Available online at www.sciencedirect.com
ScienceDirect
ELSEVIER
Journal of Economic Dynamics & Control 32 (2008) 3253–3274
JOURNAL OF Economic Dynamics & Control
www.elsevier.com/locate/jedc

Asset pricing with loss aversion

Lars Grüne[a], Willi Semmler[b,c,*]

[a]*Mathematisches Institut, Fakultät für Mathematik und Physik, Universität Bayreuth, 95440 Bayreuth, Germany*
[b]*Department of Economics, New School, 65 Fifth Avenue, New York, NY 10003, USA*
[c]*Center for Empirical Macroeconomics, University of Bielefeld, Germany*

Received 11 August 2005; accepted 9 January 2008
Available online 8 February 2008

Abstract

The use of standard preferences for asset pricing has not been very successful in matching asset price characteristics, such as the risk-free interest rate, equity premium and the Sharpe ratio, to time series data. Behavioral finance has recently proposed more realistic preferences such as those with loss aversion. Research is starting to explore the implications of behaviorally founded preferences for asset price characteristics. Encouraged by some studies of Benartzi and Thaler [1995. Myopic loss aversion and the equity premium puzzle. The Quarterly Journal of Economics 110 (1), 73–92] and Barberis et al. [2001. Prospect theory and asset prices. Quarterly Journal of Economics CXVI (1), 1–53] we study asset pricing with loss aversion in a production economy. Here, we employ a stochastic growth model and use a stochastic version of a dynamic programming method with an adaptive grid scheme to compute the above mentioned asset price characteristics of a model with loss aversion in preferences. As our results show using loss aversion we get considerably better results than one usually obtains from pure consumption-based asset pricing models including the habit formation variant.

JEL classification: C60; C61; C63; D90; G12

Keywords: Behavioral finance; Loss aversion; Stochastic growth models; Asset pricing and stochastic dynamic programming

*Corresponding author at: Department of Economics, New School, 65 Fifth Avenue, New York, NY 10003, USA.
E-mail addresses: lars.gruene@uni-bayreuth.de (L. Grüne), semmlerw@newschool.edu (W. Semmler).

0165-1889/$ - see front matter © 2008 Published by Elsevier B.V.
doi:10.1016/j.jedc.2008.01.002

1. Introduction

Consumption based asset pricing models with time separable preferences, such as power utility, have been shown to encounter serious difficulties in matching financial market characteristics, such as the risk-free interest rate, the equity premium and the Sharpe ratio, with time series data. In those models, even if the coefficient of relative risk aversion in the power utility function is raised significantly, neither the risk-free rate nor the mean equity premium and nor the Sharpe ratio fit the observed data. The former is usually too high and the latter two are much too low in the model when compared to the data.

One important concern has been that asset pricing models have often used models with exogenous dividend streams.[1] The difficulties of matching stylized financial statistics may have come from the fact that consumption was not endogenized. There is a tradition in asset pricing that is based on the stochastic growth model which endogenizes consumption, see Brock and Mirman (1972) and Brock (1979, 1982). The Brock approach extends the asset pricing strategy beyond endowment economies to economies that have endogenous state variables including capital stocks that are used in production. Authors, building on this tradition,[2] have argued that it is crucial how consumption is endogenized. In stochastic growth models, the randomness occurs in the production function of firms and consumption and dividends are derived endogenously. Yet, models with production have turned out to be even less successful. Given a production shock, consumption can be smoothed through savings and, thus, asset market features are even harder to match.[3]

Recent developments in asset pricing have focused attention on extensions of intertemporal models, conjecturing that the difficulties in matching real and financial time series characteristics may be related to the simple structure of the basic model. In order to better match the asset price characteristics of the model to the data, economic research has explored numerous extensions of the baseline stochastic growth model.[4] An enormous effort has been invested in models with time non-separable preferences,[5] such as habit formation models, which allow for adjacent complementarity in consumption. This type of habit specification gives rise to time non-separable preferences and time varying risk aversion. Risk aversion falls with rising surplus consumption and the reverse holds for falling surplus consumption. A high volatility in surplus consumption will lead to a high volatility in the growth of marginal utility and thus to a high volatility in the stochastic discount factor (SDF).

Such habit persistence was introduced in asset pricing models by Constantinides (1990) in order to account for high equity premia. Asset pricing models along this line have been further explored by Campbell and Cochrane (2000), Jerman (1998) and Boldrin et al. (2001). As the literature has demonstrated[6] one needs not only habit formation but also

[1] Those models originate in Lucas (1978) and Breeden (1979), for example.

[2] See Rouwenhorst (1995), Akdeniz and Dechert (1997), Jerman (1998), Boldrin et al. (2001), Lettau and Uhlig (2000) and Hansen and Sargent (2007), the latter in a linear-quadratic economy. The Brock model has also been used to evaluate the effect of corporate income tax on asset prices, see McGrattan and Prescott (2005).

[3] For a recent account of the gap between such models and facts, see Boldrin et al. (2001), Cochrane (2001, Chapter 21) and Lettau et al. (2001).

[4] For detailed studies of those extensions see, for example, Campbell and Cochrane (2000), Jerman (1998), Boldrin et al. (2001) and Cochrane (2001, Chapter 21).

[5] For an extensive exploration of the role of preferences for asset pricing, see Backus et al. (2004).

[6] See Jerman (1998), and Boldrin et al. (2001).