

Pricing of Illiquid Debt

CFA Future of Finance

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- ▶ e-Financials
 - Big Picture and Services we provide
 - Application and Models in production

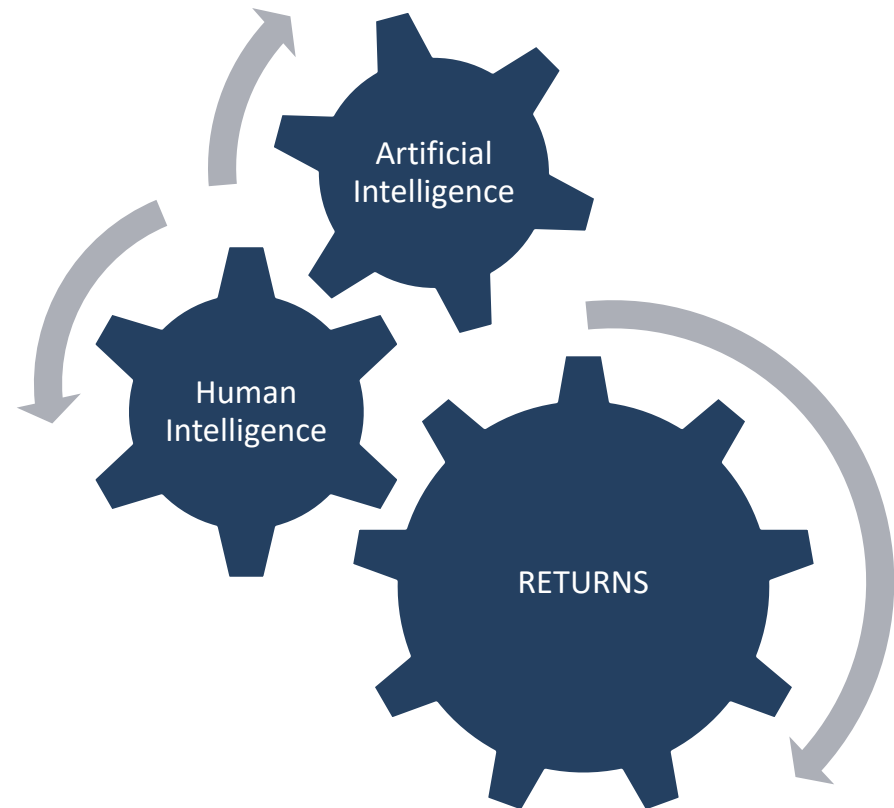
- ▶ Pricing of illiquid debt
 - Machine Learning
 - Pricing of Bonds

- ▶ Summary

Big Picture

Build up
Quantitative Research
from Scratch

Asset managers
Family offices
Pension funds
Insurance companies
Big 4



Services we provide

Have a reasonable basis

A reasonable basis is formed through the balanced use of quantitative study, third-party research, and company reports. Due diligence assumes a thorough study of numerous reputable sources of information before making recommendations.

Services

- ▶ [Data Provider](#)
- ▶ [Quantitative Analysis](#)
- ▶ [Investor Networking](#)



Data Provider

We serve as a data provider to support your company's data needs and facilitate informed investment decision-making. As a leading data provider, we offer comprehensive and reliable data solutions tailored to your specific requirements. Data coverage includes:

- ▶ Bonds
- ▶ Equities
- ▶ ETF
- ▶ Forex
- ▶ Curves
- ▶ Indices



Quantitative Analysis

We serve as a developer of quantitative solutions for investment companies. Quantitative analysis is a systematic approach to studying and understanding phenomena using mathematical and statistical methods. It involves the collection, organization, and interpretation of numerical data to uncover patterns, relationships, and insights.

In finance, quantitative analysis is widely used to make informed decisions and support evidence-based reasoning. It relies on the use of quantitative techniques, including statistical analysis, mathematical modeling, and data mining, to examine data and draw meaningful conclusions.



Investor Networking

We serve as an investor networking company focused on financial institutions utilizing proprietary research and analysis. Building relationships and connections with potential investors, industry professionals, and other stakeholders in the investment community plays a crucial role in the world of finance.

Build relationships, not just transactions

Focus on building meaningful relationships with investors rather than solely pursuing transactions.



Machine Learning

for Investment, Risk Management and Trading



The course provides general understanding of Machine Learning concepts combined with practical case studies in Python. The target group is Investment, Risk management and Trading staff. No prior experience with ML/AI or Python is needed

1. Differences between supervised and unsupervised ML.
2. Basics of linear regression and ideal set up a project.
3. Features and feature engineering, terms, and definitions
4. Polynomial features, one-hot encoding, bias-variance trade-off. Covariance.
5. Logistic regression. Regression vs Classification.
6. Support Vector Machines.
7. Decision trees: Gradient-boosted decision trees
8. Simple perceptron. Multilayer perceptron.
9. Unsupervised learning: KNN, k-means, PCA.
10. Model comparisons: ML Synthesis including



Application

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Fixed Income Solution

- Market Overview
- Market News
- Offers NEW
- Offers News NEW
- War countries exposure NEW
- Model Description
- About us

DESCRIPTION OF SECURITY
The Goldman Sachs Group, Inc.

MATURITY
5/15/2024

COUPON
1.375

Security selection - Enter ISIN code

Model Selection - Select model

Enter valid ISIN code in Security selection, use Search in table below to find specific security

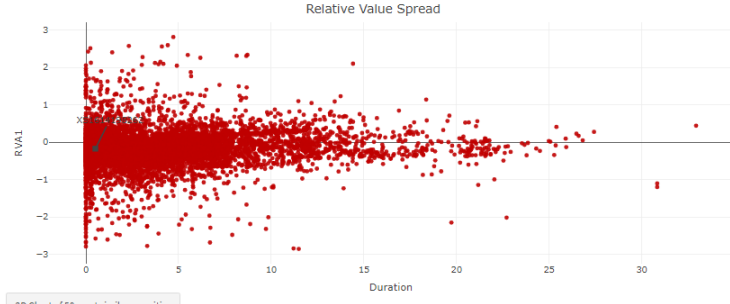
Relative Value Model (RVA1) measures mispricing of the bond in bps in relation to market observable Yield

YIELD
4.0317

DURATION
0.51

RELATIVE VALUE SPREAD
-0.1759

3D Chart of 50 most similar securities



<https://app.e-financials.net/>

Models in Production

XGB Static Model includes:

- Data
- Model
- Technique
- Model Back Test

Research paper

XGB Static Model for Fixed Income Yield

Abstract

Artificial Intelligence (AI) is a powerful tool that is already widely deployed in financial services. It has great potential for positive impact if companies deploy it with sufficient diligence, prudence, and care. XGB Model applies extreme gradient boosting decision trees technique which provides clear handling of complex and non-linear relationships of individual features, which proves to be a powerful tool in estimation of non-classified issues. Our results shows that, the model's consistent outperformance against the benchmark, exceeding it on average by 0.5% on a monthly basis and cumulatively by almost 10% over a two-year horizon, underscores its robust and sustainable performance.

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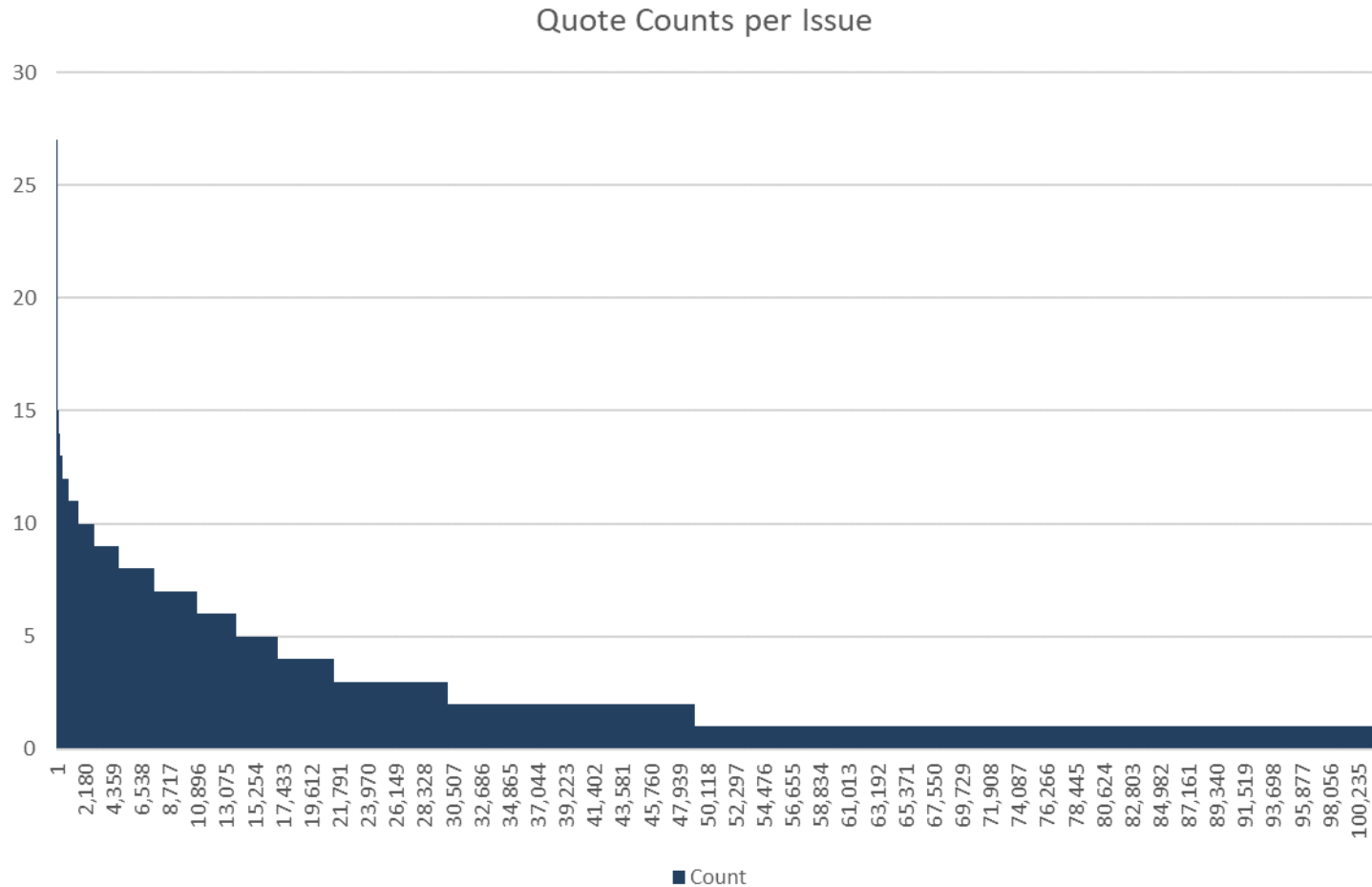
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<https://e-financials.net/2023/10/24/xgb-static-model-for-fixed-income-yield/>

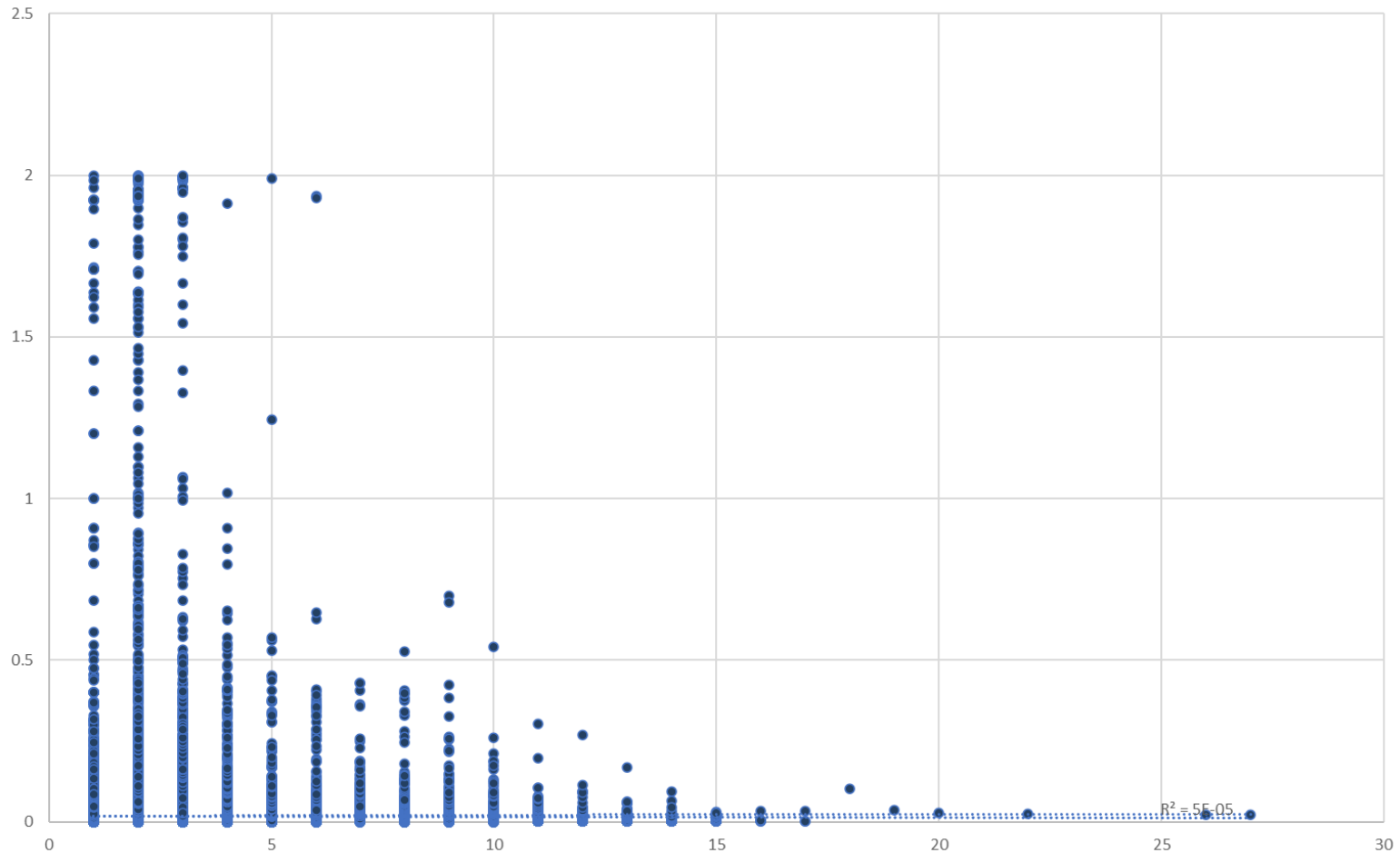
Pricing of illiquid Debt

Bond Market is illiquid



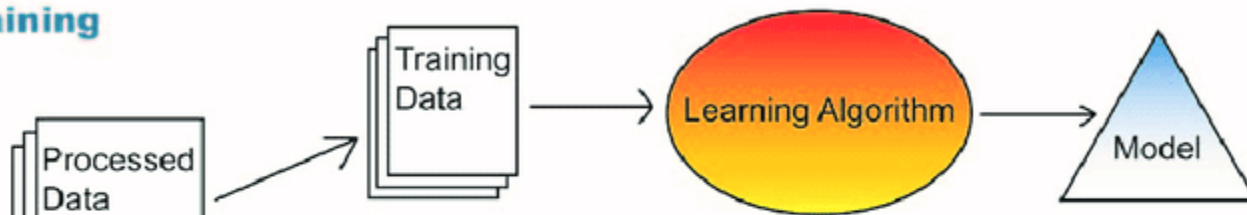
Bond Market is illiquid

Yield Spread per Quotation Count



Supervised Learning

A) Training



B) Validation



C) Prediction

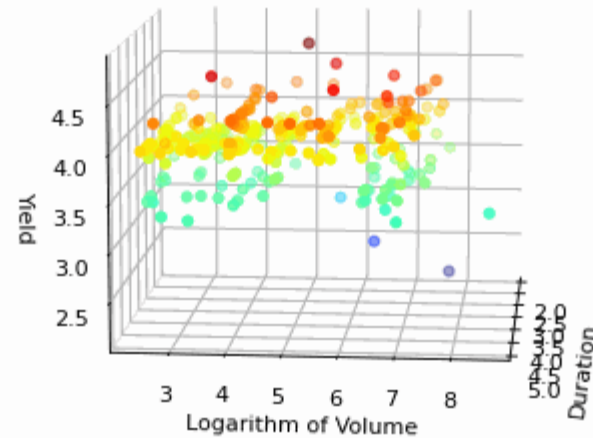


Machine Learning

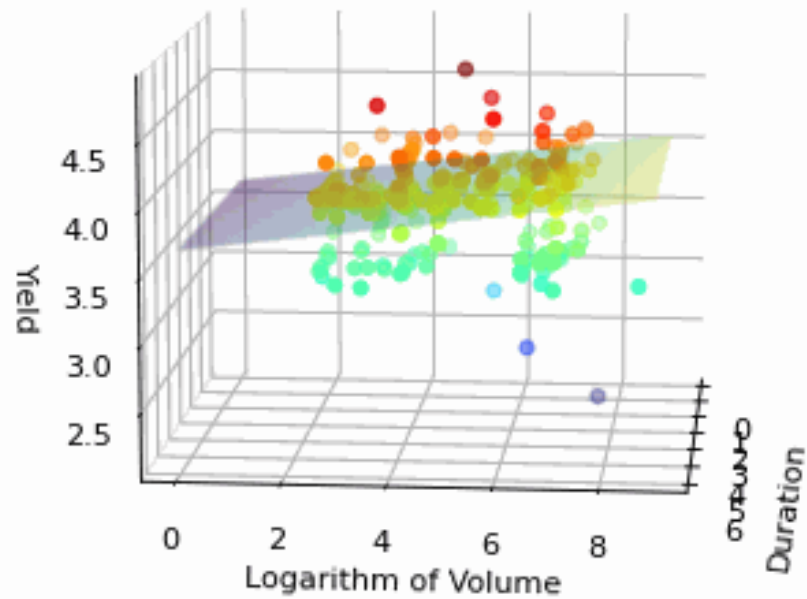
1. Preprocessing: plays a crucial role in enhancing the quality of your data and, consequently, the performance of your machine learning models. Preprocessing of data is most effort and time-consuming part of the ML process.
 - Handling missing data, Feature scaling
 - Categorical data encoding, Handling outliers
2. Complex Relationships: Illiquid bonds often have complex and **non-linear relationships** with various factors affecting their pricing. Machine learning models, particularly advanced ones like neural networks, can capture intricate patterns and relationships that may be challenging for traditional pricing models to discern.
3. Feature Extraction: Machine learning algorithms can automatically **identify relevant features** or factors that influence the pricing of illiquid bonds. This can lead to a more nuanced understanding of the market dynamics and help in better pricing predictions.

Pricing of Bonds

- We can show 3D ScatterPlot:
 - 'x – duration
 - 2-5 years
 - 'y – volume (log)
 - 11 – 5.300 mio EUR
 - 'z – Yield to Maturity
- Real problem characteristics
 - N dimensions
 - Nonlinear relationships
 - Sample consist of many datapoint:

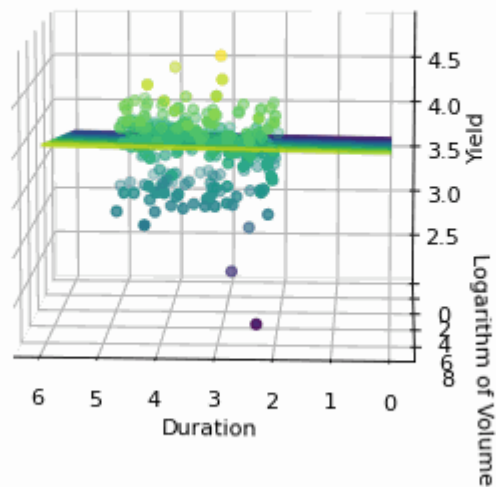


Pricing of Bonds

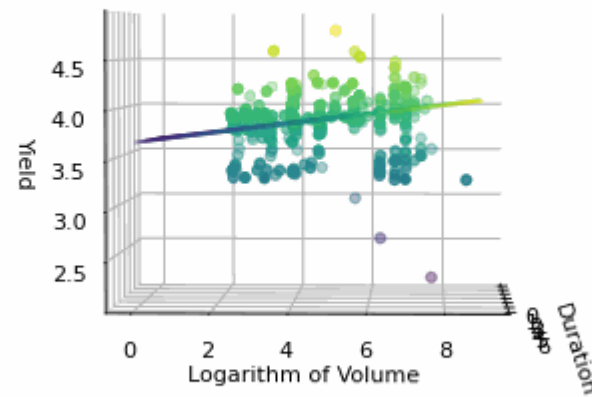


Pricing of Bonds

Offsetting the yield with respect to parameters



Offsetting the yield with respect to parameters



Summary

1. Relatively high interest rates makes bonds more attractive, but there is a risk of higher default rate, so the pricing of bonds is crucial.
2. In comparison to Bloomberg or LSEG (Refinitiv) bond prices, e-Financials provides a more transparent and detailed algorithm with known traits, leading to improved results.
3. We are ready to assist you in developing a tool for portfolio management, risk management or audit purposes on a fair and reasonable basis.

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