*Option Prices under Bayesian Learning: Implied Volatility Dynamics and Predictive Densities*

*By Guidolin and Timmermann*

## Summary by Dan Wouden

**Big Picture:**

This paper looks at the empirical biases of Black and Scholes option pricing model, and how they can be explained by Bayesian learning effects. What they do is they relax the assumptions of Black and Scholes, in particular the stochastic process in which Black and Scholes derives its fundamentals.

One assumption that Guidolin makes that is really interesting is that the market updates its beliefs using Bayes rule. Guidolin replaces the up and down probabilities, think binomial tree, with Bayesian learning. These learning effects also produce implied volatility smiles, like the Black Scholes model.

Guidolin and Timmermann conclude that their model has smaller hedging errors than those of the Black Scholes. They show that Bayesian learning prices options more accurately than all previous mentioned models, especially Black Scholes. If this is true, the market will adopt this model to better price assets. Theoretically, Guidolin should be able to price options better and therefore would be able to arbitrage.

**Questions:**

Are option prices more determined by these different models than their true value? How do we know if this is happening? Do we have to worry about this happening? Wouldn't the majority of traders have to adopt a new model for the options true value to change? Theoretically, if you had a better model but everyone else is using a different model, would you find many arbitrage opportunities?