



USING A FARM BALANCE SHEET

AAE 320

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Agricultural & Applied Economics

Learning Goals

- How to calculate and interpret common Financial Ratios for Liquidity and Solvency
- Develop an awareness of typical financial ratios by farm type
 - Current Ratio and Debt:Asset
- Suggestions for where to go for more information

What use is a Balance Sheet?

- Can see where assets and liabilities are and their relative sizes
- Can look at changes if have balance sheets from previous years—see if you're gaining
- Typically focus on ratios to look at Liquidity and Solvency of the business
- Ratios control for differences in business size

Current Ratio and Liquidity

- Measures ability to meet current financial obligations as they come due without disrupting normal business
 - Ability to generate cash in the short-term
- Current Ratio =
$$\frac{\text{Current Assets}}{\text{Current Liabilities}}$$
- Example: 1.4 or 40%

BALANCE SHEET

SHEET

Date: 8/21/20120

Business Consolidated Personal	A	B	C
	March 1, 2019 Beginning Balance	Feb. 29, 2020 Ending Balance	Net Change
CURRENT ASSETS			
1. Cash & Checking	3,421	37,815	34,394
2. Accounts Receivable	900	-	(900)
3. Prepaid Expenses	-	-	-
4. Cash Investment Growing Crops	54,669	54,669	-
Inventories:			
5. Marketable Livestock	241,992	241,992	-
6. Stored Crops and Feed	4,860	5,060	200
7. Purchased Feed	-	-	-
8. Supplies	2,000	2,000	-
9. Other Current Assets	-	-	-
10. TOTAL CURRENT FARM ASSETS	307,842	341,536	33,694
Non-Farm Assets:			
11. Savings	28,394	32,590	4,196
12. Marketable Securities	-	-	-
13. Other Non-Farm Assets	-	-	-
14. TOTAL CURRENT ASSETS	336,236	374,126	37,890
NON-CURRENT ASSETS			
15. Breeding Livestock	116,850	116,850	-
16. Vehicles	133,908	120,518	(13,390)
17. Machinery, Equipment	646,682	704,680	57,998
18. Investment in Capital Le			
19. Contracts & Notes Rece			79,058
20. Investment in Cooperati			
21. Real Estate, Land			(8,327)
22. Buildings & Improvermer			-
23. Other Non-Current Asse			70,731
24. TOTAL NON-CURRENT ASSETS			34,959
Non-Farm Assets:			
25. Cash Value, Life Insurance	14,056	14,914	858
26. Investment in Other Entities	15,000	16,000	1,000
27. Other Non-Farm Assets: House	125,000	123,839	(1,161)
28. TOTAL NON-CURRENT ASSETS	2,892,496	2,937,312	44,816
29. TOTAL ASSETS	3,228,732	3,311,438	82,706

<input type="checkbox"/> Cost Basis <input type="checkbox"/> Market Based	D	E	F
	March 1, 2019 Beginning Balance	Feb. 29, 2020 Ending Balance	Net Change
CURRENT LIABILITIES			
30. Accounts Payable	-	-	-
31. Line of Credit and Operating Notes	153,552	85,000	(68,552)
32. Current Portion of Term Debt	33,630	60,776	27,146
33. Accrued Interest	10,035	15,660	5,625
Taxes Payable:			
34. Ad Valorem	1,647	1,647	-
35. Employee Payroll Withholding	-	-	-
36. Income Taxes	10,350	10,350	0
37. Deferred Taxes	63,696	63,817	121
38. Other Accrued Expenses	-	-	-
39. Other Current Liabilities	-	-	-
40. TOTAL CURRENT FARM LIABILITIES	272,910	237,250	(35,660)
Non-farm Liabilities:			
41. Non-Farm Notes & Interest	15,279	15,167	(112)
42. Other Non-Farm Liabilities	-	-	-
43. TOTAL CURRENT LIABILITIES	288,189	252,417	(35,772)
NON-CURRENT LIABILITIES			
44. Notes Payable, non-Real Estate	31,862	116,407	84,545
45. Notes Payable Real Estate	45,344	32,142	(13,202)
46. Deferred Taxes	442,042	449,757	7,715
47. Other Non-Current Liabilities			-
48. TOTAL NON-CURRENT LIABILITIES			79,058
49. TOTAL LIABILITIES			(8,327)
OWNER EQUITY			
53. Contributed Capital	93,500	93,500	-
54. Retained Earnings	958,633	1,006,380	47,747
55. Total Valuation Equity	1,275,302	1,275,302	-
56. TOTAL EQUITY	2,327,435	2,375,182	47,747
57. TOTAL LIABILITIES & EQUITY	3,228,732	3,311,438	82,706

CR on 3/1/2019 = 336,236 / 288,189 = 1.17
 CR on 2/29/2020 = 374,126 / 252,417 = 1.48

Current Ratio

- Too low: cash flow problems
 - If asset prices change or costs suddenly arise (repairs), can have trouble meeting current liabilities
 - Don't want to sell 1 acre to put new roof on barn
 - Can't take advantage of opportunities when they arise
- Too high: holding too much cash, current assets typically have lower returns than if put capital into productive assets or market
 - Income lost by keeping cash “under the mattress”
 - Parable of the talents: buried gold in ground

What are typical current ratios?

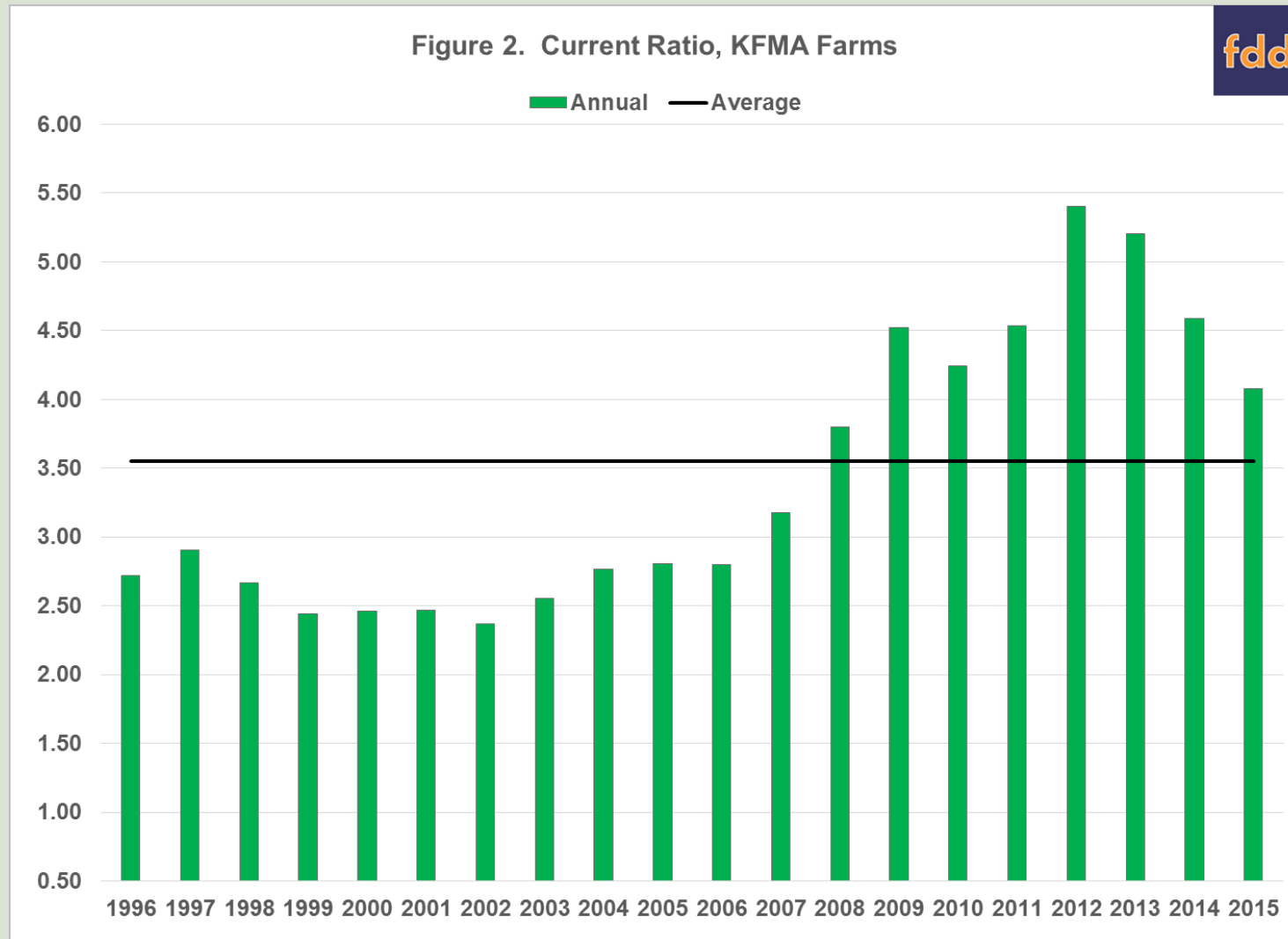
- IL Farm Business Farm Management Program
 - 2,166 IL farms in 1996
- Fairly typical by farm types

<u>Farm Type</u>	<u>Median Current Ratio</u>
Hogs	2.03
Grain	1.81
Beef	1.57
Dairy	1.33

What's a good Current Ratio?

- Iowa State University Extension:
 - Typically farms with adequate liquidity have current ratios > 2.0
 - Farms with continuous sales (dairy) often have current ratio as low as 1.5
 - Beef feeding farms have low current ratios
 - Farms with concentrated sales (cash grain) need current ratio as high as 3.0 early in year
- Ohio State University Extension:
 - Measures of Dairy Farm Competitiveness: 1.3 is competitive

Kansas Farm Management Assoc. Farmers



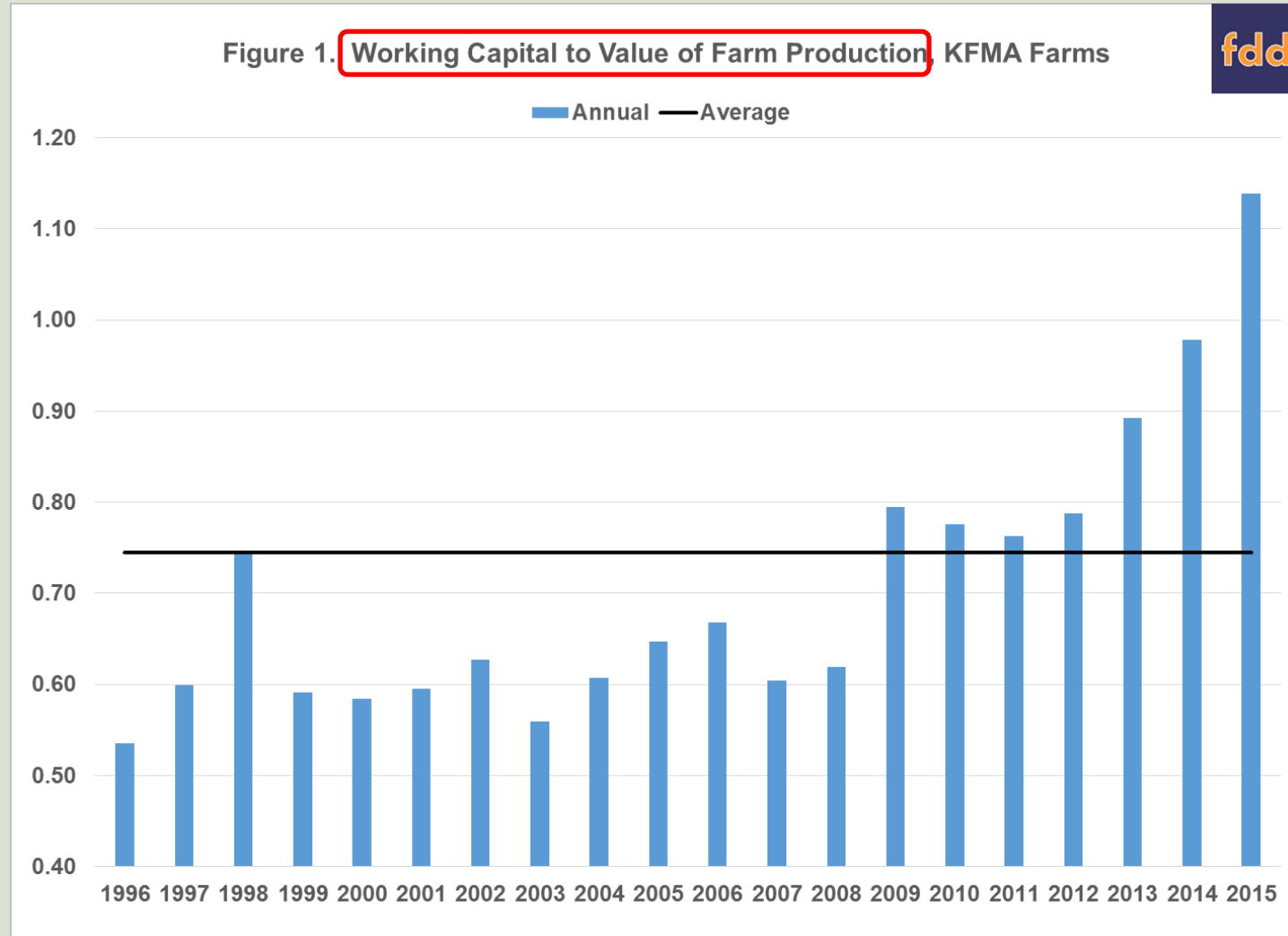
Examining Trends in Liquidity for a Sample of Kansas Farms:

<http://farmdocdaily.illinois.edu/2016/07/examining-trends-in-liquidity-sample-kansas-farms.html>

Working Capital vs Current Ratio

- Working Capital = Current Assets – Current Liabilities
- Measures the margin of safety in dollars (not ratio or %) to meet short-term liabilities
- For cross farm comparisons (or to track your farm over time if changing in size) need to relate it to size of business in some way, that's why use current ratio
 - \$10,000 not much for a 5000 acre farm, but may be more than enough for a 20 cow dairy
 - This why most use Current Ratio
 - Alternative: divide working capital by total revenue or value of production to tie to the “size” of the business

Kansas Farm Management Assoc. Farmers



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University of Minnesota FinBin (2015)

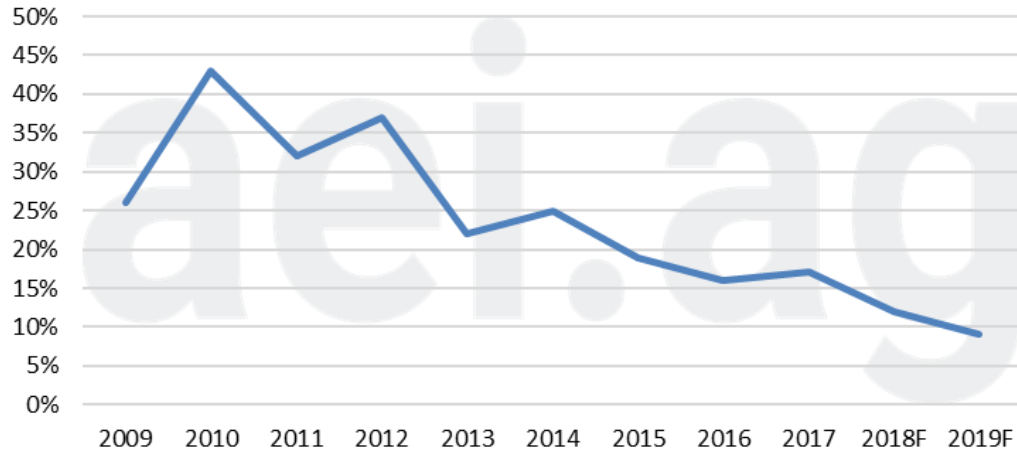
Financial Standards Measures (Farms Sorted By Farm Type)

	<u>Avg. Of All Farms</u>	<u>Crop</u>	<u>Dairy</u>	<u>Hog</u>	<u>Beef</u>	<u>Crop and Dairy</u>	<u>Crop and Hog</u>	<u>Crop and Beef</u>	<u>Other</u>
Number of farms	3036	1491	372	53	161	85	43	240	585
Liquidity									
Current ratio	1.66	1.76	1.84	1.68	1.27	1.82	1.62	1.49	1.50
Working capital	226,854	278,878	155,255	631,863	108,602	193,197	388,903	159,770	157,990
Working capital to gross inc	29.7 %	39.7 %	14.5 %	21.0 %	17.0 %	24.6 %	27.7 %	28.9 %	26.6 %
Solvency (market)									
Farm debt to asset ratio	40 %	38 %	42 %	49 %	50 %	41 %	47 %	39 %	44 %
Farm equity to asset ratio	60 %	62 %	58 %	51 %	50 %	59 %	53 %	61 %	56 %
Farm debt to equity ratio	0.68	0.60	0.73	0.95	1.02	0.69	0.90	0.64	0.79

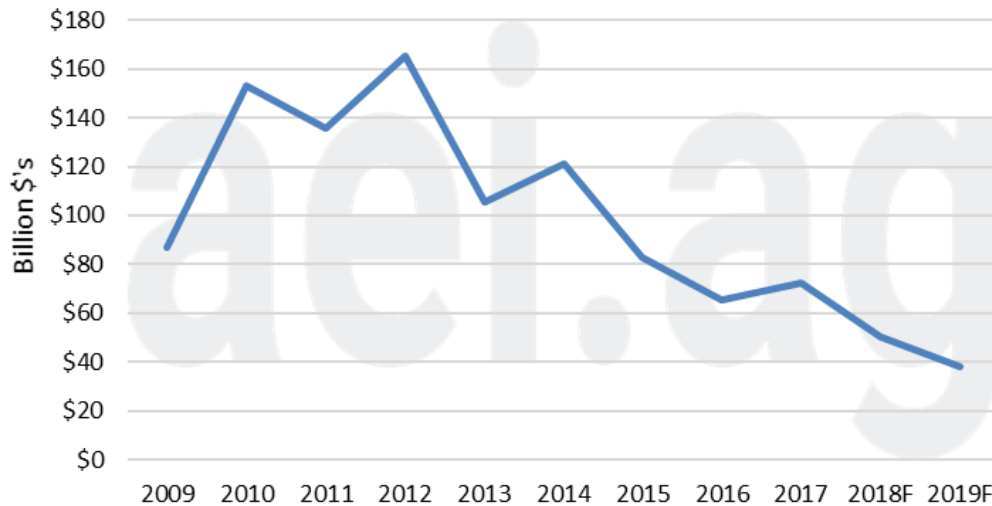
- <https://finbin.umn.edu/>
- Mostly farms in MN, plus NE, MO

Liquidity Trends for US Farm Sector

Working Capital to Gross Revenue Ratio, U.S. Farm Sector 2009-2019



Working Capital, U.S. Farm Sector 2009-2019



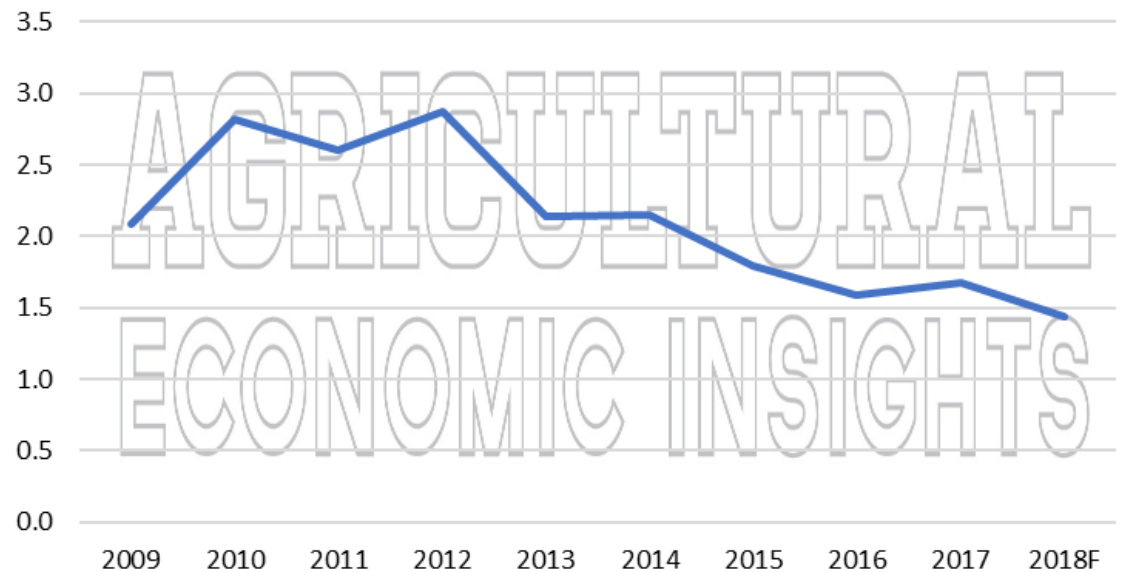
Farm Financial Conditions Trend Weaker Again (Brent Gloy Oct 15, 2018)

<https://ageconomists.com/2018/10/15/farm-financial-conditions-trend-weaker-again/>

Farm Sector Working Capital at Critical Levels (Brent Gloy Jun 24, 2019)

<https://aei.ag/2019/06/24/farm-sector-working-capital-at-critical-levels/>

Current Ratio, U.S. Farm Sector 2009-2018



Solvency

- Measures relative relationships among assets, liabilities, and equity to assess “health” of firm
- Could the farm’s debts be paid off if foreclosed?
 - Requires that $\text{Assets} > \text{Liabilities}$
- Measured by three ratios
 - Debt to Asset Ratio
 - Equity to Asset Ratio
 - Debt to Equity Ratio
- Given any one ratio, you can derive the others, so each is a different way to look at Solvency

Debt to Asset Ratio

- $\text{Debt/Asset} = \text{Total Liabilities/Total Assets}$
- Proportion (or %) of business assets owed to lenders (i.e. % the bank owns)
- 0.70 means you owe 70% of farm assets to lenders (bank owns 70%)
- 1.0 means debts = assets
 - Means owner equity is zero, bank owns 100%
- > 1.0 means business is insolvent

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Inventories:			
5. Marketable Livestock	241,992	241,992	-
6. Stored Crops and Feed	4,860	5,060	200
7. Purchased Feed	-	-	-
8. Supplies	2,000	2,000	-
9. Other Current Assets	-	-	-
10. TOTAL CURRENT ASSETS	3,228,732	3,311,438	82,706
Non-Farm Assets:			
11. Savings	-	-	-
12. Marketable Securities	-	-	-
13. Other Non-Farm Assets	-	-	-
14. TOTAL NON-CURRENT ASSETS	-	-	-
NON-CURRENT ASSETS			
15. Breeding Livestock	116,850	116,850	-
16. Vehicles	133,908	120,518	(13,390)
17. Machinery, Equipment	646,682	704,680	57,998
18. Investment in Capital Leases	-	-	-
19. Contracts & Notes Receivable	-	-	-
20. Investment in Cooperatives	18,000	18,350	350
21. Real Estate, Land	1,776,000	1,776,000	-
22. Buildings & Improvements	47,000	46,161	(839)
23. Other Non-Current Assets	-	-	-
24. TOTAL NON-CURRENT FARM ASSETS	2,738,440	2,782,559	44,119
Non-Farm Assets:			
25. Cash Value, Life Insurance	14,056	14,914	858
26. Investment in Other Entities	15,000	16,000	1,000
27. Other Non-Farm Assets: House	125,000	123,839	(1,161)
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 Cost Basis
 Market Based

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Taxes Payable:			
34. Ad Valorem	1,647	1,647	-
35. Employee Payroll Withholding	-	-	-
36. Income Taxes	10,350	10,350	0
37. Deferred Taxes	63,696	63,817	121
38. Other Accrued Expenses	-	-	-
39. TOTAL CURRENT LIABILITIES	210,360	217,250	6,890
NON-CURRENT LIABILITIES			
44. Notes Payable, non-Real Estate	31,862	116,407	84,545
45. Notes Payable Real Estate	45,344	32,142	(13,202)
46. Deferred Taxes	442,042	449,757	7,715
47. Other Non-Current Liabilities	-	-	-
48. TOTAL NON-CURRENT FARM LIABILITIES	519,248	598,306	79,058
Non-Farm Liabilities:			
49. Non-Farm Notes	93,860	85,533	(8,327)
50. Other Non-Farm Liabilities	-	-	-
51. TOTAL NON-CURRENT LIABILITIES	613,108	683,839	70,731
52. TOTAL LIABILITIES	901,297	936,256	34,959
OWNER EQUITY			
53. Contributed Capital	93,500	93,500	-
54. Retained Earnings	958,633	1,006,380	47,747
55. Total Valuation Equity	1,275,302	1,275,302	-
56. TOTAL EQUITY	2,327,435	2,375,182	47,747
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$$D:A \text{ on } 3/1/2019 = 901,297 / 3,228,732 = 0.279$$

$$D:A \text{ on } 2/29/2020 = 936,256 / 3,311,438 = 0.283$$

Equity to Asset Ratio

- $\text{Equity/Asset} = \text{Total Equity/Total Assets}$
- Proportion (or %) of assets owned
- 0.45 means you own 45% of farm
- 1.0 means equity = assets so owner has no liabilities (he/she owns all equity)
 - Own 100% of the farm
- < 0 means business is insolvent—has no or negative equity

Debt to Equity Ratio

- $\text{Debt/Equity} = \text{Total Liabilities/Owner Equity}$
- Proportion of financing provided by lenders relative to that provided by owner equity
- 1.0 means you and your lenders are providing equal proportion of financing
- 0.75 means for each dollar of equity financing you provide, your lender provides \$0.75 of financing
- 1.8 means for each dollar of equity financing you provide, your lender provides \$1.80 of financing
- Very large Debt/Equity ratio implies very small equity and potential for insolvency

Relation between Ratios

- Given any of these three financial ratios, you can derive the others
- Basic Accounting Identity must hold
$$\text{Assets} = \text{Liabilities} + \text{Equity}$$
$$\text{Assets} = \text{Debts} + \text{Equity}$$
- Notation: $A = D + E$
 - $\text{Debt/Asset} = D/A$
 - $\text{Equity/Asset} = E/A$
 - $\text{Debt/Equity} = D/E$

Relation between Ratios

- $A = D + E$ Divide by A : $1 = D/A + E/A$
Debt/Asset + Equity/Asset = 1, or
Equity/Asset = $1 - \text{Debt/Asset}$
Debt/Asset = $1 - \text{Equity/Asset}$
- $(D/A)/(E/A) = D/E$, or
Debt/Equity = Debt-to-Asset/Equity-to-Asset
- Rearrange and use D/A and D/E connection
Debt/Asset = Debt/Equity/($1 + \text{Debt/Equity}$)
Equity/Asset = $1/(1 + \text{Debt/Equity})$

Typical Solvency Ratios

- IL Farm Business Farm Management Program of 2,166 IL farms in 1996

Debt to Asset Ratios

<u>Farm Type</u>	<u>Upper 25%</u>	<u>Median</u>	<u>Lower 25%</u>
Hogs	0.44	0.30	0.16
Grain	0.46	0.29	0.15
Beef	0.52	0.31	0.17
Dairy	0.50	0.36	0.23

WI Center for Dairy Profitability

WI Dairy Balance Sheet for 2000

<u>Size (cows)</u>	<u>Debt/Asset</u>	<u>Equity/Asset</u>	<u>Debt/Equity</u>
< 50	23%	77%	30%
51-75	24%	76%	32%
76-100	29%	71%	41%
101-150	31%	69%	45%
151-250	49%	51%	95%
> 250	53%	47%	112%

UW Extension

Managing in Difficult Times

Measure	Strong	Stable	Weak
Current Ratio	> 1.5	1.0 – 1.5	< 1.0
Debt:Asset	$< 30\%$	30% - 70%	$> 70\%$
Equity:Asset	$> 70\%$	70% - 30%	$< 30\%$
Debt:Equity	$< 42\%$	42% - 230%	$> 230\%$

University of Minnesota FinBin (2015)

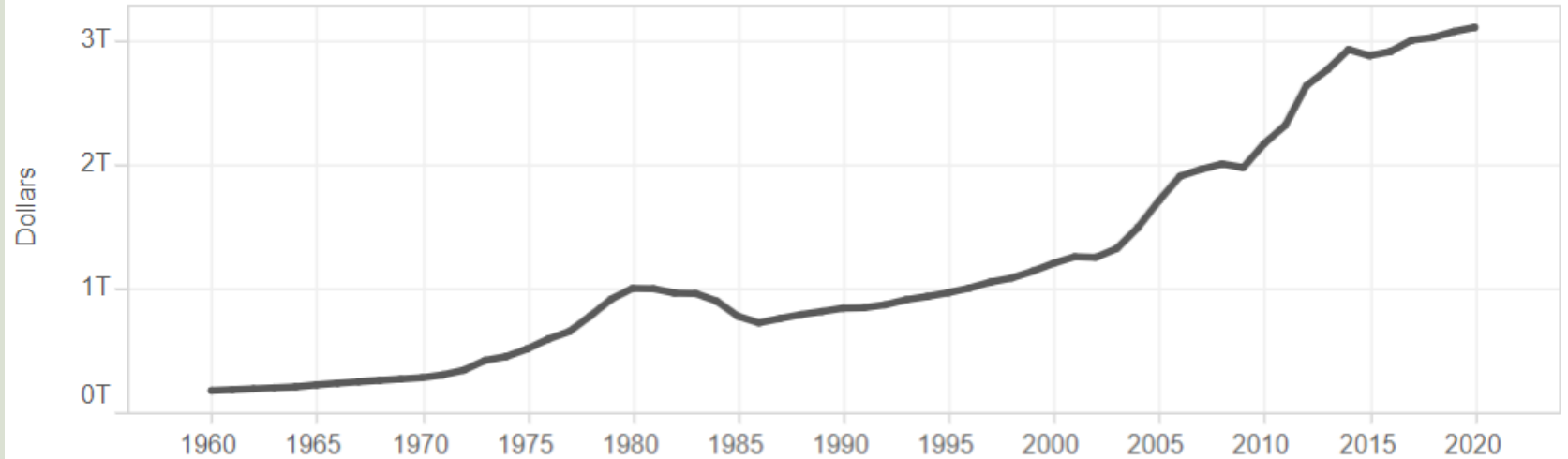
<i>Financial Standards Measures (Farms Sorted By Farm Type)</i>									
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- <https://finbin.umn.edu/>
- Mostly farms in MN, plus NE, MO

Value of Farm Assets 1960 - 2020

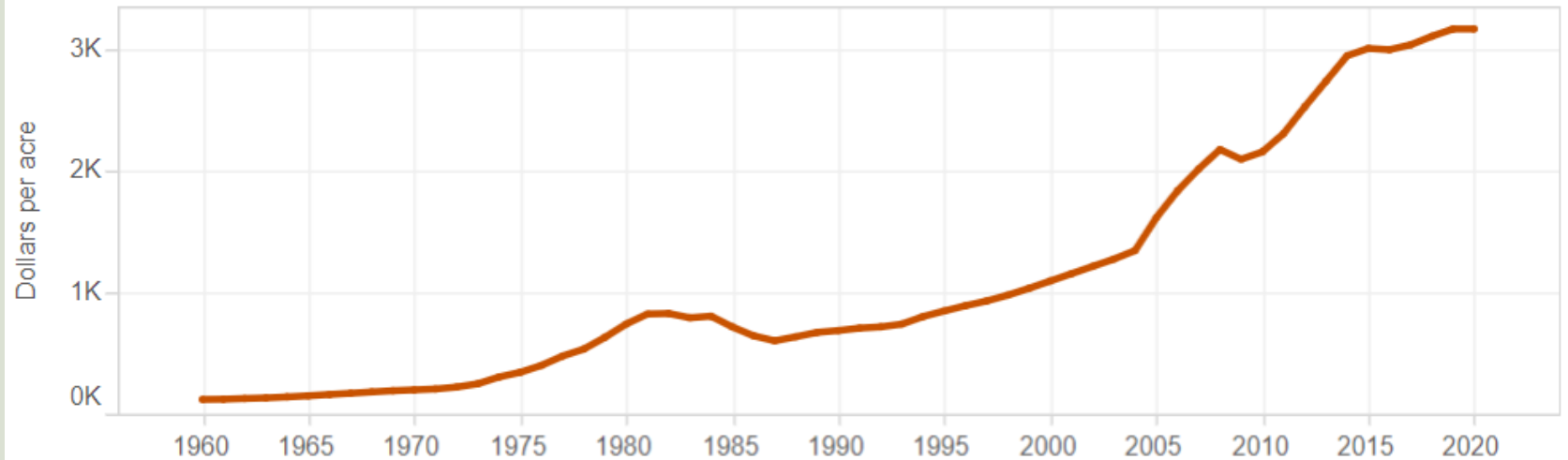
<https://www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/charts-and-maps-of-us-farm-balance-sheet-data/>

Total farm assets, 1960 to 2020



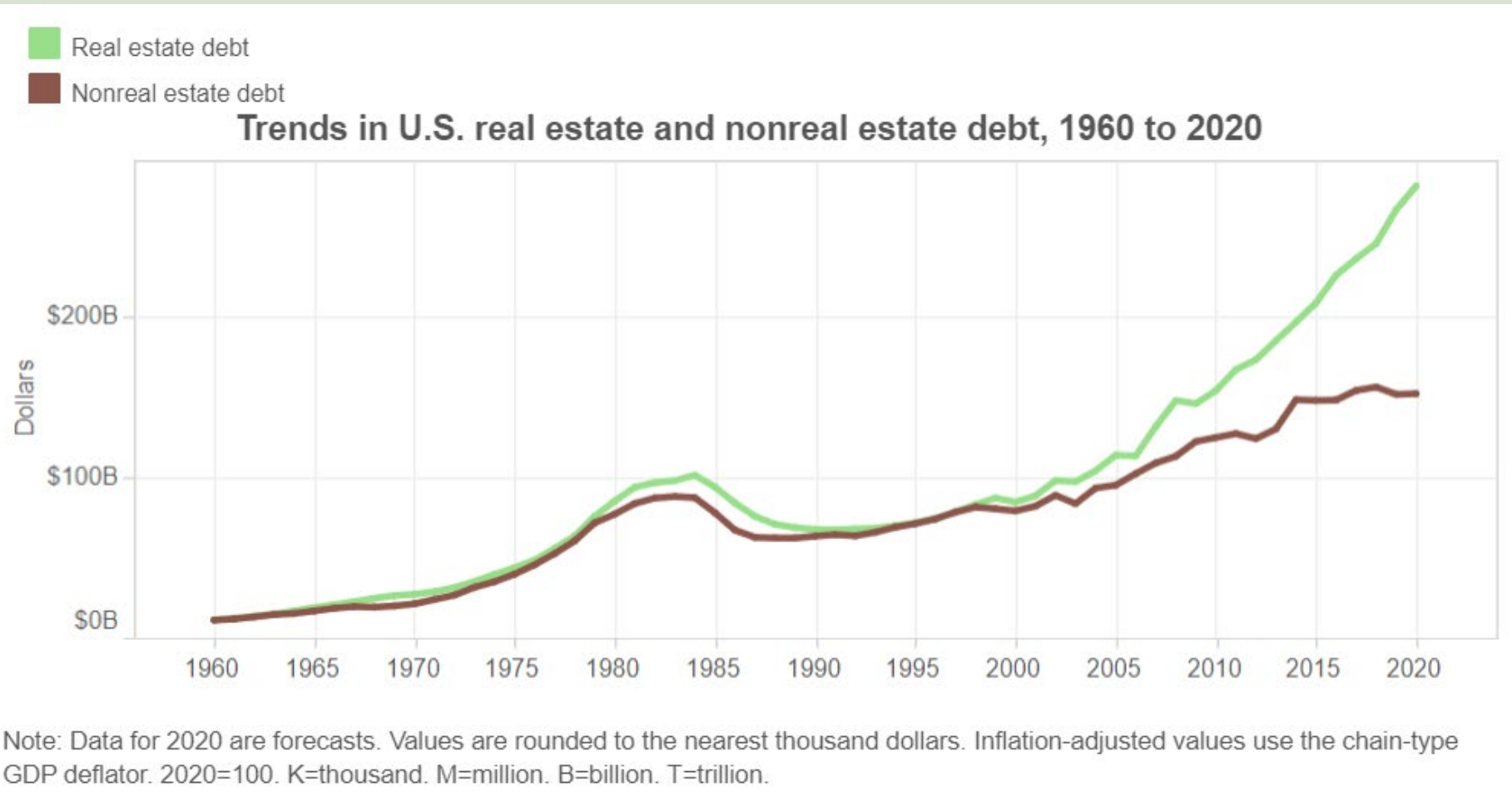
Data for 2020 are forecasts. Data values are rounded to the nearest thousand dollars. Inflation-adjusted values use the chain-type GDP deflator. 2020=100. K=thousand. M=million. B=billion. T=trillion.

U.S. average value of farm real estate* per acre, 1960 to 2020



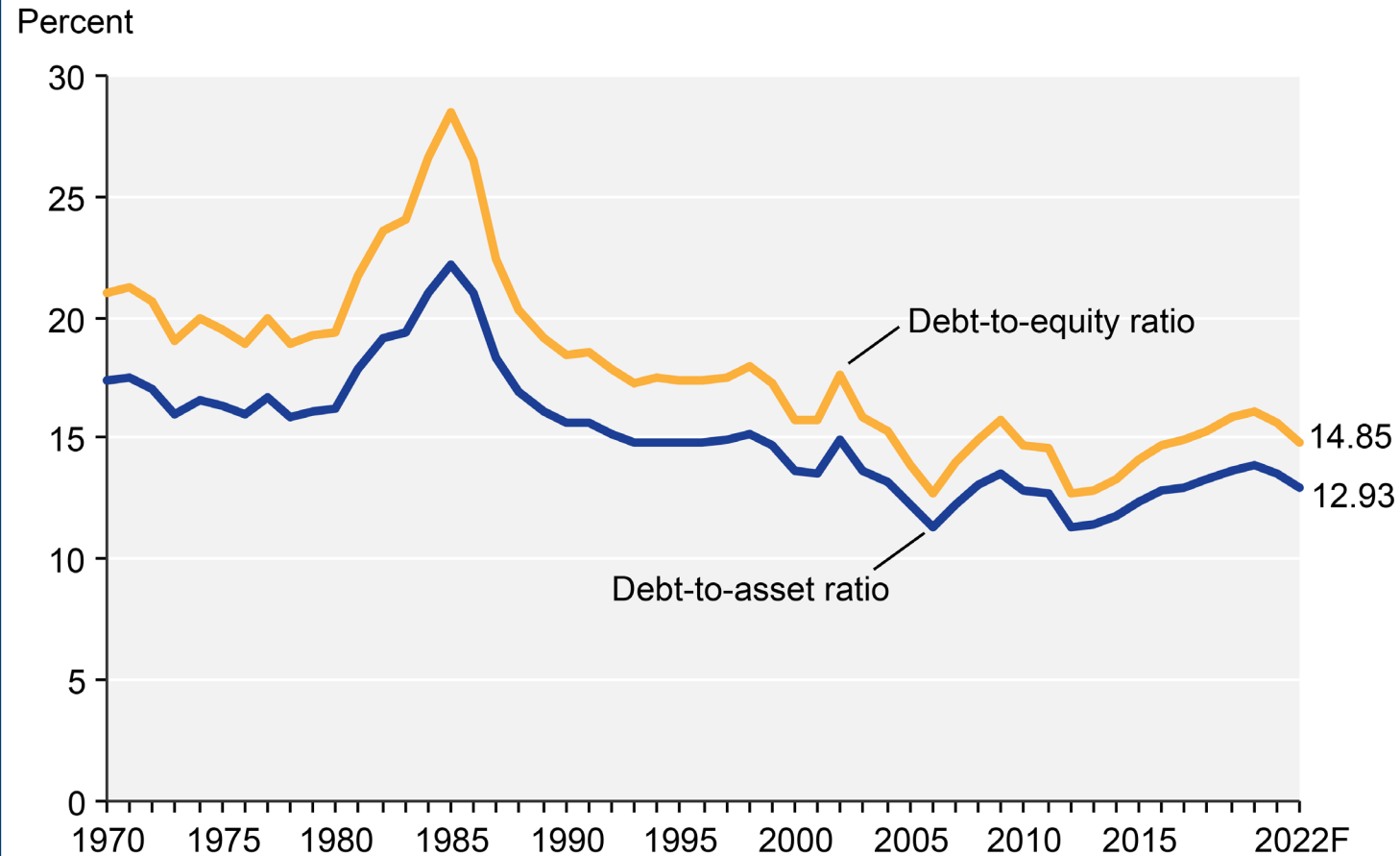
Source: USDA, National Agricultural Statistics Service, *Land Values Summary and Quickstats* (<http://usda.library.cornell.edu/concern/publications/pn89d6567?locale=en>).

Increasing debt among U.S. farms



US Farm Sector Debt to Asset Ratio

U.S. farm sector solvency ratios, 1970–2022F



Note: F = Forecast.

Source: USDA, Economic Research Service, Farm Income and Wealth Statistics.

Data as of September 1, 2022.

Source: <https://www.ers.usda.gov/topics/farm-economy/farm-sector-income-finances/assets-debt-and-wealth/>

More Information

- Provide a quick list/overview of what sort of information is available on farm finance
- Farm Financial Standards Council
- University Extension: UW and other states
- UW Center for Dairy Profitability

Farm Financial Standards Council

- Home page: <http://www.ffsc.org/index.html>
- Mission: “To provide education and a national forum to facilitate the development, review, communication and promotion of uniformity and integrity in both financial reporting and the analytic techniques useful for effective and realistic measurement of the financial position and the financial performance of agricultural producers.”
- *Financial Guidelines for Agricultural Producers*
<http://www.ffsc.org/html/guidelin.htm>
- Recommendations of how to prepare Farm Financial Balance Sheet with several examples
- The source for this sort of information

UW Center for Dairy Profitability

- Homepage: <http://www.cdp.wisc.edu/>
- Focuses mostly (not exclusively) on dairy
- Lots of materials, some financial, the midst of updating
 - Financial analysis reports have become dated
- WI dairy data as Farm Balance Sheets for comparison and benchmarking
<http://www.cdp.wisc.edu/Financial%20Benchmarks.htm>
- AgFA (Agricultural Financial Advisor) becoming FarmBench
- Collect, analyze, and store financial data, create farm specific benchmarks and reports
<http://cdp.wisc.edu/AgFAnew2.htm>

Neighboring States

- University of Minnesota: Center for Farm Financial Management
<http://www.cffm.umn.edu/>
- Sell/Support FINPACK: “The most comprehensive computerized farm financial planning and analysis system available”
- Iowa State University: AgDecision Maker
<http://www.extension.iastate.edu/agdm/homepage.html>
- University of Illinois: FarmDoc
<http://www.farmdoc.uiuc.edu/>
- Both have sections on Farm Finance with several publications and decision aids

Summary

- How to calculate and interpret common Financial Ratios for Liquidity and Solvency
 - Know how to construct and interpret Current Ratio and Debt:Asset
- Develop an awareness of typical financial ratios by farm type
 - Know what is typical for farms
- Suggestions for where to go for more information