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Chicago, IL
Bangalore, India
www.mu-sigma.com

Agent Based Modeling Case Study

Understanding the Drivers of the Alcoholic Beverage Market

A leading spirit manufacturer utilized Agent Based Modeling to understand the underlying drivers of major shifts in the drinks market

Outcomes

A working model could help to understand the circumstances under which major shifts in category preference, such as the recent rise in the popularity of gin in Europe, can occur, and the **actions** we might be able to take in order to benefit.

By building a model of the drinks market to answer **what-if** questions, we will be investing in an ongoing strategic capability that can be used to answer further questions about market dynamics, and that can be extended to cover other countries.

Create a game-changing**, competitive advantage**

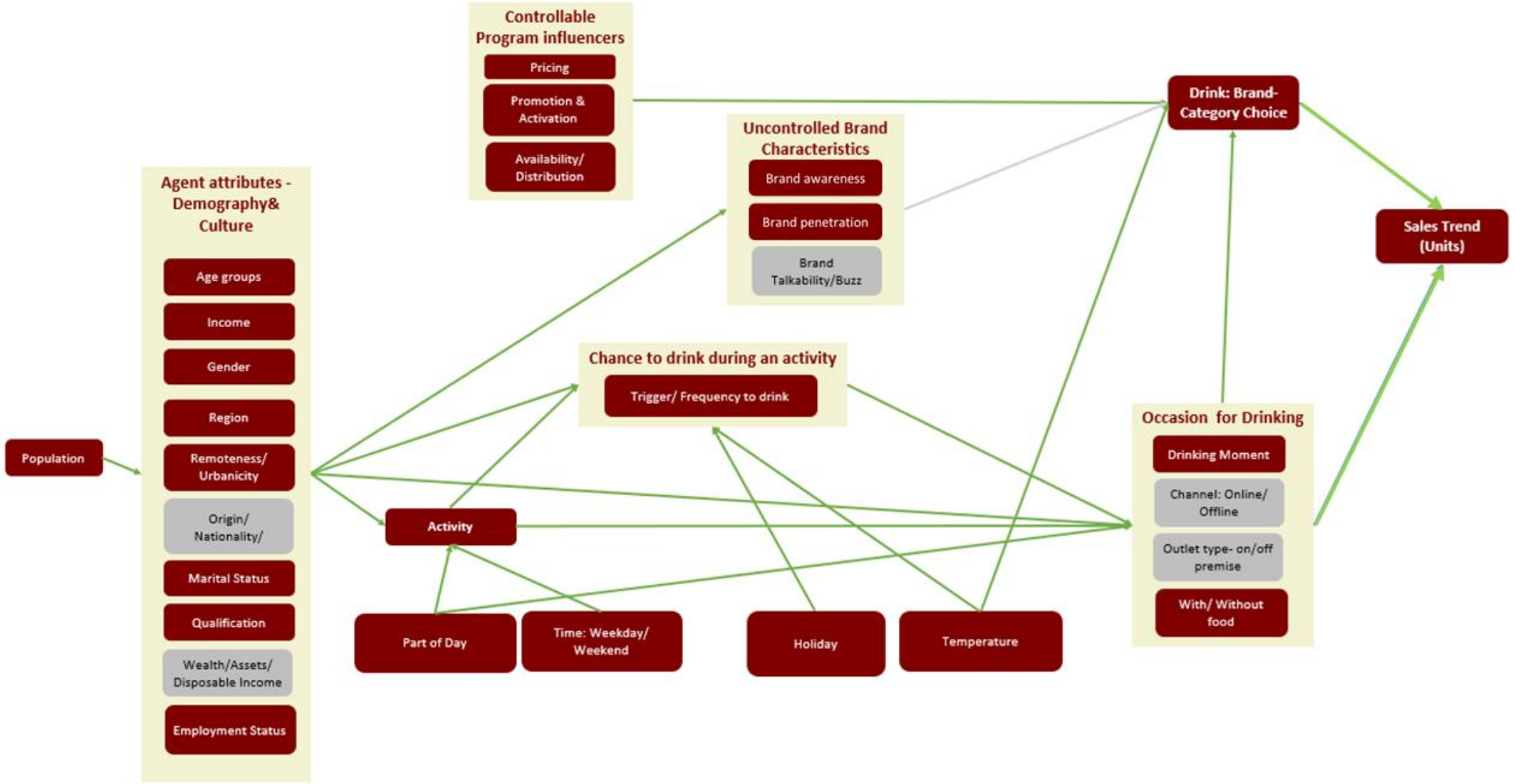
The scope of the project was to understand the category shifts within the Australian market

The model projects the sales impact of consumer behavior and cultural change. It's total category not just brands, as such leveraged for brand and portfolio planning. We could generate category insights for our customers no other competitor would have. We could seek to understand:

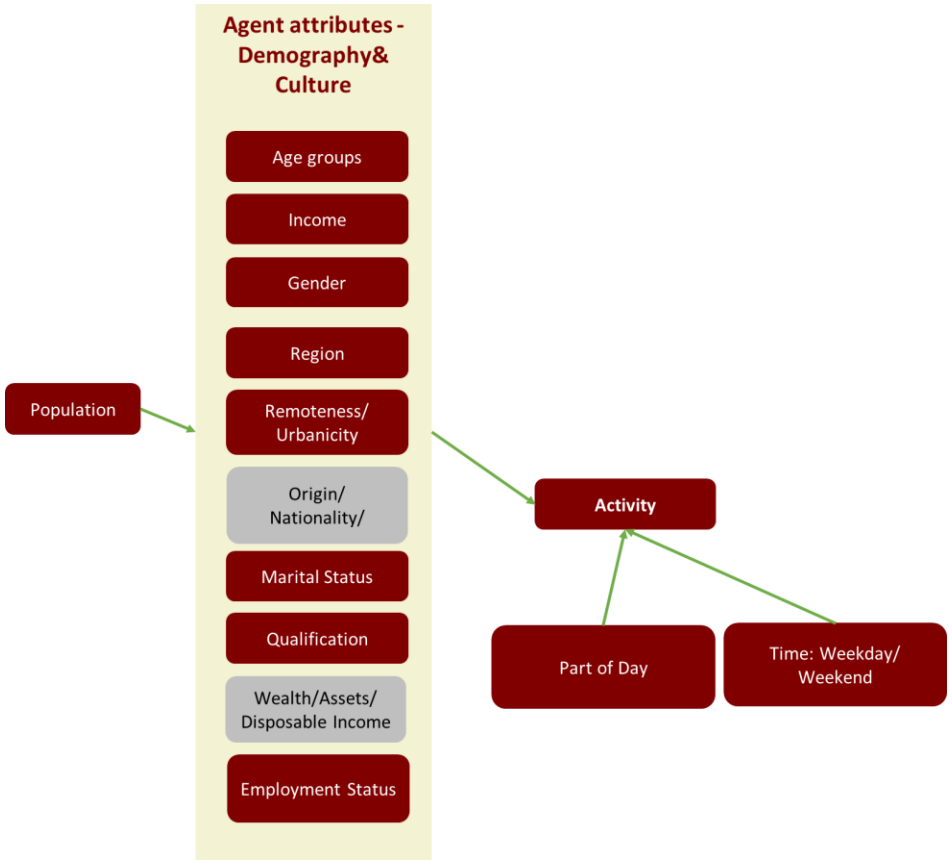
1. What if population growth continues at ~2% PA driven by cap cities with a 50/50 mix of organic to immigration?
2. What if 15% of evening occasions cease to exist with a further 15% shifting to early afternoon?
3. What if a new brand's penetration grown rate trails behind competitors by 30%?
4. Additionally this should connect the dots between penetration and volume considering all the macro inputs that drive this relationship ethnicity mix / per capita etc.

Bayesian Network Details

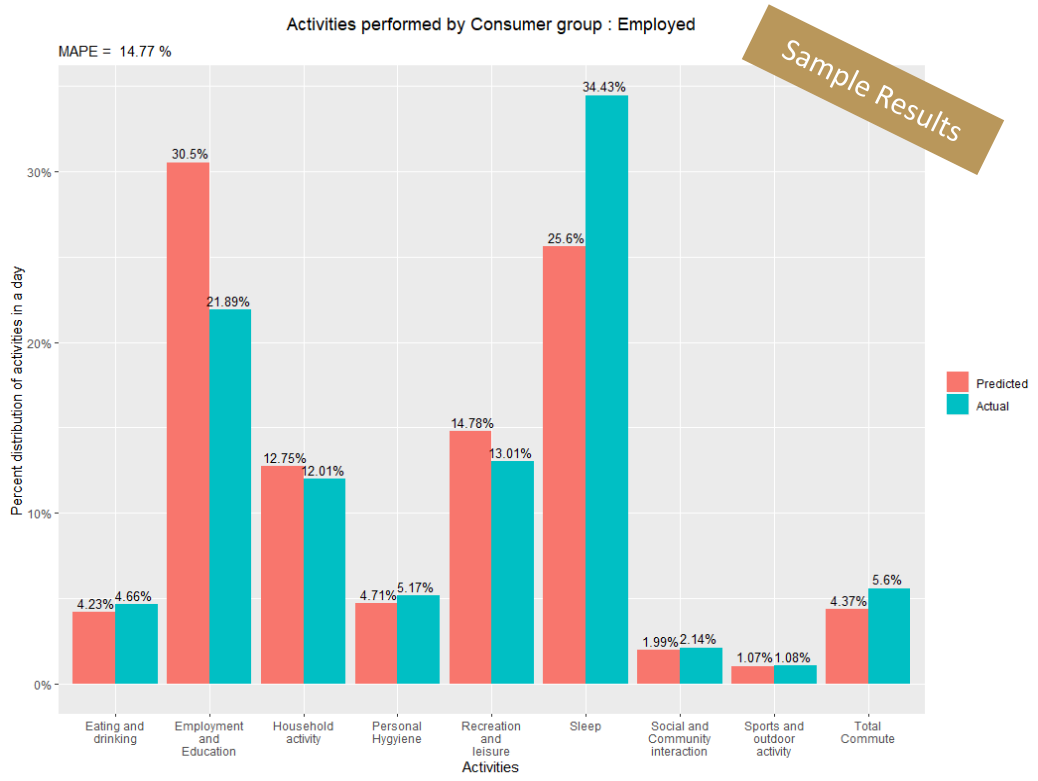
The Bayesian network provided the probability of a category-brand choice and was validated using sales trend



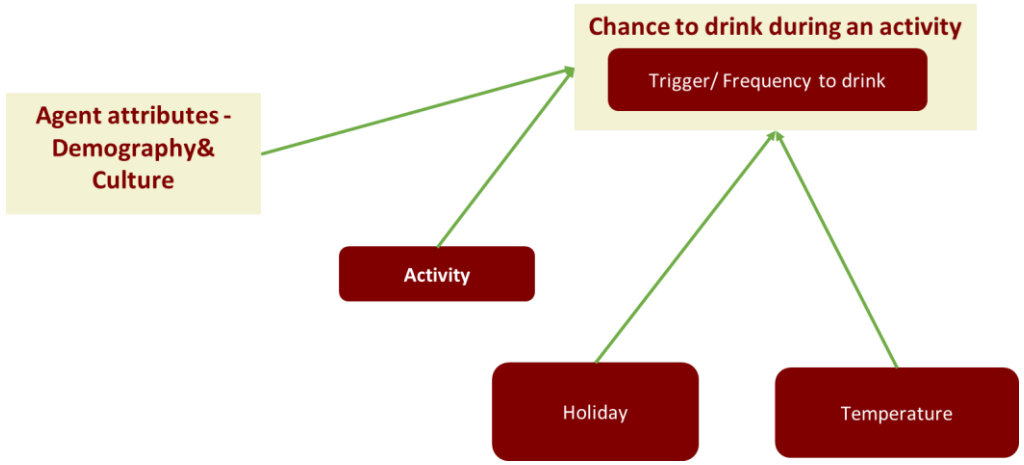
ACTIVITY - What is the likelihood of an agent partaking in different activities?



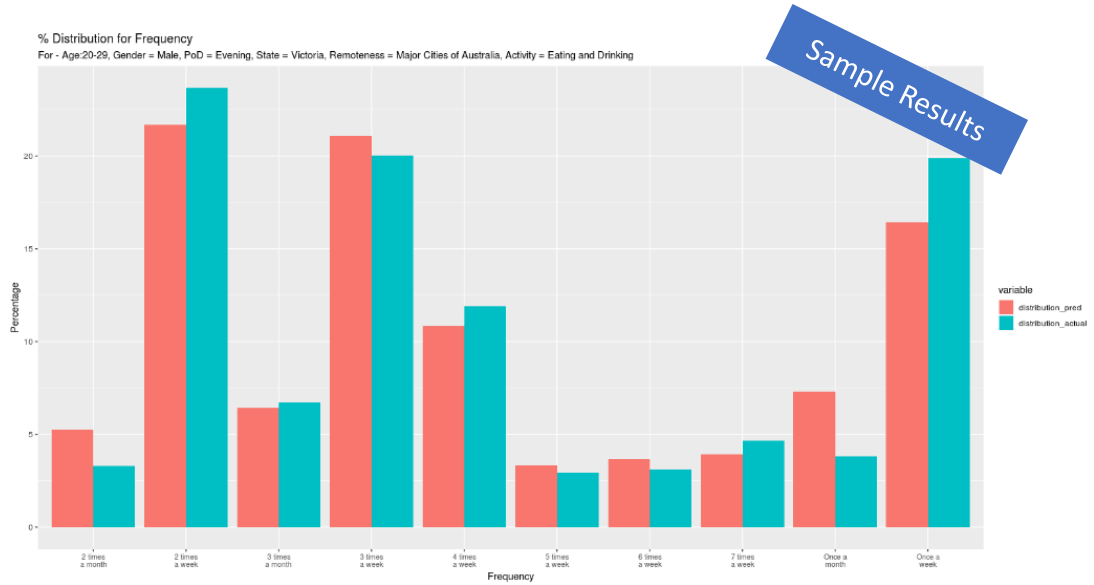
What is the typical day in the life of an agent?
Key activities are simulated for agents based on demography, part of day & day of the week



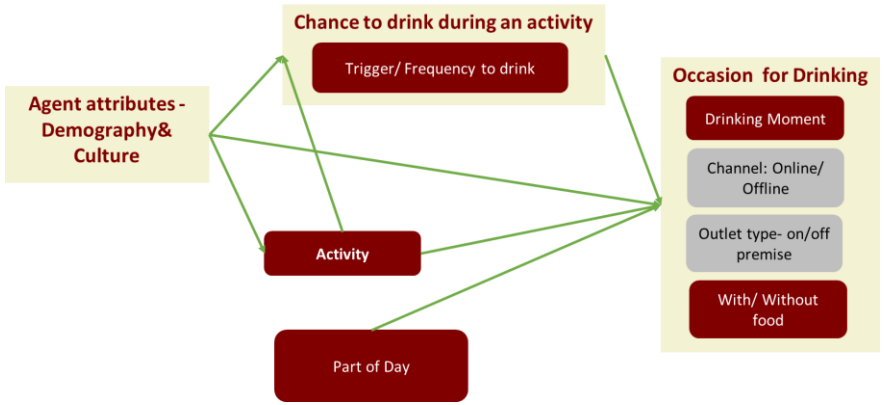
TRIGGER TO DRINK – What's the likelihood of my agent drinking at this moment?



What are the chances an agent drinks during an activity?
Agent's likeliness to drink during a certain activity (eating, sleeping, social interaction, etc.)Also influenced by holiday, temperature and agent's demography

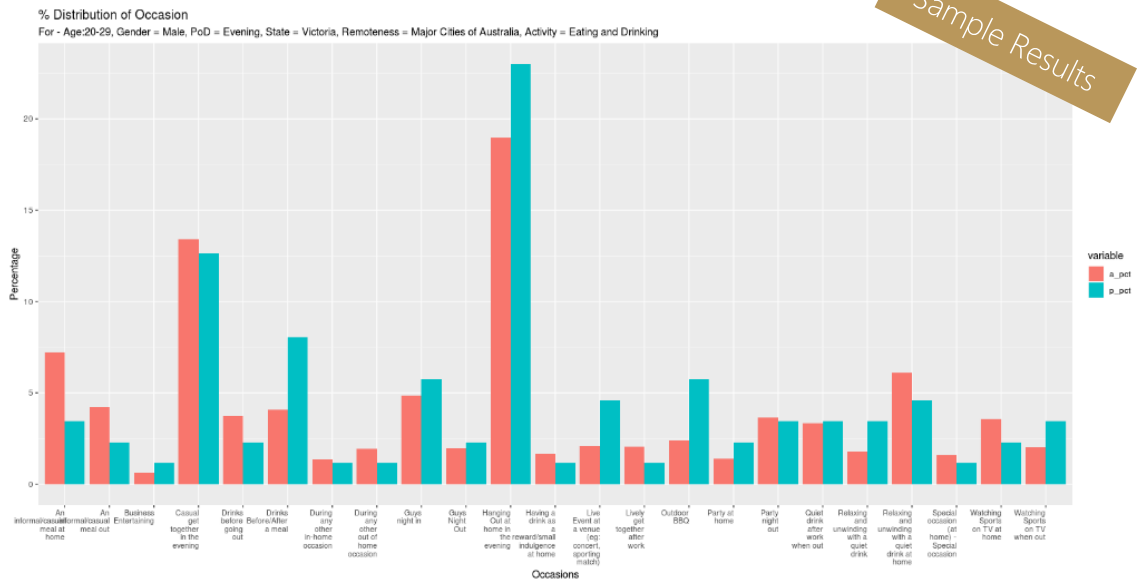


DRINKING MOMENT – What type of drinking moment is the agent partaking in?

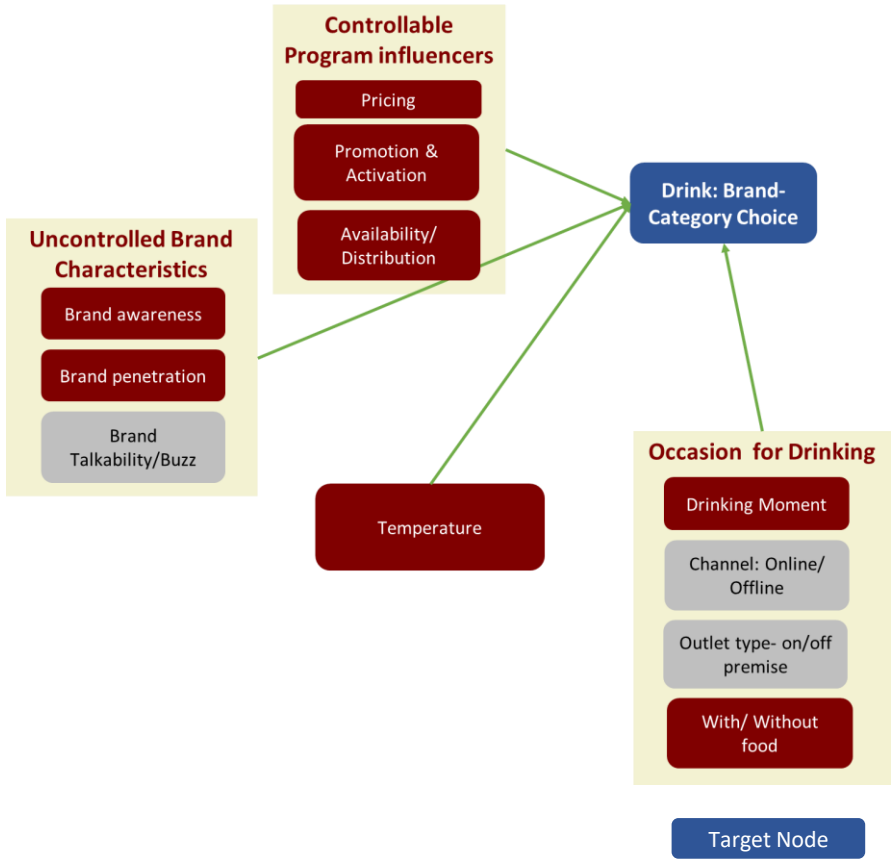


What drinking moment/occasion is the agent in?
Simulate the possible occasion an agent is likely to be in during a drink trigger- agent experiences a drink trigger during occasions like outdoor BBQ, business entertainment

Sample Results

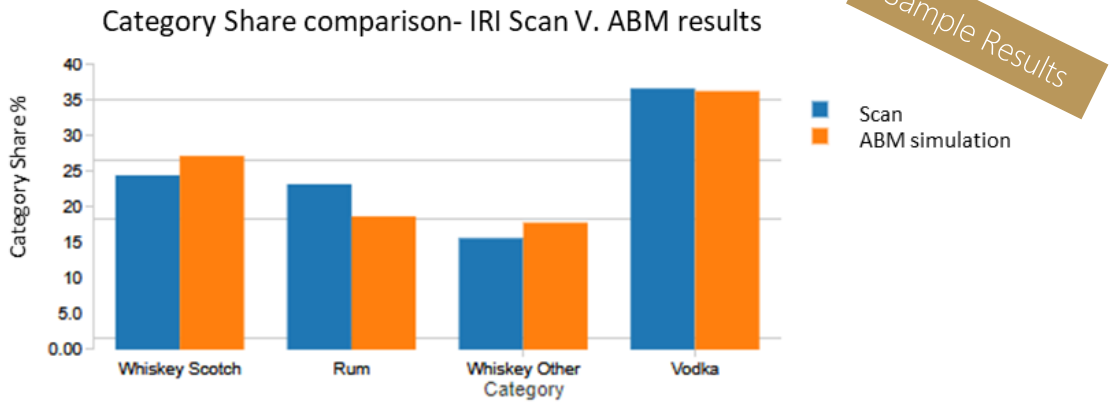


BRAND CATEGORY CHOICE - What brand and category will the agent decide to drink?



What drink will an agent choose in a certain occasion?
Agent's choice of drink is likely to be influenced by the occasion, temperature and other influencers like price, promotion, brand image, etc.

Sample Results



Mu Sigma

We made some assumption and business rules as we developed our simulation

Only **population** in the legal drinking age is considered for the model

Occasion to **activity** is done based on **heuristics** and rules

Only **off premise** and **offline sales** are considered in the model

Holiday calendar is applied **nationally**. Regional holidays are not considered

Mean temperature of a day is considered **constant** across a **state**

Every person is assumed to consume the **similar unit** measure of alcohol when there is a **trigger** to drink

Price of a brand is derived from the **revenue** generated and **units** sold

Simulation Results

What if population growth continues at ~2% PA driven by cap cities with a 50/50 mix of organic to immigration?

Population growth simulation results

Summary

Customer Demographics

- Age and Gender impact the choice of drink category
- Income, Ethnicity do not have a significant impact
  - *Hypothesis: Since Kantar (and other available sources) do not provide category choice across ethnicity, variance might not captured by the model*

Region

- Tasmania and Northern territory show higher percentage share of Whiskey Scotch compares to other states
- South Australia and Western Australia show a lower share of Gin
- Wine has a higher category share in cities while Whiskey Scotch and Rum are more preferred in regional areas

Key Learnings

Analyzing impact of Customer demographics

- Incorporating metrics that measure relation between ethnicity and drink choice can highlight causal relation between the two
- Granular ethnicity information might provide variation in choice of drink

Time Trend

- Exhaustive exploratory analysis on the key trends should be performed to identify and include the drivers in the model
  - *Example: Detailed analysis of what drives (peer influence, brand talkability, likeability, etc.) choice of Gin should be studied over time*

Simulation Results

-What if population growth is significantly driven by immigrants and student groups?

-Connect the dots between volume and ethnicity mix

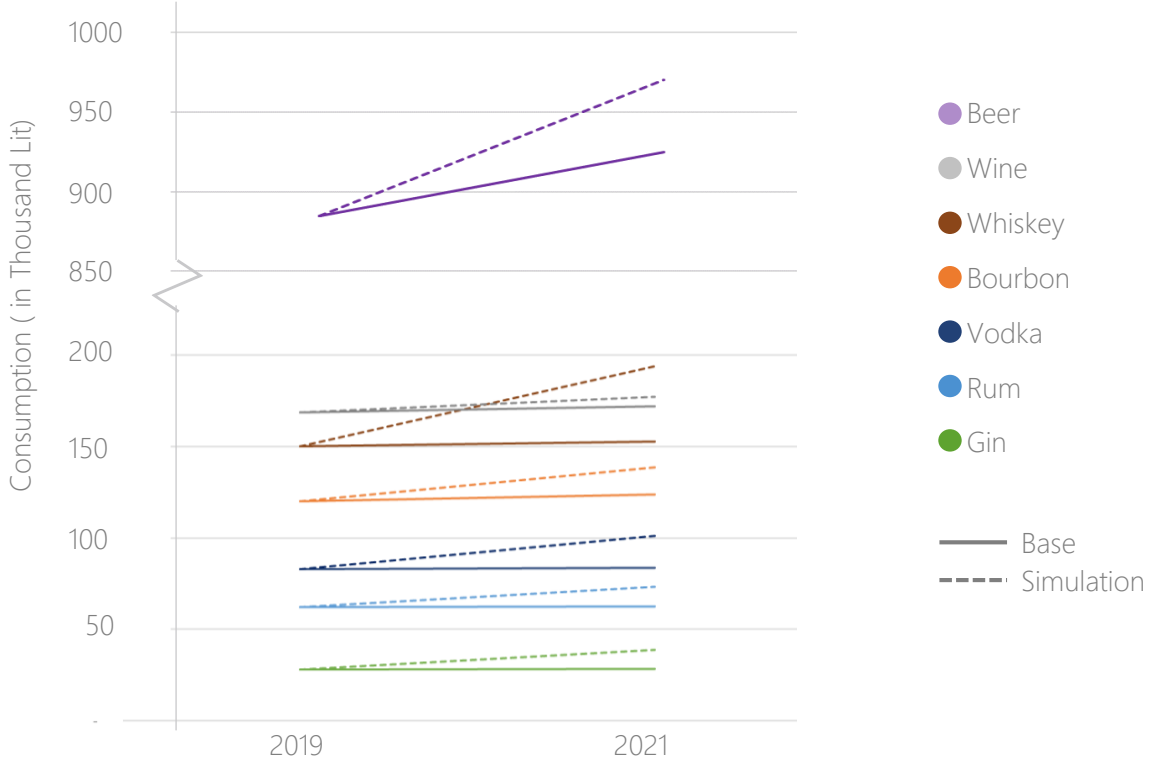
Impact of population growth driven by students

DRIVER

15% of the population constitutes of STUDENTS

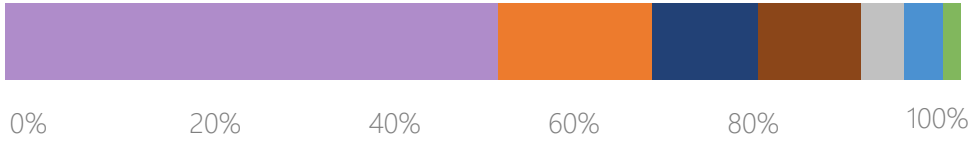
▲ 8% Baseline

OBSERVATIONS

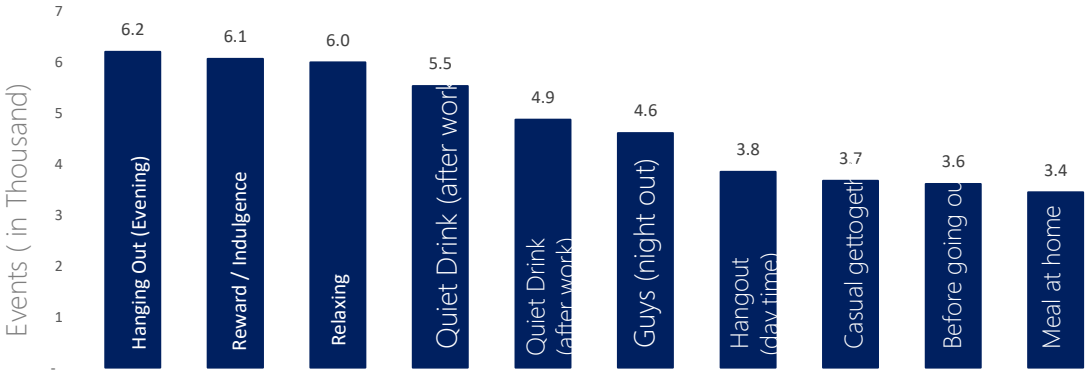


FINDINGS

TOP CATEGORIES (for students in thousand lit)



TOP OCCASIONS



10% of the sale in Bourbon and Vodka is contributed by students, who contribute for 5% of the total liquor consumption

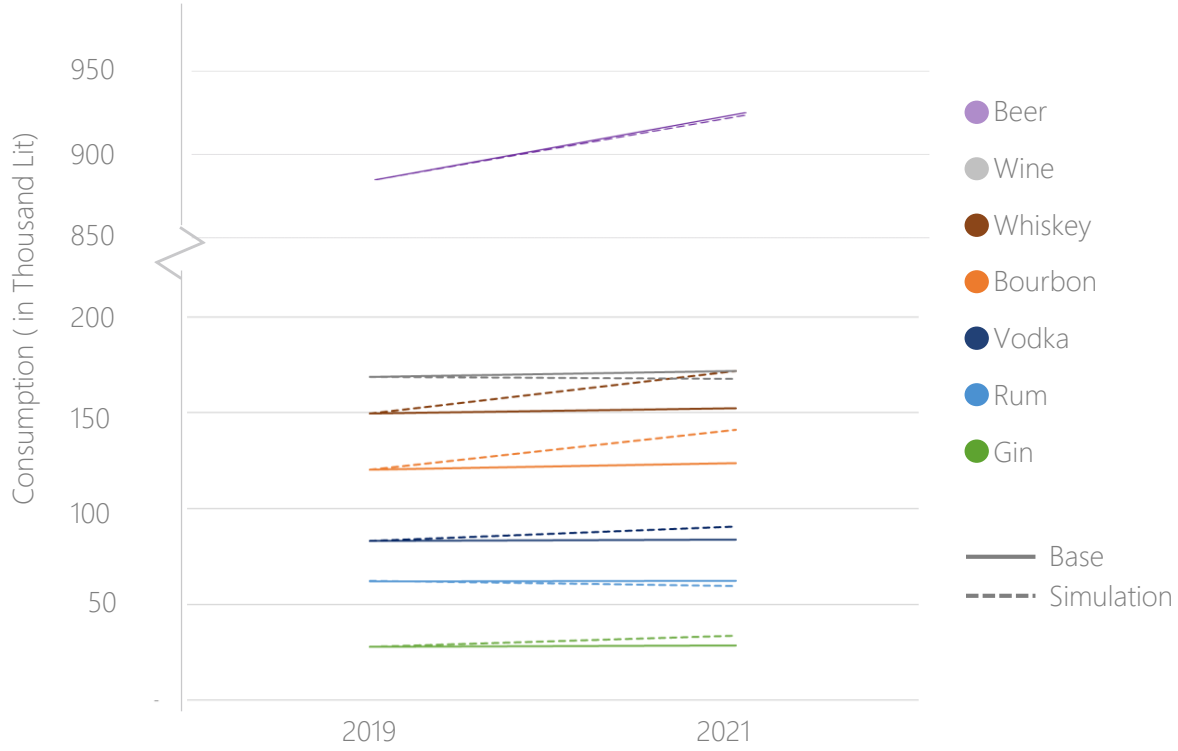
Impact of population growth driven by Indian immigrants

DRIVER

6% of the population constitutes of **INDIANS**

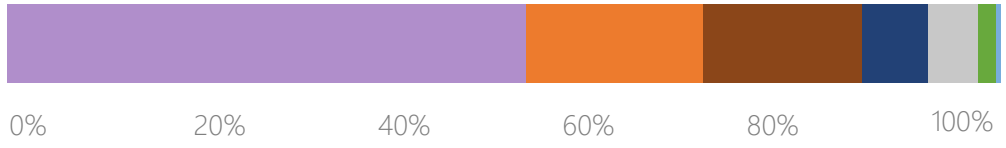
▲ 3% Baseline

OBSERVATIONS

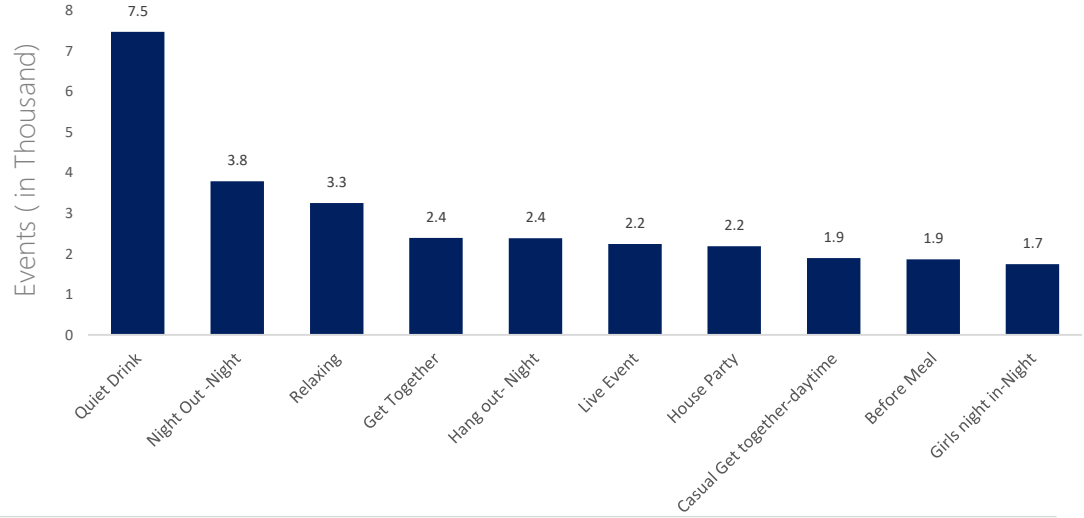


FINDINGS

TOP CATEGORIES (for Indians in thousand lit)



TOP OCCASIONS (for Indians)



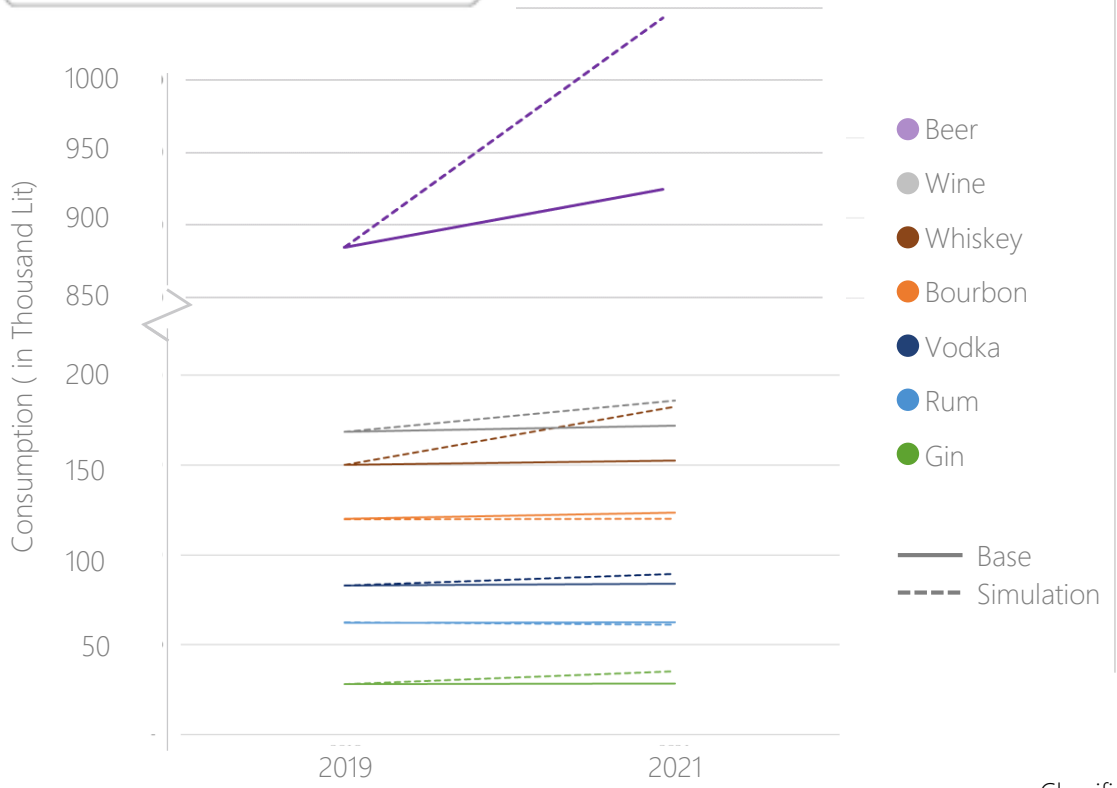
Impact of population growth driven by Chinese immigrants

DRIVER

16% of the population constitutes of **CHINESE**

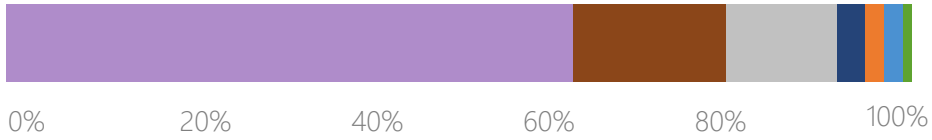
▲ 10% Baseline

OBSERVATIONS

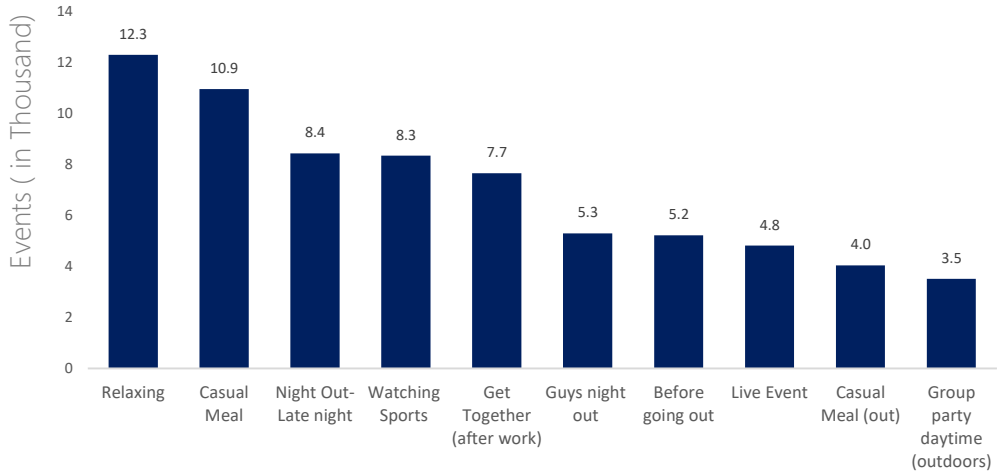


FINDINGS

TOP CATEGORIES (for Chinese in thousand lit)



TOP OCCASIONS (for Chinese)



Simulation Results

What if 30% of evening & night occasions cease to exist with a further 30% shifting to afternoon?

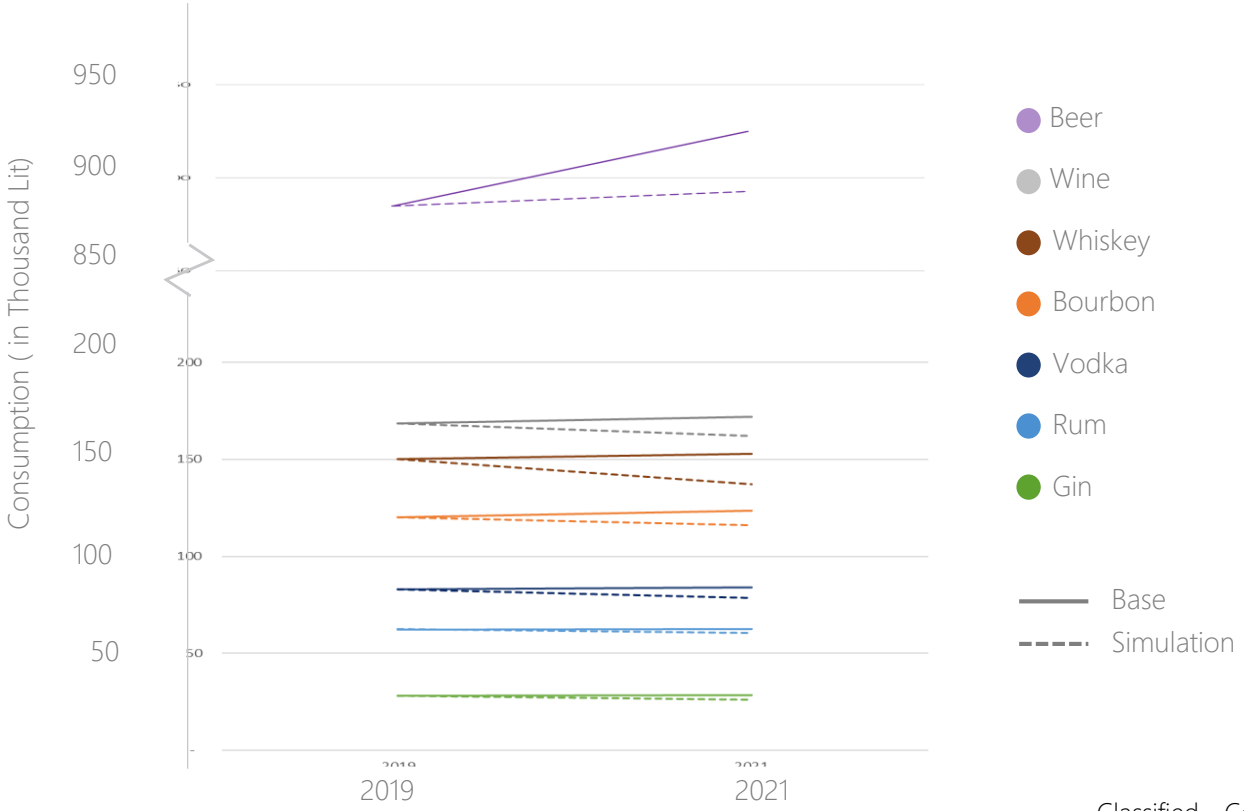
Impact of shift in occasions across day parts

DRIVER

30% decline in NIGHT OCCASIONS

3% Baseline

OBSERVATIONS



FINDINGS

IMPACT BY EACH PART OF DAY

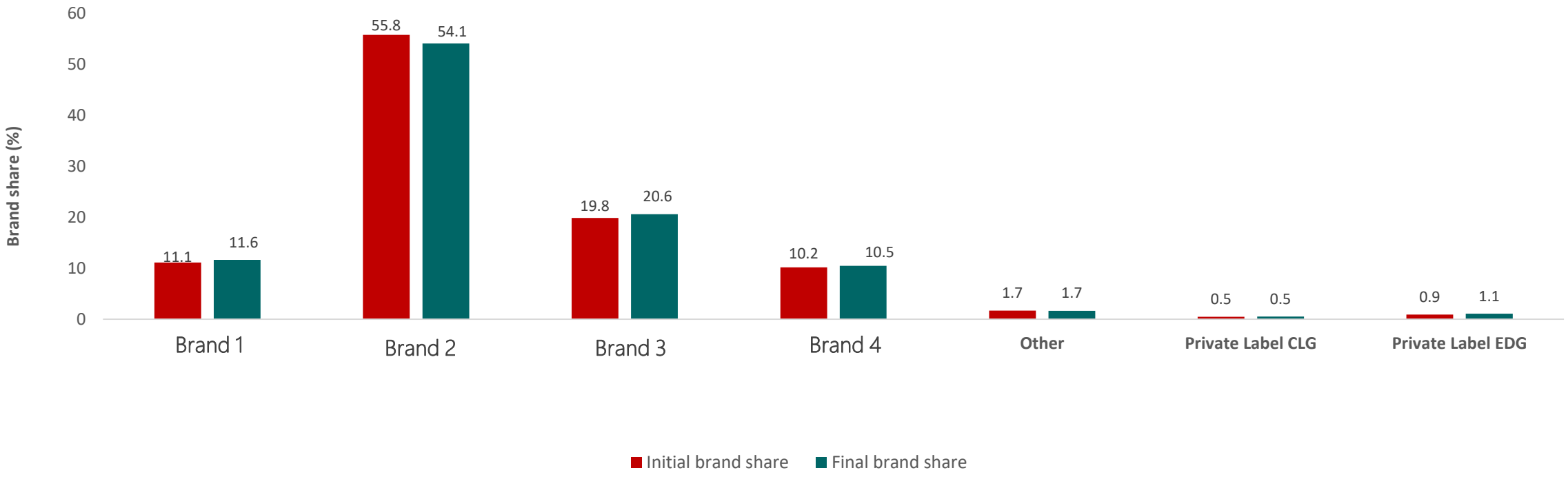
	Alcohol Consumption (in lts)	
	Base simulation	Shift in occasions
Morning	63,607	63,607
Early afternoon ↑	125,636	163,388
Late afternoon ↑	159,520	207,454
Early evening	665,165	665,165
Late evening ↓	424,023	297,067
Night ↓	110,341	76,798

- Evening & night events tend to have higher volume of alcohol consumption resulting in overall vol. drop
- Spirits have the maximum decline since they are driven by events like parties and night outs

Simulation Results

What if a new brand's penetration declines trail by 2%

Impact of decline in the new brand's market share



Callouts

- Drop in the new brand's (Brand 2) share is taken up by our brand (Brand 3)
- Brand 1 (0.5%) and Brand 4 (0.3%) also see an increase in market share with drop in Bundaberg's market share