Lecture XIV: Solvency, Liquidity and Firm Growth

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A Variation on the DuPont Formulation

- A slight modification of the DuPont formulation has become popular in agricultural finance.

$$\frac{R}{E} = \left[\frac{S-C}{S}\right] \times \left[\frac{S}{A}\right] \times \left[\frac{A}{E}\right] \tag{1}$$

  - R is the net return (i.e., the operating return above less the cost of debt),
  - S is the gross sales,
  - C is the cost of production (including the cost of debt),
  - A is the asset level, and
  - E is the level of equity

- Given the commodity nature of agriculture, sales are largely determined by the quantity produced.

$$\frac{R}{E} = \left[\frac{R}{A}\right] \times \left[\frac{A}{E}\right]. \tag{2}$$

- To focus attention on the debt decision, Equation 2 can be rewritten as

$$\frac{R}{E} = \left[\frac{R - D \times K}{A}\right] \times \left[\frac{A}{E}\right] \tag{3}$$

  - where D is the level of debt and
  - K is the interest rate on debt.

- Rewriting the leverage ratio in terms of the debt-to-asset ratio yields

$$\frac{R}{E} = \left[\frac{R - D \times K}{A}\right] \times \left[\frac{A}{A - D}\right]. \tag{4}$$

- Dividing teach term through by the level of assets yields

$$\frac{R}{E} = \left[\frac{R}{A} - K\frac{D}{A}\right] \times \left[\frac{1}{1 - \frac{D}{A}}\right]. \tag{5}$$

- Substituting r_A for the rate of return on assets and δ for the debt-to-asset ratio, Equation 5 can be rewritten as

$$r_E(\delta) = [r_A - K\delta] \times \left[\frac{1}{1 - \delta}\right] \tag{6}$$

where r_E is the rate of return on equity.

Solvency

- The ability of the farm to repay its long-term liabilities is another key area of concern.
  - A moderate amount of debt in the firm can increase returns on equity when operating return on assets is healthy.
  - To assess the long-term solvency there are two key metrics to consider:
    - the proportion of debt used to purchase the assets and
    - the ability of the operating cash flows to service the interest and principal payments.
- The most frequently used financial measurement of the solvency of the firm is the debt-to-asset ratio.

- A closely related financial metric is the **interest coverage ratio**.
  - This ratio can be calculated by dividing the operating profit by the interest expense.
- The **debt service coverage ratio** is calcuated by dividing *earnings before interest, taxes, depreciation, and amortization* (EBITDA) by total interest and principal payments.

$$\text{Debt Service Coverage} = \frac{20,849 + 12,658}{13,945} = 2.40. \qquad (7)$$

Liquidity

- A final important financial consideration for managers is the liquidity of the firm.
  - Cash is the most liquid asset.
  - Accounts receivable typically are considered the second most liquid asset because they are due to turn into cash in the next few months.
  - Long-term assets, such as land, are less liquid because it takes a longer time to turn them into cash at their full value.
- The most commonly used method of assessing liquidity is to investigate the working capital of the firm.
  - Working capital is calculated by subtracting current liabilities from current assets.

Firm Growth

- For beginning farms, the most important emphasis might be to grow the business to capture **economies of scale**.
  - As the equity position grows from additional retained earnings, the farm can reinvest in opportunities that leverage existing capacity and expertise.
  - Farm equipment has grown in size and horsepower such that it can cultivate and harvest many thousands of acres. Running this equipment over additional acreage will help to spread fixed costs over additional units of output.
  - Management might be interested in determining how fast it can grow the business using retained earnings and/or additional borrowing.

Plowback Ratio

- The **plowback ratio** and the return on assets can be used to determine the firm's **internal growth rate**.
- The plowback ratio indicates the proportion of net income reinvested into the farm rather than withdrawn for the use of the owners for personal consumption.
- This ratio is calculated by the dividing the retained earnings (or more appropriately the net increase in retained earnings in the period of analysis) by the net income.

$$\text{Internal Growth Rate} = \frac{\text{Operating Return on Assets} \times \text{Plowback Ratio}}{1 - \text{Operating Return on Assets} \times \text{Plowback Ratio}} \tag{8}$$