

Agricultural Land Values and Producers' Balance Sheets

Charles B. Moss







Facts about Farmland Values

- ▶ Three stylized facts about farmland values:
 - ▶ Farmland values are appropriately priced in the long run
 - ▶ Farmland values are characterized by excessive volatility in the short run, raising the possibility of rational bubbles
 - ▶ Changes in relative risk affect the valuation of agricultural real estate over time



Balance Sheet Hypotheses

- ▶ Three stylized facts about the agricultural balance sheet:
 - ▶ External capital is raised largely through increases in debt
 - ▶ The Balance Sheet is dominated by farmland values
 - ▶ Most of the “returns” are unobserved returns from capital gains



Questions Based on these Hypotheses

- ▶ These stylized facts raise a number of questions:
 - ▶ What can be said about pure capital theory?
 - ▶ What can be said consumption decisions?
 - ▶ What are the implications of boom/bust cycles in farmland values?
 - ▶ What are the implications for agricultural policy?
 - ▶ What are the implications for agribusinesses?



Balance Sheet Mechanics

- ▶ Starting with three standard accounting entries

Account	Debit	Credit
Cost of Goods Sold	XXX	
Cash		XXX
Interest Expense	XXX	
Cash		XXX
Cash	XXX	
Sales		XXX



Income Summary T-Account

Income Summary	
Debit	Credit
	Sales XXX
Cost of Goods Sold XXX	
Interest Expense XXX	
	Income XXX



Owner Equity T-Account

Owner's Equity			
Debit		Credit	
		Initial Equity	XXX
		Income	XXX
Distribution (Consumption)	XXX		
		Ending Equity	XXX



Income, Farmland Appreciation and Changes in Equity

- ▶ Starting with an equation from my work on optimal debt

$$\Delta E = [R_0 + i A - K D] - C$$

- ▶ E is the level of equity, R_0 is the return from operations, i is the rate of appreciation in farmland, A is the value of farmland, K is the cost of capital, D is the debt level, and C is consumption.
- ▶ From a management point of view a market-valued balance sheet is constructed



Affect of Farmland Appreciation on Balance Sheet

Balance Sheet

Assets		Liabilities	
Cash	XXX	Debt	XXX
Inventories	XXX	Equity	$E + R_o + iA - KD - C$
Equipment	XXX		
Farmland	$A(1 + i)$		
Total Assets	XXX	Total Equity	XXX



Income Recognition (GAAP Principles)

- ▶ Returns are only recognized when they can be objectively established in a market transaction
- ▶ Operating Income is recognized when goods are sold
- ▶ When should the appreciation in farmland values be recognized?



Common Valued Agricultural Balance Sheet

Table 1. Aggregate Agricultural Balance Sheet 2007

Assets		Owner's Equity	
	<i>Percent (Common Valued)</i>		
Financial Assets	3.6	Debt	9.6
Purchased Inputs	0.3	Equity	90.4
Crops Stored	1.0		
Machinery and Motor Vehicles	4.9		
Livestock and Poultry	3.6		
Real Estate	86.5		



-
- ▶ Real estate represents 86.5 percent of all agricultural assets or \$ 1.9 trillion
 - ▶ Farmland value is overstated if the current market price of farmland is higher than when it was purchased
 - ▶ Strict GAAP viewpoint the equity level is overstated



-
- ▶ The changes in equity from either operating returns or capital gains can support consumption
 - ▶ Capital gains only provide funds for consumption if the asset is liquidated, or
 - ▶ Consumption can only be supported in excess of current returns by additional borrowing

$$\tilde{D} = C + KD - R_o$$

Balance Sheet

Assets		Liabilities	
Cash	XXX	Debt	$D + \tilde{D}$
Inventories	XXX	Equity	$E + iA - \tilde{D}$
Equipment	XXX		
Farmland	XXX		
Total Assets	XXX	Total Equity	XXX



Sector Solvency

- ▶ New Debt to Asset Ratio

$$\frac{D + \tilde{D}}{E + iA + D}$$

- ▶ Increased probability of equity loss.
- ▶ Debt and solvency linkage may be related to the recent housing debacle
- ▶ In the farm sector this linkage may affect the cost of debt capital



Table 2. State Level Effect of Changes in Land Values, Returns and Interest Rates on Solvency

	Regression Estimates				Total	Bits of Information		
		Real	Return	Interest	bits of	Real	Return	Interest
State	Constant	Estate	Assets	Rate	Inform	Estate	Assets	Rate
Southeast								
Florida	0.142 (0.049)	-0.553 (0.120)	0.000 (0.000)	-2.710 (1.959)	0.725	0.499	0.147	0.078
Southern Plains								
Oklahoma	0.012 (0.034)	-0.233 (0.095)	-0.002 (0.001)	1.271 (0.798)	0.558	0.186	0.291	0.081
Texas	0.105 (0.027)	-0.436 (0.098)	0.000 (0.001)	-1.657 (0.614)	0.671	0.457	0.036	0.178



Table 3. Informational Results for the Fixed Effect Panel Specification

Region	Regression Estimates			Total bits of Inform ation	Bits of Information		
	Real Estate	Return on Assets	Interest Rate		Real Estate	Return on Assets	Interest Rate
Lake States	-0.396 (0.049)	-0.001 (0.000)	2.095 (0.936)	0.938	0.573	0.273	0.092
Corn Belt	-0.470 (0.044)	0.000 (0.000)	-1.092 (0.725)	0.757	0.646	0.060	0.050
Northern Plains	-0.428 (0.061)	-0.001 (0.000)	-0.300 (0.600)	0.488	0.358	0.103	0.026
Southeast	-0.369 (0.086)	0.000 (0.000)	-1.726 (0.662)	0.238	0.103	0.088	0.047
Southern Plains	-0.216 (0.082)	-0.001 (0.000)	0.062 (0.536)	0.433	0.078	0.341	0.014

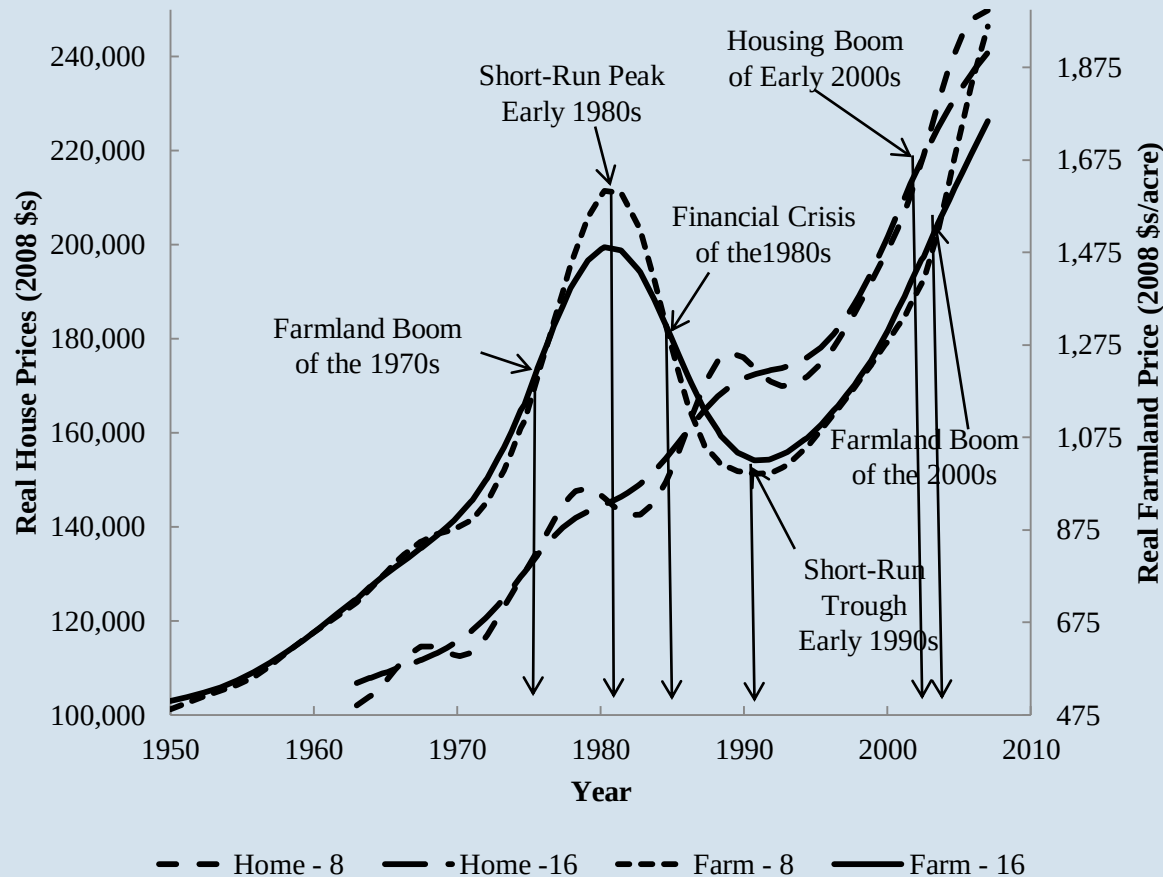


What Affects Sector Solvency?

- ▶ In the Southern Plains, an increase in returns reduces the aggregate debt-to-asset ratio
- ▶ In aggregate increases in the rate of return do not reduce the aggregate debt-to-asset ratio
- ▶ In Oklahoma and the Southern Plains the informational content of returns to agriculture is high
- ▶ The general results indicate more information in the appreciation of land



Factors Driving Farmland Values: Changes in the Housing Market



House Prices and Farmland Values

- ▶ This study assumes that factors other than agricultural returns could drive farmland values

$$V_t = -5244.676 + 0.0163H_t + 14.532R_t - 52454.87r_t$$

(0.0054) (10.692) (9440.73)



Effect of Solvency on Farmland Values

- ▶ Mishra, Moss, and Erickson investigate the potential linkage between farmland values and the sector's solvency

$$v = \frac{\frac{\Delta \pi}{\Delta A}}{\frac{\Delta r}{\Delta D} + r}$$



Panel Cointegration Results

Returns to Farmland	0.6996
Real Interest Rates	-4.3291
Debt to Asset Ratio	-0.0397
Government Payments	-0.8205
R-Squared	0.7273
R-Bar-Squared	0.0217



Farmland Values and Solvency

- ▶ Lower solvency could increase the interest rate by increasing the probability of default.
- ▶ Empirical results support the hypothesis that the sector's solvency affects farmland values.
 - ▶ Increases in the debt-service-ratio reduce farmland values



Conclusions: What does it all add up to?

- ▶ What does it mean for agricultural capital markets?
 - ▶ Investments in agriculture share some of the characteristics of growth stock
 - ▶ The internal rate of return may be very high due to capital gains on farmland, but the cash income to be used as dividends is low.
 - ▶ There is a persistent problem with scale: Farmers may want to downsize to control their debt payments by selling farmland, but this will eliminate most of their long-run profit from farmland appreciation.
 - ▶ There is a potential problem with agricultural labor as a quasi-fixed asset.



Conclusions: What does it all add up to?

- ▶ Live poor and die rich or live rich and die poor (i.e. do you finance consumption from capital gains by debt?)
- ▶ Given the tendency to finance with debt and the endogeneity of the cost of debt, there is an increased tendency to sustain boom/bust cycles.



Conclusions: What does it all add up to?

- ▶ What does this mean for Agricultural Policy?
 - ▶ The aggregate estimate of firm equity (and solvency) is probably overstated in boom periods and understated in bust periods.
 - ▶ There is a real dichotomy in agricultural policy with respect to payments to farmers.
 - ▶ Direct payments coupled with production have two possible effects:
 - They could increase consumption by providing spendable cash, or
 - They could be bid into farmland values leading to increased appreciation.

