Choice Pricing Design Seminar

A Seminar to the Experimental Reading Group-
LEEPS – Economics Department

by

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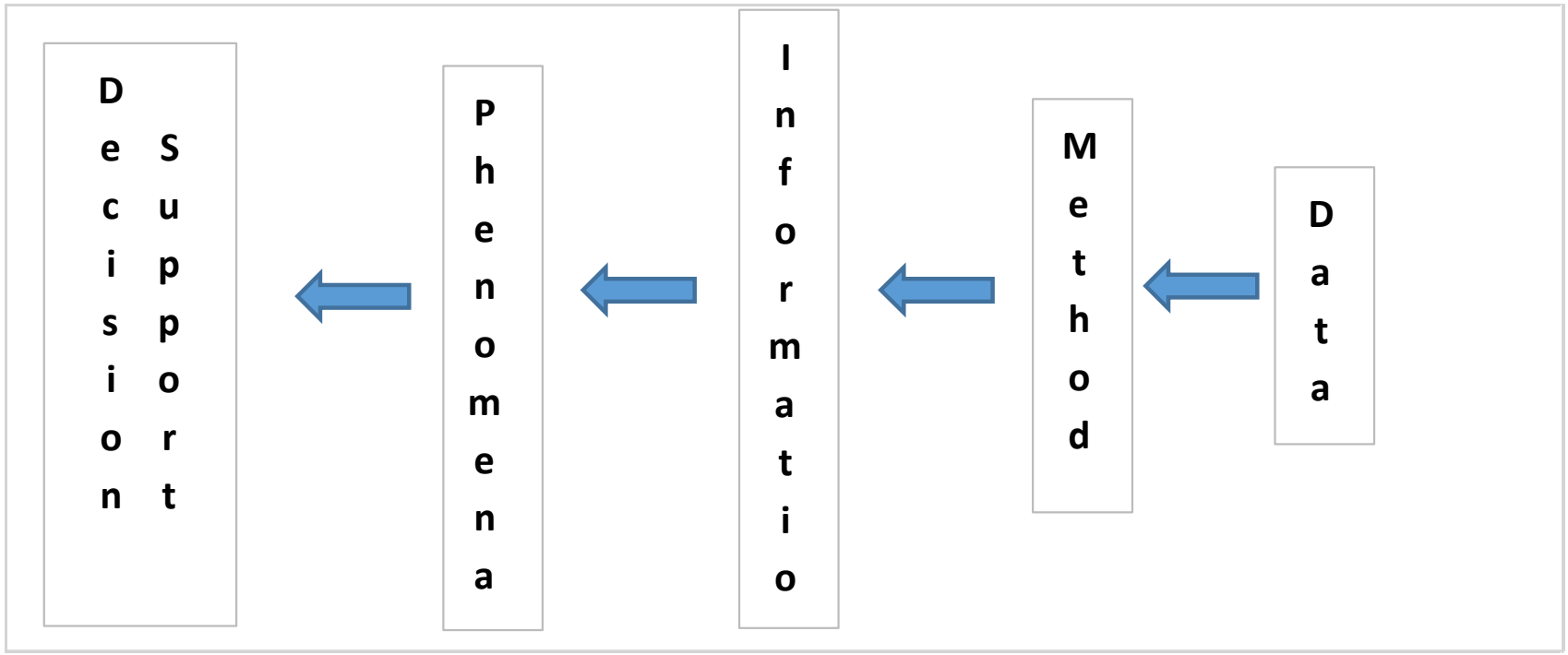
Agenda

- **Review the Principles of Experimental Design**
- **Economic Demand as a Phenomena**
- **Measuring Economic Demand**
- **Design Examples:**
  - **Complete Choice Modeling**
  - **Using Levers**
  - **Stimuli Displays**
  - **Hierarchical Choice**

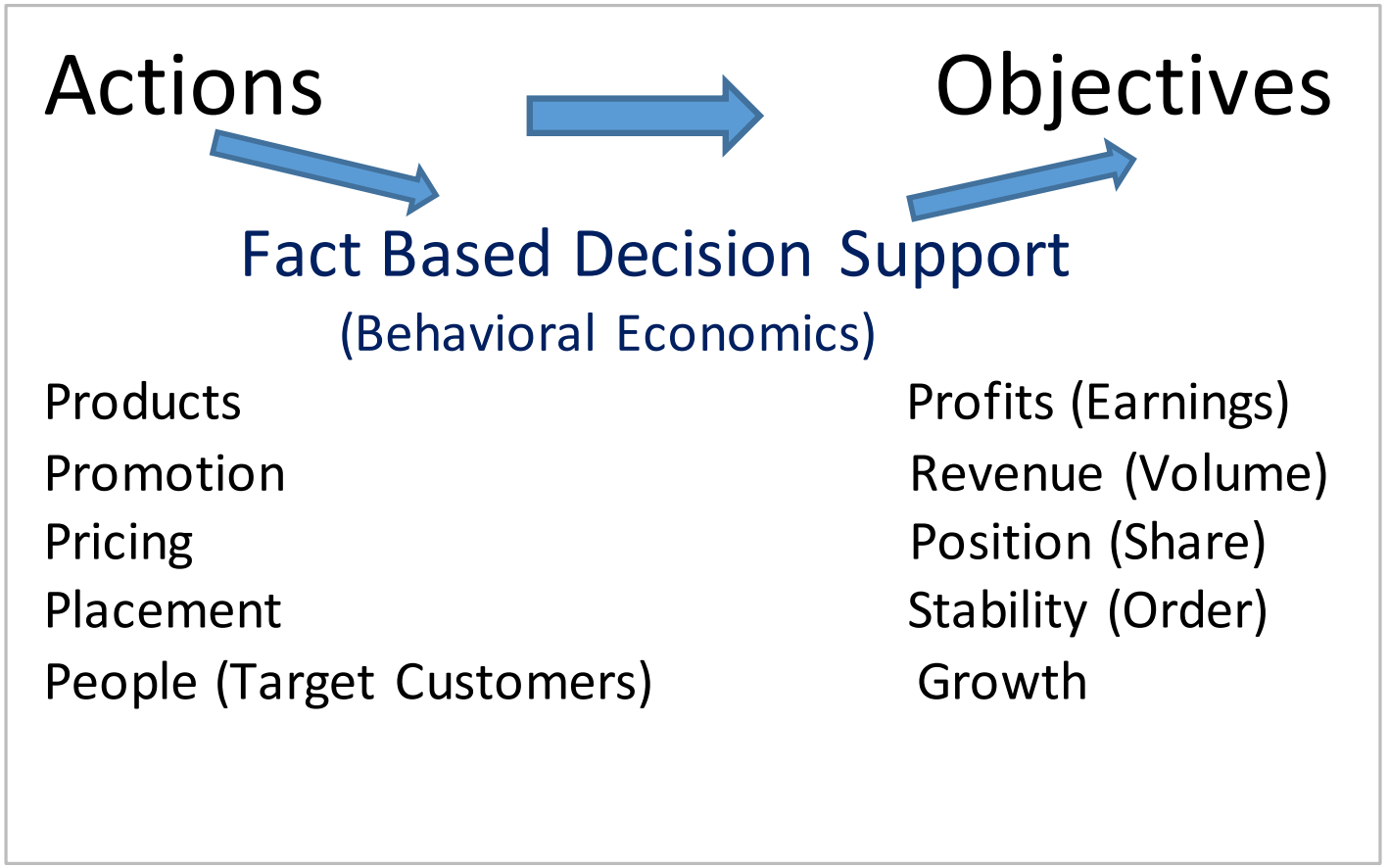
Take Away's

- The Results of the Research rests on the Quality of the Experimental Design
- Design Dictates the Analysis Model
- No Perfect Design
  - Always Balancing of Sources of Error
  - Highly Conditional
- Designing Experiments is a Creative Process
- It is Difficult and Requires Care

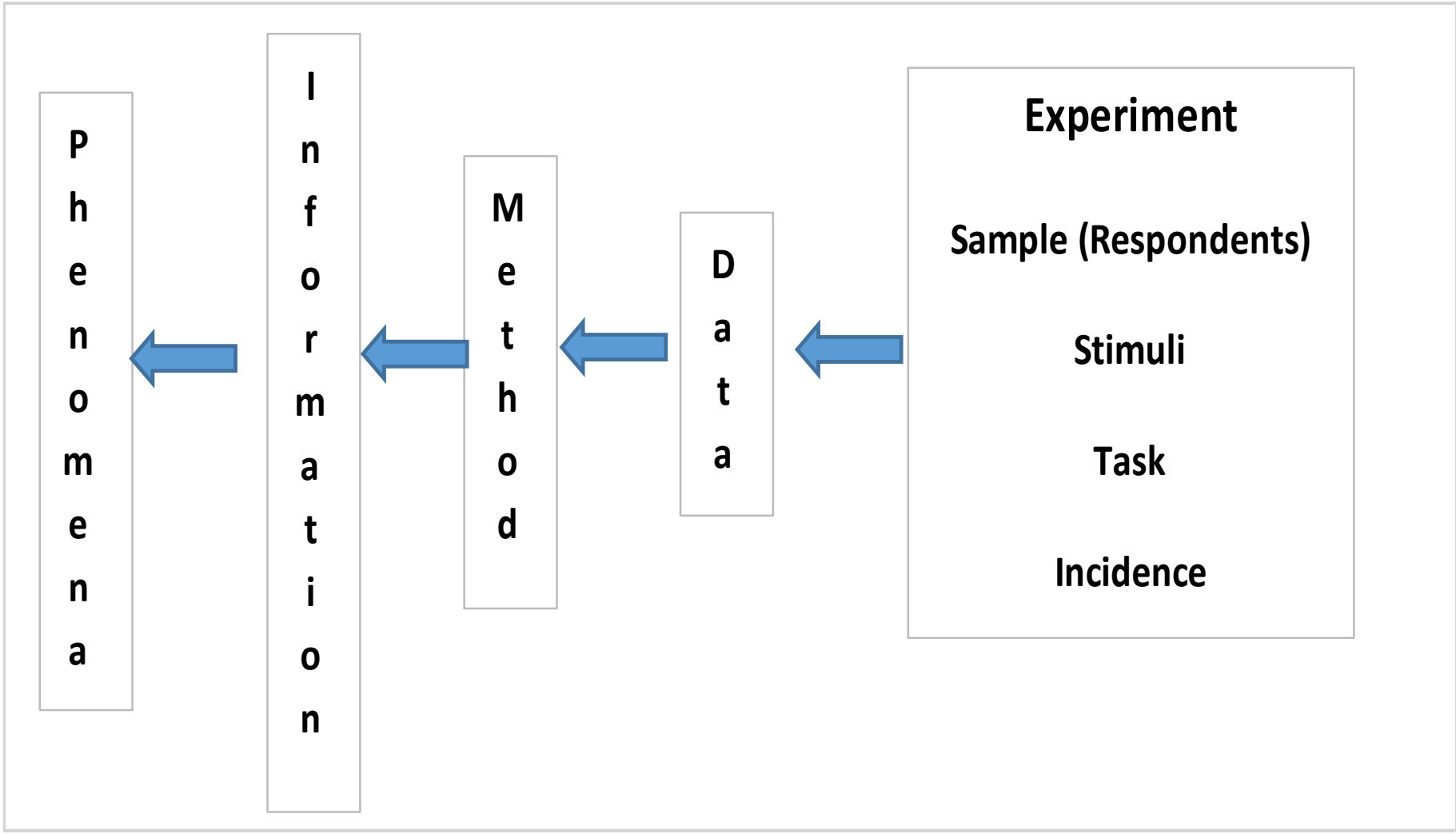
Experimental Design



Decision Support
Establishing Phenomena



Experimental Design



Experimental Design:
Determining the

- **Sample – Categorized Respondents**
- **Stimuli – Sets the Situation and Conditions**
- **Task – Particular Actions by the Respondents (Data)**
- **Incidence – Repeated Tasked for Varied Conditions**

- **Methods – The way we convert the data**

Variables (Stimuli & Respondents)

- Target Variables
  - Direct Estimation
  - Measured for/with Interactions
  - Measured with only Primary Effects
- Confounded Variables
  - Need to Reduce the Variables
  - Imposed Conditions
  - Indirect Measurement with Assumed Relationship
- Nuisance
  - “Unimportant”, Non-Drivers, Extralities
  - Handled Mainly by “Averaging”
  - Unfortunately, they come back and bite your

Reality Check

- Do we capture the Process (Is it real?)
  - Inclusion of Variables
  - Coverage of Variable Ranges
  - Coverage of Situations
- Is the Exercises Doable (without Undue Error)?
- Is the Situation Believable?
- Are the Results Meaningful?
  - Consistency of Instructions
  - Stability of Results
  - Independence of Outside Conditions

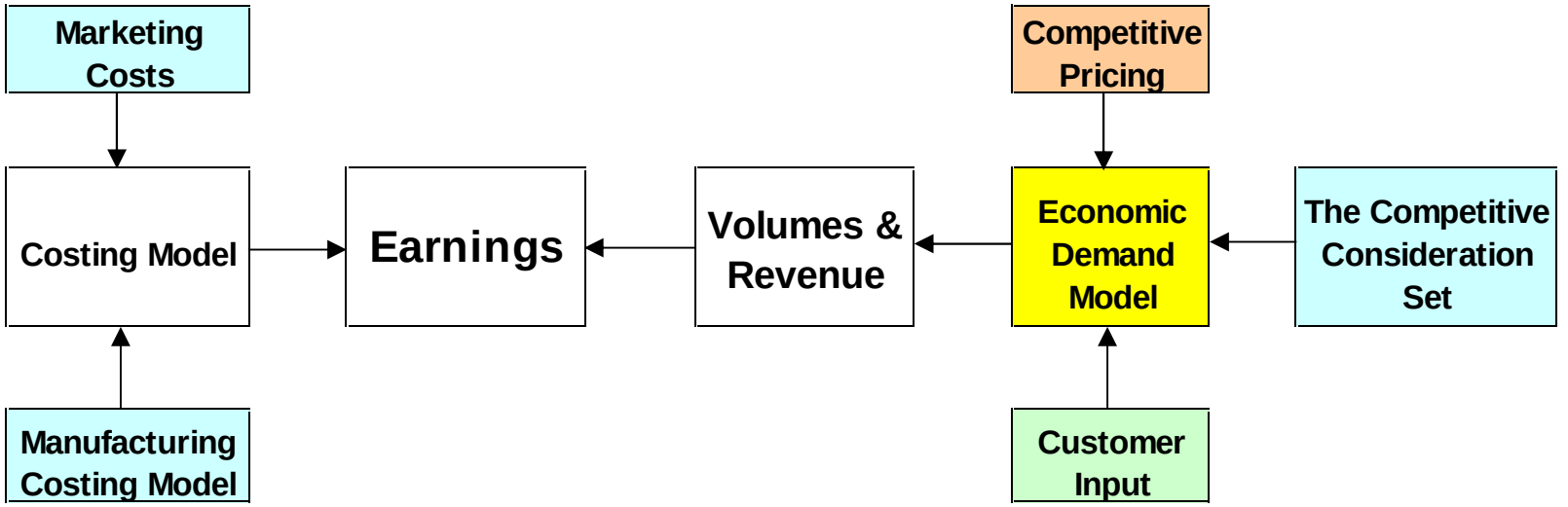
Experimental Considerations

- Coverage – Inclusion of Variables
- Range – of the Variables and Conditions
- Inherent Assumptions (Things Excluded)
- Response Aggregation
- Sensitivity of the Method (Fault Tolerance)
- Difficulty of the Method
- Efficiency of the Method
- Quality of Responses
- Flexibility – Ability to Modify Conditions with the Design
- Robustness – Ability to Handle Partial, Incomplete, and Inaccurate Data – Handling the Screw-ups
- Reproducibility – Ability to Argument the Data

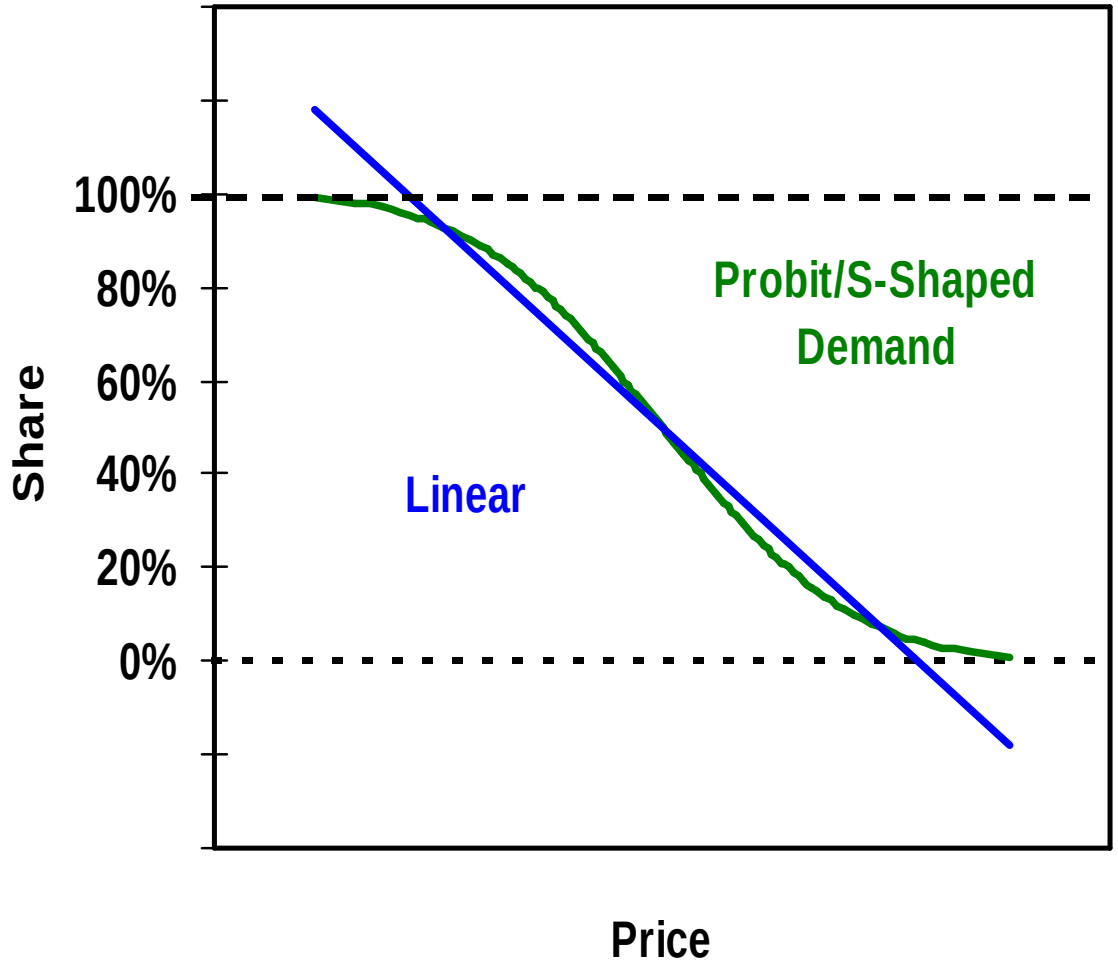
Quality & Validation

- Data Quality
  - Disengagement of Respondents (Straight-lining, randomization, speeding, inconsistency)
  - Projective Responses (Desirable Reactions)
  - Confused Responses and Gaming
  - Inappropriate Respondents
- Internal Validation (Consistency, Projective)
  - Method Comparisons
  - Internal Reference Testing (Hold-out Samples)
- External Validation (Predictive)
  - References and Standard
  - Problematic due to Scaling
- Face Validity
  - Simulating The Process
  - Context, Situation and Simplicity

Modeling the Market



Demand Curves and Functions



Modeling the Economic Demand

Linear Demand Function

$$Volume_a = {}_a + \alpha_{aa}P_a + \sum_{i \neq a}\{\alpha_{ai}P_i\}$$

$$Volume_a \geq 0$$

"S-Shaped" Demand Function

$$Share_a = Normal\ [\ f\ (\text{¢}_a + \phi_{aa}P_a + \sum_{i \neq a}\{\phi_{ai}P_i\})]$$

f = stochastic function (Gaussian, Logistics)

$$Volume_a = [\text{ƀ}_t + \sum_i\{\alpha t_{ti}P_i\}] \times Share_a$$ (t = total)

Coefficients: ${}_i\ \alpha_{ii}\ \ \delta_i\ \phi_{ii}$ estimated with regression

Test Variables: P_i (model levers)

Pricing Phenomena

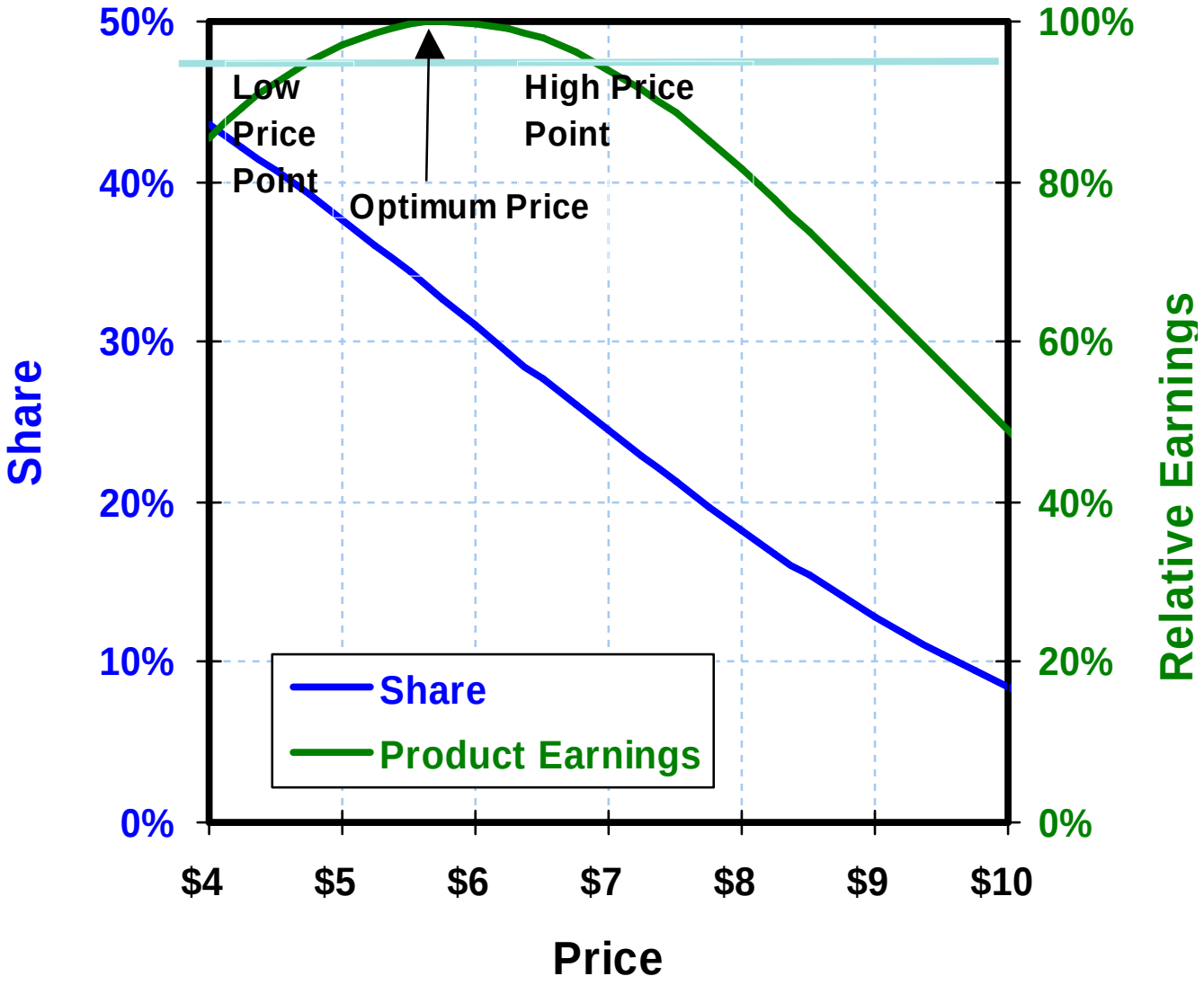
- Optimum Product Pricing (Maximizing Earnings)
- Joint Optimum Pricing (Multiple Products)
- Optimum Reseller Pricing (Sales Margin)
- Branding (Market Segmentation)
- Optimum Product Design
- Reaction of New Product Entry
- Optimum Stochastic Pricing

www.lieb.com/Documents/PRICING5.pdf

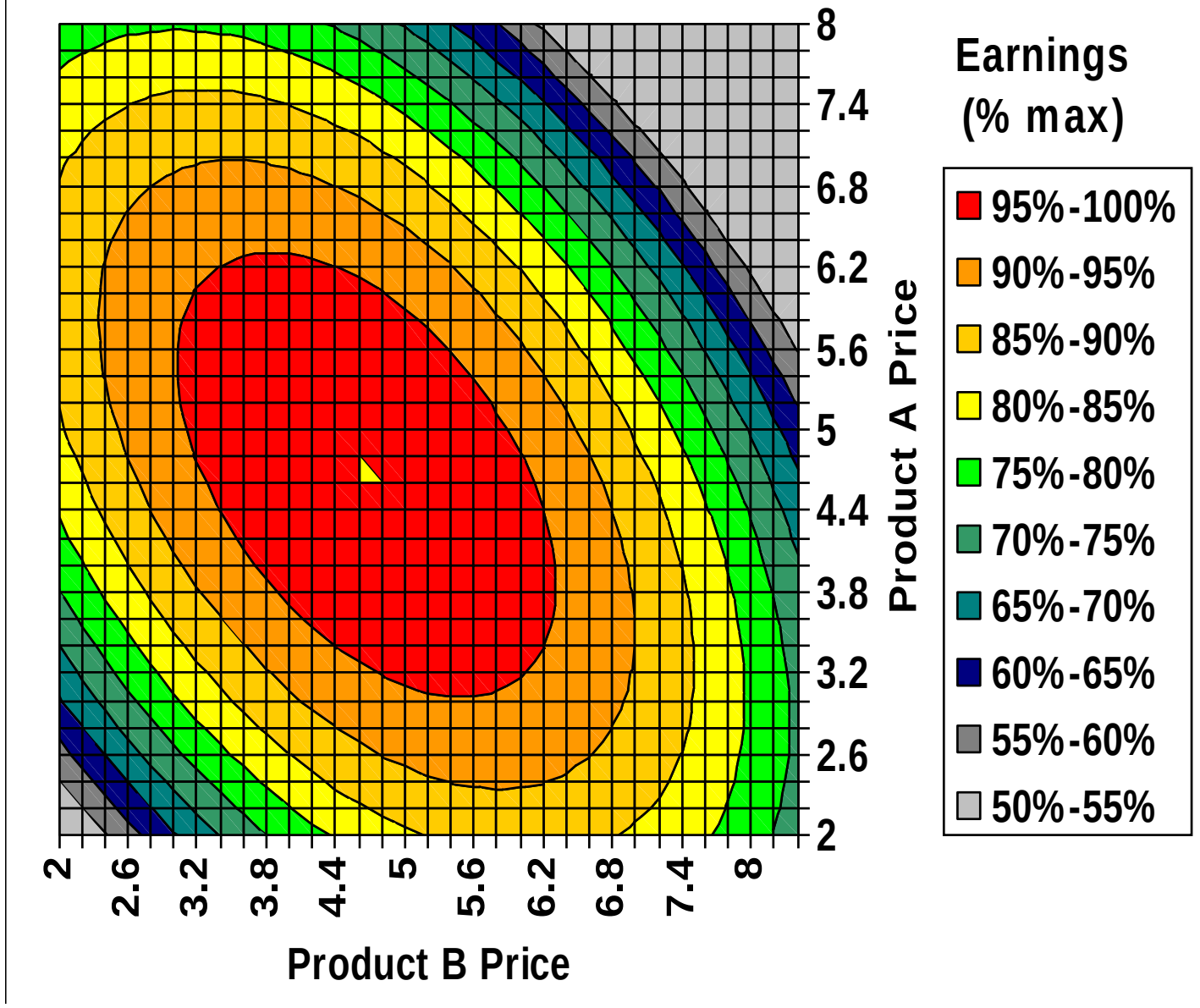
	New Price	Share		Standard Price
		Estimate	Previous	
Product A	$24.00	6.8%	0.0%	$24.00
Product B	$20.00	1.1%	0.0%	$20.00
Product C	$9.00	39.4%	37.9%	$9.00
Product D	$20.00	0.5%	0.6%	$20.00
Product E	$13.00	9.6%	13.6%	$13.00
Product F	$7.00	28.0%	28.8%	$7.00
Product G	$19.00	14.6%	19.1%	$19.00

	Cost	Earnings
Product A	$6.85	1.16
Product E	$5.00	0.77
Total		1.93

Single Product Price Optimization



Two Products Joint Pricing



Methods of Measuring Demand

- **Market Based**
  - Econometrics
  - Market Tests
- **Value Based** (www.lieb.com/Documents/PVALUE4.pdf)
  - Perceived Feature Value (Conjoint)
  - Profiling (Simalto, "Build-Your-Own"
  - Economic Value (Value-In-Use) (www.lieb.com/Documents/VALUE7.pdf)
- **Direct Measurement** (www.lieb.com/Documents/PRICING5.pdf)
  - Complete Choice Modeling
  - Concept Testing (Gabor – Grender, Van Westendorp)

Complete Choice Pricing

- Direct Measure of Demand
- Task: Respondents are asked "Intent to Purchase" (or volume of purchase) from a "Consideration Set" of Options at various prices
- Stimuli: Consideration Set and the designed Prices
- Incidence: Number of "Scenarios" at different Prices

- Fairly easy exercise for the Respondent (Efficient)

Study: Materials for Photovoltaic Cells

The Problem as Given:

- Measuring the choice of materials in the construction of Photovoltaic Cells
- Choice of four materials and the potential for Other.
- And there are a number of Respondent variables (or descriptors.

The Design:

- Three Materials will be Priced (the Fourth is Fixed)
- See Eight Scenarios of varying prices.

The Analysis:

- Regression by Groups of Respondents: 5 equations with three Dependent Variables

Study: Materials for Photovoltaic Cells

Option	Option 1	Option 2	Option 3	Option 4
Structure	**Rack-Mounted Traditonal Rigid Glass Module;**	Rack-Mounted Rigid low weight Module glass or film frontside	Rollabe PV affixes directly to substrate	Semiflex PV affixes directly to substrate
Current Use				
A	**$5.00**	**$8.00**	**$4.50**	**$6.79**
% Used				
B	**$5.00**	**$6.29**	**$5.16**	**$4.46**
% Used				
C	**$5.00**	**$4.57**	**$4.00**	**$7.64**
% Used				
D	**$5.00**	**$6.86**	**$5.66**	**$4.00**
% Used				
E	**$5.00**	**$4.00**	**$6.34**	**$6.40**
% Used				
F	**$5.00**	**$5.71**	**$6.88**	**$5.60**
% Used				
G	**$5.00**	**$5.14**	**$7.47**	**$5.12**
% Used				
H	**$5.00**	**$7.43**	**$8.00**	**$8.00**
% Used				

The Design

- Three Varying Priced Options – One Fixed Price
- Analysis will by Regression:
  - How many scenarios: (# Variables + 1) x 2

    (3 + 1) x 2 = 8 scenarios
  - Series have to be "Orthogonal"; Inter-correlations ~ 0 (< 1%)
  - Prices equally spaced
  - Range Target Prices ± 50%
- Orthogonal Designs by Brute-Force
  - Random Search for Initial Values
  - Solver on Excel to find optimum solutions (Max. Correlation)
- Volumetric (% used) or Discrete Responses

Design Considerations

- Meets the Method Requirements
  (Orthogonally, Spacing, and Sample)
- Meets the Phenomena Requirements
  (Disaggregated Data on the Respondent Level)
- Volumetric Data
- Simple Exercise
  - Quality Data
  - Efficiency – Note that this is one of five exercises in a Survey
- Face Validity
- Internal Test of Consistency (R^2)
- Flexible – Not very robust

Data Aggregation

- Data can be analyzed at the Respondent Level or Aggregated
  - If only single group aggregation is to be permitted, then the data is handled as whole
  - If groups of respondents are to be used, aggregation is done on demand for analysis
  - If an individual is required then analysis is down on the respondent Level
- Experimental Design allows for which type of Aggregation

Study: Networked Laser Printers

The Problem as Given:

- Measuring the choice of printers for Clustered Users (Small Businesses)
- Choice of nine printers and the potential for Other.
- And there are a number of Respondent variables.

The Design:

- Five Levers (Three Printers, Two Brand Variations)
- Twelve Scenarios of varying prices and Percentages.

The Analysis:

- Regression by Groups of Respondents: 10 equations with five Dependent Variables

Network Laser MFP Printers

US Version	Printer Manufacturer	Laser MFP (A) Canon	Laser MFP (CM2320fxi) HP	Laser MFP (x546DTN) Lexmark	Laser MFP (B) Canon	Laser MFP (CM3530) HP	Laser MFP (x738) Lexmark	Laser MFP © Canon	Laser MFP (CM4540) HP	Laser MFP (x792) Lexmark	Other
A	*Unit Price*	$1,449	$985	$1,384	$2,236	$1,891	$2,657	$4,985	$3,388	$4,760	
	Selection										
B	*Unit Price*	$1,563	$1,500	$1,515	$2,345	$2,881	$2,908	$4,203	$5,161	$5,211	
	Selection										
C	*Unit Price*	$938	$1,226	$1,301	$2,018	$2,353	$2,498	$5,270	$4,216	$4,476	
	Selection										
D	*Unit Price*	$1,506	$1,166	$1,165	$2,455	$2,239	$2,237	$3,381	$4,012	$4,008	
	Selection										
E	*Unit Price*	$994	$1,121	$1,017	$2,673	$2,152	$1,952	$4,003	$3,856	$3,498	
	Selection										
F	*Unit Price*	$1,165	$1,563	$1,199	$2,782	$3,000	$2,302	$4,397	$5,375	$4,124	
	Selection										
G	*Unit Price*	$1,108	$938	$1,563	$2,891	$1,800	$3,000	$3,567	$3,225	$5,375	
	Selection										
H	*Unit Price*	$1,335	$1,353	$971	$3,000	$2,597	$1,864	$4,499	$4,654	$3,340	
	Selection										
I	*Unit Price*	$1,222	$1,395	$1,398	$2,564	$2,678	$2,684	$5,375	$4,799	$4,809	
	Selection										
J	*Unit Price*	$1,392	$1,039	$1,119	$2,127	$1,996	$2,149	$4,806	$3,575	$3,851	
	Selection										
K	*Unit Price*	$1,051	$1,440	$1,432	$1,909	$2,766	$2,749	$3,225	$4,955	$4,924	
	Selection										
L	*Unit Price*	$1,278	$1,274	$938	$1,800	$2,447	$1,800	$3,890	$4,384	$3,225	
	Selection										

Network Laser MFP Printers

	Canon	Canon	Canon	HP	Lexmark
Set	Laser MFP (A)	Laser MFP (B)	Laser MFP ©		
A	$1,449	$2,236	$4,985	79%	111%
B	$1,563	$2,345	$4,203	120%	121%
C	$938	$2,018	$5,270	98%	104%
D	$1,506	$2,455	$3,381	93%	93%
E	$994	$2,673	$4,003	90%	81%
F	$1,165	$2,782	$4,397	125%	96%
G	$1,108	$2,891	$3,567	75%	125%
H	$1,335	$3,000	$4,499	108%	78%
I	$1,222	$2,564	$5,375	112%	112%
J	$1,392	$2,127	$4,806	83%	90%
K	$1,051	$1,909	$3,225	115%	115%
L	$1,278	$1,800	$3,890	102%	75%

Design Considerations

- Model is a linear combination of product prices, percentage representing OEM Sources
- Discrete Choice
- Analysis is dictated by the Design
- Meets the Method Requirements
- Meets the Phenomena Requirements
- More Complex Exercise
  - Quality Data ?
  - Efficiency ?
- Face Validity

Study: Grain Combines

The Problem as Given:

- Measuring the choice of Grain Combines by Growers and Processors
- Choice of twelve machines & the potential for Other.
- And there are a number of Respondent variables.

The Design:

- Seven Levers (One Price, Four Percent Power Prices, Two Brand Variations)
- Sixteen Scenarios of varying prices and Percentages.

The Analysis:

- Regression by Groups of Respondents: 13 equations with seven Dependent Variables

Study: Grain Combines

New Holland					John Deere					CASE					
85 HP	105 HP	125 HP	145 HP	165 HP	85 HP	105 HP	125 HP	145 HP	165 HP	85 HP	105 HP	125 HP	145 HP	165 HP	Ot
$51,000	$60,000	$65,000	$67,000	$74,000	$56,000	$67,000	$71,000	$74,000	$82,000	$53,000	$63,000	$67,000	$70,000	$77,000	
$64,000	$68,000	$70,000	$85,000	$101,000	$77,000	$82,000	$85,000	$101,000	$122,000	$63,000	$67,000	$69,000	$83,000	$100,000	
$59,000	$64,000	$69,000	$78,000	$78,000	$59,000	$64,000	$69,000	$78,000	$78,000	$51,000	$55,000	$59,000	$67,000	$67,000	
$60,000	$69,000	$80,000	$92,000	$99,000	$65,000	$75,000	$86,000	$99,000	$106,000	$64,000	$73,000	$84,000	$97,000	$104,000	
$58,000	$61,000	$71,000	$73,000	$78,000	$62,000	$66,000	$76,000	$78,000	$84,000	$57,000	$60,000	$69,000	$71,000	$77,000	
$55,000	$60,000	$72,000	$80,000	$86,000	$59,000	$64,000	$77,000	$86,000	$92,000	$59,000	$63,000	$76,000	$85,000	$91,000	
$69,000	$71,000	$83,000	$88,000	$104,000	$81,000	$84,000	$97,000	$104,000	$122,000	$67,000	$69,000	$80,000	$85,000	$100,000	
$66,000	$66,000	$68,000	$68,000	$72,000	$70,000	$70,000	$72,000	$72,000	$76,000	$70,000	$70,000	$72,000	$72,000	$76,000	
$57,000	$68,000	$73,000	$77,000	$91,000	$67,000	$80,000	$87,000	$91,000	$108,000	$57,000	$69,000	$74,000	$77,000	$92,000	
$68,000	$81,000	$88,000	$92,000	$92,000	$68,000	$81,000	$88,000	$92,000	$92,000	$71,000	$84,000	$91,000	$96,000	$96,000	
$52,000	$54,000	$57,000	$68,000	$72,000	$56,000	$57,000	$61,000	$72,000	$78,000	$60,000	$62,000	$65,000	$78,000	$83,000	
$59,000	$68,000	$70,000	$80,000	$84,000	$62,000	$71,000	$73,000	$84,000	$89,000	$50,000	$58,000	$59,000	$68,000	$71,000	
$56,000	$58,000	$58,000	$63,000	$71,000	$63,000	$66,000	$66,000	$71,000	$80,000	$57,000	$59,000	$59,000	$64,000	$72,000	
$68,000	$82,000	$90,000	$105,000	$120,000	$78,000	$94,000	$103,000	$120,000	$137,000	$72,000	$86,000	$95,000	$110,000	$126,000	
$55,000	$60,000	$70,000	$72,000	$87,000	$65,000	$72,000	$84,000	$87,000	$104,000	$50,000	$55,000	$64,000	$66,000	$79,000	
$61,000	$65,000	$78,000	$90,000	$96,000	$66,000	$70,000	$84,000	$96,000	$103,000	$59,000	$63,000	$76,000	$87,000	$93,000	

Study: Grain Combines

	85 HP	105 HP (%)	125 HP (%)	145 HP (%)	165 HP (%)	Deere (%)	CASE (%)
Set							
A	$51,000	118%	107%	104%	110%	104%	90%
B	$64,140	106%	104%	120%	120%	99%	90%
C	$59,100	108%	108%	113%	100%	86%	90%
D	$60,360	115%	115%	115%	108%	105%	94%
E	$58,200	105%	116%	103%	107%	98%	95%
F	$55,320	108%	120%	112%	107%	106%	98%
G	$69,000	103%	116%	107%	117%	97%	97%
H	$66,300	100%	102%	100%	106%	106%	99%
I	$56,760	119%	108%	105%	119%	101%	102%
J	$68,460	118%	109%	105%	100%	104%	103%
K	$52,260	103%	106%	119%	107%	115%	105%
L	$58,740	115%	103%	114%	105%	85%	108%
M	$56,040	104%	100%	108%	112%	102%	106%
N	$68,280	120%	110%	116%	114%	105%	105%
O	$54,600	110%	116%	104%	120%	91%	108%
P	$61,260	106%	120%	115%	107%	97%	110%

Design Considerations

- Model is a linear combination of a product price, percentage representing Power levels & percentages representing OEM Sources
- Discrete Choice
- Analysis is dictated by the Design
- Meets the Method Requirements
- Meets the Phenomena Requirements
- Much More Complex Exercise
  - Quality Data ?
  - Efficiency ?
- Face Validity

Study: Packaged Software

The Problem as Given:

- Measuring the choice of Software Grades, Source, Upgrade and Payment
- Choice of fourteen Options
- And there are a number of Respondent variables.

The Design:

- Twelve Levers (Two Prices, One Dollar Premium, and Nine Percentage Premiums)
- Twenty-Six Scenarios of varying prices and percentages.
- Split (Fragmented) Sampling

The Analysis:

- Regression by Groups of Respondents: 14 equations with twelve Dependent Variables

Study: Packaged Software

	Retail				Upgrade			Retail	OEM			Subscription (Monthly Charge)		
Set	Professional	SBE	Standard	Educational	Professional	SBE	Standard	StarOffice	Professional	SBE	Basic	Professional	SBE	Standard
A	$593	$557	$499	$150	$362	$343	$292	$41	$311	$260	$208	$12.55	$11.80	$10.57
B	$349	$347	$344	$103	$234	$234	$231	$26	$134	$133	$130	$18.64	$18.53	$18.37
C	$505	$485	$475	$182	$357	$349	$334	$52	$239	$234	$224	$10.53	$10.11	$9.89
D	$272	$263	$251	$113	$179	$178	$166	$60	$141	$136	$122	$6.97	$6.75	$6.43
E	$255	$191	$156	$49	$188	$181	$108	$79	$164	$145	$69	$5.71	$4.27	$3.50
F	$210	$158	$115	$48	$121	$107	$65	$76	$93	$75	$45	$8.15	$6.14	$4.48
G	$179	$172	$165	$60	$131	$130	$122	$48	$96	$86	$75	$5.43	$5.23	$5.03
H	$366	$357	$339	$138	$273	$268	$254	$67	$140	$136	$119	$11.31	$11.00	$10.46
I	$428	$380	$298	$103	$285	$266	$211	$67	$271	$205	$94	$13.14	$11.66	$9.14
J	$523	$501	$488	$190	$293	$290	$269	$38	$231	$221	$182	$25.93	$24.87	$24.23
K	$608	$549	$442	$191	$415	$375	$286	$50	$328	$299	$207	$30.13	$27.22	$21.91
L	$411	$358	$304	$135	$278	$268	$192	$70	$274	$217	$91	$11.56	$10.05	$8.53
M	$245	$175	$98	$32	$176	$136	$62	$39	$147	$116	$30	$7.00	$5.01	$2.79
N	$199	$163	$142	$58	$134	$128	$91	$26	$86	$71	$49	$7.98	$6.55	$5.71
O	$504	$405	$324	$132	$327	$315	$207	$19	$409	$345	$150	$10.51	$8.46	$6.76
P	$147	$113	$59	$22	$111	$99	$41	$35	$118	$97	$27	$4.96	$3.82	$1.98
Q	$531	$484	$456	$151	$345	$329	$303	$47	$254	$242	$171	$19.06	$17.37	$16.39
R	$361	$346	$324	$118	$225	$222	$205	$37	$139	$133	$103	$7.83	$7.50	$7.01
S	$417	$338	$284	$90	$253	$251	$174	$70	$237	$203	$117	$15.45	$12.52	$10.54
T	$487	$418	$317	$121	$299	$282	$198	$52	$335	$281	$151	$16.28	$13.99	$10.61
U	$239	$230	$221	$99	$140	$135	$127	$37	$113	$105	$91	$6.31	$6.05	$5.81
V	$292	$281	$270	$97	$177	$171	$159	$79	$138	$127	$103	$8.62	$8.30	$7.95
W	$382	$284	$228	$94	$262	$237	$169	$34	$237	$166	$73	$11.20	$8.34	$6.69
X	$141	$104	$66	$21	$82	$65	$38	$50	$123	$93	$33	$4.51	$3.32	$2.11
Y	$575	$523	$469	$180	$354	$350	$284	$64	$223	$196	$169	$14.83	$13.51	$12.12
Z	$567	$506	$461	$172	$414	$391	$339	$59	$362	$305	$221	$31.52	$28.10	$25.60

Study: Packaged Software

Set	Professional Premium($)	SBE Premium(%)	Standard Price($)	Education (%)	Professional Premium (%)	SBE Preimum (%)	Standard (%)	Star Office($)	Professional Premium (%)	Premium(%)	Basic (%)	Payback Time (years)
A	$94	62.5%	$499	30.0%	75.0%	74%	58%	$40.61	110%	50%	42%	3.94
B	$5	59.9%	$344	30.0%	71.6%	94%	67%	$25.67	82%	65%	38%	1.56
C	$30	35.0%	$475	38.3%	74.1%	65%	70%	$51.88	50%	68%	47%	4.00
D	$21	58.2%	$251	45.0%	59.0%	96%	66%	$60.48	90%	73%	49%	3.25
E	$99	35.0%	$156	31.5%	80.0%	91%	69%	$78.56	97%	81%	44%	3.72
F	$95	45.3%	$115	41.3%	59.3%	75%	56%	$75.80	50%	62%	39%	2.15
G	$13	50.6%	$165	36.6%	61.8%	88%	74%	$48.16	160%	52%	45%	2.74
H	$27	63.9%	$339	40.7%	67.6%	72%	75%	$67.09	76%	81%	35%	2.70
I	$130	63.0%	$298	34.7%	56.7%	75%	71%	$67.36	135%	63%	32%	2.72
J	$34	37.6%	$488	39.0%	70.3%	90%	55%	$38.40	145%	80%	37%	1.68
K	$166	64.6%	$442	43.2%	78.1%	69%	65%	$50.49	73%	76%	47%	1.68
L	$108	50.3%	$304	44.5%	79.7%	88%	63%	$70.30	170%	69%	30%	2.97
M	$147	52.6%	$98	33.2%	77.2%	65%	64%	$38.91	80%	74%	30%	2.91
N	$57	37.1%	$142	40.8%	75.7%	86%	64%	$26.09	64%	59%	35%	2.08
O	$180	45.2%	$324	40.9%	66.7%	90%	64%	$19.00	144%	75%	46%	4.00
P	$88	61.7%	$59	36.8%	80.0%	83%	69%	$35.07	103%	77%	46%	2.48
Q	$74	36.8%	$456	33.2%	55.8%	62%	66%	$46.72	112%	85%	38%	2.32
R	$38	59.7%	$324	36.3%	55.0%	82%	63%	$36.85	94%	85%	32%	3.85
S	$133	40.3%	$284	31.8%	60.1%	97%	61%	$70.07	90%	72%	41%	2.25
T	$169	59.7%	$317	38.0%	60.1%	83%	62%	$51.59	109%	71%	47%	2.49
U	$19	48.5%	$221	45.0%	66.0%	60%	58%	$36.59	118%	63%	41%	3.16
V	$23	52.6%	$270	36.1%	79.4%	67%	59%	$79.00	156%	67%	38%	2.83
W	$154	36.6%	$228	41.1%	60.5%	73%	74%	$34.25	107%	56%	32%	2.84
X	$75	50.3%	$66	32.3%	58.8%	63%	57%	$49.75	120%	66%	50%	2.61
Y	$105	51.4%	$469	38.4%	66.7%	94%	60%	$64.47	51%	50%	36%	3.23
Z	$107	42.2%	$461	37.2%	69.7%	70%	74%	$58.69	132%	60%	48%	1.50

Design Considerations

- Model is a linear combination of a product price, percentage representing Versions, Sources, Discounts, Competition, and Payment Methods
- Discrete Choice
- Analysis is dictated by the Design
- Split Population (Merge Aggregation)
- Meets the Phenomena Requirements
- Even More Complex Exercise
  - Quality Data ?
  - Efficiency ?
- Face Validity?

Study: Organizational Sales of Software

The Problem as Given:

- Measuring the choice of Purchase Deal by Type of Software and Payment
- Choice of eleven Options
- And there are a number of Respondent variables.

The Design:

- Nine Levers (One Prices, Eight Percentage Options)
- Sixteen Scenarios of varying prices and percentages showing quantity Discounts. (Less than Required)

The Analysis:

- Regression by Groups of Respondents: 9 equations with eleven Dependent Variables

Study: Organizational Sales of Software

		New 3D Price	Upgrade to 3D from Pro	Upgrade to 3D from Std	Current License	New Pro	Upgrade to Pro from Pro	Upgrade to Pro from Std	New Std	Upgrade to Std from Std	New Elements	Upgrade to Elements
A	1-4	$944	$254	$287	$189	$387	$112	$125	$58	$17	$39	$29
	5-49	$515	$139	$157	$103	$211	$61	$68	$32	$9		
	+50	$412	$111	$125	$82	$169	$49	$54	$25	$7		
B	1-4	$825	$289	$361	$166	$299	$69	$75	$187	$43	$39	$29
	5-49	$356	$125	$156	$72	$129	$30	$32	$81	$19		
	+50	$285	$100	$125	$57	$103	$24	$26	$64	$15		
C	1-4	$986	$310	$310	$197	$251	$85	$91	$111	$38	$39	$29
	5-49	$447	$140	$140	$89	$114	$39	$42	$50	$17		
	+50	$358	$112	$112	$72	$91	$31	$33	$40	$14		
D	1-4	$1,238	$402	$441	$271	$520	$201	$220	$254	$98	$39	$29
	5-49	$636	$207	$226	$139	$267	$103	$113	$130	$50		
	+50	$509	$165	$181	$111	$214	$82	$90	$104	$40		
E	1-4	$1,259	$334	$364	$281	$447	$122	$133	$183	$50	$39	$29
	5-49	$534	$141	$154	$119	$189	$52	$57	$78	$21		
	+50	$427	$113	$123	$95	$152	$42	$45	$62	$17		
F	1-4	$1,399	$432	$472	$336	$595	$221	$275	$182	$68	$39	$29
	5-49	$630	$195	$213	$151	$268	$100	$124	$82	$30		
	+50	$504	$156	$170	$121	$214	$80	$99	$65	$24		
G	1-4	$1,252	$357	$434	$297	$435	$137	$171	$348	$109	$39	$29
	5-49	$509	$145	$177	$121	$177	$56	$69	$142	$44		
	+50	$408	$116	$141	$97	$142	$44	$56	$113	$36		
H	1-4	$776	$194	$209	$192	$328	$106	$113	$230	$75	$39	$29
	5-49	$291	$73	$78	$72	$123	$40	$42	$86	$28		
	+50	$233	$58	$63	$58	$98	$32	$34	$69	$22		
I	1-4	$972	$266	$328	$252	$374	$79	$95	$134	$28	$39	$29
	5-49	$541	$148	$183	$140	$208	$44	$53	$75	$16		
	+50	$433	$119	$146	$112	$167	$35	$42	$60	$13		
J	1-4	$1,007	$277	$277	$265	$410	$87	$99	$320	$68	$39	$29
	5-49	$549	$151	$151	$145	$224	$47	$54	$175	$37		
	+50	$440	$121	$121	$116	$179	$38	$43	$140	$30		
K	1-4	$909	$315	$342	$249	$455	$99	$113	$89	$19	$39	$29
	5-49	$363	$126	$137	$99	$182	$40	$45	$35	$8		
	+50	$290	$100	$109	$80	$145	$32	$36	$28	$6		
L	1-4	$804	$259	$276	$235	$201	$62	$77	$86	$27	$39	$29
	5-49	$416	$134	$143	$121	$104	$32	$40	$45	$14		
	+50	$333	$107	$114	$97	$83	$26	$32	$36	$11		
M	1-4	$699	$203	$235	$196	$273	$109	$125	$91	$36	$39	$29
	5-49	$290	$84	$97	$81	$113	$45	$52	$38	$15		
	+50	$232	$67	$78	$65	$90	$36	$41	$30	$12		
N	1-4	$1,049	$347	$409	$290	$438	$173	$180	$339	$134	$39	$29
	5-49	$590	$195	$230	$163	$246	$98	$101	$191	$76		
	+50	$472	$156	$184	$130	$197	$78	$81	$153	$60		
O	1-4	$1,273	$341	$425	$369	$382	$123	$123	$107	$34	$39	$29
	5-49	$597	$160	$199	$173	$179	$58	$58	$50	$16		
	+50	$477	$128	$159	$138	$143	$46	$46	$40	$13		
P	1-4	$1,399	$456	$496	$420	$490	$98	$104	$255	$51	$39	$29
	5-49	$606	$198	$215	$182	$212	$42	$45	$110	$22		
	+50	$485	$158	$172	$145	$170	$34	$36	$88	$18		

Study: Organizational Sales of Software

Set	Lower Price	New 3D Price	Upgrade to 3D from Pro	Upgrade to 3D from Std	Current License	New Pro	Upgrade to Pro from Pro	Upgrade to Pro from Std	New Std
A	44%	$944	27%	113%	20%	41%	29%	111%	15%
B	35%	$825	35%	125%	20%	36%	23%	109%	62%
C	36%	$986	31%	100%	20%	26%	34%	107%	44%
D	41%	$1,238	33%	110%	22%	42%	39%	110%	49%
E	34%	$1,259	27%	109%	22%	36%	27%	109%	41%
F	36%	$1,399	31%	109%	24%	43%	37%	125%	31%
G	33%	$1,252	29%	122%	24%	35%	31%	125%	80%
H	30%	$776	25%	108%	25%	42%	32%	106%	70%
I	45%	$972	27%	123%	26%	39%	21%	121%	36%
J	44%	$1,007	28%	100%	26%	41%	21%	114%	78%
K	32%	$909	35%	109%	27%	50%	22%	115%	20%
L	41%	$804	32%	107%	29%	25%	31%	125%	43%
M	33%	$699	29%	116%	28%	39%	40%	115%	33%
N	45%	$1,049	33%	118%	28%	42%	40%	104%	77%
O	38%	$1,273	27%	125%	29%	30%	32%	100%	28%
P	35%	$1,399	33%	109%	30%	35%	20%	106%	52%

Design Considerations

- Model is a linear combination of a product price, percentage representing Versions, Sources, Discounts, and Payment Methods
- Discrete Choice
- Analysis is dictated by the Design
- Allow Disaggregation/ Respondent Level
- Reduced Incidences (Reduced DF)
- Complex Exercise
  - Quality Data ?
  - Efficiency ?
- Face Validity?

Hierarchical Choice Exercises Reduced Consideration Set

- Choice Exercise Usually Reflect a Single Consideration Set (Set of Completing/Interacting Options)
- However, if you allow for multiple ordered selections (1^{st}, 2^{nd}, 3^{rd}) choice, options can be removed for analysis.
- For three ordered choices per scenario, you can remove up to two options from the exercise and recomputed the selection.
- Starting with seven options, you can then represent 29 combinations: all, removing any one, and removing any two.

Take Away's

- The Results of the Research rests on the Quality of the Experimental Design
- Design Dictates the Analysis Model
- No Perfect Design
  - Always Balancing of Sources of Error
  - Highly Conditional
- Designing Experiments is a Creative Process
- It is Difficult and Requires Care