Du Pont Financial Analysis

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This article is one of a series of financial management articles that will examine financial statements and financial analysis. The Du Pont financial analysis model is a useful method of illustrating the relationships between asset turnover ratio, operating profit margin ratio, return on assets, and return on equity. In this article, a cash crop farm in west central Indiana is used to examine the relationships between profitability and financial efficiency ratios, and to examine the impact of a change in revenue, variable costs, or owning rather than leasing 150 acres on financial performance.

The November 2013 newsletter (here) contained definitions of key profitability and efficiency ratios including the asset turnover ratio, operating profit margin ratio, return on assets, and return on equity. The "base case" for these financial ratios referred to below represents information for the case farm in 2013, the latest year of data available. In 2013, the case farm had an asset turnover ratio of 0.2620 and an operating profit margin ratio of 0.1294. Multiplying these two ratios together yields a return on assets of 0.0339. The relationship between the asset turnover ratio, the operating profit margin, and return on assets makes it very clear that increasing either the asset turnover ratio ("turns") or the operating profit margin ratio ("earns") leads to an increase in return on assets. To compute return on equity, in addition to return on equity, we need a solvency measure (assets to equity) and a measure called the "debt burden". This debt burden is computed by dividing net farm income minus unpaid family and operator labor by net farm income minus unpaid operator labor plus interest expense. Return on equity is then computed by multiplying assets to equity by return on assets by the debt burden. Return on equity for the case farm in 2013 was 0.0272 (table 1 contains the value of each item used to compute return on assets and return on equity). A previous newsletter indicated that if borrowing was a profitable endeavor, return on equity would be greater than return on assets. In 2013, return on equity was less than return on assets, so in this year borrowing money did not pay. Of course, it was not possible to predict this actuality at the beginning of the year.

Table 1 compares performance for the base case with two scenarios. First, the base case is compared to cases with lower and higher revenue. Second, the base case is compared to cases involving lower and higher variable costs. Increasing revenue impacts both the asset turnover ratio and the operating profit margin ratio. A 10 percent decline (increase) causes the asset turnover ratio to drop (increase) from 0.2620 for the base case to 0.2358 (0.2882), and the operating profit margin ratio to drop (increase) from 0.1294 for the base case to 0.0326 (0.2085). As a result the return on assets and return on equity respond sharply to a change in revenue. Note that return on equity is negative after the decline in revenue. A 10 percent change in revenue is not large by historical standards. The expected drop in revenue in 2014 is approximately 20 percent.

A change in variable costs has a large impact on the operating profit margin, but does not result in a change in the asset turnover ratio. The alternatives in the last two columns of table 1 illustrate the importance of managing costs. Even small changes in variable costs can have a large impact on profitability.

The impact of buying 150 acres that is currently leased by the case farm is illustrated in table 2. Purchasing the 150 acres that was previously cash rented reduces the asset turnover ratio due to the fact that purchasing land dramatically increases average total assets, the denominator used when computing the asset turnover ratio. The operating profit margin increased due to the reduction in cash rent. In this instance, return on assets increases slightly and return on equity declined slightly. The impact on return on assets and return on equity is heavily dependent on the interest rate and the rent to value ratio for land. The interest rate on the land purchase and the rent to value ratio were assumed to be 5.0 percent and 3.1 percent in table 2, respectively. A higher interest rate or lower rent to value ratio would have lowered the relative profitability of the change in land ownership alternative.

This article examined the relationship between profitability and financial efficiency ratios, and the impact of changes in revenue, variable cost, or purchasing rather than leasing land on financial performance. A 10 decrease or increase in revenue or variable cost had a large impact on financial performance. Even a small change in revenue or cost can have a significant impact on financial performance. Another illustration examined the impact of a change in land ownership. Purchasing 150 acres of land that was previously cash rented resulted in a decline in the asset turnover ratio and an increase in the operating profit margin ratio. Rates of return on assets and equity were similar between the base case and the case that examined the purchase of 150 acres. Next month’s article will discuss balancing business and financial risk.

Table 1. Impact of Change in Revenue and Variable Cost on Financial Performance.

	Base Case	10% Lower Revenue	10% Higher Revenue	10% Lower Var Cost	10% Higher Var Cost
Return on Assets:					
Asset Turnover Ratio	0.2620	0.2358	0.2882	0.2620	0.2620
Operating Profit Margin Ratio	0.1294	0.0326	0.2085	0.1762	0.0825
Return on Assets	0.0339	0.0077	0.0601	0.0462	0.0216
Return on Equity:					
Assets to Equity	1.22	1.22	1.22	1.22	1.22
Asset Turnover Ratio	0.2620	0.2358	0.2882	0.2620	0.2620
Operating Profit Margin Ratio	0.1294	0.0326	0.2085	0.1762	0.0825
Debt Burden	0.659	-0.502	0.808	0.750	0.466
Return on Equity	0.0272	-0.0047	0.0592	0.0422	0.0123

Table 2. Impact of Owning Rather than Leasing 150 Acres.

	Base Case	Buy 150 Acres
Return on Assets:		
Asset Turnover Ratio	0.2620	0.2356
Operating Profit Margin Ratio	0.1294	0.1500
Return on Assets	0.0339	0.0353
Return on Equity:		
Assets to Equity	1.22	1.36
Asset Turnover Ratio	0.2620	0.2356
Operating Profit Margin Ratio	0.1294	0.1500
Debt Burden	0.659	0.564
Return on Equity	0.0272	0.0270