Empirical Assignment 3

Intertemporal Consumption CAPM

July 17, 2022

Question 1

Data Description

The file < EA3_data.xlsx > contains the data for this assignment. The dataset, a subset of the accompanying dataset for Campbell and Vuolteenaho (CV, The American Economic Review, December 2004) consists of 14 quarterly return series running from the first quarter of 1929 to the fourth quarter of 2001.

The first four series (columns 2-5) correspond to the estimates of the four terms in the loglinear return decomposition for the US market return from the VAR estimation performed by CV:

$$r_{m,t+1} - r_{f,t+1} - E_t(r_{m,t+1} - r_{f,t+1}) \approx (-N_{DR,t+1}) + N_{CF,t+1} \tag{1}$$

Column 2 (rm-rf) is the historical series for the excess log market return, (rm), realized at the end of the corresponding quarter. It is constructed as the difference between the log return on the CRSP value-weighted stock index and the log riskfree rate, the latter constructed by CRSP from Treasury bills with an approximate maturity of three months.

Column 3 (E[rm-rf]) is the VAR estimate of the conditional expected excess log return to the market (assumed to be known at the beginning of the quarter).

Columns 4 (-Ndr) and 5 (Ncf) are the VAR estimates of the discount-rate news and cash-flow news terms. The estimates satisfy the return decomposition exactly by construction. Note that only the two news series are directly needed for the GMM analysis of this assignment.

Column 6 (Rf) is the series for the net simple real return on a Treasury bill with an approximate maturity of three months, constructed as above and adjusted for realized inflation (CPI growth).

Columns 7-15 are net simple return series for 9 portfolios, a subset of the 25 Fama-French portfolios formed on size and book-to-market, also adjusted for inflation (realized CPI growth). The 25 Fama-French portfolios are the intersections of 5 portfolios of stocks sorted by size (market equity, ME) and 5 portfolios of stocks sorted by the ratio of book equity to market equity (BE/ME).

GMM Analysis of the Two-Beta ICAPM

1. Estimate the parameters of the linear stochastic discount factor model:

$$M_t = a + b(-N_{DR,t}) + cN_{CF,t} \tag{2}$$

   Use 10 moment conditions (one for the risk free asset and nine for the stock portfolios) of the form $0 = E\left[M_t(1 + R_{it}) - 1\right]$ and the identity weighting matrix.

2. For each parameter, report the t statics and p value for the hypothesis that the parameter is zero.

3. Assume th following approximation:

$$E\left[R_{it} - R_{ft}\right] = \gamma \text{Cov}((R_{it} - R_{ft}), N_{CF,t}) + \text{Cov}((R_{it} - R_{ft}), -N_{DR,t}) \tag{3}$$

   (i) What restriction does this condition impose on the parameters of (1)?

   (ii) Test this restriction using a Wald test. Is it rejected?

   (iii) Provide an estimate of γ and (using the delta method) the standard error of this estimate.

4. Return to the general model (1) and compute the second stage parameter estimates. Repeat parts (2) and (3) for the second stage estimates. Are the results different and why?

5. Finally, perform a χ^2 test of over-identifying restrictions using the second stage estimates. What is the p value of the test? Comment of the empirical "success" of the model.