$$\frac{\text{change in utility}}{\text{change in price of } p_j}$$

$$U_j = \alpha \cdot p_j + \beta' \cdot x_j$$

$$\frac{\text{change in utility}}{\text{change in } \cancel{\text{price}} \text{ attribute}}$$

$$\beta' = [\beta_1, \beta_2 \dots \beta_n]$$ for each non-price attribute

$$\text{Willingness to pay} = \frac{-\beta'}{\alpha} = \left[\frac{-\beta_1}{\alpha}, \frac{-\beta_2}{\alpha} \dots \frac{-\beta_n}{\alpha}\right]$$

$$= \frac{\cancel{\text{change in utility}}}{\text{change in } \cancel{\text{price}} \text{ attribute}}$$

αx_j

x_j

$$\frac{\cancel{\text{change in utility}}}{\text{change in price}}$$

$$= -\frac{\text{change in attribute}}{\text{change in price}}$$

$$\cancel{= \frac{\beta'}{\alpha} \cdot x_j}$$

Utility Models

Preference model: $U_j = \alpha p_j + \beta' x_j$
where U_j is an abstract quantity for level of preference

Willingness to pay model:
$U_j = \alpha (p_j - \omega x_j)$
where U_j is in a currency ($)

le to ship your order in its
ur order will be shipped

concerns regarding
ns pharmacist is always
u during normal
-800-934-4797
30am to 9:00pm, Saturday
unday 8:30am to 5:00pm

$w = \frac{\beta'}{\alpha}$ $\quad p =$ vaccinat

$\lambda = -\alpha$

$u_j = \alpha p_j + \beta x_j$

$= \alpha p_j + \frac{\beta'}{\alpha} a x_j \quad \log\left(\frac{p}{1-p}\right)$

$= \alpha p_j + \lambda a x_j$

$= \alpha p_j - w a x_j$

$= -\lambda p_j + w \lambda x_j$

$= \lambda (w x_j - p_j)$

M

ice

currency ($)

Market share predictions

Deriving $P_j = \frac{e^{V_j}}{e^{V_1} + e^{V_2} + \dots e^{V_K}}$

n attributes, j alternatives

- Define the market

$$X = \begin{bmatrix} X_{11} & \dots & X_{1n} \\ \vdots & & \\ X_{j1} & \dots & X_{jn} \end{bmatrix} \quad \beta^{)} = \begin{bmatrix} \beta_1 \\ \vdots \\ \beta_n \end{bmatrix}$$

- Multiply the matrices to develop utility models for each alternative

$$V = \begin{bmatrix} V_1 \\ \vdots \\ V_j \end{bmatrix} = X \text{ \%*\% } \beta^{)}$$

matrix multiplication in R

$$= \begin{bmatrix} X_{11}\beta_1 + \dots X_{1n}\beta_n \\ \vdots \\ X_{j1}\beta_1 + \dots X_{jn}\beta_n \end{bmatrix}$$

X %*% $\beta^{)}$

of e^V

Market share predictions (cont.)

$$= \frac{\text{change in attribute}}{\text{change in price}}$$

$u_j =$

Wher

Ma

Deriv

n

- Exponentiate

$$e^V = \begin{bmatrix} e^{V_1} \\ e^{V_2} \\ \vdots \\ e^{V_j} \end{bmatrix} = e \%*\% V$$

- Sum all values of e^V

$$Z = e^{V_k} + \dots e^{V_j}$$

- Compute p_j using e^{V_j} and sum of e^V

$$p_j = \frac{e^{V_j}}{Z}$$

~~Practice Question~~

WTP Simulation

$$w = \frac{\beta^j}{\alpha}$$

Table of Draws WTP

WTP	Att price	Att 1	Att 2 ...	Att n
1	α_1	β_1^1/α_1	β_1^2/α_1	β_1^n/α_1
2	α_2	β_2^1/α_2	β_2^2/α_2	β_2^n/α_2
⋮				
k	α_k	β_k^1/α_k	β_k^2/α_k	β_k^n/α_n

WTP Draws Matrix

$$\begin{bmatrix} w_{11} & w_{12} & \cdots & w_{1n} \\ \vdots & & & \vdots \\ w_{k1} & \cdots & \cdots & w_{kn} \end{bmatrix}$$