

MSFE ILLINOIS

Master of Science in Financial Engineering

2017 Practicum Project Competition

Each semester, teams of students from the financial engineering master's program work with industry partners (sponsors) to solve crucial business problems. In addition to their written reports, these students teams do a presentation to an outside panel of judges that include technical and nontechnical peers. The top three teams earn monetary prizes that are made possible by the program and the generous donations of MSFE program alumni.



FIRST PLACE

Building Predictive Models for Money Laundering Detection

First Place - \$1,500

Title: Building Predictive Models for Money Laundering Detection

Team: Sunjie Hou, James Karam, Tanmaysingh Rajput, Jesus Ramirez Castro, Bin Xu, Yi Zhu

Company Sponsor: BMO

Abstract: The objective of this practicum is to use modern day techniques and tools to detect and test potential money laundering fraud from credit card customer profiles and transaction data, based on quantitative thresholds derived from general qualitative regulations and principles. Money Laundering is defined to be the process of transforming “dirty” money into “clean” money. “Dirty” money that comes from criminal activities, such as drug trafficking, terrorist activity or political bribery may have difficulty entering into the financial system to be utilized, and it may expose the illegal activities that generate this illicit wealth during its influx and circulation within the banking system. Thus, various tricks and tools are used to conceal the origin of these “dirty” money, to create a legitimate appearance of its source, a process during which process the money is “laundered” to look “clean”. Our job here is to analyze and recognize the pattern of these laundering tricks, using quantitative tools such as big data mining and machine learning methods. Thus, banks can raise risky flags for a limited group of customers and focus their investigation resources on these high-risk targets.



SECOND PLACE

Analyzing the Impact of Weather on Commodity Prices Using Machine and Deep Learning

Second Place - \$1,000

Title: Analyzing the Impact of Weather on Commodity Prices Using Machine and Deep Learning

Team: Udit Anand, Siddharth Bhaduri, Shantanu Bhatt, Jegan Sridharma, Joonha Yoon

Company Sponsor: Google

Abstract: Weather in general is termed to be unpredictable. The unpredictability is glaringly visible when it comes to price products. In this practicum, we aim to quantify the unpredictability and consequently use that information in better understanding the financial markets. We aim to do so by employing state of the art machine learning and deep learning models.





THIRD PLACE
Analysis of High Yield Bonds and ETFS

Third Place - \$500

Title: Analysis of High Yield Bonds and ETFS

Team: Hao Du, Junli Nie, Pratik Sapre, Yuan Xiong, Yu Zhu

Company Sponsor: MarketAxess

Abstract: Although people are more familiar with equity markets, the biggest markets in the world are bond markets. The MarketAxess practicum was an exploratory analysis of the liquidity characteristics of bonds in the corporate high yield universe. MarketAxess particularly wanted to find out if bonds present in an ETF are more liquid than their counterparts. The two high yield bond ETFs considered were BlackRock's HYG and State Street's JNK. The liquidity of bonds was a challenging notion because: bonds do not trade like equities with an orderbook, and an absence of good quality public data. The group came up with two ideas of comparing the trading patterns of the two categories of bonds along with an exploration of reverse causality i.e. if bonds were included in ETFs because of their higher liquidity.

Other 2017 Practicum Projects

Title: Produce an Optimal Portfolio of Cat Treaties and Participations

Team: Veeraj Gadda, Sungwook Hong, Tonghui Li, Alexander Marunycz, Bin Xu

Company: Axis Re

Description: The team took the European wind-exposed underwriting portfolio of client and optimized over multiple scenario sets, subject to maintaining or lowering risk in the existing portfolio. The results reduced risks and increased return on capital.

Title: Market Feed Data Analysis - Predicting Time Gaps Between Exchange Reactions

Team: Mengxu Feng, Xinlei Huang, Rong Mu, Kruttika Swaminathan, Dexin Wang

Company: CME

Description: The team took the live feed from an equity exchange and examined, at the computer-packet-arrival-time level, strategies to increase the conditional success rate of transaction executions thereby making trading strategies more effective.

Title: Trading Strategies of Option Open Interest

Team: Ayush Dhingra, Jiqiong He, Zehuan Song, Shuheng Yan, Xu Zhao, Wenbo Zhu

Company: Peak6

Description: Open Interest reports for Options exchanges were examined to expose market directional insights and then the team tested various strategies designed to take advantage of such insights.

Title: Improving Index Performance by Applying Social Media and Momentum Tilt Factors

Team: Qi Chen, Anishkumar Desai, Hao Jiang, Mo Xie

Company: Social Market Analytics

Description: An index of 50 stocks was designed. Constituent stocks were chosen annually, based on known momentum protocols. The share of those stocks in the index was then adjusted or "tilted" monthly based on social media messaging thereby considerably enhancing returns.

Title: Finding the Optimal Place for Annuity in a Retirement Portfolio

Team: Lucas Assayah, Yuanzhen Cai, Jie Lian, Jie Zhang

Company: Lane/Ash Brokerage

Description: The team examined the investment decisions of a retiree, with modest savings but without a pension. The dilemma is make a trade-off between generating a reliable income and leaving heirs with an estate. Stochastic programming is used as an appropriate framework.

Title: Why Option Overlay Strategies Perform Differently

Team: Guanhua Gao, Yushan Li, Hanbo Liu, Zhenlin Qiu, Chenqi Ruan, Yang Xing

Company: SpiderRock

Description: The team examined whether call-writing strategies, seemingly successful for the S&P 500 Index, in many market environments, could be extended to other market indices - including NASDAQ and Wilshire. The purpose was to design and to recommend various overlay strategies.

Title: Loss Analysis of CMBS Portfolio

Team: Xi Chen, Yi Jiang, Malabika Mishra, Luke Tsai, Shan Xu, Ziqian Ying

Company: University of Illinois - Treasury

Description: As the investment manager of University funds the Treasury Department sought help in designing a credit early warning system for default of loss to its investments in CMBS.

Title: Forecasting Intraday Volume in Futures Markets using Times Series Decomposition and SVM Regression

Team: Yuan Gao, Junlong Guo, Yuanyuan Guo, Yiming Hu, Shihua Huang, Jianqiao Ji

Company: Wedbush - Brian

Description: The team sought to forecast intra-day trading volumes in order to enhance algorithms to both measure and improve client order executions. Times series decomposition and SVM techniques were used.

Title: Smart Order Routing System

Team: Ruoshi Li, Bingqing Luo, Yizhen Mou, Qinghua Mu, Dexin Wang, Yao Wu

Company: Wedbush - David

Description: The information about liquidity in various Dark Pools is by definition very opaque. The team designed an order-routing system to route orders to each of the Dark Pools, fully utilizing the data that does become available.