# WHY AND HOW AGRICULTURAL FIRMS FAIL: EVIDENCE FROM ESTONIA

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## Abstract

LUKASON, O., 2014. Why and how agricultural firms fail: evidence from Estonia. *Bulg. J. Agric. Sci.,* 20: 5-11

This paper is focused on a domain in literature that has received very low attention, namely firm failure causes and failure processes in agricultural sector. The two objectives of the paper are to determine the main reasons of firm failure in agricultural sector and find out whether failed firms go through different failure processes. The empirical part uses various data of bankrupt Estonian agricultural firms. Based on the failure reasons outlined in court judgments about bankruptcies, it is established that half of the firms fail because of factors from both, internal and external environment. The other half of the firms collapse because of reasons from only one environment, either internal or external. Based on the financial data from the annual reports of firms, three distinct failure processes are found by using factor analysis. Established failure processes have both, similarities and differences with those established in literature before.

*Key words*: bankruptcy, failure reasons, failure processes, agricultural firms

## Introduction

The topic of firm failure has attracted researchers for a long time, the first publications appearing already in the middle of the 20th century. Most of available failure studies have focused on failure prediction, more specifically on determining which (financial) variables discriminate between failed and non-failed firms. When it is obvious that failing firms do not perform as well as their surviving counterparts, then literature has paid relatively low attention to firm failure processes, including why failing firms perform worse and do all firms fail in the same way. Failure process is described by a set of causes (i.e. failure reasons) and changes mostly in financial performance (i.e. symptoms of failure) initiated by them (Argenti, 1976; Crutzen and van Caillie, 2008). Still, in several empirical studies (e.g. Laitinen, 1991; Laitinen, 1993) failure process has been modelled only by using financial variables, at least partly due to the lack of information about failure causes. Lack of studies focusing on different aspects of the firm failure process, especially on the example of distinct industries, has been the main motivation for composing the current paper.

Literature on why and how firms fail is multifaceted. Firstly, the term failure has different notions through literature (see e.g. Cochran, 1981), but still permanent insolvency (i.e. bankruptcy) is the most commonly applied term in empirical studies, probably because of the ease of getting relevant information. The reasons of firm failure have been elaborated in several theoretical studies (Daily, 1994; Mellahi and Wilkinson, 2004), which univocally establish that the underlying causes should in most cases be sought from both, external and internal environment of a firm. Still, in extreme cases firm failure reasons can emerge from either only inside or outside environment of a firm (Mellahi and Wilkinson, 2004: 32). Causal studies about firm failure are quite infrequent (Altman and Narayanan, 1997: 2). Available papers covering several different sectors have used varying taxonomies of reasons and their results have differed. For instance, direct (Baldwin et al., 1997) or indirect (Gaskill et al., 1993; Blazy and Chopard, 2012) breakdown of reasons into internal and external can be found. The classical distinction between internal and external reasons is that the former are under management control and the latter are not (Boyle and Desai, 1991: 34). The topic how firms fail has received remarkably more attention when compared to reasons. Through numerous bankruptcy prediction models it has been established that common problems in case of failing firms are low profitability, liquidity and solvency, excessive debt and non-productive

assets (Dimitras et al., 1996). Still, only a scanty amount of studies can be found studying whether and how financial situation in different failed firms varies before collapse (see e.g. Laitinen 1991; Lukason, 2012; Laitinen and Lukason, 2014). The papers found to consider failure of agricultural firms are concerned with failure prediction (e.g. Franks, 1998; Argiles, 2001), aggregate failure rate (e.g. Shepard and Collins, 1982; Davies, 1996), voluntary and involuntary exits of farms (e.g. Stam and Dixon, 2004). No elaborate studies were found to specifically consider failure causes of agricultural firms or whether different failed agricultural firms are characterized by varying (financial) failure process.

The research object of current study is Estonian agricultural sector. Estonia is a small open economy, being member state of the European Union (since 2004) and European Monetary Union (since 2011). When in the 1990ies and early 2000s Estonia was considered to be transformation society (Kornai, 2006), then now it is already grouped among developed countries (World Economic Forum, 2012). The NACE section A (agriculture, forestry and fishing) accounts for 3-4% of Estonian GDP, the role of agriculture (section A division 01) being specifically 1-2% (Statistics Estonia, 2013). When the collapse of Soviet Union had strong negative effect on Estonian agricultural sector, then in the last decade it has remarkably improved (also due to important support form EU Common Agricultural Policy). According to year 2012 data, there were 1702 firms registered as agricultural firms in Estonia and their total turnover was ca. 600 million euros.

Based on the gaps in literature, the paper has two main objectives. Firstly, to find out the reasons why agricultural firms fail and classify them into internal-external framework of failure reasons. Secondly, to study how is failure reflected through financial indicators and if possible, then outline taxonomy of failure processes based on financial variables.

## Materials and Methods

For current study, information about all bankruptcies in Estonian agricultural sector was obtained for the period 2002-2009. Given period has been selected, because for those years information about bankruptcy reasons could be obtained. Bankruptcy reasons for current study are obtained from Estonian county court judgments. Estonian Bankruptcy Act obliges trustee to study bankruptcy reasons and report them to court, which then brings them out in specific court judgment. Pre-bankruptcy financial data is obtained from Estonian Centre of Registers and Information Systems, where all firms submit their annual financial reports. In order to incorporate dynamics of firm's pre-bankruptcy financial situation in analysis, data is obtained from three pre-bank-

ruptcy years. Given number of years is from one hand determined by the appearance time of failure symptoms, but also by data availability and median lifetime of firms in analysis. Those firms that have some financial reports missing from the three-year pre-bankruptcy period, will be excluded from analysis, as such data limitation restricts having sufficient insight to failure process. Table 1 lists bankruptcies in Estonian agricultural sector in 2002-2009 by specific industries (NACE codes given in brackets), whereas it has also been noted which is the number of firms included in the analysis of financial failure process (firms have pre-bankruptcy financial data available for three years) and failure reasons (firms that have publicly available court judgment with insolvency reasons disclosed).

As can be seen from Table 1, 51 bankruptcies occurred in Estonian agricultural sector in the period 2002-2009. Firms from three sub sectors have higher frequency of insolvencies compared to others and they are: 1) Growing of cereals, leguminous crops and oil seeds, 2) Raising of dairy cattle, 3) Raising of swine/pigs. Given three industries account for about 57% of all insolvencies, whereas the rest of the cases are fragmented over numerous different sub sectors. Given distribution also corresponds to most common sub sectors of vital firms. There are 15 firms having all three pre-bankruptcy reports available, which make the representation of cases for analysis 29%. Several annual reports are missing, as each firm must submit its report in maximum half a year after the reporting period has ended, but when bankruptcy occurs in the first semester, the firm does not follow given regulation because of bankruptcy. Court judgments with insolvency reasons listed in them could be obtained for 14 firms (27% of all cases). Based on data availability for current study and previous practice in literature for similar analyses, the dataset can be considered enough representative.

For detecting the insolvency reasons, all court judgments are read through and insolvency reasons are extracted from them. Each court judgment includes insolvency reasons detected by trustee given as list and a longer description of the failure process. In current study, the list of insolvency reasons will be applied and the additional description will be used only to verify the validity of reasons. As trustees are obliged to list the reasons and they have studied materials provided by firms carefully, the information can also be considered reliable. After the extraction of reasons, they are systemized based on the most widely applied taxonomy in order to have generalized results. As the dataset of cases with bankruptcy reasons is small, only frequencies for applied taxonomy are provided and no additional statistical tests are conducted.

Financial data from the annual financial statements is used to calculate pre-bankruptcy financial ratios for three years. In

**Table 1**
**Bankruptcy cases in Estonian agricultural sector 2002-2009**

| Field of agriculture | All bankruptcies that occurred | Financial data available for three pre-bankruptcy years | Court judgments with insolvency reasons available |
|---|---|---|---|
| Growing of cereals (except rice), leguminous crops and oil seeds (1111) | 10 | 4 | 0 |
| Growing of vegetables and melons, roots and tubers (1131) | 2 | 0 | 0 |
| Growing of fibre crops (1161) | 1 | 0 | 0 |
| Growing of other non-perennial crops (1191) | 2 | 1 | 0 |
| Growing of other tree and bush fruits and nuts (1251) | 3 | 0 | 1 |
| Plant propagation (1301) | 1 | 0 | 0 |
| Raising of dairycattle (1411) | 10 | 6 | 3 |
| Raising of other cattle and buffaloes (1421) | 1 | 0 | 1 |
| Raising of horses and other equines (1431) | 1 | 0 | 1 |
| Raising of sheep and goats (1451) | 2 | 0 | 0 |
| Raising of swine/pigs (1461) | 9 | 2 | 5 |
| Raising of poultry (1471) | 3 | 2 | 1 |
| Raising of other animals (1499) | 1 | 0 | 1 |
| Mixed farming (1501) | 2 | 0 | 0 |
| Support activities for crop production (1611) | 2 | 0 | 0 |
| Post-harvest crop activities (1631) | 1 | 0 | 1 |
| Total | 51 | 15 | 14 |

*Source*: compiled by author.

current study, three different ratios will be applied which are variables very commonly applied in previous failure studies (see e.g. Dimitras et al., 1996). They are one solvency ratio ($\frac{CASSETS}{CLIABIL}$, i.e. $\frac{CA}{CL}$), one profitability ratio ($\frac{NI}{SALES}$, i.e. $\frac{NI}{S}$) and one capital structure (leverage) ratio ($\frac{EQUITY}{LIABIL}$, i.e. $\frac{E}{L}$). The abbreviations used in given financial ratios have the following meaning (different balance sheet and profit statement items): all liabilities (*LIABIL*), equity (*EQUITY*), current assets (*CASSETS*), current liabilities (*CLIABIL*), net income (i.e. net profit, *NI*), sales revenue (*SALES*). Each ratio calculated will be accompanied by subscript 1, 2 or 3. Given subscript notes specific pre-bankruptcy year, e.g. subscript 1 denotes the last year previous to bankruptcy year (referred to as first pre-bankruptcy year) and subscript 2 the last but one year previous to bankruptcy year (referred to as second pre-bankruptcy year). In addition, for first year before bankruptcy total assets value has been brought out. Besides outlining descriptive statistics of financial ratios, the presence of different failure processes based on pre-bankruptcy financial data will also be studied with the help of factor analysis. Factor analysis has been applied for the extraction of failure processes in previous stud-

ies (see e.g. Laitinen, 1991). Specifically, three financial ratios for three pre-bankruptcy years (in total nine variables) will be used to find latent characteristics based on the factor loadings. Firms will then be assigned into groups according to the factor that got the highest score, as this remarks the most important characteristics of specific firm. The interpretation of groups in created taxonomy will be conducted by using median values of ratios. Results will also be compared with Laitinen (1991) taxonomy, which found out three different failure processes based on the data of Finnish firms (mostly manufacturing firms). They are (Laitinen, 1991: 667): chronic failure firm (all ratios on a poor level for a lengthy time), revenue financing failure firm (indebtedness and static liquidity on an average level, but profitability was poor), acute failure firm (all ratios dramatically dropped in the year before failure). Current study does not integrate the analysis of failure reasons and pre-failure financial characteristics, as only for a few cases both data is available.

## Results and Discussion

### *Failure reasons*

The reasons of bankruptcies are listed in Table 2. As the dataset is quite small for giving statistical overview of most frequent individual reasons, occurring reasons are briefly

commented as follows. As common causes from external environment bad natural conditions, fluctuation of input and output prices, tough competition and government requirements have been emphasized. The internal causes also vary through cases, although lack of knowledge, insufficient equi-

ty capital, lack of current assets, poor or too optimistic business strategy and unprofitable primary activities are among the most commonly mentioned reasons.

The reasons are classified as external and internal by using the classifications by Boyle and Desai (1991) and Bald-

**Table 2**
**Reasons for failure of Estonian agricultural firms (14 cases)**

| Case # | Field of activity and NACE | Reasons for failure | E | I |
|---|---|---|---|---|
| 1 | Raising of swine/pigs (1461) | Growth in provender cost and reduction in demand due to economic crisis, which made activities unprofitable | + | |
| 2 | Growing of other tree and bush fruits and nuts (1251) | The field did not offer no more yield because of its old age, bad soil conditions, different quality of plants, weather conditions, illnesses. Too large plantation, so all necessary work could not be done. Lack of knowledge and experience. | + | + |
| 3 | Raising of swine/pigs (1461) | Termination of purchases by only buyer and inability to offer as good prices as competitors. | + | + |
| 4 | Raising of other animals (1499) | Changes at market that made production unprofitable. The unlawful audit by tax authority made cooperation partners to retreat and lowered motivation of management board. | + | |
| 5 | Raising of other cattle and buffaloes (1421) | During the whole lifecycle there has been lack of working capital and self finance. Owners have not invested to firm since foundation. | | + |
| 6 | Raising of swine/pigs (1461) | Drop in meat buying up prices made production unprofitable as costs remained the same. Large liabilities from privatization. | + | + |
| 7 | Raising of swine/pigs (1461) | Stop of own mixed fodder production increased swine raising. Lack of working capital to carry on activities. Lessor does not want to renew contract. | + | + |
| 8 | Raising of swine/pigs (1461) | Too large investments in production facility due to EU requirements. Instability of buying up prices. Low nutritional value of feed and sickness of animals. Failed business plan. | + | + |
| 9 | Raising of dairycattle (1411) | Unprofitable activities. Decrease in production due to bad weather. Inability to create stock because of lack of working capital. | + | + |
| 10 | Raising of dairycattle (1411) | Fire, which destroyed feed stock and part of production facility. Drop in buying up price and crop failure. | + | |
| 11 | Raising of dairycattle (1411) | Drop in buying up price, unpaid claims by buyers, being left without state support and too large investments in production. | + | + |
| 12 | Post-harvest crop activities (1631) | Inoperative management and unprofitable activities. | | + |
| 13 | Raising of horses and other equines (1431) | Too optimistic business strategy, as it was not possible to pay daily costs. | | + |
| 14 | Raising of poultry (1471) | Drop in sales due to Russian crisis, unstable situation in agriculture and unequal competition with import products, growth in resource prices. | + | |

*Note*: E – at least one external reason present, I – at least one internal reason present.
*Source*: compiled by author.

win et al. (1997) in a way that for each case it has been marked, whether trustees have noted any (cell marked with "+") external (column marked as "E" in Table 2) or internal (column marked as "I") reason for given case. The external reasons have frequency 11 (79%) and internal ones 10 (71%), marking that factors from both environments have almost the same representation. In addition, on 7 occasions (50%) external and internal reasons are represented together in specific court judgment. This allows to conclude that bankruptcies in agricultural sector for half cases occur because of both, internal and external reasons, whereas the rest of the cases almost equally divide between only external (4 cases) and only internal causes (3 cases). Given result has some differences with findings in theoretical and empirical studies, namely based on Mellahi and Wilkinson (2004) and Baldwin et al. (1997) it could be assumed that majority of cases are described with reasons from both, internal and external environment. It can also be seen, that out of five cases of bankruptcies of swine/pig growing firms, four firms (i.e. 80%) have collapsed due to causes from both environments, so it could be hypothesized that firms functioning in the same sub sector could have similar failure reasons.

### *Financial background and failure processes*

The analysis of financial data of bankrupt agricultural firms begins with relevant descriptive statistics (Table 3). As mean is affected by extreme cases more than median, both of those figures will be brought out. Table 3 indicates that the solvency of firms in second and third year before bankruptcy is not very bad. Still, according to medians only up to half of the firms can cover current liabilities with current assets. The first year before bankruptcy shows considerable drop in solvency and the current assets to current liabilities

ratio decreases remarkably. Through three pre-bankruptcy years firms have very low equity and liabilities ratio, whereas in the first year before bankruptcy equity becomes negative for majority of firms. The median firm is not profitable through first and second pre-bankruptcy years, whereas for the third pre-bankruptcy year median profitability is positive, although very low. The minimum and maximum values, but also standard deviations indicate that firms in analysis are very different in respect of pre-bankruptcy financial ratio values, bringing to the hypothesis that different firms follow varying failure processes.

In order to study the presence of different failure processes in the dataset, factor analysis is a useful tool, as it has been applied in similar studies before (see e.g. Laitinen, 1991). For factor analysis, in current study the extraction method is principal components analysis and rotation method Varimax with Kaiser Normalization. The factor analysis results in three components (i.e. latent variables), which explain an acceptable proportion of total variance, namely 79.0% (in comparison for instance 52% in Laitinen (1991) study). Table 4 lists factor loadings for extracted factors.

As given in methodological part, each firm will be classified to the group that got the highest factor score. In this way, three types of failure processes emerge, for which mean and median ratio values have been provided in Table 5. Firms in given three groups have both, similarities and differences through median values of ratios. The capital structure $\left(\frac{E}{L}\right)$ varies a lot through groups for second and third pre-bankruptcy year, but eventually all firms exhaust their reserves and are witnessing very low or negative equity because of accumulating losses. Still, for Group 1 firms the share of equity is very low through all three years, for Group 2 and 3 firms it is on different acceptable levels in second and third pre-

**Table 3**
**Descriptive statistics of financial variables (15 cases)**

| Variable | Median | Mean | Std. Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| $CA_1/CL_1$ | 0.267 | 0.359 | 0.369 | 0.000 | 1.203 |
| $CA_2/CL_2$ | 1.031 | 0.877 | 0.398 | 0.263 | 1.499 |
| $CA_3/CL_3$ | 0.788 | 0.932 | 0.472 | 0.271 | 1.821 |
| $E_1/L_1$ | -0.209 | -0.230 | 0.388 | -0.816 | 0.458 |
| $E_2/L_2$ | 0.163 | 0.220 | 0.347 | -0.233 | 0.896 |
| $E_3/L_3$ | 0.196 | 0.444 | 0.491 | -0.015 | 1.561 |
| $NI_1/S_1$ | -0.417 | -0.689 | 0.979 | -3.895 | 0.293 |
| $NI_2/S_2$ | -0.012 | -0.182 | 0.541 | -1.928 | 0.454 |
| $NI_3/S_3$ | 0.007 | -0.164 | 0.499 | -1.762 | 0.210 |
| Total assets$_1$ (EUR) | 81040 | 279146 | 570553 | 12445 | 2291041 |

*Source*: compiled by author.

bankruptcy year. Still, when Group 2 firms finally witness large negative $\frac{E}{L}$, then for Group 3 firms it is near zero. The profitability $\left(\frac{NI}{S}\right)$ of Group 1 firms is negative for the first and second pre-bankruptcy years, but slightly positive for third pre-bankruptcy year, whereas it decreases rapidly just before bankruptcy. Profitability of Group 2 firms goes through similar tendency as for Group 1 firms, but Group 3 firms witness small negative profitability throughout all viewed years. Solvency $\left(\frac{CA}{CL}\right)$ of Group 2 and 3 firms is slightly below or over one for some earlier years before bankruptcy, but drops considerably before bankruptcy. Therefore, in Group 2 the firm has practically no liquid assets left to service short-term liabilities and Group 3 firms are witnessing higher, but still non-sustainable level also. For Group 1 firms solvency remains below accepted level for all pre-bankruptcy years, but

there is also no such big drop as for other groups and firms are eventually more solvent than in other groups.

When comparing given results with the three failure processes found in Laitinen (1991), then the processes established in current study have both, similarities and differences. Namely, in case of Group 3 the $\frac{E}{L}$ ratio points to revenue financing failure, $\frac{CA}{CL}$ to acute failure and $\frac{NI}{S}$ to chronic failure. In Group 1 all ratios have so low values that they can be considered to refer to chronic failure firms. In Group 2 there is significant improvement of all ratios from third to second pre-bankruptcy year, but very sharp opposite tendency occurs between second and first pre-bankruptcy years. Such firm is characterized by elements from both, acute and revenue financing failure firm. Therefore, the three failure processes established on the example of agricultural firms mostly seem to be a mixture of the failure processes established in Laitinen (1991) study.

## Conclusion

The paper focused on reasons and financial characteristics of firm failure in agricultural sector. There is multitude of studies focusing on failure, most of them considering failure prediction. Only a few studies were found to consider failure of agricultural firms. Still, none of the previous studies specifically focuses on determining bankruptcy reasons or different failure processes in agricultural sector, which was also the main motivation for composing this paper.

Two different datasets were used in empirical analysis, namely court judgments to determine failure reasons and annual reports for obtaining financial data to be applied in studying failure processes. The study of failure reasons of agricultural firms showed that on half occasions the collapse is

**Table 4**
**Varimax-rotated factor loadings for the financial ratios**

| Variable | Factors | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| $NI_1/S_1$ | 0.876 | 0.039 | 0.323 |
| $NI_2/S_2$ | 0.799 | 0.541 | -0.201 |
| $NI_3/S_3$ | 0.842 | 0.469 | 0.067 |
| $E_1/L_1$ | 0.384 | 0.174 | 0.726 |
| $E_2/L_2$ | 0.143 | 0.913 | 0.238 |
| $E_3/L_3$ | 0.036 | 0.266 | 0.844 |
| $CA_1/CL_1$ | 0.529 | -0.072 | 0.463 |
| $CA_2/CL_2$ | 0.204 | 0.891 | 0.260 |
| $CA_3/CL_3$ | 0.026 | 0.116 | 0.717 |

*Source*: compiled by author.

**Table 5**
**Mean and median values of ratios for failure processes created with factor analysis**

| Variable | Group 1 (n=7) | | Group 2 (n=3) | | Group 3 (n=5) | |
|---|---|---|---|---|---|---|
| | Mean | Median | Mean | Median | Mean | Median |
| $CA_1/CL_1$ | 0.515 | 0.487 | 0.015 | 0.010 | 0.183 | 0.389 |
| $CA_2/CL_2$ | 0.810 | 0.739 | 1.041 | 1.126 | 1.161 | 0.919 |
| $CA_3/CL_3$ | 0.703 | 0.785 | 0.785 | 0.786 | 1.205 | 1.225 |
| $E_1/L_1$ | -0.264 | -0.273 | -0.760 | -0.589 | -0.022 | 0.047 |
| $E_2/L_2$ | 0.063 | 0.090 | 0.357 | 0.431 | 0.235 | 0.276 |
| $E_3/L_3$ | 0.084 | 0.151 | 0.121 | 0.277 | 0.926 | 0.953 |
| $NI_1/S_1$ | -0.417 | -0.470 | -0.887 | -1.010 | -0.196 | -0.803 |
| $NI_2/S_2$ | -0.012 | -0.052 | 0.002 | 0.112 | -0.074 | -0.539 |
| $NI_3/S_3$ | 0.018 | -0.103 | -0.012 | 0.042 | -0.076 | -0.373 |

*Source*: compiled by author.

caused by both, internal and external failure factors. The remaining cases almost equally divide between failures caused by either only internal or external factors. Those findings slightly contradict literature, as for instance it is proposed in Mellahi and Wilkinson (2004) and revealed in Baldwin et al. (1997) that in majority of cases factors from both environments should contribute to failure.

The study of pre-bankruptcy financial data with factor analysis revealed that three different failure processes characterize agricultural firms, which follows the finding about the number of different failure processes in Laitinen (1991). Still, failure processes in current study differ from those developed in Laitinen (1991), so it can be generalized that agricultural firms go through to a certain extent unique failure processes when compared with other sectors.

The paper can be developed in many ways, of which the major improvement possibility would be the usage of larger dataset and cases from different countries to validate the results. In addition, the interconnection of failure reasons and financial data could be analysed. The author hopes that this pilot study will lead to research that is more thorough on the topic.

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