Distance to Default as a Measure of Default Risk

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1. Abstract & Objective

Moody's KMV model has been historically the most widely used method to estimate how distant any given company is from its **default (point)**.

I analyzed the determination of **distances-to-default (DTD)** when we only have access to information from equity capital markets and verified if there are better methods than KMV's to estimate DTD by comparing the estimations performed in this project with **Credit Default Swaps** (CDSs).

The main goal is to compare the Nominal Debt Approach against the Moody's KMV in order to verify which of the two methods better explains the market's reality.

2. Hypothesis

"The **Nominal Debt** Approach should give us **more accurate** estimates than the **Moody's KMV** Approach to measure the distance to default of a given company".

3. Methodology

· Moody's KMV

$$DTD\ (KMV)_t = \frac{(V_t - DP_t)}{(V_t \cdot \sigma_{annual})}$$

· Nominal Debt

$$DTD\ (P)_t = \frac{(V_t - P_t)}{(V_t \cdot \sigma_{annual})}$$

(V) stands for Market Value and (σ) represents the annualized returns of company's assets.

The only difference between the two methods is the way in which the Default Point is compounded.

In the KMV's method, the default point (DP) is obtained by adding **one-half of the long-term liabilities** plus short-term liabilities.

While on the other hand, the default point (P) is exactly **the sum of the total liabilities** of the company.

In order to compare which of the two provides better estimations I had to do two types of regressions (Cross-sectional and Time-series).

Since **CDS**s are considered a good predictor of the possible event of default, they were used as dependent variables for both kinds of regressions.

By comparing the coefficients of determination obtained, we would get enough evidence to choose which of the two methods is more convenient.

Table 4.5. KMV vs. P correlations against CDSs

	CORRELATION		CORRELATION
DTDKMV08	-0,515	**DTDP08**	-0,724
DTDKMV09	-0,507	**DTDP09**	-0,714
DTDKMV10	-0,130	**DTDP10**	-0,518
DTDKMV11	0,096	**DTDP11**	-0,570
DTDKMV12	0,162	**DTDP12**	-0,647
DTDKMV13	0,250	**DTDP13**	-0,664

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4. Data Selection & Relevant Statistics

The chosen subject of study is the combination of **42 representative companies** included in the **EURO STOXX 50 Index** (banks excluded due to high leverage ratios).

Table 4.3. DTD mean comparison (P vs. KMV) and leverage mean by supersector

SECTOR	MEAN DTD P	MEAN DTD KMV	MEAN LEVERAGE
Chemicals	3,280	3,614	0,402
Industrial Goods & Services	2,778	3,042	0,599
Insurance	2,178	2,994	0,935
Technology	2,808	2,828	0,271
Automobiles & Parts	1,082	2,178	0,762
Retail	2,843	3,109	0,376
Telecommunications	2,199	3,675	0,598
Oil & Gas	2,740	3,200	0,503
Utilities	1,717	2,827	0,702
Personal & Household Goods	3,609	3,820	0,333
Construction & Materials	1,780	2,691	0,655
Healthcare	3,975	4,001	0,238
Real Estate	2,344	3,463	0,505
Media	2,769	3,378	0,553
Food & Beverages	2,922	3,642	0,447

5. Results

For the timeline chosen (01/01/2008 - 31/12/2013), at any level of the regressions the results show that the **R-squared values from the Nominal Debt regressions are higher than the ones performed under the KMV's approach** for both types of regressions.

Table 5.1. R-squared results (Cross-sectional regressions)

2008	2008	2009	2010	2011	2012	2013
P	0,523	0,510	0,268	0,324	0,419	0,440
KMV	0,265	0,257	0,016	0,00	0,026	0,062

Table 5.7. Time-series regressions #3

	α	β	γ	δ	Adjusted R-squared	Durbin-Watson
P	0	-65,81	-24,79	0,16	0,386	2,03
KMV	0	-75,21	-28,42	0,16	0,385	2,03

6. Conclusions

· The alternative approach gave consistently better results than the most widespread method used in the risk management industry for estimating DTD.

· The Automotive industry showed a high tendency of being close to its DTD while the Healthcare sector showed to be the one farthest from its default point.

· According to the results, CDSs and DTD seem to be negatively correlated as logically we would expect.