

**“Asset Prices under Habit Formation and
Reference-Dependent Preferences”**

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Overview

- Habit models explain the equity premium but with high risk aversion
- Loss-aversion models explain the equity premium but with utility in wealth
- A combination of habit and loss-aversion in consumption can do the job!
- New insight — loss-aversion generates the equity-premium level, while habit generates the low interest-rate volatility and time-variation in the equity premium

Details

- A general class of reference-dependent preferences:

$$\underbrace{u(C, X)}_{\text{reference dependent utility}} = \alpha \underbrace{v(C)}_{\text{consumption utility}} + (1 - \alpha) \underbrace{W(v(C) - v(X))}_{\text{gain/loss in utility}}$$

- In contrast, Campbell and Cochrane (1999) use

$$\frac{(C - X)^{1-\gamma} - 1}{1 - \gamma}$$

- Barberis, Huang, and Santos (2001) use

$$\frac{C^{1-\gamma}}{1 - \gamma} + \rho v \left(\underbrace{G_{t+1}}_{\text{gain/loss in wealth}}, \underbrace{\widehat{S}_t}_{\text{wealth}}, z_t \right)$$

Punchline

- Excellent!
- I thought Epstein-Zin preference with cash flow dynamics was the only way out of high risk aversion — see Bansal and Yaron (2004)
- Moto shows loss aversion in utility can also do the trick
- No quarrels about the big picture
- Only a laundry list of suggestions to tighten the analysis

Calibration/Estimation

- Implement the special case of linear reference-dependent utility:

$$M_{t+1} = \beta \left(\frac{C_{t+1}}{C_t} \right)^{-\gamma} \frac{w(C_{t+1}/X_{t+1})}{w(C_t/X_t)}$$

where

$$w(C_t/X_t) = \begin{cases} 1 & \text{for } C_t/X_t > 1 \\ \alpha + (1 - \alpha)\lambda & \text{for } C_t/X_t < 1 \end{cases}$$

and

$$y_{t+1} = -\delta + \phi y_t + g_{t+1}$$

- Target assets are three-month T-bill, CRSP value-weight index, SMB, and HML

- Nominal T-bill rate might be more volatile than real interest rate

[Discuss Table II in the paper]

- No model moments are directly reported, only indirectly through Figure 1

[Discuss Figure 1 and the figure of T-bill and inflation in the data]

- No big swing in interest rate in the early periods of data — to what extent this affects volatility of interest rate in the model?
- “[T]here is some procyclical variation in the riskfree rate (p.18)” — but real interest rate is countercyclical, see King and Rebelo (1999)

Table II
Descriptive Statistics for Consumption and Asset Returns

The table reports the mean and standard deviation of log consumption growth, T-bill rate, excess market return, SMB return, and HML return. The Sharpe ratio is the mean excess return divided by the standard deviation. All returns are deflated by the price index for consumption, and the sample period is annual 1929–2001.

Variable	Mean (%)	S.D. (%)	Sharpe Ratio
Consumption Growth	1.88	2.27	
T-bill Rate	1.06	4.47	
Market Return	7.26	20.40	0.36
SMB Return	3.19	14.20	0.22
HML Return	4.99	14.07	0.35

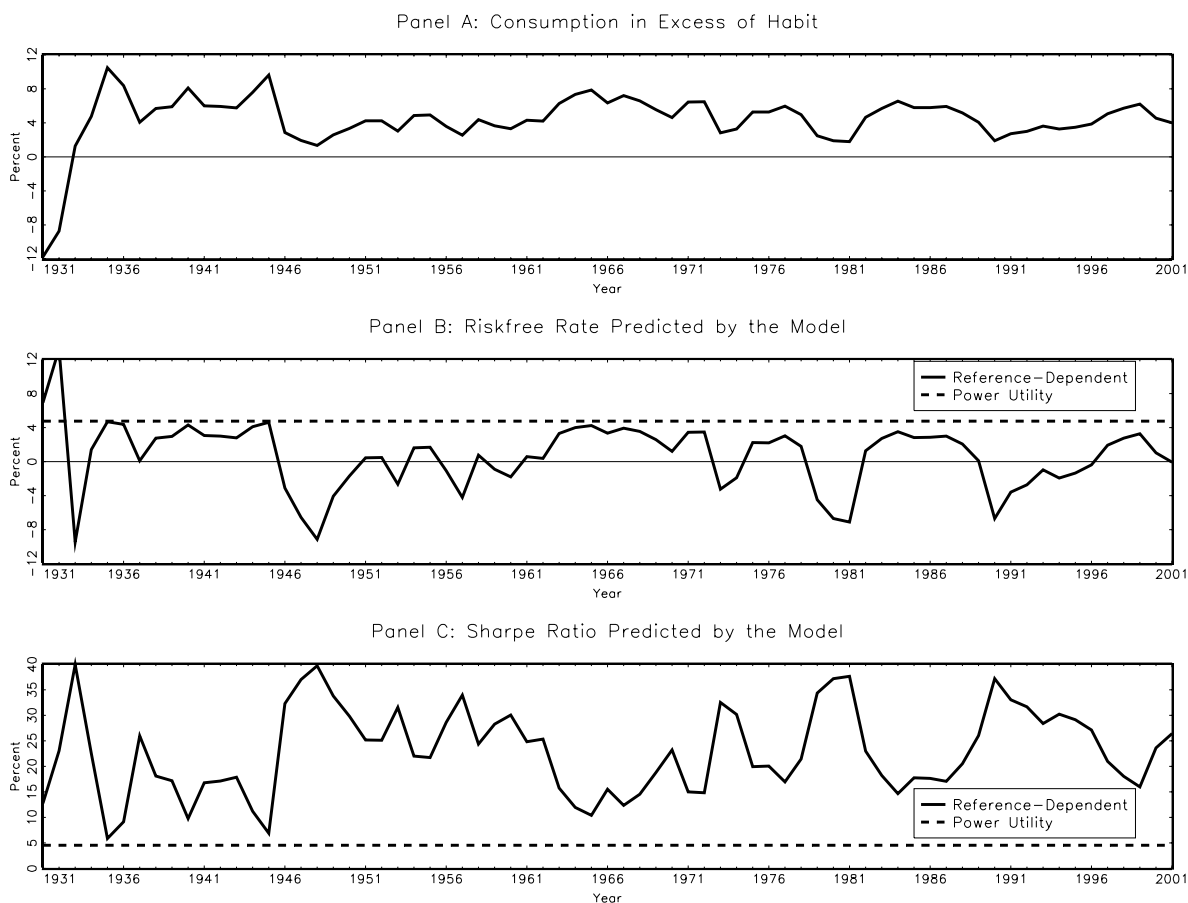
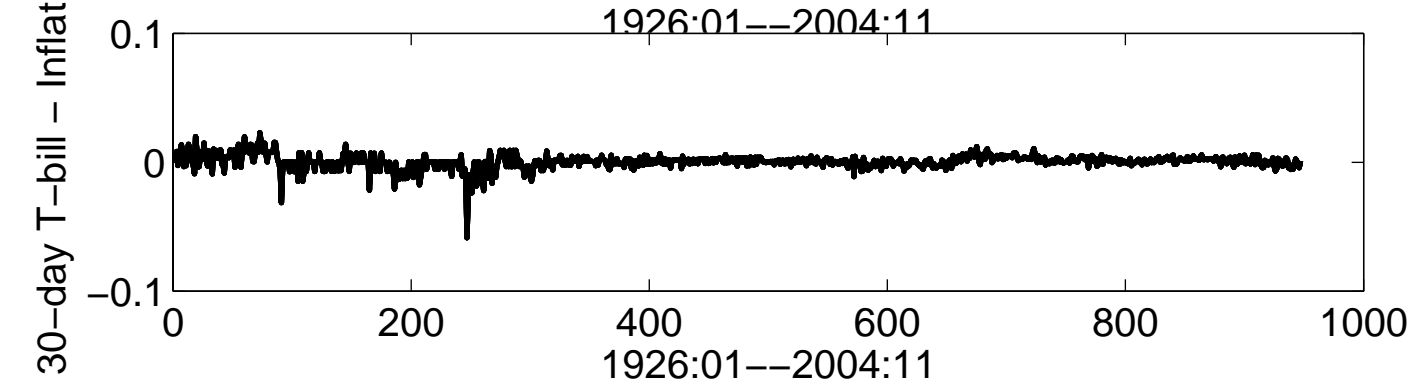
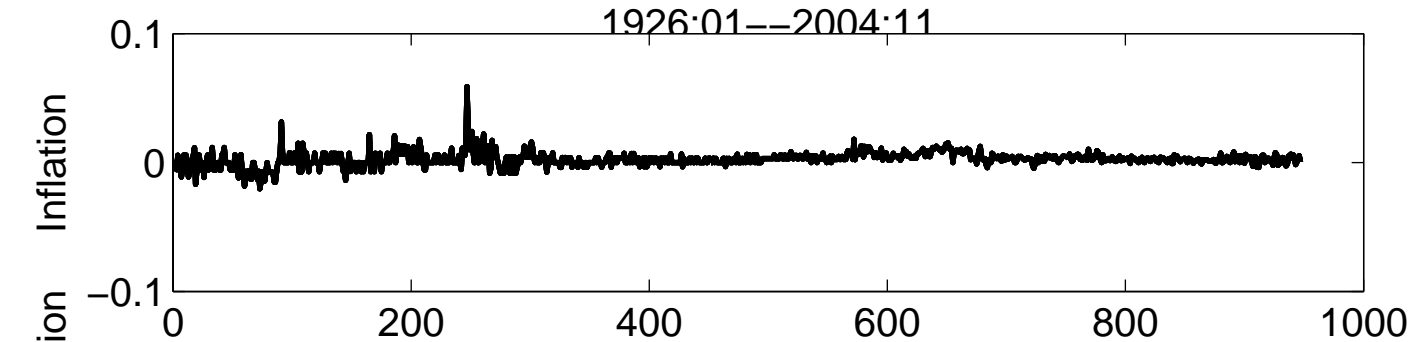
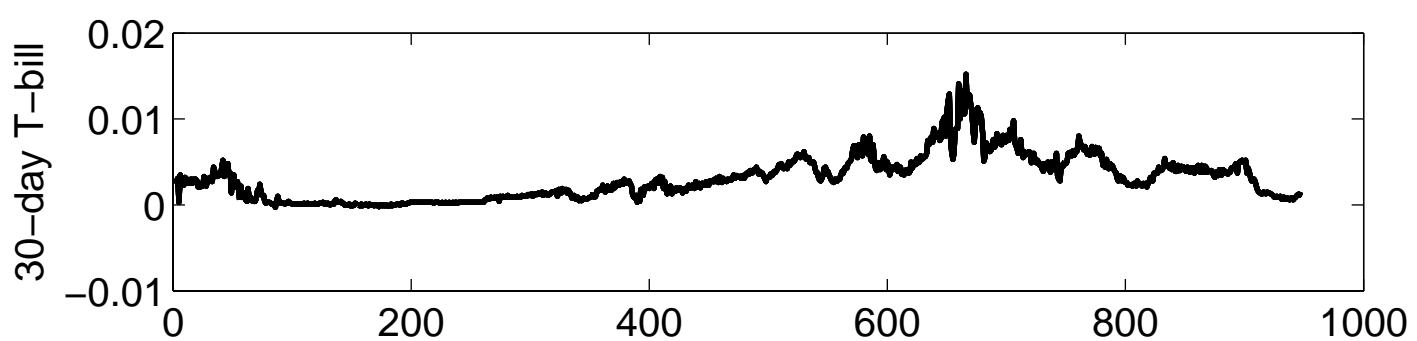


Figure 1
Calibration of the Linear Reference-Dependent Model

The linear-reference dependent model is calibrated using parameters reported in Table III and annual consumption data in the sample period 1929–2001. Panel A is a plot of the log consumption-habit ratio. Panel B (Panel C) is a plot of the riskfree rate (maximum Sharpe ratio) implied by the model.



■ Sharpen the GMM estimation and tests

[Discuss Table III in the paper]

- Large standard errors for key parameters — identification issue?
 - No pricing errors reported
 - Alternative set of target assets such as Fama-French 25?
 - Alternative set of instruments — since when the value and size spreads are standard instruments?
- Why not just focus on either calibration or estimation and do a thorough job?
- Can the gain-loss utility replicate all the Campbell-Cochrane results?

Table III
Parameters of the Reference-Dependent Model

The first column reports the parameters used in calibration of the linear reference-dependent model. The second column reports estimates of the parameters for the power reference-dependent model. The test assets are the three-month T-bill, CRSP value-weighted portfolio, SMB portfolio, and HML portfolio. The instruments are lagged consumption growth, dividend-price ratio, size spread, value spread, yield spread, and a constant. Estimation is by continuous updating GMM. Standard errors and p -values for the J -test (test of overidentifying restrictions) in parentheses.

Parameter	Calibration	GMM Estimation
β	0.99	0.90 (0.20)
γ	2.00	0.65 (9.47)
θ	0.00	0.08 (0.20)
λ	2.25	3.21 (0.95)
δ	0.00	0.02 (0.00)
ϕ	0.51	0.33 (0.39)
J -test		30.90 (0.03)

The Future

- We still do not have a GE model that can explain simultaneously the aggregate stock market and business cycle facts
- Lettau and Uhlig (2000) show the Campbell-Cochrane habit model does not fit business cycle facts too well — consumption is too smooth — because high γ leads to low $1/\gamma$, elasticity of intertemporal substitution.
- Maybe gain-loss utility in consumption is the solution?
- Another direction is to augment the Bansal-Yaron model with a production sector