1114-91-277 **Michael J Campbell***, michaeljcampbell@outlook.com. *Phase Transitions in Bounded Rational Potential Games with Applications to Cournot Models and a Speculative and Hedging Model.*

Frequently, real economic agents do not follow purely rational strategies. These individual non-rational behaviors (due to errors in judgment, partial information, emotional bias, etc.) can result in some fascinating organized large-scale structures, which depend on the degree of non-rational behavior.

We look at two such models for Potential Games [Shapley and Monderer]: a dynamical drift-diffusion model, and a static large deviation theory model based on Shannon information entropy and arbitrage. The equilibrium measure in both cases is the Gibbs measure found in statistical mechanics. We show that the variable that gauges non-rational behavior in both models is related to a "temperature" parameter as in statistical mechanics.

A type of localized discrete Cournot oligopoly has a rich phase diagram with an "antiferromagnetic" checkerboard state, striped states and maze-like states with varying widths, and finally a "paramagnetic" unordered state. Such phases have economic implications as to how agents compete given various restrictions on how goods are distributed. The theory is also applied to a Speculative and Hedging Model in Oil and U.S. Dollar Markets [Carfi and Musolino] for many "bank" players, and we speculate on a phase transition in this model. (Received August 30, 2015)