Lucilius Interim
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How to build good deviation analyses.

A Lucilius Interim®
Technical Note
Part 3: Silver Spurs.
December 2021

Deviation analyses are often set-up in ways that make their results difficult to communicate and thus reduce their impact. This note suggests a simple, easy to interpret and easy to communicate alternative.

Nine months ago, Richard took over his parents' stall on the Bornheim Produce Market. Taking stock, he finds that his sales have fallen short of his hopes – and his promises to his parents. His friend Lucy produced a simple, elegant analysis of what drove the shortfall, but was embarrassed and angry to learn that he had forgot to tell her about the Apples Plan, the last major strategy change implemented by the old folks: differentiating their offering of apples plain and simple into Granny Smith and Cox Orange, each carefully positioned.

After profuse apologies for his oversight, and – he thought – a very long wait, Richard managed to enlist Lucy's analytical skills once more ...

More Summer Wine

"Good thing that I tracked the Granny and Cox numbers separately, eh? You never know what it's good for." For a moment Lucy, thoroughly familiar with the benefits of detailed data, can only look at him in disbelief. "Yes, dear." She sighs. "So, let's see what we have…"

DATA TYPE	BUDGET				ACTUAL				DELTA			
	Net Sales	Volume	Price	Vol Mix	Net Sales	Volume	Price	Vol Mix	Net Sales	Volume	Price	Volume
PRODUCTS	[€]	[pcs]	[€/pc]	%	[€]	[units]	[€/unit]	%	[€]	[units]	[€/unit]	%
Gr. Smith	2.160	5.400	0,40	28%	5.200	10.400	0,50	43%	3.040	5.000	0,10	93%
Cox O.	3.720	6.600	0,56	34%	4.645	7.500	0,62	31%	925	900	0,06	14%
Total Apples	5.880	12.000	0,49	62%	9.845	17.900	0,55	73%	3.965	5.900	0,06	49%
Grapefruit	14.750	5.000	2,95	26%	10.150	3.500	2,90	14%	-4.600	-1.500	-0,05	-30%
Mangos	12.375	2.500	4,95	13%	11.850	3.000	3,95	12%	-525	500	-1,00	20%
Total Fruit	**33.005**	**19.500**	**1,69**	**100%**	**31.845**	**24.400**	**1,31**	**100%**	**-1.160**	**4.900**	**-0,39**	**25%**

In Parts 1 and 2 of this note, we have already seen the numbers for Apples, Grapefruit, Mangos and aggregate Fruit, but in addition, Lucy now has access to the sales volumes and prices for Granny Smith and Cox Orange. By using Granny Smith and Cox Orange, rather than Apples, as the explanatory level, she can now capture the effects of the Apples Plan and analyze the behavior of Richard's sales in a more appropriate manner. Lucy first applies the formulas we introduced in Part 2 for the base elements of the hierarchy to the Granny Smith and Cox Orange data. (Here [f] stands for any of the fruit, and T for the Fruit total.)

[f]PriceDev = [f]PriceDelta x [f]ActVol

[f]VolDev = [f]BudgetPrice x [f]BudgetVol x TVolDelta%, with

TVolDelta% = (TotalActVol – TotalBudgetVol) / TotalBudgetVol,

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NET SALES DEVIATION	TOTAL D	VOL D	PRICE D	MIX D
Gr. Smith	3.040	543	1.040	1.457
Cox O.	925	935	418	-427

Adding up the Granny Smith and Cox Orange deviations, she next calculates the deviation totals for Apples.

NET SALES DEVIATION	TOTAL D	VOL D	PRICE D	MIX D
Gr. Smith	3.040	543	1.040	1.457
Cox O.	925	935	418	-427
Apples	3.965	1.478	1.458	1.030

Then on to Grapefruit and Mangos, again using the base element formulas from Part 2:

DATA TYPE	BUDGET				ACTUAL				DELTA			
	Net Sales	Volume	Price	Vol Mix	Net Sales	Volume	Price	Vol Mix	Net Sales	Volume	Price	Volume
PRODUCTS	[€]	[pcs]	[€/pc]	%	[€]	[units]	[€/unit]	%	[€]	[units]	[€/unit]	%
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Total Fruit	**33.005**	**19.500**	**1,69**	**100%**	**31.845**	**24.400**	**1,31**	**100%**	**-1.160**	**4.900**	**-0,39**	**25%**

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Gr. Smith	3.040	543	1.040	1.457
Cox O.	925	935	418	-427
Apples	3.965	1.478	1.458	1.030
Grapefruit	-4.600	3.706	-175	-8.131
Mangos	-525	3.110	-3.000	-635

Finally, the summation over all Fruit to obtain the Total Fruit results:

NET SALES DEVIATION	TOTAL D	VOL D	PRICE D	MIX D
Gr. Smith	3.040	543	1.040	1.457
Cox O.	925	935	418	-427
Apples	3.965	1.478	1.458	1.030
Grapefruit	-4.600	3.706	-175	-8.131
Mangos	-525	3.110	-3.000	-635
Total Fruit	**-1.160**	**8.294**	**-1.717**	**-7.736**

Let's see how these results differ from what we saw in Part 2. For the comparison, Lucy has reordered the lines so that the table starts out with the big picture:

NET SALES DEVIATION	PART 2: AGGREGATE DATA ONLY				NOW USING GR. SMITH & COX O. DETAIL				DIFFERENCE	
	TOTAL D	VOL D	PRICE D	MIX D	TOTAL D	VOL D	PRICE D	MIX D	PRICE D	MIX D
Total Fruit	**-1.160**	**8.294**	**-2.101**	**-7.353**	**-1.160**	**8.294**	**-1.717**	**-7.736**	**384**	**-384**
Apples	3.965	1.478	1.074	1.413	3.965	1.478	1.458	1.030	384	-384
Gr. Smith	na	na	na	na	3.040	543	1.040	1.457	na	na
Cox O.	na	na	na	na	925	935	418	-427	na	na
Grapefruit	-4.600	3.706	-175	-8.131	-4.600	3.706	-175	-8.131	0	0
Mangos	-525	3.110	-3.000	-635	-525	3.110	-3.000	-635	0	0

Price and Mix Deviations for Apples and, hence, Total Fruit have changed. The analysis reveals that the sales increase for Apples through better pricing is in fact 384 Euros higher than we thought in Part 2. There, without the Cox and Granny detail, we could not see that the seeming 6 cents price increase on Apples was in fact a combination of an 8 cents average price increase – 10 cents on 10.4k Granny and 6 cents on 7.5k Cox – and a mix change in favor of the still lower-priced Granny Smith, which partly off-set the price increases. Which hidden effects to ferret out, Lucy thinks to herself with some satisfaction, is exactly what detail is good for.

The results are, again, 100% consistent, drillable and still easy to explain. For comparison, do try the lazy method from Part 1 on the multi-level data to see what progress Lucy has made.

They are also easy to visualize (and again, try this with the lazy method).
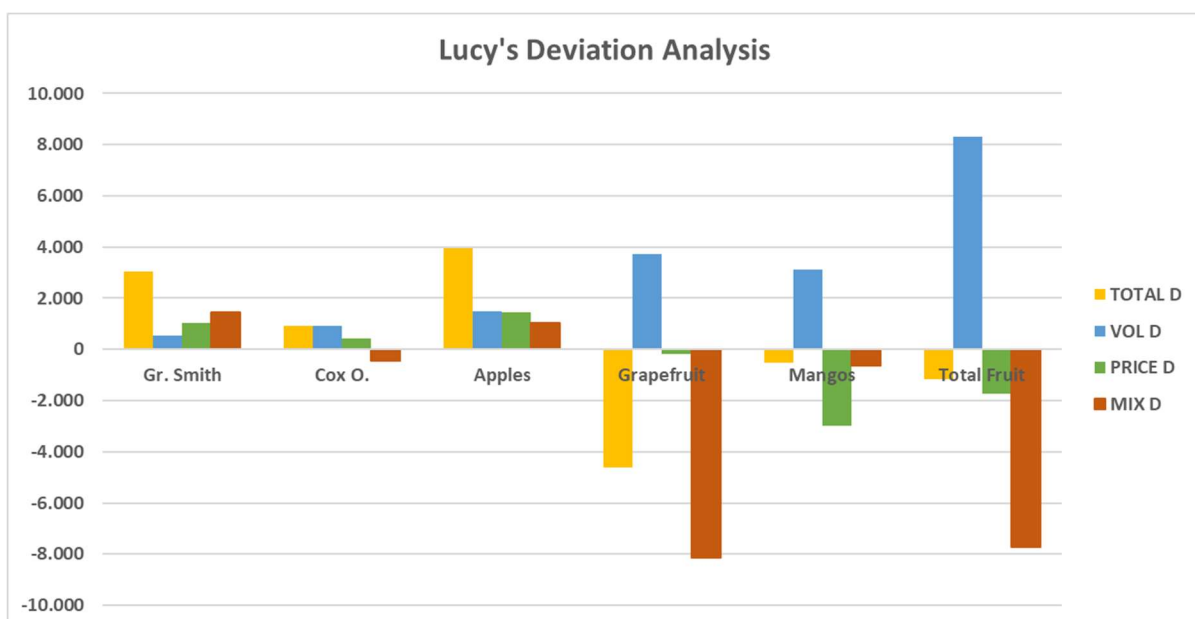
Within each cluster, the blue, green, and ochre columns show the composition of the yellow one, which represents total sales deviation. For each of the aggregate columns, the constituent lower-level ones show the contribution of the respective individual fruit. If volume and mix deviation show in the same direction (like for Granny Smith), this means that the volume of the respective fruit has grown faster than overall volume. If the mix column is negative (like for Mangos), this means that it has grown more slowly (or has even declined).

Depending on where you want to draw attention to, here are two alternative diagrams, using the waterfall format.
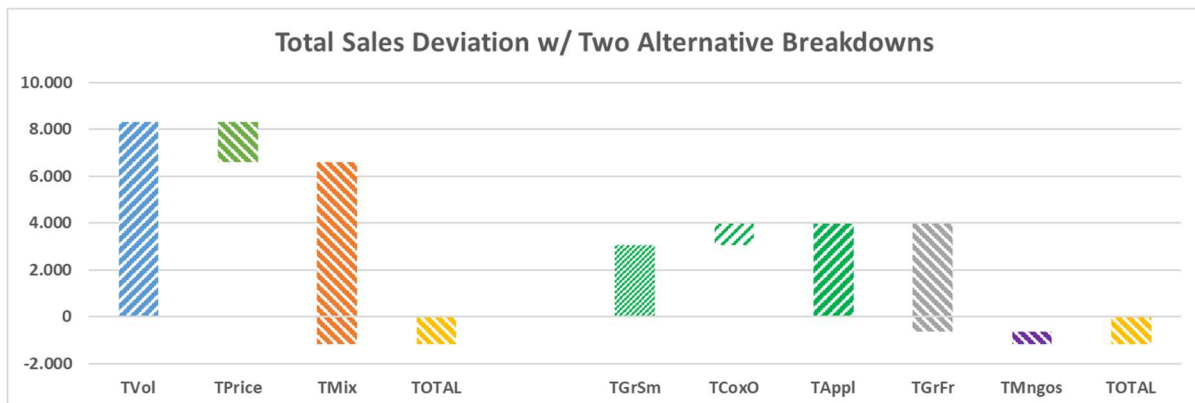
If you have this kind of analysis built into your data warehouse - which I fully recommend - an automated waterfall chart where you can flexibly display, hide, or nest hierarchy levels and toggle between grouping by fruit, by deviation type, or by size of impact, would be just awesome.

Two more technical remarks. (1) The interpretation of the Mix Deviation differs by level. On the aggregate Fruit level, the Mix Deviation says by how much Fruit sales suffered from the mix changes within Fruit; on the base level, the Mix Deviation tells us, how much the individual type of Fruit contributes to the higher-order mix; on the intermediate (Apples) level, it does both. (2) We have already seen in Part 2 that Mix Deviation can be calculated independently of the other deviations as follows:

$$\text{[f]MixDev = [f]BudgetPrice x [f]BudgetVol x ([f]VolDelta\% - TVolDelta\%)}$$

Craving for More Summer Wine

A week later, when Richard's parents come visiting on a sunny afternoon, Lucy presents her findings: Yes, differentiating the Apples offering has worked, wonderfully. Both kinds benefited

from the emphasis on their different personalities, both have sold more than expected, despite higher than planned prices. Moreover, Granny Smith pricing still seems to be at the low end of what customers would accept, and it seems a safe bet that prices can be increased further without hurting volume.

Richard's parents, happy that their Apples Plan has worked out - and with new-found confidence in their son's ability at least to attract the right friends - are satisfied. They say goodbye, and "Autumnal Mealiness…, did I not tell you…", is the last Lucy and Richard, standing side by side on their porch, can hear of their old folks' conversation as they walk home, up the Berkersheim road, holding hands against the clear evening sky.

Richard is just so relieved; Lucy has a Battlestar Analytica moment – the series, not the movie - and feels like CAG Starbuck and Commander Adama at the same time. She smiles forgivingly at Richard, who is so evidently in need of her guidance. He stares in the direction of the orchards, grinning and glowing in his certainty that he is her only and indispensable source of true inspiration.

Both are happy.

Could this be enough for a lifetime together?

Let's build a spreadsheet that can tell!

--- THE END ---