

Price, Volume Mix analysis

Sales and Gross margin went up.
Where did the money actually come from?



Project context

A public FMCG portfolio: 30 products, 5 categories, 17 brands, sold in 17 countries through 4 channels, 36 months from 2023 to 2025, 18,240 monthly lines.

The goal of the study: over the two years net sales grew +\$423k (+9.2%), gross margin +\$193k, and the margin rate +0.45pp. Explain where each of these came from: split them into volume, mix, list price, discount and cost, name the products behind each factor, and say what to do about each one.

Everything must reconcile: factors to the total, list plus discount to price, products to each factor, and the whole walk to the accounts, to the cent.

My role

Data Science × FP&A

- **Bridge engineering:** three decompositions in one fixed order, closing exactly to the accounts.
- **Product drill:** every factor split per product, with mix centred on the book average so the signs are right.
- **Verification:** all three bridges rebuilt by hand in Excel, SUMIFS on the raw rows, matched to the cent.
- **FP&A translation:** a recommendation on every result page, and dollars always beside rates.

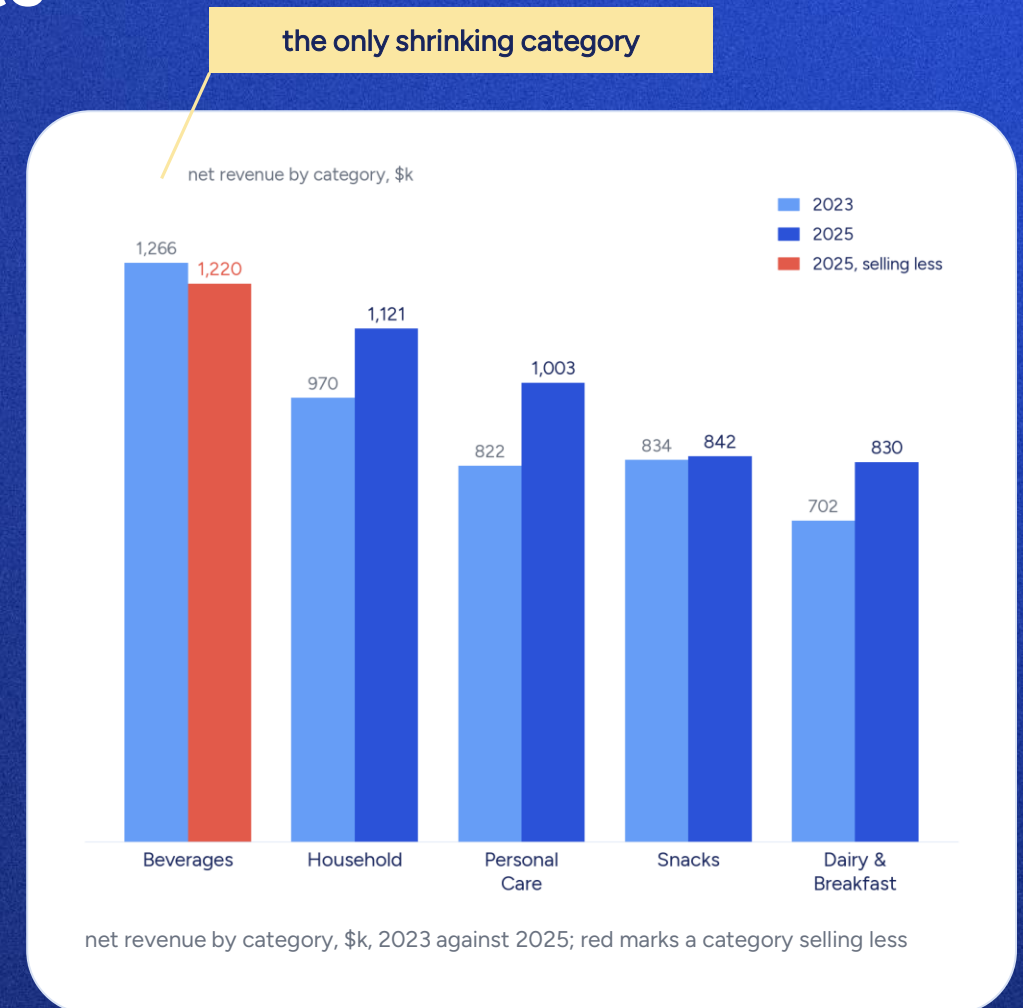
A \$5M portfolio of everyday products

Thirty products in five categories: beverages, snacks, household, personal care, dairy and breakfast. Seventeen brands, from \$2 drinks to \$8 household lines.

Four routes to market: modern trade, wholesale, distributors and online, across 17 countries. 18,240 monthly lines, one per SKU, channel, country and month.

The three years: net sales \$4.59M → \$5.02M (+9.2%), gross margin \$1.85M → \$2.04M, margin rate 40.30% → 40.75%.

Growth is not everywhere: beverages is the only category selling less in 2025, while household and personal care carry the gains. Discounts hand back about 15 cents of every gross dollar, \$0.9M in 2025.



How the +\$423k of sales growth gets split

One row per SKU, full-year 2023 against full-year 2025. Four effects, computed in this order, and they must sum exactly to the change.

1 · Volume

The whole book's unit growth, at 2023 prices. Units rose 3.21%, so volume is one number for the whole portfolio: +\$147k. A SKU's own unit story lives in mix.

$$\text{volume} = (\text{units}_{25} \div \text{units}_{23} - 1) \times \text{revenue}_{23}$$

2 · Mix

Share shifts, valued at 2023 prices. Cheap products gaining share drag mix down even while their own units grow, and dear ones lift it.

$$\text{mix} = \sum (\text{share}_{25} - \text{share}_{23}) \times (\text{price}_{23} - \text{avg price}_{23}) \times \text{units}_{25}$$

3 · Price, split in two

Each SKU's achieved price change times its 2025 units, split into list, the shelf move, and discount, the part handed back.

$$\text{price} = \sum (\text{price}_{25} - \text{price}_{23}) \times \text{own qty}_{25} \quad \cdot \quad \text{list} + \text{discount} = \text{price}$$

4 · The check

Volume + mix + price = +\$423k exactly, the change in net sales. New or discontinued products would get their own bars; this file has none.

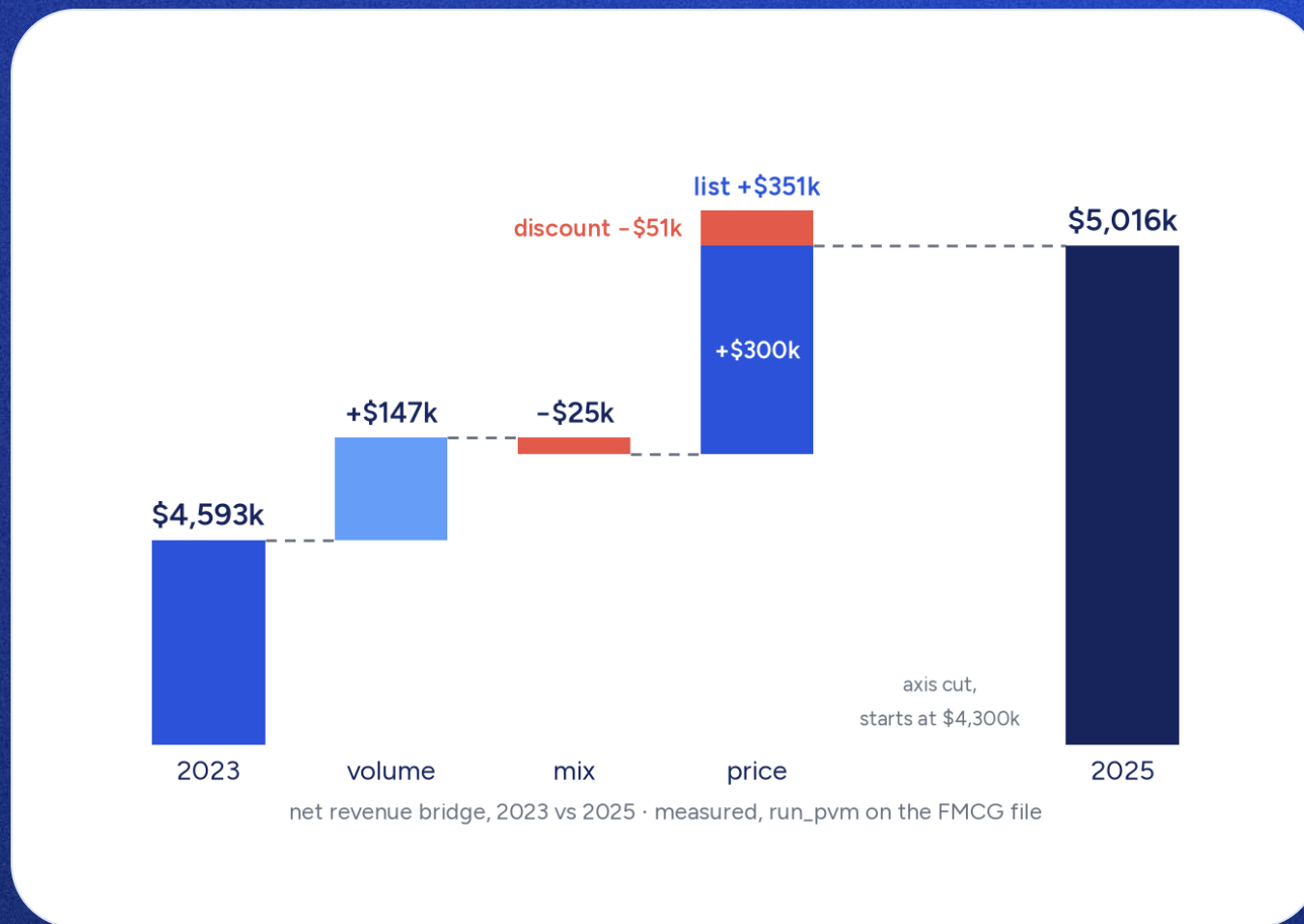
$$\text{volume} + \text{mix} + \text{price} = \text{revenue}_{25} - \text{revenue}_{23}$$

Price did the work: +\$300k of the +\$423k

Sales grew 9.2% but units only 3.21%: most of the gap is price.

Volume +\$147k. Mix -\$25k, the blend sold got slightly cheaper. Price +\$300k, of which list +\$351k and discount -\$51k.

Discounts hand back about 15 cents of every gross dollar, in both years.



Mix is a three-product story; price is everyone

FACTOR	SKU	BRAND · CATEGORY	WHAT HAPPENED	IMPACT
Mix	BEV-RT-301	RoastTrail · Beverages	\$7.07 drink lost 21% of its units after a \$0.52 price rise	-\$50.4k
Mix	HHD-HN-102	HomeNest · Household	\$7.71 cleaner grew units 36%: dear share up, mix up	+\$44.2k
Mix	BEV-AG-101	AquaGlow · Beverages	\$2.31 drink grew units 37%: cheap share up, mix down	-\$18.5k
Price	HHD-HN-102	HomeNest · Household	+\$0.63 per unit, carried by 45k units	+\$28.3k
Price	BEV-RT-301	RoastTrail · Beverages	+\$0.52 per unit, kept even as units fell	+\$24.6k
Price	top 5 together		carry only 36% of the price total: the gain is broad	+\$106.8k

Recommendation. Fix one product, protect one habit. RoastTrail 301 lost a fifth of its units and cost \$50k of mix: win half of them back and that is +\$48k of sales, +\$14k of margin at 2025 prices (next page says where). And keep pricing broad, the +\$300k came from thirty small moves.

One channel's volume, everyone's price

CHANNEL	REVENUE 2023	REVENUE 2025	VOLUME	MIX	PRICE	TOTAL
Wholesale	\$1,574.0k	\$1,822.0k	+\$180.2k	-\$49.7k	+\$117.5k	+\$248.0k
Distributor	\$1,458.6k	\$1,557.7k	-\$12.1k	+\$10.7k	+\$100.6k	+\$99.2k
Modern trade	\$1,102.3k	\$1,141.8k	-\$15.1k	-\$5.1k	+\$59.7k	+\$39.5k
Online	\$458.4k	\$494.7k	-\$11.0k	+\$16.0k	+\$31.3k	+\$36.3k
Whole book	\$4,593.3k	\$5,016.3k				+\$423.0k

Read it as. Wholesale's growth is real, not customers changing channel: it added 50,800 units while the other three channels gave up only 10,200 between them, so at most one new unit in five moved over. It paid for the volume with the worst mix, -\$50k, because it grew on its cheap lines. The other channels lost volume and made it back on price.

Three markets hold 86% of RoastTrail's loss

COUNTRY	UNITS 2023	UNITS 2025	CHANGE	PRICE 2023	PRICE 2025
France	4,031	548	-86%	\$7.83	\$8.83
Brazil	6,099	2,305	-62%	\$6.22	\$7.24
India	6,695	2,934	-56%	\$5.70	\$5.99
Mexico	4,441	2,033	-54%	\$6.48	\$6.96
UAE	3,397	1,648	-52%	\$8.00	\$8.94
Other 12 countries	34,839	37,271	+7%		
All markets	59,502	46,739	-21%	\$7.07	\$7.59

Read it as. The price rose everywhere by a similar step, yet twelve markets grew and five collapsed. India moved only +5% and still lost 56% of its units: that is not a price response, it looks like lost distribution. By channel the same, wholesale -34%, online +40%. **Do:** check listings and distribution in Brazil, India and France before touching the price. Winning back half of those three markets' lost units is +\$42k of sales at 2025 prices.

Discounts: flat by channel, drifting by product

CHANNEL	GIVEN BACK 2025	RATE 2023	RATE 2025	OF GROSS
Wholesale	\$401k	18.4%	18.0%	deepest, and the biggest cheque
Distributor	\$292k	15.8%	15.8%	unchanged
Modern trade	\$167k	12.7%	12.7%	unchanged
Online	\$48k	9.1%	8.8%	the cheapest channel to sell in

Read it as. The book hands back \$908k a year, 15 cents of every gross dollar, and no channel changed its habits. The -\$51k discount bar comes from products, not channels: FreshNest 201 and 202, PureLeaf 101, RoastTrail 301 and SilkSoft 202 all give back more per unit than in 2023, -\$20k between them. **Do:** hold each product's discount per unit at its 2023 level unless someone signs for the change; that is \$20k a year.

The same walk on margin dollars, plus a cost step

Gross margin is net sales minus cost of goods. The bridge keeps the sales skeleton and adds one bar: what cost did.

Same skeleton

Volume, mix, then price. The price term is identical to the sales bridge, +\$300k: a price dollar is a margin dollar until cost moves.

$$\text{price} = \sum (\text{price}_{25} - \text{price}_{23}) \times \text{own qty}_{25}, \text{ both bridges}$$

Mix changes meaning

Mix now weighs share shifts by unit margin, not unit price. The two mixes can disagree, and here they do: -\$25k in sales, +\$11k in margin.

$$\text{mix} = \sum (\text{share}_{25} - \text{share}_{23}) \times (\text{margin}_{23} - \text{avg margin}_{23}) \times \text{units}_{25}$$

The new bar: cost

Each SKU's unit-cost change times its 2025 units, with a minus sign. Costs rose across the book: -\$178k.

$$\text{cost} = -\sum (\text{unit cost}_{25} - \text{unit cost}_{23}) \times \text{own qty}_{25}$$

The check

Volume + mix + price + cost = +\$193k exactly, the change in gross margin. List and discount split the price bar as before.

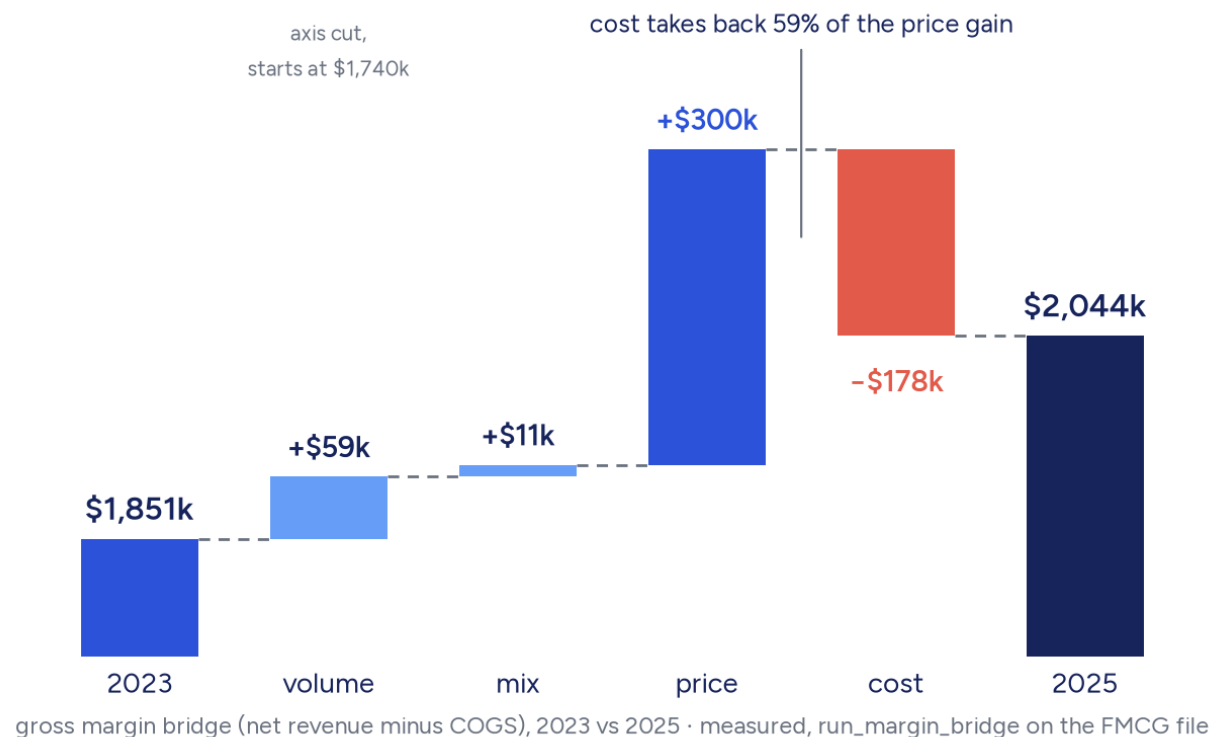
$$\text{volume} + \text{mix} + \text{price} + \text{cost} = \text{GM}_{25} - \text{GM}_{23}$$

Cost took back 59 cents of every price dollar

The same walk on margin dollars: volume +\$59k, mix +\$11k, price +\$300k, cost -\$178k, total +\$193k.

Cost clawed back 59 cents of every price dollar; \$122k of the pricing gain survived.

As margin bridges go this is a healthy one: pricing stayed ahead of cost inflation, and volume and mix both helped.



The same names sit on both sides of the ledger

FACTOR	SKU	BRAND · CATEGORY	WHAT HAPPENED	IMPACT
Mix	HHD-HN-102	HomeNest · Household	high-margin cleaner took share: the biggest single gain	+\$20.3k
Mix	BEV-AG-101	AquaGlow · Beverages	thin-margin drink took share	-\$10.8k
Mix	BEV-RT-301	RoastTrail · Beverages	28% margin drink: its lost share hurts margin less than sales	-\$8.1k
Cost	HHD-HN-102	HomeNest · Household	unit cost rose fastest exactly where price rose fastest	-\$18.1k
Cost	BEV-RT-301	RoastTrail · Beverages	second-biggest cost drag	-\$14.6k
Cost	top 5 together		carry only 37% of the cost drag: inflation hit the whole book	-\$64.9k

Recommendation. Price to cost, product by product. This time every product passed: not one saw its cost rise outrun its price rise. HomeNest 102 came closest, keeping \$10k of its \$28k. Keep the test running each close; the first product to fail it is a fake win.

Points of margin, not dollars

The rate bridge answers a different question: why did the margin percentage move from 40.30% to 40.75%? Different question, different weights.

Revenue shares, not units

Each SKU is weighed by its share of revenue, and every effect lands in points (pp) of the blended rate, not in dollars.

$\text{weight} = \text{SKU revenue} \div \text{book revenue, each year}$

No volume bar

Selling more of everything at the same prices and costs leaves the percentage unchanged. Three bars remain: mix, price, cost.

$\text{rate} = \text{margin} \div \text{revenue: scale both, it cannot move}$

Mix in points

Share moving toward SKUs whose own margin rate beats the 40.3% book average lifts the blend; share moving to thin-margin SKUs drags it.

$\text{mix pp} = \sum (\text{share}_{25} - \text{share}_{23}) \times (\text{own margin}_{23} - \text{book margin}_{23})$

Price and cost: read together

The two bars are big and opposite, +3.55pp and -3.54pp: unit costs rose in step with prices, so together they barely move the rate.

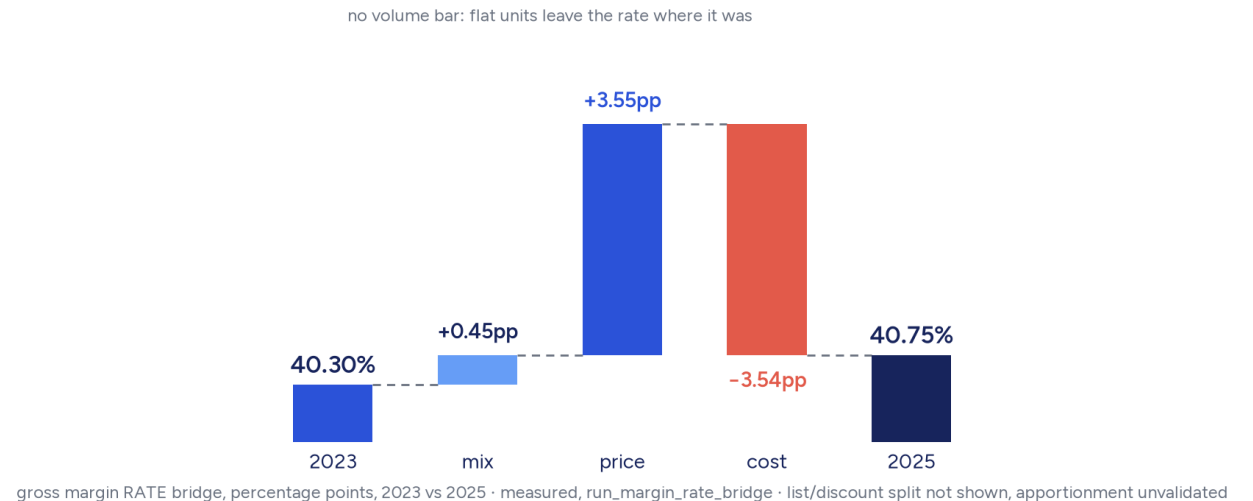
$\text{price pp} = \sum \text{share}_{25} \times (\text{cost}_{23} \div \text{price}_{23} - \text{cost}_{23} \div \text{price}_{25}) \times 100$

+0.45 points, and mix is nearly all of it

The rate gained +0.45pp: mix +0.45pp, price +3.55pp, cost -3.54pp.

Price and cost cancel: costs rose in step with prices, so pricing on its own did not move the rate.

The rate improved because the basket got richer, not because pricing outran cost.



One product, two opposite stories, both true

The biggest rate-mix winner and the biggest dollar-mix loser are the same SKU. That is not a contradiction, it is the whole lesson.

The rate view: +0.25pp

RoastTrail BEV-RT-301 earns a 28.5% margin against the 40.3% book average. When it loses share, the blended rate rises: the biggest single mix contribution.

The dollar view: -\$50k

The same lost share is the biggest revenue mix hit, -\$50.4k, and -\$8.1k of margin dollars. A richer rate on a smaller pile of money.

The rest of the rate-mix list

AquaGlow -0.07pp, HomeNest +0.06pp, ZenLeaf +0.05pp, FreshNest +0.04pp. After RoastTrail's +0.25pp everything else is small: the rate story of this book is one product's share.

Recommendation. Never manage to the rate alone. Judge RoastTrail 301 on dollars: +0.25pp of rate bought with -\$50k of sales and -\$8k of margin is not a win. Pair every rate target with a dollar floor at each product's prior-year margin; that floor flags RoastTrail on its own.