Finance and Economics: The KMV experience

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60 years of modern finance

Milestone achievements:

- Variance as a quantitative definition of risk
- Portfolio optimization and efficient frontier
- Diversification and index portfolios
- Capital asset pricing model
- Derivative asset pricing theory (options pricing)
- Term structure models
- Martingale probability measure
- Credit valuation models

Wells Fargo Bank in early seventies

- Management Science Department consultants:
  - Fischer Black
  - Myron Scholes
  - William Sharpe
- Annual conferences on modern finance
- Index portfolio battle

KMV Corporation

- A financial technology firm pioneering the use of structural models for credit valuation
- Founded in 1989 in San Francisco by
  - Stephen Kealhofer
  - John McQuown
  - Oldrich Vasicek
- Soon joined by two other partners
- No outside financing

KMV mission

- Develop and implement a model for valuation of debt securities based on modern financial theory of derivative asset pricing
- Validate the model through comprehensive empirical testing
- Extend the model to portfolio level, accounting for asset correlations
- Support and advance the continuing evolution of the debt markets

KMV development

- Grew to a firm with 250 employees
- Over 150 clients worldwide
- 70% of world’s 50 largest banks are clients
- Annual revenue of US $80 million
- Bought by Moody’s Corporation in 2002 for US $210 million
- KMV technology continues to be available through Moody’s Analytics

KMV main products

- Credit Monitor
  - Measures credit risk of publicly traded firms
- Portfolio Manager
  - Characterizes the return and risk of a debt portfolio
  - Determines optimal buy/sell/hold transactions
- Credit Edge
  - Provides EDF Implied Option Adjusted Spread
  - Prices debt securities and derivatives

Traditional approaches to credit valuation

- Traditional approaches, such as agency ratings, involve a detailed examination of:
  – company’s operations
  – projection of cash flows
  – measures of leverage and coverage
  – assessment of the firm’s future earning power

Credit Valuation Model

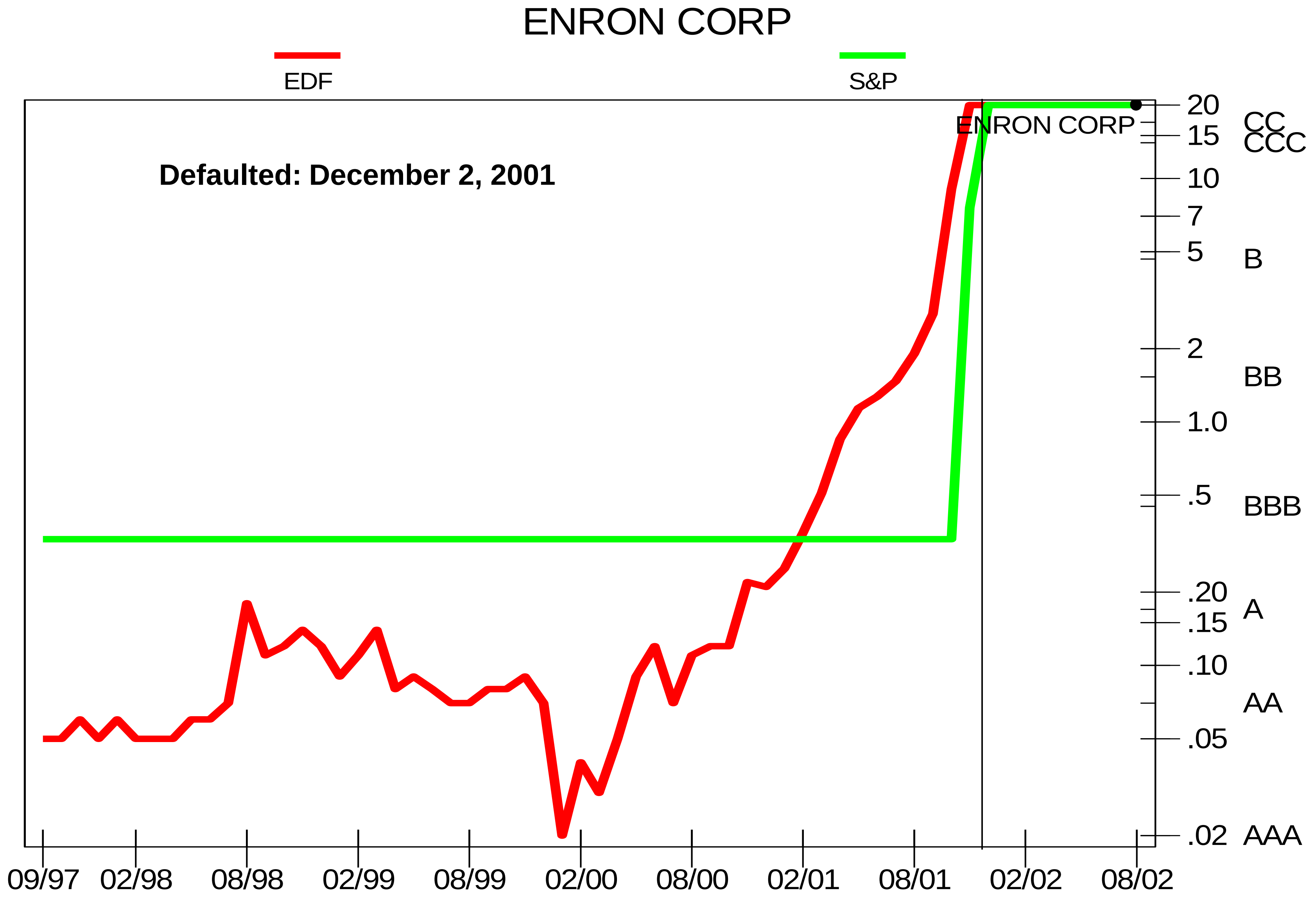
- An assessment of the company’s future has already been made by all market participants and is reflected in the firm’s current market value
- The degree of uncertainty in that valuation is reflected in its volatility
- Credit valuation is based on a causal relationship between the value of the firm and its volatility, and the event of default

Loan default

- A loan defaults if the market value of borrower’s assets is less than the default point
- The default point is the cumulative amount of obligations payable within the given time frame
- The asset value is the worth of the firm’s ongoing business

Determining asset value

- If all liabilities were traded, the market value of assets could be obtained as the sum of the market value of liabilities
- Typically, only the equity has observable price. The firm asset value are inferred from equity value by the *derivative asset pricing theory* of Merton
- For real firms, we need to accommodate:
  - Realistic description of the firm's liabilities
  - Cashflows: Interest payments and dividends
  - Convertibility, callability, etc.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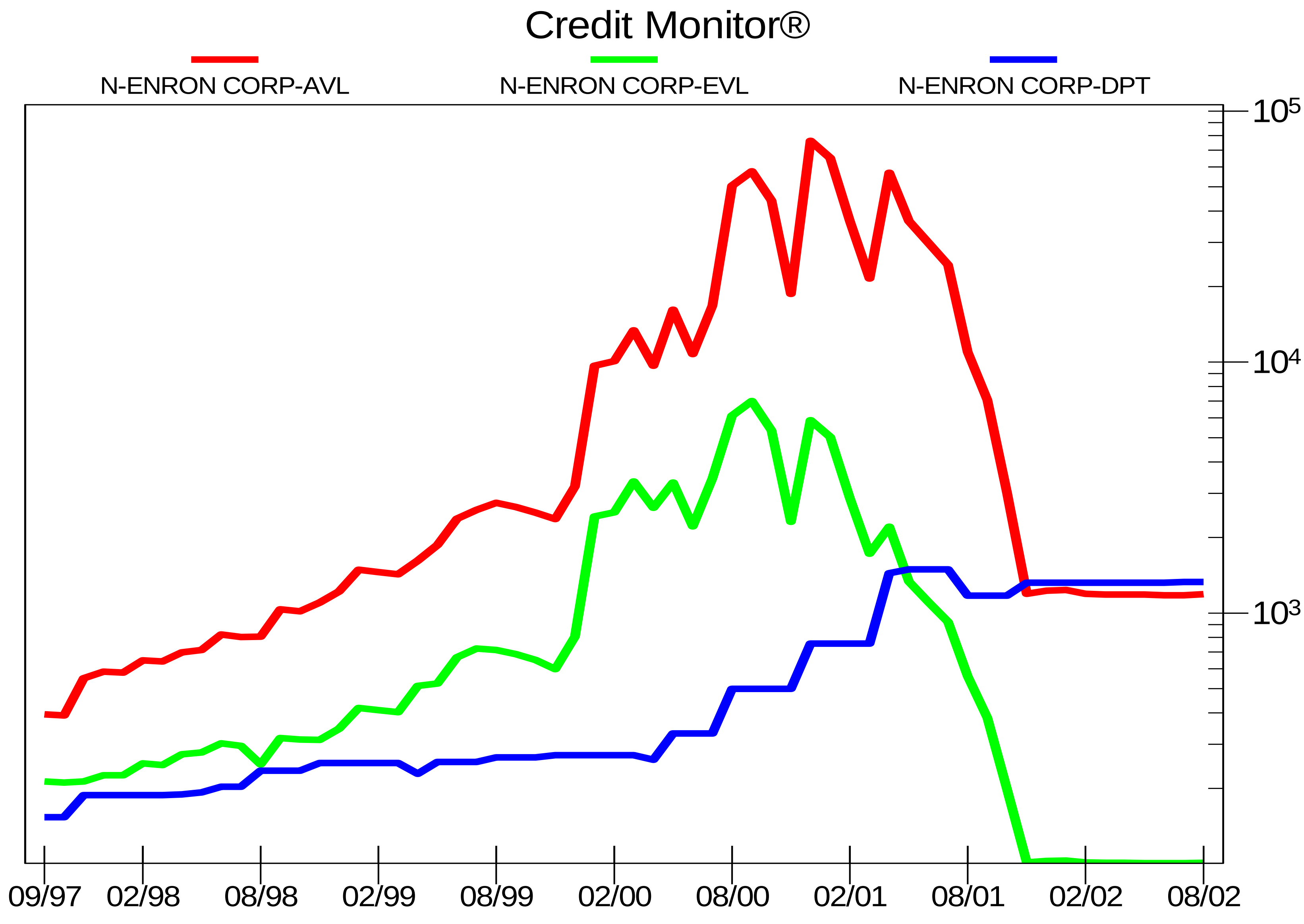

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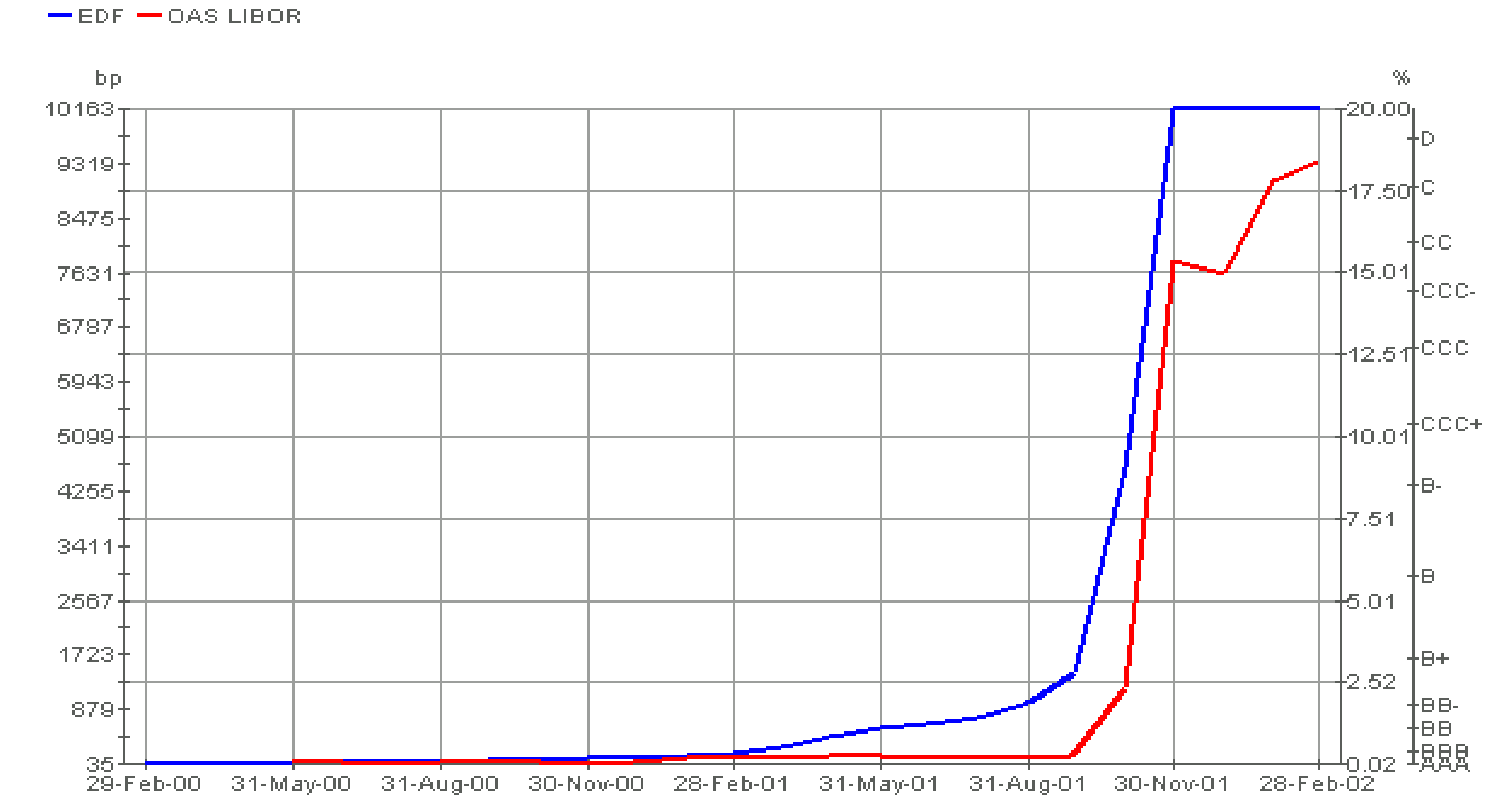

Chart Type: EDF vs. OAS LIBOR

CUSIP	29357WAA5
ISIN	US29357WAA53
Amt Outstanding	175.000
Debt Type	Sr Unsec Nt
Date Issued	23-May-00

Coupon	8.38%
Maturity	23-May-05
Yield to Maturity	95.39%
S & P Rating	BBB+
EDF	20.00% D

OAS LIBOR	9338 bp
OAS Treasury	9193 bp
Price	16.000
Current Yield	52.34%
Last Traded	28-Feb-02

Finance and economics

- Finance is about economics
- Mathematical finance can provide quantitative tools to economists to study the effect of changes in economic conditions on interest rates, credit quality of firms, stability of banks and the financial sector, etc.