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Research of Comparative Advantages in the Context of Determinants of Cross-Border Mergers and Acquisitions in the European Area

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ABSTRACT

Cross-border mergers and acquisitions are considered to be a major global phenomenon that enables companies to create synergies for business, acquire assets, generate tax savings, gain access to new technologies, diversify business activities, increase the company's competitiveness and market value. The main goal of the paper is based on quantile regression analysis to identify the link between the number and volume of cross-border mergers and acquisitions in the European period 1998-2015 in the manufacturing and services sectors with revealed comparative advantage (or comparative disadvantage) and the degree of specialization calculated by the RCA 1 index, the Balassa index RCA 2 and the Michael index. In this paper, we discuss about the relative comparative advantage, Balassa index and Michaely index affecting the increase in the average volume of mergers and acquisitions going from the source economy to the target country over the period 1998-2015 in EU countries. The effects of independent variables (RCA 1, RCA 2 and MI) in source and target countries in the observed period 1998-2015 on the dependent variable (volume of realized cross-border mergers and acquisitions) were monitored in quartiles. We divided the volume of realized cross-border mergers and acquisitions into four equal groups, each of which represents a quarter of the data sample. Based on the results of the quantum regression, we found that the growing revealed comparative advantage and degree of specialization had a positive effect on the volume of cross-border mergers and acquisitions in the manufacturing and services sectors.

INTRODUCTION

Companies in the current global economic environment with a strategy of merging with their competitors in the form of mergers or acquisitions restrict competition in order to subsequently increase their profit margin (Erel et al., 2012).

Neary's theoretical model (2007) predicts that international differences in technology create incentives for bilateral mergers in which low-cost companies absorb foreign high-cost companies. As a result, cross-border mergers and acquisitions create more specialization in terms of comparative advantage, i.

they shift production and business models close to what would prevail in the competitive Ricardian world (based on technological differences between countries). However, relatively autarkic (self-sufficient) prices cannot be observed. Therefore, the empirical literature is based on the revealed comparative advantages (RCA) for the assessment of specialized country models.

The Revealed Comparative Advantage Index (RCA) is used to identify the most important goods of companies and to determine the target group of products for the country's exports. In the international economy, it is used to calculate the relative advantages or relative disadvantages of a particular country in a particular class of goods and services (Suwannarat, 2017; French, 2017).

The comparative advantage is the basic explanation for economists who follow the development of intersectoral trade. In theoretical models, the comparative advantage is expressed in terms of relative price ratios valued without trading (Yu et al., 2009).

The index of revealed comparative advantages RCA 1 is calculated as the logarithm of the share of exports and imports of the relevant commodity in total exports and imports (Kovar and Kormosova 2015).

The indicator of revealed comparative advantages is used to quantify the competitiveness of commodity trade, added product group or trade department (Podolak et al., 2007).

RCA 1 coefficient (WIFO methodology - Austrian Institute for Economic Research based in Vienna analyzing the competitiveness of transition economies of Central and Eastern Europe for the needs of the EU) - discusses the share of exports and imports of a given commodity group in total exports and imports (Heckova, 2008).

The Balassa indicator (RCA 2) is defined as the ratio between exports and imports of groups of goods and the sum of exports and imports of these groups of goods, thus pointing to the comparative advantage of exports and thus to their competitiveness (Balassa, 1965, pp. 90 - 124).

M. Michaely (1962, 1967) created the so-called country diversity index to measure the overall difference in the composition of the commodity trade. The value of the index ranges from 0-1; the higher the value of the index, the less similar the composition of exports and imports of the observed country. The Michael Index (MI) has a wide range of applications. Its use is recommended when measuring the degree of similarity of business models, e.g. comparison of import and export models of a country, export and import models of two countries or a group of countries, etc. (Coto-Milan, 2004).

It is also used as a measure of international trade specialization at the sectoral level (Keld Laursen 1998). The index is an excellent indicator of the dynamics of the country's export structure, the dynamics of the revealed comparative advantage. It mentions the intensity of change rather than its direction (Coto-Milan 2004). The Michaely index evaluates competitiveness at the industry level on the basis of the difference between the share of the surveyed commodity group in total national exports and the share of the surveyed commodity group in national imports (Heckova, 2008, p. 122).

1. METHODOLOGY AND STRUCTURE OF USED DATA

In this paper, we discuss about the relative comparative advantage, Balassa index and Michaely index affecting the increase in the average volume of mergers and acquisitions going from the source economy to the target country over the period 1998-2015 in EU countries.

We used quantile regression to identify the impact of uncovered / revealed comparative advantages (RCA 1, RCA 2) and the degree of specialization on the volume of cross-border mergers and acquisitions in manufacturing and service sectors in European countries for the period 1998-2015. MS Excel and R (3.4.3) with RStudio (1.1.442) were used for data processing and analysis. The dataset containing records of implemented cross-border mergers and acquisitions in the European area was based on data from the Zephyr database (Bureau van Dijk 2016), Eurostat and Freedom House.

The estimated regression model has the form:

$$M\&A = \beta_0 + \beta_1 RCA_{1i} + \beta_2 RCA_{1j} + \beta_3 RCA_{2i} + \beta_4 RCA_{2j} + \beta_5 MI_i + \beta_6 MI_j,$$

Table 1. List and description of used variables

<i>Variable</i>	<i>Variable description</i>	<i>Dependence of a variable</i>
M&A	Volume of realized cross-border mergers and acquisitions in the production and services sectors in the countries of the European area.	Dependent variable
RCA_{1i}	Indicator of uncovered / revealed comparative advantages in the source country.	Independent variable
RCA_{1j}	Indicator of uncovered / revealed comparative advantages in the target country.	Independent variable
RCA_{2i}	Balassa index an indicator of uncovered / revealed comparative advantages in source countries.	Independent variable
RCA_{2j}	Balassa index an indicator of uncovered / revealed comparative advantages in target countries.	Independent variable
MI_i	Michaely's index indicator of the degree of specialization in source countries.	Independent variable
MI_j	Michaely's index indicator of the degree of specialization in the target countries.	Independent variable

Source: own processing

2. DATA ANALYSIS AND RESULTS

The effects of independent variables (RCA 1, RCA 2 and MI) in source and target countries in the observed period 1998-2015 on the dependent variable (volume of realized cross-border mergers and acquisitions) were monitored in quartiles. We divided the volume of realized cross-border mergers and acquisitions into four equal groups, each of which represents a quarter of the data sample. The achieved results of quantile regression are shown in Table 2.

From the achieved results we see that in the first quartile of the values of the volume of realized cross-border mergers and acquisitions, the statistically significant regressor at the significance level $\alpha = 0.05$ independent variable RCA_{2i} (comparative advantage - Balassa index in source countries) and with its increase, the volume of realized cross-border mergers and acquisitions in the source countries of the European area in the manufacturing and services sectors are declining. As already mentioned in the definition of comparative advantage, the RCA 2 index indicates a comparative advantage resp. comparative disadvantage of the manufacturing and services sectors and at the same time points to their competitiveness. Based on the results, we can see that the RCA 2 index in the source countries is lower than 0, and thus the countries did not have a comparative advantage. Reduced investor activity in countries that did not have a comparative advantage affected the volume of cross-border mergers and acquisitions in the monitored countries (the lower the activity, the lower the volume of cross-border mergers and acquisitions).

In the second quartile, as in the first quartile, there is a statistically significant regressor at the significance level $\alpha = 0.05$, only the independent variable RCA_{2i} . The difference between the first and second quartiles lies in the fact that in the second quartile as the RCA_{2i} index increases, the volume of cross-border mergers and acquisitions in the manufacturing and services sectors increases, which explains the higher value of the RCA 2 index than 0, and thus source countries. European area in the manufacturing and services sectors had a comparative advantage. Source countries with a comparative advantage create an attractive and competitive environment for companies from target countries, which is characterized by modern and diverse infrastructure.

Table 2. Impact of comparative advantages (RCA 1, RCA 2) and degree of specialization (MI) in source and target countries in production and service sectors for the observed period 1998-2015

<i>Explanatory variable</i>	<i>Regression coef- ficient</i>	<i>Standard deviation</i>	<i>t value</i>	<i>Pr(> t)</i>
<i>First quartile</i>				
(Intercept)	10.88010	0.53628	20.28800	0.00000
RCA _{1i}	0.00096	0.00083	1.15621	0.24764
RCA _{1j}	0.00078	0.00072	1.08805	0.27662
RCA _{2i} – Balassa index	-0.00094	0.00042	-2.25903	0.02392
RCA _{2j} – Balassa index	0.00012	0.00036	0.33824	0.73519
MI _i	-0.00075	0.00082	-0.92084	0.35717
MI _j	-0.00043	0.00069	-0.61512	0.53850
<i>Second quartile</i>				
(Intercept)	1037.52041	78.87816	13.15346	0.00000
RCA _{1i}	-0.07796	0.12780	-0.61006	0.54185
RCA _{1j}	0.05027	0.10790	0.46587	0.64132
RCA _{2i} – Balassa index	0.15667	0.06458	2.42580	0.01530
RCA _{2j} – Balassa index	-0.00703	0.05155	-0.13639	0.89152
MI _i	0.02102	-0.12316	-0.17067	0.86449
MI _j	-0.08804	0.10317	-0.85331	0.39352
<i>Third quartile</i>				
(Intercept)	2102.12512	82.70108	25.41835	0.00000
RCA _{1i}	0.02125	0.12434	0.17092	0.86429
RCA _{1j}	0.13833	0.10661	1.29755	0.19449
RCA _{2i} – Balassa index	-0.04856	0.06731	-0.72150	0.47063
RCA _{2j} – Balassa index	-0.01739	0.04906	-0.35441	0.72305
MI _i	0.03438	0.11909	0.28867	0.77284
MI _j	-0.14085	0.10104	-1.39410	0.16334
<i>Fourth quartile</i>				
(Intercept)	3268.78333	68.40767	47.78387	0.00000
RCA _{1i}	-0.08941	0.10930	-0.81800	0.41339
RCA _{1j}	0.27250	0.09307	2.92783	0.00343
RCA _{2i} – Balassa index	-0.05059	0.05680	-0.89065	0.37316
RCA _{2j} – Balassa index	-0.03293	0.04311	-0.76367	0.44509
MI _i	0.05611	0.10355	0.54181	0.58797
MI _j	-0.29116	0.08816	-3.30253	0.00096

Source: own processing

The Legend: 1. quartile $\alpha=0.05$; 2. quartile $\alpha=0.05$; 3. quartile $\alpha=0.2$; 4. quartile $\alpha=0.05$

In the third quartile of values of the volume of realized cross-border mergers and acquisitions, the statistics are a significant regressor at the significance level $\alpha = 0.2$ independent variable RCA_{1j} (comparative advantage in target countries) and independent variable MI_j (degree of specialization in target countries). From the achieved results we see that with the increase of the RCA_{1j} index, the volumes of cross-border mergers and acquisitions also increase, as the value of the RCA_{1j} index was greater than 0, which indicates a competitive environment in the manufacturing and services sectors. The second statistically significant regressor represents an increase in the independent variable MI_j, on the basis of which there was a decrease in the volume of cross-border mergers and acquisitions in the target countries of

the European area. The Michaely index identifies the average degree of specialization resp. insufficient average degree of specialization in the production and services sectors in the monitored countries. The consequence of the decrease in the volume of cross-border mergers and acquisitions in the target countries is probably due to the insufficient specialization of countries in the manufacturing and services sectors, which made companies not exceptional for source companies looking for lucrative countries with benefits for different forms of mergers.

For the fourth quartile of values of volumes of cross-border mergers and acquisitions, two regressors at the significance level $\alpha = 0.05$ are statistically significant, namely the independent variable RCA_{1j} (comparative advantage in target countries) and the independent variable MI_j , (degree of specialization in target countries). With the independent variable RCA_{1j} there was an increase in the volume of cross-border mergers and acquisitions (the value of the index RCA_{1j} was greater than 0) and with the independent variable MI_j , (the value of the index MI_j , was less than 0) a decrease in the volume of cross-border mergers and acquisitions in the target countries of the European area. The decline in the volume of cross-border mergers and acquisitions in the manufacturing and service sectors in the countries of the European area was negatively affected by the low level of specialization in the sectors. In order for economies to specialize in production and service provision, it is necessary that national factors of production be allocated efficiently and that foreign investment coming to the target countries be integrated. Therefore, it is necessary to build strong industries with a flexible economy with a dynamic and adequately educated workforce.

3. GRAPHICAL ANALYSIS OF QUANTILE REGRESSION

In quantile regression, it is more interesting to graphically represent parameter estimates for individual quantiles with corresponding confidence intervals. Information on the nature of the data can be read from the graphical representation. Figure 1 shows the graphical output of the quantile regression of the considered model. The red line represents the regression line estimated by the Ordinary least squares (OLS) method. The red dashed line represents the conflicting least squares regression interval of the OLS with a 95% confidence interval. The black dashed line shows the parameter values for the individual explanatory variables depending on the selected quartiles (quantile regression estimation). The grey area represents the corresponding 95% confidence interval of the quantile regression estimates. Intercept is an autonomous constant and from this point of view it makes no sense to interpret it.

From the graphical output of quantile regression, we see that the statistically most significant results were recorded for the regression coefficients RCA_{1j} (comparative advantage in target countries), RCA_{2j} (Balassa index of source countries) and MI_j (degree of specialization in target countries), in which we can observe the largest differences between least squares regression (OLS) and quantile regression. In the index of comparative advantages RCA_{1j} in the target countries, as we see that the development of the volume of cross-border mergers and acquisitions in the first quartile developed so that as the value of the RCA_{1j} index decreases, so does the volume of cross-border mergers and acquisitions in the manufacturing and services sectors for the monitored period of years. In the second quartile we see a directly proportional relationship between the RCA_{1j} index and the volume of cross-border mergers and acquisitions, ie with the increasing RCA_{1j} index, the volumes of cross-border mergers and acquisitions also increase. The growth in the volume of cross-border mergers and acquisitions in the target countries mainly affects the competitiveness of the productive or service sectors in individual countries, ie companies are looking for sectors that have a strong market position. At the turn of the second and third quartiles, the rising RCA_{1j} index became declining, which represented the same declining trend for the volume of cross-border mergers and acquisitions. In the third quartile, the volume of cross-border mergers and acquisitions began to increase, depending on the RCA_{1j} index. In the last fourth quartile, the volume of cross-border mergers and acquisitions realized declined, which was influenced by the declining comparative advantage in the target countries of the European area. The decline in cross-border mergers and acquisitions in the first quartile, the turn of the second and third quartiles and the fourth quartile was significantly affected by declining national GDP, global financial instability, declining oil prices and deteriorating export prospects.

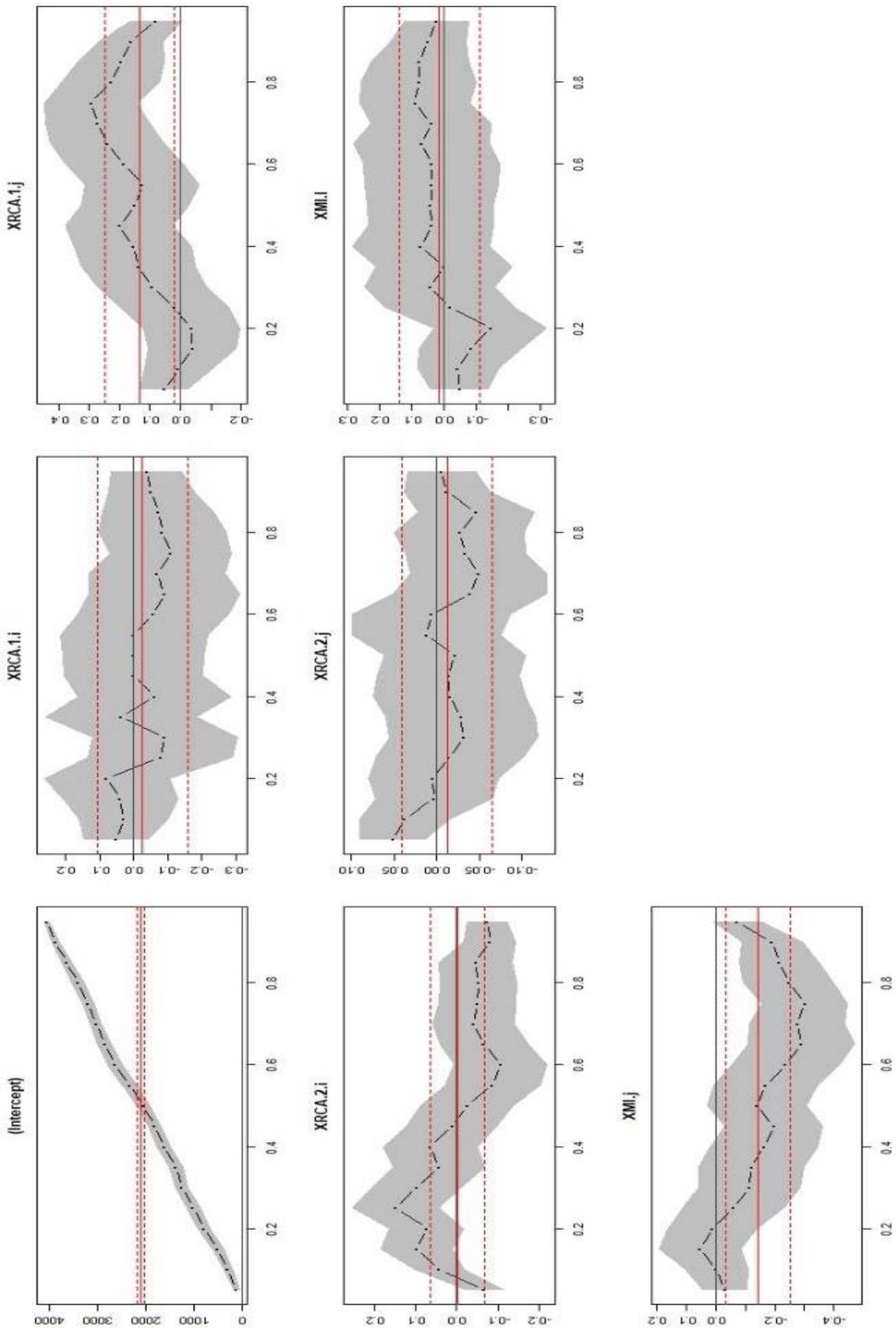


Figure 1. Graphic output of quantile regression of the considered model in the countries of the European area for the observed period 1998-2015

Source: own processing

The second interesting explanatory variable is the Balassa index RCA_{2i} in the source countries. From the graphic representation we see that in the first quartile, the volume of realized cross-border mergers and acquisitions with increasing value of the index RCA_{2i} increases the volume of realized cross-border mergers and acquisitions in source countries in the sectors of production and services. In the second and third quartiles, the volume of cross-border mergers and acquisitions in source countries was declining, depending on the declining RCA_{2i} index, which was negatively affected by financial uncertainty in countries and insufficient demand for goods and services produced or provided by countries.

In the fourth quartile, the volume of cross-border mergers and acquisitions realized can be considered independent of the RCA_{2i} index. This means that the volume of cross-border mergers and acquisitions is not dependent on the growth or decline of the RCA_{2i} index, so the value of the RCA_{2i} index may have a declining trend, but the volume of cross-border mergers and acquisitions may increase in the manufacturing and services sectors in the source countries of the European area. This was mainly due to the fact that the index RCA_{2i} did not reach a statistically significant value.

With the explanatory variable of the Michael index in the target countries, an increase in the volume of realized cross-border mergers and acquisitions in the production and services sectors in the target countries can be observed until the middle of the first quartile, depending on the increase in the MI_j index. From the middle of the first quartile to the beginning of the fourth quartile, the volume of cross-border mergers and acquisitions decreases with decreasing index MI_j , and thus in declining production and services sectors the degree of specialization in those sectors that could be mergers or acquisitions attractive to companies from source countries in the European area. The fourth quartile is characterized by an increase in the volume of cross-border mergers and acquisitions, which is directly proportional to the growing index MI_j in the target countries. Countries in which individual sectors specialize are considered to be attractive and desirable locations in which they strengthen their competitiveness, thereby contributing to export growth and having the potential for further economic growth.

4. DISCUSSION AND CONCLUSION

The main goal of the paper was to identify, based on quantile regression analysis, the interconnect- edness of the number and volume of cross-border mergers and acquisitions in the period 1998-2015 in the manufacturing and services sectors with revealed comparative advantage (or comparative disadvantage) and degree of specialization calculated by RCA 1, Balassa the RCA 2 index and the Michael index. From the results of the quantile regression analysis, we found that in the first quartile with a declining comparative advantage calculated by the Balassa index, the volume of cross-border mergers and acquisitions in source countries also decreased. In the second quartile, with a growing comparative advantage calculated by the Balassa index, the volume of cross-border mergers and acquisitions in source countries also increased. In the third and fourth quartiles, with a growing comparative advantage calculated by the RCA 1 index, the volume of cross-border mergers and acquisitions in the target countries also increased, but with the declining level of specialization (ie the Michael index), the volume of cross-border mergers and acquisitions decreased.

Based on the results of the quantum regression, we can state that the growing revealed comparative advantage and degree of specialization had a positive effect on the volume of cross-border mergers and acquisitions in the manufacturing and services sectors in the European area.

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