Investigation of Baltic States Stock Market Listed Companies' Financial Ratios

[Aija Pilvere-Javorska]

Abstract— **Financial statement analysis is used by investors, creditors, security analysts, bank lending officers, managers, auditors, taxing authorities, regulatory agencies, labour unions, customers, and many other parties who rely on financial data for making economic decisions about a company. Growth of companies is therefore essential for the development process. One of the ways how companies attract external financing for development is to list them on the stock market. The stock markets in the Baltic States has not extensively analysed in detail on listed companies' financial statement level. Therefore, the aim of this study is to analyse in the Baltic States stock market listed companies' financial ratio variables. Research results reveals the portrait of Baltic States listed company based on their financial ratios and discovers which ratios and on what level explain variability in their financial statements. Financial ratio variables indicate strong correlations between debt to equity and financial leverage, and for debt to capital and debt to assets. In the factor analysis author reduced 11 variables to 5 complex factors which explains the variance of 74%. Cluster analyses groups the Baltic States stock markets listed companies in 4 clusters and 2 outliers. Factor and cluster analysis reveal that the Baltic States stock market has mostly medium-sized (42 out of 50) listed companies. Thus, in order to activate this market, policy makers need to focus on attracting more medium-sized and small companies.**

Keywords—**companies, stock market, financial ratio, analysis.**

I. **Introduction**

The financial analysis of the companies is important both for the company itself, its cooperation partners and potential investors. Financial statement analysis is a process, which examines past and current financial data for the purpose of evaluating performance and estimating future risks and potential. Financial statement analysis is used by investors, creditors, security analysts, bank lending officers, managers, auditors, taxing authorities, regulatory agencies, labor unions, customers, and many other parties who rely on financial data for making economic decisions about a company (Analysis and Use..., n.d.). Entrepreneurial firms are the backbone of economies and drivers of both economic development and employment (Bellavitis et al., 2017). Empirical results using an instrumental variable approach show that corporate social responsibility has a positive relationship with financial performance (Akben-Selcuk, 2019). M.Hang et al. (2020) stress that "in line with the observation that companies often account for financial decision as integral part of corporate management, more recent theory states that financial decisions might affect firm value".

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G.Bottazzi et al. (2014) find that financial constraints undermine average firm growth, induce anti-correlation in growth patterns and reduce the dependence of growth volatility on size.

A.Paolo and A.Generale (2008) find that financially constrained firms, identified using various proxies, are smaller than the others (their firm size distribution is more skewed to the right). Although entrepreneurs could resort to internal sources, this can be difficult ... and could limit their growth potential (Ferrucci et al., 2020). T.Beck and A.Demirguc-Kunt (2006) point out that…we see that in the absence of well-developed financial markets and legal systems, it is difficult for firms to grow to their optimal size since outside investors cannot prevent appropriation by corporate insiders, limiting firm size.

While cross-country research sheds doubt on a causal link between Small Medium Enterprises (SME) and economic development, there is substantial evidence that small firms face larger growth constraints and have less access to formal sources of external finance, potentially explaining the lack of SMEs' contribution to growth. ...a competitive business environment, of which access to finance is an important component, facilitates entry, exit and growth of firms and is therefore essential for the development process. A focus on improving the business environment for all firms is more important than simply trying to promote a large SME sector which might be characterized by a large number of small but stagnant firms (Beck, Demirguc-Kunt, 2006). ...for domestic firms, lower collateral and higher leverage always result in higher failure probabilities, while financial variables either do not significantly affect the survival probabilities of globally engaged firms, or exert a smaller impact on them (Bridges, Guariglia, 2008). Firms' ability to access external financial resources represents a factor influencing several dimensions of firm dynamics, as the links between financial and operational activities of firms involve many types of decisions, pertaining, for instance, investment strategies, the ability to enter or survive in a market, job creation and destruction, innovative activity, and internationalization patterns (Bottazzi et al., 2014). Information asymmetries between insiders and external potential investors and stakeholders are magnified by the overlap of ownership and management in most of the young and small firms (Biancalani et al., 2020). E.Cefis et al. (2020) stress that "the availability of economic, financial, and innovation data at the beginning of the financial crisis allows us to estimate a survival model in which the inclusion of interacted variables give us the opportunity to ascertain the effect of the financial structure on the survival premium that firms could have enjoyed even during bad times".

One of the ways to attract companies for external financing for development is to list them on the stock market. New

equity financing, in the form of the initial public offering, is very important and permits a major increase in firm size. After going public, comparatively few firms make heavy use of external financing (Carpenter, Petersen, 2002). The stability of capital structure over time suggests that the factors driving cross sectional variation in leverage ratios are stable over long horizons as well. Additionally, … among private firms and after initial public offerings, these factors appear to be largely unaffected by the changes in capital market access, distribution of control, and information environment that occur at the time of the Initial public offering in the stock market (Lemmon et al., 2008). However, research shows that in Europe, the stock market in some countries or groups of countries is underdeveloped. But with changing investor and market behavior, the European Union (EU) focus is now towards reducing market abuse (recent new regulation and directive) and setting uniform and more transparent standards and requirements for the prospectuses and investment bank/brokerage pricing, deal execution and insider information handling (Pilvere-Javorska et al., 2019b). For example, ...in Italy, as in many other bank-based continental European countries, the capital market is not yet a valid alternative to bank loans... (Ferrucci et al., 2020). S. Bridges and A. Guariglia (2008) pointed out that ....in the United Kingdom (UK), global engagement affects firms' survival probabilities by shielding them from financial constraints. Poland is still an emerging market with a relatively young capital market that continues to catch up with Western Europe. Due to the political system changes and reforms implemented after 1989 in Poland and other Central and Eastern European countries, the economic growth was rapid, encouraging new investors to allocate their resources and develop their businesses in this region (Malecka, Luczka, 2017). R. Horvath and D. Petrovski (2013) indicates that the stock market integration between Central Europe and Western Europe is high with the values typical for most major stock markets in the developed countries. South Eastern European stock markets exhibit a much lower degree of integration, but also show more heterogeneity. L.T. Orlowski (2020) concludes that "the obtained impulse responses suggest that further capital markets integration and a stronger reliance on market-based financing in the EU, particularly in the euro area, will likely stimulate economic growth". Stock market capitalization in the EU (as per cent of Gross Domestic Product, end of 2013) were the lowest in Latvia (4%), Slovakia (6%), Lithuania (8%), Cyprus (9%) and Estonia (10%) (Quaglia et al., 2016). Barring Poland whose market capitalization is around US$200 billion, the remaining Central and Eastern European Countries stock markets have a market capitalization less than US$22 billion (Czech Republic, Croatia, and Romania) even less than US$4 billion (Estonia, Latvia or Lithuania) and are likely to be dominated by institutional investors, very often originated from developed markets like Germany, UK, or the United States of America (Botoc, Anton, 2020). Baltic States shows different development patterns and trends among them in terms of listed companies and their capitalization on the stock market (Pilvere-Javorska et al., 2019a). The stock markets in

the Baltic States have previously received little attention in the literature. In addition, given a common institutional setup in terms of a common owner and trading platform, institutional investors can trade on all three markets with relative ease (Brännäs, Soultanaeva, 2011). P.D.Alexakis et al. (2016) suggest that some possibilities exist for an effective portfolio diversification into the Baltic region. However, investors should be cautious about simultaneously investing in emerging Baltic markets that exhibit pure contagion in no specific pattern, since a shift in investors' risk appetite is likely to disappear the portfolio benefits when are most wanted. From policy makers' perspective, this study highlights the need for uncovering and coordinating possible decoupling strategies in order to protect the emerging Baltic markets from contagion during future crises.

Therefore, the aim of this study is to analyze in the Baltic States stock market listed companies' financial ratio variables, to make recommendations to policy makers for market activation.

II. Methodology

In this research are presented and analysed data of listed companies in the Baltic States, on Stock Exchanges of Tallinn, Riga and Vilnius. Selected were all the listed companies, and then excluded were financial companies due to their leverage being influenced by different factors compared to non-financial companies. Due to the lack of financial data First North Baltic Share List listed companies were also excluded. Another significant research limitation is survivorship biases: since data for the listed companies were taken as of July 24, 2019, thus it excludes all previously delisted companies from those Stock Exchanges during reviewed period, which is from 2004 to 2019, as well as it includes only limited data of other listed companies as of the moment of listing, if they were listed later during review period. Overall maximum number of listed companies at any particular reviewed time with data were 54 in the Baltics States. Next step evaluated obtained indicators and variables results, and eliminated were companies were indicators and variables values resulted as 0 or were missing. Thus, recognized as usable and correct were 50 Baltic States stock market listed companies for *factor and cluster analysis*.

One absolute value indicator is used to be able to classify by size the companies and determine whether there are commonalities and similarities across listed companies' financial profile - *Market capitalization* - market value of company's shares (in the mill. EUR) and 10 financial ratio variables were analysed using IBM SPSS Statistics 26 (Statistical Package for Social Sciences):

$$\text{Debt to equity} = \frac{short\ term\ debt + long\ term\ debt}{total\ equity} \qquad (1)$$

$$\text{Debt to capital} = \frac{short\ term\ debt + long\ term\ debt}{total\ debt + total\ equity} \qquad (2)$$

$$\text{Debt to assets} = \frac{short\ term\ debt + long\ term\ debt}{total\ assets} \qquad (3)$$

$$\text{Financial leverage} = \frac{total\ assets}{total\ equity} \qquad (4)$$

$$\text{Liquidity ratio} = \frac{current\ assets}{current\ liabilities} \qquad (5)$$

$$\text{Cash ratio} = \frac{total\ cash\ and\ cash\ equivalents}{current\ liabilities} \qquad (6)$$

$$\text{Debt to EBITDA} = \frac{short\ term\ debt + long\ term\ debt}{EBITDA} \qquad (7)$$

$$\text{Debt to CFO} = \frac{short\ term\ debt + long\ term\ debt}{CFO} \qquad (8)$$

$$\text{Debt to CFF} = \frac{short\ term\ debt + long\ term\ debt}{CFF} \qquad (9)$$

$$\text{Debt to FCFF} = \frac{short\ term\ debt + long\ term\ debt}{FCFF} \qquad (10)$$

where:

EBITDA - Earnings Before Interest, Taxes, Depreciation, and Amortization;

CFO - Cash Flow from Operations;

CFF - Cash Flow from Financing Activities;

FCFF - Free Cash Flow to the Firm.

Financial ratios analysis as an analytical technique is used in assessing the performance of the business enterprise (Altman, 1986). Financial ratio analysis ... is easy to calculate and also readily available in sources such as financial databases, companies' financial reports (Oberholzer, 2011). Top management, financial analysts and investors can rely on a specified set of financial ratios in their evaluation for each financial and operational performance of companies and when making decisions (Arkan, 2016). Financial ratios have long been considered as good predictors of business failure and are proved to accurately discriminate between failed and non-failed companies several years prior to failure (Moscalu, Vintila, 2012).

Analysis were performed using 2 methods: 1) *factor analysis:* to precisely identify the relationships between the different companies' capital structure indicators in the Baltic States stock market listed companies; 2) *hierarchical cluster analysis*: to obtained an agglomeration of the different companies' capital structure indicators in the Baltic States stock market listed companies. *K-means cluster analysis* was used to group Baltic States stock market companies in the predetermined by elbow rule number of clusters.

Factor Analysis is considered an interdependence method for dealing with metric data. Factor analysis is a multivariate statistical procedure that has many uses…. Firstly, factor analysis reduces a large number of variables into a smaller set of variables (also referred to as factors). Secondly, it establishes underlying dimensions between measured variables and latent constructs, thereby allowing the formation and refinement of theory. Thirdly, it provides construct validity evidence of self-reporting scales (Fabrigar, Wegener, 2012; Zygmont, Smith, 2014; Williams et al., 2010).

Hierarchical cluster analysis aim is categorizing, i.e., the creation of groups of objects to their similarities (King, 2015) and it was done in 2 steps: first using hierarchical clustering method and based on the obtained agglomeration schedule and then applying elbow rule, obtained the number of clusters to be

used as input for step two – K-means cluster analysis. The concept of K-means cluster is to create k number – used defined number of clusters – which should group observations in clusters, where observations in one cluster are as similar as possible, while clusters must be as different from each other as possible.

Financial indicators were obtained from Bloomberg data base in 2019 and calculated of each sample listed company during research period in 2004-2018 (Bloomberg L.P., 2019).

III. Results and Discussions

A. *Baltic States Stock Market Listed Companies' Factor Analysis*

When analysing 50 Baltic States stock market listed companies' 11 calculated financial ratio variables, Author established that KMO measure of sampling adequacy is 0.541 ant it is larger than 0.5, that can be conclude that sample is acceptable for factor analysis, however one should note that it is low. Bartlett's Test Sig.=0.000 which is less than 0.05 and thus the variables are unrelated. Next component of factor analysis is communalities analysis. Almost all indicators are 0.6 or above, with exception, of ratio Debt to CFO, which is only 0.311. Since majority of communalities extraction values are significant, this indicates that these variables fit well in the factor solution. Obtained communalities matrix indicate that chosen variables fit well in factor solution.

Correlation analysis revealed synergies among financial ratios, most of them at a modest level (Zorn et al., 2018). Financial ratios variables summary is represented in Table I. As these financial ratio variables: financial leverage, debt to capital, debt to assets, debt to equity are calculated and derived from absolute value indicators, this is rather logical and good that they do not correlate with each other strongly. Except for 2 pairs of strong correlations, that is debt to equity and financial leverage, and other pair is debt to capital and debt to assets.

TABLE I.   50 BALTIC STATES STOCK MARKET LISTED COMPANIES' MULTI CORRELATION MATRIX RESULTS SUMMARY FOR CALCULATED FINANCIAL RATIOS VARIABLES IN 2004-2018

Indicator	Number of indicators with positive correlation		Indicators with extra strong positive correlation
	Strong (>0.7)	*Extra strong (>0.9)*	*>0.9 with following*
Debt to equity	1	1	Financial leverage
Debt to capital	1	1	Debt to assets
Debt to assets	1	1	Debt to capital
Financial leverage	1	1	Debt to equity
Liquidity ratio, market capitalization, cash ratio, debt to EBITDA, debt to CFO, debt to CFF, debt to FCFF	0	0	No indicators

Author used eigen value larger as 1 to decided how many factors to retain, and it suggests 5 complex factors. Initial

eigenvalues except first is 3.3 and then less, so the principle is to keep all the eigen values larger 1, thus this is how much SPSS has retained based on the rule. Author reduced 11 variables to 5 complex factors or components to be retained and are good enough to explain the relationship. Next is how much of total 11 the calculated financial statement ratios indicators of 50 company's included in Baltic States stock market variables explained by the complex factors. There are 5 complex factors which explains the variance of 74% (Table II).

TABLE II.   50 BALTIC STATES STOCK MARKET LISTED COMPANIES' FACTOR ANALYSIS RESULTS FOR THE CALCULATED FINANCIAL RATIOS INDICATORS IN 2004-2018

Indicator (explained information, %)	Factor load	Indicator (explained information, %)	Factor load
Factor 1. *Debt in balance sheet and liquidity* (22.2%)		Factor 3. *Debt to EBIDTA* (12.6%)	
Liquidity ratio	-0.78	Debt to EBITDA	0.90
Cash ratio	-0.77	Factor 4. *Market valuation factor* (10.6%)	
Debt to capital	0.70		
Debt to assets	0.66	Debt to FCFF	0.72
Debt to CFO	0.50	Market capitalization	-0.70
Factor 2. *Equity multiplier factor* (19.0%)		Factor 5. *Debt to financing cash flow* (9.8%)	
Financial leverage	0.98		
Debt to equity	0.96	Debt to CFF	-0.86

Complex factor 1 – *Debt in balance sheet and liquidity indicators* – explain 22.2% of the variance of the company's calculated financial ratios variables of the Baltic States stock market listed companies and this complex factor groups the largest number of indicators – 5 or 45% of their total number. The most essential factor load is specific to the financial ratio variables are debt in balance sheet and liquidity, explaining 22.2% of variance: liquidity and cash ratios are negative (-0.78 and -0.77) in the meantime, main capital structure ratios debt to capital and debt to assets are positive (0.70 and 0.66), this indicates the negative relationship between debt to capital and debt to assets to the liquidity and cash ratios, within the factor analysis. The factor analysis calculated factor score coefficients are similar as using regression method. The results produced have mean of 0 that the breakdown of the factor scores is provided in Table III. Complex factor 1 score regression results indicate that majority of companies 22 or 44% have small deviation, normal deviation have 18 companies or 36%, but 10 companies for 20% has a large deviation from the mean.

TABLE III.   DETAILED CHARACTERISTICS OF COMPLEX FACTOR 1 – *DEBT IN BALANCE SHEET AND LIQUIDITY*

Value levels	Number of companies	Characteristics
Less than -1	6	Companies in this group have mean liquidity ratio of 9.5, which is a high value and cash ratio of 1.7. Debt to capital is only 0.05, and debt to assets same mean value of 0.05. Debt to CFO is negative 8.4. These companies are highly liquid with low debt levels
From -1 to -0.5	6	This group is less liquid when compared to the first group, while highly liquid mean value of 3.2, cash ratio of 0.99. Debt to capital and debt to assets mean values are 0.23 and 0.20.

Value levels	Number of companies	Characteristics
From -0.5 to 0.5	22	Majority of companies are in this group, with sufficient mean liquidity ratio of 1.75, cash ratio of 0.22, while debt to capital mean value 0.26 or 26% of debt into their capital structure, which is rather low result, indicating little dependence on external funding. Debt to assets ratio is even smaller, mean value of 0.19, while debt to CFO is 1.84, meaning that these companies have positive CFO, which in turn explains that companies are net receivers rather net payers of their financing cash flow.
From 0.5 to 1	12	This group of companies are barely with sufficient liquidity ratio, with mean value slightly exceeding 1, and it is 1.17, while the lowest among all groups cash ratio of 0.11. Debt to capital and debt to assets are the second highest, that is 0.47 and 0.36, implying that close to 50% of capital structure is from external funds, in the same time debt to CFO is modest 6.91.
More than 1	4	This group of companies are slightly more liquid when compared to previous group, with liquidity ratio mean value of 1.29, and cash ratio of 0.13, however have the highest dependency on external funding, debt to capital being 0.48 and debt to assets 0.38, while the highest debt to CFO ratio of 28.81, which indicates that current financial cash flow is too very low compared to the debt outstanding, or the company has taken out long term loans with maturities exceeding 30 years, however when looking at both companies having the highest ratios in this group, which are VSS1R LR* and AUG1L LH*, having these ratios as 51 and 57, allow conclude that it is unlikely that they have maturity of debt exceeding 50 years, it signals that these companies are struggling with their debt amount and financial cash flow ability to repay the loans.

Baltic States stock market listed company's ticker and exchange symbol.

Complex factor 2 - *Equity multiplier factor* explaining 19% of variance of the company's calculated financial ratios variables of Baltic States stock market listed companies and this factor groups only two indicators or 18% of their total number. Since financial leverage is a function of total assets divided by equity, which explains in turn 0.98 of variance in the complex factor, also debt to equity explains 0.96 of its variances, thus both equity multipliers carry significant load in the complex factor 2. Complex factor 2 score regression results (Table IV) indicate that majority of companies 41 or 82% have small deviation, normal deviation has 6 companies or 12%, but 3 companies or 6% has a large deviation from the mean.

TABLE IV.   DETAILED CHARACTERISTICS OF COMPLEX FACTOR 2 – *EQUITY MULTIPLIER FACTOR*

Value levels	Number of companies	Characteristics
Less than -1	1	Company represented in this group is GRZ1R LR, with negative equity multiplier ratios, financial leverage -9.53 and debt to equity of -4.23, signalling of poor state of the company, and this is confirmed by later insolvency and delisting by the decision of stock exchange on 15.11.2019.
From -0.5 to 0.5	41	Companies here represent the profile of the average listed company on the Baltic States stock markets, with financial leverage ratio of 1.9 and debt to equity of 0.46, which are stable and sufficient indicators representing that companies are not highly leveraged, but more medium leveraged.
From 0.5 to 1	6	These companies are more leveraged when compared to the previous groups, but still modest with financial leverage ratio mean value being 2.87 and debt to equity 1.29, which is more than twice larger when compared to the previous

Value levels	Number of companies	Characteristics
		group.
More than 1	2	Here are the most leveraged companies, with leverage of 6.32 and debt to equity of 2.76. These companies are UTR1LH and DPK1R LR.

TABLE V.   DETAILED CHARACTERISTICS OF COMPLEX FACTOR 3 – *DEBT TO EBITDA*

Value levels	Number of companies	Characteristics
Less than -1	2	RKB1R LR and GZE1R LR are companies in this group, with mean value of -12.52, which is in large attributable to RKB1R LR value of -25.22, indicating the negative EBITDA, GZE1R LR in turn, has very small this number, 0.18.
From -1 to -0.5	11	These companies have also negative debt to EBITDA, mean value of -1.22, which in large is attributable to RRR1R company's ratio -27.53, rest of 10 companies have positive but rather very small values for this ratio, indicating that they have relatively small debt compared to their EBITDA.
From -0.5 to 0.5	33	Most companies have debt to EBITDA mean value of 4.73, or that these companies require almost 5-year EBITDA to repay their debt.
From 0.5 to 1	2	These companies need almost 7-year EBITDA to repay their debt, since the mean value of the ratio variable is 6.91. These companies here are VEF1R LR and TVEAT ET, where for TVEAT ET the debt to EBITDA is mere 3.17.
More than 1	2	Here are GRZ1R LR and ARC1T ET, with ratio variable being 179, while ARC1T ET alone this ratio is 360, which indicates the low EBITDA generation capabilities or extremely unproportionate debt amount to the EBITDA.

Complex factor 3 - *Debt to EBIDTA* explaining 12.3% of variance of the company's calculated financial ratios variables of Baltic States stock market listed companies and composed of one ratio, thus it is simple factor and carries a load of 0.90. This indicator links both balance sheet data with income statement data. Capital structure link between balance sheet and income statement, thus also indicates the debt impact on the EBITDA. Complex factor 3 score regression results indicate that majority of companies 33 or 66% have small deviation, normal deviation have 13 companies or 26%, but 4 companies for 8% has a large deviation from the mean (Table V).

Complex factor 4 - *Market valuation factor* explaining 10.6% of variance of the company's calculated financial ratios variable of Baltic States stock market listed companies. This factor is combination of company market capitalization and debt to free cash flow to the firm, thus this is explaining the variance of size and debt proportion to free cash flow, where debt to FCFF has positive load factor of 0.72 and market cap negative 0.7 load factor. Complex factor 4 score regression results (Table VI) indicate that majority of companies 33 or 66% have small deviation, normal deviation has 6 companies or 12%, but 11 companies for 22% has a large deviation from the mean.

Complex factor 5 – *Debt to CFF* is also a single factor explaining 9.8% of variance of the company's calculated financial ratios variables of Baltic States stock market listed companies. This indicator is debt to financing cash flow, linking both balance sheet with cash flow statement. The load factor is negative (-0.86). Complex factor 5 score regression

results (Table VII) indicate that majority of companies 33 or 66% have small deviation, normal deviation has 6 companies or 12%, but 11 companies for 22% has a large deviation from the mean.

TABLE VI.   DETAILED CHARACTERISTICS OF COMPLEX FACTOR 4 – *MARKET VALUATION FACTOR*

Value levels	Number of companies	Characteristics
Less than -1	7	Mean value of debt to FCFF is -25.65 mill. EUR, which indicates that there are issues of these companies of generating positive FCFF, while as market capitalization suggest, these are by mean the largest companies, with mean market capitalization of 406.53 mill. EUR.
From -1 to -0.5	1	This company is LGD1L LH, with market capitalization of 310.61 mill. EUR and significant debt of FCFF of 9.41
From -0.5 to 0.5	33	Most of companies have mean market capitalization of 47.45 mill. EUR with small ratio of debt to FCFF – only 0.21. For the companies with positive ratio, it indicates that they are able to generate more than sufficient cash flow to the firm to cover external liabilities.
From 0.5 to 1	5	These companies have smaller market capitalization when compared to the previous group, mean value of 21.11 mill. EUR, with modest debt to free cash flow to the firm ratio of 1.55.
More than 1	4	Here are the smallest by market capitalization listed companies, with mean value of 11.14, while very high debt to free cash flow to the firm ratio of mean value 62.53. Indicating that their free cash flow is insufficient to cover debt obligations in near future.

TABLE VII.   DETAILED CHARACTERISTICS OF COMPLEX FACTOR 5 – *DEBT TO FINANCING CASH FLOW*

Value levels	Number of companies	Characteristics
Less than -1	3	These companies have the highest debt to financing cash flow ratio, mean value of 68.61, meaning that they are financial cash flow recipients and also that the value of debt to their financing cash flow is large. Here most ratio is for BAL1R LR and PZV2L LH of 147.54 and 62.08, while the third company RSU1L LH has negative and comparatively low number of -3.78
From -1 to -0.5	5	These companies have mean value of 4.92, while the most of it is attributable to GRD1R LR, where debt to financing cash flow is 24.35
From -0.5 to 0.5	33	Majority of companies has low and negative debt to financing cash flow ratio of mean value of -0,46, indicating two things – that there are paying our more cash flow in financing than receiving and debt is rather low compared to what these companies are paying out as a financing cash flow.
From 0.5 to 1	3	The mean value for this group of companies is -12, that indicates they are paying out more in financing cash flow compared to receiving, while they have 12 times more debt than the mean value of financing cash flow per year.
More than 1	6	Here are companies with the highest negative debt to financing cash flow ratio, that is mean value of -37.92.

B. *Baltic States Stock Market Listed Companies' Cluster Analysis*

ANOVA analysis displays the variance for each cluster variable, and since observed significance is below 0.05 (Sig=0.000), thus with 95% confidence level, can be concluded that there are differences between calculated

clusters. From all 6 clusters are 4 clusters and 2 outliers. Here out of 6 clusters: in cluster 2 and 4 there is only 1 company:

1) Cluster 2 - ARC1T ET which is listed on Tallinn Stock exchange, and it is characterized by small size, market capitalization of 21.73 mill. EUR, and difficulties to generate sufficient funds to cover debt, while liquidity ratio is sufficient 1.58 and debt to capital seems not enormous of 0.6 and debt to assets 0.52, while its ability to generate business income relative to debt amounts are terrible, debt to EBITDA is 360, other ratios are in moderation. This can be attributable that the company is real estate developer and brokerage company, thus loans taken out for construction are significant compared to the brokerage business income results;

2) Cluster 4 - GRZ1R LR which is listed in Riga Stock exchange. This company has negative financial ratio variables and indicating insolvency, which is consistent with the fact that it was delisted by the Riga Stock exchange on 15.11.2019.

After initial cluster analysis on the financial ratios was performed, the results were arranged to obtain the cluster descriptive statistic indicators of each of 4 clusters (Table VIII- XI). Cluster 1 members – 19 companies, incl. 5 from Estonia, 6 from Latvia, 8 from Lithuania (BAL1R LR, GRD1R LR, KA11R LR, OLF1R LR, RKB1R LR, RRR1R LR, HAE1T ET, MRK1T ET, NCN1T ET, PKG1T ET, PRF1T ET, APG1L LH, KNR1L LH, LNA1L LH, LNS1L LH, PTR1L LH, PZV1L LH, VBL1L LH, ZMP1L LH).

Cluster 1 grouped company's average portrait measured by financial ratio variables are following, mean market capitalization of 50 mill. EUR, while relatively low debt to equity of 0.41, and low leverage 1.90, while sufficient liquidity ratios of 2.03, however negative EBITDA generation capabilities to cover debt, mean value of -0.88, in this variable there is the largest variance measured by standard deviation of the sample against mean, even more than -10.43. The lowest deviation is for following ratio variables: financial leverage and liquidity ratio.

TABLE VIII. DESCRIPTIVE ANALYSIS OF BALTIC STATES STOCK MARKET LISTED COMPANIES' CALCULATED FINANCIAL RATIOS VARIABLES IN THE CLUSTER 1

Cluster 1 variables	Mean	Min	Max	STDEV.S.	STDEV.S /Mean
Market capitalization	50.09	0.68	125.59	39.28	0.78
Debt to equity	0.41	0.03	0.99	0.26	0.63
Debt to capital	0.24	0.03	0.49	0.12	0.50
Debt to assets	0.19	0.03	0.39	0.10	0.53
Financial leverage	1.90	1.20	2.94	0.46	0.24
Liquidity ratio	2.03	1.05	5.01	0.93	0.46
Cash ratio	0.20	0.01	0.60	0.16	0.80
Debt to EBITDA	-0.88	-27.53	7.50	9.18	- 10.43
Debt to CFO	2.64	-8.74	12.15	4.96	1.88
Debt to CFF	12.89	-7.49	147.54	36.02	2.79
Debt to FCFF	-0.72	-15.15	7.99	5.37	- 7.46

Cluster 3 members – 7 companies, incl. 2 from Estonia, 4 from Latvia, 1 from Lithuania (LJM1R LR, RAR1R LR, RJR1R LR, SAF1R LR, SFG1T ET, TPD1T ET, KNF1L LH). Smallest companies on average are compiled in clusters 3, that are 7 companies. Their average size of the market capitalization is very close to 33 mill. EUR. Cluster 3 (Table IX) companies have on average significantly lower debt to equity, debt to capital and debt to assets ratio, from 0.05 to 0.12, but they have significantly higher liquidity ratios when compared to cluster 6, that is 8.64 compared to 1.33. Similarly, debt to EBITDA ratio is smaller for cluster 3 companies, which is 2.17 times, meaning that cluster 3 companies require slightly more than 2 year's EBITDA to repay debt. This concludes that cluster 3 companies are lower leveraged and financially more stable when compared to the similar size companies grouped in the cluster 6. Smallest deviation in terms of Stdev.s./mean is for financial leverage and cash ratio, while the largest is for debt to cash flow from financing.

TABLE IX. DESCRIPTIVE ANALYSIS OF BALTIC STATES STOCK MARKET LISTED COMPANIES' CALCULATED FINANCIAL RATIOS VARIABLES IN THE CLUSTER 3

Cluster 3 variables	Mean	Min	Max	STDEV.S.	STDEV.S /Mean
Market capitalization	32.76	0.54	133.11	50.96	1.56
Debt to equity	0.12	0.01	0.35	0.13	1.08
Debt to capital	0.06	0.01	0.13	0.05	0.83
Debt to assets	0.05	0.01	0.11	0.04	0.80
Financial leverage	1.35	1.04	1.74	0.24	0.18
Liquidity ratio	8.64	2.59	31.89	10.36	1.20
Cash ratio	1.61	0.50	2.24	0.61	0.38
Debt to EBITDA	2.17	-2.04	13.13	5.04	2.32
Debt to CFO	-6.99	-48.96	1.22	18.54	- 2.65
Debt to CFF	-0.91	-9.87	7.69	5.12	- 5.63
Debt to FCFF	1.97	-1.34	9.27	3.82	1.94

Cluster 5 members – 8 companies, incl. 2 from Estonia, 1 from Latvia, 5 from Lithuania (GZE1R LR, TAL1T ET, TKM1T ET, ESO1L LH, LGD1L LH, LNR1L LH, RSU1L LH, TEL1L LH).

TABLE X. DESCRIPTIVE ANALYSIS OF BALTIC STATES STOCK MARKET LISTED COMPANIES' CALCULATED FINANCIAL RATIOS VARIABLES IN THE CLUSTER 5

Cluster 5 variables	Mean	Min	Max	STDEV.S.	STDEV.S /Mean
Market capitalization	394.54	66.99	706.76	202.23	0.51
Debt to equity	0.42	0.02	1.25	0.38	0.90
Debt to capital	0.24	0.02	0.54	0.16	0.67
Debt to assets	0.20	0.02	0.49	0.15	0.75
Financial leverage	1.78	1.30	2.44	0.38	0.21
Liquidity ratio	1.58	0.44	3.12	0.97	0.61
Cash ratio	0.42	0.05	1.26	0.39	0.93
Debt to EBITDA	2.25	0.18	5.86	1.83	0.81
Debt to CFO	2.92	0.13	7.63	2.46	0.84
Debt to CFF	-3.91	-12.97	0.42	4.53	-1.16
Debt to FCFF	-21.27	-98.51	9.41	41.95	-1.97

Cluster 5 is comprised of 8 companies with the largest market capitalization, thus, the largest companies there, with average market cap of 394 mill. EUR, and ranging from 67 mill. EUR to 707 mill. EUR in market capitalization. Their financial ratios are debt weight to capital structure 24%, where minimum is 2% to 54%, which is modest level of external funding weight in capital structure. Liquidity ratio is above 1, that is 1.58 on average, which is more than sufficient, while minimum value is 0.44, which is in turn insufficient to cover short term liabilities. Debt to EBITDA range from 0.18 to 5.86, that means that these – largest companies traded on the stock exchange have sufficient income generation capacity to cover their external liabilities, and in the worst-case scenario they need 6 year's EBITDA to cover average outstanding debt. Debt to financing cash flow is on the low side, that is on average 2.92 and they are debt repaying, and/or dividend paying out companies, since debt to financing.cash flow is negative. Negative financing cash flow means cash is being paid out more rather than borrowed, contrary debt to free cash flow to the firm is negative, which means that these companies on average does not generate enough cash flow to cover its operations. Negative Debt to CFF means that these companies are mostly repaying more debt than borrowing, and combined with negative debt ratio to FCFF could signal that they are most likely not paying significant dividends. Here also is the smallest deviation in terms of stdev.s. measured against the mean, thus indicating the most similar companies is this cluster when compared to the dispersions in other clusters.

Cluster 6 members – 14 companies, incl. 4 from Estonia, 5 from Latvia, 5 from Lithuania (DPK1R LR, HMX1R LR, RER1R LR, VEF1R LR, VSS1R LR, BLT1T ET, EEG1T ET, SKN1T ET, TVEAT ET, AUG1L LH, GRG1L LH, SNG1L LH, UTR1L LH, VLP1L LH).

TABLE XI.   DESCRIPTIVE ANALYSIS OF BALTIC STATES STOCK MARKET LISTED COMPANIES' CALCULATED FINANCIAL RATIOS VARIABLES IN THE CLUSTER 6

Cluster 6 variables	Mean	Min	Max	STDEV.S.	STDEV.S /Mean
Market capitalization	36.55	1.62	223.17	55.85	1.53
Debt to equity	1.32	0.67	2.88	0.65	0.49
Debt to capital	0.50	0.39	0.62	0.07	0.14
Debt to assets	0.38	0.31	0.54	0.06	0.16
Financial leverage	3.20	2.10	7.59	1.48	0.46
Liquidity ratio	1.33	0.74	3.55	0.70	0.53
Cash ratio	0.29	0.02	2.50	0.65	2.24
Debt to EBITDA	8.22	0.21	58.39	14.74	1.79
Debt to CFO	12.15	-0.65	57.14	18.26	1.50
Debt to CFF	-18.59	-176.18	5.22	46.31	- 2.49
Debt to FCFF	19.39	-9.12	166.48	45.62	2.35

Second smallest companies on average are compiled in clusters 6, where are 14 companies. Their mean size of the market capitalization is very close to 37 mill.EUR. Cluster 6 companies are more leveraged, while still the ratio is modest or average, from 0.38 to 1.32. Cluster 6 companies have significantly lower liquidity ratios of 1.33. Debt to EBITDA ratio is higher for cluster 6 companies - on average is 8.22, meaning that cluster 6 companies need more than 8 year's EBITDA to repay debt. This concludes, that despite in both 3 and 6 clusters are grouped companies similar in market capitalization, cluster 3 companies are lower leveraged and financially more stable when compared to the similar size companies grouped in the cluster 6. In the meantime, in cluster 6 grouped companies are relatively low dispersed around mean value of these indicators, calculated as stdev.s. against mean, with lowest variance being in debt to assets, and debt to capital.

IV. **Conclusions**

The Baltic States stock market listed companies' financial ratio variables analysis indicates the average profile of listed company, as well as determines what are the most influencing factors explaining variance in financial statements. Factor analysis revealed that 74% of variance is explained by 5 complex factors, which are composed of initial 11 variables. Factor and cluster analysis revealed that main explaining ratios are debt in balance sheet and liquidity, which indicates that on average Baltic States listed company has modest or low leverage levels, which combined with sufficient liquidity ratio, can allow to conclude that companies are financially sound from balance sheet perspective. In the meantime, analysis linking capital structure with income statement reveals underlying issues: while factor analysis did not indicate significant issues with EBITDA generation, noting that on average Baltic States listed companies require around 5-year EBITDA to cover their debt, which is a good result. Contrary cluster analysis discovered the issue, that for 38% of companies, that is cluster 1 companies mean debt to EBITDA is negative, thus operationally there are issues with ability to generate sufficient means to cover their costs and repay debt. As noted by both factor and cluster analysis, majority of companies are small and medium size, most being around 50 mill. EUR in market capitalization.

As noted, on the Baltic States stock market, mostly dominate medium-sized (42 out of 50) listed companies with sound balance sheet standing, while significant part has operational challenges. In order to add to existing mix of Baltic States listed companies and to activate this market, policy makers need to focus on attracting more medium-sized and small companies, while paying close attention not only on the balance sheet indicators, but even more evaluating income generation and cash flow abilities. Further analysis to strengthen this recommendation is needed to evaluate overall profile of Baltic States registered companies.

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References

[1] A.Paolo and A.Generale, "On the Evolution of Firm Size Distributions". *American Economic Review*, Volume 98, Issue 1, 2008t, pp.426-38. DOI: 10.1257/aer.98.1.426

[2] A.Pilvere-Javorska, I.Pilvere and B.Rivza, "Comparative Analysis of Investment Environment in the Baltic States". *International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM,* Volume 19, Issue 5.4, Bulgaria, 30 June 2019 through 6 July, 2019a, pp. 417-425. DOI: 10.5593/sgem2019/5.4/S23.056.

[3] A.Pilvere-Javorska, I.Pilvere and Rivza B., "Stock Market Institutional and Regulatory Framework in the Baltic States". *20th Annual International Scientific Conference Economic Science for Rural Development, Economic Science for Rural Development Conference Proceedings 2019*, Issue 52, 2019b, pp. 302-310. DOI: 10.22616/ESRD.2019.136.

[4] A.Zorn, M.Esteves, I.Baur and M.Lips, "Financial Ratios as Indicators of Economic Sustainability: A Quantitative Analysis for Swiss Dairy Farms". *Sustainability* , Volume *10*, 2018, 20 p. doi:10.3390/su10082942.

[5] Analysis and Use of Financial Statements. DELTACPE LLC DELTACPE LLC, without year, 227 p. https://www.apexcpe.com/%5Cpublications%5C171016.pdf

[6] B.Williams, A.Onsman and T.Brown, "Exploratory factor analysis: A five-step guide for novices". *Journal of Emergency Primary Health Care (JEPHC),* Volume 8, Issue 3, 2010, 13 p. Article 990399. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.475.8594&rep=rep1&type=pdf

[7] Bloomberg L.P. Data base, Bloomberg Terminal, 2019, accessed 21.10.2019.

[8] C.Botoc and S.G. Anton, "New empirical evidence on CEE's stock markets integration". *The World Economy*, Volume 00, 2020, pp.1–18. DOI: 10.1111/twec.12961

[9] C.Zygmont and M. R. Smith, "Robust factor analysis in the presence of normality violations, missing data, and outliers: Empirical questions and possible solutions". *The Quantitative Methods for Psychology*, Volume 10, Issue 1, 2014, pp. 40-55. DOI: 10.20982/tqmp.10.1.p040

[10] Ch.Bellavitis, I.Filatotchev, Dz.S.Kamuriwo and T.Vanacker, "Entrepreneurial finance: new frontiers of research and practice". *Venture Capital*, Volume 19, Issue 1-2, 2017, pp.1-16, DOI: 10.1080/13691066.2016.1259733

[11] E. Akben-Selcuk, "Corporate Social Responsibility and Financial Performance: The Moderating Role of Ownership Concentration in Turkey". *Sustainability, MDPI, Open Access Journal,* Volume 11(13), July 2019, pp.1-10. https://www.mdpi.com/2071-1050/11/13/3643/pdf

[12] E. Altman, "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy". *The Journal of Finance*, Volume 23, Issue 4, 1968, pp. 586-609. https://doi.org/10.1111/j.1540-6261.1968.tb00843.x

[13] E.Cefis, E.Bartoloni and M.Bonati, "Show me how to live: Firms' financial conditions and innovation during the crisis*". Structural Change and Economic Dynamics*, Volume 52, March 2020, pp. 63-81. https://doi.org/10.1016/j.strueco.2019.10.001

[14] E.Ferrucci, R.Guida and V.Meliciani, "Financial constraints and the growth and survival of innovative start-ups: An analysis of Italian firms". *European Financial Management*, 2020, pp.1–23. https://doi.org/10.1111/eufm.12277

[15] F.Biancalani, D.Czarnitzki and M.Riccaboni, "The Italian Startup Act: Empirical evidence of policy effects". *Leuven Working Paper 648452, Department of Management, Strategy and Innovation*, 2020, 33p. https://limo.libis.be/primo-explore/fulldisplay?docid=LIRIAS2938963&context=L&vid=Lirias&search_scope=Lirias&tab=default_tab&lang=en_US&fromSitemap=1

[16] G.Bottazzi, A.Secchi and F.Tamagni, "Financial constraints and firm dynamics". *Small Business Economics*, Volume 42, 2014, pp. 99–116. https://doi.org/10.1007/s11187-012-9465-5

[17] J. Malecka and T.Luczka, "The Private Equity Market in Poland and in Central and Eastern Europe: Selected Aspects". *Challenges of Entrepreneurship*, Volume 15, No. 1(65), 2017, pp. 69 -85. 10.7172/1644-9584.65.4

[18] K. Brännäs and A. Soultanaeva, "Infulence of news from Moscow and New York on returns and risks of Baltic States' stock markets". *Baltic Journal of Economics*, Volume 11, Issue 1, 2011, pp.109-124, DOI: 10.1080/1406099X.2011.10840493

[19] L.Quaglia, D.Howarth and M. Liebe, "The Political Economy of European Capital Markets Union". *JCMS-JOURNAL OF COMMON MARKET STUDIES,* Volume: 54, 2016, pp.185-203 DOI: 10.1111/jcms.12429

[20] L.R.Fabrigar and D.T.Wegener, "*Exploratory Factor Analysis*". Oxford: Oxford University Press,2012, 159 p.

[21] L.T. Orlowski, "Capital markets integration and economic growth in the European Union". JOURNAL OF POLICY, Volume: 42, Issue: 4, 2020, pp.893-902. DOI: 10.1016/j.jpolmod.2020.03.012

[22] M. Hang, J.Geyer-Klingeberg, A.W.Rathgeber and S. Stockl, "Rather complements than substitutes: Firm value effects of capital structure and financial hedging decisions". *INTERNATIONAL JOURNAL OF FINANCE & ECONOMICS,* Volume 1, 2020, 23 p. DOI: 10.1002/ijfe.2045

[23] M. Oberholzer, "The relative importance of financial ratios in creating shareholders' wealth". *South African Journal of Economic and Management Sciences*, Volume 15, 2011, pp. 416-428. DOI: 10.4102/sajems.v15i4.167.

[24] M.L.Lemmon, M.Roberts R. and J.F. Zender, "Back to the beginning: Persistence and the cross-section of corporate capital structure". *The Journal of Finance*, Volume 63, Issue 4, 2008, pp.1575– 1608. https://doi.org/10.1111/j.1540-6261.2008.01369.x

[25] M.Moscalu and G. Vintila, "Business failure risk analysis using financial ratios". *Procedia - Social and Behavioral Sciences*, Volume 62, 2012, pp. 728 – 732. doi: 10.1016/j.sbspro.2012.09.123

[26] P.D.Alexakis, D.Kenourgios and D.Dimitriou, "On emerging stock market contagion: The Baltic region". *Research in International Business and Finance,* Volume 36, January 2016, pp. 312-321. https://doi.org/10.1016/j.ribaf.2015.09.035

[27] R. Horvath and D. Petrovski, "International stock market integration: Central and South Eastern Europe compared". *Economic Systems*, Volume 37, Issue 1, March 2013, pp. 81-91. https://doi.org/10.1016/j.ecosys.2012.07.004

[28] R.Carpenter and B.Petersen, "Capital Market Imperfections, High-Tech Investment, and New Equity Financing". *Economic Journal*, Volume 112, Issue 477, 2002, pp. 54-72. https://doi.org/10.1111/1468-0297.00683

[29] R.S. King, "*Cluster Analysis and Data Mining: An Introduction*". Dulles, Virginia: Mercury Learning & Information, 2015, 316 p.

[30] S.Bridges and A. Guariglia, "Financial constraints, global engagement, and firm survival in the U.K.: Evidence from micro data". *Scottish Journal of Political Economy*, Volume 55, no.4, 2008, pp.444– 464. https://doi.org/10.1111/j.1467-9485.2008.00461.x

[31] T.Arkan, "The Importance of Financial Ratios in Predicting Stock Price Trends: A Case Study in Emerging Markets". *Finanse, Rynki Finansowe, Ubezpieczenia*, Volume *1* (79), 2016, pp.13–26. DOI: 10.18276/frfu.2016.79-01

[32] T.Beck and A.Demirguc-Kunt, "Small and medium-size enterprises: Access to finance as a growth constraint". *Journal of Banking & Finance,* Volume 30, Issue 11, November 2006, pp. 2931-2943. https://doi.org/10.1016/j.jbankfin.2006.05.009

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