

DOMESTIC COMPETITION, TRADE OPENNESS AND ENTREPRENEURIAL CULTURE: CANONICAL CORRELATION ANALYSIS

Milan Kostić, Jelena Živković

Abstract

The paper analyses canonical correlations between domestic competition, trade openness and entrepreneurial culture. The research covered 141 countries ranked by World Competitiveness Index in 2019. Canonical correlation analysis is applied to find relationship between two canonical variables. The first canonical variable includes sub-indexes from Domestic competition and Trade openness pillars. The second variable contains sub-indexes from Entrepreneurial culture pillar. The results of the analysis showed there is a strong, positive, statistically significant canonical correlation between these canonical variables with a Pearson coefficient of 0.86. The linear regression analysis is also applied. The regression analysis shows that the variable Distortive effects of taxes and subsidies on competition is the most important for all dependent variables. The extent of market dominance, Competition in services and Border clearance efficiency are important, but not as much as taxes and subsidies. It confirms that regulation of domestic competition and trade openness are supreme for entrepreneurial culture.

Keywords: domestic competition, trade openness, entrepreneurial culture, canonical correlation analysis, linear regression

JEL Classification: F64, F68, L22, L26

1. Introduction

In the system of free market economy, which prevails in the modern world, the implementation of a Competition policy is essential for the achievement of the economic and political goals. These goals are, among others: increasing the economic efficiency of entities and encouraging the innovation and development of entities, proper allocation of economic resources, establishment and preservation of equality of the conditions in the offer of goods and services on markets and strengthening competitiveness of domestic business entities in the national and international market (Đekić 2009, p. 229). A stable system of Competition policy should ensure the establishment of a market economy, the equality of market undertakings, encouraging economic efficiency, the creation of conditions for faster economic growth and the

Milan Kostić, PhD

Full Professor

Faculty of Economics, University of Kragujevac
Republic of Serbia

E-mail: mkostic@kg.ac.rs

ORCID: 0000-0003-2883-1474

Jelena Živković (corresponding author)

Research Assistant

Institute for Information Technologies,
University of Kragujevac

Jovana Cvijića bb, 34000 Kragujevac

Republic of Serbia

E-mail: jelenazivkovic@uni.kg.ac.rs

ORCID: 0000-0002-8670-4249

creation of the well-being of society as a whole and consumers in particular. In these circumstances, competition policy and free competition enable the domination of entrepreneurship. At the same time, the situation in the market changes when new undertakings from abroad enter. New undertakings can affect the market concentration and condition of competition.

The research aims to investigate the relationship between several sub-indexes of the Global competitiveness index: Domestic competition, Trade openness and Entrepreneurial culture. The paper is based on the following research questions:

- Is there a canonical correlation between the Domestic Competition and Trade Openness sub-indexes and the Entrepreneurial culture sub-index?
- Which sub-index from Domestic competition and Trade openness has the strongest impact on generating the relationship between Domestic competition, Trade openness and Entrepreneurial culture?
- Which sub-index from Entrepreneurial culture has the strongest impact on generating the relationship between Domestic competition, Trade openness and Entrepreneurial culture?

The paper contains the following sections. After the introduction, the first section is the theoretical background with a review of studies about the relationship between domestic competition, trade openness and entrepreneurial culture. The second section describes data sources, variables and applied methodology. In the third section, research results and discussion are presented in order to draw concluding remarks.

2. Theoretical Background

Entrepreneurial culture can be described as an environment where people are encouraged to take risk, innovate and create new business. It includes attitudes, values, expertise, and the influence of a group or individual working in taking risk company (Danish et al. 2019, p. 1). The entrepreneurial culture highlights behaviors that foster creativity, innovation, and a greater degree of ability or competency (Atiku and Fields 2016, p. 30). Any nation or economic region has a complex institutional environment made up of a variety of formal institutions, with a few presumably being the most significant (Potts et. al 2021, p. 84). According to Kuhlke (2017), the goal of entrepreneurial culture is to encourage the growth of entrepreneurial abilities in the creative and cultural industries so that they can make greater contributions to economic development on a theoretical, pedagogical, and practical level. Entrepreneurship and the competition it fosters can provide both immediate and long-term

benefits to the business owners, potential employees, customers, rival businesses, and local communities and governments (Matusik 2016, p. 561). Individual attitudes, desires, perceived opportunities, and business endeavors are the result of a particular environment. Therefore, both environmental variables and entrepreneurial actors are crucial for promoting entrepreneurship and, consequently, economic growth (Pfeifer et al. 2021, p. 1). The entrepreneur fosters economic growth and innovation, both of which have a favorable effect on job creation (Dumitru and Dumitru 2018, p, 157). Besides, innovative entrepreneurs with novel products stimulate economic expansion through creative channels (Simionescu et al. 2021, p. 131). Fazio (2010) distinguishes between two main theories that connect entrepreneurship and competition. One is Kirzner's theory, who sees market share competition between established companies and startups as being inextricably linked to entrepreneurship. The other is Schumpeter's theory, which defines entrepreneurship as the process of using innovation to open up new markets and spurring competition among businesses that are doing so. Although there is a well-known difference of opinion between Kirzner and Schumpeter about the economic role of the entrepreneur, both of these eminent theorists seem to concur that competition is a natural part of entrepreneurial activity and that potential entrepreneurs welcome it (Urbig et al. 2020, p. 194).

There are several ways to measure entrepreneurial performance and the environment for entrepreneurship development globally. The Global Competitiveness Index is one of them because it includes indicators related to the development of entrepreneurship. Coduras and Autio (2013) compared the Global Competitiveness Index data and the national entrepreneurial context qualitative information provided by the Global Entrepreneurship Monitor. The conclusion is that the Global Competitiveness Index stands as an objective measure that can be enhanced by incorporating additional entrepreneurship indicators. Using these indexes Suchek, Fernandes, and Nascimento (2019) indicate in their study that the countries examined operate within contexts that similarly impact competitiveness and entrepreneurship. Moreover, the factors driving competitiveness also affect entrepreneurship and vice versa.

In the last two decades, the contribution of entrepreneurship to economic growth has grown in significance as a research area in economics. Alongside this recognition of the importance of entrepreneurship, governments worldwide have implemented different policies to support business development (Hartwell 2014, p. 434). Also, the relationship between

entrepreneurship and national competitiveness is confirmed based on an analysis of the connection between the Global Entrepreneurship Index and the Global Competitiveness Index (Doan 2021) in 124 countries. A positive, significant relationship between entrepreneurship and national competitiveness is found in G-20 countries (Gautam and Lal 2021). The findings of the correlation and regression analyses indicate that high levels of productive and inventive entrepreneurship as well as high levels of innovation performance can account for the high levels of national competitiveness in several EU nations (Herman 2018).

There are different empirical results about the relationship between domestic competition, competition policy and entrepreneurship. Using information about new company registrations and the Global Competition Review ranking of national competition authorities for 32 countries, Fazio (2010) found a favorable correlation. Better competition policy, however, only promotes entrepreneurship after a certain level, according to the study. This is due to a lesser difference between an average and an excellent regulatory system than between a terrible and a very bad one. For instance, Choi and Phan (2006) claim that competition has a positive and considerable impact on the creation of new enterprises, based on data from the United States from 1968 to 1993 which measure the share of major firms in the economy and the amount spent on competition policy. Moreover, Golodner (2001) contends that competition policy influences entrepreneurship in another, more intangible manner. According to him, countries with strong and effective competition policies and laws encourage and value individual initiative, enterprise and risk-taking among their citizens and entities. As a result, anti-competitive behavior cannot be discouraged in countries without effective competition policy. Norbäck et al. (2006) concluded that there is relationship between competition and entrepreneurial entrance, and innovation. The relative profitability of innovation for sale compared to innovation for entry rises as competition becomes fiercer. Entrepreneurship ideas constitute an essential part in a well-functioning market economy (Gans and Persson 2013, p. 131). On the other hand, Schaper et al. (2008) examined the correlation between competition policy and entrepreneurship using data of three existing indexes: the Global Entrepreneurship Monitor, the Global Competition Review, and the Antitrust Index. The results show that high ranking competition policy does not correlate with entrepreneurship. Poor data issues, such as using highly imprecise measurement for the data, may impact this result. They also assert that entrepreneurship may not be substantially influenced by competition

policy because starting a firm is primarily influenced by a number of factors, including individual incentives, market opportunities, and access to resources. In line with these results, Capelleras et al. (2008) state that the degree of entrepreneurship in a nation is mainly fixed, meaning that legislative frameworks have little influence on this level of activity. It is more influenced by an individual's background and talents as an entrepreneur.

Regarding the link between trade openness and entrepreneurship, there is no unified view in theory about the nature of this link. The impact of trade openness on entrepreneurship is inherently unclear. On the one hand, trade openness provides new entrepreneurs with more prospects by granting them access to larger product and input markets. However, at the same time, foreign trade is more open between nations, and the level of competition increases, thus lowering incentives and raising entry barriers for potential business owners. According to Audretsch and Sanders (2007), who discussed about the nations that are integrating into the global economy, new opportunities are emerging in this process of globalization, which will make it easier to switch from "an industrial to an entrepreneurial model of production". Markusen and Venables (1997) argue that multinational entrepreneurs' entrance into the market can ultimately be advantageous for domestic competition and local entrepreneurship, primarily if entrepreneurs export growing percentages of their products to a market-wide range. Bayar et. al (2018) found the positive impact of trade openness on entrepreneurship by analysing data from 15 upper middle income and high-income countries from 2001 to 2015. Scholman et al. (2014) argued that economic openness plays a role in fostering these entrepreneurial chances connected to a country's cyclical performance because they also discover that these results only apply to highly open economies. Pinho and de Lurdes Martins (2020) investigated the impact of institutional factors and trade openness on opportunity to create a business on sample of 1771 entrepreneurs from 44 countries. The research indicates significant positive impact of the institutional factors on the potential of starting a new business. This study offered a useful perspective of the still nascent understanding that institutions and trade openness might have an important role in entrepreneurs' culture.

3. Data and Methodology

Data for this research are retrieved from Global Competitiveness Report 2019 by World Economic Forum. Global Competitiveness Report covered 141

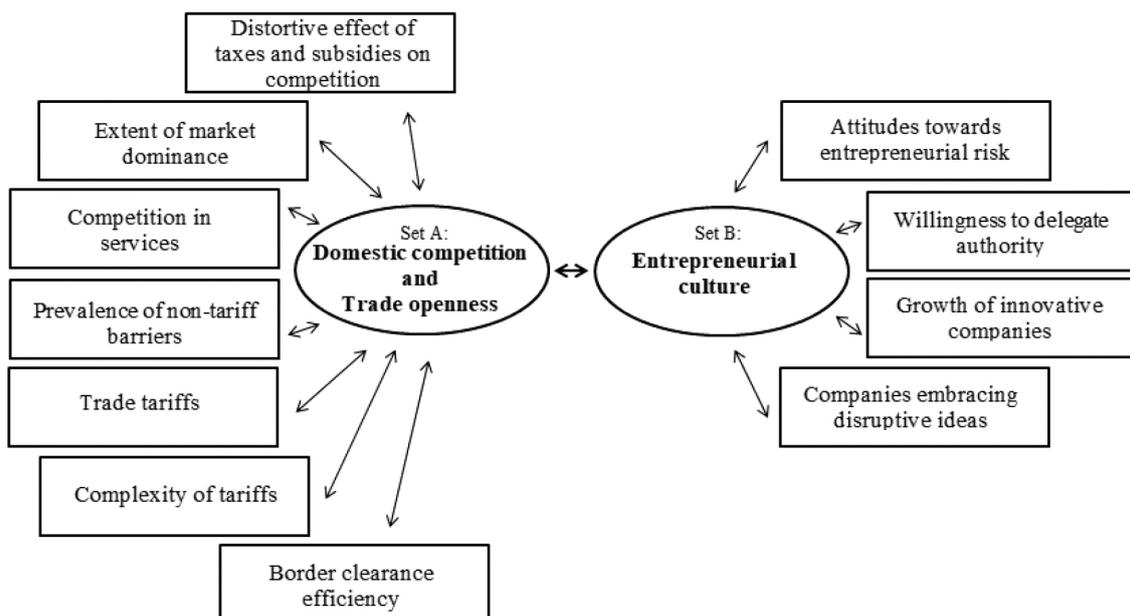
countries in 2019. Global Competitiveness Index (GCI) is composite index for measuring national competitiveness. GCI is formed by World Economic Forum in 1979. Global Competitiveness Index 4.0 is latest version of this index launched in 2018. This modification was made because it is necessary to consider the effects of the fourth industrial revolution. In such circumstances, there are changes in the factors of competitiveness. According to the World Economic Forum (Schwab 2020), it alleviates the differences in achieving the competitiveness of countries at different levels of economic development. GCI 4.0 has 12 pillars: Institutions, Infrastructure, ICT adoption, Macroeconomic stability, Health, Skills, Product market, Labour market, Financial system, Market size, Business dynamism and Innovation capability. The index value ranges from 0 to 100.

Canonical correlation analysis (CCA) is performed if pair-wise correlation or multiple approaches, like logistic regression, are insufficient to capture the expected, multivariate relationships between variables. The ultimate level of the general linear model (GLM) is represented by canonical correlation analysis. It is a technique closely related to the Pearson correlation coefficient, which is more commonly comprehended (dos Santos and Brandi 2014; Sherry and Henson 2005; Hair et al. 2005; Rencher 2002). The canonical correlation procedure's principal goal is to find meaningful and significant connections between two sets of variables (Xia 2008). Moving from a vast set of interconnected variables to a smaller set of canonical variables

is also a benefit of this technique (Kachigian 1991; Sharma 1996, Hair et al. 1998). These sets all contain a minimum of two variables. It extends beyond both multiple correlation analyses, which examine the relationship between one variable and a group of factors, as well as straightforward pair-wise correlation analysis, which tests the association between two variables. Canonical correlation was introduced by Hotelling in 1936 (Hotelling 1936). When there are several correlations between the outcome variables, CCA is helpful. According to Sherry and Henson (2005), pairs of canonical variates are constructed as orthogonal linear combinations of the variables in the two initial sets to best describe the inter- and intra-set variability. Finding the linear combination with the highest correlation is the main principle behind it. The process then continues in this fashion, starting with the initial combination and ending with the linear correlation pair that has the highest correlation among all the combinations unrelated to one another. Canonical variables are linear combination pairs, and canonical correlations are relationships between canonical variables. A set of canonical variates, or orthogonal linear combinations of the variables in each set, are identified by canonical correlation analysis as the ones that best account for variation both within and between sets.

Considering that canonical correlation analysis involves two sets of variables, the research is focused on indexes from two GCI 4.0 pillars: Product market and Business dynamism. Set A contains next sub-indexes (pillars): Domestic competition and Trade openness.

Figure 1. Canonical correlation framework



Source: Authors

Domestic competition pillar consists of next indexes: Distortive effect of taxes and subsidies on competition (X_1), Extent of market dominance (X_2), Competition in services (X_3). While, Trade openness pillar consists of next indexes: Prevalence of non-tariff barriers (X_4), Trade tariffs (X_5), Complexity of tariffs (X_6), Border clearance efficiency (X_7). Set B includes following sub-indexes of the Entrepreneurial culture pillar: Attitudes towards entrepreneurial risk (Y_1), Willingness to delegate authority (Y_2), Growth of innovative companies (Y_3), Companies embracing disruptive ideas (Y_4). The maximum number of canonical functions is equal to the smaller of the number of dependent variables (four) or the number of independent variables (seven) (Rastegar et al. 2012) Thus, four canonical functions are derived and used as the basis for the study.

For canonical correlation analysis we have two sets of variables: set A and set B. The original set of variables t includes variables from set A (p) and variables from set B (q). Set A include variables $X_{1...p}$ and set B includes variables $Y_{1...q}$. Canonical correlation represents combination of linear relationship between variables. Equation 1 is linear combination of variables from set A and equation 2 is linear combination of variables from set B. Canonical correlation can be presented as follow:

$$A_i = a_{ip}X_1 + \dots + a_{ip}X_p \quad (1)$$

$$B_i = b_{iq}Y_1 + \dots + b_{iq}Y_q \quad (2)$$

These equations can be written as follows:

$$A_i = \sum_{i=1}^p a_i X_i \quad (3)$$

$$B_i = \sum_{i=1}^q b_i Y_i \quad (4)$$

where X and Y are independent and depended variables, a and b are coefficients for linear combination. In this combination Pearson's coefficient of correlation is used.

Canonical correlation between two sets is (Androniceanu et al. 2020, p. 9):

$$\varphi_i^* = \frac{cov(A_i, B_i)}{\sqrt{var(A_i)var(B_i)}} \quad (5)$$

First step in canonical correlation analysis is the evaluation whether there is a relationship between two sets of variables (A and B) by Pillai's, Hotelling's, Wilk's lambda and Roy's multivariate criteria on significant level of 0.05. Then, we generate roots and define eigenvalues and canonical correlation coefficients. Next step is the calculation of raw and standardized coefficients for dependent and independent variables. Also, it is important to determine correlations between variables and canonical variables and variance in variables explained by canonical variables. Since canonical correlation analysis does not show a causal relationship between variables, linear regression analysis for within cells error term is also applied.

4. Results and Discussion

Table 1 shows descriptive statistics for all variables. Average value of Distortive effect of taxes and subsidies on competition is 47.059. Minimum value is 14.1 for Venezuela. Maximum value is 79.8 (Singapore). Country with the best score of 80.1 for Extent of market dominance is Switzerland in 2019, and the lowest score is for Haiti (13.2). Mean value of Extent of market dominance is 46.99. Competition in services has maximum value in Hong Kong SAR (86.3). Mean value of this variable is 64.60. Prevalence of non-tariff barriers has maximum in Singapore (83.6), and mean value 57.19. The most interesting values are for Trade tariffs because it records minimum 0 in Algeria and maximum 100 in Hong Kong SAR. Hong Kong also has the maximum value of 100 for Complexity of tariffs, while Switzerland has the minimum value for Complexity of tariffs (11.3). Border clearance efficiency with mean value of 44.267 has the lowest average among all variables. Variable Attitudes towards Entrepreneurial risk has the mean value of 50.55, minimum value of 23.3 in Tajikistan, and maximum value of 82.7 in Israel. Willingness to delegate authority is the most dominant in Denmark (82.4), and the least dominant in Mauritania (28.7). Mean value of Willingness to delegate authority is 56.57. Israel has the highest score for growth of innovative companies (80.8), Haiti the lowest (24.4). Companies which embrace disruptive ideas are mostly in Israel (68.5). In Angola companies which embrace disruptive ideas are rare, and the score is 27.0.

Table 2 shows the results of Pillai's Trace, Hotelling's Trace, Wilk's Lambda and Roy's Largest Root multivariate tests of significance and the results of tests are significant. The results show that there is a statistically significant positive linear relationship between the variables of domestic competition, trade openness and entrepreneurial culture.

Table 1. Descriptive statistics

	N	Min	Max	Mean	Std. Dev.
Distortive effect of taxes and subsidies on competition	141	14.1	79.8	47.059	12.3783
Extent of market dominance	141	13.2	80.1	46.994	12.4833
Competition in services	141	28.6	86.3	64.604	9.6230
Prevalence of non-tariff barriers	141	33.0	83.6	57.191	9.4385
Trade tariffs	141	0	100.0	59.467	28.9758
Complexity of tariffs	141	11.3	100.0	69.850	24.2697
Border clearance efficiency	141	14.3	77.3	44.267	13.8489
Attitudes towards entrepreneurial risk	141	23.3	82.7	50.549	9.7624
Willingness to delegate authority	141	28.7	82.4	56.566	11.3709
Growth of innovative companies	141	24.4	80.8	51.621	10.4301
Companies embracing disruptive ideas	141	27.0	68.5	45.238	9.2305

Source: Authors' calculation.

Table 2. Multivariate tests of significance

Test name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillai's	1.07370	6.97140	28.00	532.00	0.000
Hotelling's	3.15907	14.49786	28.00	514.00	0.000
Wilk's	0.18444	10.04311	28.00	470.14	0.000
Roy's	0.73455				

Source: Authors' calculation.

Next step in canonical correlation analysis is generating roots. In Table 3, one can see that this analysis generates four roots which rank the eigenvalues in a decreasing order. Pearson correlations between the canonical variate pairs are represented as canonical correlations. The correlation coefficient between the first pair of canonical variates is represented by the first canonical correlation, which is equal to 0.85706. According to Table 3, the total variance is indicated by the eigenvalue obtained for the pair of canonical correlation. Canonical correlation coefficients rise along with eigenvalues. It can be shown that the first function has the highest eigenvalue. Namely, 73.45%

of the variation in A_1 is explained by the variation in B_1 etc. Given that the first canonical correlation is the most significant we will keep this highest value.

In Table 4, null hypothesis that all correlations associated with the roots are equal to 0 is tested. This hypothesis that no correlation exists between any pair of canonical variates is equivalent to the null hypothesis. The p value indicates that the first three test are statistically significant, but the fourth test is not significant because $p = 0.055 > 0.05$.

Further analysis requires determining raw and standardized canonical coefficient for dependent variables. Results are shown in Table 5. Raw canonical

Table 3. Eigenvalues and canonical correlations

Root No.	Eigenvalue	Pct.	Cum. Pct.	Canon Cor.	Sq. Cor
1	2.76716	87.59423	87.59423	0.85706	0.73455
2	0.21416	6.77934	94.37356	0.41999	0.17639
3	0.10625	3.36338	97.73695	0.30991	0.09605
4	0.07149	2.26305	100.00000	0.25830	0.06672

Source: Authors' calculation.

Table 4. Dimension Reduction Analysis

Roots	Wilks L.	F	Hypoth. DF	Error DF	Sig. of F
1 TO 4	0.1844	10.04311	28.00	470.14	0.000
2 TO 4	0.69483	2.83153	18.00	371.01	0.000
3 TO 4	0.84364	2.34254	10.00	264.00	0.012
4 TO 4	0.93328	2.37709	4.00	133.00	0.055

Source: Authors' calculation.

Table 5. Raw and standardized canonical coefficient for DEPENDENT variables

Variable	1	2	3	4
Raw canonical coefficients				
Y1	0.00058	0.08380	0.15337	-0.00906
Y2	-0.04634	0.04132	-0.06858	-0.13923
Y3	-0.05995	0.10693	-0.07195	0.21046
Y4	0.01228	-0.26675	0.03863	-0.06519
Standardized canonical coefficient				
Y1	0.00562	0.81807	1.49731	-0.08850
Y2	-0.52694	0.46968	-0.77986	-1.58315
Y3	-0.62533	1.11534	-0.75045	2.19510
Y4	0.11337	-2.46227	0.35661	-0.60174

Source: Authors' calculation.

coefficients can be interpreted like coefficients in the linear regression model. In that case, canonical variates are seen like outcome variables. One-unit increase in Y_1 (Attitudes towards entrepreneurial risk) leads to a 0.00058 increase in first variate of Entrepreneurial culture. Also, we can see there are some negative coefficients. It means that every increase of one-unit in Y_2 (Willingness to delegate authority) leads to -0.04634 decrease in the first variate of Entrepreneurial culture. The change score in canonical deviation in terms of standard deviation is presented by standardized canonical coefficients (Ada 2014, p. 103). Standardized canonical coefficients show the original variant's influence level on the canonical variable's development. Which variables primarily determine which canonical variables and how they influence one another can be observed by examining the correlation level and direction between canonical variables among themselves and the canonical sets. An increase of one standard deviation in variable Y_1 leads to 0.00562 standard deviation increase in the first canonical variable. The same approximation is applicable for other variables.

We can present standardized canonical coefficient for the first canonical variates through an equation as follows:

$$B_1 = 0.005621Y_1 - 0.52694Y_2 - 0.62533Y_3 + 0.11337Y_4 \quad (6)$$

In this equation we can see which variable contributes the most in generating canonical variables. In the first canonical variable, the most contribution has variable Y_4 (Companies embracing disruptive ideas). We choose the first equation for further analysis because of the results presented in Table 3 (Sq. Cor 0.73455).

Table 6 shows the results of correlation between the dependent and canonical variables. It shows that the first canonical variable for set B (Entrepreneurial culture) is strongly negatively correlated with variable Y_1 (Attitudes towards entrepreneurial risk). The same variable is dominant in other canonical variables with negative values of Pearson's coefficients. The weakest correlation between dependent and canonical variables is between variable Y_1 and canonical variables B_2 and B_4 . Weak correlation is determined between variable Y_2 and all canonical variables except the first canonical variable. The same applies for variable Y_3 . There is a very weak correlation between variable Y_4 and canonical variables B_3 and B_4 , which is measured by Pearson's coefficient.

Table 7 shows the variance in the dependent canonical variable explained by each variable in the set and the variance among all variables in the set. Based on this result, we can see that 79.71% of variance in set B can be explained by the first dependent variable Y_1 (Attitudes towards entrepreneurial risk), 4.84% by dependent variable Y_2 (Willingness to delegate authority), 11.57% by variable Y_3 (Growth of innovative companies) and 3.87% by dependent variable Y_4

(Companies embracing disruptive ideas). Above, the first dependent variable (Attitudes towards entrepreneurial risk) can explain 58.55% of variance among all variables in set B. Other 0.85% variance among all dependent variable can be explained by variable Y_2 (Willingness to delegate authority), 1.11% by variable Y_3 (Growth of innovative companies) and 0.25% by dependent variable Y_4 (Companies embracing disruptive ideas).

Table 6. Correlations between DEPENDENT and canonical variables

Variable	1	2	3	4
Y1	-0.77050	0.06504	0.63309	-0.03610
Y2	-0.95531	0.02384	-0.02678	-0.29342
Y3	-0.95933	-0.09630	0.07132	0.25559
Y4	-0.87285	-0.42359	0.23754	0.04779

Source: Authors' calculation.

Table 7. Variance in DEPENDENT explained by canonical variables

CAN. VAR.	Pct Var DEP	Cum Pct DEP	Pct Var COV	Cum Pct COV
1	79.71164	79.71164	58.55203	58.55203
2	4.83758	84.54922	0.85329	59.40532
3	11.57568	96.12490	1.11180	60.51712
4	3.87510	100.00000	0.25855	60.77568

Source: Authors' calculation.

Table 8. Raw and specialized canonical coefficients for COVARIATES

COVARIATE	1	2	3	4
Raw coefficients				
X1	-0.01977	-0.04239	0.04034	-0.03950
X2	-0.02000	-0.03677	0.02892	0.05757
X3	-0.03938	0.08311	0.04462	0.03290
X4	-0.01230	0.10663	-0.05915	0.00781
X5	0.0037	-0.00991	0.02227	-0.03381
X6	-0.00229	-0.00645	0.02410	0.00583
X7	-0.02033	-0.04974	-0.06696	0.00096
Standardized coefficients				
X1	-0.24469	-0.52475	0.49937	-0.48898
X2	-0.24962	-0.45906	0.36103	0.71867
X3	-0.37892	0.79979	0.42936	0.31664
X4	-0.11613	1.00644	-0.55825	0.07373
X5	0.09769	-0.28704	0.64527	-0.97957
X6	-0.05563	-0.15657	0.58496	0.14161
X7	-0.28161	-0.68878	-0.92738	0.01323

Source: Authors' calculation.

The same procedure must be done for covariates (independent variables) as it was done when we determined the raw and standardized coefficients for dependent variables. One-unit increase in variable X_1 leads to a 0.01977 decrease in the first variate of Domestic competition and Trade openness. In the first variate of set A, all independent variables have negative values, except variable X_5 (Trade tariffs), but all variables have low values. This is characteristic for all coefficients.

Canonical covariates for Domestic competition and Trade openness can be written as follows:

$$A_1 = -0.24469X_1 - 0.24962X_2 - 0.37892X_3 - 0.11613X_4 + 0.09769X_5 - 0.05563X_6 - 0.28161X_7 \quad (7)$$

When we observe the correlation between covariates and canonical variables, one can see that there are mostly negative coefficients. The first canonical variable is strongly negatively dominant by all variables except X_6 whose correlation coefficient is positive but not very strong.

Results in Table 10 show what percent of variance among the covariate set can be explained by the first dependent canonical variate and the first covariate canonical variate. So, 41.19% of the variance among

set A is explained by the first dependent canonical variate, and 56.07% is explained by the first covariate canonical variate. Other variates among set A cannot be explained by the first canonical variate and first covariate canonical variate because of the low value of indexes.

Based on the presented result, it can be concluded that there are strong canonical correlations between canonical covariate Domestic competition and Trade openness and canonical variate Entrepreneurial culture with the correlation coefficient of 0.857 (Table 3). Canonical coefficient shown in Table 3 is calculated according to Equation 5. Because of the most significance the first canonical variable A_1 is chosen. The same applies to the canonical variable B_1 (Table 3). The relationship between canonical variates is shown in Figure 2. In the same figure, the standardized coefficients for dependent and independent variables are shown. There are strong correlations between the dependent variables and set B. Also, there are strong correlations between independent variables and set A. The first canonical pair is observed, therefore, 73.45% of the variation in A_1 can be explained by the variation in B_1 (Table 2). Also, it is statistically significant root by Wilks Lambda test (Table 3). The strong correlation between these canonical variables implies that the increase in Domestic competition and Trade openness is followed by an increase in Entrepreneurial culture.

Table 9. Correlations between COVARIATES and canonical variables

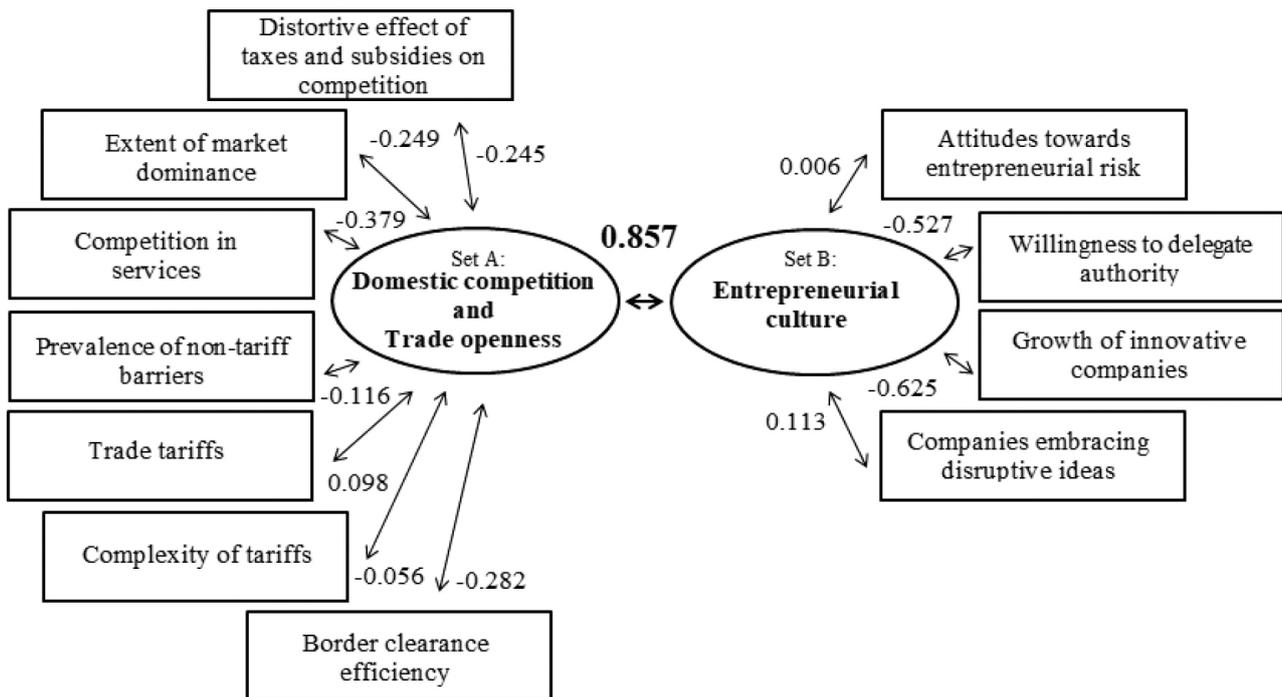
Covariate	1	2	3	4
X1	-0.83480	-0.13998	0.20490	-0.19448
X2	-0.86889	-0.23950	0.04555	0.21280
X3	-0.87081	0.33179	0.14306	-0.02787
X4	-0.78238	0.37476	-0.18724	-0.27900
X5	-0.51332	0.02036	0.03198	-0.75436
X6	0.40781	-0.04053	0.51485	0.31743
X7	-0.81937	-0.25199	-0.42430	-0.19149

Source: Authors' calculation

Table 10. Variance in covariates explained by canonical variables

CAN. VAR	Pct Var DEP	Cum Pct DEP	Pct Var COV	Cum Pct COV
1	41.18597	41.18597	56.06980	56.06980
2	0.99038	42.17635	5.61481	61.68461
3	0.74875	42.92510	7.79570	69.48030
4	0.82754	43.75264	12.40299	81.88329

Source: Authors' calculation.

Figure 2. Canonical correlation between Domestic competition, Trade openness and Entrepreneurial culture

Source: Authors

Since the canonical correlation analysis does not show a causal relationship between variables, linear regression analysis is also applied. In the regression analysis, the movement of the dependent variable Y_1 (Attitudes towards entrepreneurial risk) can only be explained by the first and the third independent variables (Distortive effect of taxes and subsidies on competition and Competition in services). The influence of these two variables is significant and positive (Table 11). So, if there is an increase in the Distortive effect of taxes on competition for one point that will cause an increase in the Attitudes towards entrepreneurial risk for about 0.2498. An increase in the Competition in services for one point will cause an increase in Attitudes towards entrepreneurial risk for 0.3534. When we talk about the second dependent variable, Willingness to delegate authority (Y_2), there are three independent variables which have a significant, positive impact on Y_2 . Those variables are: Distortive effect of taxes and subsidies on competition, Competition in services and Border clearance efficiency. The influence of those variables are: 0.2280 in the case of Distortive effect of taxes and subsidies on competition; 0.2907 in

the case of Competition in services and 0.2304 in the case of Border clearance efficiency.

In the case of the third dependent variable Y_3 (Growth of innovative companies) there are four independent variables which have statistically positive impact on it. Once there is an increase in the Distortive effect of taxes and subsidies on competition, Extent of market dominance, Competition in services and Border clearance efficiency for one point, there will be an increase in the Growth of innovative companies for 0.2012; 0.2792; 0.3096 and 0.2397 points, respectively. On the fourth dependent variable, Companies embracing disruptive ideas (Y_4), three independent variables have a statistically significant positive impact. An increase in the Distortive effect of taxes and subsidies on the competition for one point leads an increase of the dependent variable, Companies embracing disruptive ideas (Y_4), for 0.3071 points. An increase in the Extent of market dominance for one point leads to an increase of Y_4 for 0.3038 points and an increase in the Border clearance efficiency for one point leads to an increase of the Companies embracing disruptive ideas for 0.2651 points.

Table 11. Regression analysis for within cells error term

COV	B	Beta	Std. Err.	t-Value	Sig. of t	Lower -95%	CI- Upper
Y1 Attitudes towards entrepreneurial risk							
X1	0.1970004971	0.2497868975	0.08277	2.37999	0.019	0.03328	0.36072
X2	0.1692619242	0.2164362025	0.08619	1.96375	0.052	-0.00122	0.33975
X3	0.3584770475	0.3533565254	0.10379	3.45384	0.001	0.15318	0.56377
X4	-0.0062488564	-0.0060415413	0.11123	-0.05618	0.955	-0.022625	0.21377
X5	0.023561986	0.0633870850	0.03060	0.69789	0.486	-0.03917	0.08188
X6	0.0586908384	0.1459069416	0.03406	1.72323	0.087	-0.00868	0.12606
X7	-0.0105214792	-0.0149256507	0.07561	-0.13915	0.890	-0.16008	0.13904
Y2 Willingness to delegate authority							
X1	0.2094456554	0.2280001584	0.07574	2.76545	0.006	0.05964	0.35925
X2	0.1296377784	0.1423192586	0.07887	1.64379	0.103	-0.02635	0.28563
X3	0.3434898232	0.2906879957	0.09497	3.61695	0.000	0.15565	0.53133
X4	0.1255373864	0.1042033661	0.10177	1.23352	0.220	-0.15565	0.32684
X5	-0.0054837978	-0.0139739673	0.02800	-0.19585	0.845	-0.0776	0.04990
X6	0.0133014538	0.0283900535	0.03116	0.42683	0.670	-0.06087	0.07494
X7	0.1891510484	0.2303704050	0.06918	2.73402	0.007	0.05231	0.32599
Y3 Growth of innovative companies							
X1	0.1695027782	0.2011626775	0.06880	2.46372	0.015	0.03342	0.30559
X2	0.2333084337	0.2792346604	0.07164	3.25661	0.001	0.09160	0.37501
X3	0.3355607852	0.3095930616	0.08627	3.88973	0.000	0.16493	0.50620
X4	0.0522712707	0.0473018926	0.09245	0.56540	0.573	-0.13059	0.23513
X5	-0.0428788421	-0.1191209458	0.02544	-1.68582	0.094	-0.09319	0.00743
X6	0.0319519363	0.0743483060	0.02831	1.12870	0.261	-0.02404	0.08795
X7	0.1805844297	0.2397756235	0.06285	2.87338	0.005	0.05627	0.30489
Y4 Companies embracing disruptive ideas							
X1	0.2290248557	0.3071277052	0.06861	3.33811	0.001	0.09332	0.36473
X2	0.2246791428	0.3038557330	0.07144	3.14486	0.002	0.08337	0.36599
X3	0.1694845366	0.1766915934	0.08603	1.97007	0.051	-0.00068	0.33965
X4	-0.0129445466	-0.1323634547	0.09219	-1.40405	0.163	-0.31180	0.05291
X5	0.0042669279	0.0133944899	0.02536	0.16822	0.867	-0.04590	0.05444
X6	0.0434635864	0.1142786878	0.02823	1.53960	0.126	-0.01237	0.09930
X7	0.1766927557	0.2650997151	0.06267	2.81926	0.006	0.05273	0.30066

Source: Authors' calculation.

5. Concluding Remarks

Shaping an entrepreneurial culture is a complex process influenced by various factors. To encourage entrepreneurial activities, it is necessary to create an environment suitable for starting a business and operating small and medium-sized enterprises. The market situation is crucial for making decisions about starting businesses and creating new ideas. In this sense, the relationship between market competitors and the

way in which their relationships are regulated is essential. In addition, it is critical to assess the degree of the market openness to foreign trade, because the degree of competition in the domestic market, domestic companies' competitiveness, and the risk of doing business largely depend on it. For these reasons, this study deals with the relationship between the domestic competition, trade openness, and entrepreneurial culture.

The research results showed a strong canonical correlation between domestic competition, trade openness, and entrepreneurial culture, with a Pearson coefficient of 0.857. This result indicates a statistically significant relationship between indexes concerning domestic competition, which are predominantly directed towards measures of the competition policy. It means that the role of competition laws is crucial for the formation and development of an entrepreneurial culture, because they regulate the relations and behavior of market participants. Competition in services was the most dominant independent variable in generating the first canonical variable. In this sense, regulatory bodies should focus on promoting a policy that will create a market environment without an abuse of a dominant position and equal action of taxes and subsidies, while insisting on competition in services. In this way, it is ensured that all market participants have equivalent treatment without market barriers, which can encourage entrepreneurial ideas. In this way, the development of innovations in the economy is also stimulated because the principal bearers of innovative solutions are entrepreneurs. The negative coefficient in the growth of innovative companies in the formation of the Entrepreneurial culture appears because innovative product and services bring with them a new way of doing business that changes the previous entrepreneurial culture in a certain way. Promoting a new way of doing business that is riskier and relies heavily on digital innovation is essential. This is an urgent mission for national governments and the chambers of commerce.

Regression analysis showed that factors related to domestic competition are far more significant for entrepreneurial culture than those related to trade openness. This can be explained by the fact that, when entering the market, companies are more oriented towards evaluating the current market situation in terms of domestic competitors. Variables related to trade openness are not in focus so much because entrepreneurs, at the beginning, are not oriented towards the foreign market. On the other hand, foreign companies are mainly branches of transnational companies and cannot be considered direct competitors. In this context, the recommendation for regulatory bodies is to form special programs to introduce entrepreneurs to the possible risks and ways to engage in the market competition more efficiently.

The limitation of this research is reflected in the fact that the analysis was conducted for only one year. It is impossible to form a time series because data on GCI 4.0 is only available from 2018. Otherwise, the advantage of the analysis is that it covers a large number

of countries and that the canonical correlation captures the influence of a large group of variables on another large group of variables. Future research can conduct a more detailed examination of the relationship between individual sub-indexes of these pillars using other statistical methods. The results of this study can serve as a recommendation to regulatory bodies that their measures and actions should not be focused only on existing market undertakings, but should encourage the development of entrepreneurial ideas by creating an appropriate environment.

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