

# **Financial Econometrics**

## **FINN/ECON 6219-U90, Fall 2017**

**Papers are due by Friday, December 8 at noon**

### **General Requirements, Possible Topics, and Possible Data Sources**

All papers must be single-authored and self-contained. Research rarely goes as smoothly as you hope, so plan accordingly. You need to allow time for unexpected delays.

#### **Format**

The format of the paper should be similar to that required of any paper submitted to a journal for publication (or to an audience of policymakers or the board of a company). To illustrate this format, I will post a short journal article on the course webpage. The title page should include the title, the name and affiliation of the author, an abstract, key words, and possibly acknowledgments. The text starts on the second page. Pages are numbered, starting with 1, on the page following the title page. The paper should be clearly structured in sections (and possibly subsections), that are numbered using Roman or Arabic numerals. The first section is the introduction. The last section is the conclusion.

List all references (in a format suitable for journals) after the conclusions section. Only papers or books explicitly referred to in the text should be included in the reference section. Tables and figures may be placed within the text or at the end of the paper. The latter option is easier. Spacing of 1.5 or 2 lines is standard. Use footnotes rather than endnotes. The font size of the text should be 12, and the margins should be 1 inch on all sides. Create all equations using an equation editor. The font size used in the equation editor should match that of the text. Important equations should be centered on a separate line, and they should be numbered if they are referred to elsewhere in the paper.

Use a spell checker and proofread the paper before submitting it. Tables and figures should be neat, clear and professionally done (no odd spaces, odd scales, lines that cannot be read without glasses, missing labels or titles, etc). If necessary, use notes at the bottom of the tables/figures to make it self-contained. All MATLAB code should be provided in an appendix at the end of the paper (not included in the page count). The appendix comes after the reference list.

#### **Content**

All data and data sources must be well documented. Plotting data can be very helpful to the reader. If you use an econometric technique, explain why that technique is appropriate and discuss your assumption regarding de-trending, identification, etc. You may also wish to conduct sensitivity analysis using alternative specifications and discuss potential weaknesses of your

approach and how you dealt with them. Don't forget to explain the intuition behind your reasoning, and the motivation for the question you are trying to answer. The paper should be written such that a reader like me can take the data and replicate your analysis. It usually helps to state each model you are estimating in equation form. Make sure you clearly define your notation and clearly state what you are doing. If you make a modeling choice, be sure to discuss and justify this choice. Do not forget to link the econometric results to the question you posed in the introduction. Spell out the lessons learned based on your analysis.

I expect you to write the paper on your own without me being involved. I will not check your code or read details of the paper. However, I will be happy to provide general advice throughout the process or supply references if I know of any. Think of this paper as your research apprenticeship. You are expected to apply what you have learned in this course on your own.

### Choice of topic

Topics may be substantive (i.e., adding economic insights) or methodological (i.e., comparing alternative econometric methods), but they must center on the application of econometric techniques in MATLAB. You must write your own code. You may use any of the code that you developed for the problem sets, but no code available from the internet. I am open to topics outside of finance narrowly defined. I insist, however, on the paper providing some tangible and useful insight that would be of interest to a policymaker, financial analyst or economist.

I list some examples of paper ideas and potential data sources below, but feel free to be creative and come up with your own topic. Just be clear about what the question is, how you will answer the question, why it is interesting and why someone would be interested in the insights you are going to provide. Make sure to address these points in the abstract, introduction and conclusion. Descriptions of facts are discouraged, unless they help make your point or set the stage for the analysis. Literature reviews should be kept to an absolute minimum. You are doing research, not writing about research. If you decide to select one of the ideas listed below, make sure to flesh it out in some detail. I have in mind a paper of about ten pages (not including the MATLAB code). If you feel that your project may take more than ten pages, I won't object, but keep in mind that there is a premium for being concise and clear.

The papers are due by Friday, December 8 at noon. There will be no extensions or incompletes. You are free to submit the paper earlier, of course. Drop them off at my office. If I am not there, then please slide the paper under my door. I will not accept electronic submissions. Please staple the paper.

### Some possible paper topics

1. Investors sometimes use technical trading rules. For example, they compute a long moving average and a short moving average of asset prices. If the short moving average exceeds the long moving average, the presumption is that the price is too high relative to trend and should fall (with an analogous interpretation when the price exceeds the trend). Assess the ability of this trading rule to predict the sign of changes in asset prices correctly.

2. In a similar vein, can you use the level of petroleum inventories to successfully forecast whether the price of oil will go up or down? One could also develop a dynamic forecasting model involving the degree of deviation from benchmark inventory levels.
3. How well does the Michigan survey of household expectations of inflation perform as a predictor of inflation? How does it compare with the survey of professional forecasters or the Greenbook forecast prepared by the Fed? Are any of these forecasts efficient?
4. Is forecasting Euro area real GDP growth in the aggregate better than forecasting country level GDP growth and then aggregating the forecasts? Or should one just forecast German GDP growth, given the large weight of Germany in the aggregate? Compare the MSE of the forecast generated by these approaches.
5. Develop a bootstrap version of the Jarque-Bera test of normality and compare its size with that of the asymptotic test in a simulation study. Which test is better and by how much?
6. Construct prediction intervals for the real price of oil from an oil market VAR. What do you learn from this model about the real price of oil one year from now? Does it matter whether the real price of oil is specified in log levels or in log-differences?
7. Is the VAR forecast of the real price of oil better or worse in terms of the forecast MSE than a random walk forecast? Does the answer depend on the forecast horizon?
8. Are foreign exchange forward markets efficient?
9. Are housing prices and stock prices cointegrated? Does one help in predicting the other?
10. Does consumer sentiment help predict stock returns (or the other way around)?
11. Compare the risk of alternative stocks or stock price indices? For example, are high technology stocks riskier than traditional industrial stocks? How much riskier are emerging market stocks compared with U.S. stocks?
12. Test uncovered and covered interest parity. If there is a risk premium, can we interpret the time series of risk premia in light of historical events? (see Sarno and Taylor 2002)
13. Are stock markets in Japan, Europe and the U.S. cointegrated? If so, does using that information help improve predictions of stock returns?
14. What variables help in predicting the housing market? Develop a time series forecasting model of housing prices. Compare with a random walk or ARMA benchmark
15. Does model averaging improve the accuracy of interest rate forecasts? Propose and evaluate a predictive model of changes in the Federal Funds rate.

16. Do interest rate differentials, productivity differentials and other macroeconomic predictors improve the accuracy of nominal exchange rate forecasts (by themselves or in combination)? How do the results vary by the forecast horizon?
17. Code and compare alternative GARCH models. Determine which model provides the best volatility forecasts for a given return series. Are the differences economically meaningful?
18. What is the maximum horizon at which ARCH/GARCH volatility models provide a meaningful improvement in real time over the unconditional variance? Does the answer depend on whether we use daily, monthly or quarterly data?
19. Use daily data to construct estimates of realized volatility at monthly frequency and compare them to GARCH volatility estimates.
20. Compare the performance of a bivariate GARCH model to that of univariate GARCH models.
21. It has been argued that inflation risks have increased in recent years, in part in response to the Fed's handling of the credit crisis. Is that true? Propose a suitable model and conduct a formal risk analysis, building on the work of Kilian and Manganelli (Journal of Money, Credit, and Banking 2004).
22. Consider a distributed lag regression of monthly U.S. stock returns on the Romer and Romer (American Economic Review 2004) measure of exogenous monetary policy shocks. We are interested in the question of whether a monetary tightening raises or lowers cumulative stock returns. Is a monetary tightening good or bad for the stock market?
23. Program statistical procedures designed to detect the ability of forecasting model to predict turning points in the data. Such methods have been developed for business cycle analysis. Apply the procedure to asset prices (housing prices, stock prices, ...).
24. Consider the usefulness of cointegration methods for predicting housing prices using data from different states or regions of the U.S.
25. What is driving the real price of gold? Conduct an analysis of demand and supply shocks in the gold market.
26. Assess the performance of mean-variance portfolio selection using the ARMA-GARCH model applied to two major stock market indices.
27. Do bond yield differences help predict U.S. CPI inflation?
28. Assess the impact of higher gasoline prices on the behavior of motorists.
29. Informational advantages in stock markets: Do Tokyo stock returns predict subsequent stock returns in New York?

### Some possible data sources

Take a look at Economagic (<http://www.economagic.com>) for a good overview of time series data in economics and finance. This is a commercial data vendor, but it contains data provided in several other databases and allows easy downloads in ASCII or Excel format. Even if you do not pay the fee, you can search the data base on-line and look at the data on the screen at no charge.

If you obtain data from public sources, always take a good look at the data before using it. Check the mean, maximum and minimum for plausibility, and make sure to plot the level and growth rates of the data before running any regressions. This may reveal typographic errors, missing observations, changes in data frequency (e.g., quarterly data early on, then monthly data), changes in definitions resulting in discontinuous jumps, "fictitious" data points obtained from interpolations, or excessive seasonality in series that are supposed to be seasonally adjusted. Data from the IMF and the OECD are especially prone to such errors.

The following websites are (largely) free of charge:

Hussman Funds: <http://hussmanfunds.com/html/datapage.htm>

Free Lunch: <http://www.economy.com/freelunch/default.asp>

Yahoo Finance: <http://finance.yahoo.com/>

These data bases provided by the Federal Reserve System are free:

FRED (Federal Reserve Bank of St. Louis): <http://research.stlouisfed.org/fred2/>

ALFRED (Federal Reserve Bank of St. Louis): <http://research.stlouisfed.org/tips/alfred/>

Federal Reserve Bank of New York: <http://www.ny.frb.org/>

Philadelphia FED: <http://www.philadelphiafed.org/econ/forecast/readow.html>

Federal Reserve Board: <http://www.federalreserve.gov/releases/>

Other free online data sources:

Bureau of Economic Analysis (BEA): <http://www.bea.gov/>

Bureau of Labor Statistics: <http://stats.bls.gov/>

Census Bureau: <http://www.census.gov/marts/www/timeseries.html>

Department of Energy/Energy Information Agency: <http://www.eia.doe.gov/>

International Energy Agency: <http://www.iea.org/>

Michigan Survey of Consumers: <http://www.sca.isr.umich.edu/>

Professional organizations such as the National Bureau of Economic Research (NBER) and the Centre for Economic Policy Research (CEPR) maintain data archives:

NBER: <http://www.nber.org/data/>

CEPR: <http://www.cepr.org/Data/>

Some journals maintain data archives that allow the reader to replicate studies published in those journals:

Journal of Applied Econometrics Data Archive: <http://qed.econ.queensu.ca/jae/>

Journal of Business and Economic Statistics: <http://www.amstat.org/PUBLICATIONS/jbes/>

Money, Credit and Banking: <http://web.econ.ohio-state.edu/jmcb/IndexDataArchive.php>

International data are available at:

Bank of Canada: <http://www.bankofcanada.ca/en/rates/index.html>

Bank of England: <http://www.bankofengland.co.uk/>

Bank of Japan: <http://www.boj.or.jp/en/theme/research/stat/index.htm>

European Central Bank: <http://www.ecb.int/stats/services/downloads/html/index.en.html>

Eurostat: <http://epp.eurostat.ec.europa.eu/portal/>

U.K. National Statistics: <http://www.statistics.gov.uk/statbase/tsdintro.asp>

OECD: <http://miranda.sourceoecd.org/vl=2644317/cl=19/nw=1/rpsv/home.htm>

IMF: <http://www.imf.org/external/data.htm#data>

Penn World Tables: [http://pwt.econ.upenn.edu/php\\_site/pwt\\_index.php](http://pwt.econ.upenn.edu/php_site/pwt_index.php)

Further links can be found at:

AEA Web (macro): [http://www.rfe.org/showCat.php?cat\\_id=3](http://www.rfe.org/showCat.php?cat_id=3)

AEA Web (finance): [http://www.rfe.org/showCat.php?cat\\_id=8](http://www.rfe.org/showCat.php?cat_id=8)

AEA Web (international): [http://www.rfe.org/showCat.php?cat\\_id=6](http://www.rfe.org/showCat.php?cat_id=6)

Sometimes the homepages of researchers contain data developed by the authors of empirical studies. Examples:

Fama and French: [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

Shiller: <http://www.econ.yale.edu/~shiller/data.htm>

Romer: <http://www.econ.berkeley.edu/~cromer/index.shtml>