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FIRM GROWTH IN HUNGARIAN AGRI-FOOD CHAIN¹

ROZWÓJ PRZEDSIĘBIORSTW W WĘGIERSKIM ŁAŃCUCHU ŻYWNOŚCIOWYM

Key words: firm growth, agri-food chain, SMEs

Słowa kluczowe: rozwój przedsiębiorstw, łańcuch rolno-żywnościowy, MSP

Abstract. The paper analyses the firm growth after 2004 in small and medium firms of food chain in central region of Hungary using survey data. Authors focus on four factors explaining firm growth including managerial skills, firm characteristics, external company linkages, and industry specificity. Contrary to previous studies concentrating only on producers' behaviour this paper investigates three stages of food chain: producers, processors, and retailers. Results confirm that managerial attributes, firm characteristics, external linkages and branch specific characteristics have important role in growth decisions.

Introduction

Researchers have for long been interested in the evolution of structures within an economic sector, being an industry or the farming sector, in the objective of forecasting future structures and assessing optimal policies to attain specific structure. The analysis of firm growth is a central topic within research of the small business economics [Stam 2010]. Gibrat [1931] has produced a major advance in this field by introducing the Law of Proportionate Growth, then renamed into Gibrat's Law. The law states that the rate of growth of a firm/farm is independent from its size. As stressed by Wagner [1992], from a policy point of view testing whether the Law holds can provide valuable insights for tuning industry or regional policy measures, in particular whether they need to be size-specific. This issue is particularly important for small and medium size enterprises (SME), which are usually the subject of various policy measures. In addition, in the new member states of the European Union has a special research question how EU enlargement has affected on firm growth. The rest of the paper is structured as follows: section 2 presents the literature review, section 3 describes the sample and key variables. Section 4 describes the empirical results, and then section 5 concludes.

Literature review

The paper relates to a broader firm growth literature, which starts from the 'law of proportionate effects' or Gibrat's law. Although the stochastic model includes the key factors affecting firm growth and firm size, its fundamental weakness is that it does not include human capital variables, which are subsumed within the random process. Jovanovic [1982] emphasize that human capital variables are important in explaining firm growth and firm size. Young firms are assumed to know the mean and the standard deviation of the cost of all firms (efficiency), but not their own cost structure. In each production period, firms update their expectations based on previous experiences and each period they come closer to knowing their own cost structure (efficiency). Hence, those with high costs (low efficiency) will shrink their farm size (and eventually leave the sector) while those with low costs will expand their firm size. Jovanovic [1982] translates this in the testable hypothesis that firm growth decreases with age for a given firm size as firms have more accurate estimations of their efficiency and hence are less likely to shrink or expand their firm size. Several studies have tested Gibrat's law and Jovanovic's hypothesis [Stam 2010]. Studies analysing Gibrat's law and Jovanovic's hypothesis in the agricultural sector in transition countries include, for example, Rizov and Mathijs [2003] Bakucs and Fertó [2009], Fertó and Bakucs [2009]. Empirical results usually reject the Gibrat law and provide some support to Jovanovic's predictions.

¹ The paper is based on two research projects as "TAMOP-4.2.1.B-09/1/KMR-2010-0005", in the framework of subproject "Knowledge base economy in Hungary" and OTKA K 84327 „Integration of small farms into modern food chain”.

Economic enterprises are matching the resources and opportunities to create value. Growth processes of the new enterprise were explored by Garnsey [1998] in a systems model inspired by Penrose. A sequence of phases in the early life of the firm reflects growth processes and problems, solutions giving rise to new problems. Firms have to access, mobilize and deploy resources enabling them to generate resources for growth. However, subsequent phases in which growth reinforcement and growth reversal forces contend are not universal, but are set in motion in an important minority of firms, the major job creators. After early phases, critical problems facing the firm are more diverse. The growth of the firm is related to the building of the competence needed to respond to changing economic environment.

Auerswald [2008] developed a micro-economic foundation for a theory of entrepreneurship and growth with special respect to innovation and opportunities as intermediate linkages between the two. He notes that decreasing transaction costs tend to pull incumbent organizations apart, the possession of difficult to imitate production practices by the same organization keeps them together and, the dissolution of incumbent firms creates opportunities for entrepreneurs. He underlines the importance of the relationship between entrepreneurship and growth and link Schumpeterian and Coasean theories of the firm and states that Coasean entrepreneurs create „new combinations” while in the Schumpeterian sense, by either organizing within a new firm activities previously carried out by different firms, or expanding the scope of an existing firm to incorporate activities previously related through the market. He concludes that knowledge intensive entrepreneurial firms come into existence when transaction costs are relatively high, not when they are low or zero.

Gross and Verany [2010] emphasized the growing consensus that financing frictions significantly impact firm dynamic. They developed a model for investigating under monopolistic competition the link between financing constrains, firm dynamics, export decision and the pattern of trade supposing that firm heterogeneity is not induced by a one-time productivity draw, rather they are heterogeneous due to the fact of facing different financial conditions. Striking findings of latest empirical research suggest that the dynamics of exporters differ substantially from those of non-exporters.

Hart and Holmstrom [2010] developed a model to study firm boundaries designed dealing with strategic decisions taken in the absence of ex post bargaining. In the model they use authority having a central role. It is taken into account that two firms deciding whether to adopt a common standard. According to their findings nonintegrated firms may fail to coordinate if one firm loses. At the same time an integrated firm can internalize the externality, but puts insufficient weight on employee benefits.

In short, recent theoretical and empirical developments imply that external linkages of firms may affect on firm growth beyond traditional factors including firm and manager specific variables. Thus, we focus on four main possible factors to explain firm growth in Hungarian agri-food chain as firm, managerial, sectors specificity and external linkages in both domestic and international markets.

The sample and key variables

To investigate SMEs' the determinants of employment growth, a questionnaire was designed and data were collected from central region of Hungary in 2011. Firms with less than 250 employees were defined as SMEs. The sample covers three stages of food chain; producers, processors and retailers. Face-to-face interview with each respondent were conducted. The surveyed 231 firms include 64 producers, 59 processors and 108 retailers.

Table 1. Descriptive statistics of variables
Tabela 1. Statystyka opisowa zmiennych

Specification/Wyszczególnienie	N/Wielkość próby	Mean/Średnia	Std. Dev./Odch standardowe	Min	Max
Dependent variable/Zmienna zależna					
Sales growth/Wzrost sprzedaży	203	0.33	0.47	0	1
Independent variables/Zmienne niezależne					
MC: managerial experience/ Doświadczenie w zarządzaniu	230	14.83	10.86	1	50
MC: higher education/Wyższe wykształcenie	231	0.35	0.48	0	1
FC: firm size/Wielkość firmy	212	5.18	1.82	1	9
FC: skilled labour/Doświadczeni pracownicy	226	70.08	32.05	0	100
FC: own finance/Własne finansowanie	231	0.18	0.39	0	1
FC: firm image/Image firmy	228	11.33	9.09	0	62
EL: Exports/Eksport	230	0.17	0.38	0	1
EL: Info chain/Informacja w łańcuchu	231	0.38	0.49	0	1

Source: own study

Źródło: opracowanie własne

Table 2. Mean of variables by branches
Tabela 2. Średnie dla zmiennych w podziale na branże

Specification/ <i>Wyszczególnienie</i>	Processor/ <i>Przetwórcza</i>	Detailer/ <i>Detalista</i>	Producer/ <i>Producent</i>	F test/ <i>Test F</i>	Bartlett test/ <i>Test Bartletta</i>	Kruskal-Wallis test/ <i>Test Kruskala-Wallis</i>
p-value						
Sales growth/ <i>Wzrost sprzedaży</i>	0.40	0.19	0.45	0.00	0.06	0.00
MC: managerial experience/ <i>Doświadczenie w zarządzaniu</i>	18.56	11.65	18.13	0.00	0.11	0.00
MC: higher education/ <i>Wyższe wykształcenie</i>	0.23	0.28	0.53	0.00	0.59	0.01
FC: firm size / <i>Wielkość firmy</i>	5.40	5.27	5.04	0.58	0.49	0.71
FC: skilled labour/ <i>Doświadczeni pracownicy</i>	64.36	79.28	54.76	0.00	0.01	0.00
FC: own finance/ <i>Własne finansowanie</i>	0.19	0.12	0.22	0.08	0.04	0.08
FC: firm image/ <i>Image firmy</i>	12.09	8.00	17.64	0.00	0.00	0.00
EL: Exports/ <i>Eksport</i>	0.23	0.17	0.15	0.62	0.49	0.62
EL: Info_chain/ <i>Informacja w łańcuchu</i>	0.32	0.31	0.40	0.79	0.97	0.78

Source: own study

Źródło: opracowanie własne

The dependent variable, the sales growth is a binary variable takes the value of 1 if the sales increased after 2004 and zero otherwise. Table 1 shows that 33 per cent of the firms increased their sales. Independent variables can be classified into three groups. First group describes the managerial characteristics of firms (MC), including managerial experience in years, and a dummy which is one if manager's education level is above secondary education (high education) and zero otherwise. The mean managerial experience is 15 years and average, 35 per cent of respondents have higher education.

Second group identifies the firms' characteristics (FC); firm age in years, the firm size in terms of gross revenue with 9 ordinal categories. We employ a dummy for own finance (ownfin) which is one if manager answered affirmatively to the statement: 'I have satisfactory reserves' (4 or 5 in 5 items Likert scale). Finally, we measure the role of skilled labour by the share of employees with basic computer skills. The average firm size is in the middle of 9 categories. The mean age of firms 11 years ranging from newborn firm to old one (62 years) and 18 per cent of respondents think that they have satisfactory reserves. The proportion of employees with basic computer skills is more than 70 per cent.

We measure external company linkages (EL) using following variables. Export variable is a dummy variable takes one if firm exports, otherwise zero. Info_chain is a dummy equal to one if manager answered affirmatively to the statement: 'there is reciprocity in knowledge transfer in the supplier-buyer chain' (4 or 5 in 5 items Likert scale), otherwise zero. 25 per cent of respondents have international links, 38 per cent think that there is reciprocity in knowledge transfer in the supplier-buyer chain.

We are interesting for the difference of variables' mean across various stages of food chain. Table 2 shows our results based on the ANOVA. Bartlett tests imply that an equal-variance assumption is implausible for 4 cases of 9 variables. Thus we apply Kruskal-Wallis tests which reinforce the results of F tests. Estimations reveal that there is no significant difference in firm size, export and info chain, support by branches at 10 per cent level of significance. Calculations confirm significant difference in managerial experience, higher education. Estimations also reveal difference in firm growth, managerial and firm age and own finance. Surprisingly, producers report with highest share sales growth (45 per cent), whilst 19 per cent of retailers show sales growth. This observation can be explained by the rapid concentration in retail sector harming growth opportunities of small and medium size retailers. The most experienced managers are working in the food processing (18.6 years) following by farmers (18.1 years) and surprisingly retailers have only 11 years managerial experiences. Contrary to our a priori expectation, farmers are more educated than food processors and retailers.

Results

Table 3. Results for cluster analysis

Tabela 3. Wyniki grupowania według klastrów

Specification/ <i>Wyszczególnienie</i>	Cluster/ <i>Klaster</i>		
	1	2	3
MC: managerial experience/ <i>Doświadczenie w zarządzaniu</i>	13.86	20.65	13.51
MC: higher education/ <i>Wyższe wykształcenie</i>	0.41	0.42	0.23
FC: firm size/ <i>Wielkość firmy</i>	4.93	5.94	5.25
FC: skilled labour/ <i>Doświadczeni pracownicy</i>	98.52	14.52	54.03
FC: own finance/ <i>Własne finansowanie</i>	0.21	0.16	0.11
FC: firm image/ <i>Image firmy</i>	9.31	18.68	10.71
EL: Exports/ <i>Eksport</i>	0.20	0.23	0.13
EL: Info_chain/ <i>Informacja w łańcuchu</i>	0.37	0.39	0.29
N	98	31	75

Source: own study

Źródło: opracowanie własne

financial situation and youngest firm age. The second cluster is the smallest group with most experienced and educated manager, largest firm size and less skilled labour and oldest firm age. In addition, this group is involved highly in external linkages in terms of information access and international market. Finally, cluster 3 contains less experienced and educated managers, medium level of firm age and stable financial situation and less involved in external linkages.

The distribution of clusters are differing significantly each other by sectors, Cluster 1 is dominated by mainly retailer while cluster 2 includes mainly producers and cluster 3 processors.

Binary models

In order to examine the relationships between employment growth and various explanatory factors, various binary models were estimated. The binary models are typically estimated by maximum likelihood after imposing distributional assumptions of error term. However, semi parametric literature emphasizes that parametric estimators of discrete choice models are known to be sensitive to departure from distributional assumptions. Various estimators have been developed for correcting this restrictive nature of parametric models. In this paper authors apply the semi-nonparametric approach (SNP) of Gallant and Nychka [1987] and the semi parametric maximum likelihood approach (SML) of Klein and Spady [1993].

We present three different binary models focus on the determinants of firm growth (Tab. 4). Binary models show qualitatively the same results in terms of sign of coefficients. However, estimations suggest that parametric binary model produces poor results in terms of statistical significance. In addition, likelihood ratio test confirms that semi-nonparametric approach outperform probit model. Semi parametric maximum likelihood approach reports the best results in terms of statistical significance.

We focus only on the interpretation of SML model. Estimations suggest that the managerial experiences negatively, whilst higher education positively influences the firm growth. In other words, experienced manager decreased, and educated managers are more likely increased their sales after 2004. Firm size has positive impact on the firm growth rejecting Gibrat law that is firm size matter for firm growth. Surprisingly, negative coefficient skilled labour implies that firms with more skilled labour are less likely increase their sales. As we expected, the own finance has positive and significant impact on firm growth. Last firm specific variable, firm age also positively influences the firm growth. Two external company linkages variables (export and info_chain) do influence significantly sales growth. Finally, two dummy variables (Producers and Processors) were added to check the possibly impact of sectors. Both industry specificities have positive and significant effect on firm growth.

We present our results in two steps. First, we report estimations based on extrapolatory clusters analysis. Second, we show our binary models.

Cluster analysis

We employ factor analysis with k means approach; both Caliński–Harabasz pseudo-F index and Duda–Hart index identify three clusters solution. Table 3 presents the group means of three clusters obtained, while Figure 1 identifies each group by sector. Cluster 1 is the biggest is characterized by educated manager, highest share of skilled labour, stable

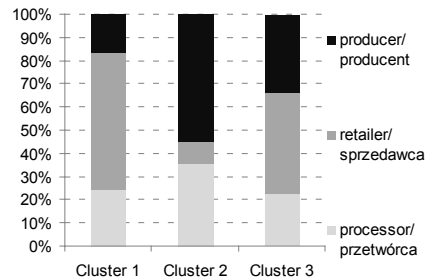


Figure 1. Clusters by sectors

Rysunek 1. Klasy według sektorów

Source: own study based on the survey

Źródło: opracowanie własne

Table 4. Binary models for sales growth
Tabela 4. Model binarny wzrostu sprzedaży

Specification/Wyszczególnienie	Probit/Sprzedaż	SNP	SML
MC: managerial experience/Doświadczenie w zarządzaniu	0.000	0.010	-0.070***
MC: higher education/Wyższe wykształcenie	0.409*	1.577***	0.460**
FC: firm size/Wielkość firmy	0.035	0.080	0.849***
FC: skilled labour/Doświadczeni pracownicy	0.003	-0.008***	-0.012***
FC: own finance/Własne finansowanie	0.496*	0.656**	2.430***
FC: firm image/Imaga firmy	0.022	0.050***	0.359***
EL: exports/Eksport	0.309	0.800***	5.840***
EL: info_chain/Informacja w łańcuchu	0.170	1.018***	0.493***
Processor/Przetwórcza	0.604**	0.790***	6.884***
Producer/Producent	0.536*	0.180	6.085***
Constant/Stała	-1.797***		
N/Wielkość próba	185	185	185
Pseudo R2/Pseudo R2	0.1484		
Like lihood ratio test of Probit model against SNP model/ Test wskaźnika wiarygodności modelu probitowego wobec modelu SNP		0.012	
Log likelihood/Prawdopodobieństwo			-81.547

Source: own study

Źródło: opracowanie własne

Conclusions

The aim of the paper is to identify factors that influence SMEs' decision on sales growth along food chain in central region of Hungary. We focus on four factors explaining firm growth including managerial skills, firm characteristics, external company linkages, and industry specificity. Results confirm that managerial attributes, firm characteristics, external linkages and branch specific characteristics have important role in growth decisions. Results highlight that government should improve access to international markets beyond to traditional measures of SME policies.

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Streszczenie

W artykule przedstawiono analizę rozwoju małych i średnich przedsiębiorstw z centralnej części Węgier po 2004 r. Wykorzystano dane pierwotne pochodzące z badania kwestionariuszowego w analizowanych firmach. Autorzy koncentrują się na czterech czynnikach wyjaśniających wzrost i rozwój przedsiębiorstw: umiejętności menedżerskie, charakterystykę firmy, powiązania z otoczeniem oraz specyfikę branży. W odróżnieniu od wcześniejszych analiz skupiono się tylko na zachowaniach producentów w odniesieniu do trzyletowego łańcucha żywnościowego: producentów, przetwórców i detalistów. Potwierdzono, że analizowane czynniki istotnie wpływają na rozwój przedsiębiorstw.

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