Group Project

By Group B

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Analysis of Repeat Purchase Behavior for Laundry Detergent (Q1-Q5)
A Five-Quarter Study Using NBD and CTA Models

Key Findings of the Analysis

Main Repeat Purchase Behavior Insights for Laundry Detergent

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*Marketing efforts should prioritize **broad reach and penetration** over loyalty programs, as occasional buyers dominate detergent sales.*

Marketing Implications

Majority of Sales from Light & Medium Buyers

- 78% of sales in Q5 from buyers purchasing 1–3 times.
- Confirms Ehrenberg's law: most customers buy infrequently.

Model Overestimation of Heavy Buyers

- NBD model inflated medium/heavy buyer segments
- avoid over-reliance on predictive models for strategy

Volatile Buyer Behavior

- Regression-to-the-mean from Q4 to Q5.
- Heavy buyers often reduce frequency; light buyers fluctuate.
- Brand choice driven by habit and availability—not loyalty.

Prioritize

Prioritize Broad-Reach Marketing

- Focus on increasing penetration among light buyers rather than attempting to increase purchase frequency among heavy buyers.
- Invest in mass-reach advertising, prominent in-store visibility, and strong distribution to maximize product availability.

Integrate

Integrate Real Data with Model Benchmarks

- Use NBD outputs as a diagnostic tool but validate them against observed sales and buyer counts before allocating budgets.
- Adjust expectations for medium and heavy buyer segments to avoid overestimating their long-term revenue contribution.

Build

Build Mental and Physical Availability

- Maintain brand salience through consistent marketing activity and ensure the product is easy to find and purchase.
- Avoid over-reliance on loyalty schemes in FMCG categories where heavy buyers are rare and naturally prone to regression.

Part I
Overview
Across five quarters

1.1 Dominance of Low-Frequency Buyers over five quarters

Dominance of low-frequency buyers

- Majority are non-buyers: 12,292 individuals (occupying 85% of the total) made no purchase in each quarter
- Low-frequency buyers dominate sales: 1,072 bought once; 581 bought two or three times
- Heavy buyers are rare: Only 139 buyers purchased six or more times
- Cumulative percentage curve confirms dominance of low-frequency buyers.

Supports Ehrenberg’s Law

- Brands rely heavily on infrequent buyers
- Buyer frequency shows steep decay with increasing purchases (NBD–Dirichlet model confirmed)

Typical purchase pattern

- Most consumers remain inactive in any given period

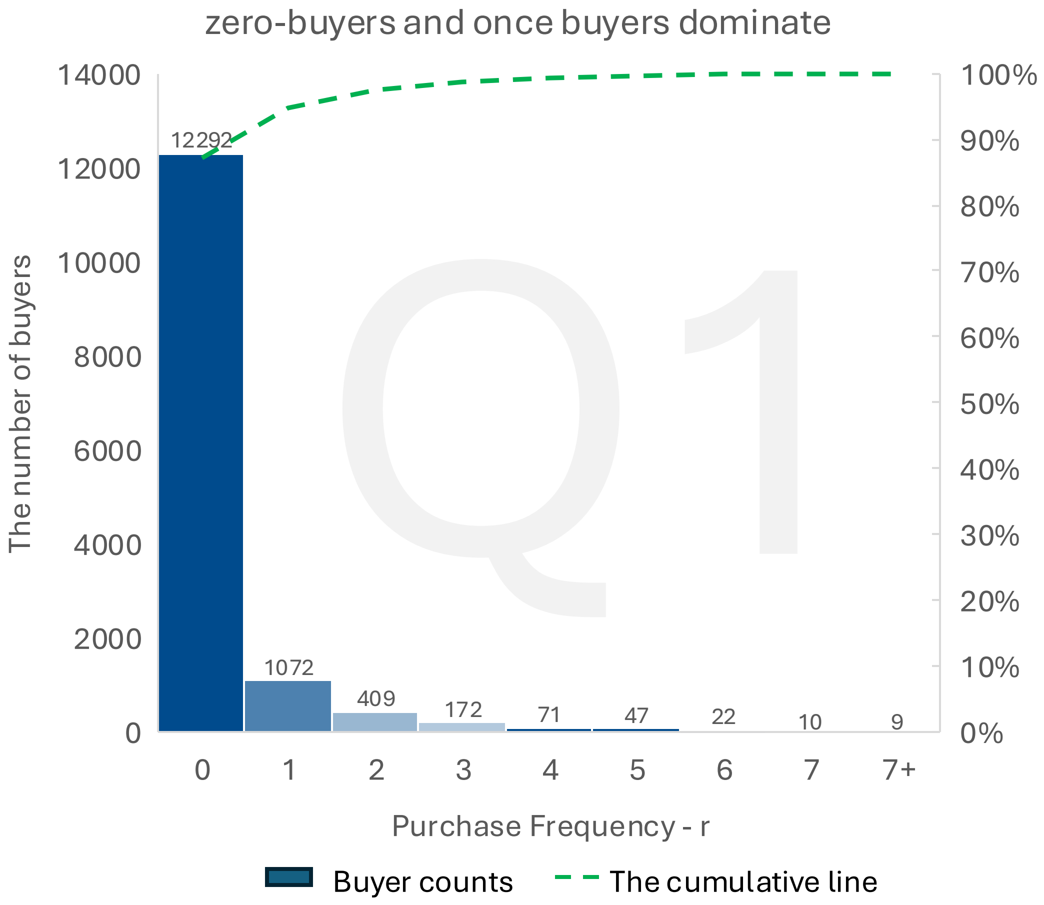
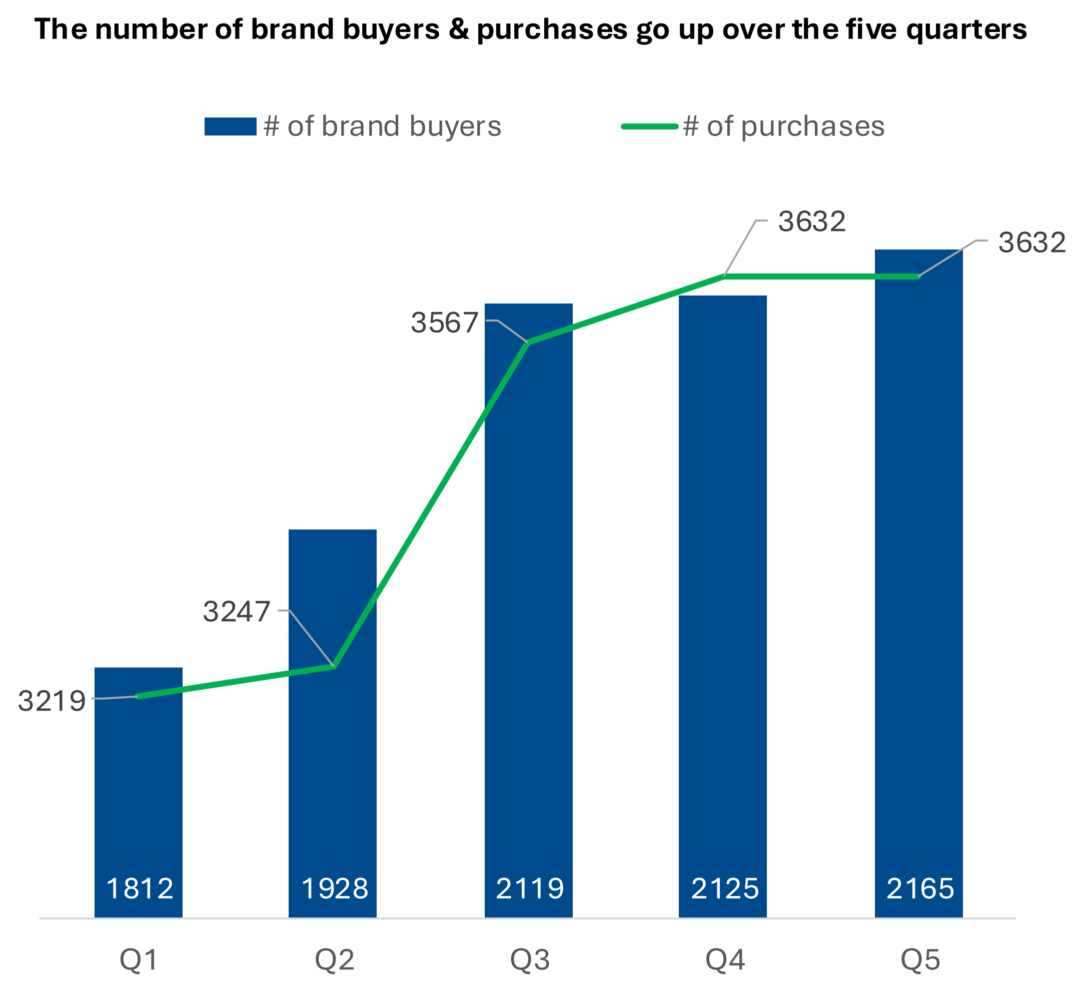


Figure: Distribution of buyers by purchase frequency (r) in Q1, with similar patterns observed in Q2–Q5.

1.2 Growth in Brand Buyers & Purchases Over Time

- **Steady growth in total buyers** from Q1 (3,219) to Q5 (3,632).
- **Consistent increase in brand buyers** from 1,812 in Q1 to 2,165 in Q5.
- **Brand buyer growth outpaces total buyer growth**, indicating rising brand engagement.
- **Quarter-over-quarter improvement** in both buyer count and brand loyalty.
- **Q3 and Q4 show strong gains**, with brand buyers exceeding 2,100.

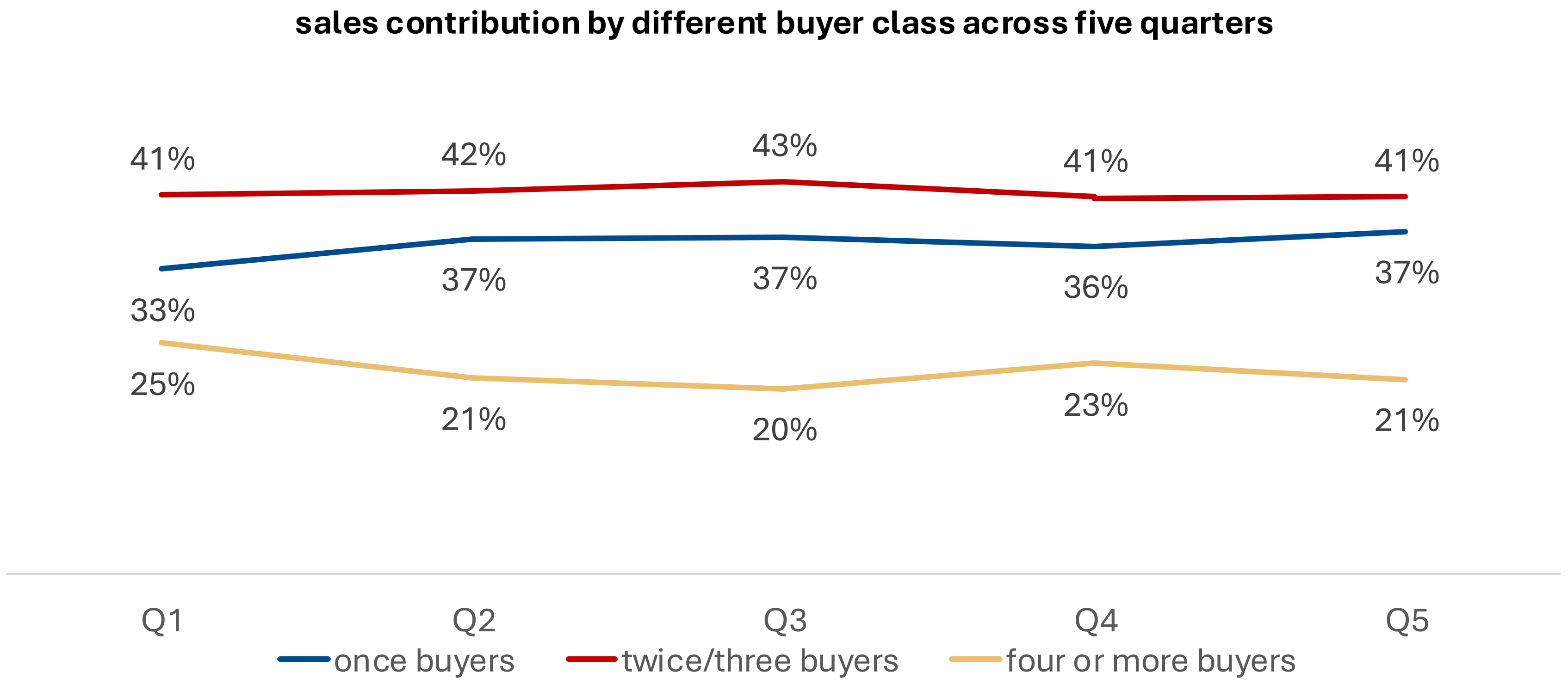


1.3 Sales Shift: Twice/Three Buyers Lead as Heavy Buyers Decline (Q1-Q5)

*Summary: The **twice/three buyers segment dominates sales**, but **heavy buyers are declining**, while **once buyers are rising**. This suggests a need to **re-engage heavy buyers** while nurturing newer customers.*

- **Twice/Three Buyers** are the **largest segment**, contributing **41-43%** of sales consistently across all quarters.
- **Four or More Buyers** show a **declining trend**, dropping from **33% (Q1) to 21% (Q5)**.
- **Once Buyers** remain the smallest segment but **grow slightly** from **25% (Q1) to 37% (Q5)**.

Over time, **once buyers** are gaining share, while **heavy buyers (four or more)** are losing influence.



Part Ⅱ
Comparison of Observed & Theoretical results on buyer counts and sales contribution

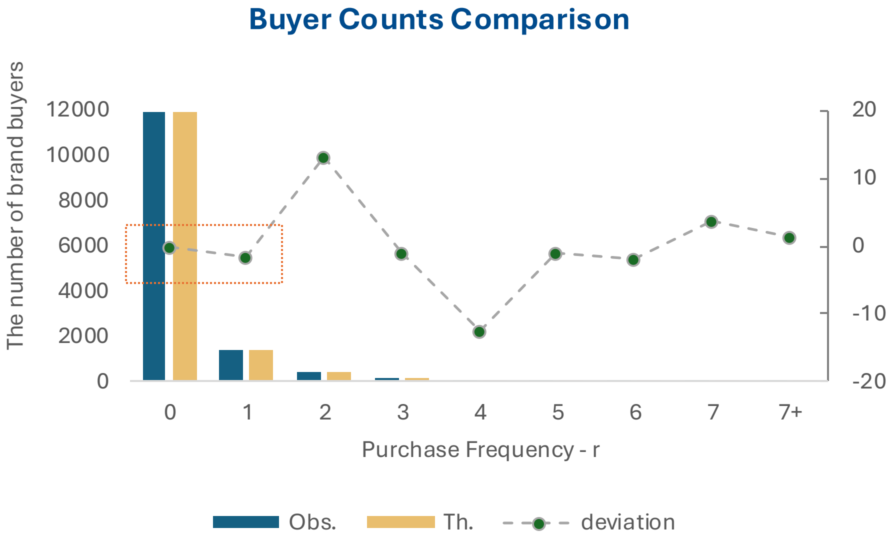
2.1 Comparison of Buyer Counts (Observed & Theoretical) by NBD benchmarks

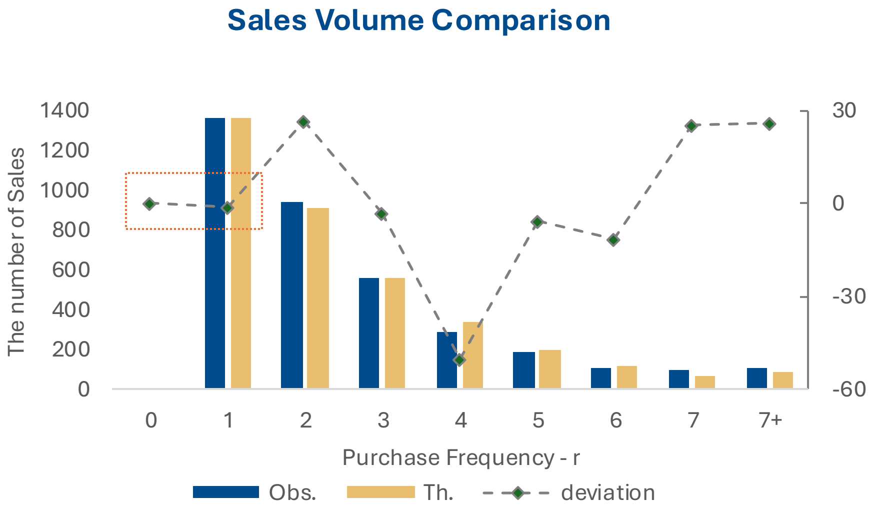
Model insights

- Limitation on NBD model: reliable for modeling light buyers, rather than medium and heavy buyers
- Most consumers are occasional buyers
- Light and Medium buyers dominate: the majority of sales came from occasional buyers, both in numbers & revenue contribution

Marketing Implications

- Broad-reach marketing: capture light and medium buyers
- Do not just focusing solely on loyalty programs for heavy buyers





2.2 Comparison of Brand Sales Contribution

Occasional buyers drive most sales, reinforcing the value of broad-reach marketing

Results Match Closely

- Observed vs. Theoretical Sales

Sales Dominated by Light and Medium Buyers

- Majority of revenue comes from occasional buyers

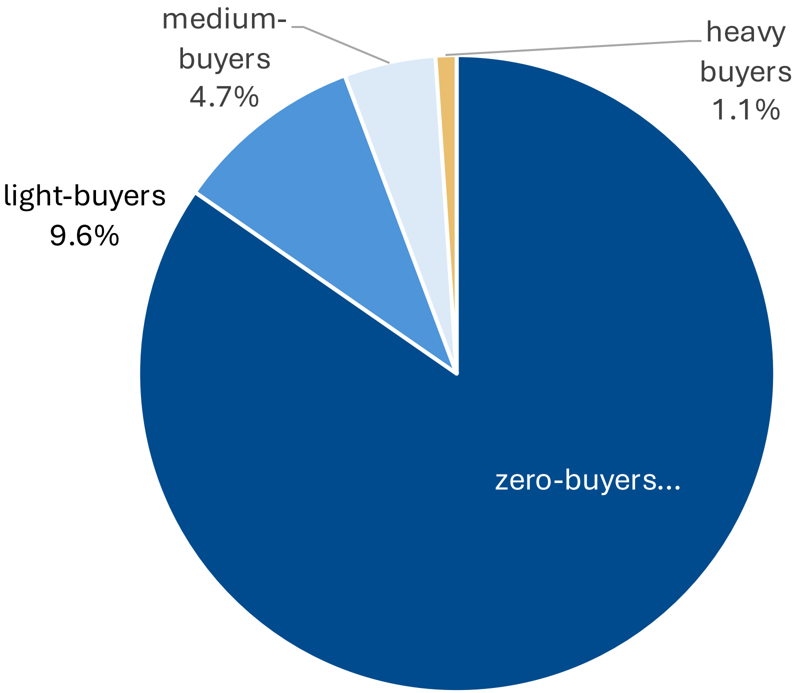
Marketing Implication

- broad-reach marketing
- Loyalty programs for heavy buyers are less impactful

Buyer Class	Obs. values	The. values
Zero	0	0
Once	37%	38%
Twice/three	41%	41%
Four or more	21%	22%

Part Ⅲ
Buyer segmentation

3.1 Unlocking Growth: Converting Non-Buyers into Light and Medium Buyers

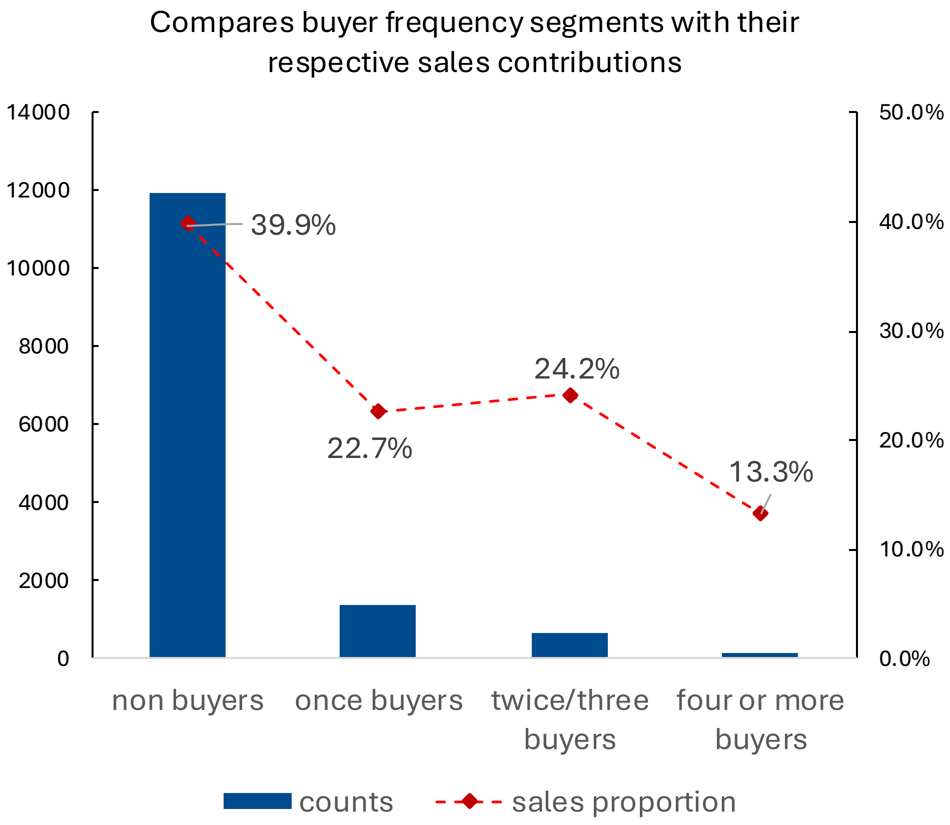


The biggest growth opportunity lies in activating the large base of non-buyers rather than loyal customers

- Majority of category buyers made no purchases
- Repeat and high-frequency buyers are rare
- Light and medium buyers offer the greatest potential for sales uplift.
- Strategic focus should shift from loyalty alone to penetration growth
- Marketing and outreach efforts should aim to convert zero-buyers into occasional buyers

3.2 Buyer Segmentation Insights & Strategic Recommendations

While heavy buyers are valuable, most sales come from light and occasional buyers—making penetration, not loyalty, the key to sustainable growth



Non-Buyers

Largest group by count

Still contribute **39.9%** of total sales—likely due to past purchases or stock-up behavior

Once Buyers

Moderate count

Contribute **22.7%** of sales—indicating trial but limited retention.

Twice/Three Buyers

Smaller group

Contribute **24.2%**—showing strong value per customer

Four or More Buyers

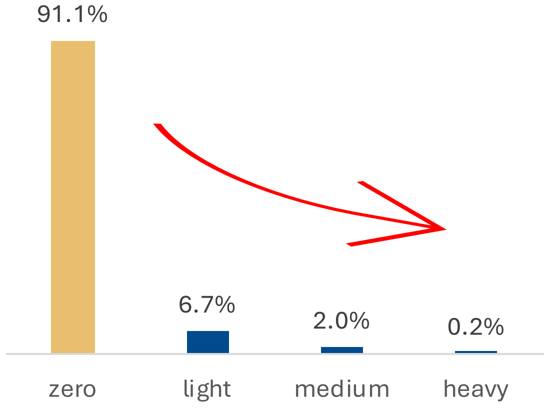
Smallest segment

Still contribute **13.3%**—high loyalty, high value density

Part IV
Analysis of Buyer Transitions

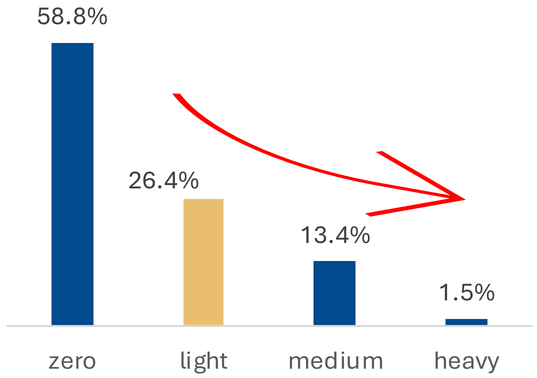
4.1 Most buyers don’t retain their prior purchase level

Q4-Q5 transition of **zero buyers**



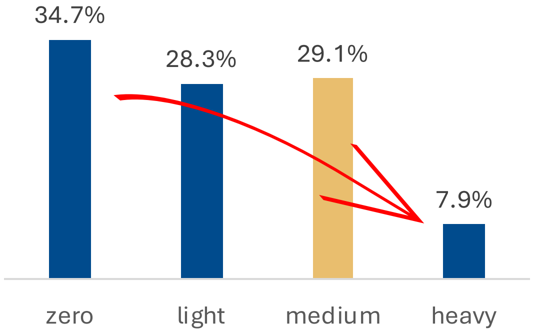
Zero buyers display strong behavioural inertia, with 91.1% remaining non buyers. Only small proportions move into active buying.

Q4-Q5 transition of **light buyers**



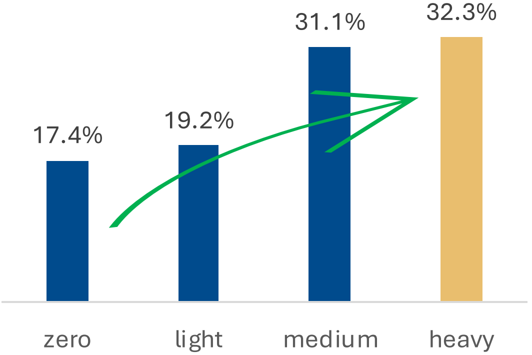
While 26.4% remain in the same category, 58.8% revert to zero purchases and only a small minority progress to medium or heavy buying.

Q4-Q5 transition of **medium buyers**



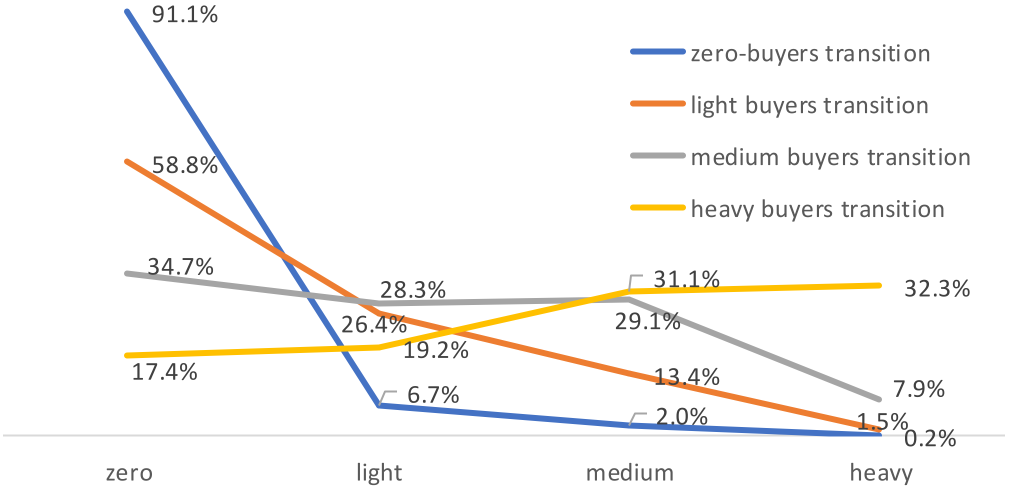
29.1% remain in the same category, while 34.7% drop to zero and 28.3% move down to light.

Q4-Q5 transition of **heavy buyers**



Only 32.3% retain their status, while 31.1% move to medium and 19.2% drop to light.

- **Buyer classes are fluid**, not fixed
- **Buyer retention decreases** as purchase frequency increases; heavy buyers are more likely to regress.
- **Zero and light buyers dominate** the population but contribute less to total sales
- **Purchase fluctuations are systematic** and largely driven by **randomness**, not deliberate switching or dissatisfaction.



4.2 Shifting Buyer Dynamics – Acquisition Success vs. Retention Gaps (Q4 vs. Q5)

Buyer class	Q5 Proportion of total buyers	Q5 relative sales contribution (%)		Q4 contribution
zero	84.6%	39.9%	← - - -	0
light	9.6%	22.7%	← - - -	36.0%
medium	4.7%	24.2%	← - - -	41.4%
heavy	1.1%	13.3%	← - - -	22.5%

Acquisition Wins, Retention Fails

- New customer activation worked, but **loyal buyers declined significantly**.
- Combined **27% drop** in high-value segments (twice/three + high-frequency).

Marketing Implications

- **Differentiated retention strategies** needed per segment.
- Balance **broad reach (acquisition)** with **stronger loyalty incentives**.

THANKS