A new approach for estimating the equity premium based on credit valuations

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CRÉDIT AGRICOLE ASSET MANAGEMENT

Introduction

- Main objectives
  - Use the Merton model to estimate the market Sharpe ratio
  - Infer this Sharpe ratio from market variables only
    - **Credit derivatives (CDS) spreads**
    - **Correlation between asset value and market portfolio**

- Main interests in this paper
  - Original methodology with strong advantage : no need to calibrate unknown variables
    - **dividends or earnings growth as in dividend discount models**
    - **asset values or default barriers as in structural model**
  - Infer a Sharpe ratio based on actual valuations in the CDS market (at current business conditions)
    - **Avoids the « equity premium puzzle » of historical estimations**
  - Very complete empirical tests of methodology's robustness
  - Many practical applications possible… to be tested !

Methodology

- **Merton (1974) model**
  - **Company’s debt is a zero bond**
  - **Default if the asset value of the company falls below the nominal value of the zero bond at the maturity**
  - **Strong hypothesis : default only possible at the maturity of the bond**
  - **Merton’s formula can be reversed, Market Sharpe Ratio function of :**
    - **the actual and risk neutral default probabilities of the company**
    - **the maturity of the bond**
    - **the correlation between the assets value and market portfolio**
  - **Need to approximate the correlation asset /market returns by the correlation equity /market return**
    - **negligible error as in the Merton framework, equity value is a deep in the money call option on the asset**

Methodology

- Limitations of the Merton (1974) model
  - Default only at maturity
  - Complete information

- Expansion to 2 types of models relaxing these strong hypotheses
  - the simple first passage time model
    - **default occurs as soon as the asset value falls below a certain barrier (observable or not)**
    - **asset value observable**
    - **adjustment factor for the Merton model determined numerically**
    - **close to 1 for IG, and if the asset volatility is higher than 10%**
    - **note that asset volatility < 10% observed only for financial companies**

  - the Duffie – Lando (2001) model
    - **unobservable barrier and unobservable asset process**
    - **model compatible with reduced form pricing models as we can derive a default intensity function**
    - **Confirms the Merton model for all IG companies**

Methodology

- Data used
  - 125 firms in the CDX index 5Y
    - **included in NYSE or Nasdaq listing**
  - CDS spreads to derive risk neutral default proba
  - 2 proxies for actual defaults
    - **Expected default proba from Moodys KMV**
    - **Actual Moodys ratings**
  - S&P500 = approximation of market portfolio
  - 2003-2007 sample period

Results

- Estimated average Sharpe Ratio (2003-2007)
  - Market SR= 0.4 – 0.39 (EDF or Moodys default proba)
  - Company SR= 0.2 - 0.19
  - Robustness to model changes
  - Important fluctuations through time
  - Differences accross sectors : between 0.3 and 0.45
  - Outlier : consumer stable due to low correlation with market

- Estimation globally in line with traditional measures
  - In line with lower band historical estimations
    - **SR =0.4-0.5 with equity premium of 7-9% (average 50Y), probably overestimated**
  - Slightly higher than « fair » estimations
    - **SR =0.15-0.3 with equity premium around 3-5%**
  - Control of 2 sources of biais :
    - **SR underestimation due to the fact that credit spreads do not reflect only credit risk but also liquidity, transaction costs, etc.**
    - **Difficult to estimate the portion of spread due to credit risk only**
    - **SR overestimation due to tax effect ? With tax adjustment : market SR = 0.32**

Questions

- Methodology based on time-varying financial variables only
  - A strong advantage for estimation
  - Can be a drawback if credit valuations do not reflect financial conditions
    - during 2004-2007 long period of very (abnormally?) low spreads (sample period ends before Subprime crisis)
    - Problem for future estimations : abnormally high level of credit spreads during Subprime crisis

- The question of empirical validity of the CAPM model
  - Used to measure the link between market and company returns
  - Strong assumption : expected returns of all assets are linearly related to their betas
    - Excess return company = beta * Excess return market
  - Other variables can have explanatory power
  - Could we have a less restrictive / more realistic assumption ?

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Questions

- How to deal with the credit spreads « puzzle » ?
  - Use only the part of the spread due to credit risk, excluding other components
    - **Liquidity premium compensating for lower liquidity**
      - Schultz (2001) estimation for US corprate market : 27 bp
      - Driessen (2003) estimation 20% of the spread
      - Perraudin Taylor (2003) even larger estimates
    - **Credit risk premium due volatility of credit spread**
      - Elton et al. (2001) between 19% and 41%
      - Driessen (2003) 18% (AA, 5Y maturity), 52% (BBB, 10Y maturity)
    - **Taxation effects compensating different taxation corporate/gvt bonds**
      - Elton et al. (2001) : 28-73%
      - Driessen (2003) : 34-57%
    - **Component due to credit risk diversification difficulty**
      - Amato Remolona (2003)
  - Litterature explaining the credit spreads components, what about CDS spreads ?

Further investigation

- Daily estimation could be used for tactical equity strategies ?
  - Sharpe ratios are time varying over business cycle
  - Here only use of historical average
  - Advantage of this methodology : we can capture their time variation and estimate daily Sharpe ratios based on CDS valuations
  - CDS spreads show predictive power on credit spreads (De Wit (2006), Blanco et al. (2005), Norden and Weber (2004))
  - We could test predictive power on equities
  - Test of strategies on sectors / single names