

FINANCIAL STATEMENTS MODELING AND ANALYTICS

Instructor: Dan Gode (<http://www.dangode.com/>)

Course web page: <http://www.dangode.com/tandon-modeling/index.htm>

This course is listed as **SPECIAL TOPICS IN ASSET PRICING FRE-GY 9713** in Albert.

Please attend the highly recommended Excel bootcamp.

I will assume that you already know Python and will teach actual financial statement analytics in the course.

1 Overview

Modeling financial statements is vital to finance. The course teaches two sets of skills: modeling financial statements and financial statement analytics. The first part establishes the framework needed to link financial statements to valuation, including identifying key metrics. The second part shows how to use modern tools (Python) to extract these metrics from historical financial statement data. These parts are summarized below and described in detail in the course outline below.

1.1 Modeling financial statements

1. Revenues and operating expenses
2. Revenue-related accruals and deferrals
3. Operating expense-related accruals and deferrals
4. Productive capacity, capex, and depreciation, and taxes
5. Unlevered free cash flows and financing needs
6. Borrowing capacity, liquidity, debt financing, and interest
7. Equity financing and linking to valuation

1.2 Financial statement analytics

8. Working with XBRL (Extensible Business Reporting Language)
9. Analyzing historical sales
10. Analyzing historical expenses

11. Identifying abnormal accruals and divergence of earnings and cash flows
12. Understanding credit rating changes and defaults [We will not try the almost impossible task of predicting future stock and bond returns.]
13. Identifying peer companies
14. Identifying LBO and acquisition targets

2 Inclusion Statement

The NYU Tandon School values an inclusive and equitable environment for all our students. I hope to foster a sense of community in this class and consider it a place where individuals of all backgrounds, beliefs, ethnicities, national origins, gender identities, sexual orientations, religious and political affiliations, and abilities will be treated respectfully. I intend that all students' learning needs be addressed both in and out of class and view diverse students as a resource, strength, and benefit. If this standard is not being upheld, please feel free to speak with me.

3 Prerequisites

Knowledge of financial accounting will be a big plus. However, it is not required per se. Students without this background will need to work hard to keep up with the course. I will provide extensive materials on Financial Accounting, including prework, before the course starts. If you have the aptitude for it, you can pick it up quickly. My undergraduate is in Electronics Engineering. I picked up accounting on my own, so can you. **The course will not teach Python per se.** Most people can pick it up on their own.

You will be building models using Excel. I am assuming you know basic Excel and can pick up the rest as the course moves along.

4 Target audience

If you expect to build valuation/credit risk models using financial statement data or write code to manipulate or analyze financial data, you will benefit from this course. This course will teach you how to code in Python to process accounting and financial market data based on financial analysis and statistical concepts. This course is unsuitable for those who want a managerial overview of data analytics techniques without hands-on coding.

5 Help and Office

- § Teaching assistant: Check NYU Brightspace. Please contact TAs first. Please do NOT copy me on your messages to the TAs.
- § Me: dgode@stern.nyu.edu, 212-998-0021, Office: KMC 10-86.
- § Administrative assistant: Please email the TA. My admin assistant at Stern cannot help you. If the TA cannot help you, please feel free to contact me.

6 Materials

- § I use my materials. Therefore, there is no required textbook, and you need not purchase anything.

7 Assignments

- § **Online assignments. Link will be posted on Brightspace.**

8 Attendance

Requiring attendance is necessary for several reasons. First, you incorrectly assume that you can catch up on a missed class by watching a recording (if available). Videos do not engage your brain as much as a live class. Second, less than 20% of you watch the recording (if available). You are then lost in class, which provides wrong signals to me as an instructor. Third, your absence hurts class discussions. Fourth, you miss out on feedback if you do not work through the questions I pose in class. Fifth, I lose the feedback since there are fewer questions.

The policy below will be in effect only after the add/drop period.

Without mandatory attendance, attendance is often below 50%. Therefore, though I dislike doing this, I penalize absences. If you anticipate being absent for good reasons, please email me well in advance. Please enter "Excused" on the attendance sheet described below to avoid the penalty if I approve. If you miss a class due to emergencies and cannot tell me in advance, do not panic. Take care of the emergency first, and then email me. I will permit you to change the "Absent" to "Excused." But, if you miss a class without a valid reason, there is a penalty, as stated below.

For sections meeting in 150-190 minute sessions, you would lose one grade (A to A-, A- to B+, B+ to B, B to B-, and so on) for EVERY missed session unless you were explicitly excused via email. Thus, if you miss two class sessions, you would lose two grades, and so on.

For sections meeting in 75-80 minute sessions, you would lose one grade (A to A-, A- to B+, B+ to B, B to B-, and so on) for EVERY TWO missed sessions unless you were explicitly excused via email. Thus, if you miss four class sessions, you would lose two grades, and so on.

Please sit in the same seat in every class and display your name tags. For zoom classes, you must keep your video on AT ALL TIMES. You must also have a good working headset or mic as it is extremely rude to be inaudible and force me to ask you to repeat yourself. After entering the class, please mark yourself present in the first 20 minutes on the OneDrive sheet (link posted on Brightspace). **You will be marked absent if you are more than 20 minutes late unless it is because of factors beyond your control (traffic, subway, interviews running late).** You will also be marked absent if you leave the class early unless you have my permission or get it afterward. You will get an F in the course if you are caught cheating on the attendance sheet.

9 Exams and Grading

- § Please read about the penalty for missed classes above.
- § Assignments: 30%
- § Project: 30%
- § Final exam: 40%

10 Topics

10.1 Topic 1: Modeling sales and operating expenses other than depreciation

10.1.1 Sales and sales growth

Potential market size

Market share and pricing power

10.1.2 Operating expenses

Cost structure and competitive advantage

Fixed costs versus variable costs

10.1.3 A general model of accruals and deferrals

A generalized model of the timing differences between income flows and cash flows

Accruals: When income flows precede cash flows

Deferrals: When income flows follow cash flows

Understanding lead/lag functions as an efficient and powerful way to model accruals/deferrals

10.2 Topic 2: Modeling revenue-related accruals and deferrals

10.2.1 Receivables: Accrued revenues or deferred receipts

When revenues precede receipts

Collection period

Long-term receivables and interest earned

10.2.2 Allowance for returns and bad debts

Accruing contra-revenues in anticipation of returns

Accruing bad debt expenses in anticipation of write-offs

Contra-assets: Allowance for returns and bad debts

10.2.3 Advance received or deferred revenues

Deliverables: When revenues follow receipts

Subscription-based models: Receipts drive future revenues

Event-based models: Future expected revenues drive current receipts

10.3 Topic 3: Modeling operating expense-related accruals and deferrals

10.3.1 Payables: Accrued expenses or deferred payments

When expenses precede payments

Days payable

Periodic payments and lumpy payments for bonus plans

Long-term accruals and judgments

10.3.2 Prepayments or deferred expenses

When expenses follow payments

Days of prepayments, prepaid rent, insurance, advertising

When future expected expenses drive current payments

Inventories: Future expected cost of goods sold drive current purchases, days of inventory

Distinguishing between costs, expenses, and payments

10.4 Topic 4: Modeling productive capacity, capex, and depreciation, taxes

10.4.1 Property, plant, and equipment: Capex leads future depreciation

Long-term prepayments

Future expected sales drive demand for current capacity, which drives capex

Useful lives, salvage values, and depreciation patterns

10.4.2 Taxes

Taxes payable: Current tax expense or tax bill versus tax paid

Deferred taxes: Total tax expense versus current tax expense

10.5 Topic 5: Modeling unlevered free cash flows and financing needs

10.5.1 Unlevered free cash flows

Net operating profit after tax

Growth in net operating assets

10.5.2 Financing needs

Operating working capital

Invested capital

10.6 Topic 6: Modeling liquidity, borrowing capacity, debt financing, and interest

10.6.1 Liquidity

Sources of liquidity

Common mistakes in modeling liquidity: Why current ratio, quick ratio, and working capital are often useless measures of liquidity

10.6.2 Metrics of borrowing capacity

Repayment ability and debt/EBITDA multiples

Interest coverage ratio

Debt to value ratio

10.7 Topic 7: Modeling equity financing and linking models to valuation

10.7.1 Challenges in forecasting terminal value

Growth beyond the forecast horizon

10.7.2 Challenges in modeling equity-linked compensation

Share-based compensation

10.8 Topic 8: Working with XBRL (Extensible Business Reporting Language)

10.8.1 Understanding XBRL

What is structured data? What is the XBRL taxonomy? Current financial reporting landscape and the limits of XBRL

10.8.2 Python skills

Language syntax: Dictionaries and Tuples

Interfaces: Understanding application programming interfaces [API]

Interacting with web-based data

10.9 Topic 9: Analyzing historical sales

10.9.1 Analytical skills

Understanding growth drivers

Business cycles: Opex versus capex commodities

Seasonal growth: Identifying seasonal patterns

10.9.2 Python skills

Using Pandas for time series analysis

Challenges of time series analysis vis-à-vis cross-sectional analysis

10.10 Topic 10: Analyzing historical expenses

10.10.1 Analytical skills

Operating leverage, financial leverage, and variances

Using the difference between sales variance and the variance of various earnings measures to infer the extent of fixed costs

Macroeconomic effects: Quantifying systematic business risk; Behavior of sales and earnings in recessions

10.10.2 Python skills

Using NumPy: NumPy and scientific computing

Using Statmodels: Using basic statistical functions in Statmodels

Using Sci-Kit Learn: Running regressions with Sci-Kit Learn

10.11 Topic 11: Identifying abnormal accruals and deferrals

10.11.1 Accruals and deferrals relating to revenues

Unexplained increase in receivables

Unexplained decrease in deferred revenues

10.11.2 Accruals and deferrals relating to expenses

Unexplained increase in prepayments and deferred expenses

Unexplained decrease in payables and accrued expenses

10.11.3 Understanding the divergence of earnings and cash flows

The "good" and "bad" causes of divergence of earnings and cash flows

10.11.4 Python skills: Regression analysis and outliers

Identifying outliers using Sci-Kit learn

Dimensionality reduction

Reducing the number of independent variables using Sci-Kit learn

10.12 Topic 12: Credit ratings and distress

10.12.1 *Leading indicators of distress*

Understanding the causes of distress

Understanding which financial metrics could be leading indicators of distress

Understanding the determinants of credit ratings

10.13 Python skills

Logit regression: Using Sci-Kit Learn for logit regressions

Cluster analysis: Using Sci-Kit Learn for cluster analysis

10.14 Topic 13: Identifying peer companies

10.14.1 *Analytical tasks*

Unsupervised learning and cluster analysis

What is unsupervised learning? SIC codes versus FAMA-FRENCH Classification versus machine learning

Comparing the traditional methods of clustering that are based on intuition with the modern machine-learning-based methods Making sense of clustering based on machine learning

10.14.2 *Python skills*

Using Sci-Kit Learn for cluster analysis

10.15 Topic 14: Acquisitions and leveraged buyouts

10.15.1 *Identifying potential acquisition and LBO targets*

Which financial metrics distinguish companies that are the target of acquisitions from those that are not acquired?

Which financial metrics distinguish companies that are the target of LBOs from those that are not taken private?

10.15.2 *Relative valuation of targets*

What is the typical premium paid for targets?

What are the determinants of premium paid?

10.15.3 *Python skills*

Using Sci-Kit Learn for logit regressions

Using Sci-Kit Learn for cluster analysis

Using Sci-Kit Learn for regression analysis