SIMON FRASER UNIVERSITY
Department of Economics

Econ 815 | Prof. Kasa
Financial Economics, I | Fall 2017

FINAL EXAM

Answer the following True, False, or Uncertain. Explain Why. 8 points each.

1. The value of a call option does not depend on the growth rate of the underlying stock price.
2. Bubbles are more likely to occur when disagreement among investors is greater.
3. If the coefficient of relative risk aversion is one, then the Price/Dividend ratio will be constant.
4. If markets are efficient, then stock prices follow random walks.
5. In the Grossman-Stiglitz model, more noise/liquidity traders makes prices less informative.

Short answer questions:

6. (30 points). **Lookback Options**. In class we focused on 'plain vanilla' options. In practice, many so-called 'exotic' options are traded (over-the-counter). One example is a 'lookback option'. These options are path-dependent, with a floating strike price. For example, a lookback call has a payoff at expiration equal to $\max[0, S_T - S_{min}]$, where S_T is the stock price at the expiration date T, and S_{min} in the *minimum* stock price during the life of the option.

   (a) Why might these options be attractive?

   (b) Without doing any math, is a lookback call going to be more or less expensive than a plain vanilla call?

   (c) The path dependent nature of the option means the standard Black-Scholes formula cannot be applied. (It is possible to derive a formula, but it is complicated). Instead, path dependent options are usually priced using monte carlo simulation. Outline how you would do this. That is, sketch out a computer program that would give you the no arbitrage value of a lookback call option. In doing this, assume the stock does not pay dividends, and its price follows the geometric Brownian motion

   $$dP = \mu P \cdot dt + \sigma P \cdot dB$$

   and let r be the (constant) risk-free rate.

7. (30 points). **Disasters and the Equity Premium**. Consider a discrete-state version of the Lucas (1978) asset pricing model, with just two states. State 1 is 'normal times', and State 2 is a 'disaster'. In state 1 per capita consumption/dividends grow at a 3% annual rate. During a disaster per capita consumption falls 22% (i.e., $c_{t+1}/c_t = .78$). Suppose we know that average annual per capita consumption growth is 2% and the equity premium is 6%.

   (a) Using the available data, what must be the long-run average probability of being in the disaster state?

(b) Suppose households have preferences

$$U_t = E_t \sum_{j=0}^{\infty} \beta^j \frac{C_{t+j}^{1-\gamma}}{1-\gamma}$$

where $\beta = .99$ and $\gamma = 5$. Use your answer to part (a) to calculate excess returns during normal times and during disasters. (Hint: Remember the 'excess return' is the difference between the stock market return and the risk-free rate. Let R_1^e be the market excess return during normal times and R_2^e be the market excess return during a disaster. Use the household's Euler equation (for excess returns) along with the constraint that the average equity premium is 6% to derive two (linear) equations in the unknowns R_1^e and R_2^e). How much does the market crash during a disaster? How often do crashes occur (on average)?

(c) What is the average risk-free rate in this economy?