1.4   References

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There are four common ways of solving the outlier problem that can be found in the literature:

- **Winsorising the outliers**

This procedure has been applied in several works to solve the outlier problem (e.g. Shumway, 2001; Beaver et al., 2005). Winsorising represents an analogy of the   winsorised mean, which can be described as follows (Meloun and Militký, 2002):

$$\bar{x}_w\left(\vartheta\right) = \frac{1}{n}\left[(M+1)\left(x_{(M+1)} + x_{(n-M)}\right) + \sum_{i=M+2}^{n-M-1} x_{(i)}\right]$$

where:

$$M = \mathrm{int}\left(\frac{\vartheta n}{100}\right)$$

and $\vartheta -$ the percentage of the "cut-off" order statistic, $x_{(i)} -$ i[th] order statistics, n – number of observations.

Usually the ϑ percentage is set to a value of 0.5 or 1 percent. Winsorising of the variables means that values above the 99th percentile or below the 1st percentile are recoded to the nearest non-outlier value.

- **The exclusion of outliers**

An alternative approach to winsorising outliers is to exclude from the sample observations that lie outside the interval (µ-3σ, µ+3σ). Such an approach has been applied by, for example, Mileris and Boguslauskas (2011). The drawback of this approach is that it may lead to a reduction in the data sample.

Due to drawbacks of total accuracy, the ROC approach and the corresponding AUC values as the performance measures of learning algorithms (and thereby of distress prediction models) are becoming preferable measures of learning algorithm performance. Bradley (1997) summarises the need lying behind the creation of ROC as follows: *"there is a need for a single measure of classifier performance that is invariant to the decision criterion selected, prior probabilities, and is easily extended to include cost/benefit analysis"*, and added that such features were not met by the total accuracy measure or specificity and sensitivity.

Figure 2.3. An example of an ROC curve
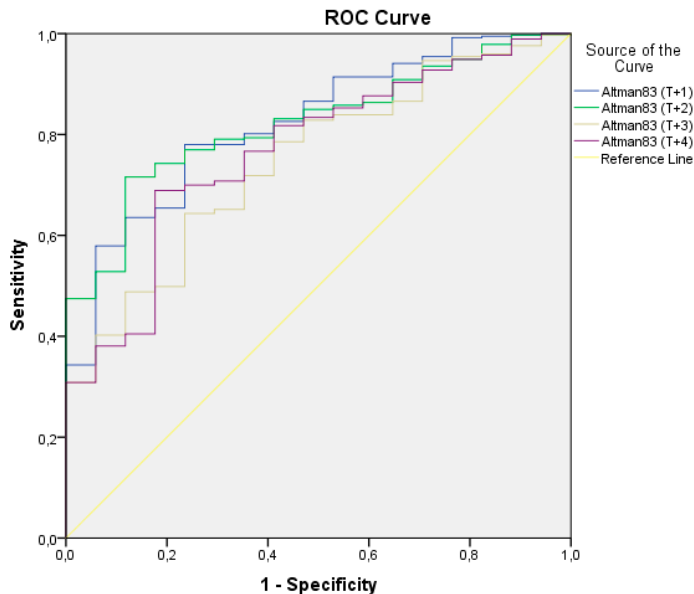
Source: the author's own processing using SPSS

3.6.5 Detailed description of the steps proposed in the flowchart

The final model was derived in several steps that address most of the issues that influence model quality. Every step results in a different variant of the model. The model derivation process lies in sequential comparison of each model variant with the employment of information criteria (Akaike and Bayes).

The first steps lie in the definition of an initial model that would later serve as a benchmark. The Bayesian Information Criterion (BIC) was chosen instead of total accuracy for evaluating the model development in the coming steps. The reason behind this is that the BIC penalises a growing number of model parameters, for which reason such employment would take control of the model's overfitting problem. The lower the BIC, the more accurate the model. The logit model was chosen as it is a more flexible tool than MDA and allows for such a criterion (BIC).

The preselection procedure was applied three times resulting in three different (pre-final) models, which would later be compared (in terms of BIC). First Welch's test will be utilised, followed by the chi-square test (after binning the variables) and finally the CART procedure. Each method is based on a different assumption, for which reason they lead to an alternative choice of variables and, thereby, a different model. The first predictor subsample will be identified like this, though in a rather univariate way.

Principal Component Analysis (PCA) will be conducted before derivation of the logit model. The PCA would serve as a tool for avoiding multicollinearity, which would otherwise have a negative influence on the logit-based model. The PCA procedure application is not always appropriate, and a correlation matrix would be used if the preselection leads to a limited number of variables.

Table 3.13. Component Matrix – Welch's test subsample

Indicator/component	1	2	3
CL/S	-0.078	0.008	-0.155
PCF/TL	0.547	-0.006	0.384
ART	0.008	-0.034	0.027
PCF/INT	0.464	**0.854**	-0.118
PCF/CL	0.618	-0.301	-0.136
C/CL	0.739	-0.413	-0.216
C/TA	0.392	-0.096	0.025
CR	**0.722**	-0.401	-0.225
EBIT/INT	0.467	**0.862**	-0.12
EBITDA/INT	0.466	**0.857**	-0.117
FA/LTL	0.076	0.057	0.73
Int. A/TA	-0.062	0.02	-0.046
lnS	0.004	0.203	0.339
OR/CL	**0.828**	-0.395	-0.014
OR/LTL	0.073	0.063	**0.748**
OR/TL	0.555	-0.033	0.486
CF/NWC	-0.003	-0.004	0.006
OCF/INT	0.4	**0.73**	-0.098
PM	0.127	0.009	0.118
QA/S	-0.006	-0.037	-0.274
S/CL	**0.822**	-0.404	-0.012

Source: the author's processing based on the Amadeus database

In line with the PCA assumption, the components should be uncorrelated with each other. However, there are several ratios correlated with each component, which might suggest that these variables are correlated with one another. Based on the component matrix, there are three groups of variables related to one of the components.

○ The first group (correlated to component one) consists of variables dealing with solvency features, i.e. current ratio (CR) or current

Figure 4.2. The ratio of completed M&As to GDP
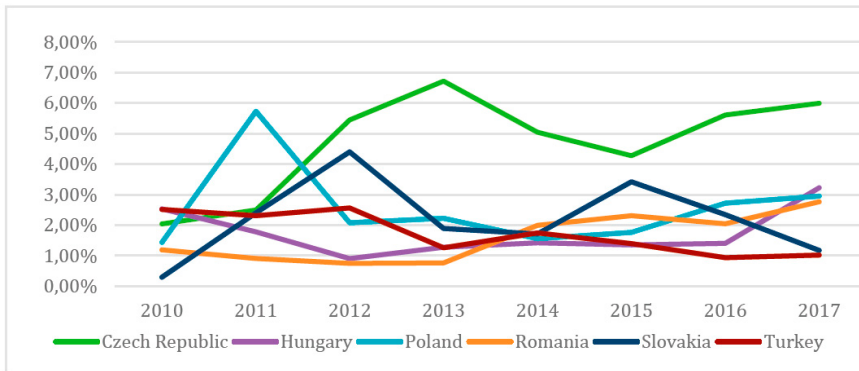
Source: the authors' results based on EY (2012, 2014, 2016, 2018a)
and EUROSTAT (2018)

The current seventh wave was probably caused by low interest rates and surplus liquidity in certain types of entity.[1] The interest in corporate mergers is also indicated by a research study conducted by Ernst and Young (EY, 2018b) in the Czech Republic. According to the results, one in five managers consider identifying and exploiting growth opportunities, which may take the form of an M&A, as the most important point on their agenda. Business managers state that the most important reason for merging companies is innovation and the acquisition of professional staff. Only 27% of managers plan mergers with another company on the domestic market. The remain-

[1] The impulses driving mergers (M&A waves) differ over time. Horizontal transactions were primarily realised, i.e. monopolisation of specific markets took place, during the first wave (at the turn of the 20th century). In the second wave (before the Great Depression), vertical M&As leading to the formation of oligopolies predominated. The third wave (during the 1960s) was characterised by conglomerate mergers, i.e. mergers outside the original line of business of the acquirer. The next wave (at the turn of the 1980s and 1990s) can be called the first worldwide wave and hostile M&As often took place. The fifth wave (at the turn of the millennium) is mainly represented by mega-transactions and the resulting globalisation. The last, sixth, wave (before the financial crisis) was mainly associated with the development of hedge funds and private equity.

Figure 4.4. Year of merger implementation
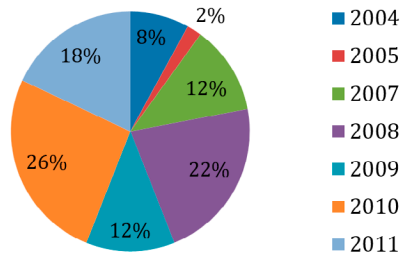
Source: the authors' results

Many mergers from 2004 to 2006 could not be included in the research due to the unavailability of financial statements and annual reports. On the other hand, the sample structure indicates that the number of mergers increased during the economic downturn, i.e. financially strong and competitive companies bought up companies facing financial difficulty.

Figure 4.5. Characteristic of the research sample
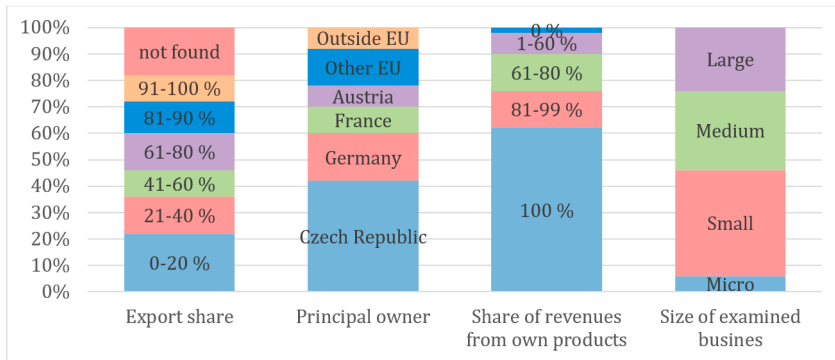
Source: the authors' results

We can state that more than a third of these companies are export-oriented because their exports generate more than 60% of sales (Fig-

5.3 Determinants for Acquirers' Behaviour on the Romanian Acquisitions Market

## 5.3.1 Evolution and characteristics of the Romanian market for corporate acquisitions

Europe is a complex continent, whether viewed from an economic, political or social point of view. It is considered the birthplace of Western civilisation, as a sum of political systems, social values and technologies specific to western countries, but also to other regions, formerly or presently connected to Europe through colonisation, influence or immigration. On the other side, Europe is a continent where many ex-communist countries are located, Romania included.

Romania began the transition to a free-market economy in 1991, when its constitution was published, followed by its membership in NATO in 2004, and accession to the European Union in 2007. Although Poland, the Czech Republic and the Baltic States (Estonia, Lithuania and Latvia) confirmed, in 1993, the thesis that radical reforms really work, for the other ex-communist countries forming the OECD group known under the acronym CEECs (Central and Eastern European Countries), lack of experience and expertise could no longer be considered as arguments to justify the lack of reforms or their insufficiency (Blejer and Šcreb, 2006). According to Bruzst (2002), there are three characteristics of the states in ex-communist countries, Romania included, which differentiate them from the advanced capitalist societies: an inability to create a predictable policy environment, a lack of capacity to prevent the use of state institutions by powerful private groups, to distribute wealth and opportunities to

Figure 5.4. The number and value of Romanian minority acquisitions
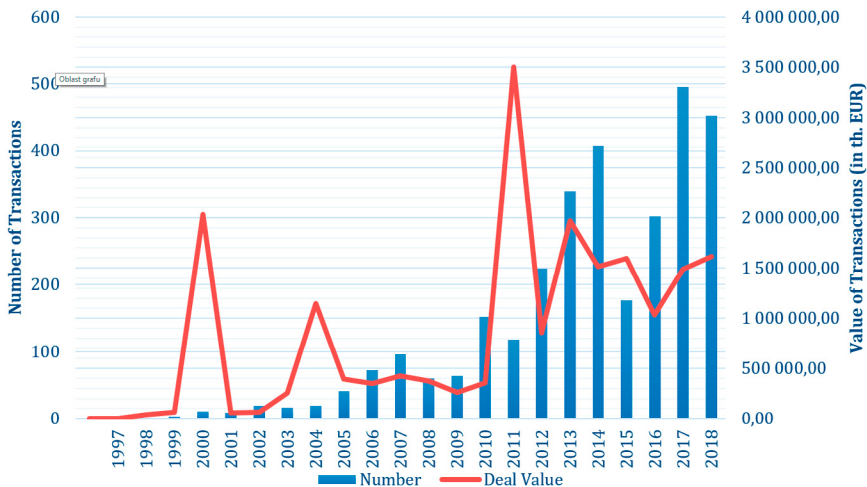
Source: authors' own processing

As shown in Figures 5.3 and 5.4, in Romania, after 2009, the acquisitions market contained a large number of transactions, characterised by a small-purchased stake and a low deal value. According to a previous study, they are the result of the politics of the foreign companies, which are interested in small companies that apply local GAAP, thus costing less than a company which applies IFRS (Aevoae et al., 2019).

From a legal perspective, different regulations apply if an acquirer chooses either a privately-owned target or a state-owned company. In this context, the target's corporate form and whether it is listed on the capital market are of great importance.

The share acquisition in a private-owned target company follows the normal track, depending, of course, by the legal form of the acquired company. In the case of unlisted joint stock companies, share transfer

Table 5.9. Variables proposed for analysis

Variables	Representation	Description	Explanation
Stake	Ln(stake) – numeric variable	Dependent variable	The percentage purchased in the target companies (0.001–50%). Information collected from the Zephyr database, for the 2010–2019 period.
Cash	Dummy variable 1. Cash 0. Other methods of payment	Independent variable	The method of payment chosen by the acquirer, to pay for the securities purchased in the target company. Information collected from the Zephyr database, for the 2010–2019 period.
Market capitalisation (mktcap)	Numeric variable – discrete	Independent variable	The market capitalisation is calculated by multiplying the quotation of a share with the number of shares of the target. company, pondered with the stake. Information collected from the Orbis database and the Zephyr database for the 2010–2019 period.
Premium	Numeric variable – discrete	Independent variable	The premium is calculated as the difference between the deal value (collected from the Zephyr database for the 2010–2019 period) and the market capitalisation, corresponding to the purchased stake.

Source: authors' own processing.

Given that relatedness between assets and/or core activities of the acquirers and target companies was proved to have an influence on the performance of M&As (Hussinger, 2010), the study includes three dummy variables which are based on the NACE Rev.2 main code of the acquirer and the target before the M&A took place.

Related acquisitions. This variable (*R_acq*) was defined as a dummy variable, where 1 represents a related acquisition and 0 represents others. Related acquisitions were measured in terms of the similarity of the industries of the acquirer and the target, based on the three-digit level of the NACE Rev.2 classification. The NACE Rev.2 codes, for both the acquirer and the target, were taken from the Orbis database for the 2010–2019 period.

Unrelated acquisitions. This variable (*UnR_acq*) was defined as a dummy variable, where 1 represents an unrelated acquisition and 0 represents others. Unelated acquisitions were measured in terms of