice, Jihlava, Plzeň, České Budějovice etc.).

This situation in the perception map of foreign firms in producer services becomes even more accentuated when we consider financial services only (Figure 4). The preference map of firms active in the financial industry quite clearly corresponds to the main characteristics of this industry itself. Financial services represent the summit of the progressive tertiary sector, which is characterized by its

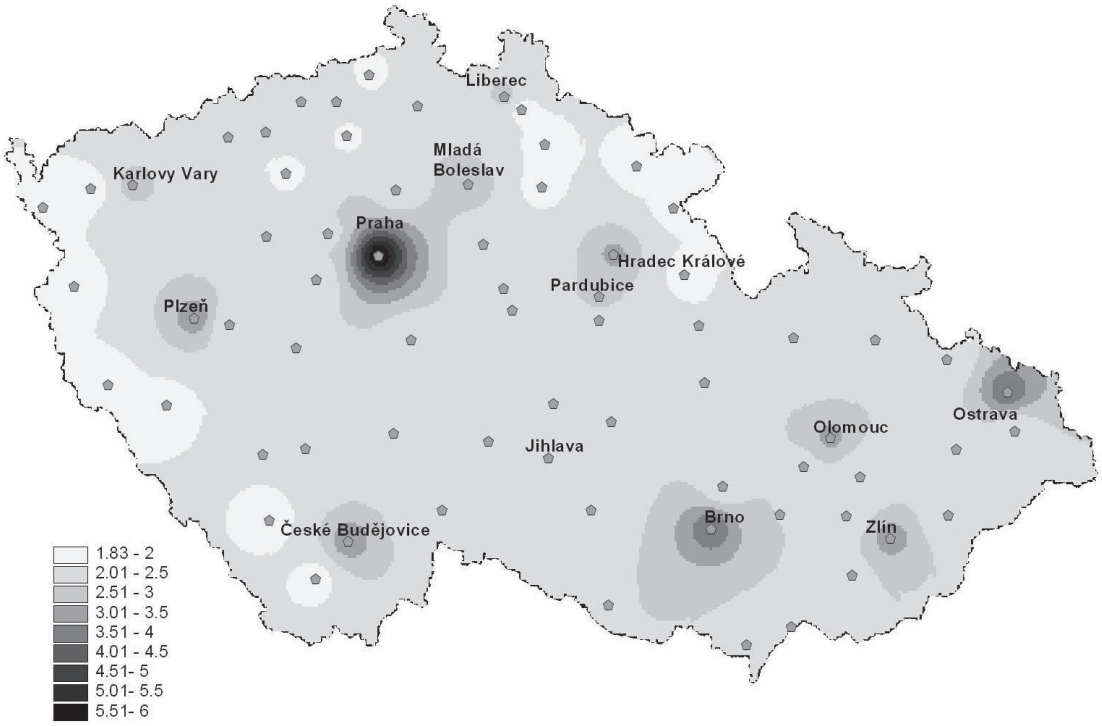

Fig. 4 Average rating of Czech regions by foreign firms according to the type of activity- financial services (n = 11). Legend: 1 – evidently unsuitable location, 6 – the most desirable location

concentration in the peaks of residential hierarchy – the biggest cities. But this industry very carefully distinguishes even within these agglomerations. The highest rating is of course found in Prague, behind which the other agglomerations are lagging. All the rest of Czech Republic is perceived by the financial industry as a periphery.

As it results from the Figures 2 and 3 there are not any radical differences between the evaluation of Czech regions by foreign investors from the manufacturing industry and the producer services. Both industries prefer the central part of the Czech Republic for their enterprising and the value of perception decreases from the centre to the periphery. The producer services prefer also larger agglomerations (in general administrative centers of the larger administrative units – kraje). This situation can be compared with the distribution of foreign firms and firms with foreign capital operating in the secondary and tertiary sector as described by Blažek (2003, p. 33). Blažek (2003) shows that foreign firms in the secondary sector as in July 1998 were obviously concentrated along the western border with Germany and the southern border with Austria. Foreign firms in the tertiary sector were more dispersed, but located mainly in the biggest cities – Prague and Brno and other larger agglomerations. It is therefore curious, that even though German and Austrian firms do not perceive Czech peripheral regions along the state border as suitable for enterprising, they tend to locate the branches of their firms in these regions and try to make the best account of the low price of the labour force and other resources. On the other hand, the services were primarily directed to the biggest cen-

ters and then dispersed in the other parts of the country (mainly the Bohemian part of the Czech Republic) and also began to evaluate these parts in a more positive way thanks to the quality of human resources in services found throughout the whole country.

5. Regression analysis estimating effects of location factors

Regression analysis generally indicates how one or more explanatory variables affect a dependent variable. Despite the fact that the respondents had to evaluate regions and not particular location factors, we can find out with the help of linear regression analysis, which characteristics of regions (districts) tend to play an important role in decisions about the location of firm branch in the Czech Republic. The average ratings of regions are used as the dependent variable and the characteristics of regions from a large database of geographical data as independent explanatory variables. In other words, the aim of our regression analysis is to explore which variables can explain the variation in the final rating of regions.

When applying the regression analysis we used various methods, using the SPSS statistical software. With the stepwise method the variables having significant effects on the rating of regions were selected. These variables were then combined into different regression equations and regression lines graphs of individual partial regressions were controlled in correlation scatters to obtain the most illustrative multiple regression equation that could explain in an effective way the impact of characteristics of regions on the variance in the ratings of regions (districts) by the foreign firms. In the second step, the Enter method of regression was chosen and the results of the regression analysis are presented in the next sections.

The multiple regression analysis indicated that 74% of variance in the ratings of regions can be explained with a small number of explanatory variables. Location variables – distance to Prague and less important distance to Bavarian border – appeared to be important explanatory variables. The variables indicating educational level of regional population in major educational categories and also increasing share of university level graduates during the transformation period in the population age groups 15 years and older are also among the most important explanatory variables. The same applies to average wages in regions indicating socio-economical level of regional populations.

5.1. LISREL modelling

In the following part we will apply the regression model aimed mainly at observing statistical effects in the framework of regression equation (for LISREL procedure, see Saris, Stronkhorst, 1984; Dostál, 1998). We use the model because it

clearly shows the individual causal effects and also it enables to specify easily the possible mediating effects of selected variables. In the LISREL model causal effects of each entering variables are depicted and thus one can trace important relations among all the variables entering the analysis and not only the effects on the final variable (perception of regions by foreign firms).

Explanatory variables detected by linear regression in the preceding part enter this model as well. As stated before, these variables together determine 74% of the variance of the variable PERCEPTION throughout 70 microregions of the Czech Republic. Individual causal effects of the LISREL model are depicted in Figure 5 and the effects of each variable on the final perception of regions by foreign firms are given in Table 1. The table presents standardized regression coefficients expressing independent causal effects within this model. For example, the effect of DISTPRG on PERCEPTION (–0.42) indicates that a positive shift of one standard deviation on the variable DISTPRG implies an average negative shift of –0.42 standard deviation on the variable PERCEPTION.

We can observe some distinctive causal effects in the model. The distance from Prague and from the Bavarian border does not have any influence on the educational level (expressed by the percentage of university graduated and other categories). This is due to the fact that the hierarchical position – that is the concentration of more educated people in bigger settlement centres – plays a major role in forming the qualitative characteristics of Czech regions (e.g. Dostál, Hampl, 2002). A relevant relation exists between the distance from the Bavarian border and the increase of university graduated in the transformational period. It was proved that higher increases were achieved in regions farther to our western border. This can be partly explained by the development of universities in Eastern Bohemia, by the success of mainly technical educational programs in Brno, by a higher number of some attractive tutorial programs at the universities in Zlín and Opava etc.

Another obvious result is that the areas which had a higher percentage of university graduated in 1991 went on gaining more university graduated during the transformational period. Generally we can state, that a higher educational level of population subsequently affects also lower educational levels in individual regions (with the exception of vocational training where the effect of university graduated on vocational training is –0.73). According to our expectations the modelling also revealed a strong effect of university education on the average wage (0.61) and a decrease of average wages with increasing distance from Prague (–0.39).

The effects of explanatory variables on the final perception of regions by foreign firms are the crucial part of the model. The model shows that the areas with a higher percentage of university graduated at the beginning of the transformational period and with an increasing number of people in this category were the best evaluated by foreign firms (0.49, resp. 0.44). The areas with qualified labour force are also appreciated by foreign firms (vocational trained 0.11). It is interesting that the areas with a higher share of general secondary education are not highly evaluated by

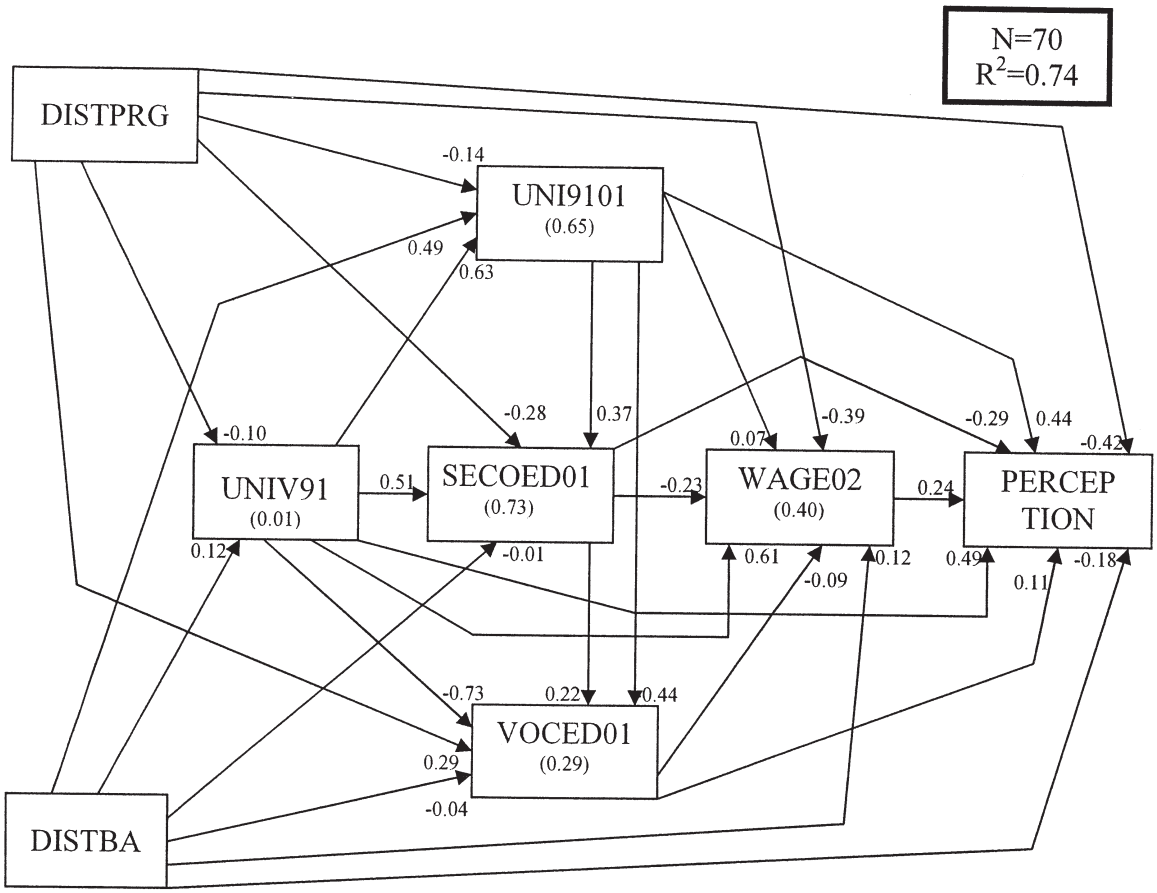

Fig. 5 LISREL model

Tab. 1 Effects of explanatory variables on the total perception of Czech regions by foreign firms (PERCEPTION).

Effects on PERCEPTION			
	Total	**Direct**	**Indirect**
DISTPRG	–0.42	–0.42	0.007
DISTBA	–0.19	–0.18	–0.006
UNIV 91	0.55	0.49	0.062
UNI9101	0.38	0.44	–0.064
SECOED01	–0.33	–0.29	–0.036
VOCED01	0.09	0.11	–0.022
WAGE02	0.24	0.24	–

foreign firms (–0.29). As stated before, the increasing distance from Prague is an important factor, which reduces the value of any region in the eyes of foreign entrepreneurs (–0.42), lesser is the effect of the distance from the Bavarian border (–0.18). Generally, the areas with higher living standard and higher wages (0.24) are preferred. To summarize, we have to admit that in the regression model only the

Tab. 2 Comparison of results of the regression analysis – standardized regression coefficients for general model, firms in manufacturing industry and producer services.

	Total perception – general model	Firms from manufacturing industry	Firms from producer services
	Standardized regression coefficients		
R square	**74%**	**66%**	**82%**
Distance from Prague[1)]	–0.415*	–0.432*	–0.198*
The increase of university level graduated in 1991–2001	0.435*	0.436*	0.150
University graduated 1991[2)]	0.489*	0.353*	0.760*
Average wage in 2002	0.241*	0.192*	0.341*
Secondary level graduated (A-level examination) in 2001[2)]	–0.293*	–0.178	–0.295*
Distance from Bavarian border[1)]	–0.182	–0.184	–0.087
Vocationally trained in 2001[2)]	0.114	0.141	0.043

1) Topological distance; 2) Percentage of educational categories in the population of the region aged 15+; *) Significant on the level of 5%.

direct effects of variables play an important role. The indirect effects are very weak and hence we do not find any significant intermediating variable.

5.2 Comparison of regression models of foreign firms in manufacturing industry and producer services

The last part of the article offers a comparison of results of regression analysis for the foreign firms in manufacturing industry and producer services as compared to the general model (explained above). The same procedure is used to obtain standardized regression coefficients for the selected explanatory variables. The results of this comparison are depicted in Table 2.

There are some significant differences mainly in the explanatory power of selected variables in different models and also in the importance given to different location factors by foreign firms in manufacturing industry and foreign firms in producer services. The selected explanatory variables can explain 74% of the variance in the evaluation of Czech regions in the general model, but up to 82% in the model of perception by producer services foreign firms and 66% in the model for manufacturing industry.

It is interesting to note that the foreign firms active in manufacturing industry attach more importance to the distance to Prague (–0.43) than all the firms in average. They also do not tend to stress the importance of university educated people (0.35) at the beginning of the transformational period, but the increase in the number of university educated people during the transformational period seems to be an important factor (0.44). This can be the evidence of the fact that these firms in manufacturing industry at the beginning of the transformation came mainly to take

advantage of the relatively cheap labour force, but during the transformational period, as the firms became more embedded, they started to evaluate also the quality of labour. As the production changed from assembly only to more complex productive processes, these firms recognized the need (and the good supply) of qualified professionals as well as of qualified workers. The importance of the number of qualified workers is also higher (0.14) than the average for all the foreign firms. The heritage of the ex "low-cost" regions attraction for the manufacturing industry can be seen in the lower coefficient for the wage factor (0.19). Thus the manufacturing industry still better evaluates regions with lower wages and therefore slightly cheaper labour force.

On the other hand, the selected explanatory variables of the general model fit better for perception of foreign firms in the producer services sector where they explain 82% of the variance in evaluation. The relative location to Prague is not surprisingly as much important in this sector of services (–0.20). The explanation may be found in more detailed structured interviews with foreign firms' representatives that reveal that Czech firms are generally more appreciated as suppliers of various services than as suppliers of material or goods. The high percentage of subcontracting Czech firms offering law consultancy, accounting, market research, personal agencies or design studios throughout the country are a proof of the quality of labour force in Czech producer services. The foreign firms in this sector tend therefore to follow their Czech competitors even to more peripheral regions and not only to major agglomerations.

The most important location factor for the producer services appears to be the sufficiency of university educated professionals at the beginning of the transformational period (0.76). The increase of this educational group during the transformational period (0.15) yet lacks significant importance, which also testifies that the first moment and the qualified human resources at the time of entering the Czech market were the most important in the sector of producer services. The need for highly qualified professionals is strengthened also by the highest coefficient for the wage explanatory variable (0.34). It is obvious that the percentage of vocationally trained has the smallest importance as a location factor (0.04). Producer services also share with the general model the low evaluation for the areas with a high percentage of people with general secondary education. This fact is also heavily supported by the results of structured interviews with foreign investors, who all criticize the trend of increasing the number of general secondary schools (gymnasia) and vocational training schools' closures.

6. Conclusion

On the basis of the data obtained from our survey, the basic map of ratings of particular Czech regions by firms of foreign investors was drafted. This general map of preferences shows very clear preferences for the central part of the Czech

Republic – the capital city of Prague and its wider surroundings. As the second important feature of basic geographical pattern of preferences, there are larger Czech agglomerations (forming a middle-regional hierarchical level) and their outskirts with higher preference scores; however, even some larger cities (located in peripheral parts of the national territory) are given lower preference scores. The third main feature of this basic map is obviously that of very low scores for the peripheral areas of the Czech Republic.

In the subsequent statistical analysis, the impacts of firm characteristics upon preference scores of Czech regions were investigated. The spatial pattern of preferences can be among others influenced by the industry to which the firms belong. Manufacturing industry copies the general pattern of preferences – the central part of the country and large agglomerations, whereas firms from other industries choose more specific regions. Producer services show the same evaluation for the central parts of the republic, but their evaluation evidently decreases in the eastern parts of the Czech Republic. The extreme case is the top of the tertiary sector – financial services. Firms from this sector clearly prefer only leading big cities and the rest of the Czech Republic remains without any interest of investors from this sector.

Multiple regression analysis exploring the effects of location factors on the total ratings revealed that 74% of the variance in the ratings of regions (70 district units) could be explained with the help of a small number of explanatory variables for the general model, 82% for the perception of firms in producer services and 66% for firms in manufacturing industry. There are some differences among these sectors in evaluating the importance of the distance to Prague and Bavarian border. However, the common explanatory factor is therefore qualified and skilled labour force, no matter whether specialists or workers – both are primary key endogenous resources. The socio-economic level of particular regions has also some influence which changes according due to the specific industry (the lowest for manufacturing, the highest for services). It is also interesting to note that districts with a higher percentage of population with secondary education in 2001 are not evaluated as attractive regions by foreign firms.

It is therefore clear that the Czech Republic should proceed to attract foreign investors mainly by uprising the educational level and the quality of human resources in general. Further interviews with foreign investors reveal the importance of quality vocational training and their rejection of the recent trend – increasing number of general secondary schools (gymnasia) and closing of vocational training schools. Foreign investors thus require not only university educated professionals for their branches in producer services, but also qualified workers and foremen for manufacturing production. The quality of human resources in the traditional areas of industrial production can (in the case of the Czech Republic) overpass even the price of labour (where the Czech Republic is losing its advantage in favour of East-European or Asian countries).

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Résumé

**Zahraniční firmy a jejich percepce regionů v České republice:
Zpracovatelský průmysl versus výrobní služby**

Článek usiluje o zachycení charakteru prostorových percepcí zahraničních firem z různých hledisek ve snaze odkrýt faktory ovlivňující jejich lokalizaci a lokalizační rozhodování v České republice. Především se snaží zjistit zda existují signifikantní rozdíly v percepci Českých regionů mezi zahraničními firmami působícími ve zpracovatelském průmyslu a ve výrobních službách a zda tedy existují důležité rozdíly v lokalizačních faktorech zásadních pro tato dvě odvětví. Pro vykreslení prostorových preferencí zahraničních investorů byly použity mentální mapy a následně byla aplikována metoda regresní analýzy při zjišťování, které proměnné mohou vysvětlit variaci ve výsledném hodnocení jednotlivých regionů zahraničními podnikateli.