DuPont Financial Analysis Model
A Process For Knowing Where to Spend My Management Time Tomorrow Morning After Breakfast

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Our computer technology today provides wonderful opportunities to collect, manipulate, and process data including financial analysis data. Sure, it gives a manager lots of numbers, but what do they mean in terms of where to spend my creative management time tomorrow morning after breakfast?

There is no lack of ratios to calculate from financial data, each of which is a valuable piece of information to the manager. The Farm Financial Standard Council’s sweet 16 ratios (recently expanded) have been a standard for years in helping farm managers evaluate their financials. However over several years of teaching undergraduate students and Extension clientele I often found it difficult for people to wrap their arms around what the ratios were indicating and ultimately where to spend their valuable management time. The challenge often led to indifference by the undergraduate students and a lack of seeing any value to go further by Extension clientele.

The DuPont system for financial analysis is a means to fairly quickly and easily assess where the business strengths and weaknesses potentially lie and thus where management time may optimally be spent. It is not the only nor the most thorough, but it is a fairly straight-forward and systematic means to drill back into the financial numbers to determine the source or lack thereof for financial performance.


If we are lucky enough to have the minimum number of financial documents needed to conduct a meaningful financial analysis (both beginning and ending balance sheets, either an actual accrual or accrual adjusted income statement, and a statement of cash flows), we are then inundated with pages and pages of intimidating numbers to sort through.
This gives many managers and advisers a justification not to give their financial records anything more than a passing glance. This is unfortunate. A good financial performance analysis should do more than inform about how a farm performed in the past. More important, it should provide the manager and adviser with insight regarding how to prioritize activities that will enable the farm to improve its financial performance.

The DuPont system has disadvantages as does any financial analysis system. However, its advantage beyond simplicity of use is that it takes into account the major levers of firm profitability – efficiency, asset use, and debt leverage.

Anatomy of Profits
Before describing the DuPont system, consider the anatomy of profits. The accounting equation is:

Total Assets = Total Debt + Total Owner Equity

As the accounting equation shows every penny of assets comes from one of two sources – that financed by debt (borrowed capital) and that financed by equity (the owner’s own money). Assets can also be described by those that are capital assets versus short-term inventory or market assets. Capital assets are longer-term investments (land, machinery, breeding stock, etc.) that are not sold themselves to make profits, but are put to work to produce marketable inventory that can be sold for profits (feeder cattle, eggs, etc.). Inventory also includes inputs such as feed, seed, and fertilizer.

Businesses earn profits by mixing their labor and management with inputs and capital assets to produce goods for sale. The DuPont system recognizes this recipe for profit-making and segregates it into three distinct components or levers:

1. Earnings (or efficiency),
2. Turnings (effective use of assets), and
3. Leverage (using debt to multiply earnings and equity)

In the DuPont system one can drill back into these three levers to determine where profit performance is coming from and potentially determine where management time should be spent for improving profits. Specifically DuPont measures:

1. How efficiently inputs are being used to generate profits [Earnings]
2. How well capital assets are being used to generate gross revenues [Turnings]
3. How well the business is leveraging its debt capital [Leverage]
Figure 1 shows a graphic of the DuPont system. It begins on the far right side with Rate of Return on Equity (ROROE). High ROROE is the prize in the DuPont system. ROROE is calculated as:

\[
\text{Net Income from Operations} - \text{Unpaid Labor & Management} \div \text{Total Owner Equity}
\]

The financial manager can then drill backward to see where ROROE performance either is, or is not, coming from.

Starting on the upper side ROROE, in-part, comes from how well the business is earning profits from its assets as measured by the Rate of Return on Assets (ROROA). ROROA is calculated as:

\[
\text{Return On Assets (less interest adj.)} = \frac{\text{Net Income from Operations} + \text{Interest} - \text{Unpaid Labor and Management}}{\text{Total Assets}}
\]

It makes sense that the higher the ROROA the higher the ROROE. In-turn, the ROROA comes from two components or levers of profitability.

One is how efficient the manager is in turning inputs into outputs, or in a financial sense, how efficient the manager is in turning the gross revenue of dollars coming into the business into net
profits that are kept in the business after all expenses are paid. This is the “Earnings” lever and is measured by the Operating Profit Margin Ratio (OPMR). The calculation is:

\[
\text{Net Income from Operations} + \text{Interest} - \text{Unpaid Labor and Management}
\text{Gross Revenue}
\]

Interest is added back so that the measure you get is one that measures efficiency of operations regardless of the debt structure. Debt structure effects will come into the system later. In situations where there is unpaid labor and management it is deducted to recognize the value of the labor and management. The more efficient you are in turning gross sales into profits that you keep the higher your Rate of Return on Assets and ultimately the higher your Rate of Return on Equity.

The second source of ROROE is how well you are using the assets of the business. This lever is referred to as “Turnings” meaning how well you are turning assets into production and sales of product. To use an extreme example, if you had a 300 acre farm (all tillable) that you left sit idle then your performance of turning assets into production and sales of product would go way down. The “turnings” lever is measured by the Asset Turnover Ratio (ATO). The calculation is:

\[
\text{Gross Revenue}
\text{Total Assets}
\]

The better able you are to use the assets you have to produce and sell product the higher the Rate of Return on Assets will be and the higher the Rate of Return on Equity.

The last lever is “Leverage,” which is also known as “Equity Multiplier”. Before going further with the explanation of leverage, it is worth backing up a step and exploring the accounting equation again

\[
\text{Total Assets} = \text{Total Debt} + \text{Total Equity}
\]

Given this equation, which is true for every business, then any profitable return to the use of assets is a profit return to the assets financed by debt and to those financed by equity. Equity is fairly straight-forward, if you invest $100 of your own money and earn $10 back then your equity has returned 10% (10/100). For the return to debt it is a bit more complicated because you have to pay someone for the use of the debt – interest. So, the question becomes whether or not the debt you have is returning a profit larger than the interest you have to pay for using that debt. If it is then the leftover profit after paying interest is an additional return to your equity. That is, if I’m paying 8% interest and my profit return on the debt is 10%, then I not only can pay my interest, but I have 2% leftover that I get to keep. This 2% becomes and increase to my
equity. This is why the debt or leverage component of DuPont is sometimes called an “Equity Multiplier.”

It may seem an odd statement to make for some, but if you want to increase your ROROE then one way to do it is to increase your debt! The trick is that the debt must be managed in a way that returns a profit greater than the interest rate. If it is not then the equity multiplier still works, just in the wrong direction!

Ultimately the leverage lever is measured by the Debt to Asset ratio (D:A), which is calculated as:

\[
\frac{\text{Total Debt}}{\text{Total Assets}}
\]

For ease of the math in the model, the leverage lever can be expressed as:

\[
\frac{\text{Total Assets}}{\text{Total Equity}}
\]

The greater this ratio then the more the proportion of debt is in the mix of assets. If the assets financed by debt are earning a return greater than the interest rate, then the higher the ratio the greater the Rate of Return on Equity.

Figure 2 shows the same DuPont model with the ratio measures.
Figure 2: DuPont Ratios

\[
\text{Net Income from Operations + Interest} - \text{unpaid labor & mgt} \quad \frac{\text{Gross Revenue}}{\text{Gross Revenue}} \quad \text{OPMR}
\]

\[
\times \quad = \quad \frac{\text{ROROA} \ (\text{less interest adj.})}{\text{Total Assets}}
\]

\[
\frac{\text{Gross Revenue}}{\text{Total Assets}} \quad \text{ATO}
\]

\[
\times \quad = \quad \text{ROROE}
\]

\[
\frac{\text{Total Assets}}{\text{Total Equity}} \quad \text{Leverage}
\]

Note, the interest rate adjustment in the ROROA box is the adjustment needed to return the cost of interest before measuring the Rate of Return on Equity. Recall that interest was taken out when calculating the OPMR.

The DuPont system as illustrated allows you to identify where profit performance is, or is not, coming from in one or more of three areas. Once identified then the next step is to drill back into the numbers that make up the ratio of concern.

For example, if the OPMR is found to be lower than the manager would like it to be then look at the numerator of the OPMR (net income from operations + interest – unpaid labor & mgt) to determine what might be the problem, particularly expenses. Compared to your more profitable peers what are your labor, vet, repair, and other input costs?

If the performance problem appears to be coming from a low ATO then the manager might drill back into the business assets to see how well they are being used. Are there dead assets in the business (ones not being used to create product for sales), does the business have excess machinery capacity, or are there assets that are under productive (poor weight gain, breeding cycles too long, sickness, death loss, etc.).

If the debt structure is low, that is debt is not leveraging equity as much as peer businesses, then the manager might drill back and question how debt is being used. Could additional debt be used
to improve facilities, machinery, etc. that ultimately pays for itself in higher production and sales or does debt that is not productive need to be paid off (or perhaps the assets sold).

As with all financial analysis systems the model is only as good as the numbers that go into it, that is, garbage in then garbage out. Another valuable piece of information to have to evaluate DuPont is benchmarks of profitable peers. There are general ranges for each of the ratios, but each industry and your size within an industry makes a difference as to what is “good” for the ratios. Finally whether you rent or own the assets you use in a business also makes a difference in the interpretation of the ratios.

Appendix A provides a brief example of using the DuPont model.

It is often said that management is part science and part art. The DuPont system has both elements. The ratio calculations are science and just a manipulation of numbers. The art is interpreting the ratios and drilling back into where the ratios indicate there could be challenges and thus information of where to spend your creative management time tomorrow morning after breakfast.

Appendix A

Brief Example (Adapted from an example from Texas Tech University) http://www.aaec.ttu.edu/faculty/phijohns/AAEC%204316/Lecture/notes/DUPONT.htm

Table 1. DuPont Analysis for Two Farms

<table>
<thead>
<tr>
<th></th>
<th>Farmer A</th>
<th>Farmer B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Operating profit margin ratio (OPMR)</td>
<td>0.30</td>
<td>0.12</td>
</tr>
<tr>
<td>2. Asset turnover ratio (ATO)</td>
<td>0.20</td>
<td>0.36</td>
</tr>
<tr>
<td>3. ROROA (1*2)</td>
<td>0.060</td>
<td>0.043</td>
</tr>
<tr>
<td>4. Interest expense to avg. farm assets</td>
<td>0.05</td>
<td>0.03</td>
</tr>
<tr>
<td>5. Equity multiplier</td>
<td>2.00</td>
<td>1.50</td>
</tr>
<tr>
<td>6. ROROE (3-4) * 5</td>
<td>0.02</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Farmer A and Farmer B each have a 2 % ROROE. However, the levers of the DuPont system indicate that the sources of the weakness are different. Farmer A has a stronger operating profit margin ratio but lower asset turnover compared to Farmer B. Furthermore, Farmer A has a higher leverage ratio (equity multiplier) than Farmer B.
The weak ratios for each farm may be decomposed into components to determine the potential sources of the weakness. To improve asset turnover, Farmer A needs to increase production efficiency or price levels or reduce current or noncurrent assets. To improve profit margins, Farmer B needs to increase production efficiency or price levels more than costs or reduce costs more than revenue.

The DuPont analysis is an excellent method to determine the strengths and weaknesses of a farm. A low or declining ROE is a signal that there may be a weakness. However, using the DuPont analysis can better determine the source of weakness. Asset management, expense control, production efficiency or marketing could be potential sources of weakness within the farm. Expressing the individual components rather than interpreting ROE itself may identify these weaknesses more readily.