Using Corporate Social Responsibility Orientation Characteristics for Small Enterprise Default Prediction

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Abstract: This study aims to analyse whether the characteristics of a company's corporate social responsibility (CSR) orientation could improve the accuracy rates of small enterprise (SE) bankruptcy prediction models. A sample made up of 382 Italian SEs is analysed and, by applying logistic regression, a SE default prediction model is designed using both CSR orientation characteristics and financial ratios as default predictors. The accuracy of this model is then compared to that of a second model based only on financial ratios as predictive variables. The main results are: i) using CSR orientation characteristics significantly improves the effectiveness of SE default prediction modelling; ii) the smaller a firm the higher the increase in the prediction accuracy that can be obtained by using CSR characteristics as default predictors; iii) SE default prediction modelling should be separately implemented for different size groups of firms.

Key-Words: Corporate social responsibility, Financial ratios, Bankruptcy, Credit rating, Default prediction modelling, Small enterprise

1 Introduction

Some significant limitations can be found in the majority of the literature which has analysed the issue of bankruptcy prediction modelling [1, 3, 4, 5, 6, 9, 22, 28, 56, 64, 66, 71, 99, 104, 116].

First of all, default prediction modelling has almost always been based entirely on financial ratios as independent variables. This aspect represents a significant weakness as default prediction looks towards the future of the firm while financial ratios regard its past. This limit is exacerbated by the fact that firms, especially smaller ones, often tend to postpone the accounting emergence of their financial problems, thereby enlarging the time gap between the emergence of a financial crisis and the corresponding worsening of financial ratios.

Secondly, most of the studies which are present in the literature have analysed only medium and/or large firms. But small enterprises (SEs) have their own specific characteristics, especially from a financial point of view [47], and their default prediction models should therefore be specifically and separately developed, precisely in order to adequately take into account the peculiarities of their risk profiles [10]. Furthermore, using only financial ratios as default predictors can be expected to be especially disadvantageous when the object of analysis are SEs, whose accounting data are typically more opaque and less articulated compared to those produced by larger firms [26].

It follows that exploring the potential of non-financial variables for SE default prediction modelling represents an interesting research field to be explored, all the more so if one considers the fundamental role played by SEs in the economies of every countries in the world [1, 60, 94].

Several studies have demonstrated the positive impact of corporate social responsibility (CSR) on various aspects of a firm's immediate performance [113], such as customer satisfaction and firm market value [78], consumer buying behaviors [112], and consumer attitudes to products [25].

However, the impact of CSR on a company's probability of default still represents a largely unexplored research field [113]. This seems particularly surprising when considering that only by analysing the overall effects of CSR on a company's viability is it possible to understand and assess the final and net effects of the costs and benefits of CSR strategies.

In this study a sample made up of 382 Italian SEs is analysed and, by applying logistic regression, a SE default prediction model is designed using both CSR orientation characteristics and financial ratios

as default predictors. The accuracy of this model is then compared to that of a second model based only on financial ratios as predictive variables. In line with the Basel Capital Accords, SEs are defined here as firms with a turnover below 5 million Euro.

This paper is organized as follows. In sections 2.1 and 2.2 a brief literature review on bankruptcy prediction modelling and the research hypotheses are presented. In the third section the default predictors used are described, while in the fourth section the analysed sample and the applied methodology are presented. Finally, a discussion of the main findings and the conclusions are provided in the last two sections.

2 Background and Hypotheses Development

2.1 Literature review

Among the first authors who analysed the issue of bankruptcy prediction are Beaver [22, 23], Deakin [46] and Altman [3]. The latter applied a multivariate linear discriminant analysis on a sample made up of 66 firms (33 defaulting. and 33 non-defaulting) and found that the following financial ratios were the best predictors of default: Working Capital/Total Assets, Retained Earnings/Total Assets, Earnings Before Interest and Taxes/Total Assets, Market Capitalization/Total Debt, and Sales/Total Assets. With the aim of overcoming the limitations that characterize a linear discriminant analysis when the independent variables are financial ratios [19, 73, 89], Ohlson [99] used logistic regression and by analysing a sample made up of 2,163 firms (2,058 non-defaulting and 105 defaulting) he developed a prediction model based on nine financial ratios.

Following these studies, many other empirical researches have investigated the effectiveness of using financial ratios as company default predictors, applying different statistical methodologies [61], analysing different samples of firms (Balcaen & Ooghe 2006), and delivering very different prediction accuracy performances [50].

Almost all the existing literature has analysed mainly, if not only, samples made up of medium and/or large firms, with the consequence that designing default prediction models specifically for SEs represents a research field which, apart from a reduced number of exceptions [10, 11, 24, 33, 39, 40, 51, 105, 111], is still largely unexplored [37].

Even less explored is the topic of the potential of using CSR orientation characteristics for company default prediction modelling.

This does not mean that the relationship between CSR and company performance has not been widely analysed in the literature, especially since the 1990s, though with conflicting results. Margolis and Walsh [83] found that more than 100 studies had already examined the impact of CSR on one or more aspects of company performance and only half of them had found a positive and significant correlation between the two variables. For example, El Ghoul et al. [52] found a negative relationship between CSR orientation and the cost of equity capital, Cheng et al. [35] found a negative relationship between CSR orientation and capital constraints, Lee and Faff (2009) and El Ghoul et al. [52] found the existence of a negative relationship between the CSR orientation of the firm and the idiosyncratic risk faced by the firm itself. More recently, research on company performance and CSR has broadened to concurrently evaluate corporate social responsibility in the strict sense (i.e. referred to "socially doing good"), and corporate social irresponsibility, referred to "socially doing bad" [108].

As a matter of fact, though many empirical researches have found a positive relation between CSR and company performance [17, 59, 85, 88, 100, 109, 120], this relationship has often been found to be quite weak [87], and sometimes not significant at all [96, 101, 106]. Furthermore, the ways and mechanisms through which this interaction works are still far from being clearly conceptualized and empirically validated [20, 72, 92].

However, only few studies can be found which have analysed the CSR-performance relationship with specific regard to SMEs [59, 68, 84, 97, 114, 115, 117], and the findings of these studies are far more uncertain than those regarding larger firms [95], due to the fact that SME CSR policies are characterized by a very low degree of codification and formalization [21].

Fewer still are the studies which have analysed the potential of CSR behavior variables as company default predictors. Using multivariate regressions as well as a discrete time hazard model, Goss [63] finds that CSR disclosures reduce a firm's probability of facing financial distress and default (as well as of becoming object of a hostile takeover). Attig et al. [15] find a significant and positive relation between several CSR attributes (such as diversity, employee relations, environmental performance, community relations and product characteristics) and a firm's credit rating. They argue that credit analysts link CSR effective activities and reporting with both long-term sustainability and high levels of transparency

regarding a firm's probability distributions of its future cash flows. Feng and Cheng [55] analysed an initial sample of 38,158 firm-year observations referred to US-based firms from 1991 to 2012 and found a significant and positive relation between CSR orientation and a firm's credit rating as well as a negative relation between CRS and credit risk (in terms of loan spreads when compared to corporate bond spreads, and in terms of distance to default). Sun and Cui [133] used secondary data collected from Fortune Magazine (America's Most Admired Companies), Standard and Poor's Corporate Credit Rating, and company websites and their annual reports from 2008 to 2010. They analysed a dataset containing 829 observations from 303 firms and found a significant and negative relationship between CSR and company default risk. Al-Hadi et al. [2] analysed the association between CSR performance and financial distress as well as the moderating role of company life cycle stages on that association. Based on a sample of 651 publicly listed Australian firm-year data covering the 2007-2013 period, their study found that positive CSR activity significantly reduces financial distress of the firm and that the negative association between positive CSR performance and financial distress is more pronounced for firms in mature life cycle stages. By applying a compound option-based structural credit risk model, Chang et al. [34] analysed a sample of listed companies from Taiwan and found a negative and significant association between their CSR score and their forward default probability. Apart from these exceptions, the literature seems to lack further researches investigating the potential of using CSR behavior variables for default prediction modelling.

Finally, and above all, to the best of our knowledge, to date no study has been conducted which analyses that potential with specific regard to small sized firms. With the aim of filling this gap this paper focuses on SEs, which, in line with the Basel Capital Accords, are defined here as firms with a turnover below 5 million Euro.

2.2 Hypotheses

Although ratios are calculated on past financial data while default prediction looks towards the future of a firm (indeed, this mismatching is exacerbated by the tendency of firms, especially SEs, to postpone the accounting emergence of their financial problems), financial indicators calculated on the last financial year accounting data undoubtedly still represent the most used class of company default predictors which has so far been used in the literature. This aspect has become particularly

critical considering that the global financial crisis which broke out in 2008 heavily called the transparency of financial statements into question, thereby bringing back unorthodox accounting behavior into the heart of the academic debate [110].

There is empirical evidence (e.g., [27]) that when firms maintain long and strict relationships with banking institutions they benefit of better financing conditions (e.g., lower interest charges). This evidence indirectly demonstrates the significant value that borrowers assign to the qualitative information they can obtain by maintaining close relationships with their clients. Nevertheless, default prediction modelling based on non-accounting variables still remains a largely unexplored research field. A reduced number of studies has analysed large firms default prediction modelling based on non-financial variables such as macroeconomic variables [70], a firm's geographical location [31], a firm's age and business sector [65], data related to financial reporting timeliness [102], or an analyst's subjective evaluations of shareholders and directors [110]. An even lower number of contributions has analysed the value for small and medium size enterprise (SME) default prediction modelling of non-financial default predictors, such as audit qualifications, the number of and change in directors, the existence of loans secured on the firm's assets and reporting lags [74], macro-economic factors, and in particular interest rates [54], regulatory compliance and "event" data relating to legal action by creditors to recover unpaid debts, company filing histories, comprehensive audit report/opinion data [11], board independence, CEO power and board size [48], corporate governance variables relating to CEO duality, owner concentration, and the number of outside directors on the board [37], the number of correspondent financial institutions [98], management characteristics [38].

With the exception of these few above mentioned contributions, the topic of the potential of non-accounting information for company failure prediction, especially with regard to SEs, still represents a largely unexplored research field.

Defined as ''the managerial obligation to take action to protect and improve both the welfare of society as a whole and the interest of organizations'' [45, p. 6], or as "situations where the firm goes beyond compliance and engages in actions that appear to further some social good, beyond the interests of the firm and that which is required by law'" [91, p. 1], CSR has been interpreted as a critical resource in linking the firm to its

stakeholders [133], as well as in earning firm integrity [91].

In consumer behavior studies, CSR has been positively associated with consumer preference [76], customer satisfaction and firm market value [78], consumer buying behaviors [112] and consumer attitudes to products [25].

In risk management studies, CSR orientation has been interpreted as an effective instrument of a company's risk management strategy [69, 93], which may help to reduce the probability of financial distress and default.

The stakeholder theory approach is by its nature coherent with a positive impact of CSR orientation on company performance [103]. In accordance with this theory, CSR orientation may in fact be considered a key instrument for effectively managing company stakeholders, effectively using resources [100], and consequently maximizing value creation [68]. Using this approach, CSR engagement is seen as an indicator of how high the quality of a firm's management is [14, 63]. If one of the reasons as to why firms default is ineffective management [8, 38], then CSR activities should reduce the probability of default.

In Resource Based Theory (RBT) studies, CSR has been considered an activity generating valuable intangible assets [79, 90]. These studies found that CSR was positively associated with corporate image and reputation [32] and, consequently, with a firm's capability to face negative events and with the stability of a company's revenue [62]. Finally, RBT studies suggest that CSR makes it possible to build close and favourable relationships between the firm and its reference communities, thereby increasing the support which is likely to be provided to the firm by these communities when that support is needed [30].

Based on these theoretical arguments, a higher accuracy rate can be expected for default prediction models built on both CSR orientation characteristics and financial ratios compared to models based only on financial ratios. Consequently, the first hypothesis of this study is:

H1: When SE bankruptcy prediction modelling is based on both CSR orientation characteristics and financial ratios, prediction accuracy rates will be significantly higher compared to models based only on financial ratios.

Taking into account that the level of transparency and the informative value of accounting data tend to get lower when the firm gets smaller [26], the above-discussed weakness connected to using exclusively financial ratios as default predictors are expected to intensify as the

size of the company decreases. Furthermore, according to Ciampi [39], it can also be hypothesised that when prediction models are calculated separately for different size groups of firms, prediction accuracy tends to get higher.

On this basis the second and third research hypotheses are:

H2: When logistic regression is separately applied for different size groups, accuracy rates are higher than when predictive functions are calculated on the aggregate sample.

H3: The smaller the firm, the higher the increase in prediction accuracy that can be obtained by adding CSR orientation characteristics as default predictors.

3 Default predictors

In this study the default/non-default event represents the dependent variable, which takes a value of 1 for failed firms and of 0 for non-failed ones. According to Ciampi [37], the default event is defined as the formal beginning of legal procedures for debt recovery (bankruptcy, forced liquidation, etc.).

CSR orientation characteristics represented the first category of independent variables which were object of analysis.

In the literature a large number of different methodologies has been used to measure CSR activities [58, 87, 118], such as the Fortune reputational rankings and Moskowitz reputational scales [29, 88, 107], content analyses of company documentation [119], forced-choice survey questionnaires [16, 17], behavioural analyses and case study methods [41]. More recently, several studies have used CSR data provided by Kinder, Lydenberg, Domini Research & Analytics (KLD) [82]. Nevertheless, considering the complexity of the concept and its multidimensional nature, building a convincing and adequately complete measure of CSR activity still remains a quite arduous task [119].

Adapted from Martinez-Consa et al. [87], Hammann et al. [68] and Lindgreen et al. [77], the 33 CSR related variables indicated in Table 1 were initially selected, which belonged to five categories (suppliers, customers, employees, the local community and environmental responsibility).

Using data from the training sample, this initial group of 33 CSR related variables was subject to the six selection techniques proposed and applied by Du Jardin and Séverin [49, 50] and only the 6 variables which were selected by at least three of these techniques were chosen and used for calculating prediction models (Table 2).

Financial ratios represented the second category of independent variables which were object of this study. According to the findings of the existing bankruptcy prediction literature based on financial ratios [3, 4, 6, 7, 9, 22, 28, 42, 51] 15 ratios were initially chosen (Table 3).

This initial group of ratios was also subject to the six selection methodologies used to choose CSR related variables. Five variables were selected by at least three of these methodologies and used for the development of prediction models (Table 4).

Table 1. Initial group of independent variables regarding CSR orientation

CSR TOWARDS EMPLOYEES	
X1	Company takes into account employees' interests in strategic decision-making
X2	Company supports favourable working and organisational environment
X3	Company supports professional development of employees
X4	Company helps employees achieve work-life balance
X5	Company understands the importance of stable employment
X6	Company develops training programmes for employees regularly
CSR TOWARDS CUSTOMERS	
X7	Company takes into account customers' interests in strategic decision-making
X8	Company gives priority to meeting its commitments about product quality
X9	Company gives priority to meeting its commitments about product price
X10	Company gives priority to meeting its commitments about product delivery time
X11	Company informs customers about appropriate use and risks of products
X12	Company takes the necessary steps to avoid customer complaints
X13	Company gives adequate response to customer complaints
X14	Company understands the importance of a serious after-sales service
CSR TOWARDS SUPPLIERS	
X15	Company takes into account suppliers' interests in strategic decision-making
X16	Company gives priority to recognizing appropriate remuneration for suppliers
X17	Company gives priority to meeting the agreed timing of payments to suppliers
X18	Company gives importance to how its image is perceived by suppliers
X19	Company informs suppliers about relevant changes of its structure and strategy
CSR TOWARDS THE LOCAL COMMUNITY	
X20	Company takes into account the local community's interests in strategic decision-making
X21	Company supports social development of the community
X22	Company supports cultural development of the community
X23	Company keeps transparent relationships with local politicians.
X24	Company worries about community development
X25	Company considers itself part of the community
CSR ENVIRONMENTAL ASPECTS	
X26	Company gives priority to respecting natural landscapes
X27	Company gives priority to respecting urban landscapes
X28	Company designs products and packaging to be reused, repaired or recycled
X29	Company exceeds voluntarily environmental regulations
X30	Company invests in saving energy
X31	Company adopts measures to design ecological products or services
X32	Company implements programmes to reduce water consumption
X33	Company performs environmental audits periodically

All variables are measured by Likert Scale from 1 to 5.

This study also analysed the following control variables: business sector (two dummy variables concerning the industry: manufacturing, commerce or services; "service" was used as the reference category), age (in terms of number of years since the company was formed), geographic location (two dummy variables concerning the geographic location: North, Centre or South Italy; "North" was used as the reference category), CEO-duality (a dummy variable with a value of 1 if the CEO was also the chair of the board of directors, 0 otherwise), family ownership (a dummy variable with a value of 1 if the majority of shares was owned by members of the same family, 0 otherwise), and level of overlap between management and ownership (measured in function of the share of the firm's capital owned by management team members as follows: 1: 0%; 2: >0%<25%; 3: >25%<50%; 4: >50%<75%; 5: >75%).

Table 2. CSR variables selected and used for default prediction modelling

VARIABLES' CATEGORY	P-VALUE
CSR TOWARDS EMPLOYEES	
Company takes into account employees' interests in decision-making	0.001
CSR TOWARDS CUSTOMERS	
Company gives priority to meeting its commitments about product delivery time	0.000
Company understands the importance of a serious after-sales service	0.001
CSR TOWARDS SUPPLIERS	
Company gives priority to meeting the agreed timing of payments to suppliers	0.000
CSR TOWARDS THE LOCAL COMMUNITY	
Company takes into account the local community's interests in decision-making	0.001
CSR ENVIRONMENTAL ASPECTS	
Company performs environmental audits periodically	0.001

Table 3. Initial group of financial ratios

Y1	Roe = Net Profit/Equity
Y2	Roi = Ebit/Net Operative Assets
Y3	Ros = Ebit/Turnover
Y4	Value Added/Turnover
Y5	Ebitda/Turnover
Y6	Interest Charges/Ebitda
Y7	Value added/Number of Employees
Y8	Cash flow/Total Debts
Y9	Interest charges/Bank Loans
Y10	Bank loans/Turnover
Y11	Total debts/Total Assets
Y12	Financial Debts/Equity
Y13	Total Debts/Ebitda
Y14	ATR (Acid Test Ratio)
Y15	Turnover/Net operative assets

Ebitda = ebit + depreciation + amortization

Table 4. Financial ratios selected and used for default prediction modelling

FINANCIAL RATIOS	P-VALUE
Ebit/Net Operative Assets	0.001
Acid test ratio	0.001
Value added/Number of Employees	0.000
Interest charges/Ebitda	0.001
Financial Debts/Equity	0.001

Ebitda = ebit + depreciation + amortization.

4 Research Design

4.1   The Structure of the Sample

The reference population object of analysis was composed of firms operating in manufacturing, commerce or the service industry, which was located in Italy, had a turnover below 5 million Euro, and was included in the CERVED database (that includes financial statements of all the Italian companies which are obliged to issue annual financial statements). In line with the main literature [2, 14, 31, 37, 58, 59, 69], the samples analysed in this study were built using a "matched-pairs" design.

The initial sample consisted in 4,716 companies and was constituted by two sub-samples. The first subsample was formed by 2,358 Italian firms operating in manufacturing, commerce or the service industry, which had a turnover below 5 million Euro, were defaulting during the year 2014, were already operating in 2010, and had issued a regularly published financial statement that same year. The second subsample was made up of 2,358 firms which were non-defaulting during the year 2014 and were selected using a stratified random sampling method, with a view to replicate the composition of the first sub-sample with regard to localization, size group distribution, and industry. A firm's size was determined by its 2010 turnover.

Data related to CSR behaviors were gathered using a questionnaire that was sent by email to the CEO of each of the 4,716 SEs in the initial sample. A pre-test of the questionnaire implemented with a limited number of firms (40) suggested to reduce the length and/or modify the form of a significant part of the questions [60, 80]. In order to compensate for the potential distortion caused by the subjective and "internal" vision of the CEO, a copy of the questionnaire was also sent to a second person, who was personally indicated by the CEO and external to the firm but also adequately informed about its CSR policies and activities (for example one of its principal customers or a key consultant).

382 fully completed questionnaires from both the CEO and the external person (177 from defaulting firms and 205 from non-defaulting firms) were received, which corresponded to 8.10% of the initial sample. In most cases the answers given by the external person were found to be significantly different from those given by the CEO. Therefore, they were used for the analysis as they were considered more objective.

Accounting data necessary to calculate financial ratios referring to the 2010 financial year were extracted from the CERVED database.

Table 5. The structure of the sample (Percentage values)

	Defaulting firms	Non-defaulting firms
Industry		
Manufacturing	45.4	46.2
Commerce	14.8	15.9
Service	39.8	37.9
Geographical Area		
Northern Italy	43.2	41.7
Central Italy	31.9	32.6
Southern Italy	24.9	25.7
Size (turnover in Euro)		
Size group 1 (below 0.3 million)	32.3	38.5
Size group 2 (0.3-0.8 million)	27.8	26.9
Size group 3 (0.8-2.0 million)	20.1	17.8
Size group 4 (2.0 million-5 million)	19.8	16.8
Gender of respondents		
Male	88.9	89.9
Female	11.1	10.1
Mean age of respondents	49.7	53.4
Total	177	205

A stratified random sampling technique was used to split the sample of the 382 responding firms into 2 sub-samples. One was formed by 254 firms (121 defaulting and 133 non-defaulting), and was used to build default prediction models (training sample). The other, made up of 128 firms (59 defaulting and 69 non-defaulting), was used to assess the prediction capability of the developed models (holdout sample). Table 5 shows the structure of the sample made up of the 382 responding firms in terms of localization, turnover size, and industry.

Table 6. Financial ratios in the responding SEs: 2010 mean values

		Defaulting Firms	Non-Defaulting Firms
Y1	Roe = Net Profit/Equity	-3.4	2.1
Y2	Roi = Ebit/Net Operative Assets	0.9	4.9
Y3	Ros = Ebit/Turnover	1.3	4.1
Y4	Value Added/Turnover	13.7	23.7
Y5	Ebitda/Turnover	2.5	9.3
Y6	Interest Charges/Ebitda	67.3	39.6
Y7	Value added/Numb. of Employees	31.9	48.7
Y8	Cash flow/Total Debts	2.1	9.7
Y9	Interest charges/Bank Loans	8.7	6.4
Y10	Bank loans/Turnover	0.89	0.46
Y11	Total debts/Total Assets	78.4	52.3

Y12	Financial Debts/Equity	176	76.8
Y13	Total Debts/Ebitda	801.3	407.8
Y14	Acid test ratio	0.788	1.121
Y15	Turnover/Net operative assets	89.7	134.2

Ebitda = ebit + depreciation + amortization

Non-failing firms are proportionally less present in the service industry and in Northern Italy and more present in Size Group 1. The analysis of the data presented in Table 6 suggests that in 2010 defaulting SEs had far higher levels of financial leverage and profitability, and a far lower level of liquidity (average Acid test ratio was 0.788 for defaulting firms and 1.121 for non-defaulting firm).

4.2 Research Methodology
In the bankruptcy prediction literature many different statistical methods have been proposed, such as the multivariate discriminant analysis [3, 23, 28, 46, 51, 80], the logistic regression analysis [99], and artificial neural networks [e.g., 40, 121]. Though it has represented the most frequently used technique, the multivariate discriminant analysis has shown several weaknesses, especially in cases where the independent variables are not linear, not normally distributed, and not completely independent of one another [12, 73, 86, 99]. Consequently, the logistic regression analysis was used in this study in order to develop two prediction models by using data from the training sample. One model was designed using both CSR orientation characteristics and financial ratios as default predictors (independent variables). The other was instead based only on financial ratios.

5 Empirical Results
5.1 Discussion
Both the model based also on CSR orientation characteristics (Model 2) and the model based only on financial ratios (Model 1) were initially developed at an aggregate level (i.e. based on the aggregate training sample) and then separately calculated for each of the four following turnover size groups of firms: below 0.3 million, 0.3.-0.8 million, 0.8-2.0 million, 2.0-5.0 million. The prediction accuracy capacity of these models was then assessed by testing their effectiveness on the holdout sample.

Tables 7 shows the results of regressing the dependent variable (default/non-default event) on the selected financial ratios, as well as on the control variables (firm business sector, age, and geographic location, CEO-duality, family ownership, and level of overlap between management and ownership), while Table 8 shows the results of regressing the

default/non-default event on both financial ratios and CSR behaviors characteristics, as well as on the same control variables.

The analysis of the data presented in these tables suggests that for both Model 1 and Model 2 all coefficients referred to default predictors were found significant at the one or five percent level, and all signs were as expected. Furthermore, the coefficients of all the control variables were always not significant at conventional levels, with the exception of those regarding CEO duality and family ownership.

Table 7. Model 1 logistic regression coefficients calculated on the aggregate sample and for each size sub-samples

Independent Variables	Aggregate Sample	Size 1	Size 2	Size 3	Size 4
Intercept	-1.56	+1.32**	+3.45**	-2.45*	-1.34**
FINANCIAL RATIOS					
Ebit/Net Oper. Assets	-4.34**	-3.54**	-3.76*	-5.78**	-4.01*
Acid Test Ratio	-3.34**	-6.78*	-8.04**	-4.73**	-3.77*
VA/ Numb. of Employees	-7.43*	-6.20*	-9.41*	-11.32*	-6.21*
Interest charges/ Ebitda	+9.65*	+12.71**	+8.62**	+16.37**	+12.55**
Financial Debts/Equity	+8.61**	+12.31**	+8.63*	+12.79*	+14.53**
CONTROL VARIABLES					
CEO duality	-1.11*	-0.89*	-2.23*	-1.45*	-3.89*
Management-Owner	+2.43	+2.78	5.76	+3.54	+11.11
Firm age	+1.45	-1.22	-2.61	-4.51	-3.56
Firm family ownership	-0.78	-0.89	-1.67	+2.54	-0.78
Central Italy	+4.67	+2.45	+3.67	+2.81	-3.78
Southern Italy	+2.56	+3.67	+3.21	+6.81	+4.78
Commerce	+2.43	+1.01	+1.04	+2.45	+3.56
Manufacturing	-1.11	-2.54	-1.34	-0.89	-1.74

*Significant at 5 percent **Significant at 1 percent. VA = Value Added

Table 8. Model 2 logistic regression coefficients calculated on the aggregate sample and for each size sub-samples

Independent Variables	Aggregate Sample	Size 1	Size 2	Size 3	Size 4
Intercept	+3.45*	+4.24*	+4.67**	+2.41**	+2.56**
FINANCIAL RATIOS					
Ebit/Net Oper. Assets	-3.61**	-6.82*	-4.27**	-6.31**	-9.51*
Acid Test Ratio	-5.43**	-3.71**	-4.32*	-8.96**	-8.21*
VA/Numb. of Employees	-1.45*	-1.73**	-3.99*	-5.51**	-8.03**
Interest charges/ Ebitda	+3.78*	+6.81**	+7.41**	+7.04**	+11.32**
Financial Debts/Equity	+6.54**	+8.51**	+4.93**	+12.74*	+11.42**
CSR TOWARDS EMPLOYEES					
Company takes into account employees' interests in strategic decision-making	-1.45*	-1.68*	-1.09*	-2.03*	-2.90**
CSR TOWARDS CUSTOMERS					
Company gives priority to meeting its commitments about product delivery time	-1.32*	-1.58*	-1.49*	-2.09*	-1.15*
Company understands the importance of a serious after-sales service	-2.58*	-2.98**	-2.54*	-3.21*	-3.89*
CSR TOWARDS SUPPLIERS					
Company gives priority to meeting the agreed timing of payments to suppliers	-3.64*	-2.51*	-3.71*	-4.97**	-3.61*
CSR TOWARDS THE LOCAL COMMUNITY					
Company takes into account the local community's interests in strategic decision-making	-1.45*	-1.68*	-1.01*	-0.90*	-1.32**
CSR ENVIRONMENTAL ASPECTS					
Company performs environmental audits periodically	-1.03*	-1.18*	-1.67*	-2.11*	-1.98**
CONTROL VARIABLES					

CEO duality	-1.45*	-2.53*	-2.78*	-4.61*	-7.43*7*
Management-Owner	+2.56	+4.51	+3.29	+3.91	+2.467
Firm age	+0.59	-0.45	-0.91	-1.31	+1.568
Firm family ownership	-1.98	-1.54	-1.78	+2.01	-0.90
Central Italy	+3.45	+2.11	+5.87	+1.67	+2.614
Southern Italy	-1.54	-1.09	-2.56	-4.71	+0.893
Commerce	+1.45	+0.61	+0.79	+2.01	+1.05
Manufacturing	-1.44	-0.67	-1.34	-0.85	-0.67

*Significant at 5 percent **Significant at 1 percent.

In addition to demonstrating that financial ratios are significantly related to company bankruptcy even when the objects of prediction are SEs, this study also finds that some CSR orientation characteristics are significantly correlated with SE default.

More specifically, adequately weighting employees' interests as well as those of the local community when strategic decisions have to be taken, respecting product delivery times promised to customers as well as payment times agreed with suppliers, giving adequate importance to a serious after-sales service, and periodically performing environmental audits, are all factors that are found significantly and negatively related to SE default.

Regarding control variables, in contrast to the results of the literature regarding larger firms [13, 43, 44, 67, 81], but in line with the results referred to SEs [37], CEO duality was found significantly and negatively correlated with bankruptcy, confirming that, the more the power of the CEO is limited, the higher the probability of company default is when SEs are object of analysis.

The results of the tests made on the holdout sample in order to assess the prediction capacity of the two models developed at an aggregate level (i.e. based on the aggregate training sample) are shown in Table 9.

Table 9. Test on holdout sample of Model 1 and Model 2 calculated on the aggregate sample

Model	Observed state		Predicted State (%)		Firms correctly classified (%)
			1	0	
Model 2	Defaulting firms	1	83.9	16.1	82.8
	Non-defaulting firms	0	18.3	81.7	
Model 1	Defaulting firms	1	77.9	22.1	75.0
	Non-defaulting firms	0	27.9	72.1	

In "Observed State 0" lines the percentages of non-defaulting firms which were wrongly classified were presented ("Predicted State 1" column; type II error), i.e. 18.3% for Model 2 and 27.9% for Model 1, and the percentages of non-defaulting firms which were correctly classified ("Predicted State 0" column), i.e. 81.7% for Model 2 and 72.1% for Model 1. In "Observed State 1" lines the percentages of defaulting firms which were classified wrongly are indicated ("Predicted State 0" column; type I error), i.e. 22.1% for Model 1 and 16.1% for Model 2, and the percentages of defaulting firms which were correctly classified ("Predicted State 1" column), i.e. 77.9% for Model 1 and 83.9% for Model 2.

In line with H1, the model based also on CSR orientation characteristics shows an increase in prediction accuracy of almost 8%, with a type II error reduction of 9.6% and a type I error reduction of 6.0%. These findings demonstrate that CSR activities towards employees, customers and suppliers reduce the probability of SE financial distress and default, by creating a good reputation and strong relationships with the stakeholders of the firm, which, in turn, represent key elements for successfully facing and overcoming difficult financial situations. They also confirm that institutional (i.e. oriented toward the entire local community) and environmental CSR activities are also beneficial to small company survival as they allow the construction of a company's moral capital which acts as an effective insurance against negative economic and/or financial events [62].

These results, which are consistent with those of Sun and Cui [133] and Al-Hadi et al. [2], confirm that the advantages of engaging in socially beneficial activities can be greater than the associated costs, thereby generating a double positive effect on a firm's viability: a lower probability of default and a higher credit rating. Our results are of particular interest as they specifically refer to SEs which usually do not have their credit rated by Standard and Poor's or Moody's.

Table 10. Test on holdout sample of Models 1 and 2 separately calculated for each size sub-sample

Size	Model 2 correctly class. Firms (%)	Model 1 correctly class. Firms (%)	Model 2 versus Model: accuracy increase (%)
Size 1	83.4	74.7	8.7
Size 2	83.9	75.3	8.6
Size 3	83.5	75.8	7.7
Size 4	83.8	76.2	7.6
Total	83.7	75.5	8.2

The results of the tests made on the holdout sample in order to assess the prediction capacity of the two models separately developed for each size sub-samples are shown in Table 10. These results:
a) provide further confirmation of H1 in that Model 2 shows higher prediction accuracy rates for all size sub-samples;
b) confirm H2 as they demonstrate that for both Model 1 and Model 2 when logistic regression is separately applied for different size groups,

accuracy rates are higher than when predictive functions are calculated on the aggregate sample. It follows that financial institutions should build different prediction models for different size groups of firms, as well as update these models each time the dimensional composition of their customer base changes significantly;

c) confirm H3 in that the Model 1 prediction accuracy rate decreases as company size gets smaller (for size group 1 it is 1.5% lower than for size group 4); at the same time, compared to Model 1, Model 2 shows prediction accuracy increases which become higher as company size decreases (8.7 and 8.6, respectively for size group 1 and 2; and 7.7 and 7.6 respectively, for size groups 3 and 4). As a consequence, unlike models based only on financial ratios, models based also on CSR orientation characteristics give prediction accuracy rates which are very similar for all the different size groups.

These findings demonstrate that using CSR orientation characteristics, in addition to improving the overall accuracy of SE prediction models, compensates for the fact that the predictive value of financial ratios tends to get lower when the firm gets smaller. Small companies default prediction using only financial ratios is particularly problematic not only as financial statements produced by SEs are typically more opaque and less detailed than those of larger firms [26], but also because SEs have reduced contractual power towards their counterparts, which have a strong influence on their strategic behaviors and financial results; consequently, for example, one year financial ratios may get worse because a key supplier has imposed a higher purchase price or an important customer has forced the firm to accept a lower selling price. These considerations are consistent with the increases in accuracy rates obtained by the model based also on CSR orientation characteristics compared to the model based only on financial ratios (H1), as well as with the fact that these increases get higher as company size decreases (H3).

5.2 Robustness Checks

A second holdout sample was used in order to assess the robustness of the results presented in the previous section.

This second sample was made up of 900 Italian firms operating in manufacturing, commerce or the service industry, which had a turnover below 5 million Euro, were defaulting during the year 2013, were already operating in 2009, and had issued a regularly published financial statement of the same financial year. 450 of these firms had failed in 2013

and the other 450 had not failed in the same year. Data related to CSR characteristics were gathered sending the same questionnaire described in Section 5.1. to both the CEO of each firm and a second person, indicated personally by the CEO, who was external to the company but also adequately informed about its CSR policies and activities.

83 fully completed questionnaires from both the CEO and the external person (38 from defaulting firms and 45 from non-defaulting firms) were received. Financial ratios were calculated on the basis of the 2009 financial statements extracted from the CERVED database.

Testing Model 1 and Model 2 on this second holdout sample confirmed the robustness of the findings of this study:

1) with regard to prediction functions calculated on the aggregate training sample, compared to Model 1, Model 2 showed an increase of the overall accuracy rate of 7.5% (81.7% against 74.2%), a type I error reduction of over 5.1%, and a reduction of the type II error of over 8%;

2) with regard to logistic functions separately developed for each size group of firms, Model 2 continued to show higher prediction accuracy rates for all size sub-samples, both Model 1 and Model 2 showed higher accuracy rates than when logistic functions were calculated on the aggregate sample; while Model 1 prediction accuracy rate got lower as company size got smaller, Model 2 gave prediction accuracy increases which got higher as company size decreased, with the consequence that, unlike the model based only on financial ratios, the model based also on CSR orientation characteristics gave prediction accuracy rates which were very similar for the different size groups.

6 Conclusion

Ratios are calculated on past financial data while default prediction looks towards the future of the firm. Furthermore, this mismatching is exacerbated by the temptation of firms, especially SEs, to postpone the accounting emergence of financial weaknesses. This aspect has become particularly critical as the 2008 global financial crisis heavily called the opacity of financial statements into the heart of the scientific debate. Nevertheless, financial indicators calculated on the latest financial statements still represent the most used category of default predictors used in the literature of firm default prediction modelling.

In this study, a sample of 382 Italian SEs was analysed and a SE default prediction model was designed by applying logistic regression and using

both CSR orientation characteristics and financial ratios as default predictors. The accuracy rates of this model were then compared to that of a second model based only on financial ratios as predictive variables.

This paper contributes to the literature on SE bankruptcy prediction and the relationship between CSR and SE default as follows. First, to our knowledge, this is the first study that explores the potential of CSR orientation characteristics for default prediction. The obtained results demonstrate that using CSR characteristics significantly improves the accuracy of SE default prediction models. Furthermore, and more specifically, they demonstrate a positive ultimate net effect on the firm's viability of several CSR policies, such as adequately weighting the interests of the employees and the local community when taking strategic decisions, respecting product delivery times promised to customers and payment times agreed with suppliers, giving adequate importance to a serious after-sales service, and periodically performing environmental audits.

Second, this paper shows that the limits of using only financial ratios for default prediction modelling tend to get greater as the size of the firms object of analysis decreases.

Third, it also demonstrates that the smaller the firm, the higher the increase in prediction accuracy rates that can be obtained by adding CSR characteristics as default predictors, with the result that, unlike models based only on financial ratios, models based also on CSR characteristics give prediction accuracy rates which are very similar for all the different size groups.

Forth, it confirms that financial institutions should design different SE prediction models for different size groups of firms, in order to capture the specific aspects that characterize the different risk profiles of each group.

This study has three main limitations. Firstly, default prediction models are based on a sample of firms located in a single country (Italy), which has its specific industrial, economic, social, and institutional characteristics which certainly limit the generalizability of the findings.

Second, both the model based only on financial ratios and, though to a lesser extent, the model based also on CSR characteristics show a prevalence of type II errors, with the consequence that they could trigger credit rationing beyond what is really necessary.

Third, this study uses only one category of non-financial default predictors, i.e. CSR orientation characteristics. In order to further increase prediction accuracy, other classes of qualitative variables should be analysed and tested, such as those related to a company's competitive strategy, organizational structure, innovation strategy, knowledge creation [36] and knowledge management strategy.

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