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An Analysis of Farmland Option Value: Ascertaining the Nature of the Recent Farmland Bubble Phenomenon

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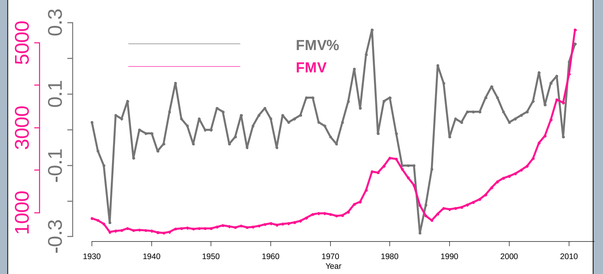
Introduction

With the spectacular increase in farmland value, it is suspected that we are experiencing a "bubble" in the farmland sector in Iowa State:

Farm Market Value Percentage Change (FMV%) Vs Farm Market Value (FMV)



However, how do we tell whether a "bubble" is speculative harmful or benign?

Objective

- How to identify a harmful speculative "bubble"?
- How to identify the contributing factors to the "bubble"?

Methods

Farm Market Value (FMV) =

Farm Value (V)+ Speculative Force

Farm Value (V)= PV+F(V)

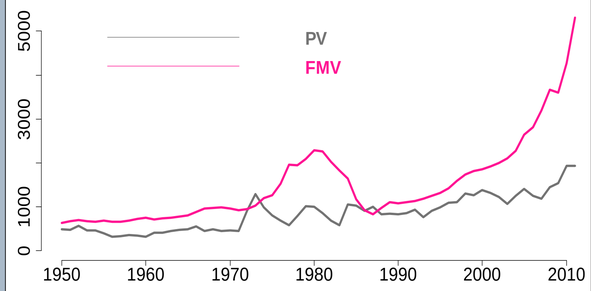
PV=Present value of rent or fundamental value

F(V)=Opportunity cost of investing today or option value

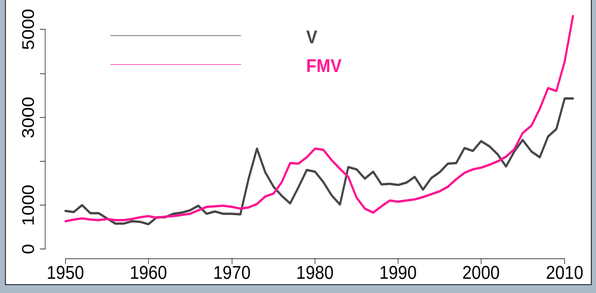
$d\,V/V = \alpha dt + \sigma dz$ Geometric Brownian Motion

By maximizing (V-PV), with Bellman equation, Ito's Lemma and three boundary conditions, the solution: $F(V) = AV^{\beta_1}$

FMV Vs PV



FMV Vs V



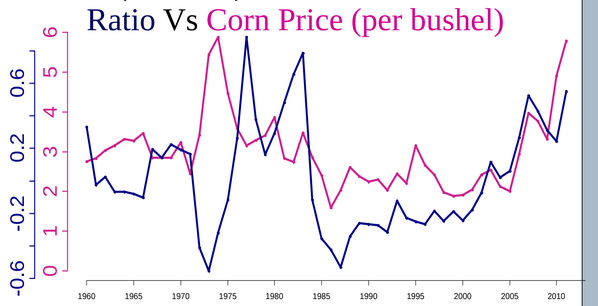
Contributing Factors: Regression Analysis

Dependent Variable: Ratio=(FMV/V)-1, large Ratio indicates a speculative "bubble"

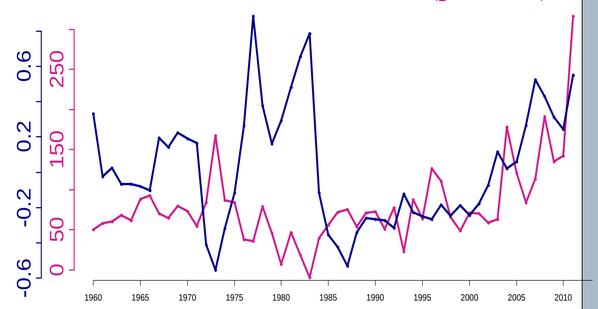
Significant Variables:

Corn Price, Debt/Asset, DirGovPay, Production Cost, Net Farm Income, Net Farm Income%, FMV%, Urban Land/Total Land

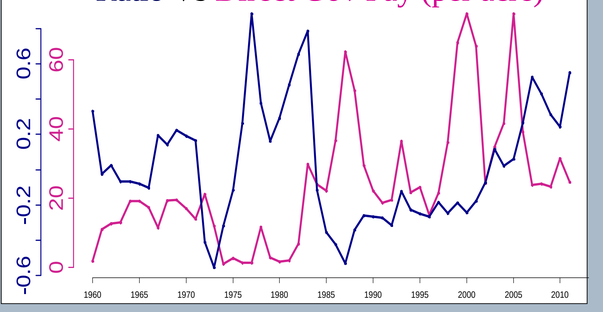
Ratio Vs Corn Price (per bushel)



Ratio Vs Net Farm Income (per acre)



Ratio Vs Direct Gov Pay (per acre)



Conclusions & Discussions

- We may now be experiencing a speculative "bubble" in Iowa.
- With the significant variables, we may be able to predict and control the speculative "bubble " .
- Different values of the parameters (discount rate , capitalization rate, FMV volatility) for calculating the option value, F(V), as well as the assumption of the Geometric Brownian Motion may change F(V) thus leading to different conclusions.

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