

Consumption Strikes Back? Measuring Long Run Risk

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Less than 25 years ago

$$\mathbf{E} \left[\left(\frac{c_{t+1}}{c_t} \right)^{\frac{1}{g}} (R_{t+1} - R_t) \right] = 0$$

Responses to Failure

I. Look at **longer time intervals**: Parker and Juillard (2005)

II. **Alternative preferences**: Campbell and Cochrane (1999) and Epstein and Zin (1989)

$$\mathbb{E} \left(\left(\frac{c_{t+1}}{c_t} \right)^{-r} \left(\frac{V_{t+1}}{R_t(V_{t+1})} \right)^{r-q} (R_{t+1} - R_t) \right) = 0$$

$$R_t(V_t) = \left(E_t(V_{t+1})^{1-q} \right)^{\frac{1}{1-q}}$$

Responses to Failure

III. Epstein-Zin plus **long-term consumption growth risk**:
Bansal and Yaron (2005)

$$\Delta c_{t+1} = \mathbf{m} + x_t + u_t$$

$$x_t = 0.979x_{t-1} + e_t$$

- x_t very persistent
- variance of $u_t \gg$ variance of e_t

Bansal and Yaron:

- Specify a process with long-run consumption risk
- Show it is “consistent” with the data

Hansen, Heaton, and Li:

- Develop methodology to link data and model
 - Model: Linearization technique (double linearization so second-order terms show up)
 - Data: VAR
- For some specifications of the VAR they find a long-run component of consumption risk that is important for asset prices

Hansen, Heaton, and Li:

- Why Epstein-Zin?
 - Forward looking term enters MRS but ...
- Why VAR?
 - Convenient, but ...

Difficulties with exotic preferences:

- *Habit persistence and interest rate volatility:*
 - Difficult to match
- *Habit persistence and quantity dynamics:*
 - Here consumption is an exogenous process
 - Difficult to generate, especially if labor is endogenous (Lettau, Ljungqvist, and Uhlig)
- *Epstein-Zin and quantity dynamics:*
 - Looks like it is easier (Tallarini 2000)

Why IES > 1:

$$\mathbb{E} \left[\left(\frac{c_{t+1}}{c_t} \right)^{\frac{q}{y}} R_{a,t+1}^{-(1-q)} (R_{t+1} - R_t) \right] = 0$$

$$q = \frac{1-g}{1-\frac{1}{y}}$$

g : risk aversion

ψ : intertemporal substitution

- With $y > 1$ and large g , q (and $-(1-q)$) is negative \Rightarrow higher covariance and higher equity premium

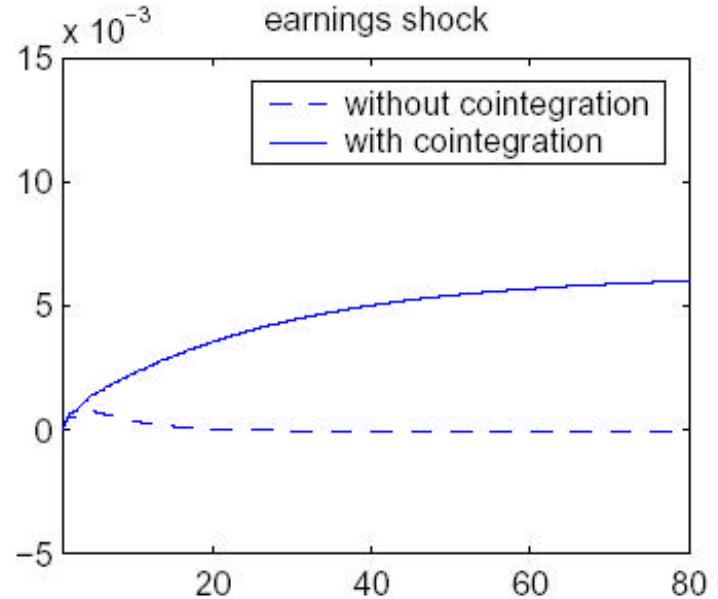
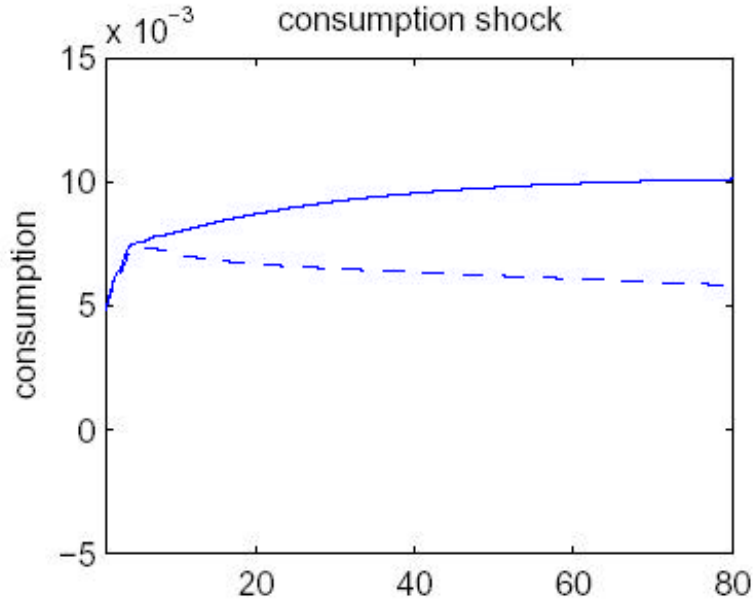
Why $IES > 1$:

- Expected consumption growth increases:
 - Expected return $\uparrow \Rightarrow$ consumption \downarrow (S.E.)
 - NPV income $\uparrow \Rightarrow$ consumption \uparrow (I.E.)
 - With $\mathbf{y} > 1$, S.E. dominates and wealth-to-consumption ratio increases

Why VAR?

- Capturing long-term growth with *univariate* process is hard
- VARs are good in capturing in short-run dynamics
- VAR any better?
- **Amazingly**, HHL do find a long-run effect on consumption growth
 - Add earnings
 - Imposing cointegration [1 -1]

Why VAR?



- When do the shocks occur?
 - Here “long-run” shocks are part of the reduced-form error term
 - Can be computed with Bansal-Yaron or regime-switching model

Can VAR capture long-run dynamics?

- Use Jorda (2005) to see how good VAR is in obtaining impulse response functions by “iteration”.
- Jorda: Obtains impulse response functions directly by projection:

$$Y_{t+s} = B_1^s Y_t + B_2^s Y_{t-1} + \cdots + B_k^s Y_{t-k} + \mathbf{e}_t^s$$

$$I^s = B_1^s d$$

More **simple** info would be nice

- What is limiting behaviour of Δc_t the VAR?
- Comparison with spectrum of actual consumption
- Comparison of standard consumption statistics
- Do other variables work? Consumer debt?
- What are, for these *dgps*, the equity premium, risk free rate, etc?

Continuation of paper

- Add **leveraged dividends** \Rightarrow equity premium increases
- Construct 5 **portfolios sorted by book to market**:
 - Add dividend of portfolio to VAR
 - Estimate long-run dividend response for the different portfolios
 - Median estimate is larger for the larger book to market portfolio

Questions?

- Dividend policies are likely to have gone through some structural breaks.
- Isn't this asking a lot of the VAR?

Long-run growth & model uncertainty?

- Are persistent changes in long-run expected growth rates the story behind the equity premium and volatile returns?
 - Agents have to be forward looking
 - Here and in BY the *dgp* is known. But, ...

What is the best time-series technique?

- Probably not univariate
- VAR?
 - linear
 - structural breaks
 - estimated to minimize one-period ahead forecast error

Consumption strikes back?

- Answer seems YES in main text:
- “*balanced growth coefficient of unity is plausible*”
- “*the dynamics of consumption ... imply substantial variation in risk prices*”

Consumption strikes back?

- Answer seems NO in concluding comments:
 - *“There is statistical evidence for growth rate changes or breaks in trend lines, but this statistical evidence is difficult to use directly in models of decision-making under uncertainty without some rather specific ancillary assumptions”*
 - *“Unfortunately, as yet there is not an empirically well grounded, and economically relevant model of asset pricing to use in deducing investors beliefs about the long-run from values of long-lived assets”.*

