Estimating The Ideal Bottle Size

DATASCI 203: Lab 2
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Research Question

What bottle size will maximize the number of bottles sold

Data & Operationalization

- Kaggle: *Iowa Liquor Sales Jan 2021 - Jan 2022*
- Each row represents individual products purchased at the store level
- Key concepts: bottle characteristics and sales
- Independent variables:
  - Bottle volume in milliliters
  - Bottle price
  - Bottes per pack
  - Liquor type (Vodka, Whiskey, etc.)
- Dependent variable:
  - Number of bottles sold
- Around 2,500 unique products makeups

https://www.ascert.biz/what-is-alcohol/

Modeling and Results

- Exploratory plots for linearity
- Transformation through log on y-variable
- Interaction term
- Progression of regression modeling
- Statistical Significance and Robust Standard Error
- Testing regression for Practical Significance

Table 1: Estimated Bottle Sales Regressions

	Output Variable: number of bottles sold		
	(1)	(2)	(3)
bottle vol ml	0.001***	0.002***	0.001***
	(0.0001)	(0.0001)	(0.0001)
bottle price		−0.04***	−0.01***
		(0.003)	(0.003)
bottles per pack		0.18***	0.16***
		(0.01)	(0.01)
Category-Distilled Specialty			−0.61**
			(0.25)
Category-Special Orders			−2.12***
			(0.20)
Category-Vodka			0.56**
			(0.24)
Interaction-dollars per ml			−0.69***
			(0.04)
Constant	5.74***	4.41***	4.82***
	(0.14)	(0.27)	(0.31)
Observations	2,484	2,484	2,484
Adjusted R^2	0.02	0.22	0.47
Residual Std. Error	2.66 (df = 2482)	2.37 (df = 2480)	1.96 (df = 2469)

Note: HC_1 robust standard errors in parentheses. Additional features that have been removed from the stargazer output are the following liquor types: Cocktail, Gin, Liqueur, Whiskey, Temp and Specialty, Rum, and Tequila.

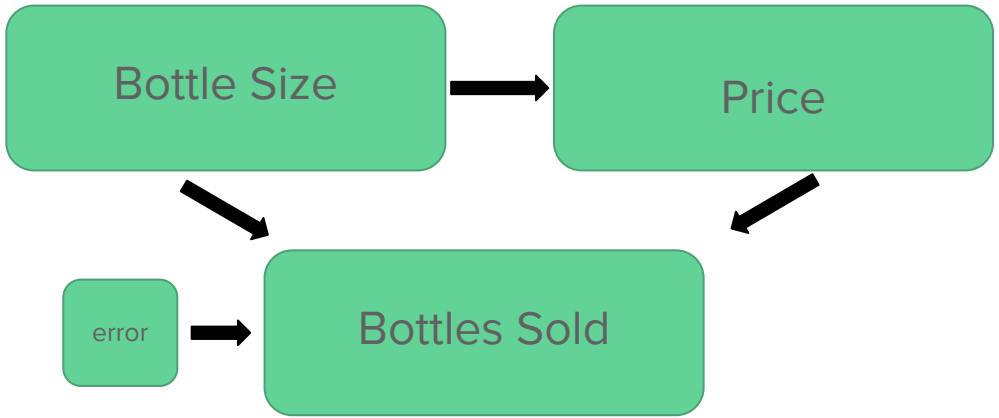
Limitations

- IID
- Unique BLP
- Omitted Variable
- Variable on Right Hand Side

Omitted Variable Bias:

$$\hat{Bottles\ Sold} = \tilde{\beta}_0 + \tilde{\beta}_1 Bottle\ Size;\ Omitted : \%ABV$$

Outcome Variable on Right Hand Side



Conclusion

- Our study estimates the number of bottles sold based on different bottle characteristics
- Maximum practical difference in volume is between 100 ml to 1,750 ml – does not result in a practical increase in bottles sold
- Future research – recode bottle volume variable to binary indicator

https://www.cracked.com/blog/fan-theory-wile-e.-coyote-has-inexhaustible-clone-army

Thank You!