Assessing the Probability to File for Troubled Debt Restructuring through Accounting Ratios Analysis: the Italian case

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ABSTRACT

This paper describes the effects of the nascent regulation of the Italian Insolvency Law in regard to Troubled Debt Restructuring (TDR), which has not yet been studied in Italy. We have developed a model to assess the probability for a firm to file for the TDR, describing the TDR's effects on the financial distress. To this end, we collected a panel dataset of 49 Italian listed companies from the period 2003 to 2011. Firstly, according to previous literature, we apply the multivariate discriminant analysis (MDA) through accounting ratios in order to distinguish the groups of "distressed" and "non-distressed" firms. Subsequently, we introduce a novel technique to forecast the probability of filing for the TDR. The results confirm our hypotheses: the probability of the "distressed" group increases until the year of TDR application and then decreases; on the contrary, it follows a constant trend for the "non-distressed" firms. Supplementary results reveal that the financial condition of the distressed group post-filing TDR is *frozen*. These findings prove that the TDR seems to support the distressed firms in regard to the maintenance of their financial stability during the crisis.

Keywords: Troubled Debt Restructuring Probability; Financial Distress; Troubled Debt Restructuring Effectiveness; Discriminant Analysis; Accounting Ratios.

1. INTRODUCTION

In Italy a continuous increase of economic and financial distress has been observed as a consequence of the global crisis which started in 2008. The Article 182-*bis* restructuring agreements (2005) has provided distressed Italian companies with an instrument aimed at overcoming the financial difficulties. This new pre-insolvency proceeding, that, for some aspects, resembles the pre-packaged plan in Chapter 11 of the U.S. Bankruptcy Code, is a hybrid method which permits a corporate reorganization. As a main feature, it occurs partially out-of-court and partially in-court.

Moreover, Article 182-bis has rarely been claimed before 2009. However, over the last years, this procedure has increasingly become more common in restructuring practices, because of recent decisions taken by Italian courts, which have clarified some doubts and uncertainties in regard to the new procedure.

The aim of the present work is twofold. Firstly, we develop a model to assess the probability of filing for Troubled Debt Restructuring (i.e. TDR) as ruled by the Italian recent reform. Secondly, we provide an evaluation about the effectiveness of TDR as a means to improve the health status of the firms in financial distress.

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In fact, to the best of our knowledge, similar studies on the Italian listed companies fail. For sure, many authors (Beaver, 1966; Altman, 1968; Ohlson, 1980; Zmijewski, 1984) have already dealt with the definition of financial distress, when developing quantitative models for corporate bankruptcy, with the trend of not distinguishing financial distress from bankruptcy. On the contrary, we focus on financial distress as a distinct phenomenon from bankruptcy. In fact, we regard financial distress as a specific condition of the life of a company, in which an unexpected decrease of cash flows from continuing operations occur with a subsequent reduction of dividend payments, technical or loan defaults, or TDR. Such a view, on the other hand, is well established throughout literature, for example: Gilson et al., 1990; Wruck, 1990; Gilbert et al., 1990; Johnsen and Melicher, 1994; Turetsky and McEwen, 2001. Significantly, we consider TDR agreements as a way to avoid bankruptcy for a firm in financial distress, and to allow financial performance restoration expected after improving accounting ratios. Within this framework, we investigate, from a methodological point of view, what the quantitative tools are – both descriptive and predictive – that are suitable for the analysis of financial distress.

In order to achieve our first objective, the empirical analysis is divided into two steps. In the first phase a descriptive assessment of the phenomenon is conducted through the use of a multivariate discriminant analysis (Altman, 1968). We employ this method to classify our observations into two *a priori* clusters based on the individual characteristics of the observations. The dependent variable in our sample is the absence or use of TDR. In the second phase we propose a way to calculate the probability for a company to resort to debt agreements. Our results highlight that when accounting ratios worsen, and companies become distressed, the probability of TDR request increases. Interestingly, we notice that, in contrast, the probability trend for non-distressed companies remains constant.

In order to address the question regarding the TDR effectiveness, we investigate to what extent accounting ratios are affected by the TDR request after its homologation by the court. We demonstrate that TDR has usually improved the health of a firm, resulting in it being an effective tool for companies having financial difficulties, therefore avoiding their failure.

Our data has been extracted from the Milan Stock Exchange list, and consists of a panel of 49 companies, 19 of which having filed the Article 182-bis restructuring agreement from 2003 through 2011. Of note these 19 firms are the entire population amongst Italian listed firms that have filed up until the time of writing. The question about the effectiveness of different industries membership in distinguishing distressed firms from non-distressed firms has also been raised.

The paper is organized as follows. In Section 2 we discuss a theoretical framework to examine firms in financial distress with a focus on troubled restructuring debt (TDR) in Italy. Section 3 presents the research questions and data collection. Methodology and main results are presented in Section 4 and Section 5 offers some concluding remarks.

2. LITERATURE BACKGROUND ABOUT TDR AND ITALIAN LEGAL FRAMEWORK

The reform of Italian Insolvency Law, issued in 2005, encourages reorganization and pre-packaged bankruptcy and, in particular, Troubled Debt Restructuring (i.e. TDR) according to *the Article 182-bis restructuring agreements*. This nascent regulation has been issued a little before the global financial crises of 2007. Indeed, due to the recent economic recession, Italian companies are experiencing decreasing cash flows and increasing difficulties in new fund raising, either via equity or via loan. As a result, there is a strong growth of the volume in the global restructured debt (Di Marzio, 2006).

In this context, this paper aims to provide a contribution to the extant literature by addressing two main research questions: on the one hand, we try to develop a quantitative model to assess the

probability for a company to request a TDR procedure; on the other hand, we try to assess the effectiveness of the TDR in overcoming the financial distress of a company. In order to achieve these outcomes, we are introducing an empirical analysis among Italian listed companies that already accessed the TDR procedures as well as the ones that did not.

Many authors have already dealt with the definition of financial distress. Gilson et al. (1990) and Wruck (1990) state that a company is in a situation of financial distress when cash flow is insufficient to meet current liabilities and it is often resolved through a private workout or legal reorganization under Chapter 11 of the U.S. bankruptcy code. In Altman's conceptualization (Altman, 1968), the definition of default concept is based on the distinction between 'static' default (negative equity) and 'dynamic' default (business cash flow is insufficient to cover the requirement payments). John (1993) describes distress events as points in time when a firm's liquid assets are not sufficient to meet the currency requirements of its contracts. Several authors (Gilbert et al., 1990; Johnsen and Melicher, 1994) compare the financial distress to a physical status of a company's disease suggesting that there are heterogeneous financial distress characteristics associated with events between corporate health and bankruptcy. Turetsky and McEwen (2001) describe financial distress as a series of financial events that reflects various stages of corporate adversity. According to all of these authors, a signal of the onset of financial distress is an unexpected decrease of cash flows from continuing operations to which it could follow a reduction of dividend payments, technical or loan default, or TDR. A firm facing financial distress can use several methods to overcome the critical moment, such as: voluntary restructuring of its operations (John et al., 1992; Donaldson, 1990); restructuring under the protection of the bankruptcy court (Weiss, 1990); and privately restructuring (Gilson et al., 1990).

According to the TDR literature, Brown (1989), Giammarino (1989) and Mooradian and Robert. (1994) state that firms resolve their financial distress in Chapter 11 despite incurring bankruptcy costs when they have severe creditors' holdout problems and are more economically distressed. In Chapter 11 restructuring is preferable to a workout when there are a large number of trade creditors (Gilson et al., 1990). They show that the presence of bank debt is positively associated with the success of a workout. Asquith et al. (1994) show that banks are generally unwilling to provide debt relief because their debt is secured and collateralized.

According to most of the authors above mentioned, companies which decide to access to TDR procedures are in a condition of financial distress, that surely represents an adverse situation but dissimilar from the bankruptcy. This distinction does not appear well defined in quantitative literature, wherein several authors developed models to forecast potential business failure within the Chapter 11 framework (e.g., Beaver, 1966; Altman, 1968; Ohlson, 1980; Zmijewski, 1984). Indeed, in Zmijewski (1984) financial distress is considered as the act of filing a petition for bankruptcy. Gilson (1990) defines a firm as financially distressed when it is in default on its debt, bankrupt, or privately restructuring its debt to avoid bankruptcy. For these authors it seems evident that financial distress and bankruptcy are a single concept. This point of view is clearly visible also in Ohlson's study (1980). He classifies the 'failed firms' as companies that must have filed for bankruptcy including Chapter 10, Chapter 11 and other bankruptcy proceedings. In the literature, a recourse to Chapter 11 or to bankruptcy proceedings is considered as close events.

On the contrary, we consider the restructuring process as a status of '*alarm bell*', in terms of liquidity, profitability, leverage, solvency and activity, which could avoid the potential final decline for a company. Therefore, the TDR is a distinct phenomenon from the bankruptcy.

Few authors focus on methods specifically designed to predict the financial distress and the TDR as a consequence. John and Vasudevan (1995) create a model to predict: when 'good' and 'medium' quality liquid firms may restructure their debt out-of-court; when "good" quality illiquid firms may use a prepack; when 'lower' quality (liquid and illiquid) firms may file for Chapter 11. They show

that the choice of restructuring method depends on the quality and liquidity of a firm. Hill et al. (1996) emphasize that an analysis of the resolution of financially distressed firms attract a dynamic methodology, because the movement to and from financial distress is a dynamic process. Previous studies of distressed firms have tended to use *ex-post* sampling techniques that are not representative of a general population of financially troubled firms (Gilbert et al., 1990). Alternatively to these techniques, Turetsky and McEwen (2001) group financially troubled firms according to an initial signal, the decrease in operating cash flows, and track them across various distress points. They incorporate the techniques of survival analysis to examine firm longevity. Survival analysis longitudinally tracks firms after a decline in firm health, through the subsequent occurrence of dividend reduction, default, or TDR.

Moreover, the law doctrine distinguishes between the financial distress and the bankruptcy. Indeed, in the US Legislation, Chapter 11 is a company reorganization procedure focused on the stipulation of an agreement between debtors and creditors in order to restore the firm after a financial distress. On the contrary, Chapter 7 exclusively concerns the bankruptcy. We note that in the Italian Insolvency Law this distinction is present as well, respectively in the *Article 182-bis* and in the *Article 216 et seqq*. In fact, it is inspired by the U.S. Bankruptcy Code. The Italian restructuring agreement is defined as *an operation whereby the creditor (or group of creditors) grants a concession to the debtor in financial difficulties, such that otherwise it would not have agreed* (OIC 6, July 2011).

3. RESEARCH QUESTIONS AND DATA COLLECTION

This study aims to address these following research questions:
1) Is it possible to estimate the probability for a firm to file the TDR?
2) Once a firm filed the TDR, is it possible to determine the effectiveness of this procedure in overcoming the financial distress without going out of business?

Our paper is focused on listed companies on the Milan Stock Exchange during the period 2003 through 2011. Most of the troubled debt restructuring of the sample is clustered in this period because it is consistent with the timing of the general economic recession of the early 2008 and the development of the nascent law. Data has been obtained from the AIDA database produced by Bureau Van Dick.

The longitudinal nature of our approach is motivated by the fact that filing for TDR request does not need to be seen as an instantaneous occurrence, but as the end of a process which evolves over a considerable period of time and, moreover, that, assuring the effects of the request reasonably, consists of checking the financial ratios over a number of subsequent years.

Firms can be partitioned into two groups: 'distressed' firms, which used debt restructuring by filling the 182-bis restructuring agreements during our reference period, and 'non-distressed' firms which are financially healthy. Differently from similar studies related to failure, where several definitions of failure have been adopted, here labelling follows a criterion which has not been chosen arbitrarily, for being purely juridical.

The sample consists of 49 companies. In particular, we have also collected a control group such that in correspondence of each distressed firm, our data includes at least one potential control firm belonging to the same industry and having a similar size. This procedure yielded a sample of 19 firms labelled as 'distressed' (Group 1), and a remaining group of 30 matched control firms drawn by following a stratified random sampling scheme (Group 2) where, obviously, the stratum variables have been size and industry. We have selected a larger group of 'non-distressed' firms because such a status comprises various levels of economic conditions, and therefore small

samples could generate 'false positive' cases in the subsequent statistical prediction or classification stages.

Table 1 reports our dataset classified according to the macro-industry stratum variable.

Table 1 – Industries classification

Industries	N. firms	Distressed (Group 1)[a]	Non-distressed (Group 2)[b]
Consumer goods	10	6	4
Consumer service	9	4	5
Finance	7	4	3
Health and Food [c]	7	-	7
Industry	5	1	4
Oil and Natural Gas	4	1	3
Technology	7	3	4
Total	49	19	30

TABLE 1 The sample is divided into seven macro-industries, following the partitioning of Milan Stock Exchange.

[a] The group of 'distressed' is constituted by the firms who have filed for the TDR since 2003 to 2011.

[b] The group of 'non-distressed' is constituted by the firms who showed the best performance according to accounting ratios in terms of liquidity, profitability, leverage, solvency and activity, that are calculated in the first step of the quantitative analysis in the same period.

[c] The industry 'Health and Food' has been included in the analysis despite it introduces only 'non-distressed' firms with high performance ratios and it has been considered in order to get a cross-industry model.

4. EMPIRICAL ANALYSIS AND RESULTS

4.1 Summary statistics

The statistical analysis has been divided into three steps.

In the first one we derive a couple of discriminant frontiers via multivariate, linear and quadratic, discriminant analysis (MDA).

In the second step, we use the scores of the linear discriminant analysis to estimate a yearly probability for each firm to resort, within the following year, to the *Article 182-bis restructuring agreements*. Such probability appears to be fairly new in the field of financial distress literature. A couple of confirmative labels have also been included, as follows. A first one is for '*distressed*' firms (equal 0) and another one is for '*non-distressed*' firms (equal 1). The labels, which remain the same for all years, are predicted by the accounting ratios, which change yearly. Here we expect that the statistical significance increases when the ratios of the most recent years will be involved. At the same time, when we are far enough from the critical period, all the labels should be '*non-distressed*'.

At last, we will verify the effectiveness of the TDR and if it will emphasize the contribution provided by the procedure.

4.2 Discriminant analysis: main results

The adoption of accounting ratios for financial statement analysis is widely recognized in order to determine the relative strength and performance of the analysed company. Ratios analysis helps to identify trends over time for one company as well as to compare two or more companies at one point in time. Ratios usually focus on three key aspects of a business: liquidity, profitability and solvency. The reliability of this kind of analysis lies in the reliability of figures of financial reporting and values. Therefore, if earnings management policies are carried out in financial reporting,

accounting ratios are misleading. Nevertheless, we take for granted that financial reports of Italian listed companies, which are included in the present observation, are reliable as they are reviewed by auditing firms and by the authority of regulation of Italian financial market (CONSOB).

In order to conduct discriminant analysis, we use the variables suggested by Altman (1968), which are financial ratios specific to bankruptcy study. This choice, which undoubtedly constitutes a baseline for a pioneering study such as ours, seems reasonable because we assume that many of the variables which are able to detect the bankruptcy, should also play a major role in explaining financial distress. Specifically, the variables consist of five standard financial ratios. The ratios we have used are denoted as X_i, i=1,...,5. In particular, X_1 is a measure of the net liquid assets of the firm, calculated as working capital/total assets; X_2 represents profitability due to retained earnings/total assets; X_3 is earnings before interest and taxes (EBIT)/total assets to measure the leverage; X_4 shows solvency of firm composed of market value of equity/book value of total liabilities; X_5 represents a standard financial ratio illustrating sales/total assets.

In this analysis we assume multi-normality of our ratios. Moreover our sample variance-covariance matrices are significantly different. Consequently, we have recurred, other than a standard linear discriminant analysis, also to the quadratic one, as the standard statistical theory suggests in similar cases.

A number of misclassified observations are reported in Table 2. We notice a reasonable discriminant power both in the case of a quadratic discriminant analysis and in a standard one, which increases in more recent years. This confirms that "distressed" labels assume significance mainly in the imminence of their request of TDR. As expected, the quadratic method performs a little better, especially in the last few years. Both methods improve along the years due to the fact that when data of a restructured firm dates back far enough from the TDR recourse, its status of a 'distressed' firm could make little sense, generating a strongly biased frontier.

Table 2 – MDA Analysis

YEAR	MISCLASSIFIED				TOT.QDA.	TOT.LDA.
	QUADRATIC		LINEAR			
	0 [a]	1 [b]	0 [a]	1 [b]		
2003	4 (21.05%)	11 (36.67%)	13 (68.42%)	13 (43.33%)	15	26
2004	1 (5.26%)	15 (50%)	5 (26.32%)	10 (33.33%)	16	15
2005	5 (26.32%)	8 (26.67%)	5 (26.32%)	12 (40.00%)	13	17
2006	3 (15.73%)	9 (30.00%)	2 (10.53%)	8 (26.67%)	12	10
2007	0 (0.00%)	10 (33.33%)	2 (10.53%)	10 (33.33%)	10	12
2008	2 (10.53%)	9 (30.00%)	5 (26.32%)	6 (20.00%)	11	11
2009	8 (42.11%)	2 (6.67%)	5 (26.32%)	5 (16.67%)	10	10
2010	7 (36.84%)	2 (6.67%)	4 (21.05%)	6 (20.00%)	9	10
2011	7 (36.84%)	0 (0.00%)	6 (31.58%)	5 (16.67%)	7	11

TABLE 2   Comparison between quadratic and linear discriminant analysis using misclassification rates. Discrimination frontiers have been calculated for each year along the whole observational period.
[a] Distressed firms.
[b] Non-distressed firms.

4.3 Development of a TDR probability model

As a second step of the statistical analysis, we assess the probability of having to file for the TDR, as estimated through the explanatory variables. The closest research to our approach is authored by Shumway (2001), who calculates the probability of a business failure event using also a logistic

regression model. In addition, this approach is related to a past literature pioneered by Beaver (1966) and Altman (1968) who have introduced several models as tools of bankruptcy risk.

Our formula of TDR probability associated to *i*-th firm at time *t* is:

$$\widehat{P}_{it} = \frac{e^{S_{it-1}}}{1+e^{S_{it-1}}}$$

where *e* indicates the Euler number; S_{it} is a score, associated to *i*-th firm at time *t*, given by the formula:

$$S_{it} = -0.515X_{1it} -0.471X_{2it} -0.630X_{3it} -0.199X_{4it} -0.718X_{5it}$$

where X_{jit} is the *j*-th variable associated to *i*-th firm at time *t*. Clearly, the sign of the coefficients is negative exactly because the score is proportional to the financial distress degree. The absolute magnitude of such a probability should be not taken into account, because it depends on the number that is added to the exponential value at the denominator, which, in our case, is 1. In fact, in the subsequent analysis we will always consider trends or relative values, exactly to remove this arbitrary size effect.

The numerical coefficients in the above formula have been obtained from a linear discriminant analysis where the ratios used for each firm are as follows: *a)* for distressed firms belonging to the year when the TDR has been filed; and *b)* for non-distressed firms the ratios are the best ones over the entire observational period. This would propitiate an efficient estimation of the score S_{it} both for the high discriminant potential of the ratios chosen in that manner, and for the reduction of temporal correlation because data from different years are compared. In fact, a fundamental assumption for our multivariate estimation is the independence of sample observations, rarely seriously considered in the majority of the previous studies.

Comparing the score S_{it} formula with the Z-score (Altman, 1968), it appears that the same ratios exert a different influence within the formula due to different coefficients. This could be explained with the consideration of the hypothesis that financial distress and bankruptcy are different phenomena as examined ratios exert an influence in the choice of a company to access TDR procedures without necessarily a result in bankruptcy. Moreover, Z-score formula emerges from a data collection on a one-year interval focused only on manufacturing companies, whilst S_{it} derives, as above mentioned, from a multi-year and multi-industry analysis on Italian listed companies. Furthermore, the S_{it} is calculated in order to be included in the determination of $\widehat{P}_{it}$ that represents the assessment of the probability of TDR for a company. On the contrary, the Z-score formula has been developed to determine a cut-off value.

The quantity $\widehat{P}_{it}$ is a probability because it is always comprised between 0 and 1. As it appears clearly from its formulation, given that *S* is inversely proportional to the firm's status of health, such probability increases with the tendency to file for TDR.

4.4 Analysis of TDR probabilities: main results

In this section, we analyse the predictive effectiveness of TDR probabilities introduced in the previous section. To this end, assuming that the TDR request is beneficial, the analysis of the time series $\widehat{P}_{it}, t = 2003, ...,2011$ should validate these two following hypotheses:

- *hypothesis 1*: in the companies belonging to Group 1, the associated probability should inflate until the year of TDR application, and then decrease;

- *hypothesis 2*: for companies that belong to Group 2, the time series should appear nearly stationary, following a constant trend over the years.

Aiming to validate the hypotheses above, we calculate the trends of average of the TDR probabilities for every year for both two groups. For a simpler comparison between the two trends, we have not used standarized values. We represent in Figure 1 the two trends. In particular, the continuous line indicates the trend of distressed firms. We can notice that when the critical period gets closer, it increases. Interestingly, we have 15 TDR requests in last three years (over a total of 19 cases), when, in fact, the trend approaches as its maximum. On the other hand, the dashed line represents the average of probabilities for non-distressed firms to file the TDR. In this case, we have a nearly constant trend, which should show non-alarming situations.
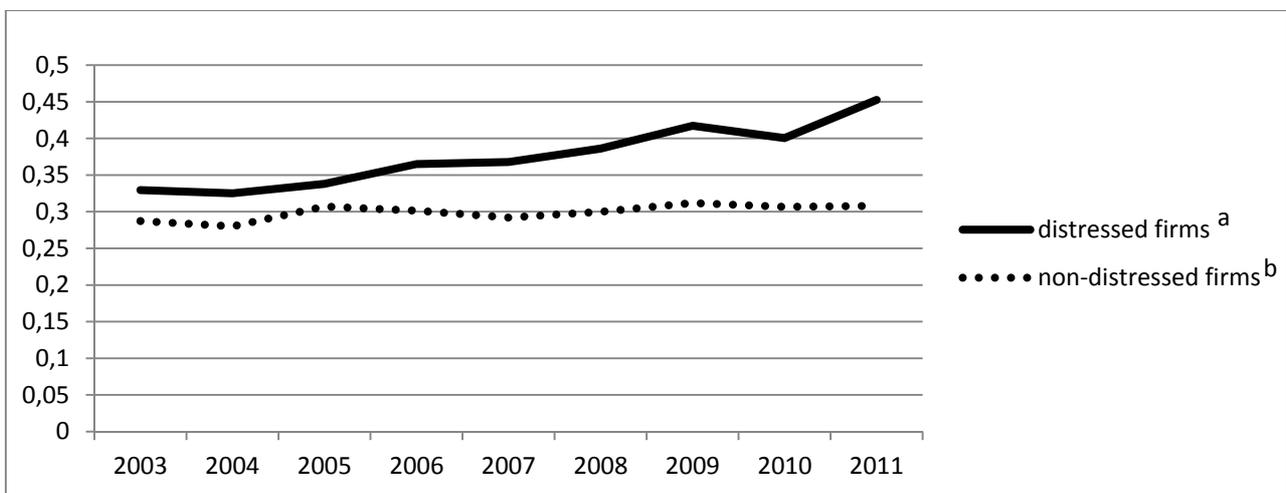
Figure 1 – Probabilities of TDR

FIGURE 1 The x-axis shows the time period analysed from 2003 to 2011, whereas the axis of ordinates includes potential average values.
[a] The continuous line represents the probability of the distressed firms to request the TDR.
[b] The dashed line indicates the probability of the non-distressed firms to request the TDR.

4.5 The effectiveness of TDR: main results

The TDR was regulated after the reform of the Italian Insolvency Law issued in 2005. Due to the short time that features this regulation, in the literature there are no analyses which show the effectiveness of this procedure. For this reason, we try to measure the effectiveness of the TDR in the period after the homologation by the court.
Through the analysis, we could verify these following hypotheses:
- *hypothesis 1*: where the financial ratios improve in the year after the TDR request;
- *hypothesis 2*: where the homologation of the TDR could provoke the financial ratios to "freeze" with the aim to maintain a stable status of health and to avoid companies failure.

Starting from the TDR probabilities already calculated, the analysis aims to verify the effectiveness of restructuring agreements used by the firms in financial distress. We separate the firms of the "distressed" group for each observation year from 2006 to 2011. Each group is labelled according

the year of the TDR request. We achieve six groups with the following labels: *"2006", "2007", "2008", "2009", "2010", "2011"*.

Starting from the period t_0, each group has *n* observation periods as many as are the years to be observed. In summary, we have six observation periods for the first Group "2006" and only one observation period for the Group "2011".

As previously pointed out, the TDR was introduced in Italy only recently and for this reason we have preferred to show in Table 3 and in the Figure 2 the groups of companies that have the possibility to view at least two periods after the approval in court.

In the first Group "2006", as it is pointed out from the average in Table 3, there is a reduction of the probability rate to file the agreement. This is a signal of an evident improvement of accounting and financial ratios. Furthermore, it shows how the financial distress status stands still during the first three years after the validation of the TDR. In Figure 2, where we reveal the trends of the averages of TDR probabilities, the progress of group "2006" is evident. The sample of the Group "2006" is the only group that results in being more complete, thanks to the opportunity to verify the trend over five periods, subsequent to the acceptance by the court. In this case the two hypotheses, above delineated, are satisfied.

The effectiveness of the TDR can be seen in the Group "2007". In this group, we underline an improvement over three periods after the approval of the agreement. The only exception is due to period T_{0+4}, where a worsening of economic and financial ratios is evident. For the first three years of observations, the established hypotheses have been satisfied by the analysis.

For the Group "2008" we can observe, in Table 3, an improvement in the period T_{0+2} with a consequent departure from the financial distress status. Also in this case, the hypotheses are satisfied.

In the end, the Group "2009" emerges an increase of the financial distress. However, due to unavailability of 2012 financial reports data, it is not possible to establish subsequent improvement or worsening of the business situation for the Groups "2010" and "2011".

As described above, the TDR has usually improved the health of a firm, shown as being an effective tool for companies having financial difficulties and it has avoided their failure. However, it is important to stress that TDR has avoided an evident worsening. Indeed, it is able to freeze the status of the analyzed sample. If we consider that this data concerns the period of the deepest financial crisis which has taken place in Italy over the past fifty years, and, for this reason, the external conditions for the recovery has been totally unfavourable, then we could express, with a mildly favourable opinion about the effectiveness of TDR request.

Table 3 – Effectiveness of TDR

	2006[a]	2007[b]	2008[c]	2009[d]
T_0	0,338143	0,431879	0,187683	0,426372
T_{0+1}	0,340753	0,413869	0,210338	0,453811
T_{0+2}	0,368847	0,372321	0,176441	0,500623
T_{0+3}	0,348378	0,391813	0,2309	
T_{0+4}	0,309527	0,588361		
T_{0+5}	0,293683			

TABLE 3   [a] The average of group "2006" is calculated from 2006 to 2011.
[b] The average of the second group is calculated from 2007 to 2011.
[c] In the third group the average is considered from 2008 to 2011.
[d] The average of group "2009" is calculated from 2009 to 2011.

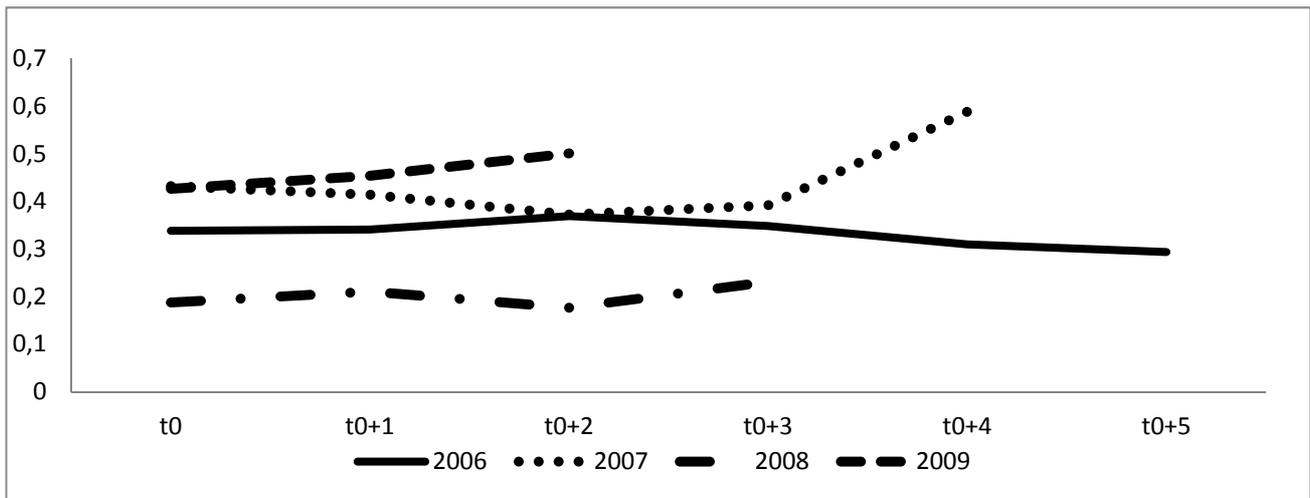Figure 2 – Effectiveness of TDR

FIGURE 2 Trends of average TDR probabilities after the request. Each average has been calculated among firms who filed for the TDR request in the same year. The request year is indicated with *t0*.

5. SUMMARY AND CONCLUSIONS

Restructuring Agreements pursuant to Article 182-*bis* of the Italian Bankruptcy Law represent a relevant innovation, made by the Italian legislator, that permits a topical debate especially in the circumstance of the current international financial crisis. In fact, firms in difficulties are recurring more and more to the TDR proceedings to allow the business to progress and avoid the bankruptcy.

In this context, starting from the analysis of the reformed pre-insolvency restructuring proceedings, this paper provides a contribution to previous literature by designing a model to assess the probability for a company to file for Troubled Debt Restructuring (TDR) and to evaluate the effectiveness of this regulation as well.

To reach these conclusions, we collected data from a sample of listed firms on the Milan Stock Exchange that filed Article 182-*bis* restructuring agreements during the period 2003-2011. From the methodological perspective, we firstly applied Altman's linear discriminant analysis – which is aimed to predict corporate bankruptcy – and a reasonable performance was obtained.

Furthermore, unlike previous research, we employed also the quadratic analysis, motivated by different sample covariance matrices, that brought out an improvement of Altman's linear method.

The results confirm that the accounting ratios are able to discriminate the economic and financial conditions both for the *distressed group* and for the *non-distressed*; for this reason the ratios have been utilized just to describe the phenomenon (as in Altman's study of 1968). Subsequently, we have developed a specific model to forecast the probability of filing for the TDR. The model demonstrates that when companies become distressed and the accounting ratios worsen, the probability of TDR request increases. At the same time, we realized that this model confirms the regularity of the probability trend for non-distressed companies.

Lastly, we attempted to assess the effectiveness of this legal instrument and our results have highlighted that the financial situation of the distressed companies seems "frozen". In this case, the TDR procedure appears as the useful path for a distressed company to restore its financial equilibrium. Nonetheless, the reform is a new regulation and many procedures remain ongoing.

Therefore, a valid assessment about the effectiveness would be achievable only through further researches.

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