A Note for Kocherlakota (1996)

Paul Weifeng Dai
University of Chicago

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Abstract

This note is a short summary of Kocherlakota (1996). This paper is on Section 6: Asset Pricing of ECON 330 Theory of Income I reading list at University of Chicago.

1. Equity premium puzzle: stocks are not sufficiently riskier than Treasury bills to explain the spread of return.
2. Risk free rate puzzle: alothough individuals like consumption to be very smooth, and although the risk free rate is very low, they still save enough the per capita consumption grows rapidly.
3. Puzzles are implied by three assumptions:
   (a) Preferences: standard power utility, agent maximizing expected discounted life-long utility
   (b) Complete asset market: individual can write insurance contracts against any possible contingency
   (c) No cost for trading asset: taxes and brokerage fess are trivial.
4. What are the puzzles?
   (a) Data
      i. The average real rate return per year: stock 7%; bond 1%.
      ii. High per capita consumption growth per year: about 1.8%.
      iii. Covariance of per capital growth with stock return is only slightly bigger than that with bond return.
   (b) The original statement of the puzzles
      i. Key assumptions in Mehra and Prescott (1985)
         A. Frictionless asset markets
         B. Complete market
         C. Representative agents maximizes $\mathbb{E}_0\left[\sum_{s=0}^{\infty}\beta^s(c_{t+s})^{1-\alpha}/(1-\alpha)\right]$
      ii. Results: Restrict β between 0 and 1, α between 0 and 10, for any value gives the expected real return to the Treasury bill less than 4%, the equity premium is less than .35%.
   (c) More robust restatement of the puzzles: while the covariance between stock and per capita consumption is positive, it is not sufficiently large enough to deter the representative with a RRA coefficient less than 8.5 from wanting to borrow and invest in stocks.
5. Preference modification

(a) Generalized expected utility

$$U_t = \left\{ c_t^{1-\rho} + \beta [\mathbb{E}_t U_{t+1}^{1-\alpha}]^{\frac{1-\rho}{1-\alpha}} \right\}^{\frac{1}{1-\rho}} \tag{1}$$

where degree of risk aversion is governed by α and the elasticity of intertemporal substitution is governed by $1/\rho$, which allows α and $1/\rho$ high simultaneously to match the data.

(b) Habit formation

i. Intuition: a person consumers a lot this period will get used to that high level of consumption will will strongly desire consumption in next period

ii. Mathematically, $u'(c_t)$ is an increasing function of c_{t-1}.

$$\mathbb{E}_t \left[\sum_{s=0}^{\infty} \beta^s \frac{(c_{t+s} - \lambda c_{t+s-1})^{1-\alpha}}{1-\alpha} \right] \tag{2}$$

(c) Relative consumption: 'Keeping up with the Joneses'

i. Intuition: the individual's utility is a function not just of his own consumption but of societal levels of consumption

ii. Mathematically, [1]

$$\mathbb{E}_t \left[\beta^s \frac{(c_{t+s}^{1-\alpha} C_{t+s-1}^{\lambda})}{1-\alpha} \right] \tag{3}$$

6. Incomplete market and trading cost

(a) Incomplete market: no state-contingent asset to insure all future state.

i. Infinite horizon economies calibrated to US data suggests the difference between incomplete markets interest rate and complete market rate is small.

(b) Trading cost: borrowing and short sales constraint

i. Borrowing and shore sales constraint do not quantitatively appear to have much impact on the size of equity premium.

(c) Transaction cost: information costs, brokerage fees, load fees, the bid-ask spread and taxes.

i. Aiyagari and Gertler (1991) and Heaton and Lucas (1995): the only way to explain the equity premium using transaction cost is to assert that there are significant differences in trading cost across stock and bond market

(d) Market segmentation: for whatever reason, only a subset of investors are actively involved in asset trade.

i. Cannot explain the equity premium

References

AIYAGARI, S. R. AND M. GERTLER (1991): "Asset returns with transactions costs and uninsured individual risk," *Journal of Monetary Economics*, 27, 311–331.

HEATON, J. AND D. LUCAS (1995): "The importance of investor heterogeneity and financial market imperfections for the behavior of asset prices," in *Carnegie-Rochester Conference Series on Public Policy*, Elsevier, vol. 42, 1–32.

KOCHERLAKOTA, N. R. (1996): "The equity premium: It's still a puzzle," *Journal of Economic literature*, 34, 42–71.

[1] I think there is a typo in the original paper of this equation. See equation (9) of Kocherlakota (1996)

MEHRA, R. AND E. C. PRESCOTT (1985): "The equity premium: A puzzle," *Journal of monetary Economics*, 15, 145–161.