Lecture 8: The Equity Premium Puzzle

Growth Model and Fiscal Policy

Economics 714, Spring 2016

1 Equity Premium

1.1 Characterization

Define \( r^f = R - 1, \beta = \frac{1}{1+\delta} \); then (net) stock return \( r_{t+1} \) satisfies:

\[
1 = E_t \left[ \frac{1}{1+\delta} (1 + \Delta c_{t+1})^{-\gamma} (1 + r_{t+1}) \right]
\]

Take 2nd order Taylor approximation of right side, unconditional expectations:

\[
E(r) = \delta + \gamma E(\Delta c_t) + \gamma \text{cov}(r_t, \Delta c_t) - \frac{1}{2} \gamma (\gamma + 1) \sigma^2(\Delta c_t)
\]

Which can be expressed as:

\[
\frac{E(r_t) - r^f}{\sigma(r)} = \gamma \sigma(\Delta c_t) \text{corr}(\Delta c_t, r_t)
\]

Left side known as Sharpe ratio

1.2 Attempted Resolutions

- Change preferences: recursive preferences, robustness, habit persistence
- Change constraints: Limited participation, transaction costs, incomplete markets
- Change shocks: disaster models, long-run risk, learning
2 Fiscal Policy in the Growth Model

Focus on deterministic neoclassical growth model with fiscal policy, date-0 sequence formulation

A government policy is a sequence of spending \( \{G_t\} \) and taxes \( \{T_t\} \) that satisfy the government budget constraint:

\[
\sum_{t=0}^{\infty} q_t G_t = \sum_{t=0}^{\infty} q_t T_t
\]

Government spending not valued, will consider different tax instruments to raise revenue \( T_t \).

Households face budget constraint:

\[
\sum_{t=0}^{\infty} q_t [C_t + I_t] = \sum_{t=0}^{\infty} q_t [r_tK_t + w_tN_t - T_t]
\]

Capital law of motion:

\[
K_{t+1} = (1 - \delta)K_t + I_t
\]

Goods market/aggregate feasibility:

\[
C_t + I_t + G_t = F(K_t, N_t)
\]

A competitive equilibrium is a price system \( \{q_t, r_t, w_t\} \), an allocation \( \{C_t, K_t, N_t\} \), and a government policy \( \{G_t, T_t\} \) s.t. (i) households optimize, (ii) firms optimize, (iii) markets clear

Ricardian equivalence: If \( T_t \) is lump sum (i.e. independent of household choices) then timing of taxes is irrelevant, all that matters is date-0 present value.
Level of taxes and spending (even if lump sum) matter because of wealth effects.

Assume $U(C_t, N_t) = U(C_t)$, so $N_t \equiv 1$, define $F(K, 1) = f(K)$.

Equilibrium conditions:

\[
u'(C_t) = \beta u'(C_{t+1})[r_{t+1} + 1 - \delta]
= \beta u'(C_{t+1})[f'(K_{t+1}) + 1 - \delta]
\]

\[K_{t+1} = f(K_t) + 1 - \delta K_t - C_t - G_t\]

Dynamics:

\[
\Delta c = 0 \implies f'(K) = \rho + \delta
\]

\[
\Delta k = 0 \implies f'(K) = C + \delta K + G
\]