

Rational bubbles with stochastic discount factor

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Abstract

In the context of the standard stochastic discount factor asset pricing model, we propose a new rational parametric bubble specification that is able to generate periodically recurring and stochastically deflating trajectories. Our bubble model is empirically plausible and has neatly interpretable parameters. We also suggest parameteric specifications for the stochastic discount factor process and the dividend process. Both the dividend process and the bubble can depend on the stochastic discount factor. Hence, the expected dividend and bubble growth rates vary over time and can be smaller in a recession and larger in a boom. Based on the model specification the implied fundamental stock value is derived. We then transform the entire stock-price-bubble framework into a nonlinear state-space form and implement a fully-fledged estimation framework, based on sequential Monte Carlo methods. This particle-filtering approach enables us (a) to obtain accurate parameter estimates, and (b) to reveal the (unobservable) trajectories of our bubble specifications. We fit our new bubble process to artificial and real-world data and use the parameter estimates to compare important characteristics of historical bubbles which emerged in different stock markets.