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Lábaj, Martin; Silaniè, Peter; Weiss, Christoph

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Entry and Competition in a Transition Economy: The Case of Slovakia

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Author: Lábaj, M. – Silanič, P. – Weiss, Ch.

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Entry and Competition in a Transition Economy: The Case of Slovakia

Martin Lábaj,[+)] Peter Silanič[+)] and Christoph Weiss[++), +++)]

Abstract
The present paper provides first empirical evidence on the effects of entry on market conduct for a transition economy. We estimate size thresholds required to support different numbers of firms for seven retail and professional service industries in a large number of distinct geographic markets in Slovakia. Our results suggest a differential impact of entry on market conduct: while market conduct is unaffected by entry in the north-western parts of Slovakia, competition tends to kick in slowly in most professions in the south-east. This latter region suffers from infrastructure bottlenecks and competitors require a larger increase in the number of customers to come in.

Keywords: entry thresholds, competition, Slovakia, cross section, geographic markets

JEL codes: L22, D22, M13, R11

1 Introduction

The structure of a planned economy as well as the behavior of firms (or production units) in this environment in many dimensions differs from the structure and conduct of firms in a market economy. In communist regimes, firms were not independent decision-making units and did not have responsibility for sales or pricing. Competitive rivalry was weak or nonexistent and entry of new firms as well as bankruptcy and exit of existing ones was effectively impossible (Estrin, 2002). Compared to market economies, firms were very large and market structure 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 and to bring supply in line with the patterns of consumer demand.

The relationship between entry and exit and the 'toughness of competition' (Sutton, 1991) in markets plays a major role in research in industrial organization. Different approaches for analyzing the degree of competition in markets, each with different strengths and weaknesses, have been suggested.[1] In a series of papers, Bresnahan and Reiss (1988, 1991) argue that one can draw inferences on the intensity of competition from the relationship between the number of firms in the

+) Department of Economic Policy, University of Economics, Bratislava, Slovakia. e-mails: martin.labaj@euba.sk, peter.silanic@euba.sk.

++) Department of Economics, Vienna University of Economics and Business (WU), Vienna, Austria. E-mail: cweiss@wu.ac.at

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1 A detailed review of the literature is available in Berry and Reiss (2007).

market and market size. The intuition is that if competition is increasing in the number of firms, market size has to increase disproportionally to support additional firms. For example, if the smallest market size necessary to support one firm is equal to S ('monopoly entry threshold') then the market size must be greater than $2S$ to support two firms if competition reduces profits. By estimating these market thresholds from the relationship between the number of firms and an exogenous profit shifter (such as population S), the researcher can draw inferences about the toughness of competition for a product or industry. The attractiveness of this approach rests in the fact that it can be applied with relatively modest data requirements. No information on prices and marginal costs is required; 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. Further, this approach captures the effects of price as well as non-price competition: the fall in profits can be the result of a decrease in prices and/or an increase in product quality. Quality upgrading is of particular importance for firms in transition economies to survive as the market environment becomes more competitive.

Whereas the concept of entry thresholds has been applied in a large number of empirical studies for developed market economies, similar studies that focus on transition economies are lacking[2]. By relating shifts in market size to changes in the equilibrium number of firms, the present paper aims at providing first empirical evidence on the effect of entry on market conduct in a transition economy. Following Bresnahan and Reiss (1991), we summarize this relationship using the concept of 'entry thresholds' for seven retail and professional service industries in a large number of distinct geographic markets in Slovakia. Specific emphasis will be given to the fact that the consequences of more market orientation will not be identical between occupations as well as between different regions within the Slovak economy. Differentiating between regions is of particular importance since regional differences in structural change and economic development are considered being one of the main problems of the Slovak republic (Šikula et. al., 2010).

The following section 2 briefly highlights relevant changes in the economic environment in Slovakia during the transition period as well as describes the data used for the empirical analysis. Section 3 presents the econometric specification and discusses empirical results and section 4 summarizes and discusses possible extensions.

2 Economic Environment and Data

Slovakia, a small open economy, started its transition as a part of the Czechoslovak federation. As all countries in transition, Czechoslovakia experienced a deep transition recession during 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 made it more dependent on markets in the Soviet Union and its Central and Eastern European satellites. However, Slovakia was able to recover quickly from the initial output collapse. Following its peaceful 'Velvet Divorce' Slovakia gained independence from Czechoslovakia on 1 January 1993. Economic reforms slowed in 1994-98, but

[2] Investigating entry and exit in transition economies is particularly interesting since 'transition economies make a particularly good laboratory for understanding the dynamics of market evolution' (Estrin, 2002, p. 101). However, only a small number of empirical studies are devoted to analyzing 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. Geroski (1995) provides an excellent survey of the empirical evidence ('stylized facts') which looks across industries in search of robust patterns of survivorship, turnover, and firm growth. The present paper follows a different approach by focusing on industry dynamics within individual industries.

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; the Slovak economy today is among the most dynamic of the Central and Eastern European countries (EC, 2007).[3]

However, 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. Before the transformation process, spatial development was a subject of regional and land use planning. Even though the principle of proportionality was among the key concepts in regional development, Slovakia entered the transformation period with relatively high regional disparities. The polarization between an north-western versus an south-eastern part considerably shaped the evolution of regions in Slovakia (Morvay et. al., 2005). Perhaps due to the proximity to higher income regions (Austria and the Czech Republic), the benefits of economic growth have been mainly reaped by the north-western part while the south-eastern regions have been left behind.[4] In examining regional income and growth disparities, Banerjee and Jarmuzek (2009) relate the superior performance of western parts of Slovakia to advantages in location, infrastructure stock and quality, ability to attract FDI, and human capital endowments. While these regions are in closer proximity to EU markets and have a much better network of quality roads and motorways, the poorer eastern regions border similar poor regions in neighboring countries and suffer from significant transport infrastructure bottlenecks. Further, western regions, especially Bratislava, have a higher concentration of educated persons. It is plausible to assume, that these regional difference in infrastructure and human capital will also bear on firms' entry and exit decisions and thus on market conduct.

The relationship between competition, market size and entry and exit will be investigated for seven occupations in Slovakia in 2010: automobile dealers (including the repair of cars and retail of vehicle parts), electricians, plumbers, restaurants, pharmacies, doctors and dentists. Cross-sectional data on the number of firms, population size and other market characteristics is available for 2,829 local markets in Slovakia. In order to account for the above mentioned regional disparities, we differentiate between markets in the north-western and the south-eastern parts of Slovakia. The north-western part is composed of 885 local markets in Bratislava, Trnava, Trenčín and Žilina regions. The south-east part includes 1,944 local markets in regions of Nitra, Banská Bystrica, Prešov and Košice.

The number of firms for each occupation is obtained from the 'Register of Economic Subjects' in the Slovak Republic which covers the whole population of firms in manufacturing and services. This register is administrated by the Statistical Office of the Slovak Republic and was provided to us by its affiliation INFOSTAT. For each firm, information on location and its main economic activity (classified according to the NACE Rev. 1 classification of industries) is collected. From this we compute the number of firms in the different local markets. Data on population as well as demographic characteristics of the regional markets are obtained from the 'Urban and Municipal Statistics'.

We control for several market characteristics such as wages, unemployment rates and the share of young and old population. Data on wages and unemployment rates are taken from the 'Regional

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[3] In 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 cut the time to register a business in half a few years later and, according to the 'World Bank Doing Business' survey, was ranked among top reformers in the business environment in 2005. According to BusinessWeek, 'Slovakia earned the title of Tatra Tiger' (BusinessWeek, 2006).

[4] Bratislava is the richest region with per capita GDP about 234 percent of the national average, and Presov is the poorest with per capita GDP about 55 percent of the national average.

Statistics Database'. Unfortunately, we do not observe these variables at the local market level; these data are available at the district level (79 districts) in Slovakia only. The share of population aged below 15 years and above 60 years for each market in Slovakia is obtained from the 'Urban and Municipal Statistics'.

Table 1 reports descriptive statistics for key variables, more details are reported in an appendix. Geographic markets are defined at the level of ZIP codes. To avoid problems of overlapping markets, we follow previous research (Schaumans and Verboven, 2011) and only retain the non-urban areas. More specifically, we restrict the number of markets according to two criteria: regional markets are included only if the number of inhabitants is lower than 15,000 and population density is below 800 inhabitants per km^2. From the total number of 2,887 towns and villages in Slovakia, 2,829 geographic markets comply with these criteria.

Table 1

Note that the number of firms differs substantially between regions and also between occupations. The maximum number of automobile dealers is 66 while the largest number of pharmacies only is 9. About 50% of all regional markets have at least one firm in the first four of the seven occupations (automobile dealers, electricians, plumbers and restaurants). However, the clear majority (around 75% or more) of regional markets does not have one pharmacy, one doctor or one dentist (see Table 2). In Table 2, all markets with more than seven firms are pooled into one category.

Table 2

3 Empirical Framework and Results

The empirical framework closely follows Schaumans and Verboven (2011), who suggest a simplified version of the pioneering work of Bresnahan and Reiss (1991). Assuming symmetric firms, per-firm profits are $\pi(N) = v(N)S - f$ where $v(N)$ are variable profits per consumer, S is market size and f are fixed costs. Since variable profits per consumer as well as fixed costs are unobserved it is not possible to analyze the effects of the number of competitors (N) on variable profits $v(N)$ directly. However, from observing a specific number of competitors in a market of size S, we can infer that N firms are profitable whereas N+1 firms are not: $v(N+1)S - f < 0 < v(N)S - f$ or equivalently $\ln\frac{v(N+1)}{f} + \ln S < 0 < \ln\frac{v(N)}{f} + \ln S$. Let us assume the ratio of variable profits over fixed costs to be characterized by a vector of observable market characteristics ($\boldsymbol{X}$), firm fixed effects (θ_N) as well as an unobservable error term $\omega \sim N(0,\sigma)$: $\ln\frac{v(N)}{f} = \boldsymbol{X\beta} + \theta_N - \omega$. The entry condition thus becomes $\boldsymbol{X\beta} + \theta_{N+1} + \ln S < \omega < \boldsymbol{X\beta} + \theta_N + \ln S$. Normalizing $\sigma = 1$, the probability of observing N firms is $\Pr(N) = \Phi(\theta_N + \boldsymbol{X\beta} + \ln S) - \Phi(\theta_{N+1} + \boldsymbol{X\beta} + \ln S)$, where Φ represents the cumulative distribution function for the standard normal distribution. The parameters $\boldsymbol{\beta}$ can be estimated from an ordered probit model where θ_N and θ_{N+1} are the 'cut-points' or entry effects.

Note that estimating this model over all distinct local markets in Slovakia assumes that the 'cut points' θ_N do not vary across markets and that entry thresholds and entry threshold ratios are identical in all regions. Given the pronounced differences in structural change and economic

development between the north-western and the south-eastern part of Slovakia mentioned in section 2, this seems a very restrictive assumption. To capture regional differences, we also estimate the ordered probit model separately for the two parts of Slovakia.

Tables 3a and 3b report results from ordered probit models estimated for all local markets in Slovakia as well as for the two regions (north-west and south-east of Slovakia).

Tables 3a and 3b

The estimation results show that population, which is our proxy for market size *S*, positively affects the number of firms in all seven retail and professional service industries. The parameter estimate of ln(*POP*) is positive and significantly different from zero across all occupations. Wages and unemployment rates as well as the demographic composition of the population in the market exert a significant impact in most equations. Because these variables summarize both demand and cost conditions, we cannot attempt to draw structural inferences about the signs of their coefficients. 'Cut points' (θ_N) are positive and increasing indicating that profits are lower in market with more firms.

From these estimation results, entry thresholds (i.e. the critical market size to support *N* firms) are computed as $S(N) = \exp\left(\frac{-\theta_N - \bar{\boldsymbol{X}}\boldsymbol{\beta}}{\alpha}\right)$ where $\bar{\boldsymbol{X}}$ represents average values of exogenous variables and α is the parameter estimate of market size ($\ln(POP)$) in the ordered probit model. From the entry thresholds, we compute per-firm entry thresholds $s_N = S(N)/N$ as well as entry threshold ratios s_{N+1}/s_N. These ratios are scale-free measures of entry's effect on market conduct. If firms are identical and entry does not change competitive conduct, then $s_{N+1}/s_N = 1$. Departures of successive entry threshold ratios from one measure whether competitive conduct changes as the number of firms increases. Entry thresholds and entry threshold ratios are computed for all occupations (the detailed results are reported in Table A1 in the appendix).

Estimating the model for all local markets in Slovakia suggests that the monopolist entry threshold for automobile detailers, electricians and restaurants is around 500 inhabitants. The monopoly threshold for plumbers is somewhat higher (around 700 inhabitants). For professions related to health care, monopoly thresholds are much higher. Approximately 1,300 inhabitants are required for the first doctor to enter a market and around 2,000 (3,000) inhabitants are necessary in a local market for the first dentist (pharmacist) to break even.

In nearly all occupations, thresholds per firm are higher for a second entrant (the only exceptions are electricians and dentists). In duopoly markets, firms need more than twice the market size of a monopoly market to be profitable. This increase in entry thresholds is most pronounced for plumbers where the per firm entry threshold size increases from around 700 in a local monopoly to 850 customers in a duopoly market. However, entry thresholds differ significantly between the north-western and the south-eastern regions of Slovakia in some occupations. Figure 1 compares entry threshold ratios for all retail and professional service industries in the two regions.

Figure 1

Figure 1 indicates that entry threshold ratios tend to be larger in south-eastern regions of Slovakia than in the north-western parts in most professions. We find entry threshold ratios significantly larger than one in four occupations in the south-east (automobile dealers, electricians, plumbers, and

restaurants) while entry thresholds are not significantly different from zero in any of these occupations in the north-western parts of Slovakia.

Differences between the two regions are particularly pronounced for plumbers and restaurants. Whereas the threshold ratios for plumbers in the south-east are significantly different from one until the fifth firm enters into a local market, entry threshold ratios are close to one (not significantly different from one) in the north-western parts of Slovakia. A monopoly plumber needs 511 customers to enter the market in the north-west while this number is 832 in the south-eastern part of Slovakia. This entry threshold remains nearly unchanged for the entry of a second or third firm in the west (entry thresholds are 535 and 574). In contrast, entry thresholds increase significantly in the south-eastern parts of Slovakia (the entry thresholds are 1,127 for the second and 1,561 for the third firm). The corresponding duopoly/monopoly ratio (s2/s1) in the north-western part is 1.047, which is not significantly different from one. For local markets in the south-east, this ratio is 1.354 and is significantly different from one.

The estimation models also suggest some differences between the two regions for restaurants. The required number of additional customers increases in the south-east until the third restaurant opens; the entry threshold ratio s3/s2 is significantly different from one at the 5%-level of significance. Entry threshold ratios are not significantly different from one in markets located in the north-west.

Note that entry threshold ratios for pharmacies in markets with more than three firms are estimated very imprecisely due to the small number of observations. Interestingly, the entry-threshold ratio s2/s1 for doctors is significantly smaller than one in both regions but is close to one as the number of doctors further increases. In this market (and maybe to some extent also for restaurants) one cannot rule out the possibility that entry not only leads to more competition for a given number of potential customers which lowers prices and margins. As argued in Bresnahan and Reiss (1991) and shown in more detail in Schaumans and Verboven (2011), entry might also increase product variety and thereby have a positive effect on consumers' willingness to pay. This countervailing effect of entry reduces entry threshold ratios and can explain ratios smaller than one.

In order to confirm that our results are not driven by the specific definition of market boundaries, regressions were run using perturbations of these definitions. Results from these estimation experiments, which are available from the authors upon request, show that our results described above are robust with respect to these modifications.

To further explore the robustness of our results, we use different definitions for the residual category in the ordered probit model and also applied a different estimation technique. Note that the ordered probit model entails some loss of information since we pooled regional markets with more than seven firms into one category. As an alternative, we re-estimate our models when using five or more firms as well as ten or more firms as a residual category. The main results remain unchanged. Further, the ordered probit model does not take into account that the number of firms in a market is not only a ranking but also a counting. As an additional robustness test, we thus follow Asplund and Sandin (1999) and compare results of the ordered probit to a Tobit model. The signs and significance of explanatory variables remain the same, although the point estimates varied slightly by a statistically insignificant amount. The most important finding is that the coefficient of population (POP) is positive whereas population squared (POP^2) is negative (see Table A2 in the appendix). This implies a concave relationship between the number of firms and market size and corresponds nicely to the results from the ordered probit model.

4 Summary and Extensions

The present paper provides first 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 the size threshold required to support different numbers of firms for seven retail and professional service industries in a large number of distinct geographic markets in Slovakia. In comparing entry threshold ratios for different occupations and different regions it is important to note that these ratios can be affected by unobserved variables such as the existence of barriers to entry, entrant inefficiencies as well as different degrees of product differentiation. We believe that the occupations analyzed in the present paper compete in a relatively homogenous market and use similar production technologies (i.e. have similar costs). Under these assumptions, our results indicate that the effect of entry on market conduct differs between the north-western and the south-eastern parts of Slovakia. We find that entry threshold ratios tend to be larger than one and decline with the number of firms in most professions in the south-eastern regions of Slovakia; these regions suffer from significant transport infrastructure bottlenecks and tend to have a lower concentration of educated persons. In markets located in the north-western parts of Slovakia on the other hand, which are in closer proximity to other EU markets and have a much better network of roads and motorways, entry of additional competitors does not change market conduct significantly; entry threshold ratios are not significantly different from one.

However, the impact of entry barriers as well as infrastructure quality and human capital has not been considered explicitly in empirical models on entry, exit and competition so far. Further, the Bresnahan and Reiss (1991) framework assumes that markets are in a state of long-run equilibrium and that at least some consumers with high reservation prices do not leave local markets; i.e. the number of consumers who are willing to drive long distances to patronize firms in other markets must not be too large. While these might be plausible assumptions for most occupations analyzed in the present paper, explicitly considering the distances (in driving time) between rival firms as well as the quality of transport infrastructure in a spatial model might nevertheless be an interesting extension of the present framework. Further, variations in entry thresholds between occupations as well as between regions might also be explained by differences in entry barriers and opportunity costs of professionals for opening a business in specific locations. We cannot rule out this interpretation without knowing the timing of entry and the identity of entrants. Additional insights into these issues might be obtained from using panel data and supplementing the present approach with an analysis of prices and costs (Einav and Levin, 2010). To address these issues, a richer empirical model of competition, entry and exit needs to be developed.

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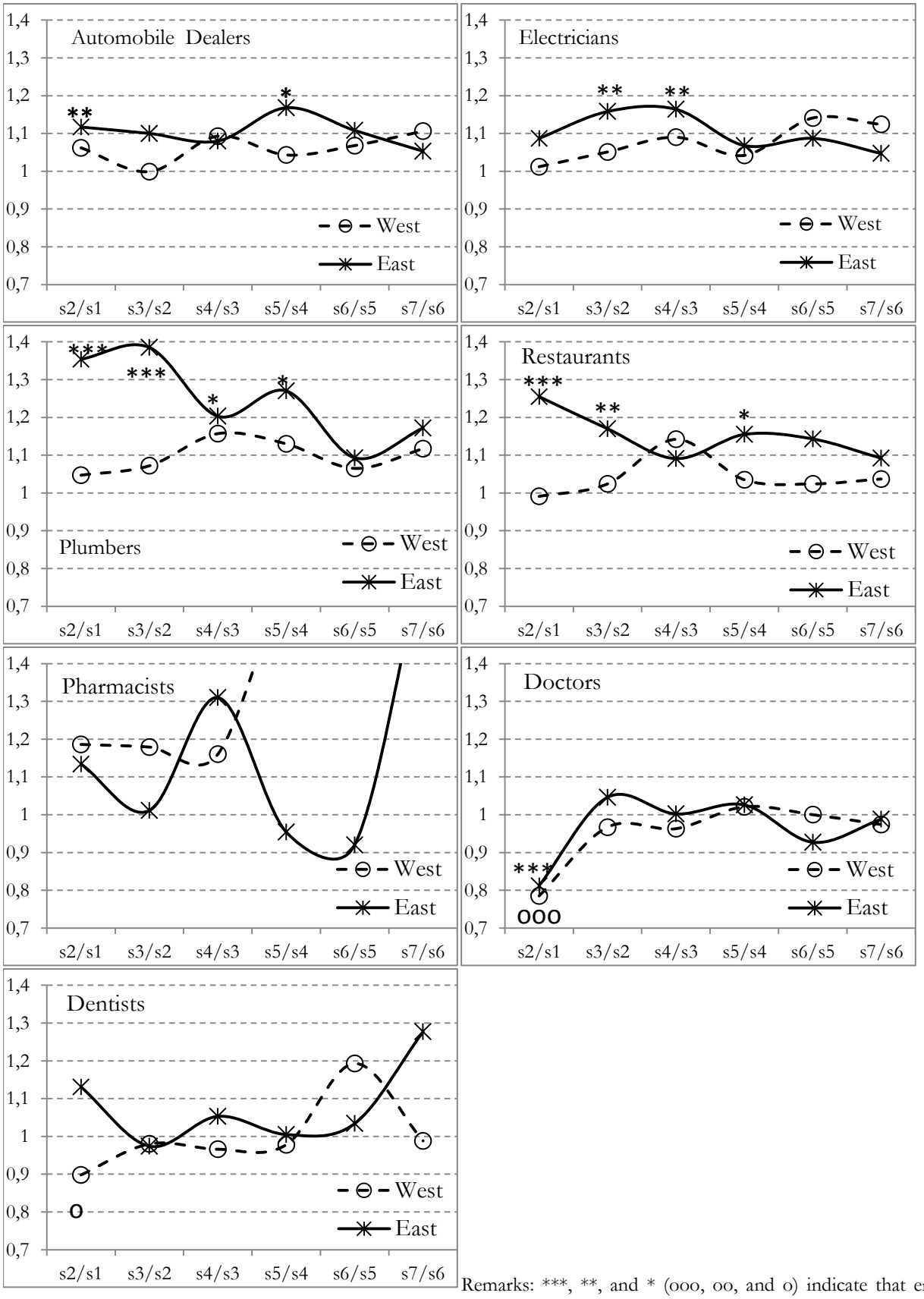
Table 1: Definition and descriptive statistics of variables (N=2,829)

Variable	Definition	Mean	Std. Dev.	Min	Max
Pop	Total population	1079.32	1473.32	12	14913
Density	Density of population per km2	75.87	72.14	1	798
Vehicles	Number of automobile dealers including the repair of cars and retail of vehicle parts	2.02	3.91	0	66
Electric	Number of electricians	1.76	3.23	0	53
Plumb	Number of plumbers	1.31	2.39	0	34
Restau	Number of restaurants	1.96	4.27	0	60
Pharm	Number of pharmacies	0.15	0.57	0	9
Doctor	Number of doctors	0.82	2.83	0	45
Dentist	Number of dentists	0.28	0.92	0	11
Wage	Average nominal wage	675.52	87.94	492	902
Unemp	Average annual unemployment rate	16.07	6.82	5.71	33.64
Young	The share of population aged 0-14 years in total polupation	0.16	0.05	0	0.69
Old	The share of population aged 60+ years in total population	0.23	0.06	0.03	0.67

Table 2: Summary statistics for number of firms in the market

Number of firms	Automobile dealers	Electric	Plumb	Restau	Pharm	Doctors	Dentists
	Number of local markets						
0	1230	1312	1494	1234	2541	2118	2396
1	618	578	574	665	204	320	288
2	300	324	292	314	48	173	66
3	193	198	160	190	22	70	28
4	131	104	102	117	7	44	15
5	86	86	51	76	2	20	14
6	62	56	45	51	4	15	10
>7	209	171	111	182	1	69	12
TOTAL	2829	2829	2829	2829	2829	2829	2829
	Share of local markets with a particular number of firms in %						
0	43.48	46.38	52.81	43.62	89.82	74.87	84.69
1	21.85	20.43	20.29	23.51	7.21	11.31	10.18
2	10.60	11.45	10.32	11.10	1.70	6.12	2.33
3	6.82	7.00	5.66	6.72	0.78	2.47	0.99
4	4.63	3.68	3.61	4.14	0.25	1.56	0.53
5	3.04	3.04	1.80	2.69	0.07	0.71	0.49
6	2.19	1.98	1.59	1.80	0.14	0.53	0.35
>7	7.39	6.04	3.92	6.43	0.04	2.44	0.42

Figure 1: Entry threshold ratios for occupations in north-western and south-eastern part of Slovakia



Remarks: ***, **, and * (ooo, oo, and o) indicate that entry threshold ratios in the south-east (in the north-west) are significantly different from one at the 1%, 5%, and 10% level, respectively.

Table 3a: Parameter estimates obtained from ordered probit model for north-western and south-eastern parts of Slovakia (for automobile dealers, electricians, plumbers, and restaurants)

	Automobile dealers			Electricians			Plumbers			Restaurants		
VARIABLES	**Slovakia**	**West**	**East**	**Slovakia**	**West**	**East**	**Slovakia**	**West**	**East**	**Slovakia**	**West**	**East**
Ln(Pop)	1.100***	1.169***	1.072***	1.029***	1.131***	0.989***	0.872***	0.993***	0.812***	1.046***	1.250***	0.967***
	(0.0310)	(0.0531)	(0.0383)	(0.0303)	(0.0539)	(0.0370)	(0.0293)	(0.0511)	(0.0359)	(0.0302)	(0.0557)	(0.0361)
Wage	4.07e-05	-0.000767	-0.000219	-0.000821***	-0.00193***	-0.000506	-0.000824**	-0.00121**	-0.00108**	-0.000699**	-0.000776	-0.00159***
	(0.000316)	(0.000548)	(0.000417)	(0.000316)	(0.000554)	(0.000412)	(0.000324)	(0.000555)	(0.000428)	(0.000312)	(0.000552)	(0.000408)
Unemp	-0.0358***	-0.0879***	-0.0210***	-0.0354***	-0.113***	-0.0393***	-0.0471***	-0.0712***	-0.0365***	-0.0290***	-0.0915***	-0.0181***
	(0.00445)	(0.0192)	(0.00545)	(0.00446)	(0.0194)	(0.00549)	(0.00468)	(0.0192)	(0.00571)	(0.00434)	(0.0193)	(0.00527)
Young	-6.061***	-0.718	-8.191***	-4.034***	-2.497**	-4.646***	-3.949***	-3.166***	-4.280***	-4.040***	-2.156*	-4.707***
	(0.655)	(1.255)	(0.819)	(0.643)	(1.200)	(0.779)	(0.671)	(1.228)	(0.820)	(0.629)	(1.244)	(0.750)
Old	-2.020***	0.137	-3.425***	-0.711	-1.558	-0.998	-2.635***	-1.873*	-3.064***	0.211	1.252	-0.397
	(0.656)	(1.119)	(0.835)	(0.645)	(1.141)	(0.793)	(0.684)	(1.135)	(0.863)	(0.608)	(1.095)	(0.738)
θ_1	4.825***	5.406***	4.108***	4.544***	3.795***	4.206***	3.146***	3.724***	2.644***	4.928***	6.078***	3.824***
	(0.420)	(0.781)	(0.531)	(0.419)	(0.766)	(0.528)	(0.428)	(0.769)	(0.545)	(0.413)	(0.780)	(0.511)
θ_2	5.684***	6.284***	4.969***	5.315***	4.592***	4.975***	3.924***	4.457***	3.452***	5.796***	6.931***	4.713***
	(0.423)	(0.786)	(0.533)	(0.421)	(0.769)	(0.530)	(0.429)	(0.772)	(0.546)	(0.415)	(0.785)	(0.513)
θ_3	6.186***	6.756***	5.505***	5.844***	5.106***	5.521***	4.454***	4.928***	4.044***	6.323***	7.467***	5.256***
	(0.424)	(0.789)	(0.535)	(0.423)	(0.771)	(0.532)	(0.430)	(0.774)	(0.548)	(0.418)	(0.789)	(0.516)
θ_4	6.590***	7.195***	5.895***	6.268***	5.529***	5.956***	4.851***	5.358***	4.428***	6.742***	7.992***	5.618***
	(0.426)	(0.791)	(0.538)	(0.425)	(0.774)	(0.535)	(0.432)	(0.776)	(0.550)	(0.420)	(0.794)	(0.518)
θ_5	6.939***	7.505***	6.300***	6.555***	5.828***	6.242***	5.195***	5.701***	4.803***	7.070***	8.314***	5.973***
	(0.429)	(0.794)	(0.541)	(0.426)	(0.776)	(0.537)	(0.434)	(0.777)	(0.554)	(0.422)	(0.797)	(0.521)
θ_6	7.225***	7.795***	6.605***	6.856***	6.183***	6.505***	5.420***	5.944***	5.022***	7.339***	8.571***	6.278***
	(0.431)	(0.796)	(0.544)	(0.428)	(0.779)	(0.539)	(0.435)	(0.779)	(0.557)	(0.424)	(0.798)	(0.524)
θ_7	7.479***	8.092***	6.826***	7.101***	6.489***	6.703***	5.671***	6.207***	5.277***	7.563***	8.809***	6.512***
	(0.432)	(0.798)	(0.547)	(0.430)	(0.782)	(0.541)	(0.437)	(0.781)	(0.560)	(0.426)	(0.800)	(0.527)
Observations	2,831	886	1,945	2,831	886	1,945	2,831	886	1,945	2,831	886	1,945
Log-likelihood	-3,600	-1,381	-2,187	-3,592	-1,316	-2,256	-3,310	-1,343	-1,946	-3,634	-1,318	-2,274
Pseudo R2	0.224	0.190	0.218	0.202	0.188	0.199	0.189	0.157	0.176	0.200	0.204	0.180

Remarks: All markets with more than seven firms are pooled in one category. Standard errors are in parenthesis. ***, **, and * indicates that parameter estimates are significantly different from zero at the 1%, 5%, and 10% level, respectively. 'West' refers to local markets in the Bratislava, Trnava, Trenčín and Žilina regions. 'East' refers to local markets in regions of Nitra, Banská Bystrica, Prešov and Košice.

Table 3b: Parameter estimates obtained from ordered probit model for north-western and south-eastern parts of Slovakia (pharmacists, doctors, and dentists)

	Pharmacists			Doctors			Dentists		
VARIABLES	**Slovakia**	**West**	**East**	**Slovakia**	**West**	**East**	**Slovakia**	**West**	**East**
Log(Pop)	1.345***	1.262***	1.416***	1.666***	1.641***	1.689***	1.637***	1.895***	1.531***
	(0.0597)	(0.0900)	(0.0812)	(0.0501)	(0.0813)	(0.0641)	(0.0600)	(0.110)	(0.0724)
Wage	-0.000390	-0.000441	-0.000677	0.000493	6.73e-05	0.000427	0.000384	0.000346	0.000137
	(0.000568)	(0.000852)	(0.000865)	(0.000426)	(0.000685)	(0.000594)	(0.000514)	(0.000833)	(0.000719)
Unemp	0.0139*	0.0262	0.0243**	0.0247***	-0.0145	0.0252***	0.0293***	0.00405	0.0241***
	(0.00805)	(0.0294)	(0.0106)	(0.00595)	(0.0230)	(0.00748)	(0.00724)	(0.0283)	(0.00898)
Young	-6.109***	-4.185	-8.201***	-4.954***	-3.062**	-6.666***	-5.320***	-4.119*	-6.431***
	(1.622)	(2.832)	(2.050)	(0.913)	(1.426)	(1.247)	(1.299)	(2.287)	(1.534)
Old	1.060	4.881**	-1.772	0.985	2.268	-0.623	-0.461	2.846	-2.672
	(1.537)	(2.242)	(2.158)	(0.991)	(1.548)	(1.354)	(1.364)	(2.144)	(1.735)
θ_1	9.976***	10.50***	9.601***	12.12***	11.90***	11.57***	12.22***	14.86***	10.50***
	(0.908)	(1.455)	(1.243)	(0.637)	(1.038)	(0.856)	(0.815)	(1.448)	(1.015)
θ_2	11.09***	11.59***	10.76***	12.90***	12.63***	12.39***	13.40***	15.97***	11.75***
	(0.919)	(1.469)	(1.261)	(0.643)	(1.047)	(0.863)	(0.827)	(1.466)	(1.030)
θ_3	11.74***	12.31***	11.35***	13.59***	13.24***	13.15***	14.04***	16.70***	12.33***
	(0.928)	(1.484)	(1.271)	(0.650)	(1.056)	(0.873)	(0.836)	(1.480)	(1.043)
θ_4	12.40***	12.86***	12.14***	14.04***	13.65***	13.64***	14.53***	17.18***	12.85***
	(0.941)	(1.501)	(1.291)	(0.656)	(1.064)	(0.881)	(0.846)	(1.493)	(1.059)
θ_5	12.87***	13.78***	12.39***	14.44***	14.05***	14.06***	14.89***	17.56***	13.20***
	(0.955)	(1.561)	(1.299)	(0.662)	(1.072)	(0.891)	(0.854)	(1.507)	(1.069)
θ_6	13.08***		12.53***	14.69***	14.35***	14.24***	15.36***	18.24***	13.53***
	(0.964)		(1.305)	(0.666)	(1.079)	(0.895)	(0.865)	(1.536)	(1.078)
θ_7	13.90***		13.48***	14.91***	14.56***	14.48***	15.84***	18.51***	14.14***
	(1.035)		(1.372)	(0.670)	(1.084)	(0.902)	(0.876)	(1.547)	(1.093)
Observations	2,831	886	1,945	2,831	886	1,945	2,831	886	1,945
Log-likelihood	-761.9	-354.5	-396.7	-1742	-717.7	-1017	-1032	-406.5	-615.1
Pseudo R2	0.367	0.293	0.415	0.348	0.299	0.374	0.396	0.392	0.399

Remarks: All markets with more than seven firms are pooled in one category. Standard errors are in parenthesis. ***, **, and * indicates that parameter estimates are significantly different from zero at the 1%, 5%, and 10% level, respectively. 'West' refers to local markets in the Bratislava, Trnava, Trenčín and Žilina regions. 'East' refers to local markets in regions of Nitra, Banská Bystrica, Prešov and Košice.

Appendix

Table A1: Per-firm entry thresholds and entry threshold ratios in Slovakia

	(1) Auto dealers	(2) Electricians	(3) Plumbers	(4) Restaurants	(5) Pharmacies	(6) Doctors	(7) Dentists
			Thresholds				
S1	488	539	692	482	2946	1305	2004
S2	1066	1140	1692	1107	6745	2084	4121
S3	1682	1906	3109	1833	10936	3153	6093
S4	2432	2877	4904	2735	17863	4130	8219
S5	3338	3803	7278	3744	25334	5251	10240
S6	4330	5095	9424	4843	29616	6102	13646
S7	5456	6465	12557	6006	54487	6963	18295
			Thresholds per firm				
s1	488	539	692	482	2946	1305	2004
	(13)	(15)	(22)	(13)	(142)	(30)	(63)
s2	533	570	846	554	3372	1042	2061
	(16)	(17)	(29)	(17)	(194)	(27)	(80)
s3	561	635	1036	611	3645	1051	2031
	(19)	(22)	(42)	(21)	(273)	(34)	(104)
s4	608	719	1226	684	4466	1033	2055
	(23)	(29)	(59)	(28)	(497)	(40)	(133)
s5	668	761	1456	749	5067	1050	2048
	(29)	(34)	(81)	(34)	(758)	(49)	(155)
s6	722	849	1571	807	4936	1017	2274
	(35)	(43)	(97)	(41)	(848)	(53)	(209)
s7	779	924	1794	858	7784	995	2614
	(41)	(52)	(125)	(48)	(2444)	(58)	(295)
			Thresholds ratios				
s2/s1	1.093	1.058	1.221	1.148	1.145	0.799	1.028
	(0.043)	(0.043)	(0.057)	(0.046)	(0.086)	(0.027)	(0.051)
s3/s2	1.053	1.115	1.225	1.104	1.081	1.009	0.986
	(0.047)	(0.051)	(0.066)	(0.051)	(0.102)	(0.042)	(0.063)
s4/s3	1.084	1.132	1.183	1.119	1.225	0.983	1.012
	(0.055)	(0.06)	(0.075)	(0.06)	(0.164)	(0.05)	(0.084)
s5/s4	1.098	1.057	1.187	1.095	1.135	1.017	0.997
	(0.063)	(0.063)	(0.088)	(0.067)	(0.212)	(0.062)	(0.099)
s6/s5	1.081	1.116	1.079	1.078	0.974	0.968	1.110
	(0.07)	(0.075)	(0.09)	(0.074)	(0.222)	(0.068)	(0.132)
s7/s6	1.080	1.088	1.142	1.063	1.577	0.978	1.149
	(0.077)	(0.082)	(0.107)	(0.081)	(0.564)	(0.076)	(0.167)
			Test ratio=1				
s2/s1 = 1	**		***	**	*	***	
Chi-sq.	4.63	1.84	15.03	10.40	2.83	53.71	0.30
s3/s2 = 1		**	***	**			
Chi-sq.	1.27	5.14	11.67	4.18	0.63	0.04	0.05
s4/s3 = 1		**	**	**			
Chi-sq.	2.34	4.94	6.00	3.92	1.88	0.12	0.02
s5/s4 = 1			**				
Chi-sq.	2.39	0.82	4.58	1.99	0.40	0.08	0.00
s6/s5 = 1							
Chi-sq.	1.34	2.40	0.77	1.10	0.01	0.22	0.70
s7/s6 = 1							
Chi-sq.	1.07	1.14	1.77	0.61	1.04	0.08	0.80

Remarks: ***, **, and * indicates that estimates are significantly different from one at the 1%, 5%, and 10% level, respectively.

Table A2a: Per-firm entry thresholds and entry threshold ratios for south-eastern and north-western regions in Slovakia for automobile dealers, electricians, plumbers, and restaurants

	Automobile dealers			Electricians			Plumbers			Restaurant		
	Slovakia	West	East	Slovakia	West	East	Slovakia	West	East	Slovakia	West	East
						Thresholds						
S1	488	362	567	539	500	569	692	511	832	482	425	530
S2	1066	768	1266	1140	1013	1238	1692	1071	2254	1107	842	1331
S3	1682	1151	2089	1906	1597	2150	3109	1722	4683	1833	1294	2335
S4	2432	1677	3009	2877	2320	3337	4904	2656	7510	2735	1971	3396
S5	3338	2187	4392	3803	3022	4456	7278	3753	11925	3744	2549	4904
S6	4330	2802	5840	5095	4138	5814	9424	4795	15642	4843	3132	6725
S7	5456	3614	7171	6465	5425	7103	12557	6250	21395	6006	3790	8568
						Thresholds per firm						
s1	488	362	567	539	500	569	692	511	832	482	425	530
	(13)	(20)	(18)	(15)	(25)	(19)	(22)	(28)	(36)	(13)	(20)	(17)
s2	533	384	633	570	507	619	846	535	1127	554	421	665
	(16)	(22)	(22)	(17)	(26)	(23)	(29)	(31)	(55)	(17)	(21)	(25)
s3	561	384	696	635	532	717	1036	574	1561	611	431	778
	(19)	(24)	(29)	(22)	(31)	(31)	(42)	(37)	(94)	(21)	(24)	(36)
s4	608	419	752	719	580	834	1226	664	1878	684	493	849
	(23)	(28)	(37)	(29)	(38)	(43)	(59)	(48)	(135)	(28)	(32)	(46)
s5	668	437	878	761	604	891	1456	751	2385	749	510	981
	(29)	(32)	(52)	(34)	(43)	(52)	(81)	(60)	(209)	(34)	(36)	(63)
s6	722	467	973	849	690	969	1571	799	2607	807	522	1121
	(35)	(37)	(66)	(43)	(55)	(65)	(97)	(69)	(260)	(41)	(39)	(83)
s7	779	516	1024	924	775	1015	1794	893	3056	858	541	1224
	(41)	(44)	(78)	(52)	(69)	(74)	(125)	(84)	(358)	(48)	(44)	(103)
						Threshold ratios						
s2/s1	1.093	1.062	1.117	1.058	1.012	1.087	1.221	1.047	1.354	1.148	0.991	1.255
	(0.043)	(0.084)	(0.053)	(0.043)	(0.073)	(0.054)	(0.057)	(0.083)	(0.089)	(0.046)	(0.069)	(0.063)
s3/s2	1.053	0.999	1.100	1.115	1.051	1.158	1.225	1.072	1.385	1.104	1.024	1.170
	(0.047)	(0.084)	(0.061)	(0.051)	(0.082)	(0.066)	(0.066)	(0.092)	(0.107)	(0.051)	(0.078)	(0.07)
s4/s3	1.084	1.093	1.080	1.132	1.090	1.164	1.183	1.157	1.203	1.119	1.142	1.091
	(0.055)	(0.1)	(0.07)	(0.06)	(0.095)	(0.079)	(0.075)	(0.111)	(0.112)	(0.06)	(0.098)	(0.077)
s5/s4	1.098	1.043	1.168	1.057	1.042	1.068	1.187	1.130	1.270	1.095	1.035	1.155
	(0.063)	(0.103)	(0.09)	(0.063)	(0.101)	(0.084)	(0.088)	(0.121)	(0.144)	(0.067)	(0.098)	(0.097)
s6/s5	1.081	1.068	1.108	1.116	1.141	1.087	1.079	1.065	1.093	1.078	1.024	1.143
	(0.07)	(0.114)	(0.1)	(0.075)	(0.123)	(0.097)	(0.09)	(0.125)	(0.145)	(0.074)	(0.105)	(0.112)
s7/s6	1.080	1.106	1.053	1.088	1.124	1.047	1.142	1.117	1.172	1.063	1.037	1.092
	(0.077)	(0.128)	(0.108)	(0.082)	(0.134)	(0.104)	(0.107)	(0.143)	(0.18)	(0.081)	(0.114)	(0.123)
						Test ratio=1						
s2/s1 = 1	**		**				***		***	**		***
Chi-sq.	4.63	0.55	4.91	1.84	0.03	2.62	15.03	0.32	15.89	10.40	0.02	16.40
s3/s2 = 1				**		**	***		***	**		**
Chi-sq.	1.27	0.00	2.70	5.14	0.38	5.71	11.67	0.61	12.93	4.18	0.10	5.91
s4/s3 = 1				**		**	**		*	**		
Chi-sq.	2.34	0.86	1.31	4.94	0.89	4.35	6.00	2.00	3.26	3.92	2.12	1.38
s5/s4 = 1			*				**		*			
Chi-sq.	2.39	0.18	3.46	0.82	0.17	0.67	4.58	1.16	3.53	1.99	0.12	2.59
s6/s5 = 1												
Chi-sq.	1.34	0.35	1.16	2.40	1.31	0.82	0.77	0.27	0.41	1.10	0.05	1.62
s7/s6 = 1												
Chi-sq.	1.07	0.68	0.24	1.14	0.85	0.21	1.77	0.68	0.91	0.61	0.11	0.56

Remarks: ***, **, and * indicates that estimates are significantly different from one at the 1%, 5%, and 10% level, respectively. 'West' refers to local markets in the Bratislava, Trnava, Trenčín and Žilina regions. 'East' refers to local markets in regions of Nitra, Banská Bystrica, Prešov and Košice.

Table A2b: Per-firm entry thresholds and entry threshold ratios for south-eastern and north-western regions in Slovakia for pharmacies, doctors, and dentists

	Pharmacies			Doctors			Dentists		
	Slovakia	**West**	**East**	**Slovakia**	**West**	**East**	**Slovakia**	**West**	**East**
				Thresholds					
S1	2946	2963	2991	1305	1430	1254	2004	2146	1991
S2	6745	7027	6780	2084	2245	2037	4121	3856	4504
S3	10936	12432	10285	3153	3256	3195	6093	5667	6578
S4	17863	19223	17968	4130	4180	4270	8219	7301	9239
S5	25334	39850	21438	5251	5334	5475	10240	8922	11612
S6	29616		23666	6102	6404	6091	13646	12774	14405
S7	54487		46291	6963	7278	7021	18295	14730	21456
				Thresholds per firm					
s1	2946	2963	2991	1305	1430	1254	2004	2146	1991
	(142)	(198)	(198)	(30)	(50)	(38)	(63)	(82)	(91)
s2	3372	3514	3390	1042	1123	1018	2061	1928	2252
	(194)	(286)	(268)	(27)	(44)	(34)	(80)	(91)	(129)
s3	3645	4144	3428	1051	1085	1065	2031	1889	2193
	(273)	(482)	(336)	(34)	(52)	(47)	(104)	(123)	(166)
s4	4466	4806	4492	1033	1045	1067	2055	1825	2310
	(497)	(802)	(694)	(40)	(59)	(58)	(133)	(150)	(222)
s5	5067	7970	4288	1050	1067	1095	2048	1784	2322
	(758)	(2618)	(763)	(49)	(72)	(73)	(155)	(175)	(256)
s6	4936		3944	1017	1067	1015	2274	2129	2401
	(848)		(758)	(53)	(82)	(73)	(209)	(288)	(299)
s7	7784		6613	995	1040	1003	2614	2104	3065
	(2444)		(2180)	(58)	(87)	(81)	(295)	(321)	(487)
				Threshold ratios					
s2/s1	1.145	1.186	1.134	0.799	0.785	0.812	1.028	0.898	1.131
	(0.086)	(0.125)	(0.117)	(0.027)	(0.041)	(0.037)	(0.051)	(0.055)	(0.083)
s3/s2	1.081	1.179	1.011	1.009	0.967	1.046	0.986	0.980	0.974
	(0.102)	(0.167)	(0.127)	(0.042)	(0.06)	(0.058)	(0.063)	(0.079)	(0.092)
s4/s3	1.225	1.160	1.310	0.983	0.963	1.002	1.012	0.966	1.053
	(0.164)	(0.236)	(0.24)	(0.05)	(0.072)	(0.07)	(0.084)	(0.101)	(0.129)
s5/s4	1.135	1.658	0.954	1.017	1.021	1.026	0.997	0.978	1.005
	(0.212)	(0.611)	(0.225)	(0.062)	(0.09)	(0.088)	(0.099)	(0.125)	(0.147)
s6/s5	0.974		0.920	0.968	1.000	0.927	1.110	1.193	1.034
	(0.222)		(0.241)	(0.068)	(0.102)	(0.091)	(0.132)	(0.199)	(0.172)
s7/s6	1.577		1.677	0.978	0.974	0.988	1.149	0.988	1.277
	(0.564)		(0.64)	(0.076)	(0.111)	(0.107)	(0.167)	(0.202)	(0.258)
				Test ratio=1					
s2/s1 = 1	*			***	***	***		*	
Chi-sq.	2.83	2.22	1.30	53.71	27.10	25.84	0.30	3.47	2.50
s3/s2 = 1									
Chi-sq.	0.63	1.15	0.01	0.04	0.31	0.61	0.05	0.06	0.08
s4/s3 = 1									
Chi-sq.	1.88	0.46	1.67	0.12	0.27	0.00	0.02	0.11	0.17
s5/s4 = 1									
Chi-sq.	0.40	1.16	0.04	0.08	0.05	0.09	0.00	0.03	0.00
s6/s5 = 1									
Chi-sq.	0.01		0.11	0.22	0.00	0.64	0.70	0.94	0.04
s7/s6 = 1									
Chi-sq.	1.04		1.12	0.08	0.05	0.01	0.80	0.00	1.15

Remarks: ***, **, and * indicates that estimates are significantly different from one at the 1%, 5%, and 10% level, respectively. 'West' refers to local markets in the Bratislava, Trnava, Trenčín and Žilina regions. 'East' refers to local markets in regions of Nitra, Banská Bystrica, Prešov and Košice.

Table A3: Estimates from Tobit model

VARIABLES	(1) Auto dealers	(2) Electricians	(3) Plumbers	(4) Restaurants	(5) Pharmacies	(6) Doctors	(7) Dentists
Pop	**0.00260*** **	**0.00254*** **	**0.00208*** **	**0.00274*** **	**0.00146*** **	**0.00311*** **	**0.00158*** **
	(0.000103)	(0.000108)	(9.51e-05)	(0.000119)	(9.65e-05)	(0.000132)	(7.83e-05)
Pop^2	**-2.04e-08** **	**-7.64e-08*** **	**-8.99e-08*** **	**-1.06e-08**	**-7.26e-08*** **	**-7.10e-08*** **	**-6.41e-08*** **
	(1.04e-08)	(1.09e-08)	(9.54e-09)	(1.20e-08)	(7.87e-09)	(1.21e-08)	(6.70e-09)
Wage	**0.00123**	**-0.000897**	**-0.000849**	**-0.000765**	**0.000173**	**0.00230* **	**0.00109**
	(0.000947)	(0.000991)	(0.000890)	(0.00109)	(0.000892)	(0.00124)	(0.000728)
Unemp	**-0.130*** **	**-0.118*** **	**-0.141*** **	**-0.119*** **	**0.00727**	**0.0364** **	**0.0224** **
	(0.0134)	(0.0140)	(0.0129)	(0.0153)	(0.0125)	(0.0170)	(0.0101)
Young	**-17.03*** **	**-13.00*** **	**-11.04*** **	**-13.30*** **	**-8.990*** **	**-15.24*** **	**-6.744*** **
	(1.920)	(1.986)	(1.806)	(2.160)	(2.285)	(2.558)	(1.657)
Old	**-10.69*** **	**-10.32*** **	**-12.51*** **	**-5.796*** **	**-1.687**	**-4.984** **	**-2.796* **
	(1.784)	(1.861)	(1.753)	(1.924)	(1.933)	(2.449)	(1.613)
Constant	**4.365*** **	**4.726*** **	**5.278*** **	**3.373*** **	**-2.481** **	**-4.375*** **	**-2.873*** **
	(1.047)	(1.093)	(0.989)	(1.192)	(1.072)	(1.375)	(0.854)
Sigma	**3.122*** **	**3.262*** **	**2.833*** **	**3.623*** **	**1.700*** **	**3.117*** **	**1.557*** **
	(0.0573)	(0.0621)	(0.0583)	(0.0664)	(0.0827)	(0.0865)	(0.0594)
Observations	2,829	2,829	2,829	2,829	2,829	2,829	2,829
Log Likelihood	-4737	-4642	-4020	-4975	-920.3	-2339	-1240
R^2	0.204	0.157	0.154	0.177	0.306	0.287	0.349

Remarks: ***, **, and * indicates that estimates are significantly different from one at the 1%, 5%, and 10% level, respectively.

The Tobit model includes population (Pop) and population squared (Pop^2) as explanatory variables in order to account for non-linearity in the relation with number of firms. Estimated parameters for population are significant both for levels and squared values. The signs are positive for population and negative for population squared which indicates that a disproportional increase in the number of population is necessary for new entrants to break even. Wages are not statistically significant (an exception are doctors). Parameters for unemployment are significantly different from zero for most professions. Similarly, the shares of young and older people exert an impact on the endogenous variable which is significantly different from zero.