Shanghai Advanced Institute of Finance
Shanghai Jiao Tong University

Jun Pan
junpan@saif.sjtu.edu.cn

Empirical Asset Pricing, Fall 2020

Week 1: Thursday Discussions

November 26, 2020

General Guideline:

- **Presenter:** For each topic, we will have two students, each presenting for 30 minutes. If the topic is on a paper, then the first student will present and the second student will discuss. Ideally, I would like both the presenter and discussant to have replicated the key results of the paper before their presentations.
- **Audience:** For students who are not presenting, please pick one of the topics and write as a presenter (or a discussant). Please write your report as an article, not as slides. Ideally, I would like you to have replicated the key results of the paper before writing your report. The report is due at the beginning of the class.

We will focus on two examples this Thursday. The first example was given as a qualifying exam earlier this year: asset pricing with rare disasters. I would like to use it to deepen our understanding of the consumption-based asset-pricing models. The second example is my job-market paper 20 years ago. I would like to use it as a practice of applying structural estimations to other areas in Finance. Also, this is a good starting point for you to prepare for your job-market paper.

1 Asset Pricing with Rare Disasters

2020 PhD Qualifying Exam, Question 1: *This exam is closed-book and closed-notes, with the exception of one page of prepared notes, A-4 sized and double-sided. The exam is 1.5 hours long, during which you are not supposed to communicate with anyone, with the exception of the PhD coordinate for clarifying questions. You need a computer with pre-loaded software (e.g., Excel, Matlab, SAS, Stata, R, Python) to finish this exam. Please turn off the internet connection on your computer throughout the duration of this exam.*
Let's work with our standard example: power utility with absolute risk aversion coefficient γ, which will be fixed at $\gamma = 50$ throughout this question, and time-t log consumption growth of

the economy is denoted by y_t. Let's consider two securities: one risky and the other riskfree. Let R_t be the log return of the risky security (i.e., stock), and r_f be the real interest rate of the riskfree asset, continuously compounded.

1. Assume that R_t and y_t are joint normal, with a correlation coefficient of $\rho = 20\%$. The mean and standard deviation of y_t are $\mu_y = 2\%$ and $\sigma_y = 2\%$, respectively. Let's further assume that the standard deviation of R_t is $\sigma_R = 15\%$.

   (a) **(10 points)** Calculate r_f for this economy.

   (b) **(10 points)** Calculate $E(R_t)$ for this economy.

   (c) **(5 points)** Compute the equity premium. *Let's definite the equity premium as the difference between the expected simple return (not log return) minus r_f.*

   (d) **(5 points)** Comment on your calculated results: which number is realistic and which is not? Where is the tension?

2. Let's now introduce a crash state, which occurs with probability p. Conditioning the occurrence of this recession, the log consumption growth is $y_t = -5\%$ and log stock return $R_t = -50\%$. Conditioning on no occurrence of this recession, y_t and R_t are joint normal with the parameters stated before.

   (a) **(5 points)** For the US economy, has the real GDP growth ever fallen below -5%? If so, give an example of when this happened.

   (b) **(5 points)** Provide an estimate of the current *real* interest rate in the US. Explain how you reach this number.

   (c) **(5 points)** Without doing any calculation, please hypothesize the relation between r_f and p, and provide your intuition.

   (d) **(20 points)** For a recession probability of $p = 1\%$, calculate r_f, $E(R_t)$ and the equity premium for this economy.

   (e) **(15 points)** Find the recession probability p that gives rise to a real interest rate of 1%. Compute the equity premium for this economy.

Instructions for the Presenters: Prepare a 30-minute presentation. The following questions might be useful but should not be constraining.

1. Present slides with answers to each question.

2. Make necessary plots or tables to further illustrate the results.

3. Convert the problem set into a paper and prepare a set of slides that contain: motivation, main findings, contributions to the literature, model, estimation, and conclusion.

2 Pan (2002)

Instructions for the Presenter: Prepare a 30-minute presentation. The following questions might be useful but should not be constraining.

1. What is the motivation for this paper?
2. What is the contribution relative to the existing literature at the time?
3. What are the key parameters to be estimated?
4. What are the moment conditions used to estimate such parameters?
5. How is the GMM estimation used in this paper different from that of Hansen and Singleton (1982)?
6. What are the main findings?

Instructions for the Discussant: Prepare a 30-minute presentation. The following questions might be useful but should not be constraining.

1. What is the motivation for this paper?
2. What is the contribution relative to the existing literature at the time?
3. What are your views of the paper?
4. What are the limitations of the paper?
5. How can this paper be improved?