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Market structure and competition in transition: results from a spatial analysis

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ABSTRACT

The present article provides first microlevel (indirect) empirical evidence on changes in entry barriers, the determinants of firm profitability as well as the nature of competition for a transition economy. We estimate size thresholds required to support different numbers of firms for several retail and professional service industries in a large number of geographic markets in Slovakia. The 3 time periods in the analysis (1995, 2001 and 2010) characterize different stages of the transition process. Specific emphasis is given to spatial spill-over effects between local markets. Estimation results obtained from a spatial ordered probit model suggest that entry barriers have declined considerably (except for restaurants) and that the intensity of competition has increased on average. We further find that demand spill-overs and/or the effects associated with a positive correlation in unobservable explanatory variables seem to outweigh negative spill-over effects caused by competitive forces between neighbouring cities and villages. The importance of these spatial spill-over effects differs across industries.

KEYWORDS

Entry thresholds; competition; Slovakia; transition; geographic markets

JEL CLASSIFICATION

L22; D22; M13; R11

1. Introduction and literature review

Entry of new firms and exit of others is an essential element of competition in a market economy. Investigating this issue in transition economies is especially interesting since 'transition economies make a particularly good laboratory for understanding the dynamics of market evolution' (Estrin 2002, p. 101). By studying the relationship between market structure (entry, exit and the number of firms in a market) and measures of market size (such as population) for different regional markets, economists can gain insight into the determinants of firm profitability, the role of fixed and sunk costs as well as the nature of competition. If competition is increasing in the number of firms, market size has to increase disproportionately to support additional firms.¹ Estimating entry thresholds from the relationship between the number of firms and an exogenous profit shifter (such as population) provides evidence on the toughness of competition (defined as the rate at which the post-entry equilibrium markup falls with the addition of competitors) for a product or industry. The attractiveness of this approach lies in the fact that it can be applied with

modest data requirements. The relative degree of competition can be assessed on the basis of information on the number of firms, population size, and other market demographics for a cross-section of local markets.

This entry threshold approach, pioneered by Bresnahan and Reiss (1990), Bresnahan and Reiss (1991) and Berry (1992), has been modified and extended in a number of ways. The effects of product differentiation are investigated in Mazzeo (2002), Davis (2006) and Schaumans and Verboven (2015). Mazzeo (2002) and Davis (2006) use direct measures of oligopolists' product characteristics and prices to determine the effects of product differentiation on competition and markups in local motel (Mazzeo) and cinema (Davis) markets. Product differentiation substantially lessens competition in these industries. Effects of product differentiation and firm heterogeneity are also investigated in Schaumans and Verboven (2015) for different local service sectors in Belgium. The authors argue that entry typically leads to a market expansion effect which implies that traditional entry thresholds may underestimate the competition effects resulting from entry. Related work by Berry and

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¹For example, if the smallest market size necessary to support 1 firm is equal to 5 ('monopoly entry threshold') then the market size (the number of inhabitants) must be greater than 25 to support 2 firms if competition reduces per-capita profits.

 Supplemental data for this article can be accessed [here](#).

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Waldfogel (2010) focuses on vertical product differentiation and investigates whether larger markets offer better products. In the case of restaurants, they find that the number of high-quality products increases with market size; for newspapers the authors argue that average product quality increases as markets grow without an increase in variety. Campbell and Hopenhayn (2005) consider differences in firm size (in addition to differences in the number of firms). They find that establishments are larger in larger cities, *ceteris paribus*. Carree and Dejardin (2007) differentiate explicitly between entry and exit of firms. The importance of imperfect information is investigated in Grieco (2014), who examines the effects of super-centres on rural grocery markets. Based upon the work of Abbring and Campbell (2010), Collard-Wexler (2014) estimates dynamic ordered probit models which allow the author to compute entry and exit thresholds separately. Using data for the ready-mix concrete market, the author investigates the evolution of market structure following an exogenous shock (a merger to monopoly) in a local market. The author's finding that it takes between 9 and 10 years for a new firm to enter the market following the merger suggests that the dynamics of market evolution can be quite low in sectors with significant entry barriers; data over a long time horizon are required to observe changes in market structure and firm conduct empirically.

The present article extends the entry threshold approach in 2 dimensions: (a) we provide first empirical evidence on (changes of) market conduct and competition in a transition economy and (b) we devote specific attention to potential spill-over effects between regional markets and the spatial dimension of competition.

While the existing empirical literature focuses exclusively on market structure and competition in developed market economies, similar microlevel studies for transition economies are lacking.² The structure of a

planned economy as well as the behaviour of firms (or production units) in this environment differs from the structure and conduct of firms in a market economy in many dimensions. During the communist regime, firms were not independent decision-making units and were not responsible for sales or pricing. Competitive rivalry was weak or non-existent and entry of new firms as well as bankruptcy and exit of existing ones was de facto impossible (Estrin (2002)). Compared to market economies, firms were very large and market structure was highly concentrated. With the collapse of communism, these countries experienced a fundamental change in their economic and institutional environment. State-owned enterprises were broken up and privatized and a large number of new (mostly small) firms were founded. This process of entry of new firms and the re-structuring of existing ones was instrumental in creating a market structure which is conducive to competition between independent rivals. Given the very specific structure of a centrally planned economy as well as the significant economic and institutional changes during the process of transition, an empirical analysis for individual industries can provide novel insights into the evolution of market structure and firm conduct in a transition economy.

An explicit consideration of the spatial dimension of competition constitutes the second novel contribution of the empirical analysis in hand. For many product markets, consumers face transportation (time) costs when switching between different suppliers. The entry-threshold approach assumes that transportation costs between different regional submarkets are prohibitively high so that individual markets are fully isolated. The equilibrium in one market must be independent – in terms of demand and competition – of other markets. While this might be a plausible assumption in some sparsely populated (rural) regions,³ the high population density in many European countries raises doubts

²Only a small number of empirical studies have dealt with entry and exit in transition economies so far. Roberts and Thompson (2003) estimate entry and exit rates across 152 3-digit industries in Poland. Similarly, Bojnec and Xavier (2004) investigate the determinants of firm entry and exit for a cross section of 3-digit industries in the Slovenian manufacturing sector. The present article follows a different approach by focusing on industry dynamics within individual industries. Avdasheva, Shastitko and Kuznetsov (2007) summarize the broader industrial organization literature on competition in transition economies with a specific focus on empirical studies for Russia.

³Bresnahan and Reiss (1991), for example, identify towns or small cities in the continental United States that are at least 20 miles from the nearest town of 1000 people or more to estimate their econometric models. Similar procedures for identifying isolated markets are used in Collard-Wexler (2014), who uses a 20 miles threshold and merges towns which are very close to each other (so-called twins). Zang and Scott (2016) use a comparable approach to identify isolated markets for medical services, whereby they exclude all metropolitan service areas (MSA) which are within 50 miles of another MSA, all small counties (with a population of less than 50,000) and all counties which are less than 15 miles from another large county or less than 50 miles from an MSA. However, using a distance-based exclusion policy is not feasible in more densely populated markets, which has led some authors to focus on size rather than isolation. To mitigate problems with overlapping markets in European countries, Carree and Dejardin (2007) use data for nonurban areas (all 455 Belgian municipalities whose local population amounts to less than 20,000 inhabitants). Similarly, Schaumans and Verboven (2008) and Schaumans and Verboven (2015) take into account only local markets with a population density of less than 800 inhabitants per square kilometre and a market size of less than 15,000 inhabitants.

concerning the assumption of perfectly isolated regional markets.

Although the ‘isolated markets’ approach has generated a number of important applications, the extrapolation of the estimation results obtained from a sample of rural markets to urban areas is not possible. Aguirregabiria and Suzuki (2015) conclude: ‘Focusing on rural areas makes the approach impractical for many interesting retail industries that are predominantly urban’ (p. 26). The importance of spatial spill-over effects between regions will not be identical over time and/or for all occupations: the process of transition was accompanied by significant investments in infrastructure as well as an increased mobility of consumers (due to an increase in income),⁴ which, for some industries, should have strengthened the spill-over effects between individual regions.

In the present analysis, we aim at extending the concept of ‘entry thresholds’ to a spatial context. We apply this approach to several professional service industries in a large number of geographic markets in Slovakia. The results from the estimation of a spatial ordered probit model for 3 years (1995, 2001 and 2010) provide evidence of the transformation of market structure and firm conduct during different stages of transition from a centrally planned economy towards a market economy.

The article is organized as follows. Section II briefly highlights relevant changes in the economic environment in Slovakia during the transition period. Section III presents the econometric specification. Section IV discusses the empirical results and Section V summarizes and proposes possible extensions.

II. Transition in Slovakia and market description

Macroeconomic changes

Slovakia, a small open economy, started its transition as a part of the Czechoslovak Federation. Like all countries in transition, Czechoslovakia experienced a deep transition recession in the early 1990s, during which output dropped significantly. The Slovak economy was hit much harder than its Czech counterpart (output dropped by more than 20% and unemployment rates

exceeded 10%), as its industrialization during the communist period had made it more dependent on markets in the Soviet Union and its Central and Eastern European satellites (Beblavý (2010)). However, Slovakia quickly recovered from the initial output collapse. Following its peaceful ‘Velvet Divorce’ Slovakia gained independence from Czechoslovakia on 1 January 1993. Economic reforms slowed down between 1994 and 1998 but then regained momentum under a reform-oriented coalition government, which restructured enterprises and banks and initiated large-scale privatizations of state-owned enterprises. These economic changes paved the way for Slovakia to enter the European Union in May 2004 and to adopt the euro currency at the beginning of 2009. The increasing pressure from foreign competitors may have had an additional impact on structural change and firm performance; today the Slovak economy is among the most dynamic of the Central and Eastern European countries (OECD (2013a)).

The mid-1990s characterize the early phase of transition. Some first reforms to establish more efficient markets had already been introduced at that time; the liberalization of prices and foreign trade started in 1991. 1995 was the third year of the independent Slovak economy and the second year of growth after the transition depression. The economic environment was strongly influenced by a search for a specific ‘Slovak way’ of transition (Marcinčin 2002). Policymakers refused to continue with the harsh reforms initiated when Slovakia was still part of the Czechoslovak Federation (1990–1992). The so-called Slovak way of transition was characterized by a slowdown of reform measures, mistrust towards foreign investors, opaque privatization measures (as exemplified by ‘sale to pre-selected owners’ procedures), exertion of political influence on investment flows and a revival of state paternalism and interventionism. In this period, the ownership structure of enterprises was highly fragmented (an outcome of mass privatization) and foreign strategic investors were absent. This period ended with the parliamentary elections held at the end of 1998 when a new government was formed.

The early 2000s constituted a period during which many corrections of the early transformation process

⁴Note that investment in road infrastructure in 2001 (2010) was 2.79 (5.45) times higher than in 1995 (OECD 2013b). The beginning of the transformation process was characterized by low capital and labour mobility at intra- and inter-regional levels (Morvay 2005). The number of vehicles in Slovakia increased from 1.65 million in 1995 to 2.34 million in 2010. Besides, the number of passenger cars increased from 1.09 million in 2003 to 1.67 million in 2010 (MISR 2014). The length of motorways increased by 60% during the 1995–2004 period (from 198 to 316 km) (EC 2006) and reached 384 km in 2008 (EURF 2011).

were implemented. Macroeconomic stabilization was achieved and the economy was gradually directed towards EU integration. The new government focused on strengthening competitiveness and initiated the transformation process in sectors that had been protected during the previous regime (Morvay (2005)). More specifically, the following measures were implemented: the banking sector was restructured, which eased financial flows and at the same time weakened political influence on the allocation of credit. Institutions and procedures of regulatory interventions were changed (regulatory bodies independent of direct political influence were established). Generally privatization took place via international tenders and the economy opened more significantly to foreign investors, which led to increased foreign investment inflows.

In the third stage of the transformation process, the Slovak economy is well integrated into the EU (after having become a member in 2004) and in many important dimensions compares well to Western European economies. After the 2009 economic recession, the economy started growing rapidly again in 2010 (OECD (2012)). Economic growth in this period was distinctively mono-structural (dependent on strong expansion in a small number of branches in the manufacturing industry, especially in the manufacture of passenger vehicles). Growth in these sectors was ensured by the reorientation of export, while domestic demand remained weak. Entry into the EU implied that the economy had already reached a certain level of commensurability with the economic environment in the more developed economies of the EU even if income levels are still lagging behind significantly (Bartosvá and Želinský (2013)). After the transformation recession, gross income, measured by GDP per capita, increased rapidly. While GDP per capita had been less than 48% of EU-27 in 1995, it reached 52% in 2001 and ran up to more than 72% in 2010 (Beblavý 2010; Sikulova 2014).

Service industries

While the transition process had a significant influence on practically all sectors of the Slovak economy, our analysis will focus on providers of

retail services, with a particular emphasis on markets which are characterized by small firms focused on selling to local customers. As such, we are interested in determining how the macroeconomic changes outlined above influenced small entrepreneurs by changing the administrative burden related to establishing a company and altering the type of demand faced by each service provider. While the macroeconomic process of transition has been well documented (Beblavý (2010)), there is limited information regarding the microeconomic forces behind this process.

In general, the service sector in the era of centrally planned economy was undersized. The planning authorities favoured the production of physical products. This also contributed to the expansion of entrepreneurial activities after the change in the system. When the economic transformation was launched, a significant part of technical services (in our analysis these will be represented by plumbers and electricians) were concentrated in urban businesses providing services in economic hubs or in side divisions of state production businesses. Trade and restaurant services were concentrated into state-owned networks of trade and public catering businesses (restaurants). Only a very small proportion of services was formally organized based on a special permission outside publicly owned businesses (this was the case with the smallest businesses with only 1 working person and with limited income). In former Czechoslovakia, the extent of private activities was small in comparison with other Central European former socialist economies (Kornai (1998)). However, this sector featured extensive shadow activities: in addition to their work in state-owned businesses, service workers also provided these services for people outside the official economy. Usually, low-quality services provided by state-owned service businesses with long waiting periods were complemented by high-quality and fast services provided unofficially. Moreover, sometimes the goal was not the gain of cash benefit but rather the mutual exchange of benefits among people, a process characteristic for the so-called shortage economy.⁵ Changes in cultural beliefs also contributed to changes in the development of service industries. For instance, there had been a strong tendency

⁵Kornai (1980) provides a detailed analysis of such practices.

towards self-help performance of dining services or towards unprofessional provision of services within family. It was in the case of small-scale services that the market economy and private entrepreneurship quickly took off. Service workers could change over from disintegrating state-owned businesses to self-employment. The shortage economy brought unsatisfied demand and the workers had experience with unofficial entrepreneurship; therefore, good conditions for the expansion of official entrepreneurship in this sector were created. The expansion of these activities was further supported by the privatization of former state-owned service businesses, as well as the relatively accessible opportunity for their performance by individual entrepreneurs. An increase in incomes in the later stages of transformation together with changes in lifestyle allowed for additional entry into the sector. The consumption structure in Slovakia started to resemble the expenditure structure of more developed Western European countries, which is characterized by a larger proportion of expenditures on services.

The transition process also influenced the ability of entrepreneurs to finance their business. In the 1990s, problems in the banking sector (related to issues connected to political influence and a large burden of bad loans) coupled with a high interest rate (supported by a considerable demand of the state for credits) meant that credits were virtually unavailable for SMEs. After the implementation of improvement measures in the banking sector (Šestáková and Ferenčíková (2015)) and a mitigation of the state's crowding-out effect, credits for this sort of enterprises gradually became significantly more available. These changes are likely to have influenced entrepreneurial activity after 1998.

Melikhova, Bažó and Holubcová (2013) point to service industries as an important driver of economic growth. In light of this attributed importance, the empirical analysis at hand aims at investigating changes in entry behaviour and competitive conduct in several service industries during the transition period.

III. Data and empirical framework

Data and descriptive evidence

The empirical analysis is conducted for 4 occupations (automobile dealers, electricians, plumbers and restaurants) in around 2900 regional submarkets in Slovakia for 3 time periods (1995, 2001 and 2010).⁶ The chosen occupations are dominated by small and independent sellers and are similar to those analysed in previous empirical studies. In selecting these industries we focus on services which are consumed and produced exclusively locally. Additionally, we focus on industries which have seen a relatively high level of entry, in order to be able to quantify the influence of market structure through a comparison across local markets.

The number of firms in each occupation is obtained from the 'Register of Economic Subjects' of the Slovak Republic which covers the whole population of firms in manufacturing and services. Information is collected on the location and main economic activity (classified according to the NACE Rev. 1 classification of industries) of each firm. From this we compute the number of firms in the different local markets. Note that the number of firms in a local market does not fully account for the aggregate supply of services offered in a particular industry. The number of registered plumbing companies, for example, will differ from the number of plumbers (due to differences in firm sizes) as well as from the number of individuals offering their services in installing and maintaining plumbing systems (due to the fact that not all services are reported as some are offered in the shadow economy). Despite these measurement errors, our estimation results will remain unbiased as long as these differences in firm sizes and the extent of the shadow economy are not significantly related to our measure of market size (population).

Following previous research, markets are defined at the level of ZIP codes which roughly corresponds to the definition of a city or village in Slovakia. The number of cities and villages (regional submarkets) identified in this way is 2843 (2897 and 2926) in 1995 (2001 and 2010).⁷ Data on population as well as demographic

⁶Additional information is also provided for 4 industries which are less likely to be influenced by the transition due to their smaller dependence on credit availability (beauticians, fitness studios, driving schools, and taxi services). The results from this analysis are available in Section IV.

⁷The main results in this article are based on the full sample of towns from 'Urban and Municipal Statistics'. The larger cities (such as Bratislava and Kosice) are divided into a number of submarkets. Unfortunately, the exact location of each individual firm within the market is not available. Our empirical model thus follows previous research and assumes that the location of a firm within a market does not have any implications on its profits or on the degree of competition with other firms. The different number of regional submarkets identified for the 3 time periods is due to the disintegration of several municipalities into separate units over time. The village Žitavany, for instance, was established in 2002 by splitting the town Zlaté Moravce into 2 separate units. A detailed description of these changes can be found in MISR (2013) and SOSR (2014).

characteristics of the regional markets are obtained from the 'Urban and Municipal Statistics'. The population of cities and villages is highly skewed, ranging from 12 to 111,800, with an average of 1879 in 2010 (at the end of our observation period).

We control for several market characteristics such as wages, unemployment rates, and the share of young and senior population. Data on wages and unemployment rates are taken from the 'Regional Statistics Database'. Unfortunately, we only observe these variables at the district level (for 79 districts). The share of population aged below 15 years and above 60 years for each market is obtained from the 'Urban and Municipal Statistics'. We supplement the data set with information on the distances between cities and villages in order to capture the spatial distribution of occupations. Descriptive statistics for all variables are reported in the supplementary material.

Table 1 shows the number of regional markets with a given number of firms. Following previous research, we pool all markets with more than 7 firms into 1 category since the number of observations for larger market sizes is insufficient to accurately identify entry effects for 8 or more competitors.

Note that the distribution of firm numbers is substantially different in different periods, as well as between occupations. While the clear majority of villages and cities in 1995 did not have a single automobile dealer (nor an electrician or plumber), by 2010 there is at least 1

incumbent firm in about 50% of all regional markets. This situation is different in the restaurant industry, however. The sector had the broadest market coverage in 1995 when there were only 39% of markets without a restaurant. Since then, market coverage has slightly decreased; in 2001 (2010), 42% (43%) of local markets had no restaurant.

To illustrate changes in market structure over time, Table 2 shows the transition probabilities of the number of firms over the time period (1995–2010). All 4 markets are fairly dynamic. The transition probabilities for automobile dealers show, for instance, that a duopoly market in 1995 has a 12% probability of being a monopoly market in 2010, an 11% probability of having no supplier and a 54% probability of having more than 2 firms (15 years later).

The large share of local markets with no incumbent highlights the importance of explicitly accounting for spatial spill-over effects as inhabitants of these markets are forced to employ the services of firms from neighbouring administrative units. The existence of these markets will thus contribute positively to the profitability of firms located in the neighbourhood.

The importance of the spatial dimension in investigating market structure is further emphasized by the strong clustering of economic activities in space. Figure 1 shows the results of a Getis-Ord analysis in the market for electricians in Slovakia in 2010.⁸ Urban areas appear to attract firms in neighbouring

Table 1. Number of firms in regional submarkets in 1995, 2001 and 2010.

Number of firms	Automobile dealers			Electricians			Plumbers			Restaurants		
	1995	2001	2010	1995	2001	2010	1995	2001	2010	1995	2001	2010
Number of local markets												
0	1812	1683	1232	2467	2222	1321	2542	2043	1501	1106	1233	1240
1	526	564	621	229	366	578	197	449	577	783	704	668
2	217	241	300	61	132	327	46	163	296	377	375	317
3	83	117	195	25	51	199	19	78	165	188	156	191
4	52	71	133	24	32	107	12	41	104	110	123	118
5	31	49	86	3	15	89	8	23	54	65	47	77
6	18	26	64	4	5	58	0	19	46	43	41	52
≥ 7	104	146	295	30	74	247	19	81	183	171	218	263
Share of local markets with a particular number of firms in %												
0	63.74	58.09	43.11	86.77	76.70	46.22	89.41	70.52	52.52	38.90	42.56	43.39
1	18.40	19.47	21.22	8.01	12.63	19.75	6.89	15.50	19.72	27.40	24.30	22.83
2	7.42	8.32	10.55	2.08	4.56	11.50	1.57	5.63	10.41	12.88	12.94	11.15
3	2.92	4.04	6.82	0.88	1.76	6.96	0.67	2.69	5.77	6.61	5.38	6.68
4	1.82	2.45	4.55	0.84	1.10	3.66	0.42	1.42	3.55	3.85	4.25	4.03
5	1.06	1.69	3.02	0.10	0.52	3.13	0.27	0.79	1.90	2.22	1.62	2.71
6	0.63	0.90	2.24	0.14	0.17	2.03	0.00	0.66	1.61	1.51	1.42	1.82
≥ 7	3.64	5.04	10.08	1.05	2.55	8.44	0.67	2.80	6.25	5.98	7.53	8.99

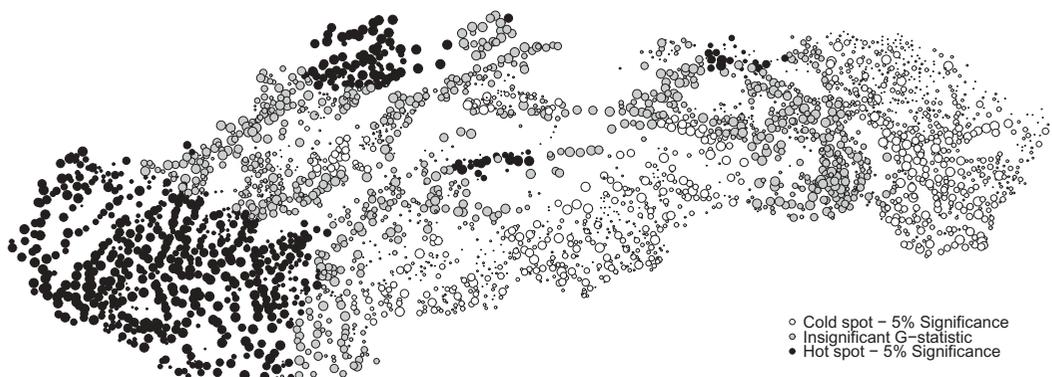
There are 2843 observations for 1995, 2897 for 2001 and 2926 for 2010.

⁸Similar results are obtained for the other occupations and time periods. The results are reported in the supplementary material.

Table 2. Transition matrices: 1995–2010.

										Number of car dealers in 2010																		Number of electricians in 2010							
										0	1	2	3	4	5	6	7											0	1	2	3	4	5	6	7
1995	0	0.59	0.24	0.08	0.04	0.02	0.01	0.01	0.01	1995	0	0.51	0.21	0.11	0.06	0.03	0.02	0.01	0.04																
	1	0.23	0.26	0.16	0.12	0.1	0.05	0.03	0.05		1	0.13	0.18	0.16	0.11	0.09	0.07	0.05	0.2																
	2	0.11	0.12	0.24	0.16	0.09	0.08	0.07	0.14		2	0.05	0.07	0.07	0.1	0.11	0.08	0.15	0.38																
	3	0.01	0.11	0.1	0.08	0.11	0.13	0.12	0.34		3	0.04	0.08	0	0.04	0.04	0.16	0.04	0.6																
	4	0	0.1	0	0.06	0.12	0.06	0.13	0.54		4	0.04	0.04	0.04	0.12	0.12	0	0.04	0.58																
	5	0	0	0	0.03	0.1	0.03	0.16	0.68		5	0	0	0	0	0	0	0	1																
	6	0	0	0	0.11	0.06	0	0.06	0.78		6	0	0	0	0	0	0	0	1																
	7	0	0	0	0.01	0	0.02	0.01	0.96		7	0	0	0	0	0	0	0	1																

										Number of plumbers in 2010																		Number of restaurants in 2010							
										0	1	2	3	4	5	6	7											0	1	2	3	4	5	6	7
1995	0	0.56	0.21	0.09	0.05	0.03	0.01	0.01	0.03	1995	0	0.66	0.21	0.07	0.03	0.01	0	0	0																
	1	0.21	0.18	0.18	0.12	0.05	0.05	0.06	0.16		1	0.43	0.32	0.13	0.07	0.02	0.01	0.01	0.01																
	2	0.04	0.11	0.13	0.24	0.09	0.04	0.11	0.24		2	0.27	0.28	0.19	0.1	0.06	0.04	0.02	0.04																
	3	0.11	0	0.05	0.21	0.05	0	0.21	0.37		3	0.14	0.21	0.19	0.14	0.12	0.06	0.05	0.09																
	4	0	0	0	0.08	0	0.25	0	0.67		4	0.11	0.14	0.1	0.16	0.16	0.09	0.05	0.19																
	5	0	0	0	0	0	0	0	1		5	0	0.14	0.11	0.12	0.14	0.18	0.06	0.25																
	6	0	0	0	0	0	0	0	0		6	0	0.12	0.05	0.07	0.09	0.14	0.12	0.42																
	7	0	0	0	0	0	0	0	1		7	0.01	0	0.01	0.03	0.04	0.04	0.04	0.84																

**Figure 1.** Cluster analysis of the number of electricians in 2010 based on Getis–Ord statistics. The individual circles represent 1 settlement. The size of the circle reflects the population quartile of the village/city.

administrative units, with small villages in the vicinity of Bratislava and Kosice, for instance, experiencing above average numbers of firms. The opposite situation can be observed in the low-income and structurally disadvantaged regions in East Slovakia where cities and villages are experiencing below average service provision.

The Moran's I statistics reported in Table 3 show that there is significant spatial correlation in the number of firms (as well as in the market characteristics). This clearly suggests that observations for the different cities and villages are not independent and that the spatial dimension needs to be taken into account explicitly in the econometric model.

Empirical analysis

The empirical framework closely follows Schaumans and Verboven (2015) and represents a simplified

version of the pioneering work on the effects of entry and exit by Bresnahan and Reiss (1991). In modelling the market for retail and professional services, we assume that firms are identical: per-firm profits on a market with N firms are $\pi(N) = v(N)S - f$, where $v(N)$ are variable per-firm per-consumer profits, S is the market size measured by the number of consumers and f is the fixed cost of production.

Since per-capita variable profits and fixed costs are unobserved, it is not possible to analyse the effects of the number of competitors (N) on variable profits $v(N)$ directly. However, from observing a specific number of firms in a market of size S , we can infer that the N incumbents break even, whereas the $N + 1$ -th potential entrant does not:

$$\pi_{N+1} = v(N+1)S - f < 0 < v(N)S - f = \pi_N$$

Table 3. Spatial autocorrelation in firm numbers and market characteristics.

Year	1995		2001		2010	
	Moran's <i>I</i>	<i>p</i> -Value	Moran's <i>I</i>	<i>p</i> -Value	Moran's <i>I</i>	<i>p</i> -Value
<i>Firm numbers</i>						
Automobile dealers	0.138	0.000	0.197	0.000	0.267	0.000
Electricians	0.065	0.000	0.167	0.000	0.246	0.000
Plumbers	0.112	0.000	0.174	0.000	0.247	0.000
Restaurants	0.155	0.000	0.217	0.000	0.253	0.000
<i>Market characteristics</i>						
Population	0.004	0.501	0.055	0.000	0.100	0.000
Wage	0.817	0.000	0.702	0.000	0.759	0.000
Unemployment	0.913	0.000	0.913	0.000	0.908	0.000
% Young	0.290	0.000	0.315	0.000	0.230	0.000
% Senior	0.278	0.000	0.279	0.000	0.259	0.000

or equivalently:

$$\ln \frac{v(N+1)}{f} + \ln S < 0 < \ln \frac{v(N)}{f} + \ln S \quad (1)$$

The log-ratio of variable profits over fixed costs ($\ln \frac{v(N)}{f}$) is characterized by a vector of observable market characteristics (X), firm fixed effects (θ_N), as well as an unobservable error term (ε):

$$\ln \frac{v(N)}{f} = X\beta + \theta_N + \varepsilon, \varepsilon \sim N(0, \sigma^2 I) \quad (2)$$

The entry condition in Equation (1) then yields the following entry rule:

$$y = N, \text{ if } \theta_N \leq y^* < \theta_{N+1}$$

$$y^* = X\beta + \ln S + \varepsilon$$

The parameters β can be estimated from an ordered probit model where θ_N and θ_{N+1} are the 'cut-points' measuring the change in the variable profits to fixed costs ratio (in log form). Large differences between consecutive cut-points ($\theta_N - \theta_{N-1}$) imply that the N th entrant has a significant influence on the competitive conduct of the incumbent firms, leading to lower markups.

In estimating an ordered probit model for the number of firms in regional submarkets, the existing literature assumes zero correlation in the outcomes of neighbouring units. The high population density of Central European countries, coupled with the increasing mobility of consumers and trade between

regional submarkets, however, cast doubts upon the assumption of perfectly isolated regional markets.

A model which ignores the presence of spatial correlation in market structure and market characteristics is likely to provide biased estimates for entry barriers and competitive effects.⁹

In order to incorporate spatial autocorrelation in the latent profitability measure (y^*), we estimate a spatial autocorrelated ordered probit model as outlined in LeSage and Pace (2009). This model implies that the entry/exit decision of each firm is not only determined by local market conditions (summarized in $X\beta$ and $\ln S$) but can also be influenced by favourable or unfavourable conditions in neighbouring markets (represented by $\rho W y^*$):

$$y = N \text{ if } \theta_N < y^* < \theta_{N+1}$$

$$y^* = \rho W y^* + X\beta + \ln S + \varepsilon, \text{ where } \varepsilon \sim N(0, 1) \quad (3)$$

In the above equation, W is a row-standardized spatial weights matrix with elements (prior to standardization) equal to $w_{ij} = 1/\text{dist}_{ij}^2$, where dist_{ij} is the distance between regions i and j .¹⁰

The latent profitability measure (y^*) is assumed to follow a truncated multivariate normal distribution:

$$y^* \sim \text{TMVN}(\mu, \Omega)$$

$$\mu = (I - \rho W)^{-1}(X\beta + \ln S)$$

$$\Omega = [(I - \rho W)'(I - \rho W)]^{-1}$$

⁹Note that (some of) the existing empirical studies have attempted to address the spatial correlation between neighbouring markets by including additional explanatory variables (such as the distance to the nearest town, the number of commuters leaving the town on a daily basis and the population located within 10 miles of the administrative unit). While the inclusion of spatially lagged explanatory variables will capture neighbourhood effects in market characteristics, the spatial correlation between neighbouring regions in market structure (i.e. the correlation in the endogenous variable, the number of competitors) is ignored. We discuss different types of spill-over effects in more detail in the next section of the article.

¹⁰We set $w_{ij} = 0$ if the distance between regions exceeds 30 km. In choosing a cut-off value of 30 km, we follow Bresnahan and Reiss (1991) who argue that towns are isolated if there are no competitors within a 20-mile radius. Estimation experiments show that our results are not significantly affected by changes in the cut-off value.

In this spatial-lag model, the parameter ρ captures the effects of competition (via the truncation of the sampling distribution) and demand spill-overs (via changes in the mean of the distribution). The parameters are estimated using a Bayesian MCMC procedure from the R package spatial probit described in more detail in Wilhelm and De Matos (2013). The method relies on data augmentation. Within the estimation process, values are generated for the unobserved profitability (y^*) based on the observed number of firms (y) via Gibbs sampling. The remaining parameters are then calculated conditional on the predicted values of the latent variable.¹¹

The estimation of the model outlined in Equation (3) allows us to compute entry barriers and to investigate whether these have changed in the transition process. In particular, we are interested in the (changes in the) minimum market size (population) necessary for the first firm to breakeven (monopoly entry threshold S_1):

$$S_1 = \exp(\hat{\theta}_1 - \bar{X}\hat{\beta} - \hat{\rho}Wy^*)$$

where \bar{X} represents the mean value of X and $\hat{\theta}_1$, $\hat{\beta}$ and $\hat{\rho}$ are the parameter estimates from the model. A significant decline in S_1 between 2 time periods is indicative of a decrease in entry barriers.

To analyse the firms' competitive behaviour and investigate changes during the transition, we follow Bresnahan and Reiss (1991) and compute entry thresholds (s_N) and entry threshold ratios (ETR_N):

$$s_N = \frac{\exp(\hat{\theta}_N - \bar{X}\hat{\beta} - \hat{\rho}Wy^*)}{N} \quad (4)$$

$$\text{ETR}_N = \frac{s_{N^m}}{s_{N-1}} = \exp(\theta_{N^m} - \theta_N) \frac{N}{N^m} \quad (5)$$

where N^m represents the upper limit of the number of firms in a market.¹²

While the existence of significant spatial spill-over effects ($\rho \neq 0$) causes the values of the entry thresholds calculated from non-spatial estimation models to be biased, entry threshold ratios will not be affected as long as the parameter estimates for the

'cut-points' (θ_N and θ_{N+1}) from the ordered probit model are unbiased or have an identical bias.

Entry threshold ratios (s_{N^m}/s_N) are scale-free measures of the effect of entry on market conduct. If firms are identical and entry does not change competitive behaviour (mark-ups), then $s_{N^m}/s_N = 1$. Significant deviations of entry threshold ratios from 1 suggest that pricing strategies change as the number of firms increases. In other words, if a larger population is necessary for the next entrant to break even, entry has intensified competition and reduced markups. Changes in entry thresholds and entry threshold ratios are indicative of changes in entry barriers as well as the intensity of competition during the transition period.

IV. Results

Tables 4 and 5 report parameter estimates from a spatial ordered probit model. The results show that population, which is our proxy for market size S , positively affects the number of firms in all industries and periods. The parameter estimate for the log of population (α) is significantly different from zero across all occupations and time periods. Wages and unemployment rates as well as the demographic composition of the population in the market have a significant impact on most equations. Because these variables summarize both demand and cost conditions, we do not attempt to draw structural inferences about the signs of their coefficients. In order to facilitate the comparability of our results with previous research, we ignore spatial effects in the following 2 sections ('Entry barriers' and 'Competitive effects'). Setting $\rho = 0$ is equivalent to assuming perfectly isolated local markets. Spatial spill-over effects will be discussed explicitly in the next subsection.

Entry barriers

Based on the parameter estimates of the spatial ordered probit model, the entry thresholds (s_N) for the different industries are calculated. The

¹¹The prior for β is normal with mean 0 and variance $T = I_K 10^{12}$, where K is the number of regressors. For the thresholds, we impose that θ_N should lie between θ_{N-1} and θ_{N+1} in order to ensure ordering but remain agnostic about the actual relationship using a uniform prior $\theta_N \sim U(\theta_{N-1}, \theta_{N+1})$. For the spatial correlation parameter we again choose an uninformative prior, using a beta (1,1) distribution to assign equal probability to all values of ρ within the unit interval. More details on the estimation procedure are provided in the supplementary material as well as in LeSage and Pace (2009, pp. 279–299).

¹²The ordered probit model restricts the number of categories. We follow previous studies and set $N^m = 7$. The loss of information is unlikely to be significant as the incremental change in the perceived competitive environment is likely to be small on a market with 7 versus 8 firms and cities and villages with more than 10 competitors are likely to consist of sub-markets.

Table 4. Parameter estimates obtained from a spatial ordered probit model for Slovakia in 1995, 2001 and 2010 for automobile dealers and electricians.

	Automobile dealers			Electricians		
	1995	2001	2010	1995	2001	2010
Population (log) (α)	0.9323*** (0.0335)	0.9502*** (0.0359)	1.0506*** (0.0486)	0.7722*** (0.0434)	0.8526*** (0.0357)	0.9989*** (0.0473)
Wages	-0.0085*** (0.0022)	0.0002 (0.0007)	0.0001 (0.0003)	0.0008 (0.0029)	-0.0041*** (0.0008)	-0.001*** (0.0003)
Unemployment (%)	-0.3717 (0.6221)	-0.9311* (0.3931)	-2.1094*** (0.4591)	-1.2989 (0.8714)	-4.0265*** (0.4972)	-1.6208*** (0.4375)
Young (%)	-6.428*** (0.9291)	-6.8196*** (0.8017)	-5.7315*** (0.6822)	-3.6165*** (1.3306)	-4.5872*** (0.9601)	-4.1251*** (65.5416)
Elderly (%)	-4.0319*** (0.7435)	-2.9060*** (0.6914)	-1.724*** (0.6472)	-2.4394** (1.1268)	-2.6615** (0.8753)	-0.3243 (0.6289)
θ_1	2.1573*** (0.6859)	4.2908*** (0.5007)	4.931*** (0.3979)	4.7595*** (0.9696)	2.4989*** (0.5824)	4.6199*** (0.4032)
θ_2	3.0339*** (0.6859)	5.1524*** (0.5037)	5.8089*** (0.4241)	5.584*** (0.9715)	3.3437*** (0.5850)	5.4291*** (0.4285)
θ_3	3.6428*** (0.6884)	5.6954*** (0.5096)	6.3211*** (0.4487)	6.0594*** (0.9750)	3.9189*** (0.5888)	5.9864*** (0.4498)
θ_4	4.0072*** (0.6912)	6.0795*** (0.5137)	6.7329*** (0.4710)	6.3642*** (0.9775)	4.2748*** (0.5903)	6.4341*** (0.4725)
θ_5	4.3249*** (0.6941)	6.4035*** (0.5195)	7.0842*** (0.4906)	6.8108*** (0.9861)	4.5880*** (0.5942)	6.7399*** (0.493)
θ_6	4.5849*** (0.6961)	6.7026*** (0.5246)	7.3644*** (0.5053)	6.9095*** (0.9879)	4.7915*** (0.5991)	7.0524*** (0.5114)
θ_7	4.7803*** (0.6986)	6.9126*** (0.5262)	7.6173*** (0.5112)	7.0423*** (0.9895)	4.8796*** (0.6001)	7.3061*** (0.5176)
ρ	0.2954*** (0.0361)	0.1885*** (0.0360)	0.202*** (0.0325)	0.2687*** (0.0655)	0.2114*** (0.0448)	0.2967*** (0.0315)
Observations	2843	2897	2926	2843	2897	2926

All markets with more than 7 firms are pooled in 1 category. SEs are in parenthesis.

***, ** and * indicate that parameters are significantly different from zero at the 1%, 5% and 10% levels, respectively.

Table 5. Parameter estimates obtained from a spatial ordered probit model for Slovakia in 1995, 2001 and 2010 for plumbers and restaurants.

	Plumbers			Restaurants		
	1995	2001	2010	1995	2001	2010
Population (log) (α)	0.4858*** (0.0373)	0.7579*** (0.0319)	0.8686*** (0.0394)	1.1259*** (0.0351)	1.0620*** (0.0378)	1.008*** (0.0473)
Wages	0.0008 (0.0027)	-0.0038*** (0.0008)	-0.001*** (0.0003)	-0.0056*** (0.002)	-0.0012* (0.0007)	-0.0008*** (0.0003)
Unemployment (%)	-1.5532* (0.8104)	-2.8220*** (0.4398)	-2.2081*** (0.453)	-1.0819* (0.5779)	-1.9596*** (0.3859)	-1.2649*** (0.4241)
Young (%)	-0.0027 (1.2387)	-2.9532*** (0.8414)	-4.1713*** (0.6838)	-5.5108*** (0.7803)	-6.2594*** (0.7176)	-3.8981*** (0.647)
Elderly (%)	-1.4517 (1.0866)	-2.5060** (0.7843)	-2.0243*** (0.6655)	-1.8826*** (0.5927)	-2.2358*** (0.5896)	0.5796 (0.5948)
θ_1	3.4594*** (0.904)	2.2597*** (0.5529)	3.5195*** (0.3925)	3.8612*** (0.6150)	3.9906*** (0.4610)	5.0548*** (0.4040)
θ_2	4.2427*** (0.9069)	3.0994*** (0.5552)	4.3417*** (0.4062)	4.9053*** (0.6169)	4.9617*** (0.4641)	5.9422*** (0.4289)
θ_3	4.6454*** (0.9087)	3.6267*** (0.5579)	4.9092*** (0.4240)	5.5774*** (0.6218)	5.6678*** (0.4709)	6.4954*** (0.4524)
θ_4	4.926*** (0.9119)	4.0256*** (0.5605)	5.3342*** (0.4391)	6.0696*** (0.6259)	6.0797*** (0.4786)	6.9349*** (0.4795)
θ_5	5.1875*** (0.9182)	4.3255*** (0.5621)	5.6878*** (0.4538)	6.4669*** (0.6294)	6.5137*** (0.4882)	7.2793*** (0.5040)
θ_6	5.445*** (0.9231)	4.5445*** (0.5638)	5.9174*** (0.4638)	6.7827*** (0.6308)	6.7280*** (0.4934)	7.5532*** (0.5191)
θ_7		4.7621*** (0.5656)	6.1581*** (0.4684)	7.0602*** (0.6329)	6.9497*** (0.4951)	7.7802*** (0.5246)
ρ	0.5725*** (0.0359)	0.3866*** (0.0363)	0.3364*** (0.0323)	0.0877*** (0.033)	0.1135*** (0.0321)	0.2742*** (0.0320)
Observations	2843	2897	2926	2843	2897	2926

All markets with more than 5 firms are pooled in 1 category. SEs are in parenthesis.

***, ** and * indicate that parameters are significantly different from zero at the 1%, 5% and 10% level, respectively.

Table 6. Per-firm entry thresholds for Slovakia in 1995, 2001 and 2010.

	Automobile dealers			Electricians			Plumbers			Restaurants		
	1995	2001	2010	1995	2001	2010	1995	2001	2010	1995	2001	2010
Total threshold population												
S_1	924	815	502	2808	1753	558	2894	1225	670	434	477	508
S_2	2366	2018	1157	8170	4721	1254	14,517	3709	1727	1098	1191	1225
S_3	4547	3573	1884	15,121	9268	2191	33,258	7437	3318	1995	2315	2120
S_4	6722	5353	2788	22,439	14,069	3429	59,266	12,590	5411	3088	3412	3279
S_5	9451	7528	3895	40,009	20,316	4658	101,530	18,701	8128	4395	5134	4614
S_6	12,491	10,313	5085	45,469	25,793	6369	172,485	24,965	10,586	5818	6282	6055
S_7	15,403	12,863	6469	53,999	28,598	8210		33,269	13,966	7444	7741	7585
Threshold population per firm												
s_1	924 (29)	815 (26)	502 (22)	2808 (338)	1753 (105)	558 (21)	2894 (535)	1225 (59)	670 (24)	434 (12)	477 (15)	508 (18)
s_2	1183 (31)	1009 (24)	579 (10)	4085 (337)	2360 (104)	627 (11)	7259 (1053)	1855 (75)	863 (19)	549 (9)	595 (11)	612 (12)
s_3	1516 (36)	1191 (24)	628 (11)	5040 (325)	3089 (114)	730 (12)	11,086 (1,291)	2479 (86)	1106 (23)	665 (10)	772 (12)	707 (11)
s_4	1680 (35)	1338 (26)	697 (12)	5610 (301)	3517 (109)	857 (15)	14,816 (1,442)	3148 (100)	1353 (27)	772 (10)	853 (13)	820 (14)
s_5	1890 (36)	1506 (27)	779 (13)	8002 (401)	4063 (115)	932 (16)	20,306 (1730)	3740 (107)	1626 (32)	879 (11)	1027 (16)	923 (16)
s_6	2082 (36)	1719 (29)	848 (14)	7578 (327)	4299 (108)	1061 (18)	28,747 (2260)	4161 (106)	1764 (32)	970 (11)	1047 (15)	1009 (17)
s_7	2200 (34)	1838 (28)	924 (13)	7714 (296)	4085 (90)	1173 (17)		4753 (112)	1995 (32)	1063 (11)	1106 (14)	1084 (16)

SEs are in parenthesis.

results are summarized in Table 6.¹³ The estimated monopoly entry threshold population suggests that entry barriers for 3 retail industries (automobile dealers, electricians and plumbers) were lowered significantly in the 15 years of transition.

The range of the drop in population necessary for one firm to break even varies across industries. From 1995 to 2001 (from 2001 to 2010) the population necessary for the first firm to break even decreased by 12% (38%) for automobile dealers. The estimated entry threshold is significantly lower than that for electricians and plumbers. However, it should be noted that automobile dealers is an aggregate category including both the sale of vehicle parts and the sale of vehicles, as well as sellers offering repairs. Since many sellers are likely to engage in both activities, we focus on the sum of sellers. As there is some differentiation between the firms selling only complete vehicles, those selling parts and those offering both, it is likely that this threshold is underestimated. We account for this in Tables 7–9, which calculates the entry threshold population for each separate category. If one focuses only on sellers offering complete vehicles, the entry threshold for the first firm goes up to

3730 (3650) in 1995 (2001) before falling to 2051 in 2010. These magnitudes are slightly higher than those calculated for electricians and plumbers and likely reflect the fact that automobile purchases occur more rarely. The observed fall in entry threshold population is likely to be correlated with the increased access to credit for consumers, which allows them to smooth consumption and make purchases of vehicles more regularly.

From 1995 to 2001 (from 2001 to 2010) the population necessary for the first firm to break even decreased by 58% (45%) for plumbers and 38% (68%) for electricians. It is important to note that this change was driven not only by institutional and structural reforms but was also related to changes in the macroeconomic environment (such as the increase in real income) in Slovakia. In particular, we conjecture that 3 processes are behind the fall in entry threshold ratios in these 2 industries. Firstly, we expect that the banking reform and access to credit allowed for increased investment in properties and a resulting boost in the demand for maintenance services. Secondly, one might expect that with the privatization and atomization of large manufacturing firms, many services which would have been offered by an ‘in-house’ technician became outsourced to small providers

¹³As economic theory constrains the parameter of $\ln S$ to 1, we normalize the other parameters when calculating entry thresholds (i.e. $S_N = \exp \frac{\theta - \bar{X}\beta}{\alpha}$).

Table 7. Parameter estimates obtained from a spatial ordered probit model for Slovakia in 1995, 2001 and 2010 for sellers of vehicles and sellers of vehicle parts.

	Sale of vehicles			Sale of vehicle parts		
	1995	2001	2010	1995	2001	2010
Population (log) (α)	0.9704*** (0.0580)	0.8550*** (0.0459)	0.8763*** (0.0372)	0.8950*** (0.0697)	0.9653*** (0.0640)	0.9168*** (0.0449)
Wages	-0.0100*** (0.0036)	0.0004 (0.0009)	0.0007* (0.0004)	0.0011 (0.0043)	-0.0014 (0.0011)	0.0008* (0.0004)
Unemployment (%)	0.0025 (0.0104)	0.0033*** (0.0009)	0.9380* (0.5646)	0.0335*** (0.0128)	0.0030*** (0.0010)	1.2651* (0.6620)
Young (%)	-7.5647*** (1.6494)	-7.8085*** (1.2965)	-5.2157*** (1.1622)	-7.9302*** (1.9459)	-5.9912*** (1.6150)	-6.1762*** (1.4109)
Elderly (%)	-3.1218** (1.4047)	-3.5120*** (1.1733)	0.5918 (1.0416)	-5.5244*** (1.6992)	-0.3065 (1.3827)	-0.0347 (1.2174)
θ_1	3.5373*** (1.1856)	4.8927*** (0.7558)	6.6248*** (0.5952)	5.7554*** (1.4702)	6.5742*** (0.9326)	7.1719*** (0.6860)
θ_2	4.4008*** (1.1870)	5.7773*** (0.7606)	7.5298*** (0.6037)	6.5963*** (1.4767)	7.5393*** (0.9390)	7.9892*** (0.6933)
θ_3	4.9513*** (1.1898)	6.2960*** (0.7673)	7.9318*** (0.6081)	7.1435*** (1.4848)	7.9811*** (0.9440)	8.4232*** (0.6996)
θ_4	5.1916*** (1.1920)	6.5726*** (0.7705)	8.2986*** (0.6163)	7.4420*** (1.4892)	8.2472*** (0.9494)	8.8340*** (0.7087)
θ_5	5.6214*** (1.1951)	6.8194*** (0.7764)	8.5471*** (0.6199)	7.7119*** (1.4955)	8.5432*** (0.9539)	9.0952*** (0.7176)
θ_6	5.8706*** (1.1976)	6.9760*** (0.7803)	8.6475*** (0.6219)	7.9563*** (1.5007)	8.8923*** (0.9614)	9.3256*** (0.7231)
θ_7	5.9753*** (1.1983)	7.1688*** (0.7844)	8.7586*** (0.6252)	8.2506*** (1.5053)	9.0643*** (0.9661)	9.4400*** (0.7266)
ρ	0.0685 (0.0903)	0.0469 (0.0688)	0.3100*** (0.0530)	0.0082 (0.0982)	-0.0373 (0.0984)	0.1257* (0.0715)
Observations	2843	2897	2926	2843	2897	2926

All markets with more than 7 firms are pooled in 1 category. SEs are in parenthesis.

***, ** and * indicate that parameters are significantly different from zero at the 1%, 5% and 10% levels, respectively.

Table 8. Per-firm entry thresholds for Slovakia in 1995, 2001 and 2010.

	Sale of vehicles			Sale of vehicle parts		
	1995	2001	2010	1995	2001	2010
Total threshold population						
S_1	3730	3650	2051	7482	5392	3375
S_2	9081	10,271	5760	19,145	14,653	8229
S_3	16,015	18,841	9114	35,283	23,157	13,212
S_4	20,514	26,035	13,851	49,252	30,508	20,683
S_5	31,947	34,749	18,391	66,585	41,456	27,499
S_6	41,300	41,733	20,624	87,487	59,517	35,357
S_7	46,005	52,288	23,412	121,554	71,123	40,054
Threshold population per firm						
s_1	3730 (554)	3650 (423)	2051 (152)	7482 (1,716)	5392 (964)	3375 (377)
s_2	4541 (424)	5136 (406)	2880 (151)	9572 (1,387)	7326 (848)	4115 (292)
s_3	5338 (383)	6280 (389)	3038 (122)	11,761 (1,300)	7719 (658)	4404 (234)
s_4	5129 (295)	6509 (327)	3463 (116)	12,313 (1,083)	7627 (519)	5171 (227)
s_5	6389 (324)	6950 (297)	3678 (107)	13317 (992)	8291 (479)	5500 (205)
s_6	6883 (308)	6955 (259)	3437 (86)	14,581 (958)	9919 (511)	5893 (193)
s_7	6572 (255)	7470 (249)	3345 (73)	17,365 (1026)	10,160 (464)	5722 (164)

SEs are in parenthesis.

of electrical and plumbing services. As such, sellers which may have been active on the market previously now represent independent economic agents, pushing the thresholds across all market structures down.

Table 9. Entry threshold ratios for Slovakia in 1995, 2001 and 2010.

	Sale of vehicles			Sale of vehicle parts		
	1995	2001	2010	1995	2001	2010
Per-firm entry threshold ratios (s_7/s_N)						
s_7/s_1	1.76 (0.27)	2.05 (0.25)	1.63 (0.13)	2.32 (0.55)	1.88 (0.35)	1.70 (0.20)
s_7/s_2	1.45 (0.15)	1.45 (0.12)	1.16 (0.07)	1.81 (0.28)	1.39 (0.17)	1.39 (0.11)
s_7/s_3	1.23 (0.10)	1.19 (0.08)	1.10 (0.05)	1.48 (0.19)	1.32 (0.13)	1.30 (0.08)
s_7/s_4	1.28 (0.09)	1.15 (0.07)	0.97 (0.04)	1.41 (0.15)	1.33 (0.11)	1.11 (0.06)
s_7/s_5	1.03 (0.07)	1.07 (0.06)	0.91 (0.03)	1.30 (0.12)	1.23 (0.09)	1.04 (0.05)
s_7/s_6	0.95 (0.06)	1.07 (0.05)	0.97 (0.03)	1.19 (0.11)	1.02 (0.07)	0.97 (0.04)
Test ratio = 1						
$s_7/s_1=1$	***	***	***	**	**	***
Chi-sq.	7.93	17.99	24.98	5.77	6.47	12.66
$s_7/s_2=1$	***	***	**	***	**	***
Chi-sq.	9.33	13.27	5.98	8.22	5.03	13.44
$s_7/s_3=1$	**	**	*	**	**	***
Chi-sq.	5.29	5.12	4.01	6.63	6.18	14.53
$s_7/s_4=1$	***	**	*	**	***	*
Chi-sq.	10	4.55	0.78	7.54	9.25	3.38
$s_7/s_5=1$			**	**	**	
Chi-sq.	0.19	1.65	7.50	6.01	6.24	0.68
$s_7/s_6=1$			*	*	*	
Chi-sq.	0.64	1.90	0.70	3.29	0.12	0.47

SEs are in parenthesis.

***, ** and * indicate that the ETRs are significantly different from one at the 1%, 5% and 10% levels, respectively.

Thirdly, there may be a propensity in these industries for informal service provision. One would expect that as

the administrative barriers for the registration of firms go down, more sellers choose to register legally. If a move away from the shadow economy has occurred during our observation period, we may overestimate the change in the actual difficulty of entry.

The transition towards a market economy followed a different path in the case of restaurants. In this industry entry thresholds did not change significantly during our observation period. The slight decrease in market coverage and the increase in the geographic concentration of restaurants in towns can be explained by decreasing employment in rural areas and high employment and income growth in towns. Besides, a lot of universal and traditional village restaurants were closed in the country-side, while restaurants with more differentiated products were established in larger towns.

Furthermore, the share of household expenditures on restaurants decreased from 7% in 2001 to 5% in 2010, which may have mitigated the effect of growing income over this period and may have contributed to the relatively constant break-even population. On the other hand, the share of expenditures on maintenance and repair of dwellings (important for plumbers and electricians) increased from 1.9% to 3% in 2010. Additionally, the increase

in real income in Slovakia could have had a stronger impact on electricians and plumbers compared to restaurants because they also supply repair services to other firms and entrepreneurs and not only to individuals (households). While the real income measured by GDP per capita increased rapidly between 2001 and 2010, it was driven mainly by the growth in gross profits and to a much lower extent by the growth of real wages. This would suggest that the growth in demand was higher for electricians and plumbers than for restaurants.

Competitive effects

Changes in competitive pressure due to entry are measured by the ordered probit parameters θ_N . Based on these values we calculate entry threshold ratios (s_7/s_N) for all occupations. Table 10 reports these values for the 4 industries in our sample; the evolution over time is illustrated in Figure 2.

The results indicate that there are substantial differences in the mark-ups of firms which hold a monopoly position and those faced with competition. Our estimates show that the entry threshold on a market with 7 competitors is significantly higher than the entry threshold for a monopolist. The

Table 10. Entry threshold ratios for Slovakia in 1995, 2001 and 2010.

	Automobile dealers			Electricians			Plumbers			Restaurants		
	1995	2001	2010	1995	2001	2010	1995	2001	2010	1995	2001	2010
Per-firm entry threshold ratios (s_7/s_N)												
s_7/s_1	2.38 (0.08)	2.26 (0.08)	1.84 (0.08)	2.75 (0.35)	2.33 (0.15)	2.10 (0.09)	9.93 (1.99)	3.88 (0.21)	2.98 (0.12)	2.45 (0.07)	2.32 (0.08)	2.13 (0.08)
s_7/s_2	1.86 (0.06)	1.82 (0.05)	1.60 (0.04)	1.89 (0.17)	1.73 (0.09)	1.87 (0.04)	3.96 (0.65)	2.56 (0.12)	2.31 (0.06)	1.94 (0.04)	1.86 (0.04)	1.77 (0.04)
s_7/s_3	1.45 (0.04)	1.54 (0.04)	1.47 (0.03)	1.53 (0.11)	1.32 (0.06)	1.61 (0.04)	2.59 (0.36)	1.92 (0.08)	1.80 (0.05)	1.60 (0.03)	1.43 (0.03)	1.53 (0.03)
s_7/s_4	1.31 (0.03)	1.37 (0.03)	1.33 (0.03)	1.38 (0.09)	1.16 (0.04)	1.37 (0.03)	1.94 (0.24)	1.51 (0.06)	1.47 (0.04)	1.38 (0.02)	1.30 (0.03)	1.32 (0.03)
s_7/s_5	1.16 (0.03)	1.22 (0.03)	1.19 (0.03)	0.96 (0.06)	1.01 (0.04)	1.26 (0.03)	1.42 (0.16)	1.27 (0.05)	1.23 (0.03)	1.21 (0.02)	1.08 (0.02)	1.17 (0.03)
s_7/s_6	1.06 (0.02)	1.07 (0.02)	1.09 (0.02)	1.02 (0.06)	0.95 (0.03)	1.10 (0.02)		1.14 (0.04)	1.13 (0.03)	1.10 (0.02)	1.06 (0.02)	1.07 (0.02)
Test ratio = 1												
$s_7/s_1 = 1$	***	***	***	***	***	***	***	***	***	***	***	***
Chi-sq.	276.08	244.55	101.90	25.37	79.86	168.32	20.06	193.62	276.33	377.04	297.59	194.03
$s_7/s_2 = 1$	***	***	***	***	***	***	***	***	***	***	***	***
Chi-sq.	235.04	252.88	267.59	26.70	73.32	400.40	20.52	170.93	422.72	579.55	451.33	331.80
$s_7/s_3 = 1$	***	***	***	***	***	***	***	***	***	***	***	***
Chi-sq.	122.20	193.20	206.07	21.29	32.12	281.34	19.11	129.74	282.11	422.62	220.21	258.10
$s_7/s_4 = 1$	***	***	***	***	***	***	***	***	***	***	***	***
Chi-sq.	83.19	123.68	118.67	17.12	13.30	141.39	15.00	73.15	154.97	258.47	138.36	119.16
$s_7/s_5 = 1$	***	***	***	***	***	***	**	***	***	***	***	***
Chi-sq.	32.91	58.04	49.71	0.35	0.02	82.39	6.42	32.97	53.49	107.28	12.91	41.46
$s_7/s_6 = 1$	**	***	***	***	***	***	***	***	***	***	***	***
Chi-sq.	5.38	8.07	14.64	0.09	2.43	17.73		12.91	22.78	30.77	7.94	9.49

As s_7 could not be estimated for plumbers in 1995, the ETRs are calculated based on s_6 .

***, ** and * indicate that the ETRs are significantly different from one at the 1%, 5% and 10% levels, respectively.

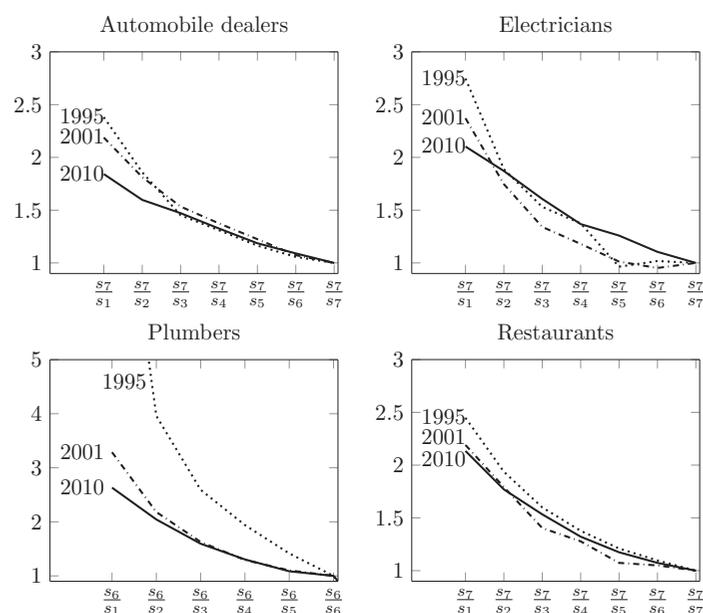


Figure 2. Break-even population and ETRs in transition.

estimated threshold ratio (s_7/s_1) ranges between 1.84 and 3.88 and significantly differs from 1 for all periods and professions.

For most occupations and time periods, the largest effect on competition occurred with the entry of the second and third firms. While the entry threshold ratios remain significantly different from 1 for the next 3 entrants, their absolute value is much closer to unity, indicating that markups were close to the competitive benchmark. These results are consistent with findings from previous empirical studies (Bresnahan and Reiss 1991; Schaumans and Verboven 2015).

The most substantial changes can be observed in the automobile dealer and plumber market. As can be seen from the results in Table 9, the changes in competitive conduct were mainly due to intense competition in the sale of vehicle parts, whereas competition in the sale of the vehicles themselves intensified only marginally over our observation period. It appears that market contestability improved in the part of the sector which requires the least initial investment (the sale of parts). In general, the accession to the European Union (from 2001 to 2010) seems to have had the strongest impact on competition in the sale of vehicles. This may be due to the availability of a wider range of suppliers once barriers to trade were completely eradicated.

The early phase of transition (from 1995 to 2001) led to a significant intensification of competition for plumbers. However, it should be noted that the reported estimate is likely to slightly overstate the true magnitude of the effect. Of the industries we focus on, plumbing and electrical services are most likely to take place in the shadow economy. This is likely to depress the recorded number of firms, especially in rural areas, where firms can benefit from a reputation without having to face the costs related to registration and taxation of their services. Since rural areas are likely to have fewer sellers, this would mean that the bias is strongest for the monopoly threshold. As such, we may overestimate the number of people which are necessary for a monopolist to break-even, since the reported results reflect the threshold population for legal registration, which may be higher than the threshold for the establishment of a firm. As outlined in the previous section, if the incentives to participate in the informal economy decreased during the transition process, this may in part explain the magnitude of change estimated for plumbing services.

No clear trend can be observed in the market for electric services; large SEs do not allow us to make conclusive statements regarding the change in competitive conduct in this market. Nevertheless, the overall trend towards decreasing monopoly mark-ups is present in the absolute value of the calculated entry threshold ratios.

Only minor changes are observed in the restaurant industry where ETRs decreased significantly between 1995 and 2001 but remained relatively constant in the subsequent period; we observe the smallest decrease in ETRs in absolute terms in this market. In the case of restaurants, it is also important to note that entry in this market does not necessarily lead to more competition for potential customers. As argued in Bresnahan and Reiss (1991) and shown in more detail in Schaumans and Verboven (2015), entry might also increase product variety and thereby have a positive effect on the consumers' willingness to pay. This countervailing effect of entry reduces entry threshold ratios (since it decreases effective competitive pressure). We would expect this 'variety effect' of entry to become stronger with the increase in real income between 1995 and 2010. This may explain why hardly any change in entry threshold ratios is observed in the restaurant industry.

Spatial spill-overs

The parameter ρ measures the influence of the spatially weighted (unobserved) measure of neighbourhood profitability (Wy^*) on the (unobserved) measure of profitability in the local market (y^*). The theoretical impact of these spill-overs on the number of firms in a local market is inherently ambiguous. At least 3 different effects may be relevant.

First, spill-over effects can be attributed to demand linkages¹⁴ between neighbouring markets. Firms not only benefit from an increase in local population (local demand) but also gain from a large population in neighbouring markets. Note that 58% of the markets in our sample had no automobile dealer in 2001; for plumbers this number goes up to 70% and for electricians it reaches 77%. Inhabitants in these cities and villages will patronize firms in other (neighbouring) cities; these neighbouring markets will thus benefit from positive demand spill-overs.

While demand spill-over effects are taken into account (to some extent) in the existing empirical literature by including measures of the population in neighbouring regions, countervailing spill-over effects due to competitive forces are typically ignored. The above numbers suggest that not all goods are produced locally but that some are imported from neighbouring markets. Firms in a local market are thus exposed to competitive pressure from firms in neighbouring markets, which counteracts the aforementioned demand spill-over effects (and implies a negative parameter value for ρ).

Finally, a non-zero value for ρ could be the result of unobserved differences in entry barriers across regions. Note that the pace of transition has not been the same in all parts of Slovakia and structural change and economic development are unevenly balanced between regions. While western regions of Slovakia are in closer proximity to EU markets and have a much better network of good roads and motorways, the poorer eastern regions border similarly poor regions in neighbouring countries suffer from significant transport infrastructure bottlenecks. Unobservable differences in the economic environment of larger regions would imply a positive spatial correlation in the error term for local markets within these regions (and thus a positive parameter estimate for ρ).

Tables 4 and 5 report significant and positive parameter estimates for ρ for all periods and occupations. This suggests that spatial spill-over effects are important and that the effect of demand linkages and/or the positive correlation in unobservable regional characteristics seems to outweigh the negative spill-over effects associated with competitive forces between neighbouring regions.

The positive spill-over effects are likely to wane with the decline of entry barriers, mainly because consumers are given the opportunity to buy locally and as such have a smaller incentive to make purchases in neighbouring towns which should decrease the demand spill-overs across town borders. This decline is clearly visible in the estimates of the spill-over parameter for plumbers and automobile dealers.¹⁵

¹⁴In principle, it would be possible to isolate demand linkages by estimating an SDM model, where the spatially lagged population is one of the explanatory variables. In practice, the strong correlation between population and the number of firms makes it difficult to separate Wy^* from $W \ln S$. The issue of collinearity is further aggravated by the fact that some control variables are available at district level only leading to a close connection between X and WX .

¹⁵However, the interpretation of the positive effects observed on the market for automobile dealers should be cautious, as this category aggregates several types of sellers and the positive correlation may be a result of this process.

Surprisingly, the opposite trend can be observed in the market of electricians as well as the restaurant market, where spill-over effects (parameter estimates of ρ) remain similar in all periods and even increase over the period from 1995 to 2010. This result is intriguing in the case of electricians, since this occupation experienced the largest inflow of firms. One may view the increase in the parameter ρ as indicative of the presence of disproportionately large pay-offs in high-profit neighbourhoods. The pay-offs of entering in a neighbourhood with high profitability, even when entry barriers are sufficiently low to increase exposure to competition, may increase if sellers provide services not only to households but also to corporate clients in related industries with agglomeration effects. If this is the case, the presence of a competitor in the neighbourhood may be offset by the extra demand generated from the presence of firms from other industries.¹⁶ With entry of new firms in the automobile manufacturing and ICT sector being spatially clustered and closely related to the accession into the EU, one can see that for electricians the importance of proximity to profitable neighbouring markets rose in 2010. While this effect is unlikely to be significant for retail automobile dealers and plumbers, it could very well be the case that the demand for electricians is higher in areas with large production capacities, generating spatial clustering.

Spatial spill-overs also appear to be increasing in the restaurant industry. The number of sellers in this category did not increase significantly in our observation period, as new entry was generally offset by exits of existing firms. As noted by Berry and Waldfogel (2010), this industry has a number of specifics not shared by other occupations.

While positive spatial spill-over effects were relatively small in the first 2 observation periods, they increased substantially in 2010. On the one hand, this can be attributed to improvements in infrastructure and a reduction in costs of visiting more distant restaurants. On the other hand, it is important to note that the size of the relevant geographical market

might differ with respect to the quality of a restaurant. Berry and Waldfogel (2010) suggest that (1) imited service restaurants have a neighbourhood as their geographic market while the market area for fancier restaurants is probably closer to the entire metropolitan area (p.10). The observed increase in income levels might have led to a higher willingness to pay for variety and quality and could thus explain why the relevant geographical market has expanded for restaurants.

As a final illustration of the importance of spatial spill-over effects, we estimate by how much the local break-even population changes when the average population in the neighbourhood increases. The results for electricians are summarized in Figure 3. The first thing to note is the decline in the monopoly break-even population (S_1). Assuming a perfectly isolated local market, Table 10 suggests that 558 inhabitants are required for the first electrician to break even in 2010. This number declines substantially if the additional demand originating from the population in neighbouring villages is taken into account.

Figure 3 further suggests a negative relationship between S_1 and the size of the neighbouring village (solid line): having a large number of consumers in the neighbourhood implies that sellers do not need to rely solely on local population. This effect is non-linear: as the population in the neighbourhood increases, the decline in the break-even population is particularly strong for smaller villages.¹⁷ In the case of a neighbouring town with a population equal to the median of the population distribution, for example, the results shown in Figure 3 suggest that the effect of 1 additional inhabitant in the local market is equivalent to the effect of 16 additional inhabitants in the neighbourhood. As mentioned above, the marginal effect of a population increase in the neighbourhood declines with the size of the neighbouring village. This is plausible insofar as firms will be able to attract a larger share of consumers in smaller as opposed to larger villages due to more intense competition in larger cities.¹⁸

It should also be noted that information on the distance to all towns (within a reasonable boundary)

¹⁶Schaumans and Verboven (2008) study the strategic complementarity of entry into related industries (pharmacies and physicians) in more detail. In their model, the marginal profits from entering in the pharmacy market increase when a physician decides to enter in the same regional market. They find empirical evidence for 847 local markets (defined at the town level) in 2001 in Belgium that entry into one profession has a positive effect on the profitability of entry into the other profession, suggesting that the entry decisions by firms of different professions are strategic complements.

¹⁷Note that this decrease in the marginal effect of consumers is inherent in the model (see Equations (4) and (5)) and not a result of the estimation results.

¹⁸Note that the number of rival firms is assumed constant in Figure 3 while the population in the neighbourhood increases.

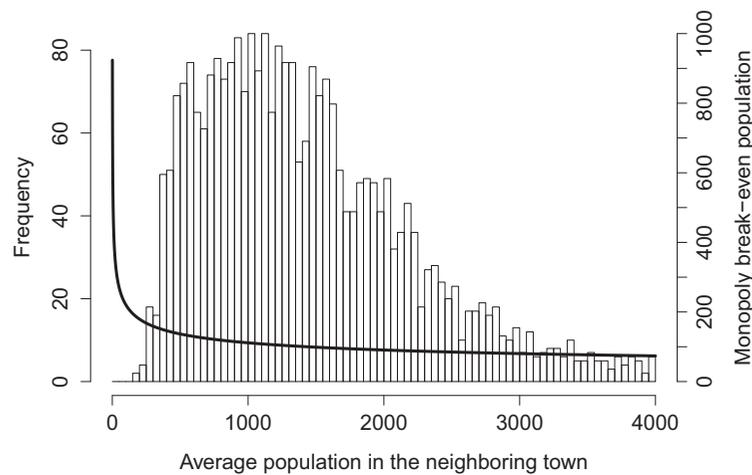


Figure 3. Simulation of the relationship between local break-even population and neighbouring population for electricians in 2010. The vertical bars represent the distribution of villages and cities in Slovakia according to their average neighbouring population. There are 138 cities with an average (spatially weighted) population above 4,000 individuals. These have been removed from the graph in order to improve readability. The average population per village is 1,879.

is taken into account in this scenario, which can be seen as an improvement to specifications which control for distance to only 1 competitor. Furthermore, through standardization, we take into account that a town in an isolated area is likely to have consumers who are more willing to travel longer distances to hire a professional.

Summarizing, we find strong empirical evidence for the presence of spatial interactions in entry decisions. Furthermore, the importance of spatial interactions differs between the industries analysed and also changed over time: spatial spill-over effects (measured by the parameter ρ) declined for plumbers and automobile dealers but increased for electricians and restaurants.

Other service industries

Tables 11–15 report estimates for 4 additional industries (beauticians, fitness studios, driving schools and taxi services), which differ significantly from the industries we focus on in the main analysis. In particular, these services are characterized by a demand which is less likely to correlate with large investment decisions and therefore is unlikely to be influenced by the availability of credit. Additionally, these industries are characterized by significantly lower coverage than the one observed on the markets in our main analysis, which results in less precise estimates of the entry thresholds and the corresponding ratios. However, these industries provide an insight into the lower limit of the effects of

liberalization, as they are unlikely to be affected by macroeconomic changes other than fluctuations in disposable income.

In terms of the monopoly entry threshold population, the results from our main analysis hold true. We find a significant decrease in the break-even population of a monopolist on these markets. The distribution of these sellers is relatively more sparse, which is reflected in the extremely high estimated entry thresholds, which point to the urban nature of these services (with beautician services being the exception to this rule).

When it comes to competitive behaviour as measured by our estimates of the entry threshold ratios, the results are not clear-cut. Beauticians and taxi services seem to have experienced an increase in monopoly margins over the transition period. This may be due to a decrease in the elasticity of demand for these services which offsets the additional competitive pressure. The opposite holds true for fitness studios and driving schools. However, since in these industries atomistic markets are rarely observed, it is unclear how well the threshold for 7 firms is estimated and hence how reliable the reported estimates are.

In terms of spatial spill-overs, we also find a significantly different picture to the one seen in our main estimation. In particular, we find that beauticians and fitness studios experience significant negative spill-overs in 1995. This suggests that consumers were likely unwilling to travel to a neighbouring town to take advantage of these services, meaning that firms chose to locate in the largest available

Table 11. Number of firms in regional submarkets in 1995, 2001 and 2010.

Number of firms	Beauticians			Fitness studios			Driving schools			Taxi services		
	1995	2001	2010	1995	2001	2010	1995	2001	2010	1995	2001	2010
Number of local markets												
0	2193	1974	1374	2680	2598	2190	2695	2707	2606	2664	2580	2456
1	381	471	637	110	192	436	88	98	180	111	187	267
2	108	187	305	23	33	114	24	33	47	19	44	72
3	35	80	176	10	16	52	9	13	19	17	27	26
4	21	33	105	5	8	27	7	8	6	5	7	20
5	9	20	64	1	11	13	7	7	13	1	6	11
6	14	13	45	3	5	9	2	5	9	3	4	11
≥ 7	82	119	220	11	34	85	11	26	46	23	42	63
Share of local markets with a particular number of firms in %												
0	77.14	68.14	46.96	94.27	89.68	74.85	94.79	93.44	89.06	93.70	89.06	83.94
1	13.40	16.26	21.77	3.87	6.63	14.90	3.10	3.38	6.15	3.90	6.45	9.13
2	3.80	6.45	10.42	0.81	1.14	3.90	0.84	1.14	1.61	0.67	1.52	2.46
3	1.23	2.76	6.02	0.35	0.55	1.78	0.32	0.45	0.65	0.60	0.93	0.89
4	0.74	1.14	3.59	0.18	0.28	0.92	0.25	0.28	0.21	0.18	0.24	0.68
5	0.32	0.69	2.19	0.04	0.38	0.44	0.25	0.24	0.44	0.04	0.21	0.38
6	0.49	0.45	1.54	0.11	0.17	0.31	0.07	0.17	0.31	0.11	0.14	0.38
≥ 7	2.88	4.11	7.52	0.39	1.17	2.90	0.39	0.90	1.57	0.81	1.45	2.15

There are 2843 observations for 1995; 2897 for 2001; and 2926 for 2010.

Table 12. Parameter estimates obtained from a spatial ordered probit model for Slovakia in 1995, 2001 and 2010 for beauticians and fitness studios.

	Beauticians			Fitness studios		
	1995	2001	2010	1995	2001	2010
Population (log) (α)	1.3373*** (0.0469)	1.1627*** (0.0389)	1.1720*** (0.0407)	0.9202*** (0.0756)	0.8871*** (0.0536)	0.9863*** (0.0349)
Wages	-0.0027 (0.0031)	0.0021*** (0.0007)	0.0002 (0.0003)	0.0047 (0.0049)	0.0026** (0.0010)	0.0000 (0.0004)
Unemployment (%)	0.0003 (0.0090)	0.0030*** (0.0009)	-2.7020*** (0.4862)	-0.0195 (0.0155)	0.0011 (0.0010)	-2.0661*** (0.5943)
Young (%)	-8.3589*** (1.2438)	-7.8422*** (0.9011)	-5.4376*** (0.6786)	-11.7769*** (2.3980)	-9.6111*** (1.5762)	-4.4304*** (0.8495)
Elderly (%)	-5.7547*** (1.0512)	-4.5979*** (0.8597)	-2.0796*** (0.6888)	-4.9557*** (1.9055)	-3.2009** (1.3058)	0.5853 (0.8225)
θ_1	6.3448*** (0.9598)	6.4924*** (0.5505)	5.8429*** (0.4273)	5.8202*** (1.6172)	5.9704*** (0.8449)	6.4365*** (0.4901)
θ_2	7.4232*** (0.9639)	7.4226*** (0.5545)	6.8096*** (0.4426)	6.8011*** (1.6240)	6.9573*** (0.8499)	7.4045*** (0.4949)
θ_3	8.0856*** (0.9666)	8.0976*** (0.5605)	7.4218*** (0.4561)	7.3783*** (1.6303)	7.4000*** (0.8565)	7.9162*** (0.4995)
θ_4	8.4767*** (0.9702)	8.5867*** (0.5646)	7.9028*** (0.4718)	7.7787*** (1.6352)	7.7274*** (0.8616)	8.3005*** (0.5065)
θ_5	8.8093*** (0.9767)	8.8825*** (0.5679)	8.2700*** (0.4831)	8.0880*** (1.6416)	8.0880*** (0.8649)	8.5891*** (0.5147)
θ_6	8.9822*** (0.9790)	9.1127*** (0.5715)	8.5555*** (0.4897)	8.2133*** (1.6476)	8.2580*** (0.8694)	8.7739*** (0.5190)
θ_7	9.2721*** (0.9816)	9.2902*** (0.5749)	8.8111*** (0.4934)	8.5058*** (1.6523)	8.4412*** (0.8717)	8.9269*** (0.5226)
ρ	-0.1607*** (0.0489)	-0.0331 (0.0394)	0.1038*** (0.0337)	-0.2124* (0.1105)	0.0255 (0.0873)	0.0414 (0.0510)
Observations	2843	2897	2926	2843	2897	2926

All markets with more than 7 firms are pooled in 1 category. SEs are in parenthesis.

***, ** and * indicate that parameters are significantly different from zero at the 1%, 5% and 10% levels, respectively.

town in a certain area and that a positive profitability in the neighbourhood was likely to attract sellers away from the local market. The market for taxi services shows a significant positive correlation in outcomes, similarly to the industries in our main specification, whereas in the case for driving schools supply and demand effects appear to cancel out.

V. Summary and extensions

The present article provides first (indirect) empirical evidence on the effects of entry on market conduct for a transition economy. We use the framework pioneered by Bresnahan and Reiss (1991) and estimate size thresholds required to support different numbers of firms for several retail and professional service

Table 13. Parameter estimates obtained from a spatial ordered probit model for Slovakia in 1995, 2001 and 2010 for driving schools and taxi services.

	Driving schools			Taxi services		
	1995	2001	2010	1995	2001	2010
Population (log) (α)	0.8801*** (0.0791)	1.0651*** (0.0761)	0.9319*** (0.0458)	0.6846*** (0.0635)	0.7116*** (0.0443)	0.7759*** (0.0345)
Wages	-0.0105** (0.0052)	0.0021 (0.0014)	0.0003 (0.0005)	0.0072* (0.0038)	0.0011 (0.0009)	0.0004 (0.0004)
Unemployment (%)	-0.0219 (0.0155)	0.0017 (0.0013)	0.0739 (0.7716)	-0.0127 (0.0119)	0.0026*** (0.0009)	-0.7278 (0.5715)
Young (%)	-4.0058* (2.1779)	-3.9266** (1.9334)	-4.3983*** (1.2746)	-0.5994 (1.6916)	-4.7794*** (1.2365)	-1.3643 (0.8804)
Elderly (%)	-3.5377* (2.0801)	-0.5903 (1.8675)	-0.9972 (1.2962)	-2.0021 (1.6242)	-4.4018*** (1.2449)	0.3941 (0.9281)
θ_1	4.0417** (1.6613)	9.5730*** (1.1854)	7.0985*** (0.6887)	6.8802*** (1.3828)	4.2673*** (0.7503)	5.9403*** (0.5279)
θ_2	4.8269** (1.6672)	10.3647*** (1.1894)	7.8680*** (0.6939)	7.6032*** (1.3856)	5.1023*** (0.7539)	6.7315*** (0.5348)
θ_3	5.3568*** (1.6761)	10.9564*** (1.2011)	8.3207*** (0.7002)	7.8608*** (1.3882)	5.5205*** (0.7588)	7.1707*** (0.5407)
θ_4	5.6882*** (1.6807)	11.3052*** (1.2132)	8.6136*** (0.7077)	8.2099*** (1.3944)	5.9146*** (0.7644)	7.4141*** (0.5434)
θ_5	6.0127*** (1.6829)	11.5693*** (1.2203)	8.7380*** (0.7108)	8.3768*** (1.3964)	6.0710*** (0.7688)	7.6588*** (0.5463)
θ_6	6.4263*** (1.6868)	11.8540*** (1.2252)	9.0063*** (0.7185)	8.4406*** (1.3973)	6.2371*** (0.7723)	7.8221*** (0.5490)
θ_7	6.6222*** (1.6884)	12.0997*** (1.2313)	9.2226*** (0.7241)	8.5810*** (1.4020)	6.3735*** (0.7761)	8.0188*** (0.5543)
ρ	-0.1140 (0.1148)	-0.1799* (0.1059)	-0.0122 (0.0739)	0.2003* (0.1202)	0.3744*** (0.0575)	0.3702*** (0.0502)
Observations	2843	2897	2926	2843	2897	2926

All markets with more than 7 firms are pooled in 1 category. SEs are in parenthesis.

***, ** and * indicate that parameters are significantly different from zero at the 1%, 5% and 10% levels, respectively.

Table 14. Per-firm entry thresholds for Slovakia in 1995, 2001 and 2010.

	Beauticians			Fitness studios			Driving schools			Taxi services		
	1995	2001	2010	1995	2001	2010	1995	2001	2010	1995	2001	2010
Total threshold population												
S_1	1842	1229	581	13,795	5099	1700	12,797	8776	4536	7699	3234	2117
S_2	4127	2736	1326	40,053	15,510	4536	31,231	18,456	10,358	22,137	10,455	5869
S_3	6772	4889	2235	74,994	25,547	7620	57,029	32,165	16,835	32,249	18,817	10,337
S_4	9072	7446	3369	115,877	36,953	11,251	83,098	44,630	23,053	53,698	32,739	14,146
S_5	11,635	9603	4609	162,179	46,760	15,076	120,152	57,188	26,344	68,530	40,787	19,389
S_6	13,241	11,705	5880	185,822	67,203	18,183	192,217	74,711	35,134	75,224	51,513	23,931
S_7	16,446	13,635	7313	255,347	82,617	21,235	240,136	94,098	44,312	92,345	62,399	30,837
Threshold population per firm												
s_1	1842 (84)	1229 (42)	581 (19)	13,795 (3794)	5099 (796)	1700 (83)	12,797 (3897)	8776 (1828)	4536 (560)	7699 (2570)	3234 (459)	2117 (176)
s_2	2063 (64)	1368 (33)	663 (11)	20,027 (3478)	7755 (804)	2268 (79)	15,615 (2904)	9228 (1170)	5179 (400)	11,069 (2267)	5228 (529)	2934 (171)
s_3	2257 (59)	1630 (34)	745 (10)	24,998 (3256)	8516 (668)	2540 (70)	19,010 (2,649)	10,722 (1022)	5612 (324)	10,750 (1,561)	6272 (490)	3446 (156)
s_4	2268 (49)	1861 (35)	842 (12)	28,969 (3088)	9238 (589)	2813 (66)	20,775 (2312)	11,157 (852)	5763 (264)	13,425 (1597)	8185 (547)	3536 (131)
s_5	2327 (44)	1921 (32)	922 (12)	32,436 (2942)	9352 (499)	3015 (63)	24,030 (2275)	11,438 (729)	5269 (198)	13,706 (1363)	8157 (455)	3878 (124)
s_6	2207 (37)	1951 (29)	980 (12)	30,970 (2384)	11,200 (531)	3030 (56)	32,036 (2764)	12,452 (695)	5856 (194)	12,537 (1056)	8586 (418)	3988 (110)
s_7	2349 (35)	1948 (26)	1045 (11)	36,478 (2537)	11,802 (495)	3034 (49)	34,305 (2622)	13,443 (664)	6330 (189)	13,192 (975)	8914 (386)	4405 (110)

SEs are in parenthesis.

industries. The firms' entry and exit decisions reveal information about the underlying (latent) profit function, the role of entry costs and the intensity of competition. The 3 time periods analysed (1995, 2001 and 2010) characterize the different stages of the Slovak

transformation process. In 1995, the Slovak economy was in the early phases of a turbulent transition process with an unclear trajectory of its future route. Half a decade later, in 2001, the economy was in the process of relieving itself of post-socialist deformations

Table 15. Entry threshold ratios for Slovakia in 1995, 2001 and 2010.

	Beauticians			Fitness studios			Driving schools			Taxi services		
	1995	2001	2010	1995	2001	2010	1995	2001	2010	1995	2001	2010
Per-firm entry threshold ratios (s_7/s_N)												
s_7/s_1	1.28 (0.06)	1.58 (0.06)	1.80 (0.06)	2.64 (0.75)	2.31 (0.37)	1.78 (0.09)	2.68 (0.84)	1.53 (0.33)	1.40 (0.18)	1.71 (0.59)	2.76 (0.41)	2.08 (0.18)
s_7/s_2	1.14 (0.04)	1.42 (0.04)	1.58 (0.03)	1.82 (0.34)	1.52 (0.17)	1.34 (0.05)	2.20 (0.44)	1.46 (0.20)	1.22 (0.10)	1.19 (0.26)	1.71 (0.19)	1.50 (0.10)
s_7/s_3	1.04 (0.03)	1.20 (0.03)	1.40 (0.02)	1.46 (0.22)	1.39 (0.12)	1.19 (0.04)	1.80 (0.29)	1.25 (0.13)	1.13 (0.07)	1.23 (0.20)	1.42 (0.13)	1.28 (0.07)
s_7/s_4	1.04 (0.03)	1.05 (0.02)	1.24 (0.02)	1.26 (0.16)	1.28 (0.10)	1.08 (0.03)	1.65 (0.22)	1.20 (0.11)	1.10 (0.06)	0.98 (0.14)	1.09 (0.09)	1.25 (0.06)
s_7/s_5	1.01 (0.02)	1.01 (0.02)	1.13 (0.02)	1.12 (0.13)	1.26 (0.09)	1.01 (0.03)	1.43 (0.17)	1.18 (0.09)	1.20 (0.06)	0.96 (0.12)	1.09 (0.08)	1.14 (0.05)
s_7/s_6	1.06 (0.02)	1.00 (0.02)	1.07 (0.02)	1.18 (0.12)	1.05 (0.07)	1.00 (0.02)	1.07 (0.12)	1.08 (0.08)	1.08 (0.05)	1.05 (0.12)	1.04 (0.07)	1.10 (0.04)
Test ratio = 1												
$s_7/s_1=1$	***	***	***	**	***	***	**		**		***	***
Chi-sq.	19.99	100.72	166.31	4.8	12.33	72.87	3.99	2.63	4.99	1.48	18.47	35.93
$s_7/s_2=1$	***	***	***	**	***	***	***	**	**		***	***
Chi-sq.	12.45	117.17	356.92	5.81	9.41	42.79	7.34	5.31	4.82	0.55	14.13	27.76
$s_7/s_3=1$		***	***	**	***	***	***	*	*		***	***
Chi-sq.	1.71	42.92	274.32	4.54	9.8	25.88	7.87	3.56	3.06	1.29	11	17.78
$s_7/s_4=1$		*	***		***	**	***	*				***
Chi-sq.	1.73	3.63	124.41	2.62	8.1	6.46	8.54	3.5	2.68	0.02	1.06	19.5
$s_7/s_5=1$			***		***		**	*	***			***
Chi-sq.	0.15	0.43	49.34	0.94	9.36	0.05	6.06	3.42	12.23	0.1	1.45	8.73
$s_7/s_6=1$	***		***						*			**
Chi-sq.	7.32	0.01	15.18	2.12	0.65	0	0.33	0.98	2.83	0.2	0.32	6.43

***, ** and * indicate that the ETRs are significantly different from one at the 1%, 5% and 10% levels, respectively.

and preparing for European integration. After being a member of the European Union for 6 years, the relevant institutions as well as the functioning of the Slovak economy in 2010 have already converged significantly towards Western European standards.

Consistent with these observations, our results indicate that the effect of entry on market conduct has changed over time. While entry threshold ratios tend to be larger than 1 and decline with the number of firms in most professions in 1995, the estimation results obtained for 2010 suggest entry threshold ratios much closer to 1. This finding is indicative of a significant decline in entry barriers, which corresponds with evidence from business surveys.¹⁹

The second novel contribution of the present article concerns the explicit analysis of spatial spill-over effects in the entry-threshold approach. These effects should be particularly important in densely populated markets (such as those of Central European countries or large urban areas in general). Parameter estimates from spatial ordered probit models suggest that demand spill-overs and/or the effects associated with a positive correlation in unobservable explanatory variables

outweigh negative spill-over effects caused by competitive forces between neighbouring cities and villages. While these spatial effects are found to decline over the transition period for automobile dealers and plumbers, we observe an increase in the estimated spill-over parameters for electricians and restaurants.

Unfortunately, identification and isolation of the individual (countervailing) spatial effects (demand spill-overs, competitive effects as well as effects associated with spatially correlated residuals) is not possible in the empirical model used in the present article but is deferred to future research. Future work should also investigate the importance of sunk costs and entry barriers for a firm's conduct in more detail by supplementing the present approach with an analysis of prices and costs (Einav and Levin 2010). Further, the impact of infrastructure quality and human capital could be explicitly considered in empirical models on entry, exit and competition. And finally, following the approach suggested in Pakes, Ostrovsky and Berry (2007) or Abbring and Campbell (2010) would allow researchers to extend the static Bresnahan and Reiss framework to a dynamic setting. Explicitly modelling

¹⁹In the 1990s, Slovakia was the country with the largest number of days required to start a business among the 18 countries listed in Table 3 in Estrin (2002). However, the country halved the time to register a business a few years later and, according to the World Bank Doing Business survey, was ranked among top reformers in the business environment in 2005.

the dynamics of entry and exit is particularly important in order to further improve our understanding of the relationship between market structure and competition in a transition economy.

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