Loblaw Companies Ltd. [LCL]

Credit Risk Analysis

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Assumptions

1. The recovery rate is calculated using the following equation

$$\hat{R} = \frac{\bar{V} - \bar{K}}{\bar{K}} = \frac{36.28B - 24.77B}{24.77B} \approx 46\%$$

   where $\bar{V}$ is the average of historical assets, and $\bar{K}$ is the average historical liabilities. The estimate is assumed to be unbiased. Data is retrieved from YCharts. `https://ycharts.com/companies/L.TO`

2. There are only two Markov states: default or solvency.

3. Assume the credit spread is constant over time.

LCL Bonds

The Loblaw bonds used to calculate the credit spread are as follows:

ISIN	Maturity Date
CA53947ZAC10	11/8/2027
CA53947ZAU18	6/9/2034
CA53947ZAF41	1/22/2029
CA53947ZAY30	1/18/2036
CA53947ZAT45	2/17/2033
CA53947ZAS61	3/1/2032

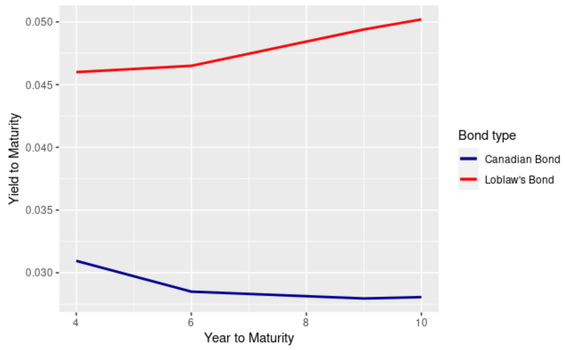

Fig. 1: Credit Spread

The average credit spread is $\hat{h} = 1.92\%$ pdf/yr. DBRS assigned a rating of BBB to Loblaw's bonds, and BBB-rating bonds have a credit spread about 2%. Thus it is reasonable to believe that 1.92% is a proper estimate.

Credit Metrics Model and Merton Model

1. Credit Metrics:
   Suppose the probability of default at year 1 is p. Since we have assumed constant credit spread and binary Markov states previously, we can implement the formula

$$\text{P(solvency)} = 1 - p = \frac{e^{-h} - R}{1 - R}$$

$$\implies \text{P(default)} = 1 - \text{P(solvency)} = 1 - \frac{e^{-h} - R}{1 - R}$$

   where $\hat{R}$, the estimate of the recovery rate R, and $\hat{h}$, the estimate of the credit spread are calculated previously. At year n, the probability of solvency is

$$\text{P(solvency at year } n) = (1-p)^n$$

$$\implies \text{P(default at year } n) = 1 - (1-p)^n$$

   The curve of default probability is plotted in the graph below (blue line).

2. Merton Model:
   Let K be the liability, V be the value, σ be the volatility of assets. The Black-Sholes tells that for a time interval τ, the probability of default is $N(-d_2)$, where

$$d_2 = d_1 - \sigma\sqrt{\tau} = \frac{-ln(Ke^{-r\tau}/V)}{\sigma\sqrt{\tau}} + \frac{\sigma\sqrt{\tau}}{2} - \sigma\sqrt{\tau} = \frac{-ln(Ke^{-r\tau}/V)}{\sigma\sqrt{\tau}} - \frac{\sigma\sqrt{\tau}}{2}$$

   The liability, value, and assets volatility are estimated in LCL stocks part.

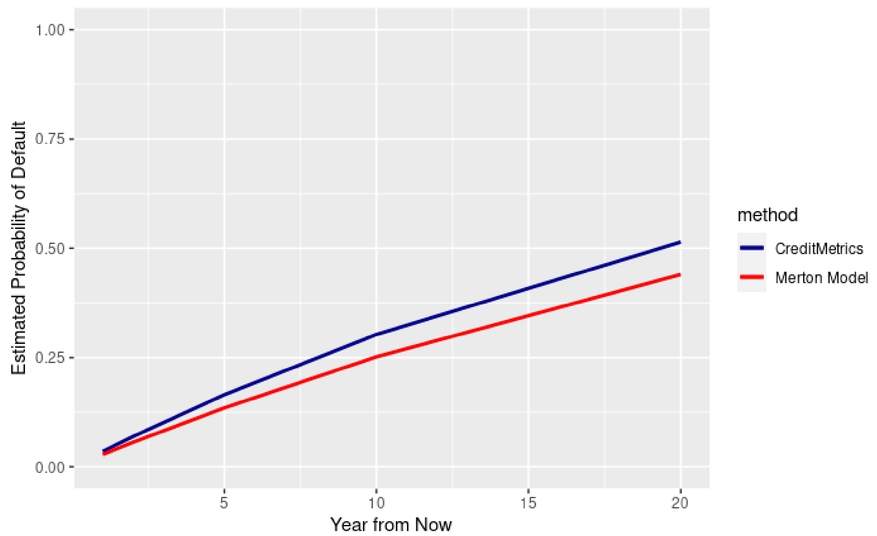

Fig. 2: Default Probability Over Time

LCL Stocks

Asset volatility is estimated from observed equity volatility.

$$\sigma_V = \sigma_S = \frac{S\partial V}{V\partial S}$$

$\hat{\sigma}_S$	0.102
$\hat{\sigma}_V$	0.145
$\hat{S}$	40.6 B
$\hat{K}$	38.2 B
leverage ratio	0.7515

Stock volatility is estimated from historical stock values. Relative data were retrieved from Yahoo Finance and YCharts. `https://ca.finance.yahoo.com/quote/L.TO/history/?guccounter=1` `https://ycharts.com/companies/L.TO/debt_equity_ratio`

Remarks

1. The credit spread estimate may not be as precise as expected, since the number of Loblaw bonds are very limited, unlike the Canadian bonds.

2. The asset values in December each year are chosen as historical data, and implemented into the calculation. This may cause some fluctuations.