

# From Data to Decision: Decoding Customer DNA to Drive Campaign Success

A strategic analysis of customer behaviour to identify high-value segments and optimise marketing effectiveness.

**Group - 14**

**Nandani Jhanwar - RBA48**

**Kashish Shemna - RBA66**

**Shruti Maghan - RBA77**

# Our marketing reaches everyone, but resonates with too few.

We currently operate with a broad, one-size-fits-all approach to a large and diverse customer base. This untargeted strategy leads to significant wasted marketing spend and low campaign response rates.

To improve ROI, we must move from mass marketing to precise, insight-driven engagement.

Who are our most responsive customers, and what truly defines them?



# We built our analysis on a foundation of clean, reliable data.

A robust model requires pristine data. Our first step was a comprehensive cleansing and preparation process to ensure predictive accuracy.



## De-duplication

Removed 182 duplicate records.



## Imputation

Addressed missing `Income` values using the median to maintain data integrity.



## Outlier Treatment

Systematically removed and capped extreme outliers that would skew results.



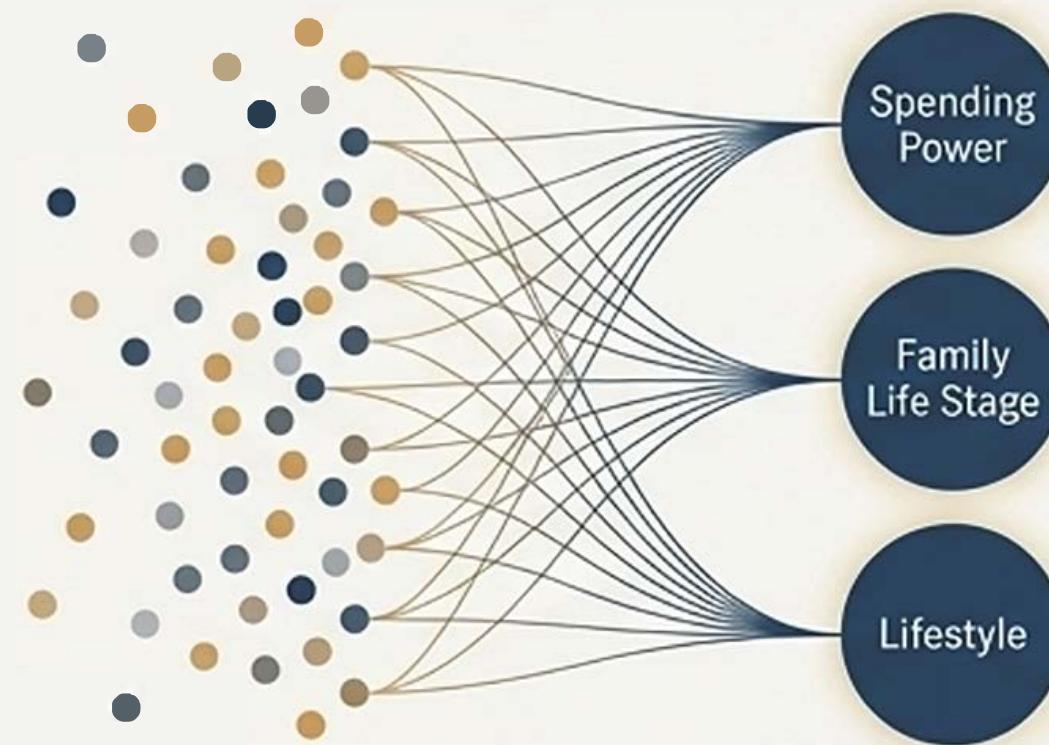
Final Analysed Records: 2,045

# We systematically isolated the customer characteristics that most strongly predict campaign response.

Not all customer attributes are equally important. We employed a two-stage approach to uncover the vital few signals from the noise.

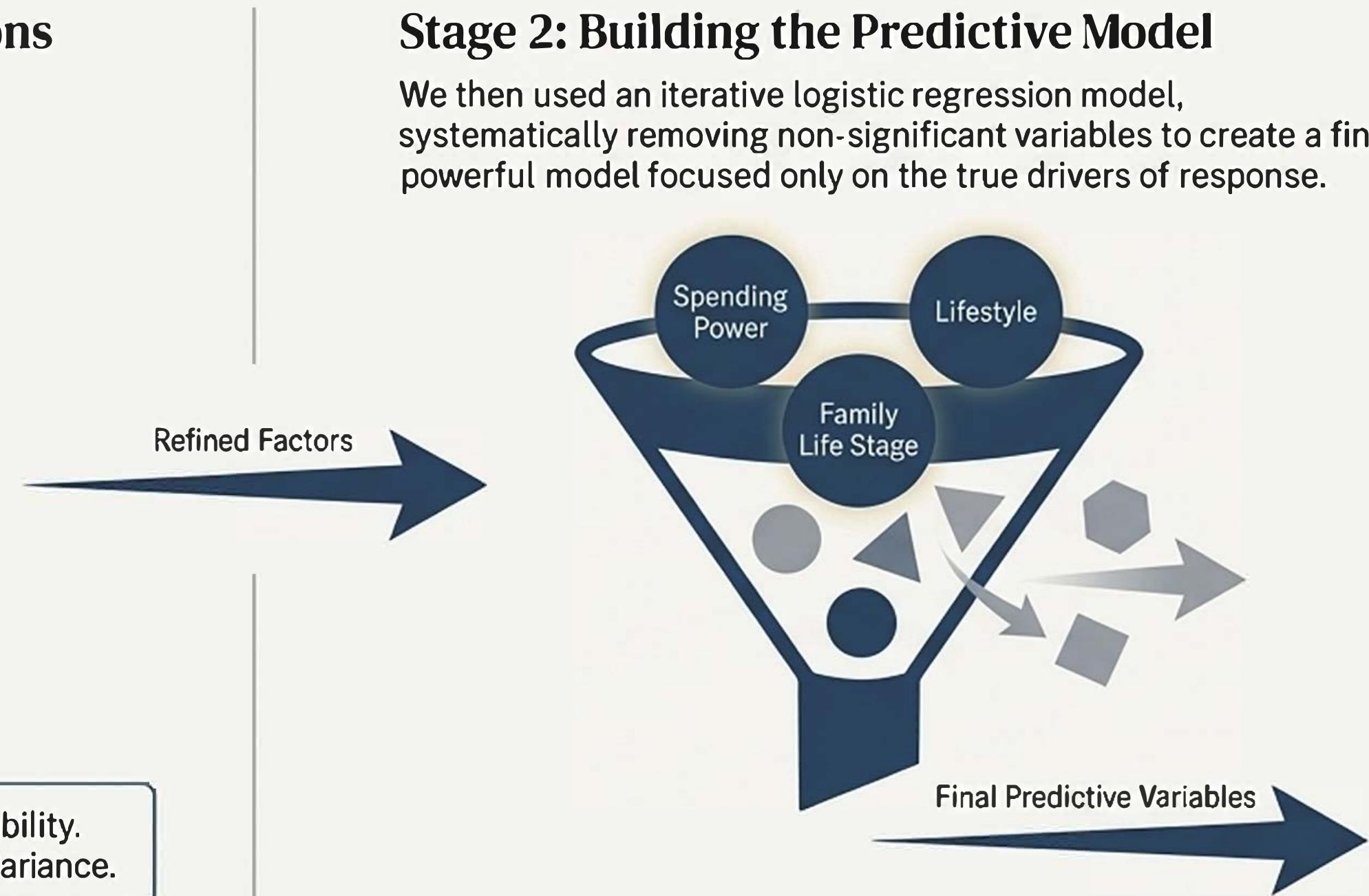
## Stage 1: Uncovering Underlying Dimensions

Used Factor Analysis to group correlated variables (e.g., spending on wine, meat, fruit) into meaningful underlying factors like "Spending Power" and "Family Life Stage".



## Stage 2: Building the Predictive Model

We then used an iterative logistic regression model, systematically removing non-significant variables to create a final, powerful model focused only on the true drivers of response.



Validation: Bartlett's Test ( $p < 0.001$ ) confirmed data suitability.  
The first 12 derived factors explained 67.25% of the total variance.

# Our final model predicts campaign response with 88% accuracy.

Accuracy

**88.0%**

AUC Score

**0.87**

## Key Drivers of Campaign Response

### Positive Drivers

**Total Expenditure:** Higher overall spend strongly predicts a positive response.

**Income:** Higher income is a key positive factor.

**Customer Tenure:** Longer-term customers are more responsive.

**Previous Campaign Success:** Having responded to Campaign 2 is a powerful predictor.

### Negative Drivers

**Marital Status (Married/Together):** These groups show lower response rates compared to the baseline.

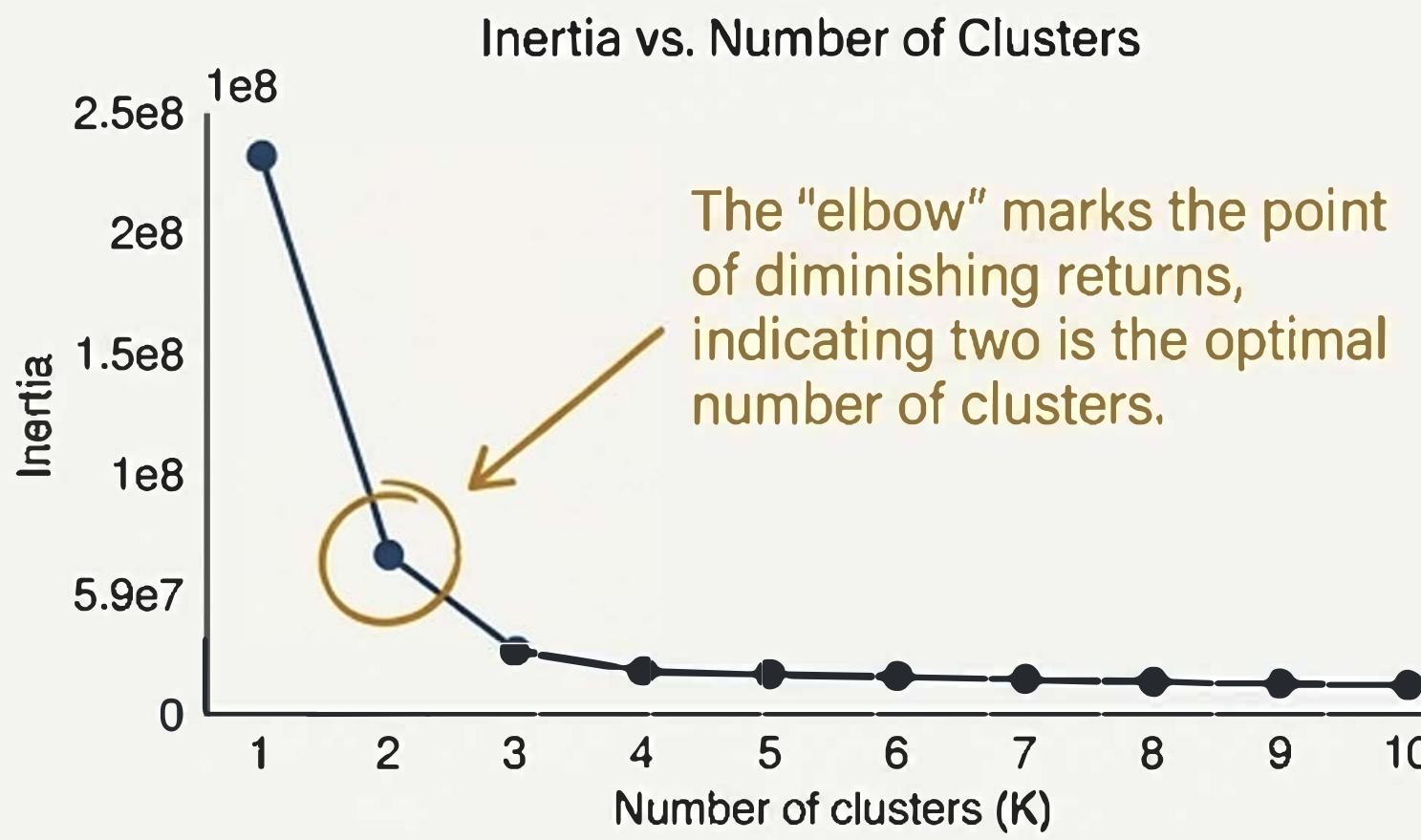
**Dependency Ratio:** A higher number of dependents negatively impacts likelihood to respond.



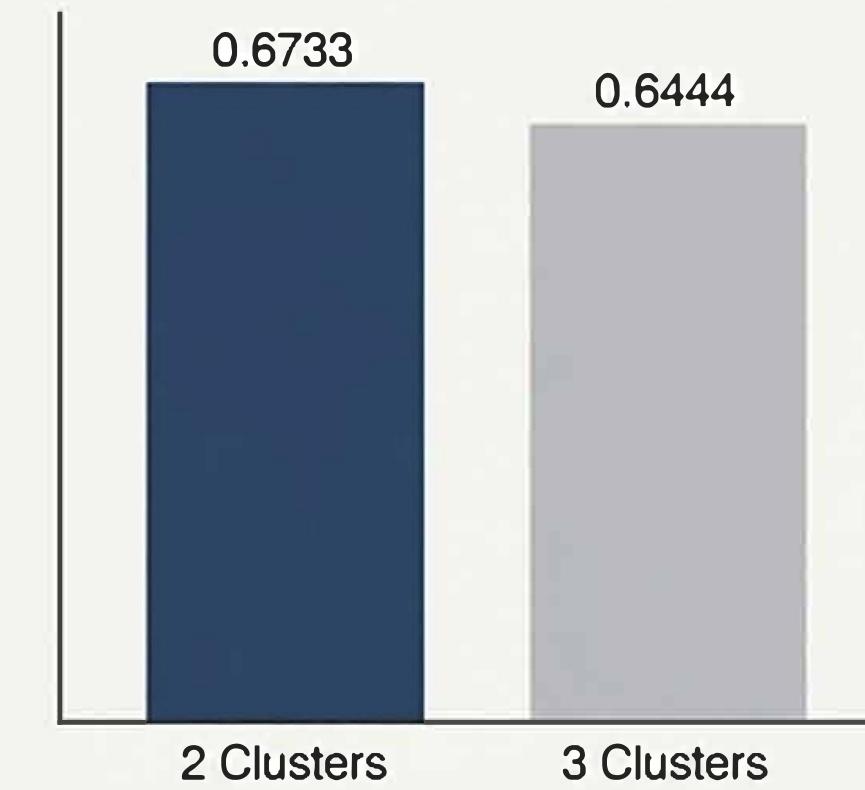
# The data revealed our customers naturally cluster into two distinct groups.

Beyond individual predictors, we used K-Means clustering to discover if our customers form natural segments based on their shared characteristics. The analysis pointed conclusively to a two-cluster solution.

## Evidence 1: The Elbow Method



## Evidence 2: Silhouette Score Validation



The higher score for a 2-cluster solution confirms it provides the best separation and compactness between groups.

# Meet the Prudent Planners.

Segment Archetype: Cluster 0



## Higher Family Dependency

Average `Kidhome` of 0.57 and `Dependency Ratio` of 0.75.



## Moderate Spenders

Lower average `Income` (scaled at 0.063) and `Total Expenditure` (scaled at 0.12).



## Lower Luxury Spend

Significantly lower spending on wine (avg. 118).



## Web Browsers

Higher number of monthly web visits (avg. 5.76).



## Lower Campaign Response

Less likely to respond to past campaigns (avg. 0.10).

# Meet the Engaged Enthusiasts.

Segment Archetype: Cluster 1



## Lower Family Dependency

Very low average `Kidhome` of 0.09 and `Dependency Ratio` of 0.38.



## High-Value Spenders

Higher average `Income` (scaled at 0.104) and much greater `Total Expenditure` (scaled at 0.53).



## Luxury-Oriented

Exceptionally high spending on wine (avg. 747).



## Decisive Shoppers

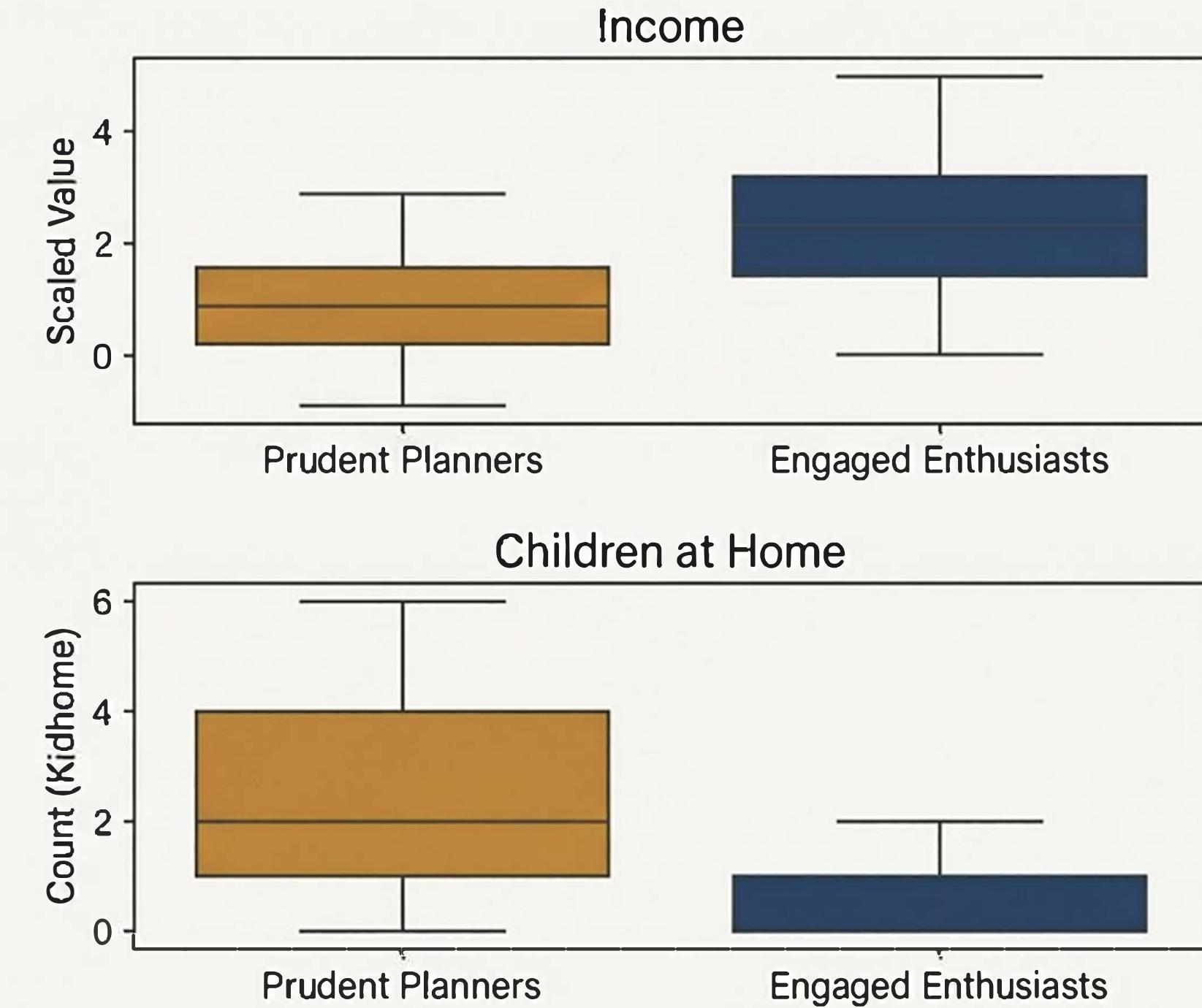
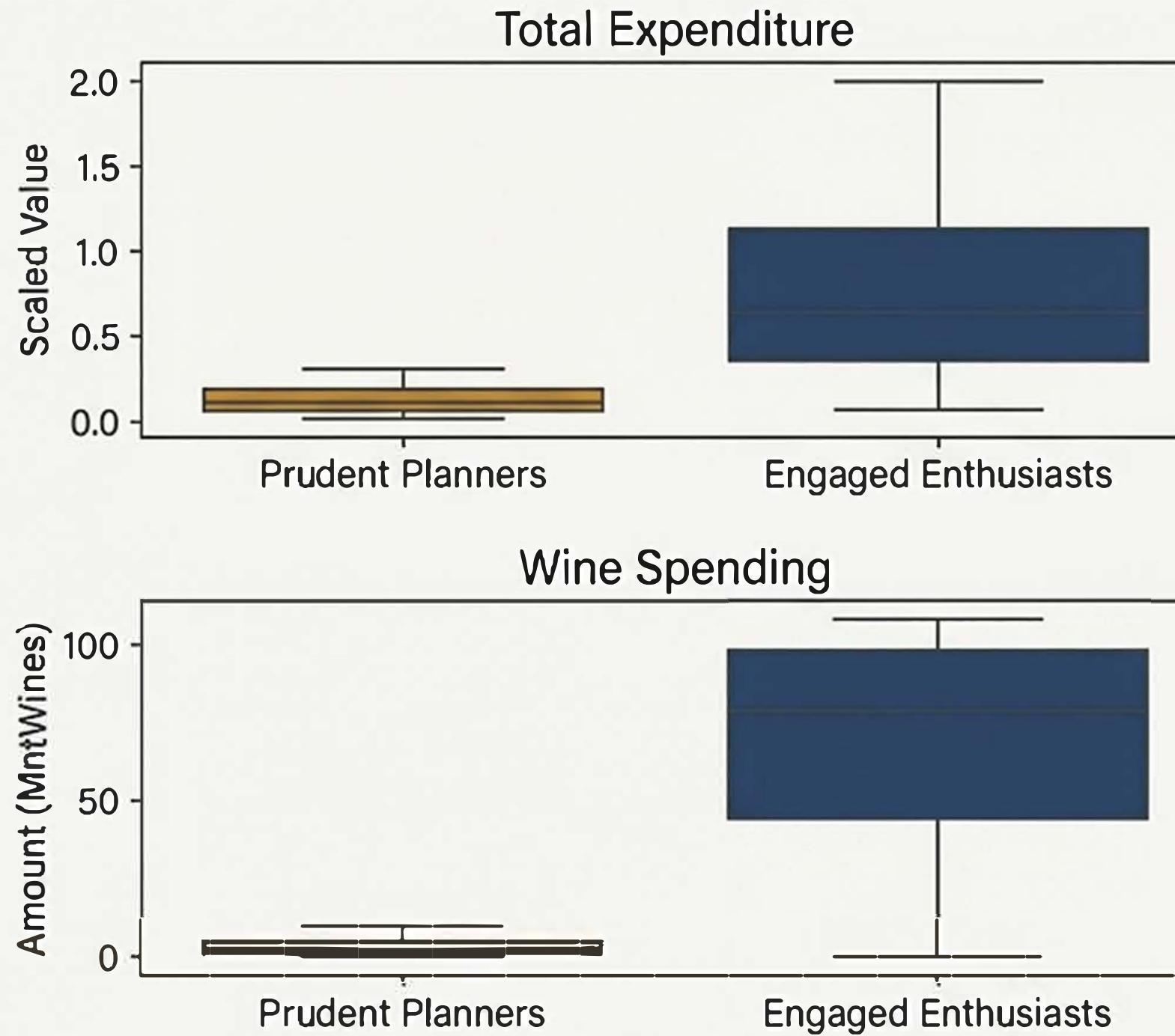
Higher catalogue purchases (avg. 5.14).



## High Campaign Response

Significantly more likely to respond to past campaigns (avg. 0.47).

The two segments exhibit fundamentally different behaviours and profiles.



The separation between segments is statistically significant across key metrics of value, lifestyle, and spending habits.

The profile of a campaign responder aligns strongly with Engaged Enthusiasts, but with a crucial distinction.

Key Feature	Prudent Planners (Avg.)	Engaged Enthusiasts (Avg.)	Campaign Responders (Avg.)	
Total Expenditure	0.12	0.53	<b>0.39</b>	{ Value profile is closer to Engaged Enthusiasts.
Income	0.063	0.104	<b>0.088</b>	
Education (PhD)	0.19	0.29	<b>0.30</b>	
Children at Home	0.57	0.09	<b>0.33</b>	Crucially, proven receptiveness is even higher than the Enthusiast segment average.
Campaign 2 Response	0.10	0.47	<b>0.56</b>	The key differentiator:
Customer Tenure (days)	0.48	0.56	<b>0.63</b>	Responders are our most loyal, long-term customers, surpassing both segments.

# The Ideal Responder: A loyal, high-value enthusiast.

Our analysis reveals that campaign responders are not just any member of the "Engaged Enthusiasts" segment. They are a super-set defined by even greater loyalty and exceptional receptiveness to marketing.



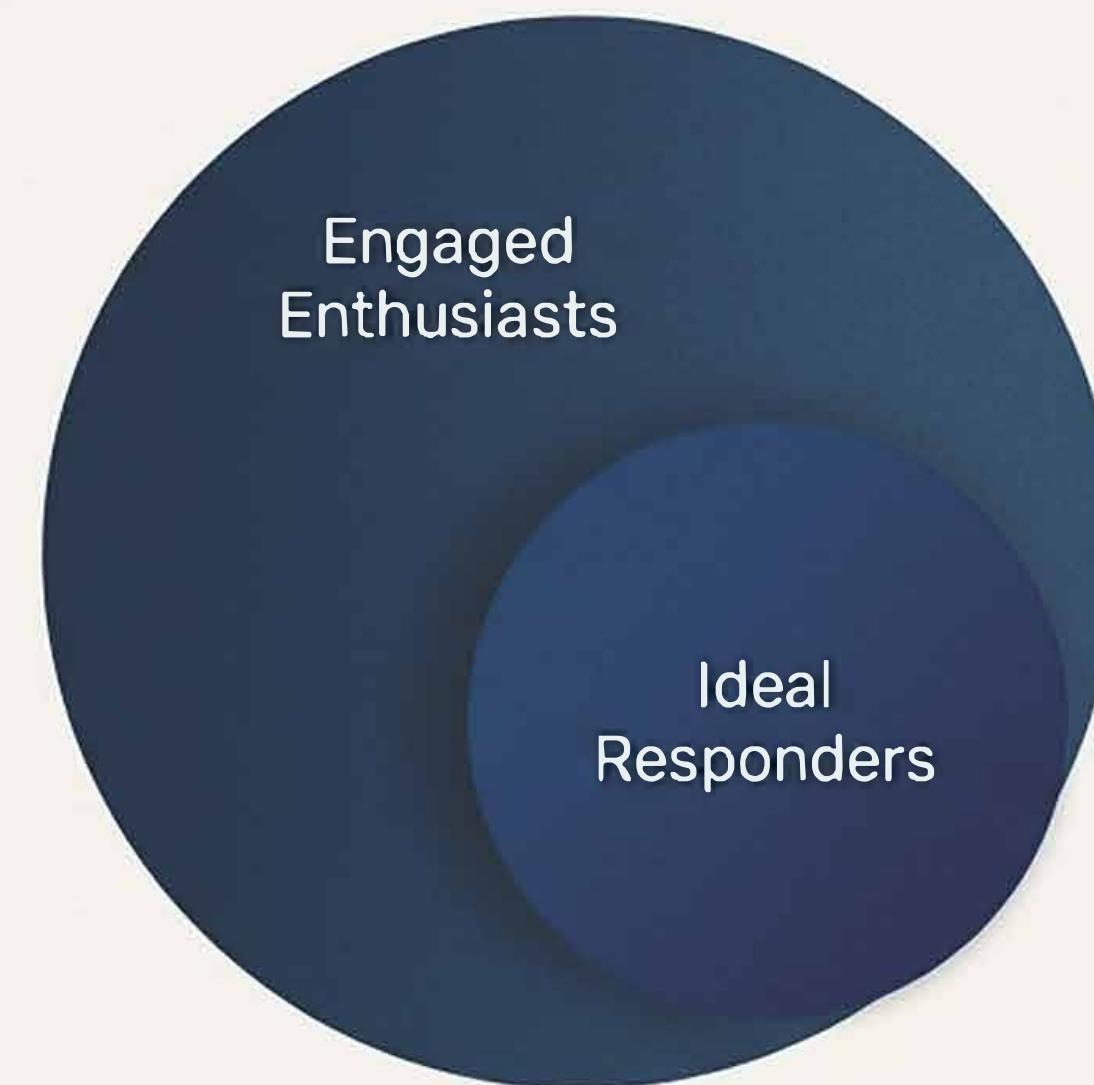
**Value Profile:** High income and high expenditure.

*Aligns with Engaged Enthusiasts*



**Key Differentiator 1: Exceptional Tenure.**

Their average customer tenure is higher than either segment, making them our most established customers.



**Demographic Profile:** Highly educated, with low family dependency.

*Aligns with Engaged Enthusiasts*



**Key Differentiator 2: Proven Engagement.**

They have the highest likelihood of having responded to past campaigns, marking them as a highly receptive audience.

# These insights provide a clear roadmap for optimising marketing strategy.



## Targeting & Acquisition

Focus future campaign spend on prospects matching the 'Engaged Enthusiast' profile, with a specific filter for long-term loyalty signals.

- **Expected Outcome**

Increased campaign response rates and higher marketing ROI.



## Personalisation & Messaging

Tailor creative and messaging to the high-value, low-dependency lifestyle of the Enthusiast segment. Emphasise premium products and experiences.

- **Expected Outcome**

Higher engagement and conversion through more relevant communication.



## Nurturing & Growth

Develop a distinct strategy for the 'Prudent Planners'. Focus on value-based offers and web-exclusive deals to nurture their potential and increase their lifetime value.

- **Expected Outcome**

Gradual value growth from a large but currently less-engaged segment.

# Appendix: Final Logistic Regression Model Details

The following table outlines the final 15 variables included in our predictive model, all of which were statistically significant ( $p\text{-value} < 0.05$ ).

Feature	Coefficient	Std. Error	P-value
Total_Expenditure_2yrs	5.6287	1.033	<0.001
MntFishProducts	-0.0079	0.003	0.005
NumCatalogPurchases	0.1793	0.042	<0.001
Income	14.8703	5.210	0.004
NumWebVisitsMonth	0.3993	0.060	<0.001
MntWines	-0.0028	0.001	<0.001
Kidhome	1.1680	0.251	<0.001
Engagement score	-0.3277	0.057	<0.001
Dependency Ratio	-1.1031	0.197	<0.001
Education_PhD	0.9557	0.188	<0.001
Marital_Status_Together	-1.5409	0.212	<0.001
Marital_Status_Married	-1.5645	0.193	<0.001
Education_Master	0.5064	0.212	0.017
Campaign2	2.0276	0.177	<0.001
Customer tenure(days)	2.0876	0.303	<0.001

# Thank You

Questions & Discussion

<https://marketing-casestudy.streamlit.app/>