

Towards the identification of critical stages in the failure path : a longitudinal approach amongst Belgian SMEs

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I. Introduction

During the last seven decades, business failure has been one of the most investigated topic in the accounting literature (Ooghe, Balcaen, 2006a) (Keasey, Watson, 1991) (Morris, 1997). However, most of this literature is focused either in a prediction perspective considered in a credit-risk management perspective or in a purely technical perspective in order to test the ability of some new statistical or mathematical technique to correctly predict a possible failure (Ooghe, Balcaen, 2006a) (Morris, 1997) (Van Caillie, 2004). As a result, even after hundreds of researches, relatively few is known about how firms evolve towards failure and a possible legal bankruptcy, so that Dimitras et al. (1996) wrote recently that this literature suffers from “an unifying theory” allowing to understand both how and why some firms fail.

Particularly, relatively few attention has been paid to the identification of some typical failure paths allowing to identify different critical stages in a failure process and to understand the dynamics of the different organizational and financial factors influencing the evolution on a failure path (Argenti, 1976) (Marco, 1989) (Malecot, 1989). So, relatively few is also known about how a company may decline and, consequently, relatively few is known on how to interfere in this process to really prevent a bankruptcy (Van Caillie, 2004). While largely hoped by academics, researchers and Public Authorities, the move from a pure passive prediction perspective to a more active and constructive preventive perspective is still suffering from a lack of conceptual models really reflecting both the large diversity of failure processes (such as suggested by Laitinen (1991), Van Wymeersch and Wolfs (1996) or Hambrick and D’Aveni (1988)) and the dynamics of these processes ; especially, little is known about the “exit path” of a failing firm, i.e. the different financial and juridical critical steps characterizing the last years before bankruptcy (Ooghe, Balcaen, 2006 b)

In this paper, built in a **normative perspective**, we thus address the following question : If we refer to a failing firm as a non performing firm and if we search for methodological tools into the literature on performance management, is it possible to identify critical financial stages in a normative failure process, with which it would be possible to associate a time lag before a fatal bankruptcy and some typical behavioral patterns amongst meaningful financial ratios ?

We test practically two hypotheses :

1° A financial database integrating financial ratios chosen for their ability to reflect the multidimensional aspects of performance and calculated in a longitudinal perspective is able to highlight some critical stages in a normative failure process.

2° Each stage is characterized by some specific financial particularities, each of them reflecting a possible strategic or organizational cause explaining the entrance into a failure path.

The test is applied to a database containing 10 financial ratios, chosen for their ability to represent the different multidimensional aspects of performance such as emerging from the “Balanced ScoreCard” model initially proposed by Kaplan and Norton (1992). This database is built from the financial data provided by all the firms located in the Belgian County of Liège, these financial data having been verified and technically approved by the Belgian National Bank. The level of failure risk is measured by using the concept of “Legal Failure Risk” (LFR), such as proposed by Van Caillie and Dighaye (2002). All these indicators are calculated for the period 1998-2004 (7 years), so that our study focus its attention on firms arrived at least at

the stage of emergence, growth or decline in their life cycle (Laitinen, 1992) (Keasey, Watson, 1991).

II. Theoretical framework

Business failure is largely considered in the literature as a phenomenon which characterizes “non performing” firms, i.e. with reference to a benchmark which is a performing firm (Morris, 1997) (Ooghe, Van Wymeersch, 1996). So, a failing firm is ordinarily defined as a firm which is unable, in a long-term perspective, to reach the different financial, organizational and social goals which are set by its shareholders, its other stakeholders and by the Community (Ooghe, Van Wymeersch, 2005).

While a lot of researches have been devoted to the identification of the different causes and symptoms which are at the origin or which accelerate the failing process, most of their results are presented in a purely normative perspective, under a form of list and without an unifying “theoretical model” explaining how and why a firm, a one moment, enters into a failing process.

Two contributions propose however a model, called then “failure path”, representing the dynamics of financial and organizational causes and symptoms :

1° In a normative perspective, Ooghe and Van Wymeersch (1996) propose a unique model representing “failure path”, based upon numerous organizational and financial qualitative studies dedicated to the identification of causes and symptoms of business failure. In this model, a company may enter into a failing path through two ways : via a weak added value or via excessive (operational) expenses. This two aspects, once combined, lead to insufficient profitability, insufficient operational return and to a lack of cash-flow and thus problems of self-financing. In this situation becomes permanent, it induces a growing problem of lack of liquidity, that may be reinforced by an excessive investment. To solve this problem, debts are heavily used, which induces a consequent increase in financial expenses and a roll-back effect appears. Once liquidity problems are too important and debts are too important, the two juridical criteria ordinarily used to define a legal situation of bankruptcy are met.

2° In 1991, in a specific study focused on the identification of failure paths amongst Finnish firms, Laitinen identifies three alternative types of failure processes : the first type is a ‘chronic failure firm’, where almost all financial ratios were poor already in the fourth year before failure, the second type is a “revenue financing failure firm” whose indebtedness and static liquidity were on an average level in every year before failure but “the sufficiency of revenue financing was rather low because of poor profitability and slow accumulation of revenues”, the third type is “an acute failure firm” where almost all financial ratios deteriorated abruptly in the last year before failure (Laitinen, 1992).

Other models were also proposed in the literature, but were inscribed in an organizational perspective (Argenti, 1976) (D’Aveni, 1991) (Hambrick, D’Aveni, 1989) : while conceptually extremely interesting, these models fail to establish a link with financial statements, so that they can not be used by external analysts to identify if and how a firm is possibly failing.

So, it appears useful to search first for a model representing corporate failure as characterizing the evolution of a non performing firm and as characterizing an unbalanced firm : it’s then logical to base it on a traditional model used in the literature on management control and performance management (such as the “Balanced ScoreCard model”, the Skandia Navigator model, the EFQM Model, ...) to represent how a performing firm is balanced. In a second step, it appears useful to

establish a clear link between the different aspects highlighted in this theoretical and conceptual model and traditional financial statements published by corporate firms.

III. Conceptual model

Based upon an observation of 50 cases of business failures administered by the Court of Commerce of the City of Liège (Belgium) in the period September 06/December 06, we choose to base our study on the “Balanced ScoreCard” model such as initially proposed by Kaplan and Norton (1991) in the early ‘90s to represent “balanced performance” in firms from the “Information Age” (i.e. emerging performing firms searching the roots of their performance in an heavy use of new information technologies, in a clear customer-orientated strategy and in a permanent search for an equilibrium between short-term and long-term performance).

This model is presented in Exhibit 1.

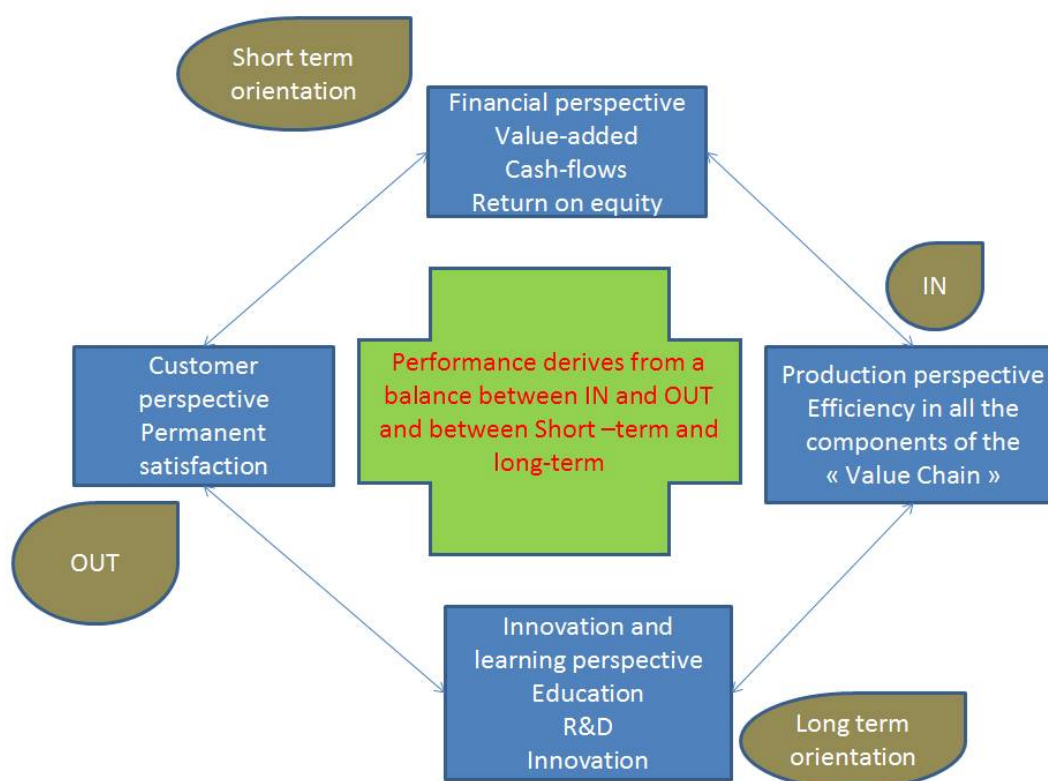


Exhibit 1 : The performance model that underlies the “Balanced ScoreCard Model” (adapted from Kaplan & Norton, 1992)

This model assumes an important underlying paradigm in a resource-based view of the firm : any company must in the long term create value for each of its stakeholder, i.e. the social benefits and/or financial revenues generated by the firm through its activities compensate at least the cost of the human, financial, tangible and intangible resources used to create, produce and deliver these activities.

The key assumption that explains this model (Kaplan, Norton, 1992) is then that the performance of any company derives from a double equilibrium : a balance between a long-term orientation (focused on innovation and learning as the main levers to ensure business continuity in the long run) and a short-term orientation (focused on a financial vision of the firm, especially from the shareholder viewpoint) and a balance between a strategic inside-out perspective (focused on a permanent search for efficiency in the daily operations organized in a “Value-Chain” perspective) and a

strategic outside-in perspective (focused on a permanent search for proximity and satisfaction with customers) (De Wit, Meyer, 2004).

To traduce this conceptual and theoretical model of performance into an operational one that could be used by external analysts via the use of financial statements and to allow its operational test in a real context, we analyze the abundant literature about financial ratios used in a credit-risk perspective and in a business failure prediction perspective (Morris, 1997) (Altman, 1994) (Ooghe, Balcaen, 2006 a). Then, we combine the results of this literature review with the practical observation of 50 cases of current business failure cases in the Court of Commerce of Liège to isolate key financial ratios that could be associated with the different aspects of our reference model.

We formalize our results in Exhibit 2 and Exhibit 3.

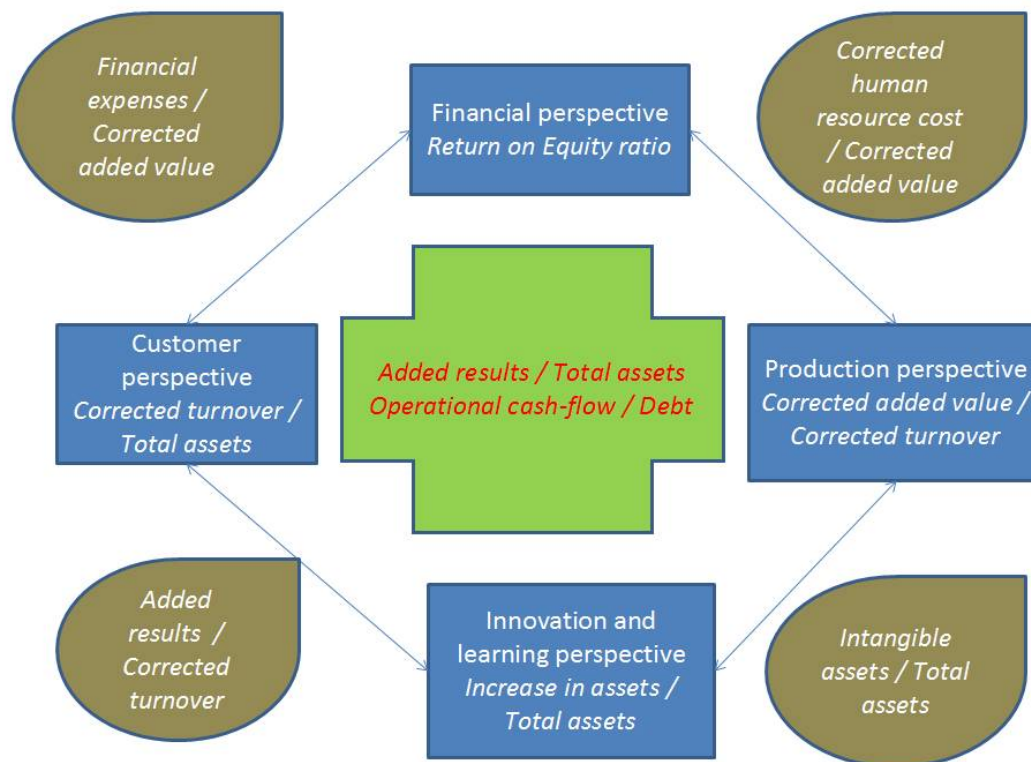


Exhibit 2 : The ten financial ratios used to test the underlying performance model
 Exhibit 2 shows that a specific financial ratio is associated with each of the four dominant dimensions in our performance model (i.e. customer perspective, production perspective, financial perspective and innovation and learning perspective), that four other financial ratios are associated with the interaction between neighbor perspectives and that two financial ratios are used to represent the global dynamics of the model, one to reflect the underlying paradigm of permanent value creation (“Added results / Total assets”²) and the other one to reflect the link between global operational performance of the firm and its ability to sustain its financial structure (the “Cash flow / Debt” ratio that was historically the first one to be considered by Beaver

² This ratio is pointed out as especially crucial in a long term perspective by Van Wymeersch and Wolfs (1997). In the case of Belgian firms, these authors show that “Added results” (i.e. the amount of added value that remains available within the firm after it has paid at a normal price all its resources, i.e. after it has taken into account the cost of human resources, financial resources, depreciation and operational taxes) is one of the first key financial indicators that deteriorates once a company enters into a failing process.

(1967) as having a significant interest in a business failure risk prediction perspective).

Exhibit 3 explains how and why these financial ratios are chosen and constructed. Two particular concepts need an explanation :

- ° The concept of “Corrected added value” is used instead of the traditional concept of “Added value”. Corrected added value is defined as a traditional added value (turnover less cost of goods acquired outside the firm), corrected by the amount of accounts receivables. This concept reflects the fact that added value becomes only cash when accounts receivable are really paid on, linking so added value created within the firm with liquidity, i.e. one of the two criteria taken into account by most Legal Authorities to define the concept of bankruptcy. So, we are able to take into account two important phenomenon in the explanation of sudden bankruptcies (Morris, 1997) : the importance of failures in a cascading effect (the failure of an important customer induces frequently the failure of its suppliers, especially when turnover is concentrated on a few number of customers or if a dependency relation exist between the supplier and its client) and the importance of “Group” effects (the failure of a subsidiary company, used to fuel cash towards its main shareholder and is unable to resist to the failure of this shareholder).

- ° The concept of “Corrected turnover” is similarly used instead of the traditional concept of “Turnover”. It is defined as a traditional turnover, reduced by the amount of accounts receivable, once again to reflect the fact that turnover becomes cash only when accounts receivable are paid.

<i>Name</i>	<i>Label</i>	<i>Justification</i>
Financial expenses / Corrected added value	CFVA	Financial expenses are due essentially to debts. An increase in debts induce a decrease in solvency (thus an increase in the business failure risk) and an increase in financial expenses. If theses financial expenses absorb an important part of the cash coming from the added value generated by customers, the business failure risk increase (link between the customer perspective and the finance perspective)
Return on Equity ratio	ROE	Return on Equity ratio is the most common ratio used to measure shareholder satisfaction (finance perspective)
Corrected human resource cost / Corrected added value	FPVA	Corrected human resource costs are the sum of costs of human resource employed within the firm (Labor Cost) and of human resource employed outside the firm (Interim Labor Cost). The more important the amount of value added absorbed by labor cost, the more important the risk of business failure (Altman, 1984) (link between the finance perspective and the production perspective, most of the labor costs being

		induced by the configuration of the “Value Chain” within the firm)
Corrected turnover / Total assets	CAAT	This measure is used to reflect the customer efficiency of the firm, as well as its global efficiency. The more satisfied the customers, the more important the corrected turnover of the firm (customer perspective)
Corrected added value / Corrected turnover	VACA	This traditional measure is used to reflect the importance of the integration of the production process within the firm. The more integrated, the more important the added value generated by the firm and the less important its dependency towards external suppliers (production perspective)
Added results / Corrected turnover	RACA	The more important the amount of added value which remains ultimately available within the firm, the less important its business failure risk (link between customer perspective and innovation perspective)
Increase in fixed assets from year to year	ACCRAIAT	This ratio, which is also a financial ratio characterizing growing companies, reflects the ability of the firm to invest in its future development, either in tangible or in intangible assets (innovation perspective)
Intangible assets / Total assets	AIAT	This ratio reflects the importance of intangible assets in the total assets and its ability to base its future development and its activities on intangible assets (link between production perspective and innovation perspective)
Added results / Total assets	RAAT	This global efficiency ratio measures the ability of the firm to generate significant added results by optimizing the use of its total assets
Operational cash flow / Debt	CFDT	This global solvency ratio measures the ability of the firm to generate a significant cash-flow from its operations, sufficient to assume the repayment of its debts

Exhibit 3 : List and explanations of the ten financial ratios

IV. Methodology

To test the ability of our performance model to really reflect the evolution of failing firms on failure paths, we use the following methodology – en quoi la technique propose permet-elle de faire ca?? :

1. First, we need to use a pertinent indicator reflecting the legal business failure risk associated with some specific firms and that would be able to be

considered as our explained variable. To do this, we use the concept of “Legal Failure Risk” proposed by Van Caillie and Dighaye (2002) : this concept results from the combination of two financial ratios, the current ratio for measuring the liquidity risk and the total debt to total equity ratio for measuring the solvency risk, each firm being compared on these two criteria with a benchmarking population and being associated to a score (in deciles) for these two criteria. So, the “Legal Failure Risk” ratio that emerges from this methodology is ranking from 2 to 20, the weakest the “Legal Failure Risk” score, the more important the risk of legal business failure.

2. Second, we build a sample of firms evolving into a failing process. To eliminate the effects of some important contingent factors (fiscal legislation, social context, macroeconomic conditions, ...) and to really focus our attention on firms evolving on a progressive failing path, we focus our investigation on all the firms located in the Belgian County of Liège and having published financial statements for the period 2002-2004. We take into consideration 14 735 private firms, from all economic sectors.³
3. Third, for each of these 14 735 firms, we calculate its “Legal Failure Risk” for year 2004. To calculate it, we first rank on the one hand the values of the current ratio and on the other hand the values of the total debt to equity ratio ; then, we replace each original value by the number of its respective decile into this population. Based upon our observation of 50 cases of recent business failures in the Court of Commerce of Liege, we choose to limit our investigation to the companies with a legal failure risk or 7 or less ⁴. This leads to take into consideration only 5 066 companies.
4. For each of these 5 066 companies, we build a financial database, containing the “LFR score” for each firm for the period 1998-2004 (i.e. 7 years, to be consistent with the results obtained by Van Wymeersch and Wolfs showing that, in the Belgian case, business failure may be predicted up to seven years in advance, especially when focusing its attention on added value and its use) and containing the ten ratios we consider as correctly reflecting the major aspects of our conceptual reference model. These ten ratios, when available, are calculated in a longitudinal perspective, for each of the seven years from the period 1998 – 2005.
5. Then, to isolate the ratios that are the most associated with the LFR score in 2004, we realize a cluster analysis of variables. The distance measure used is (1 – correlation) (the more important the correlation between two variables, the most reduced the distance between these two variables), the amalgamation rule is the Ward’s criterion (the nearest variables are associated at each step) and the analysis is performed at three levels of amalgamation (1.128, 1300 and 1.448). This leads to reduce our database to 27 financial ratios significantly linked to the LFR indicator.
6. To reduce the number of remaining ratios to a smaller number, more easily to incorporate in a further correspondence analysis, we realize a purely descriptive multiple regression. We regress the LFR indicator on the 27

³ *Public firms or public firms with a private legal status are thus eliminated, as well as young and emerging firms (literature shows that such firms are far more sensible to business failure than older firms, but for reasons that are linked to the creation process of the firm, especially insufficient initial financial resources and excessive initial investment) (Keasey, Watson, 1984) (Julien e.a., 2006).*

⁴ *All the cases which were examined by the Court of Commerce were characterized by LFR scores under 8.*

remaining financial ratios, whose values were normalized. We obtain an r-square of 0.196, which may be considered as reasonably important due to the high number of observations in our database (5 066). Fourteen financial ratios emerge from this analysis, with significant betas.

- At least, to illustrate the dynamics of the evolution of a firm once engaged into a failing process, we realize a correspondence analysis. This non-parametric multivariate data analysis technique allows to highlight the proximities between the modalities of discrete variables considered as active (i.e. explaining a phenomenon) and the modalities of discrete variables considered as passive (i.e. explained and dependent from the active variables). The results of this analysis are multi-dimensional graphs, allowing on the one hand to understand the proximities between modalities of some variables and allowing on the other hand to reduce the information contained in a database into some synthetic dimensions (Wald, ...). The implementation of such a method implies logically to replace the original values of each selected ratio by their respective deciles in the original population (i.e. to transform continuous variables into discrete variables).

V. Results

Exhibit 4 reproduces the amalgamation graph resulting from the cluster analysis of our original database.

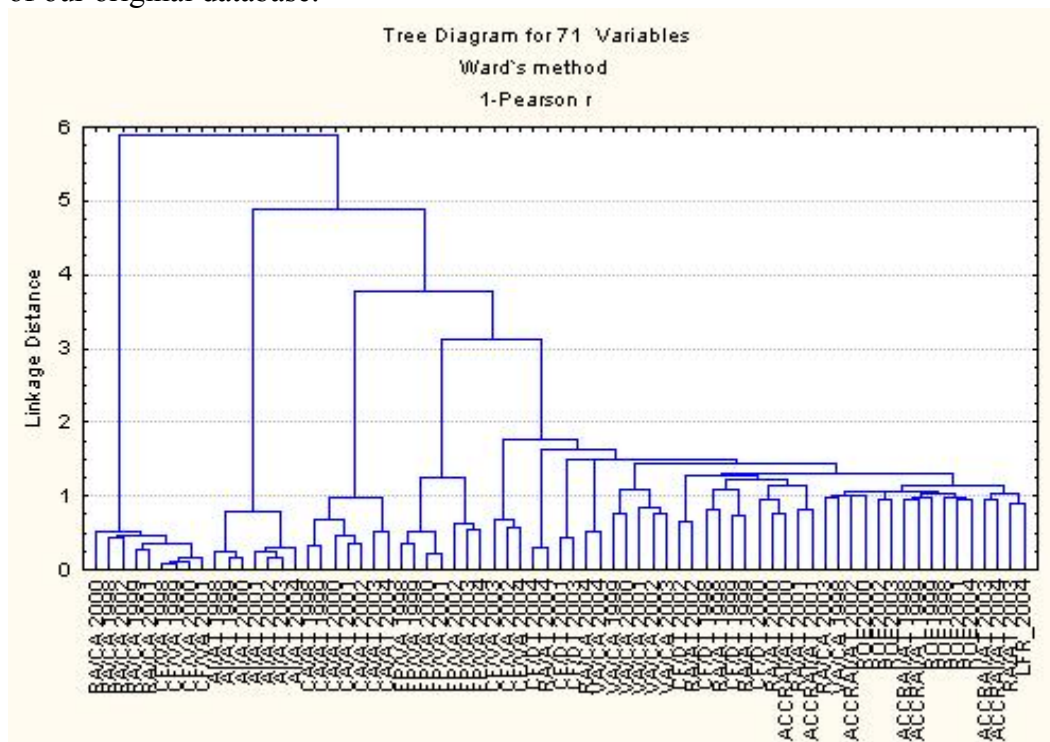


Exhibit 4 : The amalgamation tree resulting from cluster analysis – Original database

First, we state that LFR 2004, the level of Legal Failure Risk for 2004, is one of the first to be amalgamated and that, graphically, it appears on the right of the graph.

Second, a look at the linkage distance lets appear three successive levels of amalgamation involving LFR 2004 with an extremely reduced increase in amalgamation distance :

Exhibit 5 : The amalgamation tree – Summary of the analysis

Amalgamation	LFR 2004 is strongly linked with (analysis of proximities) :
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distance	
1.128	RAAT 2003 ACCRAIAT 2004, 2003, 1999, 1998 ROE 2004, 2001, 1999, 1998 VACA 98 RACA 2003
1.300	Preceding variables, plus : ACCRAIAT 2001, 2000 RAAT 2001, 2000 CFDT 2000, 1999, 1998, 2002 RAAT 1999, 1998, 2002
1.448	Preceding variables, plus : VACA 2003, 2002, 2001, 2000, 1999

The following facts emerge from this analysis, based upon a vision of the failing firm as a non performing firm and upon a vision of performance emerging from the “Balanced ScoreCard” model :

1° The level of business failure risk is explained essentially by five factors :

° The global efficiency of the firm one year before, measured by the ratio “Added results / Total assets”

° Its recent increase in fixed assets (during the last two previous periods) and its increase in fixed assets a few years ago (in 1998 and 1999, i.e. six and seven years before analysis) : the ability of the firm to efficiently manage its growth process appears to be a key indicator explaining (non) performance. Being associated with the innovation perspective, this indicator is used to reflect the long term orientation of the firm.

° Current Return on Equity, which measures the current level of satisfaction from shareholders. Being associated with the finance perspective of the Balanced ScoreCard model, this indicator reflects the short term orientation of the firm.

° The rate of added value generated up to six years in advance appears also to be meaningful. Being associated with the production perspective, this ratio reflects the ability of the firm to master its value chain : the more important the rate of added value generated, the less important the risk of business failure up to five or six years later (this confirms the initial results from Van Wymeersch and Wolfs, 199°).

° At least, the importance of the added results resulting from the corrected turnover generated previous year is also an important factor reducing the risk of business failure : this shows the importance of self-financing as the better way to finance its activities and its development.

Ultimately, two additional factors are added up :

° The firm’s ability to assume the repayment of its debts with its operational cash-flow from 3 to 7 years before heavy failure problems : this confirms the results emerging from the historical Beaver’s study, which already pointed out the role of this ratio three to four years before bankruptcy.

° The global efficiency of the firm every year during the observation period, as reflected by the ratio “Added results / Total assets” for each of the seven periods of the study.

Exhibit 6 reproduces the results from the multiple regression.

Dependent variable	LFR04
R = 0.443	R ² = 0.196
Variable Name	Prob(Beta)
AIAT 2004	0.000

ACCRAIAT 2004	0.000
ACCRAIAT 2003	0.000
ACCRAIAT 2002	0.000
FPVA 2003	0.000
CFVA 2003	0.000
CFDT 2000	0.000
RAAT 2003	0.000
FPVA 2000	0.000
RAAT 1998	0.000
ACCRAIAT 2001	0.001
FPVA 2001	0.002
VACA 1998	0.002
ACCRAIAT 1999	0.005

These results show that 14 financial ratios have a significant impact in the explanation of the level of “Legal Risk of Business Failure” in 2004. Amongst these 14 variables, 7 are due to financial statements established three or more years before the evaluation of the LFR. Furthermore, five of them highlight the importance of unbalanced growth (the different ACCRAIAT, for year 2004, 2003, 2002, 2001 and 1999) as the key factor explaining the evolution towards a lowest LFR score. At least, the rate of added value seven years before evaluation and the amount of added value devoted to personnel costs (and marginally to financial costs) during the period before evaluation are two other important factors explaining a deteriorating LFR score : the lower the added value rate up to five years in advance, the lower the LFR score for 2004 and the higher the amount of added value absorbed by personnel costs during each year before evaluation, the lower the level of the LFR score in 2004.

At least, Exhibits 7, 8 and 9 present the results of correspondence analysis.

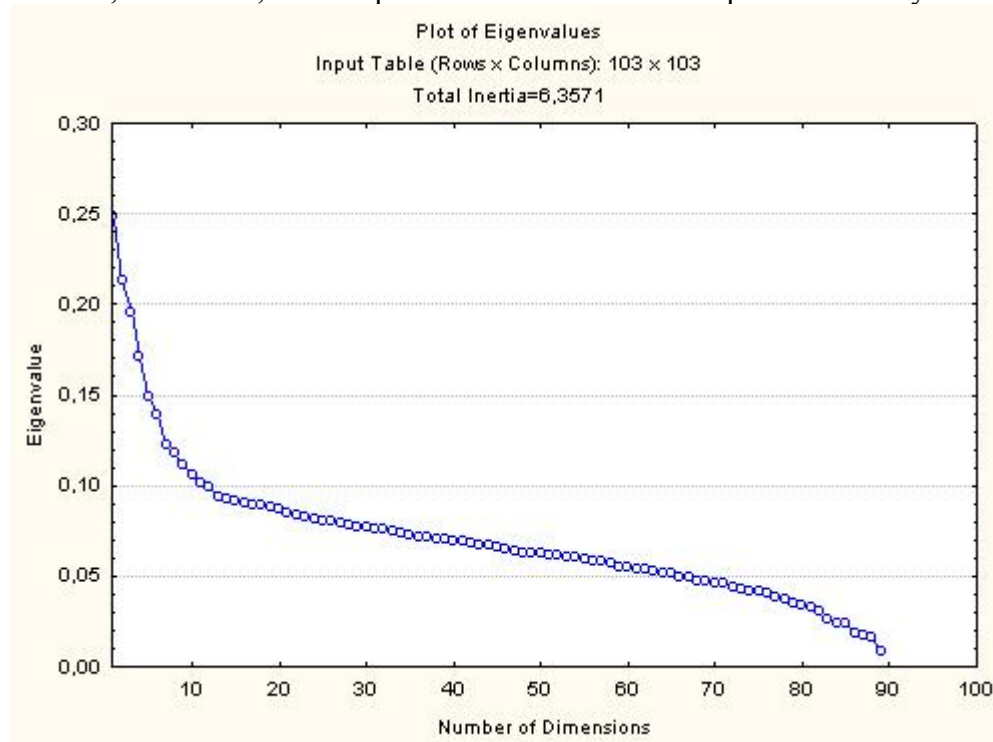


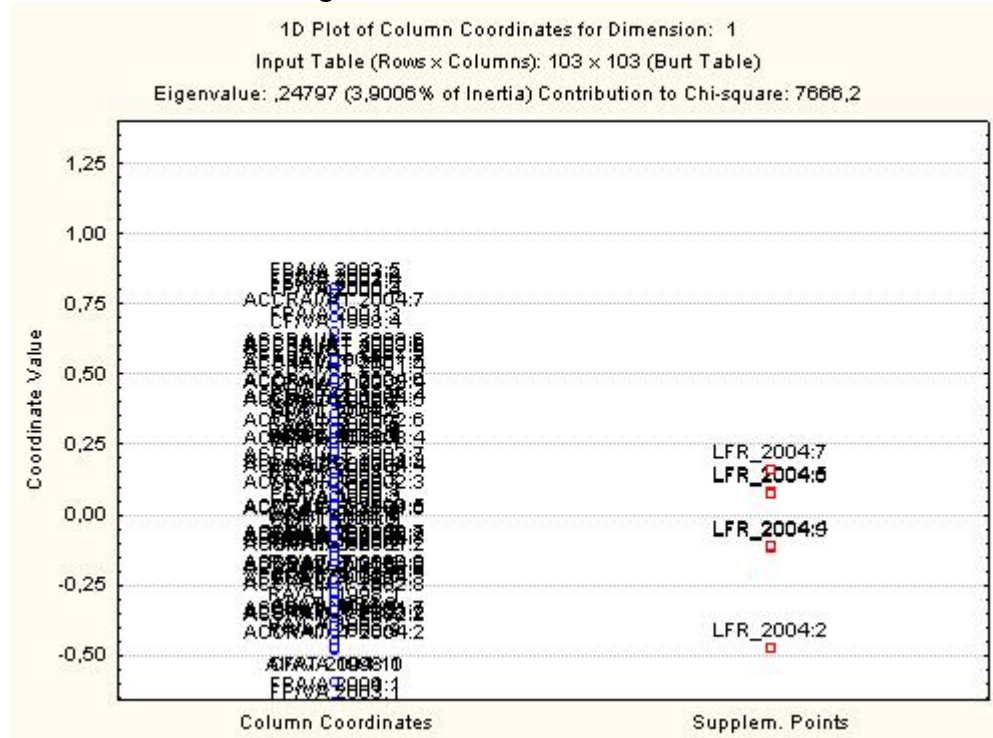
Exhibit 7 : Plot of Eigenvalues associated with the dimensions considered by correspondence analysis

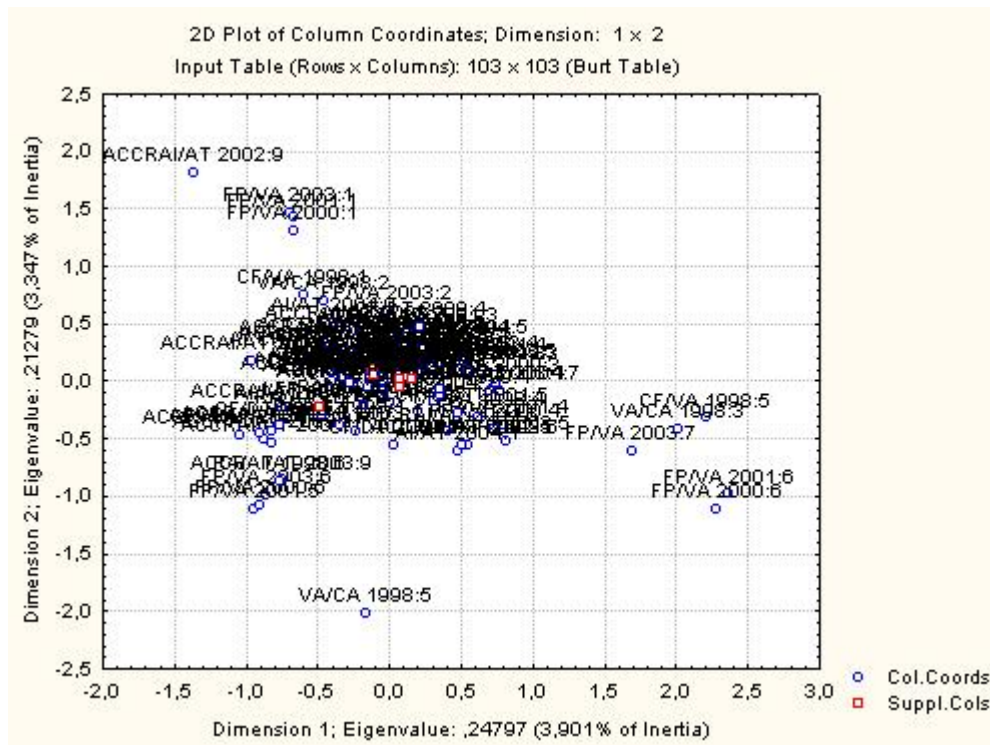
Exhibit 7 show the importance of Dimension 1, Dimension 2 and Dimension 3 in the analysis : with a total inertia of 6.35, the mean eigenvalue (for 90 dimensions) is 0.070 ; the respective eigenvalues associated with Dimension 1 (0.25), Dimension 2 (0.212) and Dimension 3 (0.197) show they are respectively 3.5 times, 3 times and 2.8 times more important than the mean dimension. So, the underlying factors explaining these dimensions are key indicators to explain the level of LFR 2004.

Exhibit 8 show the plot of column coordinates for dimension 1 :

° A look at the distribution of the supplementary points (i.e. those associated with the passive variable, LFR 2004) show that the values of 3 and 4 on the one hand and of 5 and 6 on the other hand are plotted on the same place, which means that the correspondence analysis can not dissociate these cases. We may thus infer that all the 50 cases we examine at the Court of Commerce are associated with four different stages of a normative failing path : those associated with a LFR score of 2 are near to the final bankruptcy, those with a LFR of 3 or 4 are seriously in danger but time is available for intensive care (1 or 2 years before bankruptcy), those with a LFR of 5 or 6 are in danger but time is available for a recovery strategy (3 to 5 years before bankruptcy) while firms with a LFR score of 7 enter into a failing process and may be restructured to deal with their problems.

° A look at the distribution of Column Coordinates representing the different discrete values of the financial ratios used in the analysis (analysis which is not easy only with its graphical representation) show that firms with the lowest LFR score are strongly associated with firms with negative added value and with a very important amount of added value absorbed by personnel costs, with negative added results and with a strong increase of fixed assets to total assets. This last point highlight the importance of difficulties to master growth when added value and added results are deteriorated.





VI. Comments and conclusion

The abundant literature dedicated to the business failure problem has largely focused its attention on a prediction perspective and on the identification of numerous organizational, strategic and operational causes and symptoms of business failure.

However, it has paid relatively few attention to the process of business failure (how fast a company may evolve towards a fatal bankruptcy) and to the dynamics of the process, especially in a financial perspective.

Our study considers a failing firm as a non performing firm. So, its characteristics and their evolution may be analyzed by reference to a traditional performance model, i.e. the “Balanced ScoreCard” model initiated by Kaplan and Norton (1991).

By analyzing the evolution of ten financial ratios chosen for their ability to represent every key aspect from the BSC model, calculated on a longitudinal perspective (period 1998-2004) for an homogeneous population of firms evolving in a similar legal and macroeconomic environment, we show three interesting facts :

- ° Evolution towards business failure is progressive and this evolution may be measured by taking into consideration the different values of the “Legal Failure Risk” ratio. Four stages emerge from our analysis, corresponding to four consecutive evolution towards bankruptcy that are susceptible to attract attention from Legal Authorities : the earlier corrective measures are taken by Legal Authorities or by managers, the weaker the risk of a fatal bankruptcy.

- ° If we analyze which ratios are ultimately selected to explain LFR, we state that the risk of failure (and thus the fact that the firm is a non performing firm) is associated with an unbalance between short term focus (ROE) and long term focus (increase in fixed assets to total assets) and with an unbalance between the “Operation” perspective and the “Innovation” perspective.

- ° At least, correspondence analysis show the importance of three majors factors as explaining evolution on an exit path : the lowest the added value created by the firm, the highest the risk of a near bankruptcy ; the highest the amount of added value absorbed by personnel costs, the highest the risk of a near bankruptcy ; and the more

important the increase in fixed assets to total assets associated with a weak added value and weak added results, the more important the risk of a near bankruptcy.

As a conclusion, if we consider our results (confirming previous results obtained by Van Wymeersch and Wolfs (1996), Laitinen (1991) or Ooghe and Balcaen (2006 a)), we wish at least to plea for the development of new financial models that would really be focused in a prevention perspective and that would integrate less indicators linked to liquidity and solvency and more indicators linked to added value, added results and growth, calculated in a longitudinal perspective to allow the implementation of corrective strategies by managers or even by Public Authorities.

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