Starbucks Price Multiplier Analysis

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Our Team

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Problem Statement

Different Customer may have different sensitivity to price

1% price differential can increase profits by millions

Find the best price multiplier for each Starbucks store by zip code

Data

Transactional Data

Zip Code	Time	Product	Quantity	Price	Sales	Redeem	Coupon
90010	08/01/2018	Latte	1	$5	$5	0	0

- Historical price changes for each menu item in a store (2 Years)

Data on Past Promotion

- Coupon
- Starbuck Reward Redeem

Data on Competitors

Inventory & Supply Data

Geographical Location Data

- Demographic
- Psychographic

Assumptions & Constraints

Assumptions

1. All goods are normal goods
2. No extreme condition
3. Purchasing Basket for each zip code is relatively constant
4. Demand Curve is straight line

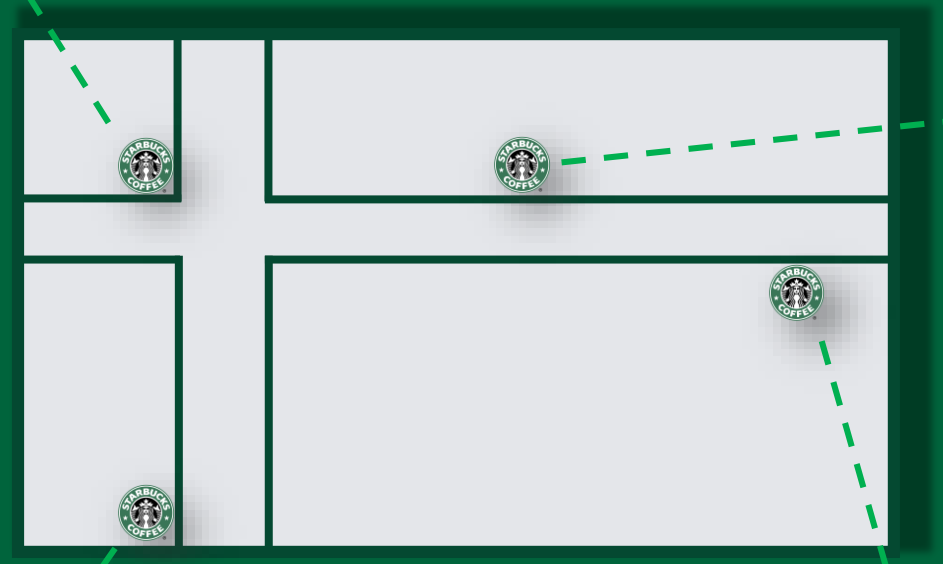
Constraints

1. Quantity less or equal to the capacity of the store
2. Non-zero and non-negative
3. Quantity is an Integer

Model

$$Weighted\ Average\ Price = \sum Price \times \frac{Quantity}{Total\ Quantity}$$

Zip Code	Time	Product	Quantity	Price	Sales	Redeem	Coupon
90010	08/01/2018	Latte	1	$5	$5	0	0



Fill In the missing value with median value of the zip code if there are stores with insufficient data

Zip Code	Time	Product	Quantity	Price	Sales	Redeem	Coupon
90010	08/01/2018	Latte	1	$5	$5	0	0

Zip Code	Time	Product	Quantity	Price	Sales	Redeem	Coupon
90010	08/01/2018	Latte	1	$5	$5	0	0

Modeling

$$Quantity = f(WAP)$$
$$= \beta 0 + \beta 1\, x\, WAP + \beta 2\, x\, Average\ Competitor\ Price$$
$$+ \beta 3\, x\, Age + \beta 4\, x\, population\ density + \beta 5 x\, Urban$$
$$+ \beta 6\, x\, Net\ Income + \beta 7\, x\, Advertisement\ Expense$$
$$+ \beta 8\, x\, Interest\ Rate + \beta 9\, x\, CPI + \beta 10\, x\, Education$$
$$+ \beta 11\, x\, Coupon\ Usage$$
$$+ \beta 12\, x\, Starbucks\ rewards\ redeem + \ldots$$

For each zip-code, we calculate:

$Quantity = f(WAP)$ = β1 x WAP + Constant *

* For the same zip-code, the data for these additional variables do not change. This is a Quantity function for each zip code, the constant will vary base on zip code.

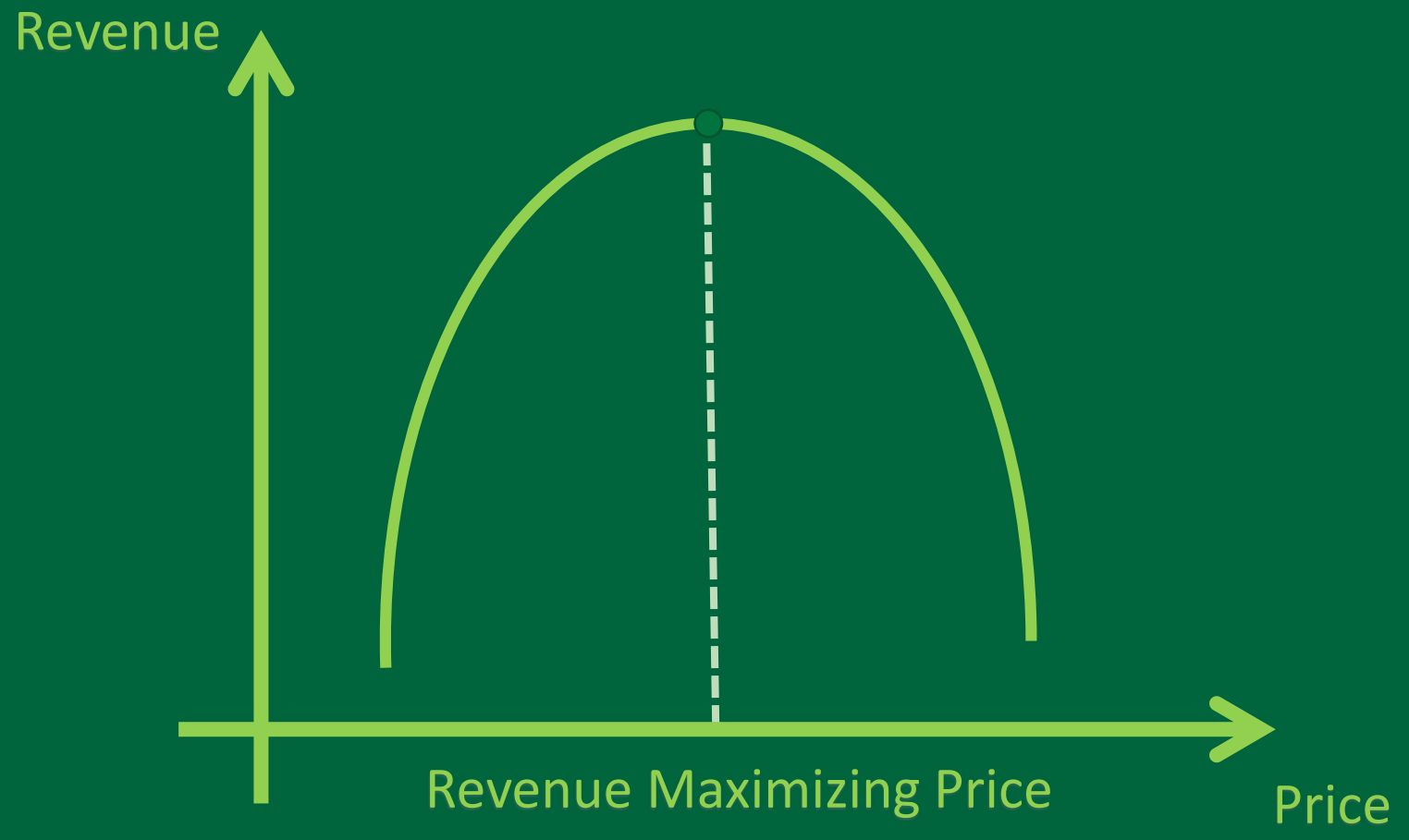
Revenue Function

- Revenue = Weighted Average Price (WAP) x Quantity

Modeling

Revenue

- Revenue = Weighted Average Price (WAP) x f(WAP)



Profit Maximization

Zip Code	Weighted Average Price	Revenue Maximization Price
90010	15.6	16.6
90011	16.2	15.4
90012	15.3	16.7
90013	15.5	15.5
…	…	…
98008	16.0	16.3
98009	14.8	17.6

$$Price\ Multiplier = \frac{Revenue\ Maximization\ Price}{Weighted\ Average\ Price}$$

Solution

List zip code with multiplier *

Zip Code	Multiplier
90010	1.01
90011	1.02
90012	0.98
90013	1
…	…
98008	1.03
98009	0.97

* Multipliers are normalized so that the average multiplier is 1

Future Work

More Factors

1. Drive Through
2. Traffic Condition

Data Collection Period

1. Weekly
2. Monthly

Non-Linear Model

1. More Flexibility
2. Uncertainty about the shape

Experimentation

1. Starbucks Rewards
2. Coupon

Thank You

Slide Changes after Presentation

- Slide 4
  - Added description on what data that needs to be collected (historical price changes)
  - Added a graph representation on how we collected the data of price changes
- Slide 6: Clarified the need to fill in missing values with median
- Slide 7: Clarified the reason why all the additional variables can be shortened to a constant
- Slide 10: Added additional step of normalizing model calculated multipliers