MTH 9897 Final Projects 2024

All the homework should be submitted via email to TA in **Jupyter Notebook** file format. You may have separate *.py files to reference in the notebook. Please submit both code and the data and make the final project runnable from start to finish. If calculation takes a long time you can pre-cache intermediary steps on the disk. Both instructors will be available for questions on the final projects during the semester. Please post on the forum your team number, team members of maximum 3 people along with the project (number and title) you have chosen as it works on a first come first serve basis.

You can choose Quantopian \ Zipline (Python), QuantConnect \ Lean (Python or C#), Backtrader (Python) trading platforms or implement the strategy yourself without an engine. You can choose either a web-based engine (using data provided by a platform) or implement a local backtest using open-source backtesting engines and data from WRDS. In the class I will show you both approaches. Last year 90% of the students implemented the strategy themselves but at that point we did not have a comprehensive demo on how to run the strategy locally with an engine. Please also note that Quantopian website was closed in October 2020, but open source zipline is available.

If you decide to use a web-based engine, at the first step just find the closest example online that works with the same data type as you intend to use. For example, if you intend to use fundamental data from 1998 to now, trade monthly 50 stocks out of 1000 in the universe, take this example and modify it accordingly. https://www.quantconnect.com/tutorials/strategy-library/momentum-effect-in-stocks This would allow you to assess at an early stage with minimum time spent whether the study you are trying to conduct is doable in QC.

You may choose not to write the strategy on the platform and just go with Python Jupyter. Moreover, some research papers cover some systematic trading aspects but does not necessarily involve trading per se, in such a case, using just Jupyter Notebook is more appropriate (example: https://arxiv.org/pdf/1409.7720.pdf). If, for example, you use monthly data and can handle survivorship bias correctly, manipulating the data in just Jyputer Notebook \ pandas + numpy (without a platform) may be an easier and better choice.

You will have access to WRDS data source (Wharton Research Data Services), which contains a lot of great industry and research-standard databases (CRSP, Compustat, OptionMetrics etc.). Try to play with this data and incorporate it to the research while you have such an excellent opportunity. If you decide to go with more complex WRDS data and spend some time on cleaning and understanding the data (for example Fixed Income or Options data), the instructors will factor it in and add a credit for data handling. Focusing more on data and less on strategy enhancements is a totally valid case.

Please keep in mind that you can choose a paper yourself. Please go to www.ssrn.com or arxiv.org and search the topic you are interested in. Please check with teaching instructors on a paper choice before you start the implementation. You can collaborate and use part of each other's code (P&L calculation, data cleaning etc.) and invest saved time in research.

1. Enhanced Momentum Strategies (Equity)
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3437919
Momentum investing is a very popular quantitative trading strategy and involves capitalizing on the continuance of an existing market trend. The strategy buys the winners and sells the losers in long/short or just buys the winners in long only portfolio construction. At the poor market condition when the market starts to rebound, the losers experience strong gains, resulting in a "momentum crash" as momentum strategies short these assets.

The given paper investigates three methods to decrease momentum crashes and claims that all three decrease momentum crashes and lead to higher risk-adjusted returns.
Those methods are **idiosyncratic momentum**, **constant volatility-scaling** and **dynamic scaling**.
Constant volatility-scaling adjusts the momentum portfolio to a constant target volatility level (say 10%) using the formula: Weight = Target Vol / The Forecasted Expected Volatility
The dynamic strategy enhances constant volatility strategy by additionally forecasting the expected return. Expected return is estimated from the fitted values of an autoregressive model extended by the forecast of the calibrated GJR-GARCH (the latter is available in Python).
Idiosyncratic momentum is calculated from idiosyncratic residuals calculated by regression of stock returns vs. Fama-French three-factors.

Only the US market is in scope for the project and it is desirable to use CRSP data from WRDS that starts in 1926. To save you some time I can share with you examples of CRSP data processing and strategies. You can also combine efforts on data components with other teams with similar starting data sets and stock universe. The desired outcome of the project is constructing P&L curve for classical momentum strategy and (hopefully) three momentum strategies that decrease momentum crashes and are described in the paper.

The sector consideration was not described in the paper. One reason for getting not comparable or unexpected results could be that you need to run stock selection logic separately sector by sector. For example if you work with top 1000 securities by market cap and Technology sector represent 15% of securities in this set and your strategy selects 50 momentum securities on a monthly basis, then you need to select 15%*50 = 7-8 securities from the Technology sector. This logic could be calculated by market or simple security count. You can impose sector constraints, say no more than 15-20% should be allocated to a single sector and such constraints, for example, will be hit by the Technology sector in 1999.

2. Fundamental data anomalies 1 (Equity Fundamentals)
Most papers on US Equity combine price and fundamental data (balance sheet, cash flow, income statements). Price data is available in the CRSP database and fundamental data in the Compustat database in WRDS. The mapping technique and data fields are described in WRDS documentations. I can provide a good example of combining and using those datasets to save you some time.
Pick from a 447 documented anomalies: Replicating Anomalies by Hou, Xue,
Zhang (posted) https://www.ivey.uwo.ca/cmsmedia/3776713/zhang_.pdf
More than one group can take this project but implement different strategies.
The paper replicated the entire anomalies literature in finance and accounting by compiling a largest-to-date data library that contains 447 anomaly variables. It contains the technical description \ calculation of all the anomalies and is a good reference point.

You have a lot of freedom here to pick and test various factors. Some of them are very easy to implement. The sector consideration described in Enhanced Momentum Strategies project may be applicable here.

3. Size and Value Anomalies (Equity Fundamentals)
Please read Chapter 10 Size and Value Anomalies of The Handbook of Equity Market Anomalies.
The value anomaly is a tendency of value stocks (stocks with low prices related to their fundamentals) to outperform growth stocks. **The size** anomaly is an empirical finding that small companies earn higher risk-adjusted returns than their larger counterparts. Value and size factors are included in the Fama-French three-factor model, one of the most recognized risk models.

The 20-page chapter in the book summarizes different papers and aspects of value and size investing. You can choose which particular analysis you would like to implement. You can start with a simple trading strategy based on classical value and size factors, however for this project it is expected that you will implement less trivial and more interesting ideas described in the chapter.

Here are some examples mention in the chapter to give you an idea:

- alternative value indicators (for example EM=EV/EZBITDA)
- decompose BE\ME ratio into operating (represent operating risk) and financing components (financial risk)
- use the value spread and the earnings growth spread as a predictors of the value premium
- check value premiums for stocks with large idiosyncratic volatilities
- combine value factor with distressed risk factors, i.e. O-score

4. Fundamental data anomalies 2 (Equity Fundamentals)
The same comments related to the fundamental data analysis as in **Fundamental data anomalies 1** is applied for this project.
Please read Chapter 5 Fundamental Data Anomalies of The Handbook of Equity Market Anomalies

12-page chapter in the book summarizes different papers on fundamental characteristics. You can choose which particular analysis you would like to implement. For example, here are a few examples be that could be implemented and described in the chapter:

- Piotroski F-Score derived from 9 fundamental metrics and measure 3 areas of a firm's financial condition: profitability, financial leverage and operating efficiency
- Mohanram's G-Score derived from 8 fundamental metrics
- Strategy based on 1. INV, measured as the difference between changes in sales and changes in inventory; 2. GM, measured as the change in gross profit less the change in sales 3. S&A measured as the change in sales less the changes in selling and administrative expenses (Abarbanell and Bushee, 1997)
- Altman's Z-Score and Ohlson's O-score - the financial ratio analysis used to develop bankruptcy prediction
- Capital investment and growth anomalies. Example: the firms that increase their investment expenditures the most tend to underperform their benchmark and other

5. Option Data trading strategy (Options)
Last year students implemented the following paper and it was one of the best projects.
Risk-Neutral Skewness: Return Predictability and Its Sources (extra credit project)
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1301648

If you are interested in a trading strategy that uses options data (either just trading options or combining options and equity data), please choose a different paper. WRDS provides two option data sources (Option Suite by WRDS and OptionMetrics).

The gist of the trading strategy that was implemented last year was to calculate some measure (Risk-Neutral Skewness) from very rich and multi-dimensional options data and use this measure in trading strategy combining with equity price data. I can help and provide an example of how to process multi-dimensional option data (any vol-surface dimensions) and you can reuse the code.

You can start your search by entering 'Options Investing' or 'Options Trading' keywords on ssrn.
This paper is worth looking at as it summarizes some strategies.
151 Trading Strategies (covers many asset classes)
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3247865

6. CTA / Commodity Futures trading strategy (Futures)

Last year students successfully implemented the following two strategies on Commodity Futures investing. The core\classical CTA strategy is trend following. Here is the link to relevant book that explains the fundamental reasons for the existence of trends in commodity futures. Please find more interesting or just different CTA trading strategy (i.e. Mean Reversion from 151 Trading Strategies paper https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3247865) on www.ssrn.com or arxiv.org

I can share the data and logic to process futures data but the data part for this project is easy. There will be about 50 most liquid futures that are presented as Back Adjusted Continuous Contracts (BACC) and you will have no more than 50 time series as an input.

Papers from last year:

6.1. Demystifying Time-Series Momentum Strategies: Volatility Estimators, Trading Rules and Pairwise Correlations: https://pdfs.semanticscholar.org/a2e9/df201d4b4774fda84a961cc804f2450988c5.pdf In short, those are classical trend following strategies with some position adjustments based on volatility and pairwise correlation.

6.2. Two centuries of trend following. Another way to express momentum https://arxiv.org/pdf/1404.3274.pdf. In short, this is a classical trend following strategy.

7. CTA / Commodity Futures calendar spread trading strategy (Futures). Extra Credit project.

There are several commodity futures contracts with different expiration traded at a time (for example Crude Oil ~ CL March 2022, CL April 2022 etc.). Different types of trading strategies trades commodity calendar spreads (for example buy 88 constructs of March contract and sell 88 constructs of April constructs).

There are many advantages of trading calendar spreads and among them are:

- spreads do not fluctuate from fundamentals for a long time (when the Crude Oil trended from $150 to $35, the spread has been in a reasonable range)
- the behavior of spreads is by far more predictable than that of outright position

Example 1: In the case of backwardation investors will accrue a positive roll return (return associated with futures roll from one month to another) and in case of contango negative roll return. Thus, we can sell the spread at contango and buy the spread at backwardation.

Example 2: Next, we can look at the whole slope curve and buy the most backwardated contract and sell the contract most in contango.

There are several such strategies, and we can explore some of them and find relevant papers. We can also help you to find the data.

8. The Conservative Formula: Quantitative Investing Made Easy (Equity)

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3145152

The paper is very interesting and the implementation requires only price historical data. For the US data, the authors utilize CRSP data going back to 1926.

Is it possible to build a simple systematic approach that beats investing in complex factor models? The research team here has proposed that a simple formula based on low return volatility, high net payout yield (dividends +/- stock buybacks), and strong price momentum gives investors exposure to the most important factor premiums in one easy-to-implement investment strategy.

The process to narrow down the largest 1000 stocks to 100 went as follows:

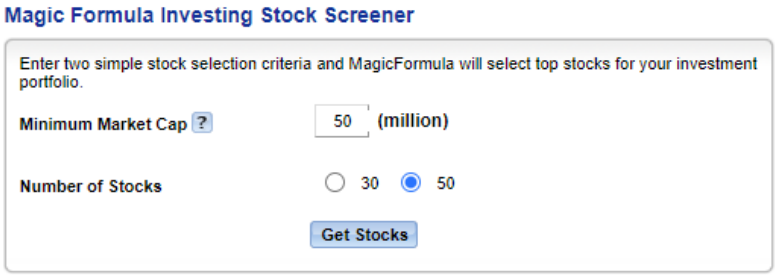
- First, they sorted the 1000 stocks into two groups based on their historical 36-month stock return volatility, which yields a high volatility group and a low volatility group.
- Then each stock in the low volatility group is ranked on its 12-1 month price momentum and total net payout yield.
- The momentum and net payout ranks (1-500) are simply averaged and the 100 best stocks in the final portfolio are equally weighted.

Please implement the strategy using CRSP data since 1929 as in the paper (data is available on WRDS). Some time should be devoted to studying and managing the data and it will be factored in grading. You will benefit by learning the data and will be able to run longer backtest simulation for different papers for yourself after the class (for example, you should be able to quickly change the logic to study momentum effect in the US Equities as per "Demystifying Time-Series Momentum Strategies:Volatility Estimators, Trading Rules and Pairwise Correlations" which utilized CRSP data since 1927).

Students implemented this strategy last year, but the result was quite noisy. It was either because they did not account for the sector positioning described in Enhanced Momentum Strategies project above or because they did not correctly account for net payout dividends (=dividends to shareholders + indirect effect from stock repurchases). Students still have got A for good effort. I am happy to share the data cleaning part if needed.

9. Greenblatt Magic Formula published in The Little Book That Still Beats the Market book (Equity Fundamentals)

Implement stock selection logic that is described in [The Little Book That Still Beats the Market] by Joel Greenblatt. The book could be borrowed from TA to save your time. Please use the following website to check the correctness of your logic by comparing the position: https://www.magicformulainvesting.com



Top 50 companies with a minimum market cap. of 50 million

Company Name (in alphabetical order)	Ticker	Market Cap ($ Millions)	Price From	Most Recent Quarter Data
Alexion Pharmaceuticals Inc	ALXN	22,021.74	08/21	06/30
Altria Group Inc	MO	80,765.49	08/21	06/30
AMC Networks Inc	AMCX	1,282.14	08/21	06/30
Barrett Business Services Inc	BBSI	436.27	08/21	06/30
Biogen Inc	BIIB	43,860.18	08/21	06/30

Greenblatt suggests purchasing 30 "good companies": cheap stocks with a high earnings yield and a high return on capital. He claims that it does in fact beat the S&P 500 96% of the time, and has averaged a 17-year annual return of 30.8% (recent years were not included though).

Formula

1. Establish a minimum market capitalization (usually greater than $50 million).
2. Exclude utility and financial stocks.
3. Exclude foreign companies (American Depositary Receipts).
4. Determine company's earnings yield = EBIT / enterprise value.
5. Determine company's return on capital = EBIT / (net fixed assets + working capital).
6. Rank all companies above chosen market capitalization by highest earnings yield and highest return on capital (ranked as percentages).
7. Invest in 20–30 highest ranked companies, accumulating 2–3 positions per month over a 12-month period.
8. Re-balance portfolio once per year, selling losers one week before the year-mark and winners one week after the year mark.
9. Continue over a long-term (5–10+ year) period.

It looks like someone already implemented the strategy on QuantConnect, but the code is not public.
https://www.quantconnect.com/alpha/d9a666f710152132129bb1c8c

Here is a related discussion that contains similar example
https://www.quantconnect.com/forum/discussion/1320/joseph-greenblatt-s-magic-formula/p1

This is probably the most useful link that contains the strategy implementation.
https://www.quantopian.com/posts/magic-formula

10. Statistical Arbitrage by Avellaneda (Equity or ETF)
https://www.math.nyu.edu/faculty/avellane/AvellanedaLeeStatArb071108.pdf
This is the classical paper and the results of the paper are mixed since it is non-trivial to make this strategy "work". Nonetheless, it is a good exercise to understand the challenges of pairs trading. The minimum requirement is to extend existing methodology to present time. Suggestions how to improve the strategy are given in the lecture notes. The major "boosters" to P&L will be using volume time to suppress "information-rich" events as non-reversing, avoiding trading in certain sectors and around the earnings. Also, if using Russell 1000 or SP500 universes (like authors did), use a richer set of ETFs that is available now (ETFs that hedge known risk factors such as size, low volatility, dividend premia, growth stocks, etc.). Consult with the instructors on the list of suggested ETFs. For extra credit implement this strategy in different market and use newer PCA techniques to identify stable risk factors:
https://mpelger.people.stanford.edu/sites/g/files/sbiybj4571/f/factors_that_fit_the_time_series_and_cross-section_of_stock_returns_20181126.pdf

11. 101 Formulaic Alphas (Equity)
https://arxiv.org/pdf/1601.00991.pdf
The signals from this paper may look a bit obscure (they are clearly what's called "technical" factors), however quite a few of them still work out of sample, especially in less efficient markets (not US). Most of them are very easy to implement. The exercise here is to find a sane way to select a group of factors that still work, suggest a way to combine them by "themes" and run model diagnostics and roughly evaluate strategy characteristics (turnover & capacity).

12. Factor Investing in the Corporate Bond Market (Fixed Income)
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2516322
Building Fixed Income and Credit trading strategies, in my opinion, are more rare skills to find and more on demand on the job market.
A given paper portfolio is constructed by sorting on one of four factors (size, low-risk, value and momentum) calculated for the US Corporate Bonds universe.
Size contains bonds of small companies, based on the market value of their outstanding bonds.
Low-Risk contains short-maturity bonds with a high credit rating.
Value selects bonds whose credit spread is high relative to a model-implied fair spread.
Momentum consists of bonds with high past returns.
Not the whole paper is in scope for implementation as a lot of additional analysis in the paper could be omitted and some methods simplified. For example, paper is using all the bonds in the Barclay US Corporate Investment Grade and High Yield indexes. A constituent of the Barclay's index may be hard to find (Bloomberg has it but the access may be limited on the college terminal) and in this case you can start with the corporate bond universe in the WRDS database and apply some screens\filters, such as minimum amount outstanding etc.
Suggested goal is to implement some factors from the paper and build P&L curve for long only and long/short portfolios, find break-even transaction cost and compare the result with corresponding ETF or better index benchmarks which could easily be downloaded from Bloomberg.

Previously no student groups implemented FI projects. Instructors will give credit for a good effort even if the project is not going to be 100% complete for data or other limitations, but some intermediary results should be achieved (for example data cleaning, understanding and factor construction but not P&L backtest because of some limitation).

13. Alternative Fixed Income and Credit Strategy (Fixed Income and Credit)
Another team can choose a strategy on Fixed Income and Credit topic and combine efforts on data cleaning and processing. You can find plenty of papers online. You can choose factor style investing (in this case it will be easier to work with a team that choses 'Factor Investing in the Corporate Bond Market') or any other approach.
Below are some relevant links to provide some directions. In general white papers by MSCI, AQR and Robeco (robeco.com) may be useful. You can use white papers or try to find a relevant papers on ssrn.com and arxiv.org
13.1. Style Investing in Fixed income
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3130245
https://images.aqr.com/-/media/AQR/Documents/Insights/Journal-Article/Style-Investing-in-Fixed-Income-Markets.pdf
13.2. Does Carry add value to existing credit factors?
https://www.robeco.com/en/insights/2017/07/does-carry-add-value-to-existing-credit-factors.html
13.3. Try to find The MSCI Fixed Income Factor Model
13.4. Common Factors in Corporate Bond Returns:
https://www.aqr.com/-/media/AQR/Documents/Journal-Articles/Common-Factors-in-Corporate-Bond-Returns.pdf
13.5. The Illusion of Active Fixed Income Alpha
https://images.aqr.com/-/media/AQR/Documents/Alternative-Thinking/Alternative-Thinking-4Q18-Illusion-of-Active-Fixed-Income-Alpha.pdf
13.6. Systematic Credit Investing:
https://images.aqr.com/-/media/AQR/Documents/Insights/White-Papers/Systematic-Credit-Investing.pdf
13.7. The Credit Risk Premium
https://images.aqr.com/-/media/AQR/Documents/Journal-Articles/JFI_Winter_2017_AQR_The-Credit-Risk-Premium.pdf
13.8. Systematic Fixed Income: A Closer Look:
https://www.aqr.com/Learning-Center/Systematic-Fixed-Income/Systematic-Fixed-Income-A-Closer-Look
13.9. Factor and risk-adjusted return Appendix, Norges Bank Investment Management
https://www.nbim.no/contentassets/195a5c9e401b4a4e8d3345f828d87414/return-and-risk-2018_appendix.pdf

Similar to the last project, previously no student groups implemented FI projects. Instructors will give credit for a good effort even if the project is not going to be 100% complete for data or other limitations, but some intermediary results should be achieved (for example data cleaning, understanding and factor construction but not P&L backtest because of some limitation).

14. Factor Momentum and the Momentum Factor
There are two groups actively publishing on this topic:
1) AQR's Tarun Gupta & Bryan T. Kelly:
https://www.aqr.com/Insights/Research/Working-Paper/Factor-Momentum-Everywhere ("Best Quant Paper" in the 2019 by Savvy Investor)
https://alphaarchitect.com/2019/06/03/is-factor-momentum-really-everywhere/

In this article, the authors document robust momentum behavior in a large collection of 65 widely-studied, characteristic-based equity factors around the globe. They show that, in general, individual

factors can be reliably timed based on their own recent performance. A time series "factor momentum" portfolio that combines timing strategies of all factors earns an annual Sharpe ratio of 0.84. Factor momentum adds significant incremental performance to investment strategies that employ traditional momentum, industry momentum, value, and other commonly studied factors. Their results demonstrate that the momentum phenomenon is driven in large part by persistence in common return factors and not solely by persistence in idiosyncratic stock performance.

2) Darthmouth's Juhani T. Linnainmaa:
http://jlinnainmaa.com/working-papers.html
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3014521
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3116974

Momentum in individual stock returns emanates from momentum in factor returns. Most factors are positively autocorrelated: the average factor earns a monthly return of 6 basis points following a year of losses and 51 basis points following a positive year. We find that factor momentum concentrates in factors that explain more of the cross section of returns and that it is not incidental to individual stock momentum: momentum-neutral factors display more momentum and momentum in firm-specific residuals appears to capture momentum in omitted factors. Our key result is that momentum is not a distinct risk factor; it times other factors.

Past industry returns predict the cross section of industry returns, and this predictability is at its strongest at the one-month horizon (Moskowitz and Grinblatt 1999). We show that the cross section of factor returns shares this property, and that industry momentum stems from factor momentum. Factor momentum is transmitted into the cross section of industry returns via variation in industries' factor loadings. Momentum in industry-neutral factors spans industry momentum; industry momentum is therefore a by-product of factor momentum, not vice versa. Factor momentum is a pervasive property of all factors; we show that factor momentum can be captured by trading almost any set of factors.

The importance of these recent papers is that they are making an attempt to explain widely popular price and industry momentum and also introduce factor timing (which is notoriously difficult). Replicate some of the paper's results, produce 2020 YTD performance.

15. The Insider Trading Anomaly (Equity + EDGAR or SEC Form 4). Extra Credit project
Please read Chapter 7 The Insider Trading Anomaly of The Handbook of Equity Market Anomalies.
Insider trading is among the most profitable stock market anomalies, delivering superior returns for more than 40 years. The large shareholders who hold more than 10% of a stock's outstanding shares, all members of the board of directors, the CEO, CFO, and other highest-level officers are considered insiders. They must file Form 4 - a statement of ownership regarding such security - with SEC. Form 4 is stored in SEC's EDGAR database.
Database: https://www.sec.gov/Archives/edgar/full-index/
Potential tool to download data: https://pypi.org/project/python-edgar/
https://medium.com/@jan_5421/insider-trading-visualised-with-python-sec-api-io-5f12a7799b3e
Please check online other sources and articles on how to download historical data using python.
Related website: https://www.secform4.com/
Please check the data in WRDS. WRDS is not open for me yet. Please also check EDGAR dataset on WRDS as it may have required data.

When you look at EDGAR data, please keep in mind that more useful signals could be generated from EDGAR dataset (not just SEC Form 4 / Insider Trading info). Those signals are valid and current and you may turn your research to different signals coming from EDGAR.

16. Seasonality signals (Equity)
1) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=687022
2) http://www.nber.org/papers/w20815.pdf or
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2224246

Those factors seem to be still working out of sample, which is quite rare. This paper is quite easy to implement, so you may want to come up with enhancement.

17. The Analyst Recommendation and Earnings Forecast Anomaly (Equity + IBES). Extra Credit project
Please read Chapter 3 The Analyst Recommendation and Earnings Forecast Anomaly of The Handbook of Equity Market Anomalies.

The analysts post buy\sell recommendations and various forecasts such as those on earnings, industry etc. IBES database (Institutional Brokers Estimate System) available on WRDS and contains the analyst recommendations, which can be used to build a trading strategy. You can combine efforts on analyzing IBES database (or any other database such as CRSP, Compustat etc.) with the Post-Earnings Announcement Drift and Related Anomalies team**.**

The 28-page chapter in the book summarizes different papers and approaches on building trading strategies based on the analysts recommendations. You can choose which particular analysis you would like to implement. Information from this chapter may be enough to build the strategy but for the details on a particular analysis you chose, you can read the paper referenced in the book.
For example, the simplest trading strategy may be sorting the stocks based on average analyst recommendation and taking long the top decile and short the bottom. Further you can enhance this strategy by, for example, excluding the recommendations by the investment banks (lower quality) and leaving those by brokerage houses (higher quality). Another possibility is to consider recommendations revisions, rather than the average recommendation. You can also add some favorable fundamental characteristics to the strategy such as high price momentum, high earnings-to-price etc. All the possible analyses, as well as some nuances and techniques are nicely summarized in the chapter and you can pick one you consider more interesting.

18. Post-Earnings Announcement Drift and Related Anomalies (Equity + IBES). Extra Credit project
Please read Chapter 4 Post-earnings Announcement Drift and Related Anomalies of The Handbook of Equity Market Anomalies.

Stock prices drift in the direction of the earnings surprise several months after the firm announces earnings, a phenomenon referred to as post-earnings announcement drift. The earnings surprise is measured as a difference between the reported earnings and predicted earnings by the analysts. IBES database (Institutional Brokers Estimate System) is available on WRDS and contains earnings forecast estimators by the analyst. You can combine efforts on analyzing IBES database (or any other database such as CRSP, Compustat etc.) with The Analyst Recommendation and Earnings Forecast Anomaly team**.**

The 26-page chapter in the book summarizes different papers and approaches on building trading strategies based on the earnings surprises. You can choose which particular analysis you would like to implement. Information from this chapter may be enough to build the strategy but for the details on a particular analysis you chose, you can read the paper referenced in the chapter.

For example, the simplest trading strategy may be sorting the stocks based on earnings surprise and taking long the top decile and short the bottom. You may need to account for the fact that not all first announce earnings simultaneously and the technique is described in the chapter.

Further you can enhance this strategy by, for example, looking at the resistance in earning surprises, combining with other fundamental characteristics (for example accrual), additionally considering the level of reported earnings etc. All the possible analyses, as well as some nuances and techniques are nicely summarized in the chapter and you can pick one you consider more interesting.

19. Related Securities and the Cross-section of Stock Return Momentum (Equity + Credit)
http://www.fmaconferences.org/Vegas/Papers/Related_Securities_LNS.pdf
The paper modifies traditional equity momentum paper and incorporates singe-name credit default swaps CDS to get to joint stock/CDS-market momentum strategy.

Please check whether Markit CDS data is available on WRDS http://www.whartonwrds.com/datasets/markit-email/. Last year it was not available. We have some CDS data saved from the last year from Bloomberg and we need to add one more year.

In general it is a great idea to combine different sources of data that are somehow orthogonal, but at the same time formed by the pricing discovery mechanisms (stock prices + option prices, stock prices + single-name CDS). Distinct information in the two markets could provide a more precise signal on firm prospects than a single market signal because related security prices often reveal signals that are relevant to their common firm fundamentals. If performed well, this project will be good to discuss during an interview, has more chances to find alpha and demonstrate the ability to work with both Equity and Credit data.

20. Dimensions of Popularity by R. Ibbotson & T. Idzorek (Equity)
Also there is a presentation which offers some of other ideas to test popularity beyond what was discussed in paper:
https://www.nomura.com/events/9th-annual-global-quantitative-investment-strategies-conference/resources/upload/4_30_Ibbotson_Puzzles_Premiums_Popularity.pdf
This paper is quite easy to implement, so you may want to come up with enhancement. Think what can be another "popularity" score and implement multiple factors, try to understand if they add any marginal value, combine them together and test the final composite factor.

21. Idiosyncratic Skewness per the q-factor Model (1 month, Isq1 factor in Replicating Anomalies) (Stocks)
https://academic.oup.com/rfs/article-abstract/23/1/169/1578688?redirectedFrom=PDF
also
https://dr.library.brocku.ca/bitstream/handle/10464/6426/Brock_Cao_Xu_2015.pdf

22. Alternative Data/Suggest your paper and check with the instructors. Using alternative data is quite popular in the industry and could be a good selling point on the resume. If you find promising alternative data on WRDS or elsewhere that was not studied much (not many papers available), you can try to implement the strategy based on your idea. Alternatively, you can find promising data and search for published papers. Please consult with the instructors.

23. The Unintended Impact of Academic Research on Asset Returns
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3054718
This paper explores a channel whereby asset-pricing anomalies can appear as investors alter portfolios according to findings in academic research. In particular, I find that assets with low realized CAPM Alphas outperform those with high ones, but this finding only appears after the CAPM's publication in the 1960s. I find evidence consistent with the widespread application of the CAPM model generating incentives to tilt portfolios systematically away from low CAPM Alpha assets, causing such assets to be undervalued. Replicate paper results. Discuss.

24. Do Stocks Outperform Treasury Bills?
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2900447
Four out of every seven common stocks that have appeared in the CRSP database since 1926 have lifetime buy-and-hold returns less than one-month Treasuries. When stated in terms of lifetime dollar wealth creation, the best-performing 4% of listed companies explain the net gain for the entire U.S. stock market since 1926, as other stocks collectively matched Treasury bills. These results highlight the important role of positive skewness in the distribution of individual stock returns, attributable both to skewness in monthly returns and to the effects of compounding. The results help to explain why poorly-diversified active strategies most often underperform market averages.
Some of this paper observations will be included in HW3. Final project can replicate paper result for more recent decades based on WRDS data.