Final Exam

Directions: Answer all questions - Point totals for each are given in parentheses. Good luck and enjoy your summer — after the prelims.

1. (25) One of the main challenges of the real business cycle research program has been achieving consistency between the model’s predictions for the cyclical behavior of labor and the data. Discuss the nature of the inconsistencies and the modeling responses made in order to improve the performance of the model. Do you think the current state of RBC models reproduce to a reasonable degree labor market behavior observed in the U.S. economy?

2. (25) Consider the following optimal growth model. Agents’ preferences are given by

\[ E_0 \left[ \sum_{t=0}^{\infty} \beta^t \frac{C_t^{1-\gamma}}{1-\gamma} \right] \]

while output is a linear function of beginning of period capital and a technology shock. That is,

\[ y_t = z_t k_t \]

It is assumed that \( z_t \) is i.i.d.

a. Solve for the optimal consumption function in this economy (use the conjecture and verify method).

b. Suppose equity is introduced into this economy. The dividend associated with equity is equal to consumption. Prove that the price of equity is equal to \( k_{t+1} \). (Work directly from the necessary condition associated with equity.)

c. Suppose a one period bond is introduced into this economy. What is the equilibrium real interest rate?

d. Prove that the equity premium in this economy is positive. Why?

3. (25) Discuss the use of “calibration” as an empirical methodology - what are its strengths and weaknesses?
4.(25) Consider the following variation of the Sidrauski model. Assume that preferences are given by:

\[ \sum_{t=0}^{\infty} \beta^t U\left(c_t, \frac{M_{t-1}}{P_t}\right) \]

Note that utility from real balances depends upon money chosen in the previous period. Output is produced using the technology \( y_t = f(k_t) \) where \( f' > 0, f'' < 0 \). In addition to money and capital, agents also trade one-period nominal bonds that cost $1 at time \( t \) and return $\( 1 + n_t \) in period \( t + 1 \). The money supply is assumed to grow at the rate \( \mu \) per period so that the law of motion of the money stock is \( M_t = (1 + \mu)M_{t-1} \). New money is introduced via lump-sum transfers.

a. Express the maximization problem as a dynamic programming problem; derive and interpret the associated first-order conditions.

b. Define a steady-state equilibrium in this economy.

c. Using steady-state analysis, calculate and interpret: \( \frac{dk}{d\mu}, \frac{dm}{d\mu}, \frac{dn}{d\mu} \). (Where \( m \) is steady-state level of real balances.)

5.(10) Out of the many intriguing theories and techniques discussed in class, what did you find most interesting?