Wharton
University of Pennsylvania
ONLINE

Growth Strategies

Economic Value to the Customer

Jagmohan Raju, Joseph J. Aresty Professor of Marketing

Measuring Maximum Willingness to Pay

- What is the maximum a potential buyer may be willing to pay for a new product, a new idea, or a new service we are contemplating taking to the market?
- Economists often refer to this as estimating the “reservation price”
- The maximum willingness to pay may vary across customers and this variation often gets reflected in what we commonly refer to as the “demand function”
  - Is in many cases nothing but the plot of reservation prices from high to low

Measuring Maximum Willingness to Pay

- Three different approaches to estimating maximum willingness to pay
  - Each is useful in different settings, and often times we use more than one to triangulate and get more confidence in our business decisions

Economic Value to the Customer

- Economic value to the customer (EVC)
- Particularly useful in business to business settings where conducting surveys is not possible
- The main outcome we are looking for is when a costumer changes from one method of solving their problem (say one technology) to another, how much might they be willing to pay for the new technology

New Chemicals Mini-Case

- The question posed at the end of the case is “How much will Professor Raju be willing to pay for the new tablet?”
- Professor Raju will be willing to pay $220 plus the cost of his time for two hours
- Let us for the moment assume that my cost of time is zero, and let us say that is not an assumption, but a fact
- How did we arrive at $220?
  - Or in other words, what are the drivers of my willingness to pay?

New Chemicals Mini-Case

- The pool is 20,000 gallons

Draining water @$1/1000 gallons	$20
Refilling Water @$1/100 gallons	$200
Cost of 2 hours of time @$0/hour	$0
Total	$220

- We are trying to get an estimate of how much it costs to do the job today, using the old method

New Chemicals Mini-Case

- If the company were to go to Professor Raju and say the tablet is priced at $220, and if it has done its calculations carefully, Professor Raju will say I am ECONOMICALLY INDIFFERENT between the old technology and the new technology
- This is how we define economic value to the customer, or EVC
  - The price of the new technology at which the customer is indifferent between the old and the new technology

New Chemicals Mini-Case

- The computation of EVC requires making assumptions as do all decisions
  - But it gives us a useful benchmark — what is the maximum someone will be willing to pay for a new idea or a new technology
- This methodology and approach also helps answer other important questions
  - Who will be willing to pay more than $220?
  - Who will be willing to pay less than $220?
- We are trying to assess drivers of economic value so we may be able to segment the market and decide who will be the buyers who are most attracted to our product or service

New Chemicals Mini-Case

What might be these drivers of economic value?

- The size of the pool
  - How will you know who has a bigger pool and who has a smaller pool?
  - Any driver of willingness to pay that is actionable should be observable to the seller
- Customers who are environmentally conscious will be willing to pay more
  - How will you know who is more environmentally conscious than the other?

New Chemicals Mini-Case

What might be these drivers of economic value?

- Geographic segmentation
  - Some counties or townships may charge more for water disposal or fresh water
  - In those counties, people with the same pool size relative to another county will be willing to pay more
- Value of time
  - Those with higher value of time may be willing to pay more
  - How would you know who has a higher value of time — is the size of their home an indicator?

Economic Value to the Customer (EVC)

- Does not just give you a number, but also gives you an idea about how that number might vary across customers
- Gives us an idea of who our true competition is

Summary

- Economic value to the customer (EVC) gives us an estimate of willingness to pay
- This information is useful in setting prices
- Differences in willingness to pay across buyers helps determine who to go after and who not to go after
- Combining economic value to the customer (EVC) with customer lifetime value (CLV) gives us a very useful way to understand our customer base or potential customer base

Wharton
University of Pennsylvania
ONLINE

Growth Strategies

The van Westerndorp Method

Jagmohan Raju, Joseph J. Aresty Professor of Marketing

Van Westendorp Method

- Often referred to as van Westerndorp's Price Sensitivity Meter
- It is a very useful approach to understanding the economic viability of a new product concept as it gives us an estimate of an acceptable price range
  - For example, if the concept is not financially viable at even the highest suggested price, it may not be worth investing in

Van Westendorp Method

- Why not just ask people what is the maximum they are willing to pay for a new product or a service?
- Most likely, respondents will not give us an accurate answer
  - Maybe they do not know the answer
  - Maybe they will game their answers — maybe they will give us a low number hoping to benefit from the low price we set based on their responses
- An alternative to consider is why not infer it indirectly?
  - That is what the van Westendorp method does
  - This indirect approach is the foundation of many good customer research methods

Van Westendorp Method

The van Westendorp Method requires that we ask each respondent four questions

1. At what price would you say that Product X would be a bargain?
2. At what price would you say that Product X would be getting expensive but you would still consider buying it?
3. At what price would you say that Product X would be too expensive to consider?
4. At what price would you say that Product X would be too cheap such that you would question whether it would work?

Van Westendorp Method

Too expensive to consider

%	Price
100	500
75	400
50	300
25	200
0	100

Too cheap to consider

%	Price
100	50
75	100
50	200
0	300
0	500

Bargain

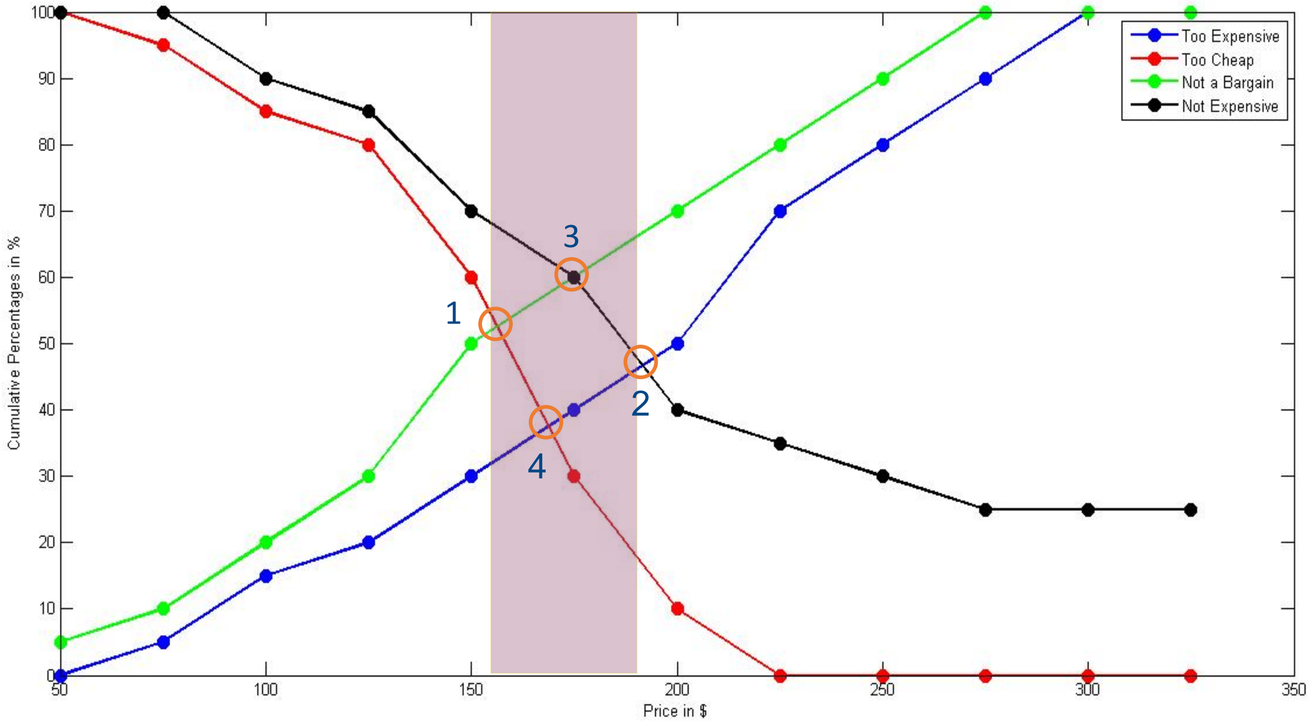
%	Price	Not a Bargain
100	100	0%
75	200	25%
50	300	50%
0	400	100%
0	500	100%

Possible Responses

1. Lower Bound: Intersection of Too Cheap and Expensive (Not a Bargain) — Point of marginal cheapness
2. Upper Bound: Intersection of Too Expensive and Bargain (Not Expensive) — Point of marginal expensiveness
3. Intersection of Expensive and Bargain — Indifference point
4. Intersection of Too Cheap and Too Expensive — Optimal Price Point

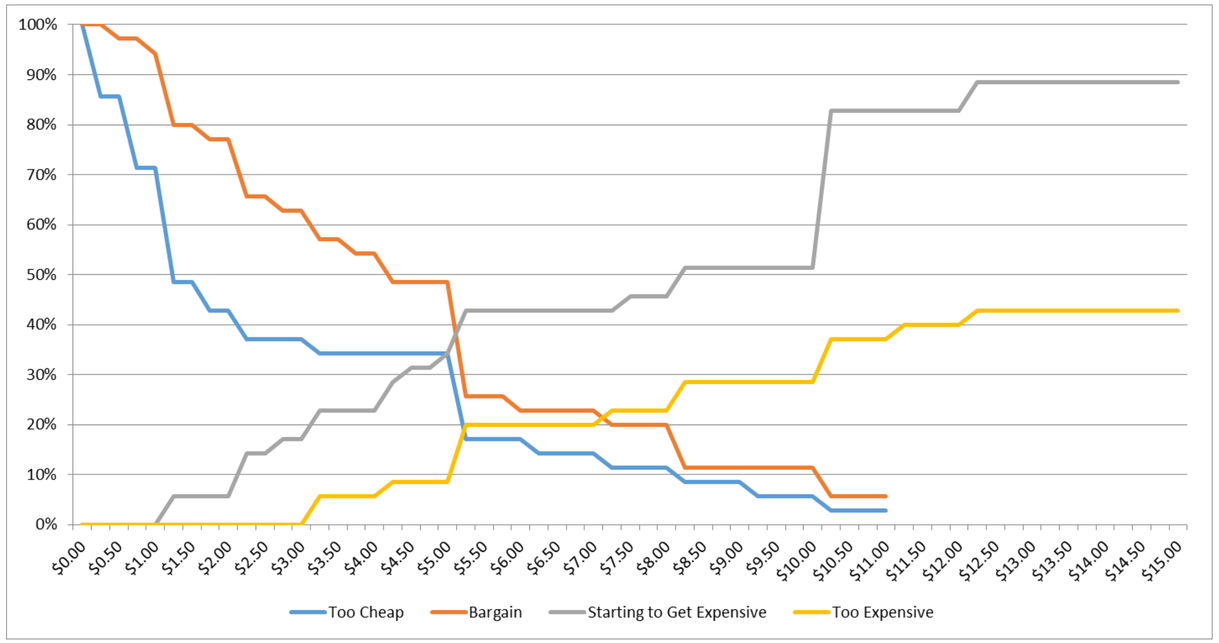
Bargain — Not expensive

Expensive — Not a bargain



Wharton Student Start-up Example: Medical Device

Indifference Price Point:	$5.00	Intersection of Starting to get Expensive and Bargain
Optimal Price Point:	$5.00	Intersection of Too Expensive and Too Cheap
Point of Marginal Cheapness	$4.75	Intersection of Too Cheap and Starting to Get Expensive
Point of Marginal Expensiveness:	$7.00	Intersection of Too Expensive and Bargain



	All Respondents			
	Minimum	Average	Median	Max
Too Cheap	$0.00	$3.16	$1.00	$20.00
Bargain	$0.25	$5.21	$4.00	$25.00
Starting to Get Expensive	$1.00	$10.60	$8.00	$75.00
Too Expensive	$3.00	$20.17	$15.00	$100.00

Summary: van Westendorp Method

- Useful for assessing the economic viability of a new product concept by suggesting a good price range
  - You do not need to have a ready product or a service as long as it can be well articulated
- Empirically based and logical
- Very often used in practice

Wharton
University of Pennsylvania
ONLINE

Growth Strategies

Conjoint Analysis - Mp3 Player

Jagmohan Raju, Joseph J. Aresty Professor of Marketing

Conjoint Analysis Hypothetical

- A company is in the process of designing different versions of an mp3 player
- R&D is already done — now it is a matter of product design and pricing
- What features to add and what not to add?
- How do you price each?
- What is the maximum willingness to pay for each model under consideration?
  - How does it vary across customers?

Specific Techniques Used

- Conjoint analysis
- Regression analysis

Step 1

- Identify and agree on the attributes important to the customer
  - Brand
  - Storage
  - Battery
  - Display
  - Warranty
  - Price
- Agree on the ranges and levels of each attribute
  - Maximum/minimum

Attributes	Brand	Capacity (songs)	Battery Life	Display	Warranty	Price
Levels	Orange Generic	5000 50	18hrs 2hrs	Color Mono	1 year None	$249 $99

Step 2

- Create product profiles to be rated by the respondents in the conjoint task
  - A conjoint task is one where a respondent gives you their relative liking for various options

Brand	Orange
Storage	5000 songs
Battery	18 hrs
Display	Color
Warranty	No
Price	$249

Step 3: Code the Profiles

- One level is coded as 1 and the other level is coded as 0

Attributes	Code	Brand	Capacity (songs)	Battery Life	Display	Warranty	Price
Levels	1 0	Orange Generic	5000 50	18hrs 2hrs	Color Mono	1 year None	$249 $99

Example: Profile A

Attribute	Value	Coded as
Brand	Orange	1
Storage	5000 songs	1
Battery	18 hrs	1
Display	Color	1
Warranty	No	0
Price	$249	1

Example: Profile B

Attribute	Value	Coded as
Brand	Generic	0
Storage	50 songs	0
Battery	2 hrs	0
Display	Mono	0
Warranty	No	0
Price	$99	0

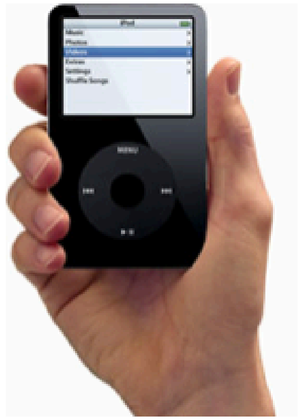
Step 4: Agree on How to Collect Data

- Rank ordering
- Paired comparisons
- Ratings

How Many Product Profiles Should a Customer Rate?

A)

Brand	Orange
Storage	5000 songs
Battery	18 hrs
Display	Color
Warranty	No
Price	$249



B)

Brand	Orange
Storage	50 songs
Battery	2 hrs
Display	Monochrome
Warranty	No
Price	$249

C)

Brand	Generic
Storage	5000 songs
Battery	18 hrs
Display	Color
Warranty	1 yr
Price	$249

D)

Brand	Generic
Storage	50 songs
Battery	2 hrs
Display	Color
Warranty	No
Price	$99

How Many Product Profiles Should a Customer Rate?

- What is the maximum number of profiles possible?
  - The maximum number is two raised to the power six, which is 64
  - 6 attributes, each has two levels — 64 possible combinations
- What if I asked you to rate 64 profiles — what would you do?
- What is the minimum number of profiles we must ask the respondents to rate so that we know something about the value of each attribute?
  - Some say 10, others say 2, yet others say 12
  - The best answer here is 7 — you need the base case and then six others where one of the attributes is high and the rest low

How Many Product Profiles Should a Customer Rate?

- How do we decide how many profiles we need beyond the minimum?
  - Or asked differently, when might 7 profiles be enough?
  - 7 will be enough if we can assume that the willingness to pay across attributes is independents
- For example, if a respondent's willingness to pay for a warranty does not depend on the brand and so on, then 7 profiles would be sufficient
  - This is rarely the case a priori
- Key question — what are the interactions we are not sure about?
  - These are the interactions that we must include
- In this particular example, each respondent rated 16 profiles

Step 5: Collect Data

- Ratings collected from one respondent

#	Brand	Price	Capacity	Battery	Warranty	Display	Rating
1	1	1	1	1	0	1	73
2	1	1	0	1	1	0	42
3	1	0	1	0	1	0	87
4	1	0	0	0	0	1	80
5	0	1	1	1	0	0	38
6	0	1	0	1	1	1	28
7	0	0	1	0	1	1	80
8	0	0	0	0	0	0	5
9	1	1	0	1	0	1	51
10	1	0	1	1	1	0	95
11	1	1	0	0	1	0	32
12	1	1	1	0	0	1	47
13	0	0	0	1	0	0	64
14	0	0	1	1	1	1	75
15	0	1	0	0	1	1	27
16	0	1	1	0	0	0	18

Conjoint Utility Model

- Utility = $\alpha + \beta_{Brand}$ Brand + $\beta_{Capacity}$ Capacity
  - + $\beta_{Battery}$ Battery + $\beta_{Display}$ Display
  - + $\beta_{Warranty}$ Warranty + β_{Price} Price
  - α is utility from other (invariant) attributes; baseline value
  - βs are known as the (attribute) part-worths
  - Attributes as we discussed can be represented using dummy variables

Attribute	Brand	Capacity	Battery	Display	Warranty	Price
Dummy = 0	Generic	50	2 hrs	Mono-	None	$99
Dummy = 1	Orange	5000	18 hrs	Color	1 yr	$249

Step 6: Analyze the Data

- Estimate part worths using regression
  - Utility (Rating) = $\alpha + \beta_{Brand}$ Brand + $\beta_{Capacity}$ Capacity
  - $+ \beta_{Battery}$ Battery + $\beta_{Display}$ Display
  - $+ \beta_{Warranty}$ Warranty + β_{Price} Price
- Regression results

Attribute	*Coefficient*	*Value*
Intercept	a	30.9
Brand	b_{Brand}	25.7
Price	b_{Price}	-33.6
Capacity	$b_{Capacity}$	18.8
Battery	$b_{Battery}$	15.5
Warranty	$b_{Warranty}$	7.0
Display	$b_{Display}$	14.2

$R^2 = 0.85$

Step 7: Estimate Maximum Willingness to Pay

- What is the utility-to-$ "exchange rate"?
  - Exchange rate = ($249 – $99) / 33.6 = 4.45 $/util
    - Price changes from $99 to $249, utility reduces by β_{Price}
- What is the Willingness to Pay for Model 1?

Attribute	Value	Dummy Level	Utils
Brand	Orange	1	25.7
Storage	5000 songs	1	18.8
Battery Life	18 hrs	1	15.5
Display Type	Color	1	14.2
Warranty	1yr	1	7.0
Intercept	-	-	
		Total Utils =	81.20

81.20 utils = 81.20 x $4.45 = $361.34

Step 7: Estimate Maximum Willingness to Pay

- What is the utility-to-$ "exchange rate"?
  - Exchange rate = ($249 – $99) / 33.6 = 4.45 $/util
    - When price changes from $99 to $249, utility reduces by β_{Price}
- What is willingness to pay for Model 2

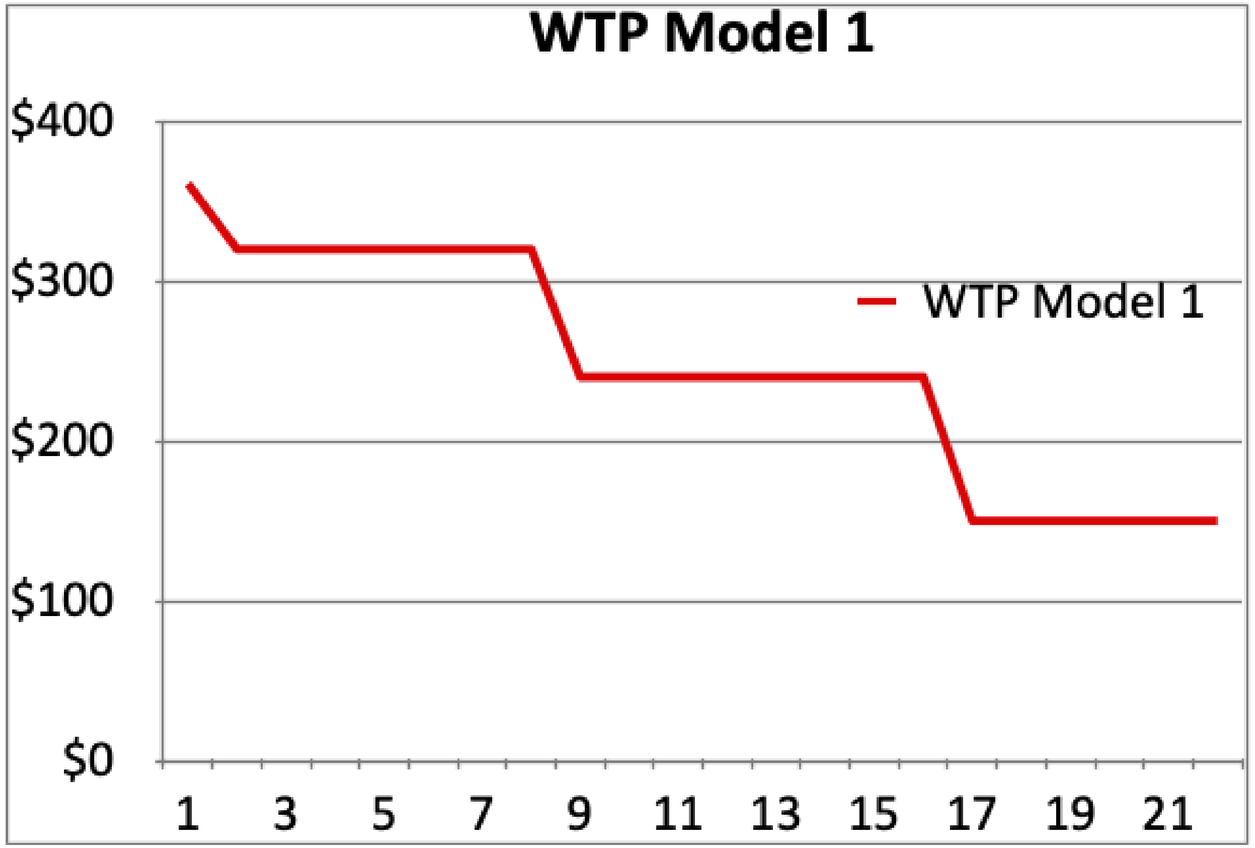
Attribute	Value	Dummy Level	Utils
Brand	Orange	1	25.7
Storage	2500 songs	0.5	9.4
Battery Life	18 hrs	1	15.5
Display Type	Mono	0	0
Warranty	None	0	0
Intercept	-	-	
		Total Utils =	50.6

50.6 utils = 50.6 x $4.45 = $225.17

Step 8: Repeat This Exercise for Each Customer

- For each customer we shall get maximum willingness to pay for Model 1 and Model 2
- Rank order by maximum willingness to pay from the highest to the lowest, and plot

Step 8: Variation in WTP Across Customers



Summary

- The conjoint based method is based on published studies
- It requires more work but can also give us different kinds of results
  - For example, from the same consumer data, we can estimate willingness to pay for different models
  - In the van Westendorp type of analysis, we would have had to conduct a different survey for each model
- Overall, the three methods we have discussed complement each other
  - Economic value to the customer
  - The van Westendorp method
  - The conjoint approach

Wharton

UNIVERSITY of PENNSYLVANIA

ONLINE