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Firm-level intra-industry links in Croatia's tourism industry*[1]

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Abstract

In this paper we investigate firm level activity in Croatian tourism industry. Our analysis is based on the sample of more than 10,000 firms obtained from Bureau van Dijk database for the period 2006-2015. Theoretical basis of our paper is the Gibrat's law, which states that firm size and growth rate are independent of each other. Within tourism industry, we differentiate between supporting divisions and the main industry division (accommodation industry), and test the Law on firms in supporting divisions using modified hybrid estimator. In that way, we add to the existing field of knowledge in two ways: through analysis and quantification of intra-industry links within the Law's framework and by employing hybrid estimator originally developed by Mundlak, which is a novelty in this field of research. Although, our findings do not confirm the Law, we are able to discern supporting tourism industry divisions whose growth is highly determined by the growth of accommodation industry.

Key words: *industrial organization, tourism industry, Gibrat's law*

JEL classification: *L16, L83*

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1. Introduction

The applied industrial organisation is mostly focused on explaining firm's growth. Firm's growth relates to and affects market structure and vice versa, market structure affects firm's growth (causing endogeneity problem when doing applied research). Moreover, firm's growth relates to/affects firm's survival chances, structure of employment, innovation and technological changes and serves as a signal for policy makers in decision making process. Since the welfare of a society is correlated with economic growth and development, and since firms are the most important generators of national welfare, research and explanation of firm's growth has been extensive throughout the years. Focus of this paper is on service sector of Croatia, that is, its tourism industry. Reason for choosing service sector in general is its growing importance in post-transition and developed economies in the 21th century, while the reason for choosing tourism industry is the fact that Croatia is in group of countries where tourism in one of the pillars of economic growth and development.

The role of tourism as a driver of economic development has been widely recognized. Data from The World Travel and Tourism Council (2017) show that Travel and Tourism contribution to world GDP is growing continuously and has reached 9.8% of world GDP in 2015, while it employs around 9% of the global workforce. Tourism industry, as a part of service sector, has key role in Croatian economy as well; it makes up around 18% of Croatian GDP and supports 9.8% of domestic labour force. Expenditures of the tourists have direct impact on the sales revenues of firms oriented primarily on the tourism (e.g. in accommodation), but also an indirect effect on other firms, since an increase in revenues of the firms in tourism industry will increase purchases of goods and services from second tier firms and second tier firms will increase their purchases from third tier firms etc. (tourism multiplier effect). Thus, although usual statistical publications contain data on tourism arrivals and overnights, the impact of tourism activities on these n-tier industries and firms (henceforward supporting industries and supporting firms) is more important for the domestic value added and for domestic economy in general. In our paper we empirically test the impact of accommodation industry division growth on supporting industry divisions within tourism industry, while the theoretical bedrock of the paper is Gibrat's law (Gibrat, 1931). However, the aim of our research is not only to test Gibrat's law, but to identify linkage between growth of different industry divisions within tourism industry in Croatia.

Gibrat's law or the Law of Proportional Effect (hereinafter the Law) simply states that the expected value of the increment to a firm's size in each period is proportional to the current size of the firm (Sutton, 1997). Moreover, Sutton explains that the Law holds only for some industries with particular market structure. Thus, in our paper we test augmented Gibrat's law on supporting tourism industry divisions while controlling for effects of main industry division growth

(Accommodation, division 55 of NACE classification). We argue that with the inclusion of the growth variable we add value to the empirical test of the Law for the case of tourism industry. We are focusing on tourism industry because the numerous papers have dealt with it, especially in the context of testing the Law, but without considering its idiosyncrasies, the most important one being the gravitational force of the accommodation industry. Papers were mostly focused on different determinants of firm's growth. Determinants of firm's growth, other than its size, include age, growth opportunities usually proxied by intangible assets, cash flow, debt, interest paid, government subsidies and labour productivity (Serrasquieiro and Macas Nunes, 2016: 376), and the list is not finite. In this paper, we minimize the number of explanatory variables to avoid doing "kitchen sink" regression and focus only on the most important structural variables of the firm in the context of firm's growth – growth of sales/sales, and age of the firm.

Second chapter continues with the literature review. Methodology is explained in third chapter, while empirical data and analysis are given in fourth chapter. Chapter five is reserved for the results discussion and we conclude and suggest guidelines to future research in chapter six.

2. Literature review

Theory on the growth of the firm is an open set, which includes neoclassical theory of optimal size of the firm and continues with the Gibrat's Law, Penrose theory, Marris theory, evolutionary economics approach inspired by Schumpeter etc. (Coad, 2009). Many papers have tested the Law on different samples, but as far as we know, none of those papers tested the Law on the supporting firms of the tourism industry in post transition countries. In general, the Law has mostly been rejected, but various studies have found that the Law is valid for certain subsamples or time periods. Therefore, the main research question of this paper is whether the Law is valid for the Croatian supporting firms of the tourism industry as the tourism makes a great share of Croatian GDP and given that the supporting firms of the tourism industry are one of the driving forces of Croatian economy. Answering this question can help us to empirically substantiate the claim that the accommodation sector is the center of the gravity for service sector in countries oriented to tourism.

Understanding the mechanism of firm's growth is still one of the important topics in economic literature and numerous papers tried to test whether there exists statistically significant relationship between the growth rate of a firm and its initial size. In 1931 Robert Gibrat gave a fundamental contribution to this debate known as the Gibrat's Law, where he stated that the growth rate of a firm is independent of its size. Moreover, he concluded that the distribution of firm's size which can be measured by sales and number of employees of firms, could be well approximated with a lognormal distribution, the reason being the nature of the firm's growth process, that is multiplicative and independent of the size (González-Val et al., 2010). The theory continued to receive much attention in the theoretical and empirical literature and many authors tested the validity of the Law, especially in 1960s and 1970s. According to Teruel-Carrizosa (2010) the market structure in 1960s was mainly controlled by a small number of firms, that is why earlier studies based on small subsamples of well-established and large firms tended to reject the Law, namely that large firms grow more than small ones. Furthermore, he argues that firms in service sector will grow slower than firms in manufacturing sector, because of difficulty to achieve economies of scale in former case.

In 1997 Sutton made an overview of the Law and related research. In his paper Gibrat's Legacy, he reinterprets Gibrat's original idea and writes that "expected value of the increment to a firm's size in each period is proportional to the current size of the firm". Considering this interpretation, it is important to differentiate between the absolute and relative growth. Hence, the Law states only that the relative growth is independent of the firm's size. The considerable literature has rejected the Law, but majority of the studies analyzing the validity of the Law were focused on manufacturing rather than the service sector. Most of the testing based on manufacturing sector rejected the Law while the research based on service sector is showing mixed results.

Santarelli (1997) tested the Law on the sample of entire Italian hospitality sector which consists largely of family-owned and independent businesses and found out that Gibrat's Law holds in most regions. Audretch et al. (2004) tested the Law on Dutch firms in the hospitality industry which, as well as in Italian example, mostly consist of family-owned and independent businesses and the results suggest that in most cases growth rates are independent of firm size. It is important to point out that the Dutch hospitality industry is similar to other EU countries such as Greece, Italy, Portugal and Spain.

Audretch et al. (2004) indicated and later Serrasquiero and Macas Nunes (2016) confirmed the evidence of rejecting the Law when hotel sector firms are small and as well they have found a negative linear relationship between age and growth in hotels, which led them to the conclusion that younger hotels grow more quickly than older ones. In the same paper, Serrasquiero and Macas Nunes (2016) confirmed that the impact of both size and age on the growth of hotels in Portugal hospitality industry is not statistically significant, which means that hotels which are concurrently smaller and younger do not grow more quickly than hotels which are concurrently older and larger.

Several authors have tested the Law on various sub-samples on the Spanish tourist industry and most of them got similar results. Rufin (2007) tested the Law on all Spanish firms connected to the tourism. His sample included 1131 surviving firms during observed period. In the sub-sample, he included hotels, camps, restaurants, travel agencies, road transport firms etc. He tested the relationship between firm size and sales growth rate. Results showed a negative dependent relationship between initial firm size (when measured in terms of initial sales) and the sales growth rate accumulated in the following four years. Moreover, the results indicate that in Spanish tourist industry two groups of firms are present and are differentiated by a "threshold" size (when size is measured in sales terms). According to Rufin (2007), firms included in the testing which were above threshold level, grew at an importantly lower rate than firms below it. Oliveira and Fortunato (2008) tested if Gibrat's Law can be rejected for the Portuguese services sector as it has been for manufacturing sector. The sample included all size firms in the period from 1995 to 2011. The Law was rejected, and the results indicate that firm growth is mainly explained by firm's age and size.

Piergiovanni et al. (2003) tested the Law on a large sample composed only by new-born firms in five business groups; hotels, camps, restaurants, cafes and cafeterias. The Law was rejected in three out of five business groups. The results for the cafeterias and the camping sites sub-sectors showed that size and growth were statistically independent. In the sample, which included only surviving firms, the Law was valid for the camping sites, but was rejected for the rest of the business groups. However, the paper suggests that smaller firms which entered the market, at the beginning rush to achieve a size comparable to that of larger firms, while afterwards they have random growth rates, which means that the results tend to be in favor of the Law over long term, once the firm achieve certain threshold in terms of size and age. Moreover, as a firm grows in size, it is possible that it loses flexibility and organizational efficiency which means it is more difficult for large firms to grow faster than the small ones (Kwangmin and Jinhoo, 2010).

The Law can be very useful in explaining firm growth patterns in the tourism industry. Rufin (2007) argue that it might be that the hotels which are not integrated into large chains belong to a specific market segment essential to the tourist destination where they are located. In addition, the growing market share of hotel chains within the hotel sector in Spain advocate that a specific location and product differentiation alone are not enough for hotels to compete (Devesa et al., 2013). Having that in mind, the hotel industry in Croatia grew both in activity and productivity over the last ten years. Ivandić (2015) gave the contribution to the existing field of knowledge by testing the Law on the population of Croatian hotel companies and rejected the Law by showing that smaller companies grow more rapidly than larger ones, distinguishing between private and state-owned firms. Results not surprisingly show that growth varies, depending on firm ownership, were slower growth is observed in state-owned firms. Nonetheless, most of the studies testing the Law in tourism industry were generally oriented to developed countries, whilst the studies testing the Law on the tourism industry firms in post transition countries are rare.

As far as we know, this is this first time that an analysis of the Law is tested on all divisions of tourism industry defined by UNWTO classification (industry divisions according to Statistical classification of economic activities in the European Community, hereinafter NACE Rev. 2). Moreover, we single out division 55 (Accommodation) as a main industry division and include year-on-year growth of it as a regressors. We test the effects of tourism accommodation industry on all tourism supporting industries and we believe that this is the most important contribution of our paper to the existing literature in this field.

3. Methodology

Basic approach to testing of the Law is quite simple. Since the Law assumes that:

$$x_{it} - x_{i,t-1} = \varepsilon_{it} x_{i,t-1} \tag{1}$$

Where x_{it} is the size of firm i in period t, $x_{i,t-1}$ is its size in period t–1 and ε_{it} is a stochastic shock that determined the firm growth rate between two periods, one needs to test the following simple model:

$$\ln x_{it} = \beta_0 + \beta_1 \ln x_{i,t-1} + \varepsilon_{it} \tag{2}$$

If $\beta_1 = 1$, then we can safely conlude that the Law holds, and if $\beta_1 \neq 1$, we reject the Law. We build on the equation (2), while following modern econometric approaches to our problem. Morover, if the coefficient is smaller than 1, we say that smaller firms are growing faster, while if coefficient is bigger than 1, we say that larger firms are growing faster than smaller ones.

Standard approach in econometric modelling of panel data includes employing either pooled ordinary least squares (POLS), fixed effects (FE) or random effects (RE) estimator. The trilemma is regularly solved as follows: first, one uses Breusch-Pagan LM test to distinguish between POLS and RE. Since, constant variance under H_0 of B-P test is practically never a reality (as it was in our case), one goes further and employs Hausman test (often forgetting restrictiveness of the test, for example, use of standard errors not corrected for heteroskedacity, that is by default used in statistical software packages, e.g. Stata) to test whether H_0 holds, that is, whether both FE and RE estimators are consistent, but RE is more efficient. Regularly (again, this proved to be the case in this paper), Hausman indicates that RE is not consistent and that FE should be used to obtain consistent estimates. More about these issues can be found in Dieleman and Templin (2014).

If we were to use standard approach in aforementioned process of econometric modelling, the basic econometric model could be the following:

$$growth_{it} = \beta_0 + \beta_1 sales_{it} + \beta_2 age_{it} + \beta_3 g\_aals_t + a_i + \lambda_t + u_{it} \tag{3}$$

It should be noted that equation (3) is basically a regression model with two-way error components. More and more researchers turn static equation (3) in dynamic one by including lagged dependent variable and apply dynamic panel data estimators (like generalized method of moments, GMM). We use GMM only as a robustness check, since estimates obtained with GMM estimator tend to vary a lot with the change in the number of instruments in the case of unbalanced panel data and therefore it is difficult to explain why someone uses exact *k* instruments or only two lags etc., that is, it leaves a lot of room for manipulation with the results. Also, lagged values of the independent variables are weak instruments. In our paper, we follow another estimation approach, as it will be discussed further on.

Since in this paper we wanted to test not only Gibrat's law in tourism industry (Serrasquieiro and Macas Nunes, 2016; Ivandić, 2015), but an augmented version of the model, that in our case includes accommodation industry growth variable, standard FE was not an option, because growth values are equal within year for each of the firms in supporting industries and therefore are wiped out in the process of within transformation of the data due to perfect collinearity. We could use RE, but that would be going against the results of the Hausman test (which, according to Clark and Linzer (2014) in some cases is not a problem if we are willing to sacrifice unbiasedness for efficiency; the results of the Hausman test are available upon request). Thus, to get the unbiased and consistent results (in theory) together with the effect of (exogenous) accommodation industry growth, we decided to use within-between estimator (hereinafter hybrid estimator, HE) that was originally proposed by Mundlak (1978). With HE, we basically estimate transformed and augmented equation (1) with random effects while keeping unbiasedness and consistency of FE estimator. Here, we present modified version of the original Mundlak's model:

$$growth_{it} = \alpha + \beta(l.X_{it} - \overline{X_{i.}}) + \delta\overline{X_{i.}} + \lambda_t + v_{it} \tag{4}$$

where growth is calculated as annual sales growth of the firm *i* (measured as the difference in log values between sales in years *t* and *t-1*), first right-hand side (RHS) term is a constant, while second is a matrix made of three variables (see equation (3)). Observations of the variables were transformed by using within transformation of the one-year lagged sales (sales), age of the firm (age) and growth of the accommodation industry (g_aals). Third RHS term ($\overline{X_{i.}}$) is a panel unit-level mean of each of the regressors. Fourth term (λ_t) present dummy variable for each year within 2006-2015 period and it is included to control yearly aggregate effects. The last term, v_{it} is the composite error term that includes unobservable individual-specific effect (a_i from equation (3)) and the remainder disturbance that varies across individuals and time (u_{it} from equation (3)). We clustered on the panel unit (firm) and used heteroskedasticity consistent standard errors which results in estimates that are robust to cross-sectional heteroscedasticity and serial correlation.

Since both deviations from the panel-level means and panel-level means are estimated in equation (4), the obtained estimate β (in our case there are 3 βs, since we have 3 regressors) is orthogonal to the panel-level means. This means that we need to “remove” between effect (obtained from estimating panel-level means) from within effect and this can be done simply with subtracting between from within effect. So, from each β_k (k = 1,2,3) we subtract δ_k (Dieleman and Templin, 2014). As a robustness check, we estimate equation (3) with both FE and RE estimator. Results of these estimations are presented in the Appendix (Table A2 and A3). Moreover, we transform the static econometric model presented in (3) into dynamic one and employ system GMM estimator. We use difference in sales and lagged values of sales as variables for GMM style instruments, while we us age of the firm and time fixed effects as standard instruments. More about theoretical aspects of system GMM estimator and application of the estimator in Stata statistical software can be found in Roodman (2009), while empirical application can be found in Zajc Kejžar et al. (2016).

4. Empirical data and analysis

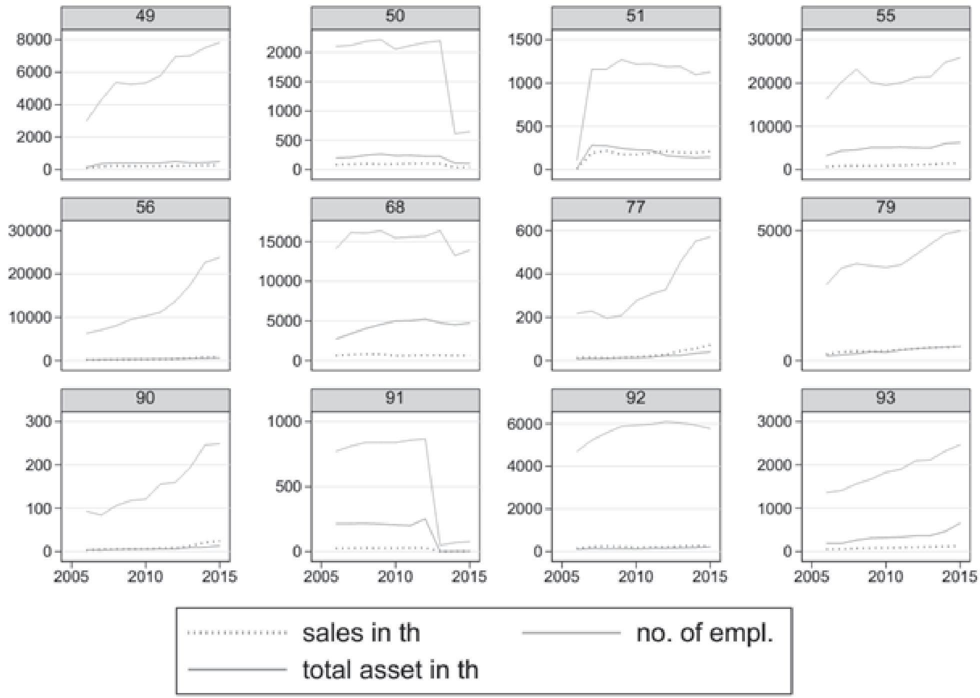
4.1. Empirical data

For our research, we followed United Nations World Tourism Organization (UNWTO) classification of industries that constitute tourism industry (International Recommendations for Tourism Statistics 2008). Altogether, 12 tourism divisions form tourism industry. Since classification of tourism industries by UNWTO follows NACE, we also distinguish 35 industry classes within 12 industry divisions (Table A1 in Appendix contains list and descriptive statistics of industry classes according to the NACE Rev. 2). Furthermore, divisions 49-51 normally include data for both, passenger and freight transport, however, we use only passenger transport data in our sample (as can be seen in Table A1 in Appendix). Firm-level data for firms registered in one of the 35 industry classes was obtained from BvD Amadeus database. We obtained financial data for Croatian firms for 2006-2015 period. Our data contains only active firms that have at least one employee during considered period.

Following descriptive statistics is based on data of 35 industry classes aggregated on 12 industry divisions. It includes only the classes related to tourism and passenger transport and excludes freight transport.

From Figure 1, we can see prevailing positive trend of the employment variable for most industry divisions, while the trend regarding sales and assets size are relatively stagnant throughout the period.

Figure 1: Aggregate sales, no. of employees and total assets across industry divisions



Source: Author's calculations

Table 1 contains descriptive statistics across industry divisions; first column shows the average (μ) number of firms throughout the observed period while the second column shows the average number of employees in firms within industry classes. Third and fourth columns show average sales and average EBITDA in firms within industry classes in thousands of euros.

Table 1: Descriptive statistics of tourism industry divisions

NACE	Description	No. of comp. (μ)	Empl. (μ)	Sales (μ, in th.)	EBITDA (μ, in th.)
49	Land transport and transport via pipelines	169.7	36	1343.577	245.2932
50	Water transport	98.5	25.38	1103.532	200.4258
51	Air transport	14.7	75.32	12348.12	997.8171
55	Accommodation	660.3	35	1592.665	419.0901
56	Food and beverage service activities	1823.4	7.45	226.9796	24.4515
68	Real estate activities	785	23.62	1074.047	320.4091
77	Rental and leasing activities	77.2	4.70	357.11	42.84793
79	Travel agency, tour operator reservation service and related activities	632.1	6.54	659.1721	30.99776
90	Creative, arts and entertainment activities	56.6	2.93	168.3319	16.90302
91	Libraries, Archives, museums and other cultural activities	5.4	111.82	3577.74	880.1248
92	Gambling and betting activities	43.3	132.67	5091.66	1098.445
93	Sport activities and amusement and recreation activities	158	13.43	612.3706	209.1264

Source: Author's calculations

Data from Table 1 clearly indicate that the Accommodation division, especially industry class 5510 (Hotels and similar accommodation, as can be seen from the Table A1 in Appendix) is the driving force of the tourism industry. If we consider the average number of firms in this class, as well as the average number of employees, connect it with the EBITDA and compare it with other industry classes, the dominance of the 5510 class is obvious. This is the reason for considering it a driver force of Croatian tourism industry.

4.1. Empirical analysis

Results of the estimation of the hybrid estimator (equation 4) are shown in Table 2. When we compare the sizes of the estimates obtained with HE with FE (Appendix: Table A2), we see that they are not significantly different (after adjustment for the between effect as discussed in methodology section). Signs and sizes of estimated coefficients, especially the sign and size of the lagged values of sales, show that the Law is not supported by the data at hand. Results of the robustness check - GMM estimation (Appendix: Table A4), confirm the results of the main model.

Regarding the importance of age for the firms' growth, results show it to be largely insignificant and mildly negative, although our sample contains predominantly younger firms, the average age of the firms being 10 years. This result neither supports nor rejects the Law, although negative relationship between age of the firm and growth is favourable to the rejection of the law. We also find it interesting that the coefficient of the lagged values of the variable age is most of the cases the same size as in Serrasquiero and Macas Nunes (2016), although their sample included only small and medium-sized hotels (as opposed to our study of supporting industries).

From estimated coefficients of the growth of the main industry division variable (*aals*), we can see that for 4 out of 11 industry divisions, both quasi-within (it is plain from the Methodology chapter why we call it quasi) and between estimator are significant, which means that their sign and strength can be interpreted. For example, with the significance level of 1% we can say that 1% increase in the growth of accommodation industry increases growth of sales of firms within industry division 56 (Real estate activities, see Table 1 for description of industry divisions) by ((-1.278-(-2.900)=1.622%). Analogously, we observe positive and significant effects of accommodation industry on division 56 (Food and beverage service activities), 79 (Travel Agency, tour operator reservation service and related activities), 92 (Gambling and betting activities). We argue that with the inclusion of the *aals* we augment on the empirical analysis of the Law within tourism industry.

Our results hold different robustness checks. We estimate the equation (3) on various subsamples of the original sample. We tried eliminating firms younger than 10 years, since according to the mainstream theories of firm's growth, the Law applies to the firms that are large enough to have overcome the minimum efficient scale of production. Signs and sizes of coefficients estimated on that subsample were in line with those of the full sample. Furthermore, we subsampled the original sample by only keeping the firms that where in the original sample throughout the observed period, thus creating a balanced panel. Signs and sizes of the coefficients where same as in the original sample, except for the size of the lagged value of sales. Its value was consistently lower by 15% on average so we argue that the qualitative interpretation rests the same as for estimations on the original sample.

Table 2: Result of the estimation of equation (2) with the hybrid estimator

	(49)	(50)	(51)	(56)	(68)	(77)	(79)	(90)	(91)	(92)	(93)
Variables	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales
L.wb_lnsales	-0.588***	-0.762***	-0.608***	-0.731***	-0.864***	-0.791***	-0.660***	-0.908***	-0.508***	-0.503***	-0.637***
	(0.0725)	(0.0925)	(0.118)	(0.0211)	(0.0280)	(0.0805)	(0.0451)	(0.0744)	(0.111)	(0.160)	(0.0577)
L.wb_age	-0.0306	-0.0390	-0.111	-0.0143**	-0.0419***	-0.0108	-0.0295**	-0.0390	0.0622	-0.312**	0.00976
	(0.0202)	(0.0389)	(0.102)	(0.00580)	(0.0109)	(0.0238)	(0.0136)	(0.0415)	(0.0693)	(0.152)	(0.0241)
L.wb_d_aals	-1.662**	-1.371	-5.007	-1.736***	-1.152***	0.0827	-1.221**	-1.067	1.394	-10.88*	-0.810
	(0.811)	(0.928)	(4.052)	(0.194)	(0.396)	(0.800)	(0.534)	(1.422)	(2.195)	(5.753)	(0.924)
lnsales_t_avg	-0.0200	0.00716	0.00358	-0.00927**	0.00860	0.00234	0.0151**	0.0456	0.100	0.0486*	0.00438
	(0.0158)	(0.0153)	(0.0300)	(0.00470)	(0.00548)	(0.0176)	(0.00623)	(0.0322)	(0.0636)	(0.0294)	(0.00950)
age_t_avg	-0.0027**	-0.000896	-0.0108	-0.00952***	-0.00656***	-0.0180***	-0.00877***	-0.00851	-0.0139*	0.00743	-0.00710*
	(0.00133)	(0.00195)	(0.0146)	(0.000865)	(0.00139)	(0.00355)	(0.00216)	(0.00585)	(0.00739)	(0.00852)	(0.00365)
d_aals_t_avg	1.928	-4.254*	-1.376	-2.404***	-2.627***	-0.747	-1.928*	1.769	-0.812	-13.89*	-0.452
	(1.675)	(2.213)	(3.377)	(0.413)	(0.830)	(1.919)	(1.017)	(2.716)	(6.690)	(7.810)	(2.081)
Constant	0.362	0.784**	1.201*	0.787***	0.605***	0.407	0.534***	0.0525	-0.265	2.589**	0.366
	(0.258)	(0.327)	(0.671)	(0.0635)	(0.115)	(0.280)	(0.143)	(0.345)	(0.875)	(1.288)	(0.281)
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,073	601	100	9,825	4,999	435	4,162	302	39	335	942
Number of id	211	133	17	2,084	1,201	104	770	66	8	50	191

Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

Source: Author’s calculations

5. Results and discussion

Overall, our results show that linkages between growth of particular industry division within tourism industry in Croatia, mainly the impact of the growth of the accommodation division on the growth of the firms within other tourism divisions, is not quite as strong as we anticipated. Although for the case of Croatia, to the best of our knowledge, there is no research on this topic that we could use as a benchmark, while studies in other countries have indicated positive effects. In USA, Kim and Kim (2015) used input-output analysis to identify the economic structure of relations between the accommodation industry and other industries for the case of Texas. They found that the accommodation industry had significant impact on the economy of Texas through output, income and employment increase. Obviously, their research is not directly comparable due to different methodology but shows the overall significance of the accommodation industry for an economy. Obviously, in the case of small open economy with predominant industry being tourism like Croatia is, we expect that these effects should be even stronger, that is, spillover effects should be significant. Pratt (2015) quantified these effects for small island developing states (SIDS). His results showed that small countries with predominant tourism sector can get caught up in so-called Dutch Disease, where productive resources are drawn into booming sector (tourism) from other sectors (mainly manufacturing). Although economy of Croatia is structurally quite different from SIDS countries, strong specialization in tourism industry and relatively slow development of other industries in Croatia is noticeable. What is even more troublesome, in SIDS countries tourism industry is a pull factor for transport industry, while our results for the case of Croatia don't show any significant between growth in accommodation industry and growth of firms operating in transportation sector.

When it comes to the Gibrat's Law, our results show that average growth of the firms is independent from their size. That indicates that idiosyncrasies within industry divisions and firms affect firms' growth. Apart from the firm's size, we included age as a variable with potential significant impact on growth. Yet, our results showed that for the case of Croatia and its tourism industry, age of the firms does not determine their growth rate. Results of the other empirical studies dominantly show that smaller firms tend to have higher growth rates, that is, that there is negative correlation between age and growth rate. Again, existing results cannot be used as a benchmark in our case since there are no published studies conducted on firms in tourism sector using UNWTO classification.

One of the limitations of our study is that we focused only on firm-level data, without considering input-output analysis which can be used as a starting point in this type of research (intra-industry links). One can start from input-output tables and then extend them into a detailed account using firm-level data. In this respect, our research can be considered as a founding block for future research in this field.

6. Conclusions

From Gibrat's original paper back in 1931, there have been numerous attempts of testing whether the Law holds within different industries. Mostly, these papers were concerned only with proving or disapproving the Law, without giving enough attention to the idiosyncrasies across industries while doing so. Our paper tries to rectify the previous research methodology in the case of tourism industry on the sample of Croatian firms. Regarding technical part of our research, we used modified HE, first developed by Mundlak to avoid common pitfalls associated with FE and RE estimators. Results of our estimations were clearly against the Law across all industry divisions. Our estimates proved to be robust when we modified the original sample to test whether attrition affects the findings.

Aim of our research was not only to test the Law, but to observe whether there is significant link between growth of different industry divisions within tourism industry in Croatia, so the second part of the results concerns the augmented Gibrat's model. By including growth of the accommodation industry, which is the core industry division of the tourism industry and represents supply side of the tourism industry in Croatian economy, as the regressor, we controlled for its effects on the growth of supply side industries. Our results show connection between Food and Beverages, Tourism agencies and Real estate industry division firms' growth with Accommodation industry division, but also show important link between Gambling and Accommodation divisions. Peculiarity of Croatia's gambling division is high geographical concentration in Istria. Spreading the activities of that division to other parts could be one way of increasing revenues from tourism.

On the other hand, we find no significant impact of Accommodation division growth on Sport activities. Although, noticeable increase in sports activities has been noticeable in recent years, more should be done to exploit this opportunity for increasing revenues from tourism activities, specially since sport tourism represents the fastest growing sector in global tourism. Finally, future research should focus on exploiting input-output data, through which one can get full picture about the interaction between different industries within economy.

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Unutar-industrijski odnosi na razini poduzeća u hrvatskom turističkom sektoru

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Sažetak

U ovom radu analizira se aktivnost poduzeća u turističkom sektoru Hrvatske. Analiza je temeljena na uzorku od više od 10 000 poduzeća preuzetom iz baze podataka Bureau van Dijk za razdoblje od 2006. do 2015. godine. Teorijski temelj našeg rada je Gibratov zakon, koji navodi kako su veličina i stope rasta poduzeća međusobno neovisne. Unutar turističkog sektora razlikujemo sporednu i glavnu sektorsku klasifikaciju (smještaj) te testiramo Gibratov zakon na poduzećima iz potpornih odjeljaka koristeći se modificiranim hibridnim procjeniteljem. Na taj način doprinosimo postojećoj literaturi na dva načina: analizom i kvantifikacijom unutar-industrijskih odnosa unutar okvira Gibratova zakona i primjenom hibridnog procjenitelja koji je izvorno razvio Mundlak, što je novost u ovom području istraživanja. Iako rezultati našeg istraživanja ne potvrđuju Gibratov zakon, možemo detektirati koja je od sastavnica sektorske klasifikacije turizma u velikoj mjeri određena rastom smještajne industrije.

Ključne riječi: *industrijska organizacija, turistički sektor, Gibratov zakon*

JEL klasifikacija*: L16, L83*

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Appendices

Table A1: Descriptive statistics of tourism industries classes

NACE	Description	No. of comp. (μ)	Empl. (μ)	Sales (μ, in th.)	EBITDA (μ, in th.)
4910	Passenger rail transport interurban	3.2	434.85	14330.76	2956.70
4932	Taxi operation	26.4	12.32	252.03	29.00
4939	Other passenger land transport n.e.c.	140.1	30.25	1195.22	208.12
5010	Sea and coastal passenger water transport	95.2	26.23	1141.48	207.54
5030	Inland passenger water transport	3.3	3.90	123.01	8.53
5110	Passenger air transport	14.7	75.32	12348.12	997.82
5510	Hotels and similar accommodation	348.3	59.07	2712.53	698.36
5520	Holiday and other short-stay accommodation	213.1	3.90	153.07	33.97
5530	Camping grounds. recreational vehicle parks and trailer parks	43.1	10.52	761.19	279.48
5590	Other accommodation	55.8	4.27	241.95	43.40
5610	Restaurants and mobile food service activities	820.3	10.09	313.75	34.12
5629	Other food service activities	23.4	12.54	443.47	23.04
5630	Beverage serving activities	979.7	5.05	146.96	15.72
6810	Buying and selling of own real estate	203.7	3.22	253.58	85.37
6820	Renting and operating of own or leased real estate	231.2	11.89	1519.23	392.92
6831	Real estate agencies	224.5	3.34	160.26	97.43
6832	Management of real estate on a fee or contract basis	125.6	102.81	3073.60	859.42
7711	Renting and leasing of cars and light motor vehicles	61.1	5.32	423.94	49.92
7712	Renting and leasing of trucks	2.3	1.66	52.51	12.46
7721	Renting and leasing of recreational and sports goods	13.8	1.87	82.67	9.38
7911	Travel agency activities	579.6	6.23	598.77	33.58
7912	Tour operator activities	35.1	14.87	2167.42	-29.34
7990	Other reservation service and related activities	17.4	3.74	132.49	10.65
9001	Performing arts	14.8	3.47	274.11	35.20
9002	Support acitivities to performing arts	26.1	3.43	183.66	13.29
9003	Artistic creation	11.7	2.04	60.61	11.82
9004	Operation of arts facilities	4	1.65	56.46	5.79
9102	Museums activities	2.1	1.87	54.75	-7.34
9103	Operation of historical sites and buildings and similar visitor attractions	1.6	22.00	688.44	246.08
9104	Botanical and zoological gardens and nature reserves activities	1.7	360.58	11479.77	2670.99
9200	Gambling and betting activities	43.3	132.67	5091.66	1098.44
9311	Operation of sports facilities	26.6	18.95	425.69	18.08
9313	Fitness facilities	19	3.36	61.09	-3.19
9321	Activities of amusement parks and theme parks	9	3.80	238.63	22.00
9329	Other amusement and recreation activities	103.4	13.87	768.00	304.63

Source: Author's calculations

Table A2: Results of the estimation of equation (3) with the FE estimator

NACE	(49)	(50)	(51)	(56)	(68)	(77)	(79)	(90)	(91)	(92)	(93)
VARIABLES	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales
L.lnsales	-0.451***	-0.626***	-0.532***	-0.641***	-0.761***	-0.603***	-0.573***	-0.851***	-1.005***	-0.322	-0.515***
	(0.0569)	(0.0746)	(0.108)	(0.0212)	(0.0292)	(0.0640)	(0.0418)	(0.0644)	(0.0919)	(0.231)	(0.0558)
L.age	0.0102	0.00557	0.00128	0.0452***	-0.0103	-0.0184	-0.00197	-0.0217	0.107*	-0.0455	0.0210**
	(0.00736)	(0.0194)	(0.0411)	(0.0147)	(0.00803)	(0.0179)	(0.00535)	(0.0211)	(0.0498)	(0.0284)	(0.0106)
Constant	2.406***	3.101***	3.276***	2.859***	3.533***	2.984***	3.084***	3.978***	3.613***	2.921**	2.445***
	(0.286)	(0.303)	(0.762)	(0.122)	(0.138)	(0.362)	(0.188)	(0.313)	(0.842)	(1.349)	(0.261)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,161	637	108	10,547	5,312	464	4,532	325	43	366	1,014
R-squared	0.302	0.298	0.381	0.463	0.458	0.362	0.390	0.541	0.839	0.167	0.302
Number of id	211	133	17	2,091	1,214	104	774	67	8	50	192

Source: Author's calculations

Table A3: Results of the estimation of equation (3) with the RE estimator

NACE	(49)	(50)	(51)	(56)	(68)	(77)	(79)	(90)	(91)	(92)	(93)
VARIABLES	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales
L.lnsales	-0.301***	-0.184***	-0.128**	-0.373***	-0.369***	-0.278***	-0.302***	-0.474***	0.114**	-0.0710	-0.208***
	(0.0368)	(0.0367)	(0.0604)	(0.0156)	(0.0215)	(0.0530)	(0.0266)	(0.124)	(0.0547)	(0.0847)	(0.0311)
L.age	0.0122***	0.00557	0.00407	-0.008***	0.00733**	-0.029***	-0.000392	-0.00912	-0.0138**	-0.0111	0.00413
	(0.00362)	(0.00508)	(0.0188)	(0.00170)	(0.00286)	(0.0103)	(0.00450)	(0.0139)	(0.00655)	(0.0117)	(0.00629)
L.d_aals	0.987**	1.293*	0.689	-0.694***	1.619***	-0.535	0.596**	0.0464	1.007	1.984**	0.527
	(0.411)	(0.741)	(1.581)	(0.147)	(0.380)	(0.844)	(0.279)	(0.959)	(1.299)	(0.950)	(0.436)
Constant	1.366***	0.698***	0.772	2.151***	1.233***	1.705***	1.469***	2.148***	-0.643**	0.258	0.973***
	(0.195)	(0.231)	(0.565)	(0.0859)	(0.110)	(0.389)	(0.168)	(0.648)	(0.292)	(0.615)	(0.184)
Observations	1,073	601	100	9,825	4,999	435	4,162	302	39	335	942
Number of id	211	133	17	2,084	1,201	104	770	66	8	50	191

Source: Author's calculations

Table A4: Results of estimation of econometric model (3) using System GMM estimator

NACE	(49)	(50)	(51)	(56)	(68)	(77)	(79)	(90)	(91)	(92)	(93)
VARIABLES	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales	d_lnsales
L.d_lnsales	0.155***	0.0557	0.652	0.0644***	0.0950***	-0.105	0.0367	0.00536	0	0.169	0.0757
	(0.0563)	(0.116)	(0.495)	(0.0181)	(0.0262)	(0.0839)	(0.0318)	(0.0694)	(0)	(0.150)	(0.0572)
L.lnsales	-0.402***	-0.433***	-0.957***	-0.884***	-1.168***	-0.212**	-0.583***	-0.406***	-0.275**	0.0562	-0.279***
	(0.0909)	(0.103)	(0.338)	(0.0435)	(0.0641)	(0.0894)	(0.0761)	(0.136)	(0.124)	(0.0653)	(0.101)
L.age	-0.0256***	-0.0197*	-0.225*	-0.0101**	-0.0474***	0.0130*	-0.00528	0.00420	0.00115**	0.00659	-0.0168
	(0.00725)	(0.0118)	(0.134)	(0.00444)	(0.00976)	(0.00755)	(0.0108)	(0.00882)	(0.000501)	(0.00430)	(0.0114)
Constant	53.48***	41.61*	456.2*	24.47***	100.1***	-24.92*	13.68	-6.334	0	-13.42	35.15
	(14.93)	(23.87)	(269.0)	(8.927)	(19.64)	(15.11)	(21.54)	(17.55)	(0)	(8.771)	(23.13)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	961	509	91	8,592	4,181	365	3,798	263	35	320	833
Number of firms	182	105	17	1,638	987	87	692	57	7	50	158
AR(1)	-3.193	-2.102	-2.158	-3.376	-3.160	-2.748	-2.681	-2.735	-1.271	-2.145	-3.040
p value of AR(1)	0.00141	0.0355	0.0309	0.000735	0.00158	0.00600	0.00735	0.00624	0.204	0.0319	0.00237
AR(2)	1.497	0.425	1.041	1.223	1.297	0.206	1.072	-0.0522	-0.484	-0.733	1.799
p value of AR(2)	0.134	0.671	0.298	0.221	0.195	0.837	0.284	0.958	0.628	0.463	0.0721
Hansen	109.3	85.32	2.002	242.5	127.2	68.25	185.5	42.87	0	44.19	104.4
Hansen(df)	82	82	76	82	82	80	82	81	24	81	81
Prob > chi2	0.0236	0.379	1	0	0.00103	0.823	5.44e-10	1	1	1	0.0410

Source: Author’s calculation