

4) Using the data for Johnson & Johnson presented below

a) Calculate the ratio of each year's data to the previous year for each of the above items for *JNJ*.

b) From your calculations in part a, calculate each year's rate of growth.

c) Calculate the average growth rate (using the average function) for each item using the results from part b.

d) Use the Geomean function to estimate the compound annual growth rate for each of the above items

e) compare the results from part c to those in part d (Geomean vs Avg). Is it true that the arithmetic average growth rate is always greater or equal to the geometric average?

f) Contrast the results from those of the geometric average to those of the arithmetic average, for the variables listed below. What do you observe about the differences in the two growth estimates for Sales and Retained Earnings? What do you observe about the differences in the two estimates for Net Cash from Operations and Net Income.

(Hint: Look at the results from part b) (the individual yearly growth rates) for each variable to draw some conclusions about the variation between the arithmetic and geometric averages

- 1) Sales
- 2) Retained Earnings
- 3) Total Assets
- 4) Net Cash from Ops
- 5) Net Income

Fiscal Year	2014	2015	2016	2017	2018
Sales	74334	70200	71937	76481	81534
EBIT	20609	18368	21350	19565	21253
Interest Expense	518	552	763	1017	1184
Total Net Income	18523	15409	18540	1300	15297
Earnings Per Share	6.28	5.89	6.33	1.34	6.67
Total Assets	131119	133411	141208	157303	152954
Accounts Payable	7633	6668	6918	7310	7537
Total Liabilities	61367	62201	70790	87143	93022
Retained Earnings	97245	103479	110511	107193	109216
Net Cash from Ops	18471	19279	18707	21056	22201
FCF	14797	15810	15541	17777	18531

Fiscal Year	2014	2015	2016	2017	2018
Sales	1	0.944	1.025	1.063	1.066
EBIT	1	0.878	1.182	0.916	1.086
Interest Expense	1	1.066	1.392	1.333	1.174
Total Net Income	1	0.844	1.073	0.079	1.178
Earnings Per Share	1	0.936	1.075	0.212	4.978
Total Assets	1	1.017	1.058	1.144	0.972
Accounts Payable	1	0.874	1.037	1.057	1.031
Total Liabilities	1	1.015	1.137	1.372	0.959
Retained Earnings	1	1.068	1.064	0.921	1.043
Net Cash from Ops	1	1.044	0.873	1.122	1.054
FCF	1	1.072	0.983	1.144	1.042

Fiscal Year	2014	2015	2016	2017	2018
Sales	0	-5.56%	2.47%	6.32%	6.61%
EBIT	0	-12.24%	16.23%	-8.36%	8.63%
Interest Expense	0	6.65%	38.22%	35.29%	17.49%
Total Net Income	0	-5.62%	7.34%	-92.14%	1070.89%
Earnings Per Share	0	-6.36%	7.47%	-78.83%	397.76%
Total Assets	0	1.75%	5.84%	11.40%	-2.76%
Accounts Payable	0	-12.84%	3.75%	5.67%	3.11%
Total Liabilities	0	1.46%	13.70%	37.23%	-4.06%
Retained Earnings	0	6.82%	6.42%	-7.92%	4.35%
Net Cash from Ops	0	4.97%	-2.68%	12.20%	6.44%
FCF	0	7.18%	-1.74%	14.38%	4.24%

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Category	Avg Growth Rate
Sales	2.46%
EBIT	1.07%
Interest Expense	23.87%
Total Net Income	248.57%
Earnings Per Share	80.01%
Total Assets	4.00%
Accounts Payable	-0.03%
Total Liabilities	12.08%
Retained Earnings	2.42%
Net Cash from Ops	4.84%
FCF	6.02%

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Category	Geomean Rate
Sales	2.34%
EBIT	0.38%
Interest Expense	23.22%
Total Net Income	-1.03%
Earnings Per Share	1.48%
Total Assets	3.93%
Accounts Payable	-0.32%
Total Liabilities	11.01%
Retained Earnings	2.23%
Net Cash from Ops	4.71%
FCF	5.86%

I added conditional formatting to better depict growth patterns. Cash Sources (+) and Cash Sinks (-) have opposite formatting rules.

All Average Growth rates are greater in value compared to their Geomean counterpart

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Focus Group	Avg	Diff	Geomean
Sales	2.46%	0.12%	2.34%
Retained Earnings	2.42%	0.19%	2.23%
Total Assets	4.08%	0.13%	3.93%
Net Cash From Ops	4.84%	0.13%	4.71%
Net Income	248.57%	248.18%	-1.61%

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The growth estimates for Sales and Retained Earnings are very similar. Both are around 2.5% and have these similar magnitude differences between their Avg and Geomean, which sits between 10 to 20 basis points. This applies to Total Assets and Net Cash from Operations as well. Their magnitude difference are the same at 13 basis points. Net Cash from Ops just happens to have a little bit higher of a growth rate by about 80 basis points compared to Total Assets.

When comparing Net Cash from Operations and Net Income, there is a distinctive difference in the average versus the geomean. The Geomean difference yields a realistic comparable less affected by the volatility in Net income over time. This is opposite for the average, which is an astounding 242% greater than the Net Cash from Ops.

Ultimately, through the Geomean approach to solving growth rate, we get a more reliable interpretation of comparables for financial data.