

# **FINANCIAL DECISION MODELS**

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## **PROJECTS OVERVIEW – D1**

# PROJECT INTRODUCTION

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Projects to address real-world-scale problems in:

- ◆ Marketable securities, or
- ◆ Entity-level projects.

Approach can be either

- ◆ Design a product, or
- ◆ Perform a consultant-style research project.

Projects may be:

- ◆ Generated by you (and approved by instructor)
- ◆ Drawn from below list of examples.

## Logistics:

- ◆ Two or three person teams.
- ◆ Deliverables
  - ◆ Slide deck (Consulting Report or Product Pitch)  
Specific details to follow.
  - ◆ Verbal presentation of deck.
  - ◆ Excel, Python code, Database.
  - ◆ Due ~ Wednesday 12/5.

# EXAMPLE PROJECT IDEAS

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## Marketable Securities Examples

### ◆ Risk Hedging (Product)

For any S&P 500 security,

- ◆ Find the best set of 2-5 ETFs to hedge with (monthly or quarterly)
- ◆ Report selected ETFs, projected performance, costs.

For this you need to (among other things):

- ◆ Establish a set of 20-50 ETFs to use as hedging candidates.
- ◆ Establish a database of closing prices of the ETFs and an example subset of S&P 500 stocks.

## ◆ Trade Sourcing (Consulting)

For any ETF with large, liquid options market

- ◆ Search ETF's closing prices for (say) bouncing around a two-year low, based on 10-day moving average.
- ◆ Find deep out of the money puts to sell.  
(Maybe use put spread to insure against big losses).
- ◆ Estimate probabilities of negative gains and returns.
- ◆ Establish a risk-reward policy for these types of trades.
- ◆ Determine how many puts to trade per \$100K in account, in accordance with probabilities and risk-reward policy.

Example securities:

- ◆ VXX, TLT

- ◆ Multi-period Portfolio Optimization (Product)  
Consider a portfolio of the SPY +/- Several S&P 500 Sector ETFs.  
Create a product that aims to outperform the S&P 500  
(based on a measure of gain or return over multiple periods and  
downside risk of same).
- Methodology:
  - ◆ Use economic sector reports and other data to determine which  
sector ETFs to buy/sell at certain times to outperform the S&P 500.

## Entity-Level Project Examples

- ◆ Purchase Evaluation of “fixer-upper” Entity for Private Equity Firm.  
For a potential target firm (firm to potentially be purchased by PE firm):
  - ◆ Assume plan is:  
Purchase, optimize capital structure and operations, sell in 5-6 years.
  - ◆ Perform ratio analysis against better-performing comps.
  - ◆ Estimate multiple-at-exit (ie: Price/FCF, Price/EBITDA, etc) after company has been improved  
(from ratio analysis of better-performing companies).
  - ◆ Determine optimum capital structure  
(from algorithm learned in class).
  - ◆ Determine achievable operational improvements to EBITDA  
(from ratio analysis with comps).

- ◆ Determine key drivers of Free Cash Flows and model these as random variables (from sensitivity analysis and historical performance).
  - ◆ Prepare Random Variable, DCF valuation of the entity, as it would be modified by the PE firm.
  - ◆ Make a Go-NoGo recommendation.
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- ◆ Financial Plan (Consulting)
    - ◆ Details provided verbally



- ◆ Financial Data Analytics (Big Data)
  - ◆ See Bank of America Example
  - ◆ Involves:
    - ◆ Several datasets.
    - ◆ Querying, Stats and Probability.
    - ◆ SQL or SQL-like features of Python.

# Coding-Intensive Examples (Entity-Level or Marketable Securities)

- ◆ Creating general purpose *Python* code for Pro-forma models.
  - ◆ Read historical statements from CSV or online data source.
  - ◆ Perform analysis of “% of Sales” projections for each relevant account.
  - ◆ User provides:
    - ◆ Rules for certain account projections (instead of % of sales). (cash maintained at 5% sales, etc).
    - ◆ Item to solve for in final projected period.
    - ◆ How many periods of detailed projections to include.
- ◆ Code outputs:
  - ◆ key ending account values
  - ◆ ratio analysis of all projected periods.

- ◆ Creating general purpose *Python* code for entity-valuation models.
  - ◆ Read historical statements from CSV or online data source.
  - ◆ Analyze “% of Sales” projections for each relevant account.
  - ◆ User provides:
    - ◆ Rules for certain account projections (cash maintained at 5% sales, etc).
    - ◆ Terminal value method to apply.
    - ◆ Rocc (opportunity cost of capital).
    - ◆ How many periods of detailed projections to include.
  - ◆ Code determines:
    - ◆ Optimal capital structure.
    - ◆ Key drivers of Free Cash Flows.
    - ◆ RV distributions for these drivers.
    - ◆ Probability distribution of NPV/E with current and optimal Capitalization ratios.  
(NPV/E = NPV per dollar of equity funds invested).

- ◆ Automating *Excel* Solutions of “Simulation - Brute-Force Optimization” Problems
  - ◆ Use VBA, data-tables to produce results elegantly in Excel.