

The Cost of Debt in Unlisted Companies

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Abstract

A consistent value of cost of debt is necessary to have a congruous weighted average cost of capital to use in evaluation processes. Nevertheless in literature there is a lack about the estimation of cost of debt in unlisted companies. After a review of methods used to compute cost of debt in listed companies we have elaborated a new model for unlisted companies, according to common features of the researches. Our model is based on a logit regression in which dependent variable is the rating assigned by Standard and Poor's and independent variables are taken from the main approaches in literature. We find that this algorithm has a good predictive performance and in particular some independent variables, such as the rating of country where enterprise operates, have a higher statistical significance.

Keywords: cost of debt, weighted average cost of capital, WACC, discount rate, evaluation process, unlisted companies, rating.

1. Introduction

The idea of this paper stems from the importance of weighted average cost of capital (WACC) in evaluation process. WACC is used as discount rate in discounted cash flow models and a right determination of WACC leads to a more accurate fair value. Nevertheless the determination of WACC is not simple due to the presence of three fundamental elements: cost of debt; cost of equity; financial structure weights. In this work we have paid attention to cost of debt, postponing other topics to future studies.

The cost of debt in listed companies is a subject widely debated in literature while there are few contributions about ways to determine cost of debt in unlisted companies. This is a limitation especially in country where there is a large presence of small and medium enterprises that often do not go public.

About listed companies, Merton (1973) develops a method for pricing corporate liabilities however this method cannot be applied for unlisted companies because it requires some variables unavailable in unlisted companies.

Most of the studies on cost of debt focus in corporate bonds, assuming that the cost of corporate bond is a proxy of cost of debt. However unlisted companies often do not have corporate bond publicly traded. So a specific model is necessary.

Studies on corporate bonds refer to determination of a rating in order to estimate the cost of debt.

Indeed the relationship between cost of debt and rating is confirmed in Kliger and Sarig (2000). They assert that announcements about rating affect debt value.

We analyze rating models present in literature and we elaborate a specific rating model for unlisted companies, considering the characteristics of unlisted companies.

In this way we determine rating and related cost of debt for unlisted companies starting from some variables available for unlisted companies.

The paper is organized as follows: section 1 refers to a review of the literature on the topic. Then, in section 2, we provide information about dataset and methodology. Section 3 contains the results. Finally, section 4 presents the conclusions.

2. Literature

Solomon (1955) affirms that the costs of borrowed funds is a relatively straightforward problem. The borrowing contracts produce a precise timetable for the repayment of principal and interest. The net proceeds of a loan or a bond issue are also known. From these two facts, it is a simple matter to compute the effective rate of interest the company pays for the use of borrowed funds. The only adjustment which is necessary arises from the tax-deductibility of interest charges. Nowadays this approach is less useful for two reasons: we need a measure of cost of debt that is projected to the future, instead the cost of debt of Solomon is historical; balance sheet data, that are available also for unlisted companies, are not sufficient. Solomon's approach needs some information that are not immediately available reading balance sheet.

Merton (1973) develops a method for pricing corporate debt. This model requires market variable, so it is not suitable for unlisted companies.

Fisher (1959), Merton (1973), Bierman and Hass (1975), Chen (1978), Boardman and McEnally (1981) and Briys and de Varenne (1997) agree that the cost of corporate bond is a proxy of cost of debt.

Fisher (1959) presents some hypothesis in his work: the average risk premium on a firm's bonds depends primarily on the risk that the firm will default and second on the marketability of its bonds, that is represented by the market value of all the publicly traded bonds that the firm has outstanding. In particular Fisher identifies three variables as determinants of the risk of default: earnings variability (measured by the coefficient of variation of the firm's net income over the past nine years), financial leverage (measured by the firm's market value of equity to book value of debt ratio), and the length of time the firm has been operating without forcing its creditors to take a loss. The author relates risk premium of corporate bond to accounting data and market data. As we know unlisted companies often do not have bond publicly traded and consequently market data.

Merton (1973) asserts that cost of corporate bond depends essentially on three items: risk-free rate; characteristics of bond (maturity date, coupon rate, call terms, seniority in the event of default); the probability of default. Also in this case we find that some information required are not available for unlisted companies.

Bierman and Hass (1975) in their paper confirm that bondholders have to face three types of risk: the risk of default of the issuer, the risk of interest rate changes and price level risk.

Chen (1978) defines the cost of debt capital as the equilibrium required rate of return on a risky corporate bond. According to Chen a firm's cost of debt is function of the risk-free interest rate, the firm's systematic business risk, the probability of bankruptcy, the corporate income tax rate and the costs of bankruptcy. He seeks to relate the expected return of a risky bond to the systematic risk of its

return flows and its default character. It can be seen that also following this approach cost of debt is influenced by specific feature of the enterprise and exogenous variables as risk-free rate, systematic risk and corporate income tax rate.

Boardman and McEnally (1981) link the price of corporate bonds with three elements: the pure price of time; the default risk; , the features of the bond itself.

Briysand de Varenne (1997) in their paper develops a corporate bond valuation model that takes into account both probability default and interest rate risk. For corporate bondholders, the default of the bond issuer is a possibility that cannot be ignored. In fact expectations of possible future losses have to be reflected in current bond yield.

A common element of the cited researches is the presence of the probability issuer default. The default risk seems to be the central item relatively to cost of debt. Rating is a measure that explains the probability of default, in effect bond ratings are used extensively in the investment community as a surrogate measure for the riskiness of bond. As reported in West (1970) bond ratings receive wide publicity and appear to be influential in determining risk premiums and even the marketability of bonds. Thus in the following part of the paragraph we analyze the main contributions about estimation of rating.

A good number of studies have been able to develop statistical model capable to predict rating of corporate bonds. These studies include Horrigan (1966), Pogue and Soldofsky (1969), West (1970), Pinches and Mingo (1973), Altman and Katz (1976), Cannata (2001). Studies differ in the statistical procedure used to estimate the prediction equation and in the selection of the independent variables.

The aim of the work of Horrigan (1966) is to investigate the predictive power of accounting data, in particular financial ratios, regarding corporate bond rating. He uses regression in which the dependent variable, the bond rating, is coded on a nine-point scale (9 is the highest bond rating) and accounting data are independent variables. He does not use the absolute value deducible from balance sheet but he prefers to calculate financial ratios. He tries many different candidates for independent variables, selecting those that has the highest R^2 in regression equations. The sole non-accounting variable used is a 0-1 dummy that explicates the subordination status of a bond issue. The best independent variables are: total assets (the only piece of absolute accounting data employed), working capital/sales, net worth/total debt, sales/net worth. The ratios are classified essentially into liquidity and profitability categories. The author concludes that the hypothesis is confirmed: the correlations between the bond ratings and the independent variables is largely as expected. Accounting data and financial ratios are useful for determination of corporate bond rating.

Pogue and Soldofsky (1969) elaborate a regression model with a dichotomous dependent variable to predict which of two ratings a bond should be assigned. The most significant independent variables are long-term debt/total assets, a coefficient of earnings variation and total assets. Return on assets results less important and earnings coverage of interest charges is insignificant. The selection of independent variables is quite similar to Horrigan adding a measure of earnings instability but omitting the dummy about subordination. The authors conclude that the probability of a bond having the higher of a pair of ratings is inversely related to the leverage and earnings instability and directly related to the firm's size. Moreover although intangibles of judgment undoubtedly enter into the determination of bond ratings, the results of this study suggest that differences in bond ratings can be explained to a significant degree by available financial and operating variables.

West (1970) criticizes Horrigan's study. The most important criticism is about the concentration on only accounting data as independent variables and also on the lack of contact with the previous study of Fisher, that relates risk premium of corporate bond to both accounting data and market data. West use the four independent variables from Fisher's study: earnings variability, reliability, capital structure and marketability. West selects the same dependent variable present in Horrigan: corporate bond rating coded on a nine-point scale. West uses regression as well as Horrigan.

Pinches and Mingo (1972) differently to the previous researches opt for multiple discriminant analysis rather than regression. The dependent variable is always corporate bond rating while independent variables are classified in four categories: variables related strictly to the bond features;

one year variables of financial characteristics; five year average financial variables; coefficients of net income variation and long term debt/total assets. In order to replicate Moody's ratings the most significant independent variables are: earnings stability, size of the issue, leverage, debt and debt coverage stability, return on investment, subordination of the issue.

Ang and Patel (1975) focus their research on the goodness of Horrigan, West, Pogue and Soldofsky, and Pinches and Mingo models. They find that, these models do as good a job as the agencies' rating at a much lower cost when the objective is to forecast short-term probability of financial loss. In general, these models are able to correctly classify 60%-80% of the bonds.

Altman and Katz (1976) applies multiple discriminant analysis. Unlike Pinches and Mingo, Altman and Katz do not make a priori screening of independent variables.

Recently, special techniques have been developed for categorical dependent variables, in fact Cannata (2001) and Kamstra, Kennedy and Kin-Suan (2001) use logit regression in order to determine corporate bond rating, while Jones and Hensher (2004) use logit regression in order to estimate financial distress.

In particular Cannata (2001) classifies independent variables into three categories: solvency (cash flow/total debt, quick ratio, current ratio), profitability (return on equity, return on assets, return on capital) and financial structure (gearing ratio, leverage). The results point up a robust connection between accounting data and rating. His model is able to correctly classify about 60% of the bonds.

Damodaran (2016) suggests a different approach to identify corporate bond ratings. His approach is very simple. He considers only one independent variable: interest coverage ratio. He elaborates a table in which there are range of interest coverage ratio. At every range corresponds a rating. This method is applicable also to unlisted companies but it considers only one variable and so there are some doubt about his prediction power.

Relatively to rating of unlisted companies it can be seen that there are not specific model and indeed most of the models considers variables that are not available for unlisted companies (in particular market data and characteristics of issue). Moreover in the previous study there is a variable that is not considered: the rating of the country where enterprise is localized. Some recent researches show the influence of sovereign rating on corporate bond rating. Cantor and Packer (1996) argue that sovereign ratings are important not only because some of the largest issuers in the international capital markets are national governments, but also because these assessments affect the ratings assigned to borrowers of the same nationality. Dittmar and Yuan (2006) analyze the impact of emerging-market sovereign bonds on emerging-market corporate bonds. They find that a relation exists.

3. Data and Methodology

As in the recent literature we use an ordinal logit regression in order to evaluate ratings. Logit regression is a regression model where the dependent variable is categorical. For each observation this model provides a number of outputs equal to the number of categories of the dependent variables. The outputs are probabilities to belong to the different categories of rating.

Data are collected from Thomson Reuters Datastream and refer to a panel of 240 firms. These firms are the enterprises that in July 2016 have a S&P rating and are listed in one of the following countries: Italy, Germany, France, Spain, United Kingdom, Sweden, Denmark, Netherlands, Greece, Ireland and Finland.

The dependent variable of our model is the bond rating that is coded on a four-point scale as shown in the following table.

S & P Rating of enterprises	Model scale
AAA	0
AA+	0
AA	0
AA-	0

S & P Rating of enterprises	Model scale
A+	0
A	0
A-	0
BBB+	1
BBB	1
BBB-	1
BB+	2
BB	2
BB-	2
B+	3
B	3
B-	3
CCC+	3
CCC	3
CCC-	3

So rating are distributed in the following manner.

Rating	Number of firms
0	42
1	108
2	55
3	35

Like in the main literature our independent variables are financial ratios about solvency, financial structure and profitability (current ratio; interest coverage ratio; leverage; return on equity; working capital/total assets), absolute accounting data (natural logarithm of revenues) and measures of variability (coefficient of variation of revenues; coefficient of variation of operating income; coefficient of variation of net income). The only addition is the variable about the rating of country where firm is located. Sovereign rating refers to July 2016. This variable is coded in the following way.

Sovereign S&P Rating	Model scale
AAA	0
AA+	1
AA	2
AA-	3
A+	4
A	5
A-	6
BBB+	7
BBB	8
BBB-	9
BB+	10
BB	11
BB-	12
B+	13
B	14
B-	15
CCC+	16
CCC	17
CCC-	18

Financial ratios and absolute accounting data are the average of the yearly values from 2005 to 2014. Also the measures of variability, that are a single value and not an average, are calculated over the same 10-year period.

Independent variables concerning the issue (like bond size, subordination, etc) do not appear because unlisted companies usually do not have this information.

Consequently our model is based on common features of main literature regarding methodology and selection of variables considering meanwhile the specificity of unlisted companies.

4. Results

After adding the quadratic terms to independent variables and the explication of variable selection process we arrive to the results of the logit regression.

	Groupe 0	Groupe 1	Groupe 2	Groupe 3
Intercept	0,00	-44,39	-30,48	-2,78
Working capital/Total assets	0,00	-13,89	-6,44	-32,33
CV Net Income	0,00	2,31	2,65	3,69
CV Operating Income	0,00	2,05	2,58	3,38
ROE	0,00	-0,12	-0,12	-0,12
LN Revenues	0,00	6,39	4,87	1,46
Sovereign Rating	0,00	0,28	0,38	0,63
(Working capital/Total assets) ²	0,00	59,29	35,83	123,18
(CV Net Income) ²	0,00	-0,05	-0,06	-0,16
(CV Operating Income) ²	0,00	0,00	-0,01	-0,04
(ROE) ²	0,00	0,00	0,00	0,00
(Leverage) ²	0,00	-5,80	-10,74	-10,03
(CV Revenues) ²	0,00	-2,64	1,55	-0,07
(LN Revenues) ²	0,00	-0,22	-0,19	-0,10

On the basis of the regression values from the table above the percentage of correctly classified companies is 71,25%.

Moreover we can see that starting from a wide list of independent variables only some are significant: Working capital/Total assets, CV Net Income, CV Operating Income, ROE, LN Revenues, Sovereign Rating, (Working capital/Total assets)², (CV Net Income)², (CV Operating Income)², (ROE)², (Leverage)², (CV Revenues)², (LN Revenues)².

5. Conclusions

We have found that most statistical rating methods consider variables that are not available in unlisted companies. This represents a significant weakness considering the importance of cost of debt in weighted average cost of capital determination. WACC has assumed increasing centrality in evaluation processes. Indeed it represents the discount rate to apply to future cash flows or incomes. An incorrect discount rate could strongly affect the evaluation process. Hence it is necessary calculate a consistent value of cost of debt of unlisted companies in order to evaluate correctly the unlisted companies.

Thus we develop a rating model for unlisted companies based on common features of main literature. Starting from a set of independent variables that are taken from the main approaches in literature, after a variable selection we demonstrate that interest coverage ratio and current ratio result insignificant. So the independent variables in our model are: Working capital/Total assets, CV Net Income, CV Operating Income, ROE, LN Revenues, Sovereign Rating, (Working capital/Total assets)², (CV Net Income)², (CV Operating Income)², (ROE)², (Leverage)², (CV Revenues)², (LN Revenues)². The only independent variable that no one previous studies have considered is Sovereign Rating and in our analysis it results significant. The prediction power of the model is aligned to main literature, indeed the percentage of correctly classified companies is 71.25%. After the definition of unlisted company rating we have to identify the effective cost of debt. One of the solutions is to use spread rating available on Thomson Reuters Datastream.

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