Supervised, Unsupervised and Reinforcement Learning in Finance

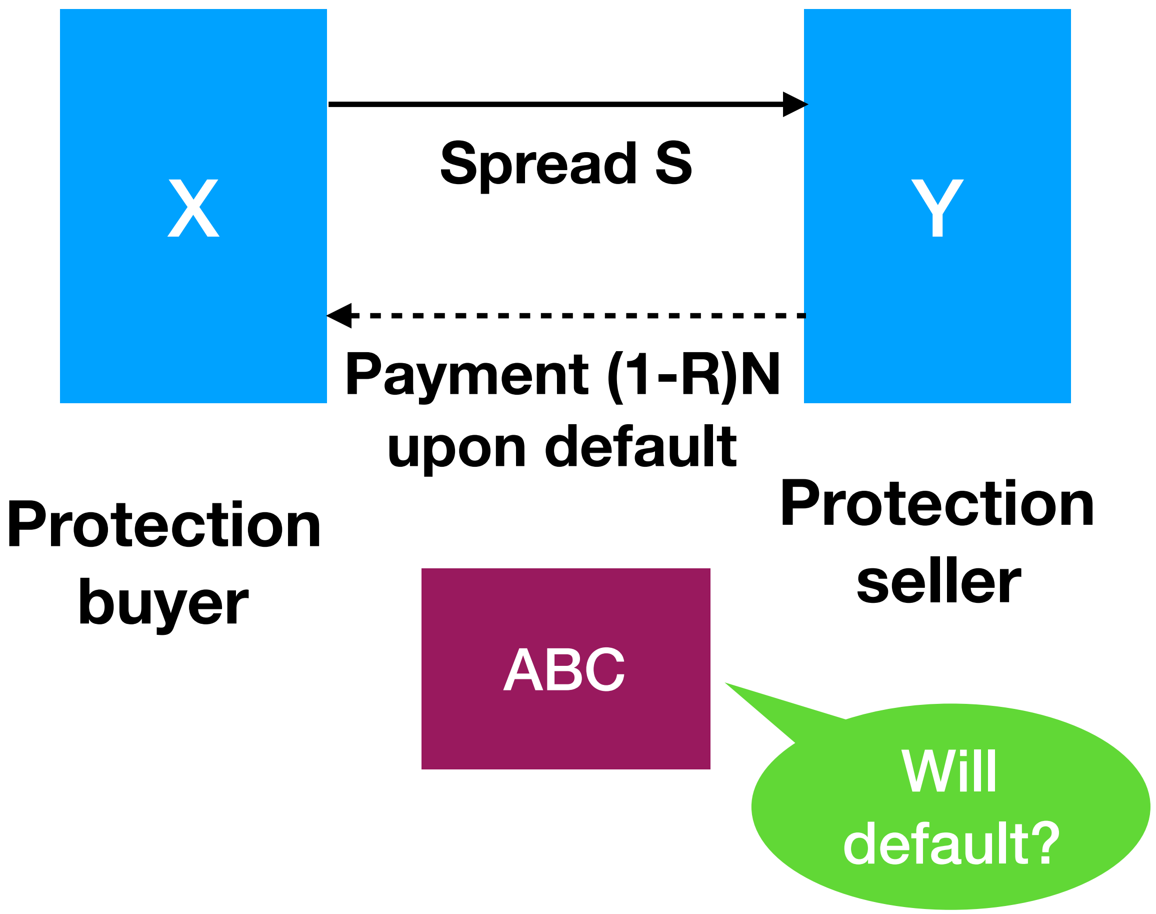
Week 1: Supervised Learning

Support Vector Machines part IV:
Example: SVM for prediction of credit spreads

Igor Halperin

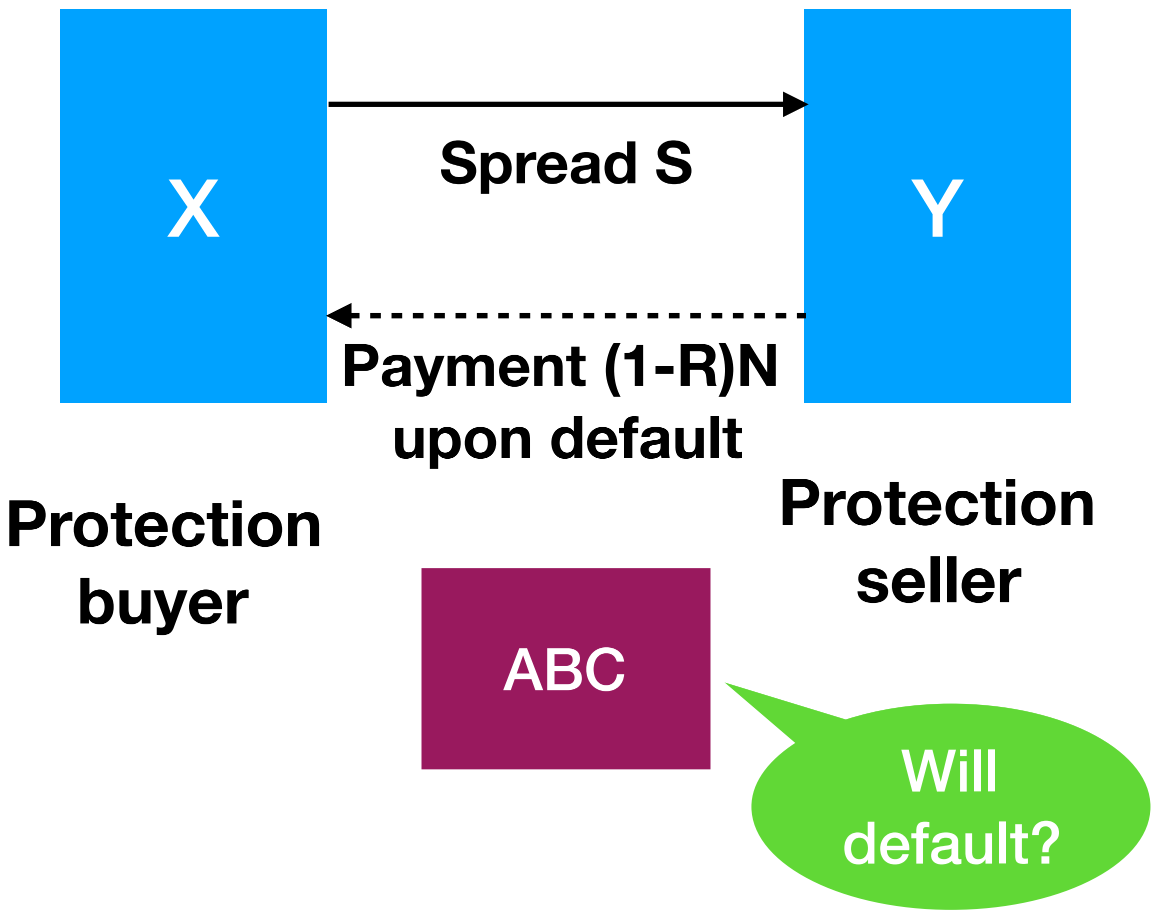
NYU Tandon School of Engineering, 2017

Credit Default Swap (CDS)

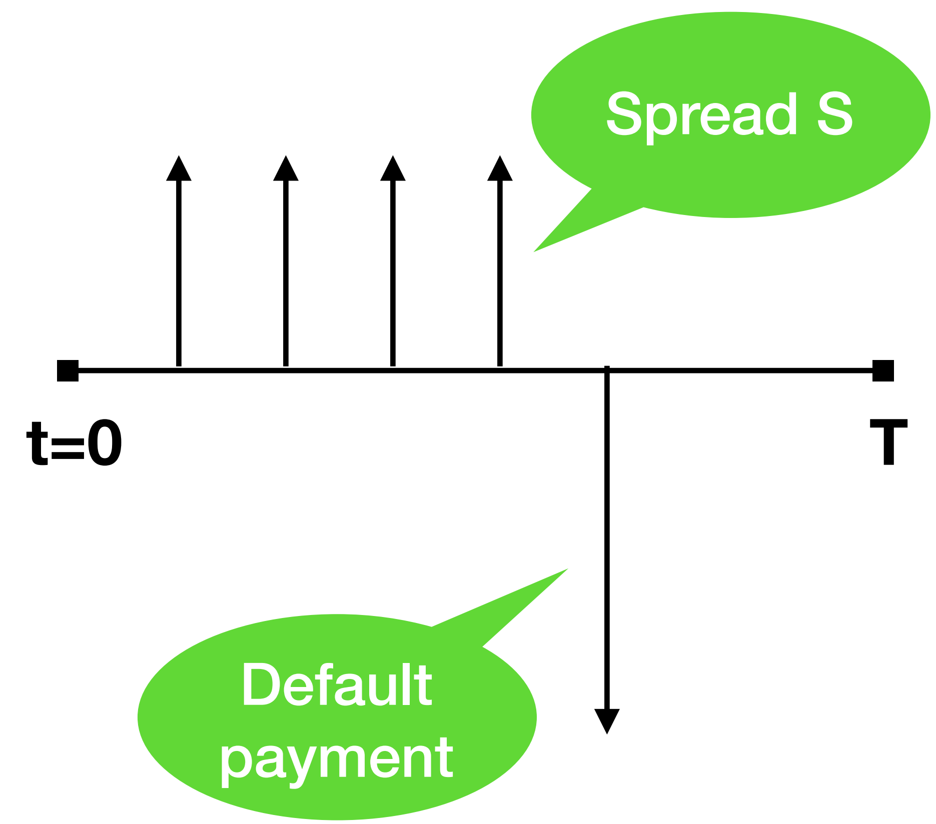


Spread S is paid on the notional amount N of $10m

Credit Default Swap (CDS)



Cashflows for protection buyer X



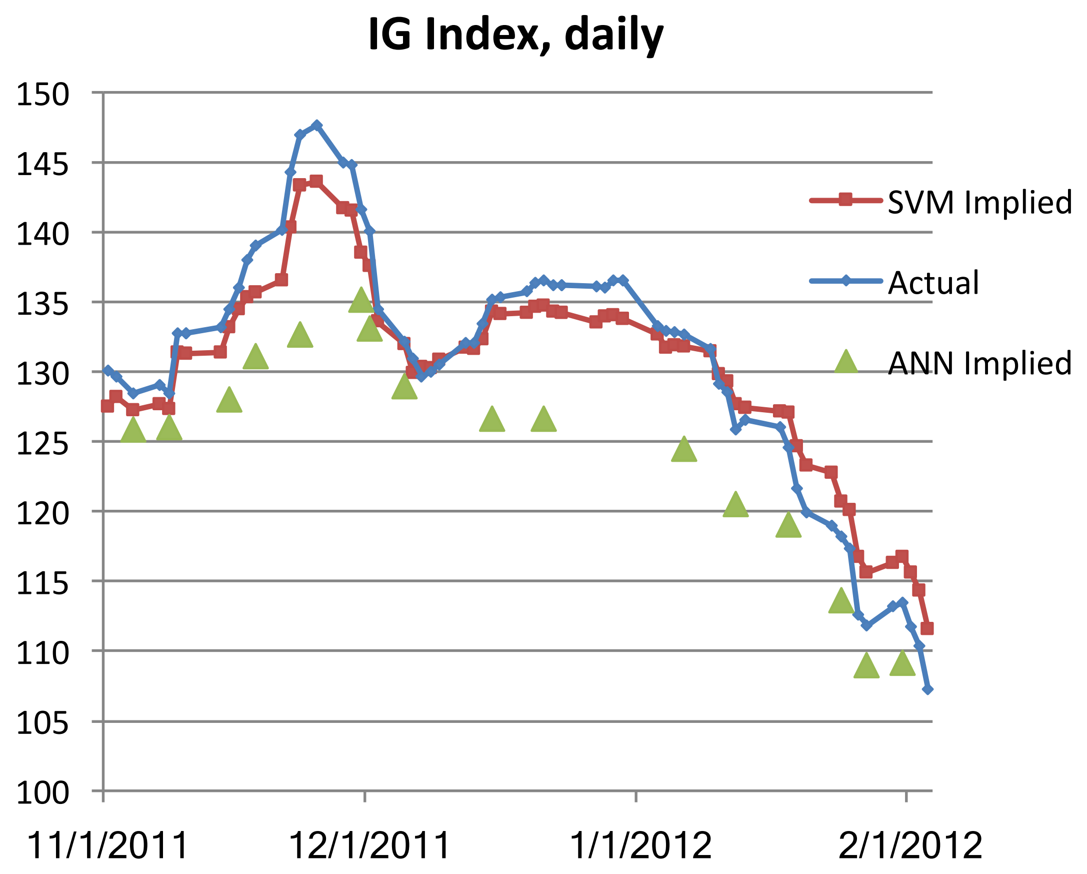
Spread S is paid on the notional amount of \$10m

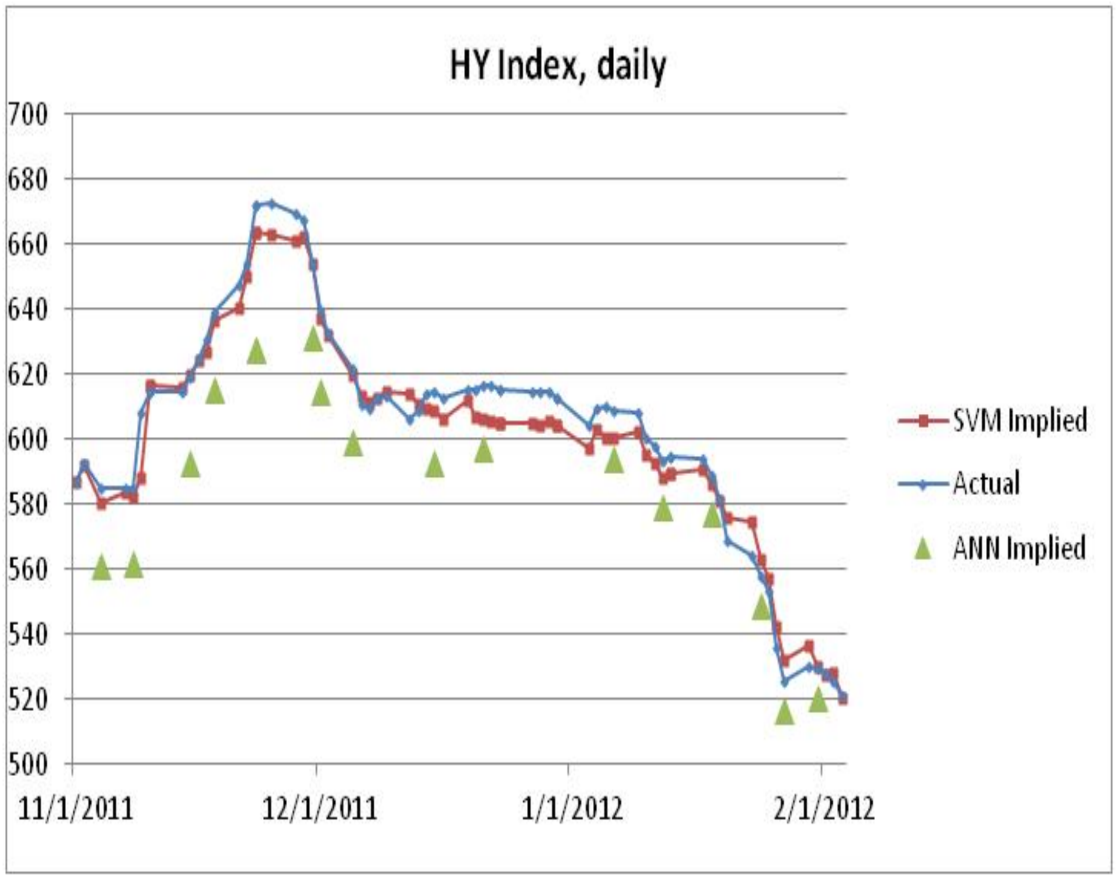
Example: Illiquid CDS spread modeling

- **Task:** Estimate unobserved CDS spreads for companies with illiquid debt based on observed spreads and other characteristics of other, liquid companies.
- **Inputs:** $X_i = (X_i^1, \ldots, X_i^D)$ - company's "features": rating, industry sector, geographic sector, Expected Default Frequency (EDF - supplied by Moody's)
- **Additional optional inputs**: financial indicators, implied volatilities, CreditGrades, etc.
- **Outputs**: Y_i - CDS spread for company i.
- **Training sample**: $\{(X_i, Y_i)\}_{i=1}^N$ for observed universe of liquid CDS (~500 companies in the US market)
- **Usage**: Counterparty credit risk management, capital calculation etc.
- **Models used:** Neural Network (NN) or Support Vector Machine (SVM)

Illustration of performance of SVM for spread prediction

As one of the metrics for tracking model performance, one can compute time series for a theoretical index spread mimicking (in terms of generic names for given sector/rating) CDX or iTraxx indices, and compare them with the actual time series of the index





Control question

Select all correct answers

1. A Credit Default Swap (CDS) is an insurance-like contract between a protection buyer (X) and protection seller (Y), whose payoff is contingent on a default event by a reference entity ABC.
2. As upon default by reference entity, protection buyer (X) benefits from a payment from a CDS contract, it shares its revenues with ABC, so the latter is partially compensated for its default.
3. A one-time payment to the protection buyer X by the protection seller Y happens only in the case of default by the reference entity ABC.

Correct answers: 1, 3