CLASSIS CAPITAL

Classis PMI Z_I-Score

Helping Italian SMEs to Fund their Success and Investors to Assess the Risk/Return Trade-off

Crediamo nella supremazia della Conoscenza.

Crediamo nelle forza delle Idee.

Crediamo nell'Ispirazione.

Dr. Edward I. Altman
Dr. Gabriele Sabato
Maurizio G. Esentato
Milano, April 12, 2016

Evolution of Statistical Models for Predicting Financial Distress of Companies

- **1968** Creation of the **Altman Z-Score model** still used today as the **most prominent risk metric globally**
- **1984** Creation of Risk Metrics and Returns for the U.S. High Yield (Junk Bond) market
- **1989** Adapting Credit Scoring models to provide an International Language of credit via the Bond Rating Equivalent Method (BRE) and Probability of Default (PD) and Loss Given Default (LGD)
- **1995** Development of a Credit Risk Model for Emerging Market Companies
- **1999** Introduction of Basel 2 and the universal use of credit scoring models for bank counterparty risk
- **2005-2010** Adaptation of credit scoring models for SMEs in U.S. and U.K. (See our "white paper" for relevant sources)
- **2016** Creation of the Classis PMI Z_I-Score

Classis PMI Z_I-Score: why and when it was conceived

- **2011** — Formation of **Classis Capital SIM SpA** & its founding members

- **June 2011 (FT article):** Focus on Italy as critical to Euro Sovereign Debt Crisis. **The importance of Private Sector Growth**

Markets & Investing

Final battle for the euro will be fought on Italy's shores

Edward Altman

Our overall credit risk metric, while better than two years ago, places Italy among the riskiest private corporate sectors

- **2014-2015** — Conceptualisation of the **role of the credit culture for Italian SMEs & the Minibond Market.** Announcement of the launch of the venture for the creation of the model (June 2014)

Classis Approach for the Italian Minibond Market

Role of a Credit Culture in the **Italian Minibond market**

- Greater understanding between borrowers and investors
- Create a Shadow Rating Model

- **2015-Jan 2016** — Development of the Classis PMI Z_I-Score

The importance of SMEs

- SMEs comprise a major share of economic activity in advanced economies. They account for **over 95% of enterprises, 60% of employment and over 50% of value added in the Private sector**. In the EU, SMEs have created 85% of net new jobs from 2002/2010.

- After the last financial crisis, being heavily reliant on traditional bank lending, the majority of SMEs were faced with significant financing constraints in a deleveraging environment and with restricted credit availability from banks. Despite recent central banks' supportive stimulus, **capital market bond financing is increasingly attractive.**

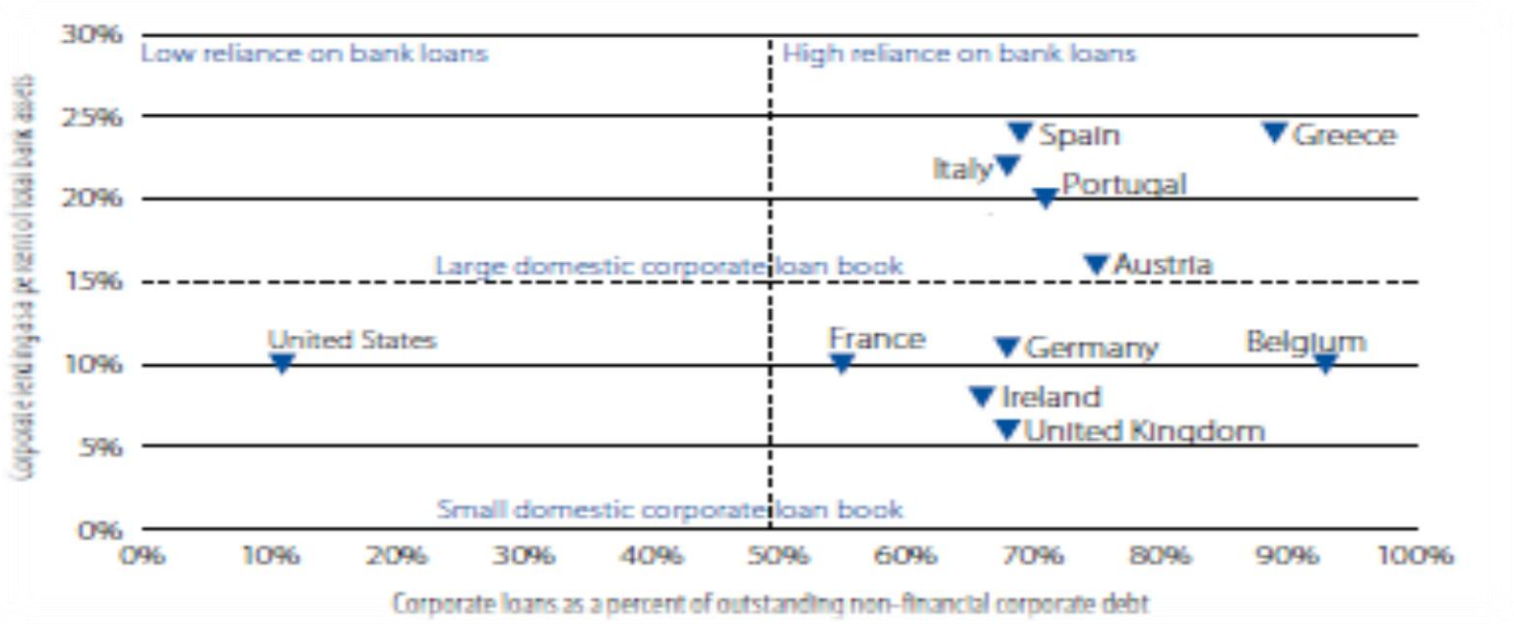
- Non-bank market-based financing increasingly appeared as an option to improve the flow of credit to SMEs, while enhancing diversity and widening participation in the financial system.

- Since 2012, new channels have become increasingly important for SMEs to satisfy their funding needs. Examples of these new sources of funding are crowdfunding, P2P lending, equity participation, securitizations, and Mini-bonds. However, in Europe SME financing is still heavily reliant on bank lending.

After the last financial crisis, SMEs have been forced to consider new channels to finance their growth due to the sharp decrease in bank lending.

SMEs Reliance on Bank Financing

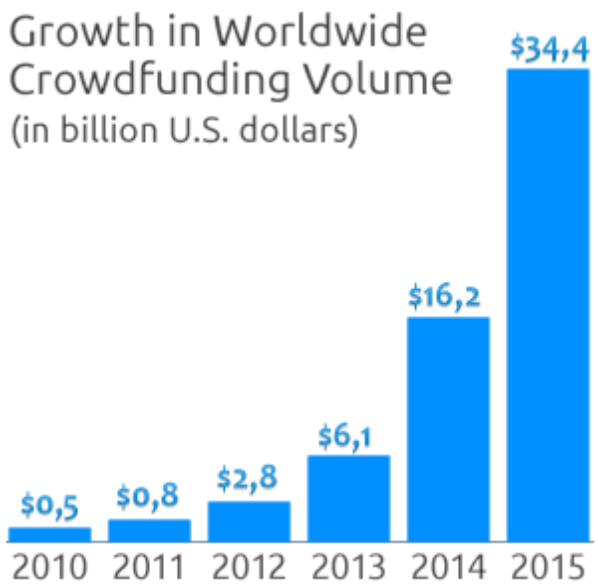
Reliance on bank financing by SMEs (in%)



Source: IMF (2012), based on data from the ECB, Eurostat, Federal Reserve and Haver Analytics.

After the last financial crisis, reliance on bank financing by SMEs has started to decrease. However, European SMEs are still lagging behind US ones that are significantly less dependent on bank lending

New Funding Opportunities: CROWDFUNDING

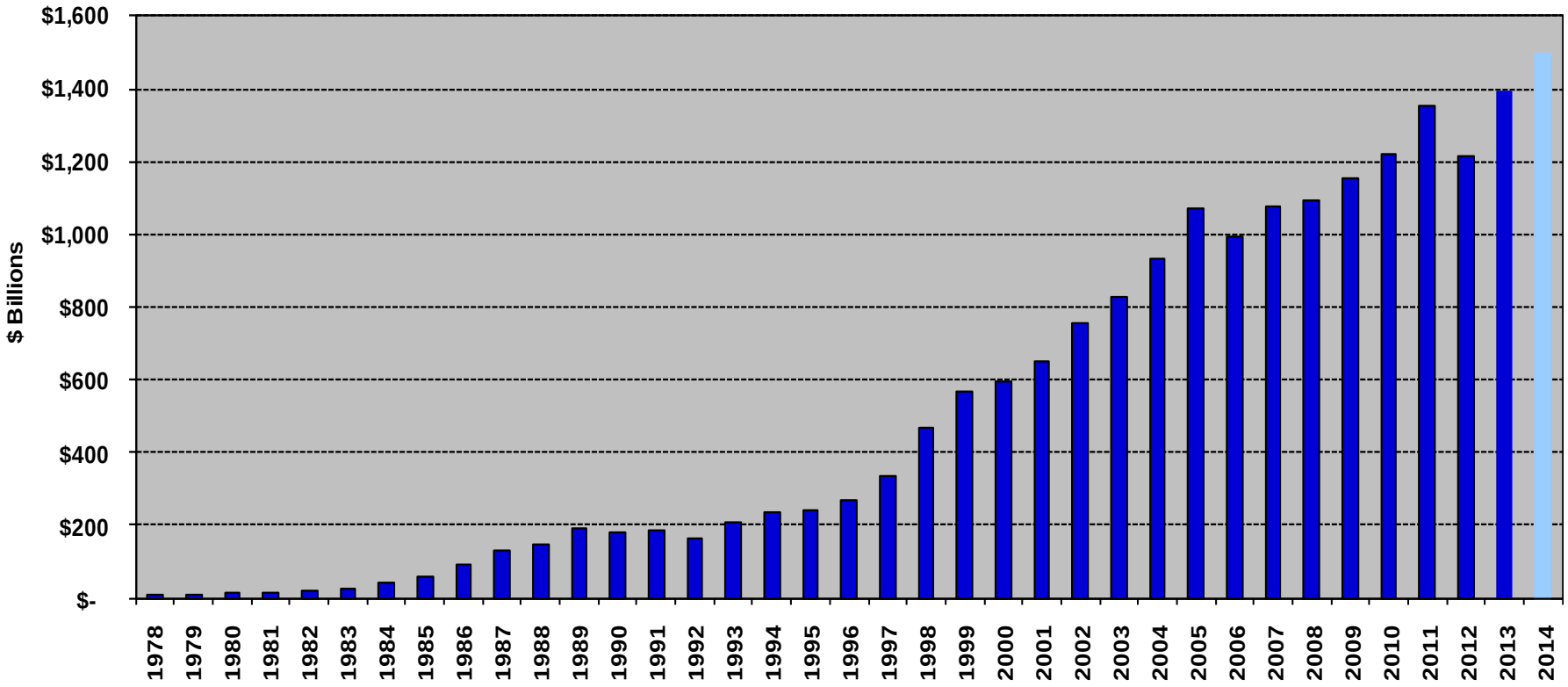


Source: BBVA Research

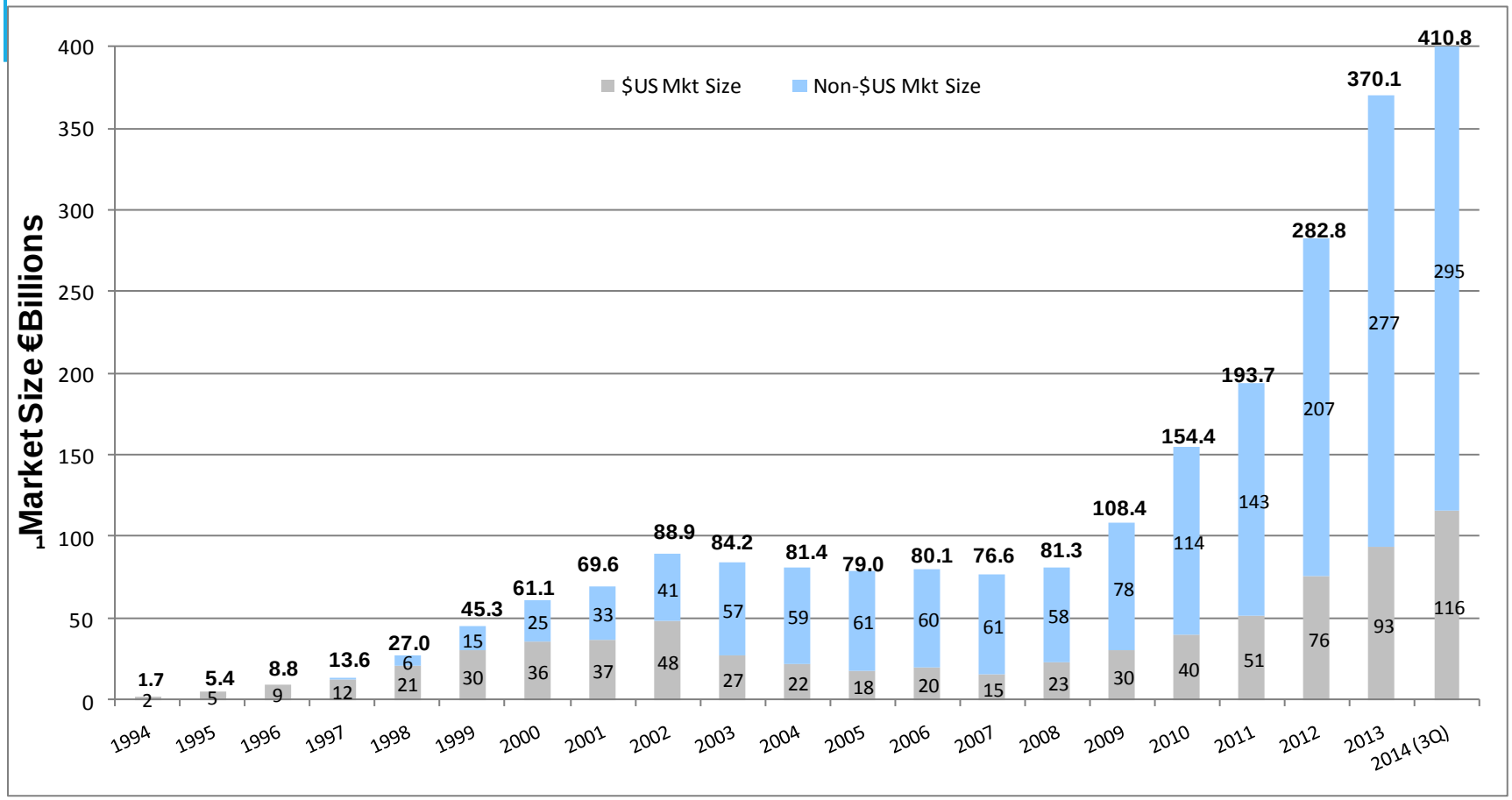
Crowdfunding has emerged as one of the strongest channels for SME financing across Europe, but has achieved limited success in Italy so far.

Size of the US High-Yield Bond Market

1978 – 2014 *(Mid-year US$ billions)*



Size of Western European HY Market (€ Billions)

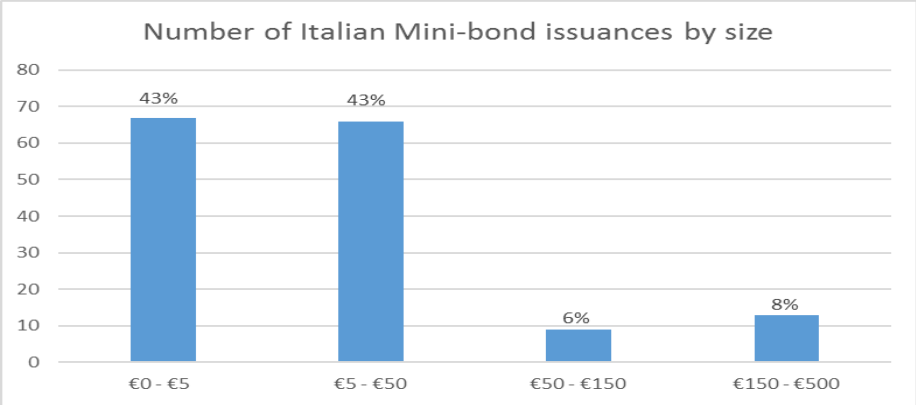


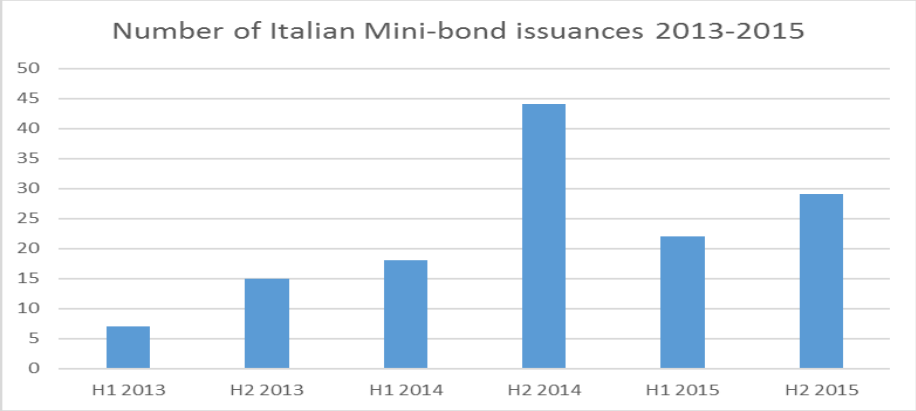
Includes non-investment grade straight corporate debt of issuers with assets located in or revenues derived from Western Europe, or the bond is denominated in a Western European currency. Floating-rate and convertible bonds and preferred stock are not included.

Source: Credit Suisse

The Italian Mini-bond Market

- Europe High-yield bond market is still lagging behind the US one, but the growth has accelerated in the last 3 years.
- In Italy, the market for SME bonds is known as ExtraMOT PRO "Mini-bond" market.
- The new segment of the Extra-MOT market dedicated to listing of bonds, commercial paper, and project finance bonds started in February 2013.
- The total amount of listed issuances since February 2013 is 160, for a total issued amount of about Euro 6,146bn. As of March 2016, there is Euro 4.491bn outstanding, from 130 issues.
- **In Q1 2016, 17 new issues have been launched.**





We believe "Mini-bonds" can be a success in Italy as long as the market supplies an attractive risk/return tradeoff to investors as well as affordable and flexible financing for borrowers.

What are the constraints to the success of the Italian ExtraMOT PRO Mini-bond market?

- All bonds face three main risks (Market, Liquidity and Credit), but it is **credit risk that is perhaps most critical** for relatively unknown, smaller enterprises.
- The information asymmetries generated by the uncertainty around the riskiness of SMEs are holding back investors concerned about the real quality of the underlying assets.
- On the other side, SMEs are discouraged from going directly to the market by the often inefficient pricing and the complexity of the bond issuing process.
- Similar concerns apply to all new sources of direct funding for SMEs.
- Since the ExtraMOT PRO market is still quite young, there are not as yet aggregate default and recovery statistics. **We prefer,** therefore**, to concentrate on issuer default & return analytics based on Italian SME experience.**

Classis PMI Z_I-Score model will help Italian SMEs to grow and succeed by assessing their risk profile and suggesting what would be the best funding option for them

Classis PMI Z_I-Score model will help portfolio managers to assess the risk-return trade offs in investing in either individual or portfolios of Italian SME mini-bonds

Classis PMI Z_I-Score: Summary of Results

- We segmented the Italian SMEs by industrial sectors and developed four default prediction models for Manufacturing, Services, Retail and Real Estate firms.

- Models have been developed on a representative sample of more the 14.500 SMEs located in the north of Italy and then certified for their relevance at national level.

- Prediction power of the models, measured both in terms of Type I and II errors and accuracy ratios, varies by sector, but it is significantly high due to the innovative variables and the techniques applied.

- In addition to the score, firms/analysts/investors will also receive an estimated **Bond Rating Equivalent** and **Probability of Default** that will allow them to compare the credit worthiness of SMEs to the rest of the market.

- The **Classis PMI Z_I-Score** is a powerful tool that will improve the matching of demand and supply on the capital markets between SMEs looking for funding options and investors seeking investment opportunities.

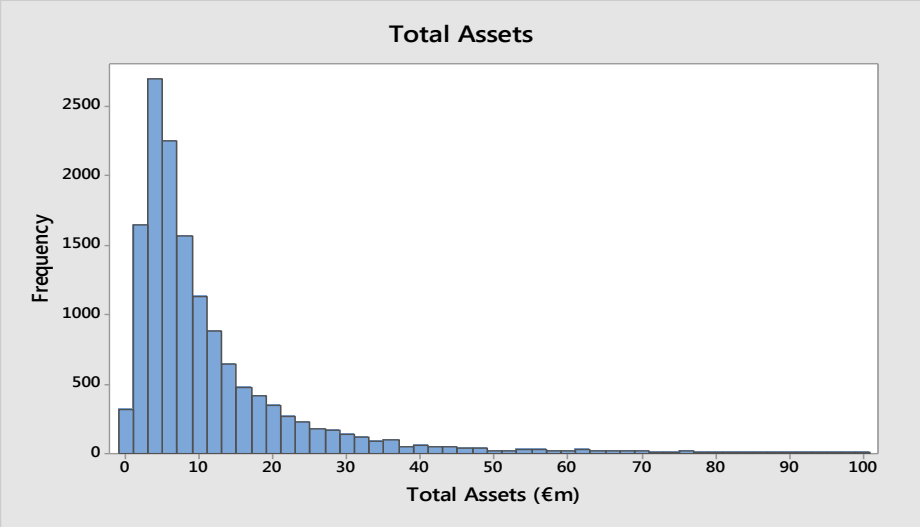
The Dataset

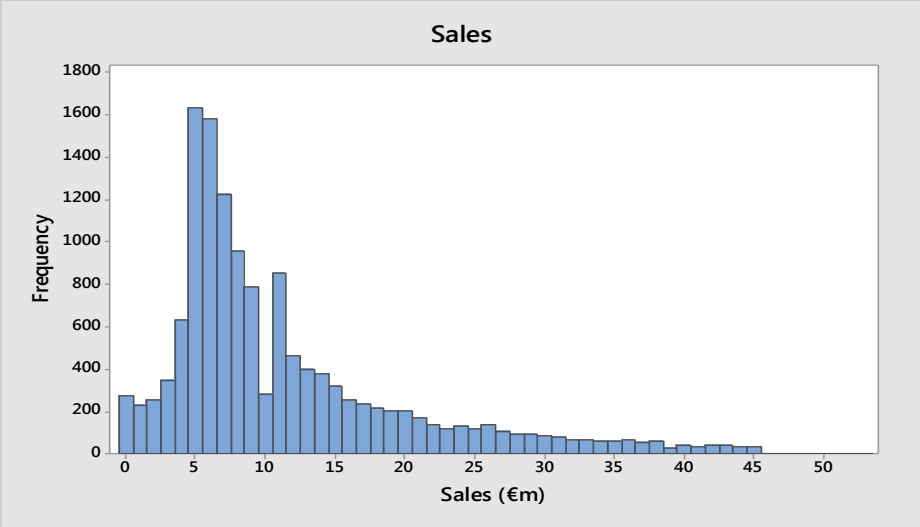
- Initially, financial data of 15,362 active and 1,000 non-active companies were extracted from AIDA (BvD) covering the years 2004 to 2014 (1).
- Few companies (1,852) had to be dropped due to missing financial information.
- The shape and size of the final development sample is reported below

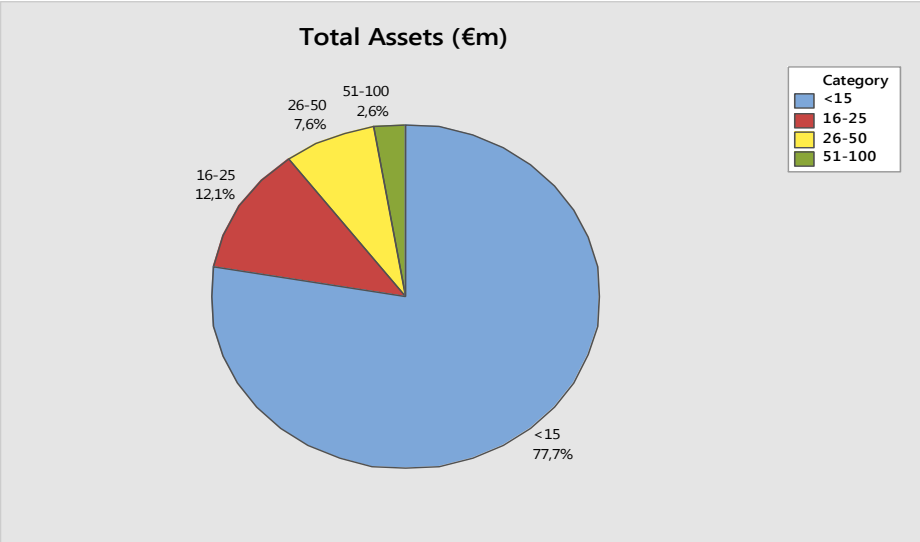
	Number	Percentage
Non-defaulted firms	13,990	96.4%
Defaulted firms	520	3.6%
Total	14,510	100%

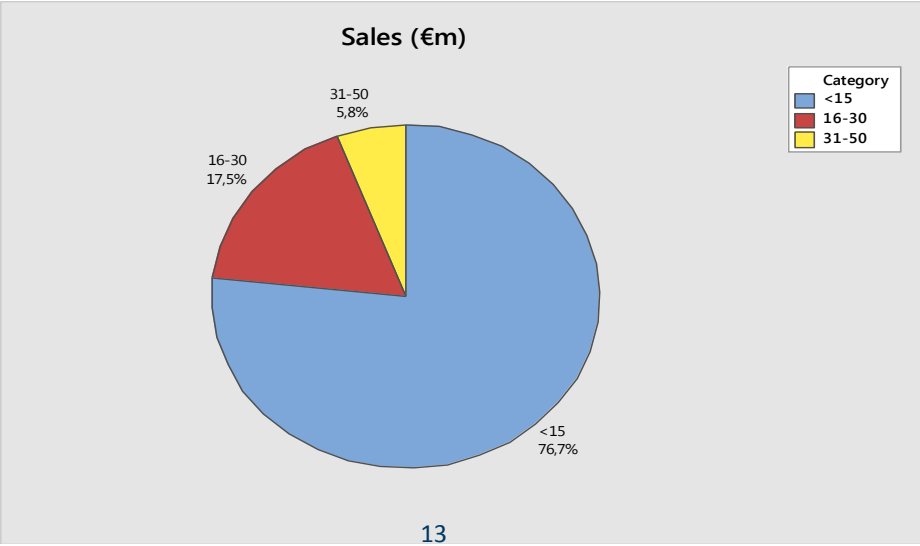
(1): We thank ASSOLOMBARDA for supporting this research by providing Italian SMEs data

Italian SMEs Profile

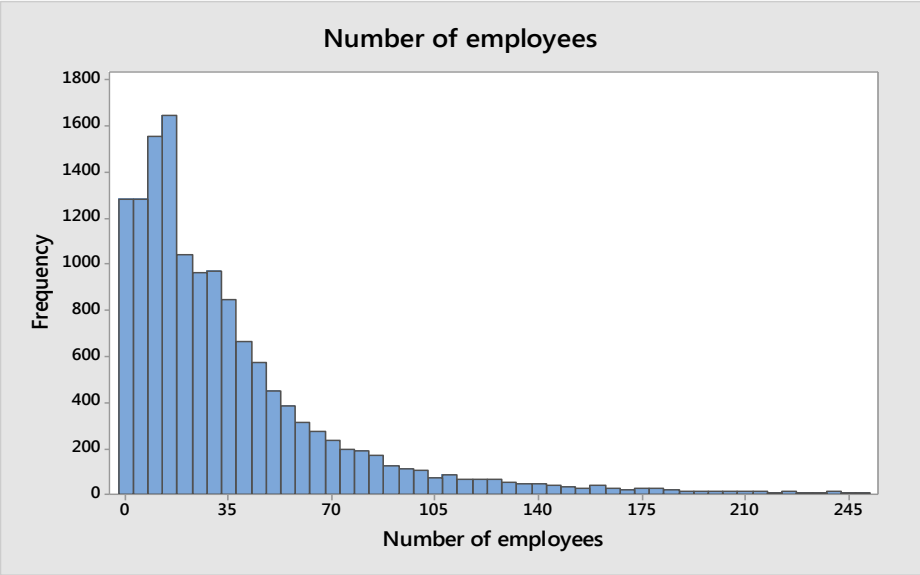


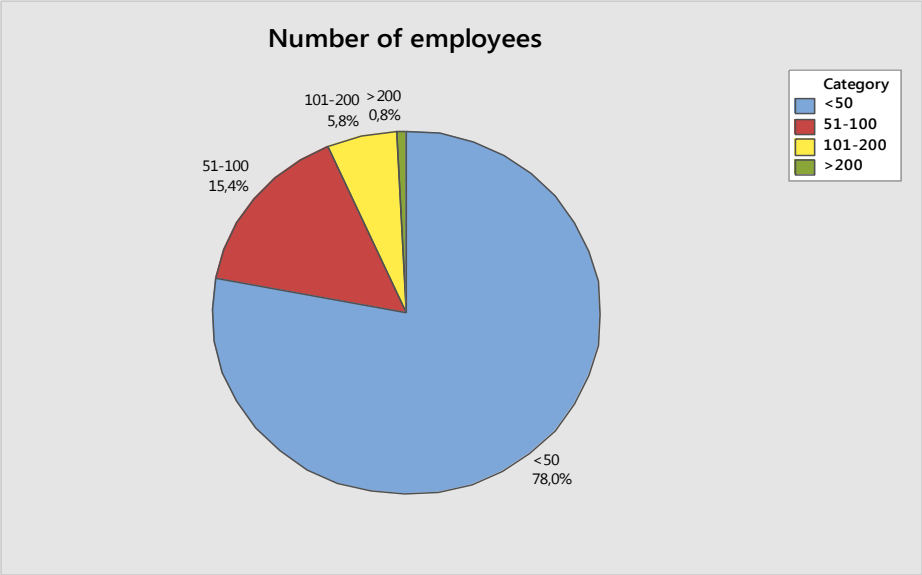




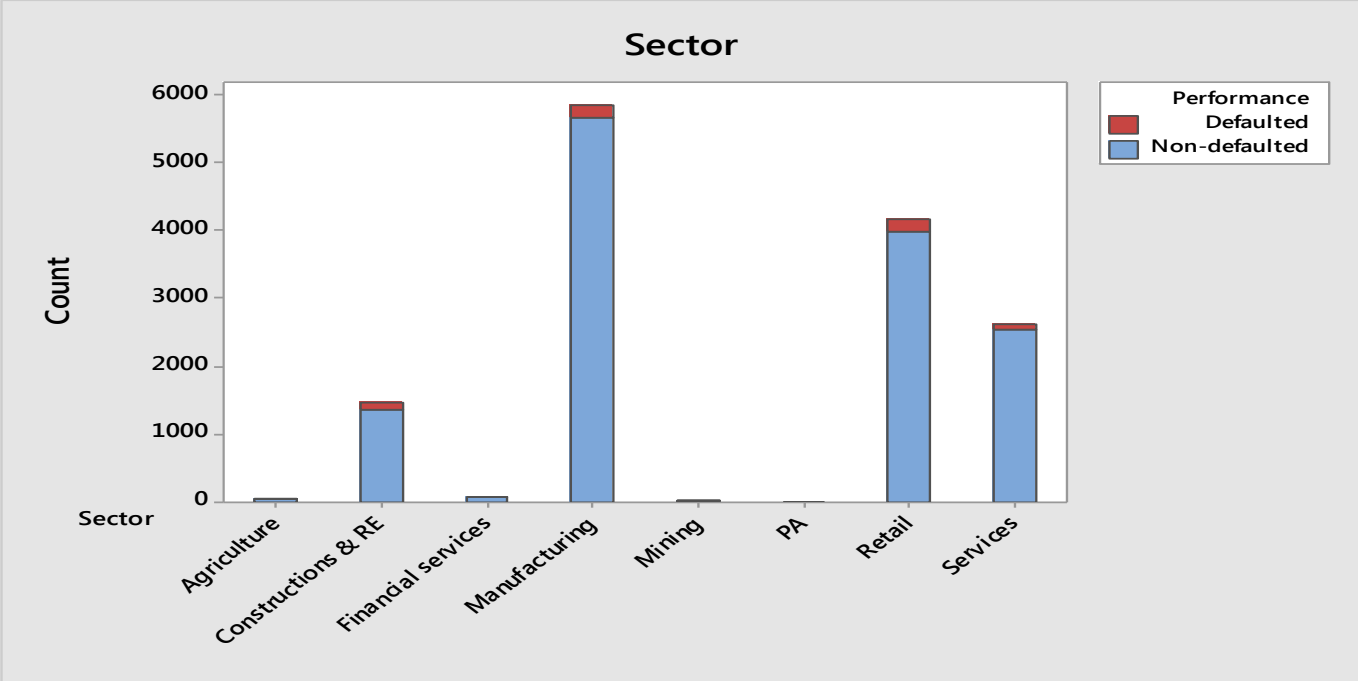


Italian SMEs Profile





Sector Analysis



		Sector								
		Agriculture	Construction & RE	Financial services	Manufacturing	Mining	PA	Retail	Services	Total
Performance	Non-defaulted	47	1482	96	5697	31	2	4007	2628	13990
	Defaulted	0	107	5	161	0	0	168	79	520
		47	1589	101	5858	31	2	4175	2707	14510

Variables Selection

Accounting Ratio Category	Selected Variables
Leverage	Short Term Debt/Equity (Book Value) Equity (Book Value)/Total Assets Current ratio Quick ratio Short Term Debt/Total debt Short term debt/Total Assets Debt/EBITDA Net Debt/EBITDA Change Short term debt in Last 2Y Total debt/Total Assets
Liquidity	Cash/Total Assets Working Capital/Total Assets Tangible/Total assets Intangible/Total Assets
Profitability	Ebitda/Total Assets Net Income/Total Assets Return on Equity Retained Earnings/Total Assets Net Income/Sales
Coverage	Ebitda/Interest Expenses Ebit/Total assets
Activity	Sales/Total Assets Account Payable/Sales Account Receivable/Liabilities

- Consistent with a large number of studies, we choose five accounting ratio categories describing the main aspects of a company's financial profile: liquidity, profitability, leverage, coverage and activity.
- For each one of these categories, we create a number of financial ratios identified in the literature as being most successful in predicting firms' bankruptcy and transform them in highly predictive variables
- Next, we apply a statistical forward stepwise selection procedure to the selected variables and estimate the full model for each of the four sectors eliminating the least helpful covariates, one by one, until all the remaining input variables are efficient, i.e. their significance level is above the chosen critical level.

The Results

	Type I error rate	Type II error rate	1- Average Error Rate	Accuracy ratio
Manufacturing Model	6.92% (8.23%)	26.57% (27.64%)	83.26% (82.07%)	93.08% (92.21%)
Retail Model	16.77% (18.54%)	27.78% (28.89%)	77.73% (76.29%)	83.23% (81.76%)
Services Model	12.05% (14.88%)	24.54% (26.43%)	81.70% (79.35%)	87.94% (84.12%)
Constructions and Real Estate	8.89% (10.12%)	26.02% (28.24%)	82.55% (80.82%)	91.11% (89.86%)

The Bond Rating Equivalent

In order to provide additional measures of credit worthiness, we introduce the concept of Bond Rating Equivalents (BRE) and Probabilities of Default (PD). Our benchmarks for determining these two critical variables are comparisons to the financial profiles of thousands of companies rated by one of the major international rating agencies (Standard & Poor's) and the incidence of default given a certain bond rating when the bond was first issued. The latter is based on updated data from E. Altman's Mortality Rate Approach (Altman, Journal of Finance, 1989). The actual process is a three-step approach:

1. Build a credible and accurate credit scoring model.
2. Assign BREs to each firm based on its proximity to the Average Scores of the relevant bond ratings of constituent firms, as assigned by S&P (for each of the four sector models).
3. For mini-bonds issued in the last two years, utilize the most recent updated marginal and cumulative Mortality Rate Matrix of actual Default Frequencies given the history of new issue defaults by original bond rating over the extended period 1971-2015. For more seasoned issues, use the standard cumulative default rate matrices from the rating agencies.

BRE	One-Year	Three-Year
AA	0.01%	0.14%
A	0.10%	0.17%
BBB	0.34%	3.96%
BB	0.95%	6.75%
B	2.86%	17.42%
CCC	8.15%	34.0%
CC	20.0%	50.0%
C	50.0%	70.0%

Source: Altman & Kuehne, NYU Salomon Centre, 2016

Mortality Rates by Original Rating

All Rated Corporate Bonds*

1971 -2015

Years after Issuance

		1	2	3	4	5	6	7	8	9	10
AAA	Marginal	0.00%	0.00%	0.00%	0.00%	0.01%	0.02%	0.01%	0.00%	0.00%	0.00%
	Cumulative	0.00%	0.00%	0.00%	0.00%	0.01%	0.03%	0.04%	0.04%	0.04%	0.04%
AA	Marginal	0.00%	0.00%	0.21%	0.07%	0.02%	0.01%	0.01%	0.01%	0.02%	0.01%
	Cumulative	0.00%	0.00%	0.21%	0.28%	0.30%	0.31%	0.32%	0.33%	0.35%	0.36%
A	Marginal	0.01%	0.03%	0.12%	0.13%	0.10%	0.06%	0.02%	0.25%	0.08%	0.05%
	Cumulative	0.01%	0.04%	0.16%	0.29%	0.39%	0.45%	0.47%	0.72%	0.80%	0.85%
BBB	Marginal	0.33%	2.36%	1.26%	1.00%	0.50%	0.22%	0.26%	0.15%	0.15%	0.34%
	Cumulative	0.33%	2.68%	3.91%	4.87%	5.34%	5.55%	5.80%	5.94%	6.08%	6.40%
BB	Marginal	0.94%	2.02%	3.88%	1.97%	2.34%	1.51%	1.45%	1.12%	1.43%	3.13%
	Cumulative	0.94%	2.94%	6.71%	8.54%	10.68%	12.03%	13.31%	14.28%	15.51%	18.15%
B	Marginal	2.85%	7.72%	7.85%	7.80%	5.70%	4.48%	3.58%	2.08%	1.76%	0.77%
	Cumulative	2.85%	10.35%	17.39%	23.83%	28.17%	31.39%	33.85%	35.22%	36.36%	36.85%
CCC	Marginal	8.13%	12.43%	17.89%	16.32%	4.85%	11.65%	5.44%	4.84%	0.66%	4.28%
	Cumulative	8.13%	19.55%	33.94%	44.72%	47.40%	53.53%	56.06%	58.19%	58.46%	60.24%

***Rated by S&P at Issuance**

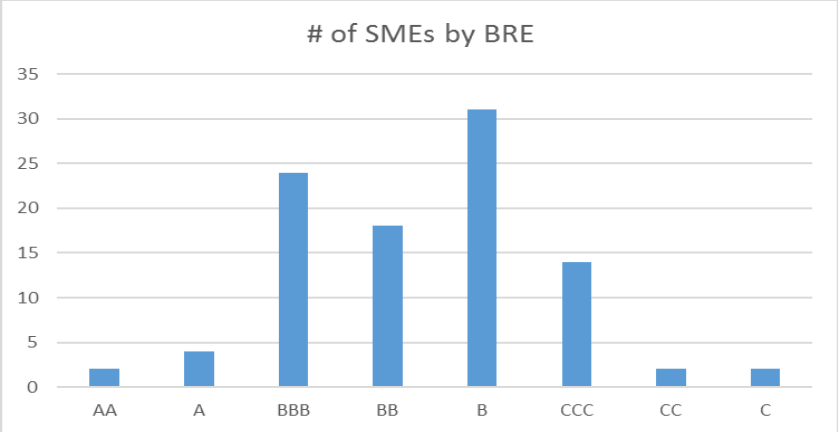
Based on 2,903 defaulted issues

Source: Standard & Poor's (New York) and Author's Compilation

How to use the Classis PMI Z_I-Score?

Bond Rating Equivalent	# SMEs	% SMEs	Avg. Coupon Yield
AA	2	2%	0,057
A	4	4%	0,062
BBB	24	25%	0,065
BB	18	19%	0,055
B	31	32%	0,059
CCC	14	14%	0,065
CC	2	2%	0,030
C	2	2%	0,060

Source: Firms listed on Borsa Italiana, calculations by the authors



Source: Firms listed on Borsa Italiana, calculations by the authors

The Classis PMI Z_I-Score is a powerful tool that provides an assessment of the company's risk profile based on the **last 2 years financial information**.

It can be used to:

- understand the company creditworthiness relative to others in the group.
- risk rank a portfolio of homogenous companies
- calculate their Bond Rating Equivalent and Probability of Default
- define groups of companies that share the same business risk profile and assign them a relative rating
- enhance pricing consistent with the risk profile of the company

Classis PMI Z_I-Score Takeaways

- The Classis PMI Z_I-Score **is not a RATING** –It is not supported by a thorough due diligence on the company, by a strict regulation in terms of transparency, procedures and market communication: but **it is critical in today's regulatory and analytical environment**, providing a **robust, objective,** and **independent indication** of **counterparty credit risk.**

- **Some defaults in the ExtraMOT PRO (Minibond Market) are natural, expected and acceptable in a Portfolio context.**

Helping Italian SMEs to succeed

- We are building a web-based platform to help SME's understanding better their risk profile and selecting the most appropriate source of funding.
- The Classis PMI Z_I-Score will be one of the tools we will use together with other models to assess SME's:
  - Risk profile
  - Debt capacity
  - Cash flow strength
  - Recovery profile
  - Market outlook
- These elements will help to fill the gap between SMEs and several types of lenders by equipping them with the right tools and knowledge to have informed discussions about funding and pricing options.
- We plan to deploy this platform in several countries across Europe, **but Italy will be our first application.**

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Classis (classem, classì, classis) is the Latin noun for Fleet.

The Classis is known as the naval fleet of the navy of ancient Rome. Its purpose was to control waters around the Roman provinces. Its job consisted mainly of providing logistics of personnel and support, while keeping communication routes open.

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