Review III – Ratio Analysis

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Basic DuPont Ratios

1. In our discussion of the DuPont expansion, we briefly discussed the arbitrage condition

$$\frac{R_{E,i}}{CS_i P_{CS,i}} > \frac{R_{E,j}}{CS_j P_{CS,j}} \tag{1}$$

where $R_{E,k}$ is the return to equity on investment k, CS_k is the number of common stocks in investment k in the market, and $P_{CS,k}$ is the price of common stock for investment k. Given the inequality in Equation 1

   a. Arbitrage will continue until the rate of return on equity is the same for both investments.
   b. The investor will purchase investment j in order to execute a short sale.
   c. The investor will attempt to sell shares of stock in investment j and purchase shares in investment i causing the price of shares in investment j to decline while the price of shares in investment i increases.
   d. a and c above.

2. The DuPont expansion –
   a. Is a way to evaluate the profitability of a firm.
   b. Was used by the DuPont Corporation to evaluate the profitability of acquisitions.
   c. Can be used to analyze expansion decisions involving debt.
   d. All of the above.

Kansas Farms

	State Average					Part-time	
Item	2012	2013	2014	2015	2016	2015	2016
Farm Assets	1,169,672	1,436,262	1,443,311	1,549,151	1,691,996	705,145	770,792
Current Assets	166,006	134,928	162,849	141,256	127,323	34,593	29,474
Noncurrent Assets	1,003,666	1,301,334	1,280,462	1,407,895	1,564,673	670,552	741,318
Land and Buildings	738,013	1,025,534	986,002	1,130,122	1,262,308	504,446	572,830
Equipment	151,243	148,262	156,260	149,328	155,555	60,601	57,243
Breeding Animals	33,269	56,464	70,289	52,058	60,352	30,445	28,044
Other	81,141	71,074	67,911	76,387	86,458	75,060	83,201
Ownership	1,169,672	1,436,262	1,443,311	1,549,151	1,691,996	705,145	770,792
Liabilities	144,658	164,527	249,559	221,901	207,189	75,636	57,583
Current Debt	81,342	87,955	154,035	133,974	119,398	32,772	30,111
Non-Current Debt	63,316	76,572	95,524	87,927	87,791	42,864	27,472
Equity	1,025,014	1,271,735	1,193,752	1,327,250	1,484,807	629,509	713,209
Gross Income		39,945	44,291	45,081	48,281		14,417
Sales		220,154	252,633	239,272	219,796		57,641
Cash Expenses		162,096	188,920	177,094	157,110		35,777
Depreciation		18,113	19,422	17,097	14,405		7,447
Interest Paid		4,125	4,132	4,759	4,677		3,319
Net Income		35,820	40,159	40,322	43,604		11,098

Ratio Analysis

	Annual Observations				Statistics	
Ratio	2013	2014	2015	2016	Average	Std. Dev.
Operating Margin	0.1814	Q2	0.1884	0.2197	0.1912	0.0197
Asset Turnover	0.1690	Q3	0.1599	0.1356	0.1600	0.0175
Leverage	1.1346	1.1680	1.1870	1.1526	1.1606	0.0223
Net Income/Operating Income	0.8967	0.9067	0.8944	0.9031	0.9002	0.0057
Rate of Return on Assets	0.0307	Q4	0.0301	0.0298	0.0304	0.0005
Rate of Return on Equity	0.0312	Q5	0.0320	0.0310	0.0317	0.0007
Interest Rate	0.0267	0.0200	0.0202	0.0218	0.0222	0.0031
Operating Margin (Moss's DuPont)	Q6	0.0108	0.0099	0.0080	0.0082	0.0030
Rate of Return on Equity (Moss's DuPont)	0.0312	0.0326	0.0320	0.0310	0.0317	0.0007
Interest Coverage	9.6836	10.719	9.4728	10.3231		
Payment (Assuming 10 Years)	17,819	23,049	26,270	24,110		
Debt Service Ratio	2.2417	1.9216	1.716	2.0025		

Question 3 - 5

3. The Operating Margin for 2014 is
   a. 0.0301
   b. 0.1753
   c. 1.1634
   d. None of the above
4. The Asset Turnover Ratio for 2014 is
   a. 0.1753
   b. 1.1680
   c. 0.1755
   d. None of the above
5. The Rate of Return on Assets in 2014 is
   a. 0.0308
   b. 0.0298
   c. 0.0326
   d. None of the above

Questions 6 - 7

6. The Rate of Return on Equity in 2014 is
   a. 0.0308
   b. 0.0298
   c. 0.0326
   d. None of the above
7. The Operating Margin defined as $r_A - K$ where K is the interest rate in 2014 is
   a. 0.0108
   b. 0.0040
   c. 0.0310
   d. None of the above

Part-Time Farmer Financial Statements

Item	2015	2016
Farm Assets	705,145	770,792
Current Assets	34,593	29,474
Noncurrent Assets	670,552	741,318
Land and Buildings	504,446	572,830
Equipment	60,601	57,243
Breeding Animals	30,445	28,044
Other	75,060	83,201
Ownership	705,145	770,792
Liabilities	75,636	57,583
Current Debt	32,772	30,111
Non-Current Debt	42,864	27,472
Equity	629,509	713,209
Gross Income		14,417
Sales		57,641
Cash Expenses		35,777
Depreciation		7,447
Interest Paid		3,319
Net Income		11,098

Questions 8 - 10

Compare the profitability of the part time farmer in Table 3 with the average farm in Kansas in Tables 1 and 2.

8. How does the operating margin for the part-time farmer compare with the average operating margin?

9. How does additional leverage effect the part-time farmer?

10. On average how does the rate of return on equity for the part-time farmer compare with the average Kansas farm?

Questions 11 - 13

11. If $r_A - K \gg 0$ where r_A is the rate of return on assets and k is the interest rate (or cost of capital)
    a. An additional dollar of debt will decrease the rate of return on equity.
    b. An additional dollar of debt will increase the rate of return on equity.
    c. The firm is not liquid.
    d. None of the above.
12. The Debt Service Ratio is a measure of
    a. The profitability of an additional dollar of debt.
    b. Typically less than one.
    c. A measure of the ability of the firm to meet its debt obligations when the come due.
    d. All of the above.
13. What is the interest coverage ratio for the part-time farmer? Is it better or worse than the state as a whole?

Common Valued Balance Sheets

	Annual Data					Statistics		Part-Tim
Item	2012	2013	2014	2015	2016	Average	Std. Dev.	Farmer
Farm Assets	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000
Current Assets	0.1419	0.0939	0.1128	0.0912	0.0753	0.1030	0.0255	0.0382
Noncurrent Assets	0.8581	0.9061	0.8872	0.9088	0.9247	0.8970	0.0255	0.9618
Land and Buildings	0.6310	0.7140	0.6832	0.7295	0.7460	0.7007	0.0453	0.7432
Equipment	0.1293	0.1032	0.1083	0.0964	0.0919	0.1058	0.0146	0.0743
Breeding Animals	0.0284	0.0393	0.0487	0.0336	0.0357	0.0371	0.0076	0.0364
Other	0.0694	0.0495	0.0471	0.0493	0.0511	0.0533	0.0091	0.1079
Ownership	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000
Liabilities	0.1237	0.1146	0.1729	0.1432	0.1225	0.1354	0.0235	0.0747
Current Debt	0.0695	0.0612	0.1067	0.0865	0.0706	0.0789	0.0180	0.0391
Non-Current Debt	0.0541	0.0533	0.0662	0.0568	0.0519	0.0565	0.0057	0.0356
Equity	0.8763	0.8854	0.8271	0.8568	0.8775	0.8646	0.0235	0.9253

Questions 14 - 16

14. Does the common sized balance sheet support the contention that the part-time farmer has too much land?

15. Is the part-time farmer more heavily leveraged than the general Kansas farm?

16. Does the part-time farm appear to be more or less liquid than the general Kansas farm based on the common valued balance sheet?

Common Sized Income Statement

Item	Annual Data 2012	2013	2014	2015	Average	Std. Dev.	Part-Time Farmer
Gross Income	0.1814	0.1753	0.1884	0.2197	0.1912	0.0197	0.2501
Sales	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000
Cash Expenses	0.7363	0.7478	0.7401	0.7148	0.7348	0.0141	0.6207
Depreciation	0.0823	0.0769	0.0715	0.0655	0.0741	0.0072	0.1292
Interest Paid	0.0187	0.0164	0.0199	0.0213	0.0191	0.0021	0.0576
Net Income	0.1627	0.1590	0.1685	0.1984	0.1722	0.0179	0.1925

Question 17

17. According to the Common Sized Income Statement the interest expense for part-time farmers is
    a. Statistically higher than the average Kansas farm.
    b. Is higher than the average Kansas farm, but the difference is not statistically significant.
    c. Is lower than the average Kansas farm.
    d. Impossible to compare with the data in the Common Sized Income Statement.

Question 18

18. Based on the information in the Common Sized Income Statement
    a. The part-time farmer a lower gross income per dollar of sales than the average Kansas farm.
    b. The part-time farmer has a higher gross margin because the case expenses and depreciation are lower than the average Kansas farm.
    c. The part-time farmer has a higher gross margin largely because of lower cash expenses than the average Kansas farm.
    d. None of the above.

Question 19 – The Plowback Ratio

19. The Plowback Ratio refers to the amount of money that is retained after payments to owners. In a corporation, this would be one minus the dividend payout ratio (i.e., dividends divided by net income). For the sole proprietorship, we are interested in how much of the income is distributed to the owner. Hence, the Plowback Ratio becomes one minus the payments to the sole proprietor divided by net income. Returning to the Kansas farmer in 2016, if we assume that the farmer takes $ 40,000 for income, the Plowback Ratio becomes
    a. 0.9173
    b. 0.0827
    c. 0.7500
    d. None of the above.

Question 20

20. The Internal Growth Rate for the Kansas farm is then
    a. 0.0025
    b. 0.0298
    c. 0.0827
    d. None of the above.