



JOHNS HOPKINS UNIVERSITY

“Applied Economics & Finance” – EN. 570.470 (W, Q, S)

Course Syllabus

Prof. Steve H. Hanke

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PURPOSE AND SHORT COURSE DESCRIPTION

This document presents an overview of Applied Economics and Finance, a course that has been taught at The Johns Hopkins University by [Prof. Steve H. Hanke](#) on a year-round basis for over twenty years. It has produced a distinguished group of alumni who are operating at the highest levels of finance. The course is widely recognized in banking, finance, and trading circles.^{[1][2][3]}

This course focuses on company valuations, and does so in depth. (1) Students are taught the “ins” and “outs” of a Probabilistic Discounted Free Cash Flow Model (PDCF). Students use the model and primary data from financial statements filed with the Securities and Exchange Commission to calculate the value of publically-traded companies. (2) Students use Monte Carlo simulations to generate forecast scenarios, project likely share-price ranges, and assess potential gains/losses. Emphasis is placed on using these simulations to diagnose the subjective market expectations contained in current objective market prices and the robustness of these expectations. (3) Students use long-term “asset turns” and “returns on invested capital” trends, in conjunction with DCF and Monte Carlo simulations, to gain unique insights into their analyses. (4) To evaluate trading strategies, students use proxy statements to determine the degree to which a company’s management is incentivized to pursue policies that will generate free cash flow.

So, the four unique elements of a comprehensive system of valuation presented in this course are: 1) the construction of DCF models from scratch using primary data, 2) the application of Monte Carlo simulations, 3) an asset-turns and returns on invested capital diagnosis, and 4) proxy statement analysis. See Annex C “The Checklist” for more details.

During the weekly seminar, students’ company valuations are reviewed and critiqued. A heavy emphasis is placed on research, writing, and craftsmanship. The course is a Hopkins Writing Intensive course (see Annex A). High-quality craftsmanship requires a great deal of practice at detecting and correcting errors, and this course is designed to give students plenty of practice in doing just that (for more on this, see Annex C “The Check List.”) Work products are expected to be of publishable quality at the Johns Hopkins University Institute for Applied Economics, Global Health, and the Study of Business Enterprise [Studies in Applied Finance](#).

The course is taught by Prof. Hanke with contributions from [Dr. Hesam Motlagh](#) and [Dr. Jun Gao](#) (Fellows at The Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise). It meets once a week on Fridays from 1:30PM-4:30PM in Gilman 400.

Beyond the specifics of the modeling and so forth, Prof. Hanke challenges students to think and figure things out for themselves. To do this, they must learn the meaning of the 5 Ps: Prior Preparation Prevents Poor Performance. If the 5 Ps aren’t followed, students quickly learn the meaning of Prof. Hanke’s dictum: “you run the show, or the show runs you.”

The 5 Ps should not only be followed for the duration of this course. For anyone in the finance profession, broadly defined, it’s as Aristotle taught us: you need to know everything – and that’s going to take a while. But, if you follow through, you will learn what Voltaire learned: “nothing is so agreeable as to make one’s fortune by oneself.”

OVERALL COURSE DESIGN

1. Prerequisites for the course:

- a. *Problems in Applied Economics* (EN.570.428) taught by Prof. Hanke is a pre-requisite. The prerequisites for *Problems* are Financial Accounting, Micro-, and Macroeconomics. The students should also be Bloomberg Markets Concepts (BMC) certified. The students who are rusty on this material will be guided the first four weeks and can use the lectures as a launching pad to get up to speed on the material.
 - i. Students who are not BMC certified must complete the material in the first few weeks. Please talk to Dr. Motlagh to perform the certification via BloombergInstitute.com.

2. What the students are expected to do:

- a. Understand the importance and use of primary data. Specifically, they should be able to analyze financial statements from the Securities and Exchange Commission and to analyze company proxy statements.
- b. Build reproducible and high-quality DCF models, with a full understanding of the accounting underpinnings that make it unique. All models must be built from scratch – “by hand.” Replication, citation, and documentation of work are “musts.”
- c. Understand and employ re-sampling theory via Monte-Carlo Simulations and appreciate the difference between point estimates and probability distributions. This is towards the Hopkins “Q” (quantitative) requirement.
- d. Understand the importance of reproducibility and primary data. We do not allow the students to use private data providers for building their models.
- e. Provide high quality writing that reflects clarity of thought from the above concepts. This is towards the Hopkins “W” (Writing Intensive) requirement.
 - i. Students are expected to write summaries of each model in addition to a final article that will be a cogent investment thesis. The final article is expected to be of publishable quality in the Johns Hopkins University Institute for Applied Economics, Global Health, and the Study of Business Enterprise [Studies in Applied Finance](#).
- f. Discuss the companies, whether or not it is a worthwhile investment based on the information above, and the possible fundamental value ranges.
- g. Be prepared with a high-level background in modern finance and be ready for an interview with a unique selling proposition (U.S.P.) – i.e. know why the PDCF and Monte-Carlo simulations are unique and how to discuss in probability distributions (not point estimates).

3. Student assessment:

- a. In the spirit of a Hopkins upper-level course (read: old school), the class consists of a mix of undergraduate, masters, and doctoral students. As a result, the course will be taught as a hybrid between a lecture and a seminar. Thus, students will be routinely called on to answer questions and contribute to discussions.
- b. The beginning of each lecture will consist of an oral exam dubbed the “Wheel of Fortune”. This will ensure all students are caught up on recent material. See the Lecture Flow of the Course (below) for more information.

- c. Students will be tested by presenting their models and by submitting written summaries. Every student will present once with a few students presenting two or three times during the semester depending on performance. Students should prepare presentations that take ~20 minutes which will be interrupted with questions and discussion. The companies and homework are assigned on Friday, are delivered to a TA by market open on Tuesday (9:30AM), due to the Head Teaching Assistant by market close on Wednesday (4:00PM). At this point Dr. Motlagh will approve the material and it should be finalized by class time on Friday. During the week, when the write-up is due, the papers (if changed at all) are to be sent to Dr. Motlagh by the time the U.S. Markets close on that Wednesday. The papers will then be distributed to all students to allow everyone an opportunity to familiarize themselves with the investment thesis.
- d. Students will submit write-ups on each company. They will also write a final paper, which will be an investment thesis research article for publication in addition to an explanation of why the PDCF is unique.
- e. Students will have weekly readings and will be called on to lead discussions. Many of these discussions will utilize articles written by Prof. Hanke.

4. Workload:

- a. We expect the students, at a minimum, to spend 15 hours per week outside of class on their work. This course should be their top priority.
- b. Students will learn, Prof. Hanke’s dictum: the 5 Ps – Prior Preparation Prevents Poor Performance. If more than 15 hours are required to satisfy the 5Ps, so be it.

LECTURE FLOW OF THE COURSE

Every lecture will begin with a short oral exam. We have dubbed this exercise the “Wheel of Fortune.” A random number generator will select students and ask questions that must be answered on the spot or students must approach the chalk-board to explain a particular concept of importance. All previous lecture material is considered fair game. Additionally, you will be receiving notes and articles from your instructors that discuss recent events in the market. The articles will focus on questions that include, but are not limited to: What is the macro narrative? What news is dominating the conversation? How has the market performed? What were the big movers in the market? Do the big movers represent investment opportunities? What sectors or industries have out- or under-performed? What economic data were released this week? These exams will include these articles and are intended to be short (10 to 15 minutes) and to ensure that students are in tune with the pulse of markets.

The two highest quality publications to read regularly are the *Wall Street Journal* “Heard on the Street” and the *Financial Times* “Lex” columns. It is expected that students keep their nose in the news through a myriad of other sources including, but not limited to: Professor Hanke’s blogs and articles, *Investor’s Business Daily*, *Bloomberg*, *CNBC*, *Zero Hedge*, *Barron’s*, the *New York Times*, etc... Students will be called on to provide insight and offer their opinions on the subject matter randomly throughout lecture as well. These are critical skills to develop if one wishes to be a finance or economics professional. Note that all Hopkins students have access to the WSJ and FT (<http://guides.library.jhu.edu/news>).

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The rest of the lecture will be devoted to teaching and discussing models. In the first five weeks the students will learn how to build PDCF models from scratch (i.e. with primary data in empty spreadsheets), re-sampling theory via Monte-Carlo simulations, how to analyze a company’s incentive structure as contained in proxy statements, and how to use this conceptual framework for investing. After these initial lectures, the students will build a PDCF every three weeks and present it to the class along with a write-up. The written summaries will read as a hybrid between an investment pitch (e.g. sell-side research) and a technical report. This will force students to: (1) Write more and receive feedback on that writing, and (2) Think out their model and investment thesis more thoroughly. Additionally, the write-ups being presented will be distributed to students early in the week for reading. This will ensure that all students are familiar with the company and the model being presented. These discussions will be led in an interview question format to prepare the students for interviews and the professional workplace.

SELECTION OF COMPANIES

Students will pick their own companies and must have them approved by Dr. Motlagh. We highly recommend a Standard and Poor’s (S&P) 500 company within one of the suggested sectors (see Lecture notes #1 for more details). The first 5 weeks will mostly consist of teaching the students how to build, tune, and interpret their first model. Every three weeks after that a new model will be built. Companies will be assigned on weeks 1, 6, and 9.

- All models will be built individually. This is to ensure that each student can perform the analysis independently. We will try our best to have students “specialize” by sectors and accommodate interesting companies.
- The first few weeks we will focus on simpler companies to ensure that students can properly construct the models. Later on, companies will be more difficult (i.e. more complicated financial statements and/or uncertainty in historical statistics) and advanced students can attempt to model exceptionally difficult companies (e.g. financials, pre-profit pharmaceuticals, or mergers/spin-offs).
- If a student wishes to specialize in a specific sector/industry or eventually build one of the advanced models please let Dr. Motlagh know so that we can assign companies accordingly.

WRITTEN SUMMARY OF EACH COMPANY

At least once during the semester, each student will have to present a write-up and a defense of an investment thesis of their choosing in front of the class. This will be a great opportunity for students to learn to write and think on the spot. These skills are critical for a successful analyst. Annex A contains guidelines for how to construct your write-ups – feel free to change the format for however you see fit for your investment thesis. However be warned, the questions and concepts detailed in Annex A must be addressed at a minimum. Part of the pleasure of being an analyst is presenting your intellectual property in creative ways. The final product must be well thought out. If not the student risks having an embarrassing experience in front of the rest of the classroom. Examples of exceptional write-ups can be found in the [Studies in Applied Finance](#) series on the institute website. In particular we highly recommend [James Shin’s Investment Thesis for Mohawk Industries \(SAF//No.1/April 2016\)](#) as an example of how to write an exceptional paper. See Annex A for more details on the writing requirement, required elements of a write-up, and general advice on writing.

FINAL WRITING ASSIGNMENTS

There will be two final writing assignments. The first one is a “how to” guide for building a PDCF. You must write up with an example of a business how to build a model from scratch. You must explain the idiosyncrasies of the model and what they mean, how they differ, and why they are important. Do not copy material from the lecture notes or checklist – you should be able to write this paper with nothing but a model and blank document in front of you. The final papers will be screened for anti-plagiarism and students deemed to have copied material will be punished. The second paper is an investment thesis that must be of publishable quality. They are intended for review and publication in the *Studies in Applied Finance* series at the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise, which is edited by Prof. Hanke and Dr. Motlagh. The form should follow that of [past papers](#). For more on the course designation “W” (writing intensive) and what is expected, see Annex A.

TEACHING ASSISTANT GROUP DISCUSSIONS

There is a significant amount of effort being poured into this course from your instructors and teaching assistants (TAs). There is an expectation that students reciprocate this effort level and professionalism. Each student will be assigned a TA in the first week. This is your direct contact for editing/revising your models and write-ups. Once the homework is assigned on Friday, you will have until 9:30AM on the following Tuesday to submit it to your TA. At this point, the editing/revising process begins until 4PM on Wednesday when it is due to the Head TA. If you do not meet the 4PM submission deadline, you will have an immediate reduction in your grade (see grades and attendance for more information). After the head TA has approved the material, it is then sent to Dr. Motlagh who will give the final approval to proceed to the next stage of the assignment on Friday.

Given the significant work load of the course, the head TA will hold a review session on Mondays at 5PM in Ames 240. The head TA has published multiple papers in the *Studies in Applied Finance* and has extensive experience in editing/revising models. This is an excellent opportunity to discuss any questions or concerns you have with your work before you submit it to your TA on Tuesday. Even if you do not have specific questions or concerns, these sessions will provide insight into other industries/sectors and also help you identify common mistakes made in your models.

IMPORTANT DUE DATES

The culmination of every assigned company is a paper detailing the process and drawing a definitive investment conclusion. The major writing assignments and due dates are detailed in the table to the right.

Assignment	Assigned Date	Due Date	Due Time*
Model #1 Write-Up	9/1/2017	10/5/2017	4PM EST
Model #2 Write-Up	10/6/2017	11/2/2017	4PM EST
Model #3 Write-Up	11/3/2017	11/30/2017	4PM EST
Final Paper Rough Draft	9/1/2017	12/8/2017	4PM EST
"How to" Guide	9/1/2017	12/22/2017	4PM EST
Final Paper	9/1/2017	12/22/2017	4PM EST

*Note: These due date/times are non-negotiable. Failure to turn in assignments on time will result in immediate grade reduction.

READING MATERIAL FOR THE COURSE

Reading will be assigned weekly and we will have a short discussion at the beginning or end of class on the material if necessary. Given the lively nature of the markets, readings will be assigned that are timely and discussions will focus on current developments. Many of these discussions will utilize articles written by Prof. Hanke.

REQUIRED READING MATERIAL

Given the extensive suggested reading material below, we have picked two books which are required readings for the course (in addition to the McClintock book in Annex A). We will consistently reference material from these two books throughout the course. Both books are relatively easy reads and should be completed by week five of the course as we begin presentations.

Topics for required readings - The Capital Cycle and Capital Allocation:

- **Chancellor, Edward (ed). *Capital Returns: Investing Through the Capital Cycle: A Money Manager’s Reports 2002-15*. New York: Palgrave, 2015.** A very insightful book that delves into the capital cycle in various industries and how the lags between investment and changes in supply (the “cobweb effect”) influence margins. An understanding of the cycle is important for timing investments. The book yields insights into how to judge the capital allocation skills of managements, and is useful for making investments, particularly in capital intensive industries subject to large capital cycle savings.
- **Thorndike, William N. Jr. *The Outsiders: Eight Unconventional CEOs and Their Radically Rational Blueprint for Success*. Boston: Harvard Business Review Press, 2012.** This book yields insights on how some of the best CEOs allocate capital and enhance shareholder value. The eight CEOs that are covered operate according to the principles laid out in Applied Economics and Finance.

SUGGESTED READING MATERIAL

Below is a reading list of suggested books for students to obtain and read for preparation to be a financial professional. This reading list is by no means complete, but provides an exceptional starting point to develop general knowledge on the subject matters:

Standard High-Quality General References on Valuation:

- **Damodaran, Aswath. *Damodaran on Valuation: Security Analysis for investment and Corporate Finance*. 2nd ed. Hoboken: Wiley Finance, 2006.** This book does an excellent job of walking through discounted cash flow valuation and multiples analysis. The multiples analysis sections will help wrap your head around its relationship to fundamental value and why the vast majority of equity research uses this valuation methodology.
- **McKinsey & Company Inc. *Valuation: Measuring and Managing the Value of Companies*. 6th ed. Hoboken: Wiley Finance, 2015.** This book is currently treated as “the book” on valuation by a number

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of consulting and investment firms. It is a long read, but it cites the important literature and provides good examples for demonstrating concepts.

Older Classics on Valuation and Value Investing:

- **Graham, Benjamin. *The Intelligent Investor: The Definitive Book on Value Investing*. Rev. ed. New York: HarperBusiness, 2006.** This is one of two classic Benjamin Graham books on value investing; the other being **Graham, Benjamin, and David L. Dodd. *Security Analysis*. 6th ed. New York: Whittlesey House, McGraw-Hill Book, 2008.**
- **Fisher, Phillip A. *Common Stocks and Uncommon Profits and Other Writings*. 2nd ed. Hoboken: Wiley, 2003.** This classic extends Benjamin Graham by stressing the importance of a competitive moat.
- **Klarman, Seth A. *Margin of Safety: Risk-Averse Value Investing Strategies for the Thoughtful Investor*. 1st ed. New York: HarperCollins, 1991.** This book is a classic but costs >\$1,000 due to it only being printed once; it is recommended you obtain an electronic copy online. The physical copy is considered a trophy among value investors.

High-Quality Readings on Various Aspects of Value Investing:

- **Greenblatt, Joel. *You Can Be a Stock Market Genius: Uncover the Secret Hiding Places of Stock Market Profits*. New York: Simon and Shuster, 1999.** Joel Greenblatt is a renowned value investor. In this book, he describes the basics of some of his investment strategies and then walks through “special situations” such as spin-offs and how one can achieve excellent returns.
- **Greenwald, Bruce C. N., and Judd Kahn. *Competition Demystified: A Radically Simplified Approach to Business Strategy*. New York: Portfolio, 2005.** This is one of the few books that deals with competitive market dynamics and pricing power (read: sustainable margins), and then ties them into valuation.
- **Greenwald, Bruce C. N., Judd Kahn, Paul D. Sonkin, and Michael van Biema. *Value Investing: From Graham to Buffett and Beyond*. 1st ed. Hoboken: Wiley Finance, 2004.** This is the textbook used by Columbia Business School for teaching value investing; Prof. Greenwald teaches from this book and has updated Graham/Dodd value investing to reflect more modern times and sprinkles in new knowledge from the last century. It is edifying to read this book after the *Intelligent Investor* and *Security Analysis* to observe the evolution of value investing thinking.

On the Importance of Statistical Distributions:

- **Savage, Sam L. *The Flaw of Averages: Why We Underestimate Risk in the Face of Uncertainty*. 1st Ed. Hoboken: Wiley, 2012.** This is an excellent read on why using point estimate means (and not probability distributions) can lead to misleading and sometimes false conclusions. This type of thinking is at the heart of why we use Monte Carlo simulations for our modeling class.

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- **Taleb, Nassim Nicholas. *Fooled by Randomness: The Hidden Role of Chance in Life and in the Markets*. 2nd ed. New York: Random House Trade Paperbacks, 2005.** Nassim Taleb is another well-known investor who thinks about investment strategies in terms of probability distributions. This book reads more like a novel than a textbook. Taleb was trained by a current Johns Hopkins professor – Professor Helyette Geman.

One for the Investment Bankers:

- **Rosenbaum, Joshua, and Joshua Pearl. *Investment Banking: Valuation, Leveraged Buyouts, and Mergers & Acquisitions*. 2nd ed. Hoboken: Wiley, 2013.** For those interested in investment banking internships, this book is highly recommended before an interview. It was written by two analysts from the Street. They claim that their book would have helped them significantly in their interviews and during their first year on the Street. They are right. Their book serves as a high-level introduction to most subjects encountered.

A Useful Font of Wisdom:

- **Munger, Charles T. *Poor Charlie's Almanack*. 3rd ed. Virginia Beach: The Donning Company, 2005.** As an example of Munger's wisdom, consider: “Our experience tends to confirm a long-held notion that being prepared, on a few occasions in a lifetime, to act promptly in scale, in doing some simple and logical thing, will often dramatically improve the financial results of that lifetime. A few major opportunities, clearly recognizable as such, will usually come to one who continuously searches and waits, with a curious mind that loves diagnosis involving multiple variables. And then all that is required is a willingness to bet heavily when the odds are extremely favorable, using resources available as a result of prudence and patience in the past.”

Keynes as a Value Investor:

- **Chambers, David, and Elroy Dimson. “John Maynard Keynes, Investment Innovator.” *Journal of Economic Perspectives*, vol. 27, no. 3, 2013, pp. 213-28.** Keynes was not only one of the most influential economists of the 20th century, but also a big-time speculator and investor. You are advised to put the information in this article under your belt. It could prove to be valuable in an interview.

A Survey of Global Equity Markets:

- **Dimson, Elroy, Paul Marsh, and Mike Staunton. *Credit Suisse Global Investment Returns Yearbook 2016*. Zurich, Switzerland: Credit Suisse AG, 2016.** This annual volume is the “Bible” on what has occurred historically in all the major stock markets in the world. It contains sophisticated analytical material, too.

Buffett-Munger and Berkshire:

Roger Farley, JHU Writing Seminars graduate (M.A.), one of Professor Hanke's distinguished former students and now a successful investor at Ronin Capital, LLC in Chicago, has made this useful recommendation and remarks: “The [Buffett Partnership Letters 1957-1970](#) are valuable in so many ways. When I was a teenager, I

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learned about Buffett and wondered how people stuck with his stock—didn’t it ever get overvalued, how did they stay in it and how was that ever rational? Reading the letters, you can find your own answer to that question. It’s a very important question to answer.”

The Joel Greenblatt-John Petry Website:

Again, wise counsel from Roger Farley: “I also direct people to go to the website [Prof. Greenblatt] cofounded with John Petry: www.valueinvestorsclub.com. In the top left corner of the site, just below the logo, you can select Show: Contest Winners. You can learn more from a good example than a lot of theory. The contest winners are generally well thought out ideas and are a good way to cut through the mass of ideas. Whether with those selections or just randomly, it is also a fun exercise to go back and pick an unfamiliar idea and take a guess at how it might have worked out.”

GRADES AND ATTENDANCE

Grades will be determined based on overall class performance, quality of material submitted, performance in the “Wheel of Fortune”, and class participation. There is also a strict attendance policy. Given that class convenes only once a week it is expected that students attend every lecture. However, we understand that extenuating circumstances may evolve and thus allow two absences from class with no questions asked. Note that you must e-mail Prof. Hanke, Dr. Motlagh, and the Head Teaching Assistant with at least a 48 hours’ notice that you will be missing lecture. If you are going to miss lecture on the day you are assigned to present, we require at least a two week notice so that we may schedule another student accordingly. This is out of respect to your peers and is part of the professionalism expected from students. We highly recommend you compare your personal schedule to the lecture schedule ASAP.

In the spirit of an elite Hopkins upper-level course, there are no strict cut-offs for letter grades as papers and submitted material will be subjected to edits at the level of publishable peer-reviewed research. As a result, a strict 90% A, 80% B, etc... cutoff is unfair. We expect all students to show improvement throughout the semester. Since this course is made up of students who form an elite corps, a better way to think about grades is that every student begins with an A and will have the grade reduced upon late assignments, lack of improvement, excessive absences, lack of participation, etc... The weighting per assignment is as follows:

- 10% = Write-up and Model #1
- 10% = Write-up and Model #2
- 10% = Write-up and Model #3
- 10% = Rough Draft of Final Paper
- 40% = Final Papers
- 20% = Class Participation.

Note on Class participation: We expect students to be actively involved in all presentation discussions. This course follows a lecture/seminar format. At a minimum, this requires asking at least one question per discussion. Additionally, performance on the “Wheel of Fortune” will be incorporated into class participation.



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Annex A: The Writing Requirement and Assignments

Prof. Steve H. Hanke

To think, one must be able to write. I stress high-quality writing in each of my three courses. When writing, never forget Voltaire’s motto: “Get to the point.” The primary objective in all three of my courses is to produce publishable work. Exceptional papers will be published in the Studies in Applied Economics or Studies in Applied Finance working paper series. I developed this series, in part, for Hopkins students and Fellows at the Johns Hopkins Institute for Applied Economics, Global Health and the Study of Business Enterprise (<http://krieger.jhu.edu/iae/economics/> or <http://sites.krieger.jhu.edu/iae/working-papers/studies-in-applied-finance/>).

I require my students to read Prof. McCloskey’s edifying little book to assist them in reaching a university level of writing and thinking. Also required is the essay on George Orwell by Douglas E. Abrams.

I recommend a most interesting and useful book by Prof. David Crystal. He is an expert on rhetoric and oratory. Crystal has written over a hundred books on these topics, and his new one is important. If you master its content, you will be able to leverage off your other skills and go somewhere. If not, the likelihood of a successful professional career will be limited no matter how “smart” you are and how much you might “know”.

In addition, the Hopkins requirements associated with the writing-intensive (W) designation are listed below, and will be adhered to.

Required readings:

Deirdre N. McCloskey. *The Writing of Economics*. New York: Macmillan Publishing Company, 1987. 2nd Edition.

Douglas E. Abrams. “George Orwell’s Classic Essay on Writing.” *The Nebraska Lawyer*. September/October 2014, pp. 49-56.c

Recommended reading:

David Crystal. *The Gift of the Gab: How Eloquence Works*. New Haven: Yale University Press, 2016.

In order to satisfy the requirements for this class, the student must fulfill the requirements below.

The university defines a writing-intensive (W) course as one in which students write at least 20 pages of *finished writing* over multiple assignments, *usually 3 or 4 papers* of varying length; instructors respond to students’ work in *written comments or in conference*, or both; and students have *at least one opportunity to receive their instructor’s response on a draft and then revise* before submitting the revised version for a grade. In other words, a writing-intensive course does more than assign writing; it guides students’ practice in writing and makes writing an integral part of the course.

- *Finished writing.* “Finished writing” describes papers written outside of class and submitted for a grade. Ungraded pre-draft writing assignments or drafts, in-class writing, journals, and exams do not fulfill this criterion.

- *Usually 3 or 4 papers.* Expertise in writing is gained through the guided practice of writing, as the writer gradually takes on greater challenges. A typical writing-intensive course will therefore assign 3 or 4 papers, starting with shorter assignments and building to longer ones. In writing, as in other complex practices, expertise builds with repetition over time. It’s logical, then, that lower-level W courses (100 and 200) designed to introduce students to writing in a discipline would follow this pattern of assigning 3 to 4 papers. On the other hand, upper-level W courses (300 and 400) designed for majors in the discipline may require only 2 longer papers; and, in some cases, a course may be designed to teach students how to produce a single research essay or article in the discipline. Juniors and seniors, for instance, taking an Independent Study or writing a Senior Essay in the major may work on one 30-page paper for the entire semester.

- *Instructors respond to students’ work in written comments or in conference, or both.* The teaching and learning of writing requires that instructors respond to students’ writing, providing an explanation of both strengths and weaknesses. This responding to students’ writing can take the form of notes written on papers or posted on a course web site, of in-person discussions in conference, or of some combination of these.

- *At least one opportunity to revise.* The opportunity to receive the instructor’s response on a draft and then revise is a key criterion of a writing-intensive course. The instructor’s response to a student’s draft and the student’s revision of the draft, in response, comprise the dialogue of writing instruction. A strong writing-intensive course will offer more than one opportunity to engage in this indispensable dialogue.

Required Elements for a Write-Up

Cover Page

1. Company Logo
2. Basic information about the company (share price, shares outstanding, cap, beta, P/E, etc...). Refer to the cover page of the model from lecture for information you should include.
3. Table of contents.
 - a. Make sure each page is numbered and that there is a header as well that includes: the company name, the date it was last updated, and the name of the student writing it.

Executive Summary (1 paragraph)

1. This should be a paragraph that gives an overview of the paper. You must describe the company, a brief overview of the model, the conclusion you draw from the results, the quality of management compensation and capital allocation, and finally the investment recommendation.

Catalysts/Risks

1. A list of important factors that influence your investment recommendation. For instance, the global macroeconomic landscape will most likely influence your recommendation and should be listed as a potential catalyst/risk.

Company Description and Historical Performance (approximately 5 paragraphs) – The order below will change for each company – it is up to the student to come up with the most cogent order of presentation.

1. What is the company and what do they do?
 - a. What industry/sector are they in? How has this industry/sector performed historically and how do you expect it to perform in the future? How much market share do they have? What are the market dynamics – i.e. is it a consolidated or fragmented market? Who are the major players? Who has the competitive advantage (if any)?
 - i. *An organization chart of the company is desirable.*
 - b. This section will vary significantly. Students should make certain to focus on the company's corporate strategy.
2. What *mechanistically* generates revenue?
 - a. What are the major business segments? How have these segments historically contributed to their business over time?
 - b. As a corollary – how should they be modeled? How must their revenue projections be represented?
3. How has their stock performed? What are analyst recommendations?
 - a. *Must include figure of at least 5 years performance versus the proper index (most companies will be the S&P500, however, some small cap companies may require the Russell 2000 or another appropriate index).*
4. What have the four tuning parameters looked like the past 5 years? Is there a systematic trend? What are the historical averages?
 - a. *Must include a figure and discussion of the four model tuning parameters.*

Model of the company

1. How has the company historically performed and how was the model built?
 - a. Projected Revenue Growth discussion – was the forecast made with geographies, segments, or other? Why is this the best approach?
 - b. Cash Flow/Margins discussion – How has the revenue been spent? Does the company have historically consistent margin structure? Does the business model have operating leverage?

How much has been spent on working capital and capital expenditures historically? How was this information incorporated into the forecast?

- c. Other questions that should also be addressed: is there anything in the historical data that stands out? For instance, if the company had a merger was there a year of data that was thrown out in the historical analysis?
2. Probabilistic Discounted Cash Flow and Tuning of the model
 - a. Not mutually exclusive from the information above, but how were the data aggregated together to forecast future performance?
 - b. What specific assumptions were well determined while others required extra research and/or management guidance?
 - c. How does your forecast compare to historical activity? Are the model tuning parameters within the historical range? If not, then why were the assumptions changed?

Results, Discussion, and Sensitivity Analysis of the model

1. Results and Discussion: What is the expected free cash flow per share from the Monte-Carlo simulation? Is the distribution well-determined? Where does the current stock price fall in the distribution? Does this seem reasonable given market expectations?
2. Sensitivity Analysis: What assumptions significantly change the distribution? Does it make sense that these variables affect the distribution? You should walk through the sensitivity analysis you have performed and how you cleaned up your distribution (if you did).

Capital Allocation Discussion

Capital Sources Analysis

1. Of the major sources of capital (business, equity, and debt), which does the company seem to rely on?
2. Has the company issued additional equity after their initial public offering? This would be problematic as our possible equity stake in the company could be diluted.
 - a. If an additional offering was done, under what circumstances did this happen? Did the company have to raise cash to avoid defaulting? What series of events led up to this event and in your assessment was it something management had control over?
3. If the company has debt please assess how much debt they have – i.e. what is the “leverage” (*Net Debt/EBITDA*), corporate rating, etc...
 - a. What is the company’s corporate rating? Are they in risk of default?
 - b. Has management guided what their goals for capital structure and willingness to take on debt to finance operations, buybacks, and/or mergers & acquisitions?

Historical Allocation Analysis

1. Of the business expenses you have already analyzed in your value drivers tab is there a discernable pattern? For instance, is there a reduction in research & development as a percentage of sales over the course of the last 5 years? If that’s the case perhaps management is changing capital allocation priorities and/or there is some operating leverage in the business.
2. *Mergers and Acquisition (M&A) discussion*
 - a. Has the company done any recent M&A?

- b. What type of deals has the company pursued? e.g. “bolt-on” acquisitions or transformational?
- c. How much did the company pay for these deals? How much was the premium to the market price? Has the deal created value?
- d. How does the company finance their deals?

3. *Return to shareholders discussion*

- a. Does the company return cash to shareholders? If so, do they do it through a dividend or repurchase?
- b. What is the current dividend yield? Is there sufficient dividend coverage?
- c. How big is the current buyback if there is one? How much is approved and how much has management actually bought back?

Compensation and Corporate Governance

1. Who are the executives and board members?
 - a. It is imperative to pay attention to the Chief Executive Officer (CEO), their past corporate history, corporate strategy, the length of their tenure, and the performance of the business during this tenure.
2. Is there an independent compensation committee?
3. What is the compensation structure for the CEO and other Named Executive Officers (NEOs)?
 - a. What portion of their compensation comes from base salary, short-term incentives, and long-term incentives?
 - b. What portion of compensation is at risk each year?
 - c. Is management paid in cash or equity? If equity – what is the vesting period of their shares? Is there a claw back policy?
 - d. What metrics are used for each portion of their compensation? Would you consider these “good” metrics?
 - i. Are they using adjusted accounting? If so please describe an example of the adjustments and whether or not you think these are reasonable.
4. Other points to consider including:
 - a. Does management hold a significant number of shares? Is a significant portion of their net worth tied to equity performance?
 - b. Has management been selling or buying shares on the open market?

Conclusions and Investment Decision

1. Tie together and synthesize your analysis into a brief concluding paragraph. Conclude whether the investment is a BUY, HOLD, or SELL.
 - a. BUY recommendation indicates the analyst believes the stock is under-valued.
 - b. HOLD recommendation indicates the analyst believes the stock is fairly valued.
 - c. SELL recommendation indicates the analyst believes the stock is over-valued.

Suggested data sources: 10-K, 10-Q, DEF-14A as primary data sources from the SEC EDGAR database. Shareholder reports, earnings transcripts (from Seeking Alpha or Bloomberg), Bloomberg Terminal, and Yahoo

Finance as potential secondary sources. Caution must be used for secondary data and private data vendors – make sure to cite your sources. Refer to the lecture notes for additional information sources.

General Writing Advice:

The typical student is quite good at aggregating data into a Word document. However, when it comes to *thinking* about what the data mean and *fluidly writing in a brief manner* students tend to be lacking. A quote that resonates with this observation comes from *With Hemingway: A Year in Key West and Cuba* by Arnold Samuelson: “The first draft of anything is shit.” You should pretend someone who has never stepped foot into the classroom (but has a general sense of finance and the markets) has just picked up your report or presentation and only has 20 minutes to read it and will not want to put the paper down. This means the write-up should read like a story. This is a difficult skill to develop and it only comes with time. Some of the best pieces of advice we can give you (which may overlap with the McClintock book we assigned) are:

1. Read your writing to yourself out loud. This will help you realize if the wording is awkward.
2. Re-read every sentence pretending that words/phrases are removed. Does their removal change the overall point of the sentence? If not, then remove it. Repeat this exercise for each sentence in a paragraph. Then for each paragraph in a section. Then for each section in the paper. *Brevity is the soul of wit* – most of the writing we receive is too wordy and could be reduced in magnitude by ~50%.
3. Finish writing your report at least three days before it is due and then do not look at it for a day. Finally take a fresh look at it the day before it is due. If you are less dispassionate about the work you have poured into the writing you are more inclined to remove redundant information and/or have better perspective on the writing.
4. Ask for help from your Teaching Assistants and Instructors – in aggregate we have all published a significant body of work in top peer-reviewed journals and can offer great feedback.
5. Remember, an Investment Thesis is an opinion, not fact. Thus, any set of assumptions are perfectly valid if supported by the analysis. There is no clear-cut answer in this process thus you will have to develop an opinion and support it.

Required Format of a Write-Up

The student is expected to reach publication quality writing by the end of this semester. As a result, there are certain formatting requirements that must be followed for every paper to get past the editorial process:

- Citations: a link is not enough. You must use APA for our purposes and have it be a footnote. Cite everything that you have gathered from an outside source including websites. You should all be citing the 10-K's, 10-Q's, DEF-14A's, Investor Relations websites, and Bloomberg at a minimum.
- Header/footer: Your paper must include a header with the paper title and author name. The footer must also contain a page number. Refer to previously published papers for formatting help.
- Acronyms: The first time you use an acronym you must define it and then continue to use it throughout the paper. If you are not using the acronym again then do not define it.
- No colloquial expressions/terminology: This should be a no brainer.
- No contractions: e.g. use “they are” not “they’re”

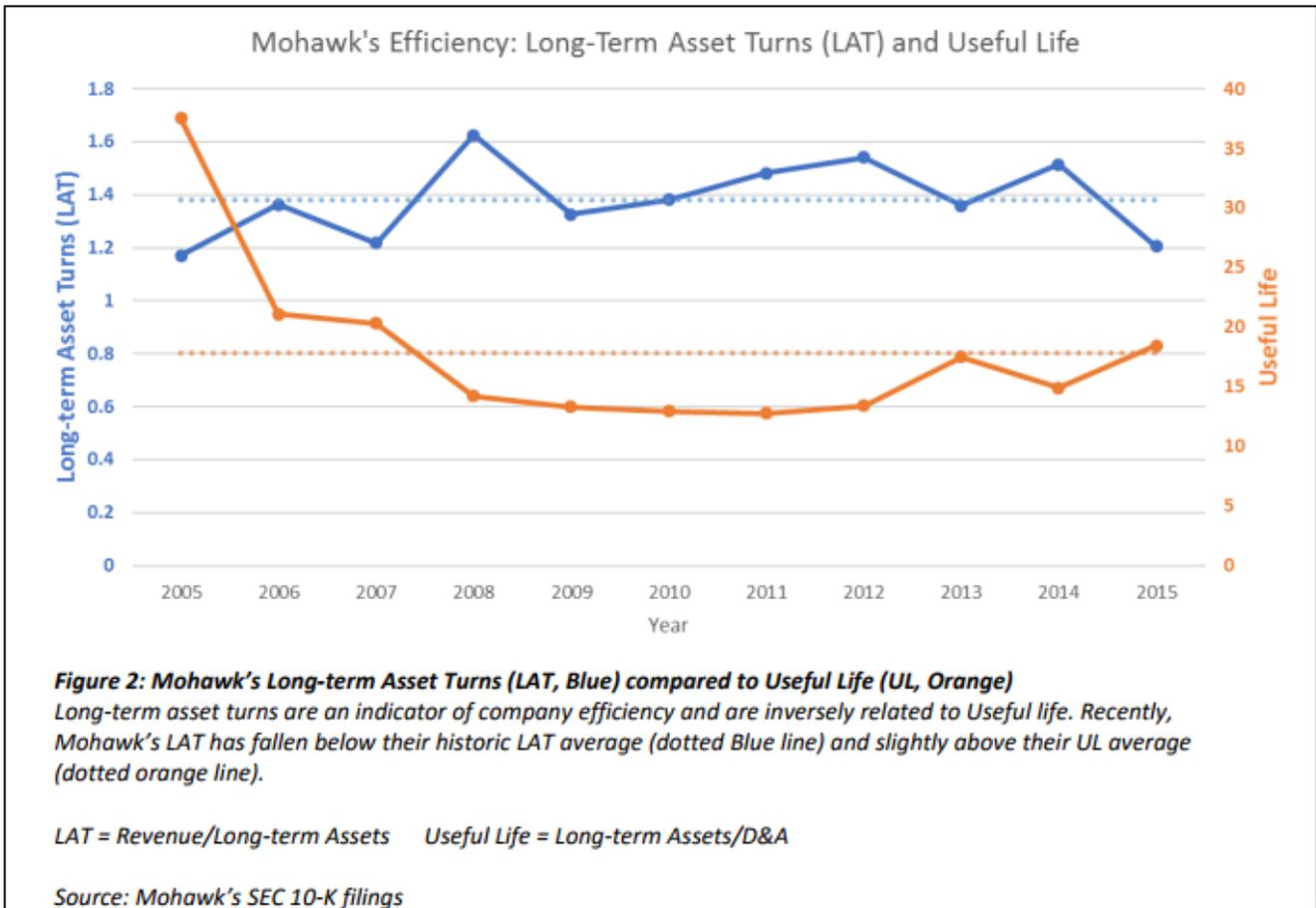
- Oxford comma: This is a hotly contested issue but we always use the Oxford comma for the Studies in Applied Finance.
- Table of contents: Do not build the table of contents by hand – as we edit and revise the paper page numbers will change and sections will move around. This is an utter waste of time. For Microsoft Word users [instructions can be found here](#) or from a cursory Google search.

How to properly make a figure (non-Bloomberg)

Figures are key to your thesis. There are specific requirements for a figure to be included in a publication:

- There must be an informative title.
- Axes must be labeled with units.
- There must be a figure legend describing what the reader is looking at. The reader should be able to get the point you are trying to make with the data by just reading the figure.
- Figures must include sources.
- The figures must be readable (i.e. if you take a screenshot, it should be easily legible)

Overall, the figure must stand on its own. This means that one should be able to read *only the figure* outside of the context of the write-up and understand the point being made. Here is an excellent example of a properly made figure taken from James’ MHK paper:



How to properly make a figure (Bloomberg Screenshots)

Every paper has Bloomberg Screenshots. There are a few requirements for publication:

- The axes must be readable – many screenshots have awful color schemes and/or quality that is so low that we cannot even read out the magnitude of the x- or y-axis.
- There must be an informative legend.
- You must cite the source – i.e. what Bloomberg terminal command did you use and when was it accessed.

See below for an example from Samantha's KITE paper for a properly made Bloomberg Screenshot figure:



Figure 6. Kite Pharma (Nasdaq: KITE) stock performance (white line) compared to the S&P 500 (purple line) and the S&P SmallCap 600 Health Care Index (orange line)

(Source: Bloomberg Terminal; Command <GP>; Accessed 12-8-16)



JOHNS HOPKINS UNIVERSITY

“Applied Economics & Finance” – EN. 570.470 (W, Q, S)

Annex B: Week by Week Breakdown of Lectures

Prof. Steve H. Hanke

Week 1 - Friday, September 1st

- Lecture Topics

- Oral exam
- Introduction to the course and general housekeeping – what makes this class a “Q” and a “W”
 1. Determine which students have (1) taken the course before, (2) know financial accounting, and (3) know how to use a Bloomberg terminal.
- Goals and Summary for this lecture
- Investment management, security analysis, and Market Efficiency
- How are companies valued?
 - Point Estimates versus Probability Distributions
- Revenue, margins, asset-turns, and free cash flow
- Brief overview of the importance of primary vs. secondary data
- How to read a 10-K and 10-Q
- Model: Cover Page, Balance Sheet, and Income Statement.

- Assigned Work

- Read the syllabus
- Read *Notes for Lecture #1*
- Brush up on financial accounting
- Read your company’s 10-K
- Start building the first model: Cover Page, Balance Sheet, and Income Statement
- Read *Notes for Lecture #2* in preparation for the next discussion

Week 2 - Friday, September 8th

- Lecture Topics

Annex B for “Applied Economics & Finance” – EN.570.470 – Prof. Hanke

- Oral exam
- The concept of free Cash Flow, Value, and Value Creation
- Revenue forecast and three examples: (1) Operating Segment, (2) Geography, and (3) Other Metrics.
- Operating and Non-operating Expenses
- Cash Flow Drivers: Current and Long-term portion of the balance sheet
- DuPont Analysis and Model Tuning Parameters
- **Assigned Work**
 - Build your PDCF up through the Value Drivers Tab
 - Read *Notes for Lecture #3* in preparation for the next discussion

Week 3 - Friday, September 15th

- **Lecture Topics**
 - Oral exam
 - Time Value of Money
 - Discount Rates: opportunity cost versus the weighted average cost of capital (WACC)
 - Getting to Free Cash Flow from Revenue Forecasts: leveraged vs. unleveraged free cash flows
 - How to “tune” your model
 - Simple two-dimensional stress tests of models: Sensitivity Analysis
 - The mathematics of resampling theory and Monte Carlo simulations
 - Performing Monte-Carlo simulations and interpreting results
- **Assigned Work**
 - Finish your PDCF and if approved by Dr. Motlagh move on to the Monte Carlo simulation
 - Read *Notes for Lecture #4* in preparation for the next discussion
 - Additional Reading assignments:
 - [“Capital Allocation” by Mauboussin and Callahan](#)
 - Goldman Sachs Equity Research Note from 11/15/2016 – *Management Incentives: 3 questions worth answering* by Derek R. Bingham and Evan Tylenda

Week 4 - Friday, September 22nd

- **Lecture Topics**
 - Oral exam
 - Common mistakes in PDCFs and how to avoid them
 - Capital allocation: Past behaviors and incentives
 - How to read proxy statements and wrap your head around incentives
 - Common incentive metrics
 - Walk through an example of a proxy
 - How to analyze the health of a company’s balance sheet through bonds
 - Depending on time: Multiples analysis and discussion
- **Assigned Work**

Annex B for “Applied Economics & Finance” – EN.570.470 – Prof. Hanke

- Read your company’s DEF-14A
- Finish your proxy write-ups and Monte Carlo Simulations
- Read *A Primer on Relative Valuation*

Week 5 - Friday, September 29th

- **Lecture Topics**
 - Oral exam
 - Relative Valuation
 - How to determine what the market is discounting
 - How to properly “tune” your model and interpret the results.
 - Have the advanced students present their investment theses
- **Assigned Work**
 - Finalize models and write-ups. Prepare to present starting next week.

Week 6 - Friday, October 6th

- **Lecture Topics**
 - Oral exam
 - Begin new student presentations, students will be randomly chosen at the beginning of class.
- **Assigned Work**
 - Second models will be assigned to students. Build up to the PDCF tab.

Week 7 - Friday, October 13th

- **Lecture Topics**
 - Oral exam
 - Go over models and hear investment pitches.
- **Assigned Work**
 - Make sure PDCF is polished, start performing MC simulations, do proxy write-up.

Friday, October 20th - No lecture (Fall Break)

Week 8 - Friday, October 27th

- **Lecture Topics**
 - Oral exam
 - Finish first round of models and investment pitches
 - Begin to discuss financial model (if time permits)
- **Assigned Work**
 - Finish second model and write-up.

Week 9 - Friday, November 3rd

- **Lecture Topics**

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- Oral exam
- Start going over second models and investment pitches.
- **Assigned Work**
 - Assign third models – build up to the PDCF tab.
 - Recommended – start working on write-up as workload decreases

Week 10 - Friday, November 10th

- **Lecture Topics**
 - Oral exam
 - Continue model presentations.
- **Assigned Work**
 - Make sure PDCF is polished, start performing MC simulations, and complete a proxy write-up.
 - Recommended – start working on final write-up as workload decreases

Week 11 - Friday, November 17th

- **Lecture Topics**
 - Oral exam
 - Continue model presentations
- **Assigned Work**
 - Finish third models and write-up and/or start writing rough draft of final paper
 - Outline for final investment pitch.

Friday, November 24th - No lecture (Thanksgiving Break)

Week 12 - Friday, December 1st

- **Lecture Topics**
 - Oral exam
 - Final presentations (if any remain)
- **Assigned Work**
 - Upon approval of final investment thesis write rough draft of your final paper

Week 13 - Friday, December 8th

- **Lecture Topics**
 - Oral exam
 - Final presentations (if any remain)
 - Go over any papers or investment theses students with to discuss.
 - Fill out evaluations.
- **Assigned Work**
 - Your rough draft should be done and you should have some critical feedback at this point.
 - Work on your final paper.

Final writing assignment is due Thursday, December 22nd by 4PM EST (i.e. market close)

No extensions will be granted for the final writing assignment since grades are due immediately afterwards. Plan your finals week accordingly.

All final-write ups are expected to be of publication quality.



JOHNS HOPKINS UNIVERSITY

“Applied Economics & Finance” – EN. 570.470 (W, Q, S)

Annex C: The Check List

Prof. Steve H. Hanke

Introduction

In Applied Economics and Finance, a complex system is developed for the purpose of valuing companies traded on exchanges. Execution errors are the Achilles’ heel of all complex systems that integrate multiple models and require many calculations. As John Kay put it in his 29 August 2012 *Financial Times* column, “You can buy tanning lotion on the beach but delivery of sugar to a cruise line needs a helicopter.” Small errors in execution can be costly. Indeed, a small error in a company valuation can cost an investor a bundle.

This checklist, which has been compiled by students over the years, is designed to reduce errors. Ignorance, ineptitude, and clerical errors are the bane of high quality work products.

Recommended Reading: Gawande, Atul. [*A Checklist Manifesto: How to Get Things Right*](#). New York: Metropolitan Books, 2009.

Prof. Steve H. Hanke

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Purpose

In building Professor Hanke’s valuation system, certain mechanical steps must be followed. Mistakes can be avoided and corrected by referencing this checklist. Rationalization for differing definitions and information surrounding analysis of the model’s output can be found subsequent to the mechanical steps.

Pre-Model Requirements and Conditions

1. Before beginning, the analyst must read the most recent 10-K and 10-Q (if applicable) in great detail. Refer to the notes from the first lecture on how to read annual reports. Additionally, make sure to read the most recent letter to the shareholders.
 - a. The areas to focus on are the *Business Description*, *Risks*, and the *Management Discussion & Analysis*.

Examine the Stock Price and Industry

Questions the analyst should answer before modelling:

2. What is the current price? Why is the price low or high? How has it performed in the past 5 years versus the market or its industry as a whole? Are there any dramatic sell-offs or increases in price? If so, what do these changes correspond to?
3. What is most likely being discounted in the stock price given the high-level narrative? There are usually a couple different competing narratives that the market trades on which is incorporated into the stock price. A question you should eventually answer with your model is: what are the objective market expectations? Knowing the “bear” or “bull” case before you start modelling will help in answering this question.
4. Does the company operate in a well-defined market? Is the market consolidated or fragmented? What market share does the company have?
5. Is the industry heavily regulated? Does it have any dominant players? Is it vulnerable to the emergence of disruptive technologies?

Note: Many of these questions are required for context of modeling of the company. Unless you have previous experience in the industry or sector your company is in, it will be difficult to answer these questions in a timely fashion. This will require reading the company’s 10-K along with other primary data sources. Additionally, you should read the most recent earnings call transcript to get a sense of what analysts from the Street are asking and what management is guiding in the near-term. Earning call transcripts are available from Seeking Alpha and the Bloomberg Terminal. This will allow you to approach the modeling process in a “top-down” fashion and have perspective on what the market is currently discounting into the valuation.

Model Mechanics

Cover Page Tab

6. Every page will have the same information in the top left corner: the company name, the exchange and ticker, the title of the tab (e.g. “Cover Page”), and the analyst name.
7. Include the company logo along a myriad of descriptive information.
 - a. Information such as the company name, the date the model was created, fiscal year, current price, 52-week high and low, market cap, etc... should all be included. Refer to the example model from class for the specific information and how to access it via the Bloomberg Terminal.
8. Historical performance should be included on a 1-year, 3-year, and 5-year trailing basis versus the respective index and sector benchmark. Include two screenshots of the stock price versus the S&P500 and one with comparative returns versus the benchmark and sector benchmark for the past 5-years.

Balance Sheet Tab

- Using only 10-K and 10-Q SEC filings, copy five years of balance sheet data into the second tab of the valuation model. If the last filing available is a quarterly report, then use that data for the current year and make sure to have at least 5 years of annual data if your company is cyclical through the quarters.

Note: Refer to the lecture notes for more detail here. You should be able to understand and explain every single line item to your classmates when you are present the material. Additionally, a change in accounting standards and/or magnitudes of line-items should have an accompanied explanation in a column denotes “Notes” to the right of your balance sheet.

Income Statement Tab

- Using only 10-K and 10-Q SEC filings, copy five years of income statement data into the third tab of the valuation model. If the last filing available is a quarterly report, then use that data for the current year and annualize it by multiplying by the reciprocal of the fraction of the year’s data that is available. You must check if the earnings of your company vary in a systematic fashion by quarter. This can be checked at a Bloomberg Terminal by viewing quarterly earnings and recognizing if there is a consistent pattern of earnings quarter to quarter (most companies will see have such patterns).
- Below the income statement, calculate the cost of goods sold (or cost of sales), net depreciation and amortization (D&A) using the following formula: $\text{Cost of Goods Sold, Net D\&A} = \text{Cost of Goods Sold} - \text{D\&A}$. Note: You may need to locate D&A on the statement of cash flows if it is not specifically listed on the income statement. If D&A is already listed on the income statement then it is not included in the Cost of Goods Sold and does not need to be subtracted. This is an important fundamental concept the student should understand – ask yourself: is D&A a cash expense? If so, what does it correspond to?
- It is important to know whether the sales and earnings of the business are cyclical by quarter. This is usually the case which will make extrapolation of the most recent 10-Q unreliable. One way to assess this is through the historical statements or by using the Bloomberg Terminal.

Value Drivers Tab

- Copy the income statement and balance sheet to the bottom of the tab. The first main section of the value drivers tab will be the “Model Input Parameters” which are detailed in steps 14 through 24.
- Start by demarcating a “Model Input Parameters” section which will be systematically filled in. Calculate the year-over-year (YOY) revenue growth for each pair of consecutive years for every segment using the following formula: $\text{YOY Revenue Growth} = [(\text{Segment Revenue}_t - \text{Segment Revenue}_{t-1}) / \text{Segment Revenue}_{t-1}]$. This should be expressed as a percentage. We will model revenue in more detail in another tab, however these results are required for the operating leverage calculation (steps 26-29).
- For each year of historical data, calculate the percentage of total revenues for each operating expense. Typical values include cost of goods sold (net D&A), SG&A (selling, general, and administrative expense), and research and development. To the right of each of these line-items calculate the average in a

column denoted “Average”, the sample standard deviation in a column denoted “Std. Dev.”, and the trend using a Sparkline in a column denoted “Trend”.

- a. Note: the analyst may have to show discretion if there are one-time items such as “Amortization of Goodwill”. The questions the analyst should ask are: Is this recurring? If so, is it an operating expense?
16. Calculate earnings before interest, taxes, depreciation, and amortization (EBITDA) using the following formula: $EBITDA = 1 - \text{Sum}(\text{all operating expenses})$. i.e. subtract the operating expenses; you may have to show judgement if there are certain line items that are nonrecurring (e.g. a one-time impairment of assets). The reason for this is that when you calculate Taxes as a percentage of “Earnings before taxes” you might artificially inflate the percentage if you decide to zero out the values in your forecast.
 - a. Calculate the average, standard deviation, and trend-line in their respective columns.
17. For each year of historical data, subtract the non-operating expenses including one-time items. For this, you will have to calculate interest expense as a percentage of total debt and also include D&A as a percentage of sales.
 - a. Calculate the average, standard deviation, and trend-line in their respective columns.
18. To yield the “Earnings before Interest (EBT)” margin, subtract every expense except for taxes: $EBT \text{ Margin} = EBITDA - \text{non-operating expenses} - D\&A$.
 - a. Although we do not treat D&A as a cash expense, it provides a tax shield and should thus be subtracted to get a realistic estimate of the effective tax rate.
 - b. To confirm you have performed the calculation correctly at this point, you can determine the EBT margin directly from the income statement: income before tax provisions divided by sales.
 - c. Calculate the average, standard deviation, and trend-line in their respective columns.
19. Calculate the income tax expense as a percentage of EBT. If the company has deferred taxes and/or not earning income this number may seem extremely volatile.
 - a. Calculate the average, standard deviation, and trend-line in their respective columns.
20. Below the Model Input Parameters (leave at least 15 rows of room for other calculation), calculate the working capital for each year using the following formula: $\text{Working Capital} = \text{Current Assets} - \text{Current Liabilities} - \text{Effective Cash}$. Note: $\text{Effective Cash} = \text{Cash} + \text{Marketable Securities}$
21. Calculate the change in working capital between each year using the following formula: $\text{Change in Working Capital}_t = \text{Working Capital}_t - \text{Working Capital}_{t-1}$. There should not be a change in working capital calculation for the earliest year.
22. Calculate the capital expenditures for each year using the following formula: $\text{Capital Expenditures}_t = (\text{Total Non-Current Assets}_t) - (\text{Total Non-Current Assets}_{t-1}) + \text{Depreciation and Amortization}_t$. There should not be a capital expenditures calculation for the earliest year. The Depreciation and Amortization may or may not be found in the income statement (see next section). If not, you will have to obtain it from the statement of cash flows and note the source in your model.
23. Beneath CAPEX calculate the “Invested Capital (IC)” which is $\text{Working Capital} + \text{Long-Term Assets}$.
24. Now calculate the “Cash Flow Drivers” as a margin on revenue – i.e. change in working capital and capital expenditures.
 - a. Calculate the average, standard deviation, and trend-line in their respective columns.

25. Beneath the “Model Input Parameters” you will need to calculate the “Model tuning Parameters”. This semester we are using four parameters that are intimately tied together. Please refer to the *Notes for Lecture #2* for more details on their derivation and importance.
- Potential Free Cash Flow Yield (PFCFY): Although listed second, you need to determine this value first. This will require you to determine what recurring expenses versus one-time expenses are. You will calculate it as follows: $1 - \text{all recurring operating expenses} - \text{interest expense/income} - \text{EBT margin} * \text{Income tax Expense (as \% of EBT)} - \text{D\&A}$. We subtract D&A because this represents the maximum amount of free cash flow yield the company could generate if they only pay their recurring operating and non-operating expenses, have no change in working capital, and pay capex equal to D&A. Make sure you understand why this is the case conceptually.
 - Free Cash Flow Return on Invested Capital (FROIC): This is equal to $\text{PFCFY} * \text{Revenue} / \text{Invested Capital}$ for each year. It represents the return the company generates in FCF on the invested capital.
 - Long-Term Asset Turnover (LTAT): This is a variant of the asset-turn ratio that is tied to FROIC and is defined as $\text{Revenue} / \text{Long-Term Assets}$ for each time period.
 - Percent of Invested Capital in Long-Term Assets (LTA/IC): This term gives a sense of how much the company relies on the long-term versus short-term portion of the balance sheet in its business operations. It is defined as $\text{Long-Term Assets} / \text{Invested Capital}$ for each time period.
26. Beneath the “Model Tuning Parameters” create a new section names “Degree of Operating Leverage Calculation”.
27. Calculate the Operational EBITDA (i.e. “adjusted EBITDA”) numerically using the following formula: $\text{Revenue} * (1 - \text{sum of all operating expenses})$; i.e. do not use non-recurring operating expenses.
28. Calculate the EBITDA growth year over year using the same formula as sales growth.
29. Calculate the Degree of Operating Leverage using the following formula: $\text{EBITDA Growth} / \text{Sales Growth}$.
30. Now for the Model Tuning Parameters and the Degree of Operating Leverage, calculate the minimum in a column denoted “Min.”, the average in a column denoted “Average”, the maximum in a column denoted “Max”, and the trend using a Sparkline as previously described.

Revenue Growth Tab

- Using 10-K and 10-Q SEC filings, copy five years of historical segment revenue data. Do this for both the product segment revenue data and geographic segment revenue data, as available. Annualize final quarter data as necessary. The student should show a lot of discretion when forecasting revenue to ensure that they are projecting segments that are in line with how the business *mechanistically* operates.
- Calculate the year-over-year (YOY) revenue growth for each pair of consecutive years for every segment using the following formula: $\text{YOY Revenue Growth} = [(\text{Segment Revenue}_t - \text{Segment Revenue}_{t-1}) / \text{Segment Revenue}_{t-1}]$. This should be expressed as a percentage.
- Calculate the segment/geography contribution to net sales – i.e. the margin on total net sales which should be expressed as a percentage.

34. For each segment, calculate the historical average YOY revenue growth rate in a column denoted “Average”, the standard deviation in a column denoted “Std. Dev.”, and the compounded annual growth rate (CAGR) in a column denoted “CAGR” to the right of the data. Calculate CAGR using the following formula: $CAGR = [(Revenue_t / Revenue_s)^{1/(t-s)}] - 1$. Note that t corresponds to the final year while s corresponds to the initial year (e.g. if the data are from 2011 to 2015, $t = 2015$ and $s = 2011$). This should be expressed as a percentage.
35. Place an “Assumed” column directly to the right of the CAGR column and link it to either the average value or the CAGR value for each line segment initially.
36. Project the revenues by segment going forward ten years, using the most recent year’s data as year 0. Do this by growing each segment’s revenue by its assumed YOY revenue growth rate for each of the ten years. For example, Projected Segment Revenue_t = Segment Revenue_{t-1} * (1 + Assumed YOY Segment Revenue Growth Rate). Do this for both product segment and geographic segment data separately.
37. Find the sum of all of the product segments’ revenues for each year to produce a total revenue figure for each year.
38. Calculate the margin on total net sales for each segment/geography as previously described.
39. Calculate the CAGR of the forecasted revenue for each line segment as a reality check on your assumed rate – i.e. the assumed rate should be equal to the CAGR you calculate for your 10 year projection.
40. Repeat these steps for any method of revenue forecasting. Refer to the lecture notes for other mechanisms of forecasting revenue.

Probabilistic Discounted Cash Flow (PDCF) Tab

41. Refer to the model from lecture to understand the organization of steps 41-46 which will be placed above the PDCF. First, list all the assumptions along with their averages, standard deviations, and the trend line in a section denoted “Model Input Parameters”.
 - a. At the top make sure to have the revenue assumptions used to model the business from the *Revenue Growth* tab, followed by the operating expenses, non-operating expenses, cash flow drivers, and the degree of operating leverage (DOL) statistics.
42. Create a section to the right denoted “Model Discounting Parameters” with the Discount rate of 10 percent, the actual company WACC taken from Bloomberg, and the terminal growth rate of 1.5 percent.
43. Create a section below the “Model Discounting Parameters” denoted as the “Model Tuning Parameters”. Demarcate two sections for the Model Output and the Historical Statistics. Fill in the Minimum, Average, Maximum, and Trend for the historical statistics. The model output will be calculated below.
44. Underneath the Tuning Parameters, denote a section “% of DCF in TV” which will be the percentage of the sum of the DCF contained in the Terminal Value (TV).
45. Underneath the “Model Tuning Parameters”, create a section denoted “Wall Street Comparison Output”. We will transfer over four years of data from the model to compare it to the Street. Denote the years with the letter “E” (e.g. 2019 forecast is “2019E”). For each of the four fiscal years, create rows corresponding to Sales, adj-EBITDA, adj-Income, adj-EPS, Implied P/E, and Unlevered-FCF which will be directly compared to consensus estimates (see model from lecture for more detail).

46. Finally, to the right of the “Wall Street Comparison Output”, make a section denoted “Model Valuation Output” which will eventually contain your estimated share price, the current price, and projected gains/losses.
47. Beneath all of these inputs and outputs, create a section denoted “Probabilistic Discounted Cash Flow Model”. List out the most recent year along with the 10 forecasted years to be included in the DCF. Place the period number that each year represents above the actual year, with the first forecast year being period 1 and the tenth projected year being period 10.
48. List the assumed YOY revenue growth rate for each projected year. Link year one’s YOY growth rate to the assumed revenue growth rate cell above the DCF. Then, link each future year cell to the previous cell, resulting in each projected year having the same assumed revenue growth rate.
49. Calculate the projected revenue for each projected year (periods 1-10) using the following formula: $\text{Projected Revenue}_t = \text{Projected Revenue}_{t-1} * (1 + \text{Assumed Revenue Growth Rate})$. Note that for Year 1 you will have to calculate it based on the most recent historical data.
 - a. If you are forecasting using a more granular approach, then list each segment/geography and grow each line item individually. Sum the values to get total net sales and calculate “Total Revenue Growth Rate” for each year.
50. Paste in the name of every operating cost. Link the assumed percentage of total revenues for each value driver in the projected year one column. Link the next year’s percentage of total revenues to the previous year’s, starting with year two. This should result in assumption maintaining its same share of total revenues over every projected year.
51. You are expected to pay close attention to detail to succeed in this course and as an equity analyst. Thus, your first assignment that will count towards your participation grade is to demonstrate that you have read this syllabus.
52. Please e-mail Prof. Hanke and Dr. Motlagh citing that you have read up to this point and include the following in your e-mail: the name of your favorite investor, a link to an article about the investor, and a brief summary of the article.
53. Beneath the operating costs, create a Degree of Operating Leverage “DOL” for each year that is linked to the assumption above. Initially, assume a value of 1.0 (i.e. no operating leverage).
54. Beneath the DOL number in year 1, calculate the Operating Leverage using the following formula: $(\text{DOL} - 1.0) * \text{Revenue Growth} * \text{Revenue}$.
55. For years 2-10, calculate the Cumulative Operating Leverage as follows: $\text{Operating Leverage}_{t-1} + (\text{DOL}_t - 1.0) * \text{Revenue Growth}_t * \text{Revenue}_t$.
56. Calculate EBITDA using the following formula: $\text{Total Revenue} - \text{Sum}(\text{Operating Expenses}) + \text{Cumulative Operating Leverage}$. Also calculate the EBITDA as a percentage of Total Revenue as “EBITDA Margin”.
57. Calculate the value of all non-operating costs beneath EBITDA as percentage of sales except for Interest and Income Tax.
 - a. For the interest expense you will have to carry over the previous year’s Total Debt and project that into the future based on the interest expense assumptions.
 - b. Calculate the current year’s interest expense as follows: $\text{Interest Expense Margin}_t * \text{Total Debt}_{t-1}$
 - c. Calculate Total Debt in the current year as follows: $\text{Total Debt}_t = \text{Total Debt}_{t-1} - \text{Interest Expense}_t + \text{Interest Expense Margin}_{t-1} * \text{Total Debt}_{t-1}$
 - d. Finally, zero out the interest expense in Year 10.

- e. For a conceptual overview of why this is the case, refer to the lecture notes.
58. Arrive at the *Earnings Before Taxes* value using the following formula: EBITDA – Non-Operating Costs – D&A.
59. Calculate the Income tax expense as a percentage of EBT.
60. Calculate Net Operating Profit after Interest and Taxes (NOPAIT) for every projected year using the following formula: NOPAIT = EBITDA – Non-Operating Costs. Note that this does NOT explicitly include D&A.
61. Calculate the projected values of change in working capital and capital expenditures for each projected year by multiplying their respective share of total revenues for each year by the total projected revenue for that year.
62. Calculate the free cash flow (FCF) for every projected year, except the final projected year, using the following formula: FCF = NOPAIT – Change in Working Capital – Capital Expenditures.
63. Calculate the discounted free cash flow for each projected year using the following formula: $DCF_t = FCF_t / (1 + \text{Discount Rate})^t$, where T is the time period.
64. Find long-term debt from the balance sheet and/or 10-K or 10-Q and transfer it over near the year 10 FCF forecast.
65. Calculate the final projected year (period 10) DCF known as the Terminal Value using the following formula: $DFC_{10} = (((FCF_{10} * (1 + \text{Discount Rate}) / (\text{Discount Rate} - \text{Terminal Growth Rate})) - \text{Total Debt}_9) / (1 + \text{Discount Rate})^{10}$.
66. Beneath the PDF, create a new section denoted “Model Valuation of the Company”.
- Sum all 10 of the projected DCFs. At this point, you can calculate the percent of the sum contained in the terminal value. Usual values are 40-60%.
 - Calculate effective cash by adding the latest cash balance on the balance sheet to any short-term securities on the balance sheet.
 - Calculate the equity value using the following formula: Equity Value = Sum of DCFs + Effective Cash.
 - Find the diluted total shares outstanding from the latest 10-K or 10-Q.
 - Calculate the projected price per share using the following formula: Price per Share = Total Equity Value / Total Diluted Shares Outstanding.
67. Link the estimated price per share cell that you originally put above the DCF to the cell in the DCF where you just calculated the estimated price per share value.
68. Calculate the projected gain or loss on the stock using the following formula: Projected Gain/Loss = (Estimated Price – Current Price) / Current Price. This should be expressed as a percentage.
69. Beneath the “Model Valuation of Company”, create a new section denoted “Model Tuning Parameter Output”
- Carry over the Long-Term Assets, Working Capital, and Invested Capital values from the final year of historical data.
 - For each year t calculate the new working capital using the following formula: $WC_t = WC_{t-1} + \text{Change in Working Capital}_t$.
 - For each year t calculate the Long-Term Assets (LTA) using the following formula: $LTA_t = LTA_{t-1} + CAPEX_t - D\&A_t$.
 - Arrive at the Invested Capital (IC) in each year by summing the WC and LTA.

70. Using the WC, LTA, and IC results, calculate the four model tuning parameters using the following formulas:
- Free Cash Flow Return on Invested Capital: $FROIC_t = FCF_t / IC_t$
 - Potential Free Cash Flow Yield: $PFCFY_t = FCF_t / Revenue_t$
 - Long-Term Asset Turnover: $LTAT_t = Revenue_t / LTA_t$
 - Percent of Invested Capital in Long-Term Assets: % of IC in $LTA_t = LTA_t / IC_t$
71. Transfer over to the “Model Tuning Parameters” near the top the Minimum, Average, Maximum, and Trend lines of the “Model Tuning Parameter Output” to be directly compared to historical values.
72. Finally, transfer over the values from your model to the “Wall Street Comparison Output” using the following values or formulas:
- For Sales, simply use the forecasted Revenue.
 - For adj-EBITDA_t, use the EBITDA_t estimate from your model.
 - adj-Income_t: Earnings Before Taxes_t – Tax Expense_t.
 - adj-EPS_t: adj-Income_t / Diluted Shares Outstanding.
 - Implied P/E_t: Estimated Share Price / adj-EPS_t
 - Unlevered Free Cash Flow: $UL-FCF_t = FCF_t + Interest\ Expense_t - Interest\ Income_t$.
 - Use a Bloomberg Terminal to access the consensus estimates for each of these (see lecture notes) and transfer them over for direct comparison to Wall Street.
73. At this point, your model is ready to be error-checked and tuned to obtain an estimate of the share price.

Differing Definitions

- Working capital = Current Assets – Current Liabilities – Cash & Cash Equivalents
- Capital Expenditures_t = (Long-term Assets)_t – (Long-term Assets)_{t-1} + D&A_t
- Discount Rate = 10%
- Terminal Value₁₀ = [Free Cash Flow₁₀ * (1+r)] / (r-g) – (Total Debt₉)
Discounted Cash Flow₁₀ = PV (Terminal Value₁₀) = (Terminal Value₁₀) / (1+10%)¹⁰

Reasoning for Differing Definitions

- Working Capital: Note that the line item ‘cash and cash equivalents’ is subtracted from working capital. The reason is that cash should not be treated as an operating asset. Conceptually this is difficult to grasp – of course cash is required to run a business. However, the amount of cash on the balance sheet is usually a *capital allocation decision made by management* and not reflective of the day-to-day operations of a business. For instance, Apple has accumulated a significant amount of cash on their balance sheet over the course of many years as of the time of this writing. This would arbitrarily make it seem that the company needs to reinvest working capital into the company to perform day-to-day operations when in fact it is simply done to keep the company’s balance sheet healthy and not repatriate cash back into the United States. To conflate *capital allocation* with *using cash to operate the business* is the main reason why we do not treat cash as a current asset in working capital.

- (2) Capital Expenditures: By analyzing the change in the company’s asset base within the CAPEX calculation, the analyst is able to capture the total amount of cash spent on acquiring new long-term assets. This is very important from the perspective of an investor because this cash is no longer available to the shareholders. Moreover, depreciation and amortization expense is added back to CAPEX even though this is a non-cash expense. This is done because all depreciable assets will have to be replaced one day. Once that day comes, the replacement of each asset will require cash, which will be a cost against free cash flow.
- (3) Discount Rate: We do not use the company’s WACC for many reasons (refer to lecture notes). One primary reason is that a company’s WACC is constantly changing through time. However, more importantly, another reason is that the investor is more concerned about his or her opportunity cost of capital, not the opportunity cost of capital from the perspective of the firm. By definition, WACC is the cost of capital for the firm, which is very different from the investor’s cost of capital. Thus, the investor should use a discount rate that reflects his or her opportunity cost of capital, such as the average return of the S&P 500, which happens to be 10%.
- (4) Instead of using a terminal multiple, we elect to use a perpetual growth model. This formula simply happens to be an extension of Gordon’s Growth Model, except the face value of the company’s long-term debt is subtracted from the expression to achieve a terminal value. Here we make the assumption that the company’s total debt will be repaid at year 10. It is unreasonable to assume that the company will pay back its debt immediately; the firm will typically roll over its debt. Consequently, we believe that dealing with the firm’s debt in year 10 is the most realistic approach. As a result of assuming that the company’s debt will be repaid in year 10, we also assume that interest expense in year 10 is equal to zero.