

# Financial Performance Before Failure: Do Different Firms Go Bankrupt Differently?

Oliver Lukason

**Abstract**—This paper studies, whether pre-bankruptcy financial performance differs through firm types. Based on the whole population data of Estonian bankrupt firms from the period 2002-2009 and an extensive set of financial data changes it is shown, that distinct differences in the pre-bankruptcy financial performance exist. Namely, it is proven that for different industries, size groups, bankruptcy years, insolvency types and varying levels of control, the pre-bankruptcy changes of financial variables and ratios are not the same.

**Index Terms**—Bankruptcy, financial data, failure process.

## I. INTRODUCTION

Firm failure topic has been actively studied in the past decades. As for other fields of business management, the interdisciplinary nature of the topic has resulted in various research domains, of which some have been thoroughly considered and other relatively underdeveloped. Failure literature has been divided to subsets focusing on causes and preconditions, signs and prediction, cognition and learning, recovery [1]. A separate domain not considered in previous list is the context of legal system in firm failure, whereas studies have been directed to analysis of different characteristics (e.g. debtor and creditor friendliness, effectiveness, economics) of insolvency legislation. From different subsets of failure literature, the most widely developed research area is evidently failure (or bankruptcy) prediction and during past fifty years hundreds of forecast models have been created (e.g. [2]-[4]). Failure literature focusing on prediction models has also been under remarkable criticism, mostly because of its *ex post* nature [5]. Limitations in current literature considering financial aspects of failure are also the application of stationary view and lack of discrimination between different types of failed firms. Previous means that failure models are constructed using comparison in the pre-failure levels in financial data for healthy and bankrupt firms, not studying whether firms with varying characteristics witness different failure dynamics. Current paper aims to contribute to filling this gap by studying whether different firms (defined by size, level of control, industry, age and insolvency type) go through different financial failure process. For achieving the aim, financial data for the whole population of Estonian bankrupt firms from 2002-2009 will be applied. Besides offering some new academic evidence about characteristics of failed firms' financial management, current paper also offers some

knowledge for practitioners. The paper is structured as follows. Firstly, literature review focusing on major achievements on the topic will be outlined. This will be followed by empirical analysis, describing data, methodology and results of the study. Paper ends with conclusion, which also includes future research directions and implications.

## II. SUMMARY OF RELEVANT LITERATURE

The amount of studies focusing on the comparison of pre-bankruptcy performance of different failed firms is not large. It is possible to outline at least three different domains that include relevant content in the light of current study. One section of literature aims to develop distinct failure processes or patterns (e.g. [6]-[13]). The results of studies indicate the existence of different failure pathways, but there is lack of validating those trajectories on the example of different firm groups. It has been suggested, that different financial failure patterns are varyingly represented through size categories and industries [12]. Similar finding has been established when using both, failure reasons and financial data [9].

The second relevant domain focuses on the usage of financial characteristics to discriminate between failed and healthy firms (e.g. [2],[14]-[18]). Although majority of the literature in the second group does not directly outline variation in financial statement variables or financial ratios through different categories of failed firms, the analysis of financial data of failed firms in specific studies or between studies creates clear indication that pre-bankruptcy performance of firms can have large variance, which supports the idea outlined from the first group of literature, that pre-bankruptcy performance for different types of firms can diverge. In conclusion one can find clear indication from both viewed sets of literature, that the specifics how and to what extent pre-bankruptcy financial data varies through firm groups (especially industries and size), should be studied in more detail.

The last domain is specifically focusing on the creation of different financial failure pathways, applying dynamic approaches by using changes in financial data. Given domain includes the smallest amount of studies. The usage of financial ratio trends and levels has shown that different indicators are important in various failure phases [19].

Analysis of previous studies shows that a paper focusing on the topic whether different firms witness varying pre-failure financial performance, could be necessary addition to current literature of mainly static concepts.

## III. DATA AND METHODOLOGY

Bankrupt firms' list and pre-bankruptcy financial data has

Manuscript received May 19, 2012; revised July 5, 2012.  
O. Lukason is with the Tartu University, Faculty of Economics and Business Administration, Narva road 4, Tartu 51009, Estonia (e-mail: oliver.lukason@ut.ee).

been collected from Estonian Commercial Register (ECR, see [20]). All bankrupt firms in Estonia from 2002-2009 were included in the analysis and financial information is obtained for period 1999-2008, as the analysis applies information from three pre-bankruptcy years. ECR data includes balance sheet and profit statement data, but cash flow statement data has not been applied. This is because cash flow statement panel data is available in Estonia starting from 2005, which in current case would leave six years out of ten without specific information. For all firms calendar year matches business year. This creates a certain limitation common to most of failure studies – the time between bankruptcy and last data reported is not homogenous. It is not possible to address that limitation, as Estonian legislation (being the case for most countries) does not demand more frequent than annual reporting. Industries in analysis have been detected based on the statistical classification of economic activities in the European Community (NACE Rev. 2, see [21]) and division to size groups relies on European Commission regulation 96/280/EC (see [22]), which recommends using following groups outlined according to the number of workers: 1) 0 employees, 2) 1-9, 3) 10-49, 4) 50-249, 5) 250-499, 5) 500-. There are two different legal types for firms (private limited firm, PrLC, and public limited firm, PuLC). Their main distinguishers are minimal capital requirements (2500 euros for PrLC and 25000 euros for PuLC), but also compulsory audit, presence of council and other formal procedures for PuLC. This way PuLC is submitted to more control.

For conducting profound analysis, most of balance sheet and profit statement financial variables available have been used and only those, for which information is missing for some viewed group, have been excluded. From balance sheet the following variables have been used (with abbreviations in brackets): assets (*ASSETS*), liabilities (*LIABIL*), equity (*EQUITY*), current assets (*CASSETS*), cash and cash equivalents (*CASH*), accounts receivables (*RECEIV*), current liabilities (*CLIABIL*), current financial liabilities (*CFLIABIL*), accounts payables (*APAYABL*), retained earnings (*RETEARN*), net income (i.e. net profit, *NI*). From profit statement the following variables have been used: sales revenue (*SALES*), operating costs (*OCOST*), operating profit (*OPROFIT*), sum of financial income and cost (*FINCOST*), sum of operating costs, financial income and financial cost (*COST*), profit before taxation (*BTPROFIT*).

The selection of financial ratios for the analysis is based on their previous usage in studies (e.g. [16]), but also on the principle that ratios commonly causing misinterpretations will be excluded from analysis. Following an overview of the financial ratios applied has been given: two solvency ratios ( $\frac{CASSETS}{CLIABIL}$ , i.e.  $\frac{CA}{CL}$ ;  $\frac{CASH}{CLIABIL}$ , i.e.  $\frac{C}{CL}$ ), three profitability ratios ( $\frac{NI}{SALES}$ , i.e.  $\frac{NI}{S}$ ;  $\frac{OPROFIT}{SALES}$ , i.e.  $\frac{OP}{S}$ ;  $\frac{BTPROFIT}{SALES}$ , i.e.  $\frac{BP}{S}$ ) and two other ratios ( $\frac{EQUITY}{LIABIL}$  measuring capital structure, i.e.  $\frac{E}{L}$ ;  $\frac{CASSETS}{ASSETS}$  measuring liquidity, i.e.  $\frac{CA}{A}$ ). Also two additional solvency variables, i.e. balance sheet test or net assets (*Net assets* = *ASSETS* – *LIABIL*, i.e. *NETASSET*) and net working capital (*CASSETS* – *CLIABIL* = *Net working capital*, i.e. *NWC*) have been applied.

As noted in introduction, current study views the dynamics

of failure process, and in order to capture it, changes of financial variables and ratios will be applied. Changes will be calculated between first and second, but also between second and third pre-bankruptcy year. The change will be calculated as  $(Value_n - Value_m)$  divided by  $|Value_m|$ , where  $Value_n$  denotes the value of specific variable or ratio for the first or second year before bankruptcy year,  $Value_m$  respectively for the second or third year before bankruptcy year. The usage of absolute value (i.e.  $|Value_m|$ ) in denominator is necessary, as some financial data can have negative values and this could lead to misinterpretation of changes. The change in the value of specific variable or ratio has been denoted with subscript 12 (change between first and second pre-bankruptcy year) and subscript 23 (change between second and third pre-bankruptcy year) in the following text. Two different changes have been applied, as studies would suggest that financial characteristics of failure can diverge in a way that for some firms problems emerge rapidly before failure and for others they are signaled long time before collapse occurs. Beside the fact, that changes have not commonly been applied in literature, their usage is also motivated by the fact that evidently values of financial variables and ratios differ through firm types, mainly because of different business models, competition, legal requirements and other reasons. This contrary cannot be presumed for financial data changes in the failure process.

In current study the focus is to test, whether pre-bankruptcy changes in financial data differ through different firm types. For those purposes a nonparametric test, Independent Samples Median Test (ISMT), will be used. Nonparametric test is applied because Kolmogorov-Smirnov Test and Shapiro-Wilk Test indicate violation of normality assumption in data, which excludes the usage of tests assuming normality without data transformations. The ISMT views, whether there is at least one sample among  $k$  samples, that has different median than others (i.e.  $H_0: \Theta_0 = \Theta_1 = \Theta_2 = \dots = \Theta_k$ ;  $H_1$ : the median of at least one population is different).  $H_1$  will be accepted when asymptotic significance of the test is  $< 0.05$  and significance will be denoted in following tables as Sig., where additionally test statistic values have been shown. The calculation mechanism of ISMT can be followed in [23]. When those financial measures have been detected, where at least one median is different from others, it has been shown, which group differs from others by outlining median values for each group. This is important for theorizing how failure processes differ from each other. Still, as the objective of current paper has been to outline specific pre-bankruptcy financial data which is different through firm types, the analysis of medians remains descriptive and no additional statistical tests have been conducted to show the interconnection between statistically different financial data changes.

The whole population data of firms is reduced to those, which have all three pre-bankruptcy annual reports available. This narrows the study to 999 firms, which accounts for 24% of all firms that bankrupted in the period 2002-2009. Estonian Bankruptcy Act [24] lists two permanent insolvency options. In case insolvent firm has no assets to be used to fund bankruptcy proceeding, then bankruptcy will not be declared and bankruptcy process ends up with bankruptcy proceeding abatement, after which firm will be liquidated by

trustee. In case there is enough resources in bankruptcy estate to carry on with the proceeding, then bankruptcy will be declared. Both of those options represent permanent insolvency declared by court, so they will not be treated separately in empirical analysis (except for one subsection of analysis).

#### IV. RESULTS OF EMPIRICAL ANALYSIS

Results of empirical analysis will be outlined as follows. ISMT will be applied to test, whether medians of different financial data (financial variables and financial ratios) changes vary through firm groups. Tables in current section list the data which is different at least between two groups. In case there are only two groups available, then it is evident that the test result is caused by the difference between two available groups, but in case there are more groups, not all of them might differ from each other. Previous is more specifically commented for each of the tables. Tables also list the medians, so it is possible to follow the results obtained from analysis. With the help of results in each table, generalized results how different firms become insolvent are offered, which contribute to the understanding of financial failure processes. For all tables below the hypotheses of different medians is accepted when ISMT significance value is 0.05 or below.

Firstly, firms in four different size groups have been studied. Analysis shows that six indicators are different among size groups created using the number of workers, whereas only one of them views difference between first and second year and other five consider the difference between second and third year (see Table I). The generalized conclusions are:

- 1) Smallest and largest industry are similar in respect to all indicators. Values of indicators for the smallest and largest groups are below general median and for two other groups (10-49 workers, 50-240 workers) the values are over the general median value.
- 2) The drop in sales for smallest and largest group between first and second year is quicker than for other groups, whereas the largest group witnesses rapid drop. Still, the reliability of largest group results could be somewhat questioned due to small number of observations (namely 2 cases).
- 3) All groups except the largest firms witness growth in liabilities between second and third year. The growth in liabilities is mostly induced by the growth in current liabilities, in case of which accounts payables is remarkably more important contributor than current financial liabilities. That means firms tend to favor credit from suppliers, not financial institutions. This is probably connected to the fact that no additional loans are issued to given firms or firms do not want to offer sureties. The growth in all liabilities is modest in case of smallest firms compared to two groups of medium sized firms.
- 4) When smallest firms witness a steady level for current assets in comparison of second and third year, then two groups of medium sized firms show a small rise.

TABLE I: FINANCIAL DATA MEDIAN CHANGES SIGNIFICANTLY DIFFERENT THROUGH FIRM SIZE GROUPS (ISMT TEST STATISTIC AND SIG. IN BRACKETS, MEDIANS IN CELLS).

Variable (test statistic; sig) / Group	<i>SALES</i> <sub>12</sub> (14.882; 0.002)	<i>LIABIL</i> <sub>23</sub> (1 4.963; 0.002)	<i>CLIABIL</i> <sub>23</sub> (12.921; 0.005)
1. Up to 10 workers	-0.29	0.10	0.14
2. 10-49 w.	-0.16	0.18	0.23
3. 50-249 w.	-0.17	0.28	0.34
4. 250 and more w.	-0.56	-0.18	-0.20

  

Variable (test statistic; sig) / Group	<i>CASSETS</i> <sub>23</sub> (10.781; 0.013)	<i>APAYABL</i> <sub>23</sub> (9.577; 0.023)	<i>CFLIABIL</i> <sub>23</sub> (8.123; 0.044)
1. Up to 10 workers	0.00	0.06	0.00
2. 10-49 w.	0.11	0.18	0.08
3. 50-249 w.	0.18	0.46	0.23
4. 250 and more w.	-0.61	-0.39	-0.77

Previous results allow to conclude that small firm failure is described by sharper drop in sales, which is turn preceded by lower leverage than for larger firms. As there is strong statistically significant (Sig. 0.01) correlation between *SALES*<sub>12</sub> and *LIABIL*<sub>23</sub> (R=0.752) or *CLIABIL*<sub>23</sub> (R=0.860), it can be said that larger firms try to sustain their pre-bankruptcy sales level more with leverage compared to small firms, resulting in lower drop in sales figures. Previous conclusions are supported by the fact that all variables except *APAYABL*<sub>23</sub> are statistically different between first and second or third group, but there are remarkably less differences between second and third group.

Analysis is followed by considering different industries. Larger industries having at least 50 cases are chosen for analysis and major anomalies are studied based on specific indicators and industries, not by analyzing various statistically different changes together, as for size groups. This way analysis is limited to 8 large sectors (A – Agriculture, forestry and fishing, C – Manufacturing, F – Construction, G – Wholesale and retail trade; repair of motor vehicles and motorcycles, H – Transporting and storage, I – Accommodation and food service activities, M – Professional, scientific and technical activities, N – Administrative and support service activities). Expectedly there is a large amount of differences between industries, which are outlined in Table II. There are 13 financial indicators, which are different at least in one industry, among them eight about the change between second and third year, and five about the change between first and second year. Among 13 indicators there are three ratios. Important conclusions from analysis are:

- 1) All chosen sectors (except A) witness small drop or no change in *OCOST* and *COST* levels between first and second year, which accompanied with the dramatic drop in *OP/S* ratio change (which has remarkable differences through sectors) in the viewed period indicates inability to create sales revenue while the cost level remains practically unchanged. The largest decreases in profitability are witnessed in N and G sectors, whereas in the viewed set C and M drop the less. The differences are more than twofold for the largest and smallest sector. The accumulation of losses (*RETEARN*<sub>12</sub>) is similar through industries, whereas sector C shows small growth in reserves.

- 2) The drops in one solvency ratio ( $CA/CL_{12}$ ) are large and the change varies about two times from sector C to sector I (the latter being the largest decreaser). At the same time the drop for another solvency indicator ( $NETASSETS_{23}$ ) is modest and the differences between industries are also remarkably smaller. Probably because of previously given  $CA/CL_{23}$  is not significantly different through groups.
- 3) Most of the sectors see small rise or steady level of liabilities and current financial liabilities between second and third pre-bankruptcy year, but sector N shows large drop for latter variable.

TABLE II: FINANCIAL DATA MEDIAN CHANGES SIGNIFICANTLY DIFFERENT THROUGH INDUSTRIES (ISMT TEST STATISTIC AND SIG. IN BRACKETS, MEDIANS IN CELLS).

Variable (test statistic; sig) / Industry	A	C	F	G
$SALES_{23}$ (36.828; 0.002)	0.04	0.03	0.37	0.07
$OCOST_{23}$ (29.862; 0.019)	0.28	0.05	0.29	0.06
$EQUITY_{23}$ (29.258; 0.022)	-0.12	-0.09	0.03	-0.02
$RETEARN_{12}$ (28.256; 0.029)	-0.08	-0.24	0.09	-0.09
$COST_{23}$ (27.861; 0.033)	0.35	0.05	0.29	0.06
$CFLIABIL_{23}$ (25.933; 0.039)	0.16	0.00	0.08	0.00
$LIABIL_{23}$ (27.217; 0.039)	0.09	0.16	0.35	0.07
$COST_{12}$ (27.078; 0.041)	0.05	-0.09	-0.17	-0.14
$ASSETS_{23}$ (26.952; 0.042)	0.00	0.00	0.25	0.00
$OCOST_{12}$ (26.940; 0.042)	0.00	-0.10	-0.16	-0.12
$OP/S_{12}$ (30.282; 0.017)	-2.76	-1.87	-2.48	-3.27
$NETASSETS_{23}$ (29.680; 0.020)	-0.13	-0.09	0.03	-0.02
$CA/CL_{12}$ (28.814; 0.025)	-0.54	-0.33	-0.33	-0.35

Variable (test statistic; sig) / Industry	H	I	M	N
$SALES_{23}$ (36.828; 0.002)	0.26	-0.02	0.11	0.09
$OCOST_{23}$ (29.862; 0.019)	0.27	0.00	0.08	0.11
$EQUITY_{23}$ (29.258; 0.022)	-0.09	-0.18	0.00	-0.04
$RETEARN_{12}$ (28.256; 0.029)	-0.29	-0.40	-0.17	-0.21
$COST_{23}$ (27.861; 0.033)	0.27	0.02	0.07	0.11
$CFLIABIL_{23}$ (25.933; 0.039)	0.09	0.00	0.00	-0.21
$LIABIL_{23}$ (27.217; 0.039)	0.06	0.06	0.15	0.15
$COST_{12}$ (27.078; 0.041)	-0.13	0.00	-0.13	-0.29
$ASSETS_{23}$ (26.952; 0.042)	0.04	-0.03	-0.05	-0.03
$OCOST_{12}$ (26.940; 0.042)	-0.14	0.00	-0.12	-0.30
$OP/S_{12}$ (30.282; 0.017)	-2.86	-2.38	-1.47	-4.46
$NETASSETS_{23}$ (29.680; 0.020)	-0.09	-0.18	0.00	-0.04
$CA/CL_{12}$ (28.814; 0.025)	-0.49	-0.61	-0.49	-0.56

Previous results allow to hypothesize that larger industries are quite similar in the sense of pre-bankruptcy financial data changes. When smaller sectors are included in the analysis, the amount of statistically different changes rises, but there could be a threat of inaccurate results, as in case of some industries low number of anomalous observations can determine the test outcome.

Analysis is followed by considering different legal types of firm. As stated in the data overview, there are two types of firms in the analysis – the number of PrLC’s is 851 and PuLC’s is 148. There are 13 statistically different indicators and four of them are ratios (see Table III). Six indicators are about changes between first and second year, 7 indicators are about changes between second and third year. Analysis is easier than for industries, as there are only two groups of firms. The major conclusions are as follows:

- 1) Before insolvency occurs (change between first and

second year) PrLC’s witness much sharper drop in solvency, quicker accumulation of losses and increasing liabilities compared to PuLC’s.

- 2) Changes between first and second year are preceded (i.e. change between second and third year) by quicker increase in costs and sales, but also usage of additional leverage by PrLC’s.

TABLE III: FINANCIAL DATA MEDIAN CHANGES SIGNIFICANTLY DIFFERENT THROUGH FIRM LEGAL TYPES (ISMT TEST STATISTIC AND SIG. IN BRACKETS, MEDIANS IN CELLS).

Variable (test statistic; sig) / Group	PrLC	PuLC
$LIABIL_{12}$ (14.080; 0.000)	0.04	-0.05
$ASSETS_{23}$ (10.281; 0.001)	0.06	-0.03
$EQUITY_{12}$ (10.364; 0.001)	-0.92	-0.61
$SALES_{23}$ (5.434; 0.020)	0.10	0.01
$OCOST_{23}$ (6.250; 0.012)	0.14	0.02
$COST_{23}$ (5.383; 0.020)	0.14	0.03
$FINCOST_{23}$ (5.211; 0.022)	0.49	0.18
$RETEARN_{23}$ (5.085; 0.024)	0.05	-0.07
$LIABIL_{23}$ (5.003; 0.025)	0.15	0.06
$CLIABIL_{12}$ (4.573; 0.032)	0.09	-0.01
$CA/CL_{12}$ (5.125; 0.024)	-0.39	-0.28
$NWC_{23}$ (6.319; 0.012)	-0.11	-0.30
$NETASSETS_{12}$ (10.535; 0.001)	-0.92	-0.61
$E/L_{12}$ (9.735; 0.002)	-0.95	-0.52

In summary it can be concluded that main differences between the financial failure process of PrLC and PuLC are as follows. PuLC’s witnesses more steady decline, whereas PrLC’s try to use leverage to cover accumulating losses, which turns out to be ineffective and due to that failure is more acute. This could prove that firms subordinated to more control are less mobile in their decisions compared to those firms where the level of control is smaller. Also, in large proportion of PrLC’s in Estonia the members of board are also owners in the same firm, which rules out the possibility of shareholder and management conflict (a typical problem addressed by agency theory).

Table IV allows to conclude that there are 13 variables significantly different through viewed bankruptcy years and nine of them are changes between second and third pre-bankruptcy years. Some tendencies can be outlined, like firms becoming insolvent during economic recession (defined by macroeconomic indicators, like sharp drop in GDP) years of 2008 and 2009 in Estonia witnessed remarkable growth in sales between years 2005 and 2006 or 2006 and 2007, when at the same time the increase in losses measured by before tax profit or net profit was very sharp between first and second pre-bankruptcy years. These tendencies were not so common to firms becoming insolvent in years before the recession. At the same time drop in solvency ratios for recession time insolvencies was not very much different compared with previous years. There might be an issue of overvaluing assets (for instance accounts receivables) for firms failing during recession years of 2008 and 2009.

Previous would allow to hypothesize that firms failing during economic recession do this mainly because quick accumulation of losses, whereas for firms failing in normal economic circumstances the list of possible failure causes could be more varied.

TABLE IV: FINANCIAL DATA MEDIAN CHANGES SIGNIFICANTLY DIFFERENT THROUGH DIFFERENT BANKRUPTCY YEARS (ISMT TEST STATISTIC AND SIG. IN BRACKETS, MEDIANS IN CELLS).

Variable (test statistic; sig) / Group	2002	2003	2004	2005
ASSETS <sub>23</sub> (28.605; 0.000)	-0.03	-0.06	-0.01	-0.05
SALES <sub>23</sub> (37.840; 0.000)	-0.15	0.01	0.09	0.03
RETEARN <sub>23</sub> (29.637; 0.000)	-0.69	0.00	0.05	0.19
BTPROFIT <sub>12</sub> (27.075; 0.000)	-1.00	-0.64	-1.34	-1.87
RETEARN <sub>12</sub> (27.161; 0.000)	-0.29	-0.23	0.00	-0.23
NI <sub>12</sub> (27.806; 0.000)	-1.00	-0.64	-1.39	-1.87
EQUITY <sub>23</sub> (23.304; 0.002)	-0.20	-0.14	0.01	-0.09
OCOST <sub>23</sub> (21.871; 0.003)	-0.08	0.09	0.10	0.04
COST <sub>23</sub> (20.551; 0.004)	-0.08	0.08	0.10	0.04
CA/CL <sub>23</sub> (16.980; 0.018)	-0.16	-0.10	-0.04	-0.07
NWC <sub>12</sub> (20.290; 0.005)	-0.38	-0.52	-0.88	-0.84
NETASSETS <sub>23</sub> (23.484; 0.001)	-0.65	-0.57	-1.05	-0.97
NWC <sub>23</sub> (23.484; 0.001)	-0.21	-0.14	0.01	-0.10

  

Variable (test statistic; sig) / Group	2006	2007	2008	2009
ASSETS <sub>23</sub> (28.605; 0.000)	0.00	0.04	0.10	0.14
SALES <sub>23</sub> (37.840; 0.000)	-0.06	-0.01	0.14	0.24
RETEARN <sub>23</sub> (29.637; 0.000)	-0.11	-0.12	0.01	0.24
BTPROFIT <sub>12</sub> (27.075; 0.000)	-1.20	-0.85	-0.97	-2.35
RETEARN <sub>12</sub> (27.161; 0.000)	-0.39	-0.50	-0.11	0.01
NI <sub>12</sub> (27.806; 0.000)	-1.20	-0.85	-0.98	-2.36
EQUITY <sub>23</sub> (23.304; 0.002)	-0.16	-0.17	-0.03	0.02
OCOST <sub>23</sub> (21.871; 0.003)	-0.03	0.17	0.13	0.24
COST <sub>23</sub> (20.551; 0.004)	-0.05	0.17	0.14	0.24
CA/CL <sub>23</sub> (16.980; 0.018)	-0.15	-0.13	-0.21	-0.04
NWC <sub>12</sub> (20.290; 0.005)	-1.17	-0.43	-0.45	-1.10
NETASSETS <sub>23</sub> (23.484; 0.001)	-1.02	-0.92	-0.66	-0.92
NWC <sub>23</sub> (23.484; 0.001)	-0.16	-0.17	-0.03	0.02

The last part of empirical analysis is directed to studying differences between groups which end up with bankruptcy declaration and bankruptcy proceeding abatement. The major difference between two given groups is that in case of bankruptcy proceeding abatement firms witness total drainage from assets, whereas in case of bankruptcy declarations a certain amount of assets is sustained. The largest number of different indicators (17) is found, whereas majority of them (11) are for changes between first and second year (see Table V). Following conclusions can be drawn from analysis:

- 1) Abatement cases witness sharper unfavorable changes for most indicators and in cases where the drop is larger for bankruptcy declaration cases, differences are minimal. As logical to those groups, changes in ASSETS and CASSETS are significantly different for both periods.
- 2) Abatement cases witness remarkably sharper drop in pre-bankruptcy profitability, which is accompanied by remarkable drop in sales. At the same time cost levels are decreased more than for bankruptcy declaration cases. This is accompanied only by small increase in current liabilities.

Previous allows to hypothesize that total drainage from assets is not preceded by increasing leverage (i.e. taking additional risks to save the firm) and is probably solely dependent of more quick increase in losses than for bankruptcy declarations.

TABLE V: FINANCIAL DATA MEDIAN CHANGES SIGNIFICANTLY DIFFERENT THROUGH INSOLVENCY TYPES (ISMT TEST STATISTIC AND SIG. IN BRACKETS, MEDIANS IN CELLS).

Variable (test statistic; sig) / Group	Abatement of bankruptcy proceeding	Bankruptcy declaration
ASSETS <sub>12</sub> (28.673; 0.000)	-0.40	-0.19
CASSETS <sub>12</sub> (19.945; 0.000)	-0.41	-0.23
CFLIABIL <sub>23</sub> (14.909; 0.000)	0.00	0.11
ASSETS <sub>23</sub> (9.713; 0.002)	0.00	0.08
OCOST <sub>12</sub> (11.376; 0.001)	-0.19	-0.06
COST <sub>12</sub> (7.439; 0.006)	-0.18	-0.06
APAYABL <sub>12</sub> (6.839; 0.009)	-0.08	0.03
CLIABIL <sub>23</sub> (6.633; 0.010)	0.14	0.23
RECEIV <sub>12</sub> (6.581; 0.010)	-0.55	-0.31
CASSETS <sub>23</sub> (5.118; 0.024)	0.00	0.09
CLIABIL <sub>12</sub> (6.076; 0.014)	0.03	0.12
SALES <sub>12</sub> (5.477; 0.019)	-0.29	-0.20
LIABIL <sub>12</sub> (4.332; 0.037)	0.01	0.04
APAYABL <sub>23</sub> (4.871; 0.027)	0.04	0.19
CA/CL <sub>12</sub> (10.805; 0.001)	-0.48	-0.32
OP/S <sub>12</sub> (4.877; 0.027)	-2.91	-2.04
NWC <sub>23</sub> (4.529; 0.033)	-0.05	-0.23

In summary it can be said that current study showed that there are some statistically different financial data changes through firm types. This allows to hypothesize that different firms go through varying financial failure process. Although all firms in analysis end up with similar solvency problems (i.e. their  $C/CL_I$  is not different in any of the groups created using five different grouping options), the pathway how they go there differs. Previous analysis showed that the propositions in literature (see [9], [10], [12], [19]) that pre-bankruptcy financial data changes differ through firm groups were accepted. As every research has used different variables and typologies, it is not possible to directly compare results of current study with those conducted previously.

## V. CONCLUSION

Past decades have resulted in large amount of studies focusing on firm failure, but a domain receiving relatively low attention is the one considering failure processes of firms. Namely, large amount of studies discriminate between bankrupt and non-bankrupt firms using static financial information. Differences in the dynamics of financial data for failed firms has received relatively low attention in literature, which in turn served as a motivator for current paper.

Based on an extensive dataset of bankrupt Estonian firms from the period 2002-2009 it was studied, whether financial failure process differs for various firm types. The usage of large set of financial variable and ratio changes indicated that through groups of firm size, industry, legal type, bankruptcy time and bankruptcy type there are substantial differences in the financial failure process.

The paper can be developed in several ways. It is possible to link changes in the values of financial measures to initial scale of those variables, by outlining whether decline in different industries or size groups emerges from more or less healthy stadium. Another option would be to view changes in financial measures applied for current analysis in interconnection to each other, this way testing whether some unique financial failure patterns emerge through combining

different data.

Several managerial and policy implications can be drawn from the study. Policy makers and implementers can adjust their practices to follow the fact that firms fail differently. This could result in changing specific legislation or its implementation. Managers can be more aware of the different trajectories of failure and adjust early warning systems and practices based upon that.

#### REFERENCES

- [1] M. Pretorius, "Critical Variables of Business Failure: A Review and Classification Framework," *South African Journal of Economic and Management Sciences*, vol. 11, no. 4, pp. 408-430, 2008.
- [2] E. I. Altman, "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy," *The Journal of Finance*, vol. 23, no. 4, pp. 589-609, 1968.
- [3] R. Edmister, "An Empirical Test of Financial Ratio Analysis for Small Business Failure Prediction," *Journal of Financial and Quantitative Analysis*, vol. 7, no. 2, pp. 1477-1493, 1972.
- [4] J. A. Ohlson, "Financial Ratios and the Probabilistic Prediction of Bankruptcy," *Journal of Accounting Research*, vol. 18, no. 1, pp. 109-131, 1980.
- [5] C. G. Johnson, "Ratio Analysis and the Prediction of Firm Failure," *The Journal of Finance*, vol. 25, no. 5, pp. 1166-1168, 1970.
- [6] J. Argenti, *Corporate Collapse: The Causes and Symptoms*, New York: McGraw-Hill, 1976, 193 p.
- [7] P. Baumard and W.H. Starbuck, "Learning from Failures: Why It May Not Happen," *Long Range Planning*, vol. 38, no. 3, pp. 281-298, 2005.
- [8] S. D. Chowdhury and J. P. Sheppard, "Riding the Wrong Wave: Organizational Failure as a Failed Turnaround," *Long Range Planning*, vol. 38, no. 3, pp. 239-260, 2005.
- [9] N. Crutzen, "Essays on the Prevention of Small Business Failure: Taxonomy and Validation of Five Explanatory Business Failure Patterns," Ph.D. dissertation, University of Liege, 2009.
- [10] R. D'Aveni, "The Aftermath of Organizational Decline: A Longitudinal Study of the Strategic and Managerial Characteristics of Declining Firms," *Academy of Management Journal*, vol. 32, no. 3, pp. 577-605, 1989.
- [11] S. De Prijcker and H. Ooghe, "Failure processes and causes of company bankruptcy: a typology," *Management Decision*, vol. 46, no. 2, pp. 223-242, 2008.
- [12] E. Laitinen, "Financial Ratios and Different Failure Processes," *Journal of Business Finance & Accounting*, vol. 18, no. 5, pp. 649-673, 1991.
- [13] B. Richardson, S. Nwankwo, S., and S. Richardson, "Understanding the Causes of Business Failure Crises: Generic Failure Types: Boiled Frogs, Drowned Frogs, Bullfrogs and Tadpoles," *Management Decision*, vol. 32, no. 4, pp. 9-22, 1994.
- [14] P. Barnes, "The Analysis and Use of Financial Ratios: A Review Article," *Journal of Business Finance & Accounting*, vol. 14, no. 4, pp. 449-461, 1987.
- [15] R. D'Aveni and D. C. Hambrick, "Large Corporate Failures as Downward Spirals," *Administrative Science Quarterly*, vol. 33, no. 1, pp. 1-23, 1988.
- [16] A. I. Dimitras, S. H. Zanakis, and C. Zopounidis, "A survey of business failures with an emphasis on prediction methods and industrial applications," *European Journal of Operational Research*, vol. 90, no. 6, pp. 487-513, 1996.
- [17] L. R. Gilbert, K. Menon, and K. B. Schwartz, "Predicting Bankruptcy for Firms in Financial Distress," *Journal of Business Finance & Accounting*, vol. 17, no. 1, pp. 161-171, 1990.
- [18] J. Pindado and L. F. Rodrigues, "Parsimonious Models of Financial Insolvency in Small Companies," *Small Business Economics*, vol. 22, no. 1, pp. 51-66, 2004.
- [19] E. Laitinen, "Financial Predictors for Different Failure Processes," *Omega*, vol. 21, no. 2, pp. 215-228, 1994.
- [20] Estonian Commercial Register. [Online]. Available at: <http://www.rik.ee>
- [21] Statistical classification of economic activities in the European Community. [Online]. Available at: <http://eurostat.ec.europa.eu/>
- [22] European Commission regulation 96/280/EC. [Online]. Available at: <http://eur-lex.europa.eu>
- [23] S. B. Green and N. J. Salkind, *Using SPSS for Windows and Macintosh: Analyzing and Understanding Data*, New Jersey: Pearson/Prentice Hall, 2005, 458 p.
- [24] Estonian Bankruptcy Act. [Online]. Available at: <http://www.riigiteataja.ee>

**Oliver Lukason** has received his MA degree from Tartu University and is currently working as a researcher at Tartu University, Faculty of Economics and Business Administration in Estonia. His previous research has mainly concerned different facets of firm failure, e.g. firm bankruptcies and reorganization, survival and performance of start-up and spin-off firms, violation of different legal requirements by firms.