1067-91-1473   **William K Brayer*** (`wbrayer@gmu.edu`), 1741 sundance dr, Reston, VA 20194. *An Agent-Based Modeling Approach to Financial Markets.*

Standard financial models are inadequate because they make very strong assumptions about rationality and efficiency that imply a Gaussian distribution of price changes. Yet bubbles and crashes frequently occur: thus conventional models severely underestimate the risk of extreme events in financial markets. The standard models use geometric Brownian motion to simulate the evolution of an asset price p over a timestep h via

$$p(n+1) = p(n)\exp(\sqrt{h}\eta - \frac{h}{2})$$

where $\eta \sim N(0,1)$.

We replace this pricing formula with

$$p(n+1) = p(n)\exp(\sqrt{h}\eta - \frac{h}{2} + \kappa\Delta\sigma(n))$$

where the additional term $\kappa\Delta\sigma(n)$ corresponds to changes in demand for the asset amongst M agents who are simulated directly.

Using simple rules, the market generates internal dynamics that correspond to the gradual formation of price bubbles followed by rapid crashes that closely resemble those seen in real financial markets (note that such internal effects are explicitly ruled out in the standard model).

We use this model to test a variety of trading rules germane to technical analysis. We show that technical analysis can produce excess returns and that herding may account for this phenomenon. (Received September 21, 2010)

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