Agricultural finance Lecture 5 Financial Ratios)

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Financial Ratios- Ratio analysis

A number of key ratios are important indicators of business performance. Perhaps the most important is

$$\text{Return on Equity} = \frac{\text{Net income}}{\text{Average Owner's Equity}} \times 100$$

Textbook uses a survey of all farms (this is not usually what this is used for). To calculate ROE (Return on Equity) one needs the income statement and the balance sheet of an enterprise. We will use the Texas wheat farm data from the previous chapter.

Texas wheat farm - ROE

Assets			Ownership	
Item	Value	Net value	Item	Value
Cash		15,000	Operating debt	33,564
Growing crop	41,955	Machinery debt	175,000	
Equipment	1,028,510		Real estate	409,645
Depreciation	501,913		Total debt	618,209
		526,597		
Land			Equity	630,943
Total assets		1,249,152	Total ownership	1,249,152

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Item	Accrual	Cash
Sales	226,800	226,800
Cost of goods sold		
Planting cost	41, 955	41, 888
Harvest expense	18, 560	18, 560
Gross margin	167, 965	168, 032
Depreciation	105, 319	105,319
Interest	52,058	52,058
Net income	8,907	8,974

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Two answers (depending on whether net income is calculated based on cash or accrual methods):

$$\text{ROE} = \frac{8,907}{630,943} \times 100 = 1.41\%$$

$$\text{ROE} = \frac{8,974}{630,943} \times 100 = 1.42\%$$

Arbitrage Equilibrium

$$\frac{\text{Return}_i}{\text{Average Owner's Equity}_i} = \frac{R_{E,i}}{CS_i P_{CS,i}} = \frac{R_{E,j}}{CS_j P_{CS,j}}$$

where CS is the capital share and P_{CS} the share price.

Du Pont identiity

$$\text{Return on equity} = \text{Earn} \times \text{Turns} \times \text{Leverage}$$

$$= \text{Operating profit margin} \times \text{Asset turnover} \times \text{Leverage}$$

$$= \frac{\text{Operating income}}{\text{Revenues}} \times \frac{\text{Revenues}}{\text{Average Total Assets}}$$

$$\times \frac{\text{Average Total Assets}}{\text{Average Owner's Equity}} \times \frac{\text{Net income}}{\text{Operating income}}$$

$$= \text{Operating return on assets} \times \text{Financial leverage}$$

Earns

$$\text{Operating profit margin} = \frac{\text{Operating profit}}{\text{Sales}}$$

see income statement

$$\text{Operating profit} = \text{Gross sales from crops and livestock}$$

$$+\text{government payments} + \text{other farm related income}$$

$$-(\text{variable cash expenses} + \text{income and property taxes}$$

$$+\text{insurance premiums} + \text{rent and lease payments} + \text{depreciation})$$

Turns

$$\text{Asset Turnover Ratio} = \frac{\text{Revenue}}{\text{Average Assets}}$$

Low asset turnover ratio

1. Use of expensive farm equipment (capital intensity)
2. Farmland dominance (asset specificity)

Operating return on assets

$$\text{OROA} = \text{Operating Profit Margin} \times \text{Asset turnover}$$

or

$$\text{OROA} = \frac{\text{Operating Income}}{\text{Average Total assets}} \times 100$$

High risk industries will have higher OROA.

Leverage

- Asset to equity ratio
- Debt to Equity ratio
- Debt to Asset ratio

Alternative to DuPont

$$\frac{R}{E} = \left[\frac{S-C}{S}\right] \times \left[\frac{S}{A}\right] \times \left[\frac{A}{E}\right]$$

where

- R is the net return
- S sales
- C cost of production
- A Asset level
- E E is equity

Returns $R = S - C$ so

$$\frac{R}{E} = \left[\frac{R}{A}\right] \times \left[\frac{A}{E}\right]$$

Alternatively, set $S = R$ and $C = DK$so

$$\frac{R}{E} = \left[\frac{S-C}{S}\right] \times \left[\frac{S}{A}\right] \times \left[\frac{A}{E}\right]$$

$$= \left[\frac{R-DK}{R}\right] \times \left[\frac{R}{A}\right] \times \left[\frac{A}{E}\right]$$

$$= \left[\frac{R-DK}{A}\right] \times \left[\frac{A}{A-D}\right] \quad \text{E = A- D}$$

$$= \left[\frac{R}{A} - K\frac{D}{A} \times \frac{1}{1-\frac{D}{A}}\right]$$

Set $\frac{R}{A} = r_A$ and $\frac{D}{A} = \delta$:

$$r_E(A) = (r_A - K\delta) \times \left(\frac{1}{1-\delta}\right)$$

Profitability Ratios

$$\text{Gross Profit Margin} = \frac{\text{Gross Revenue} - \text{Cost of Goods Sold}}{\text{Gross Reveneue}} \times 100$$

This can be represented either as a percentage or simply as revenue minus cost of goods sold. Accountant typically represent it as a percentage

Inventory Turnover

$$\text{Inventory turnover ratio} = \frac{\text{Cost of goods sold}}{\text{Average Average Inventory}}$$

Accounts receivable turnover

$$\text{Accounts receivable turnover ratio} = \frac{\text{Sales on credit}}{\text{Average Accounts Receivable}}$$

Measures average time it takes to receive accounts receivable (Average collection period).

Accounts payable turnover

$$\text{Accounts payable turnover} = \frac{\text{Cost of goods sold}}{\text{Average Accounts Payable}}$$

This ratio indicates how often a business repays it's accounts.

Operating cycle and cash cycle

operating cycle

Inventory period + accounts receivable period

Cash cycle

operating cycle - accounts payable period

Debt service

$$\text{Debt service coverage ratio} = \frac{\text{Earnings before interest, taxes, depreciation and amortization (EBIDA)}}{\text{Total interest} + \text{Principal payments}}$$

Liquidity

Working capital

Current Assets - Current Liabilities

Cannot be compared across firms.

Current ratio

$$\frac{\text{Current assets}}{\text{Current liabilities}}$$

Farm Growth

Plowback ratio

$$\frac{\text{Retained earnings}}{\text{Net income}}$$

$$\text{Internal growth rate} = \frac{\text{OROA} \times \text{Plowback ratio}}{1 - \text{OROA} \times \text{Plowback ratio}}$$

$$\text{Sustainable growth rate} = \frac{\text{ROE} \times \text{Plowback ratio}}{1 - \text{ROE} \times \text{Plowback ratio}}$$

Summary

- Two approaches to analyzing farm information
  - DuPont system
  - Text also looks at cross-farm comparisons by normalizing against asset values (useful for broader studies of industry sector or region)
- Benchmarking against other firms in industry or region
- Farms have a low asset turnover ratio
- I've concentrated on the single farm case rather than comparisons (looking at it from a prospective buyer or investor)