

Pricing Research Tools You Must Know

Monadic Experiments, Van
Westendorp, and Conjoint Analysis

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Why Surveys?

Why use surveys to study pricing and price sensitivity?

- Often, analyzing existing sales data or doing in-market pricing experiments is not feasible
- New to the world product
- Modifications to existing products, including new price outside of range of experience



Some Common Survey-Based Pricing Methods

1. Monadic price experiments
2. Van Westendorp Price Sensitivity Meter (PSM)
3. Conjoint Analysis (CBC, also known as DCE)

(You could also just ask respondents how much they'd expect to pay for your product, but this has obvious weaknesses...invites low-balling, problematic)



Monadic Price Experiments

- Split respondents randomly into different groups (experimental cells); sometimes matched quotas before, respondent weighting afterward
- Introduce the product concept, show each group a different price and ask a standard 5-pt purchase intent scale
- Compare the cells on purchase intent (typically adjusted downward)



Standard 5-pt Purchase Intent Scale

- Definitely Would Purchase
- Probably Would Purchase
- Might or Might Not Purchase
- Probably Would NOT Purchase
- Definitely Would NOT Purchase

Often in consumer packaged goods research we deflate the 5 point purchase intent scale (e.g., we might use 75%, 25%, 10%, 0%, 0%)



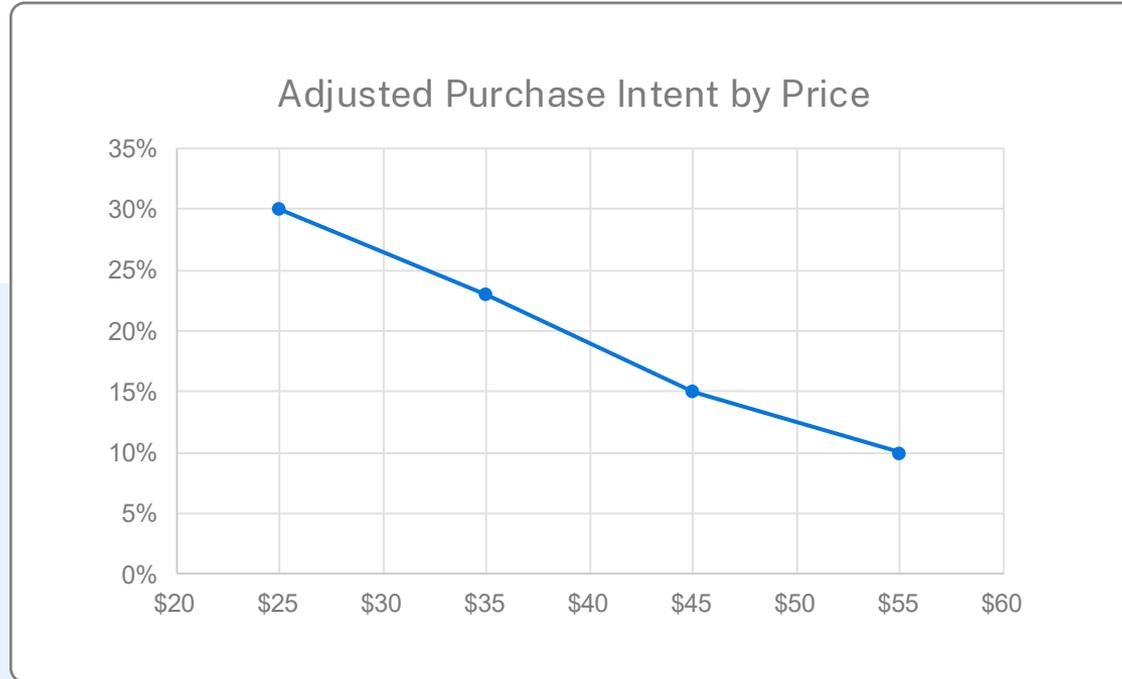
Example Responses for Cell (resp group) 1

- Definitely Would Purchase (30%)
- Probably Would Purchase (25%)
- Might or Might Not Purchase (30%)
- Probably Would NOT Purchase (10%)
- Definitely Would NOT Purchase (5%)

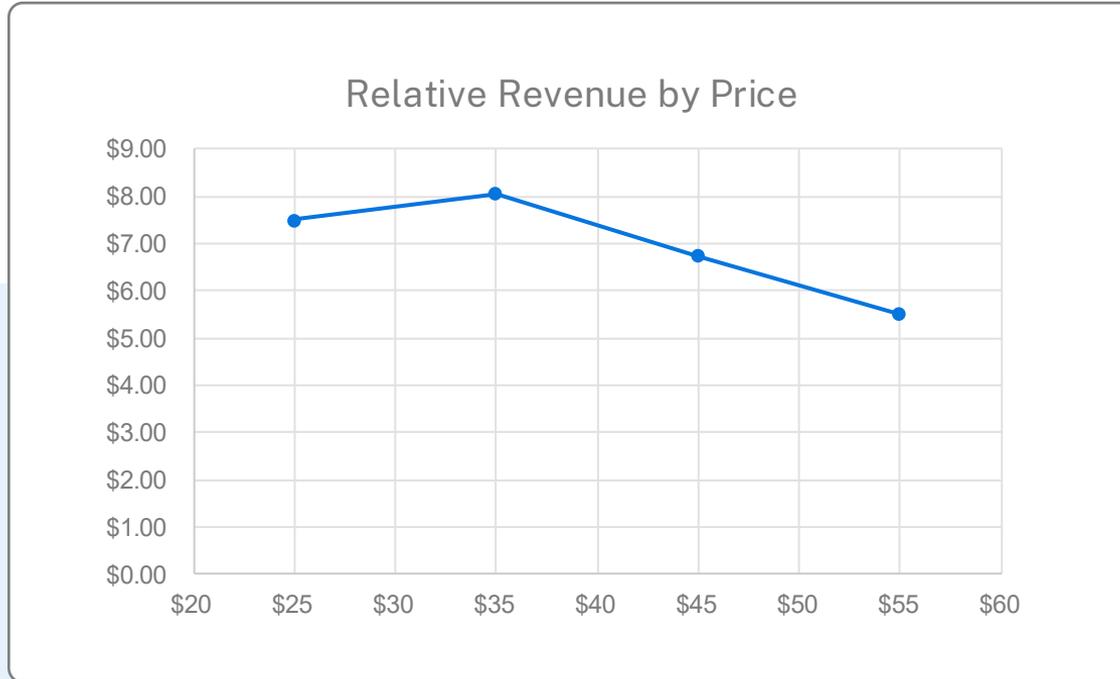
Adjusted purchase intent is $(75\% \times 30\%) + (25\% \times 25\%) + (10\% \times 30\%) + (0\% \times 10\%) + (0\% \times 5\%) = 30.25\%$



Plot Adjusted Purchase Intent (PI) across Cells



Multiply $PI \times Price$ at Each Tested Price for Relative Revenue Curve



Bringing Competitive Context into Monadic

Even better, could include a single conjoint-looking choice task where your product's price (\$X) differs across the experimental cells (groups of respondents) but the competitors stay constant

If these were your only choices, which would you choose?

| | | | |
|---|--|---|--|
| Competitor 1 \$25 <input type="button" value="Select"/> | Your product \$X <input type="button" value="Select"/> | Competitor 2 \$45 <input type="button" value="Select"/> | None: I wouldn't buy any of these <input type="button" value="Select"/> |
|---|--|---|--|



Better Yet, a Dual-Response Question with Purchase Intent

If these were your only choices, which would you choose?

Competitor 1

\$25

Select

Your product

\$X

Select

Competitor 2

\$45

Select

Given what you know about the market and your budget, how likely are you to purchase the option you chose above?

Definitely would purchase

Probably would purchase

Might or might not purchase

Probably would NOT purchase

Definitely would NOT purchase



Some Advantages for Monadic Pricing Experiments

- Quick for respondents to answer (45 seconds or less)
- It's a pure (across subjects) experiment (unless you do sequential monadic and ask multiple prices of each respondent)
- If competitors are shown alongside the test product for competitive context, it resembles the strong conjoint analysis (CBC) approach (but in a limited way that just focuses on the firm's price sensitivity)

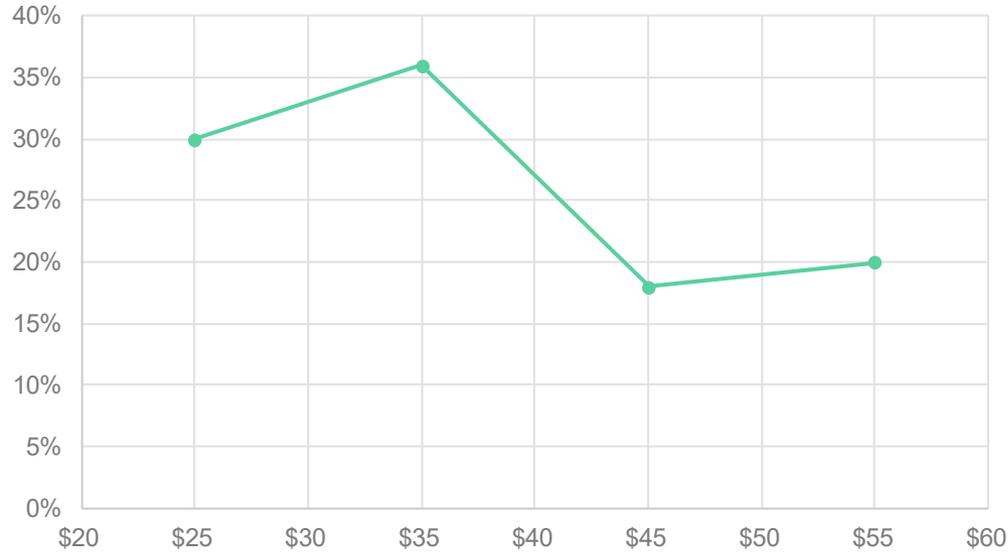


Challenges with Monadic Pricing Experiments

- Sample Size Requirements big: $n=300-500$ per cell. (To deal with this, sometimes respondents are shown a random 3 out of 7 total prices, for a “sequential monadic experiment”)
- Usually just a single or a very few product concepts may be tested
- If you ask respondents about purchase intent for a product without competitive context, it often understates price sensitivity



Adjusted Purchase Intent by Price



Price Reversals! (Problem)

How to avoid?

1. Ample sample sizes (n=300-500) per cell
2. Balanced sample (upfront quotas and post hoc weighting)
3. Measure price points at least 10% apart
4. Show product within competitive context



Van Westendorp PSM (1976)

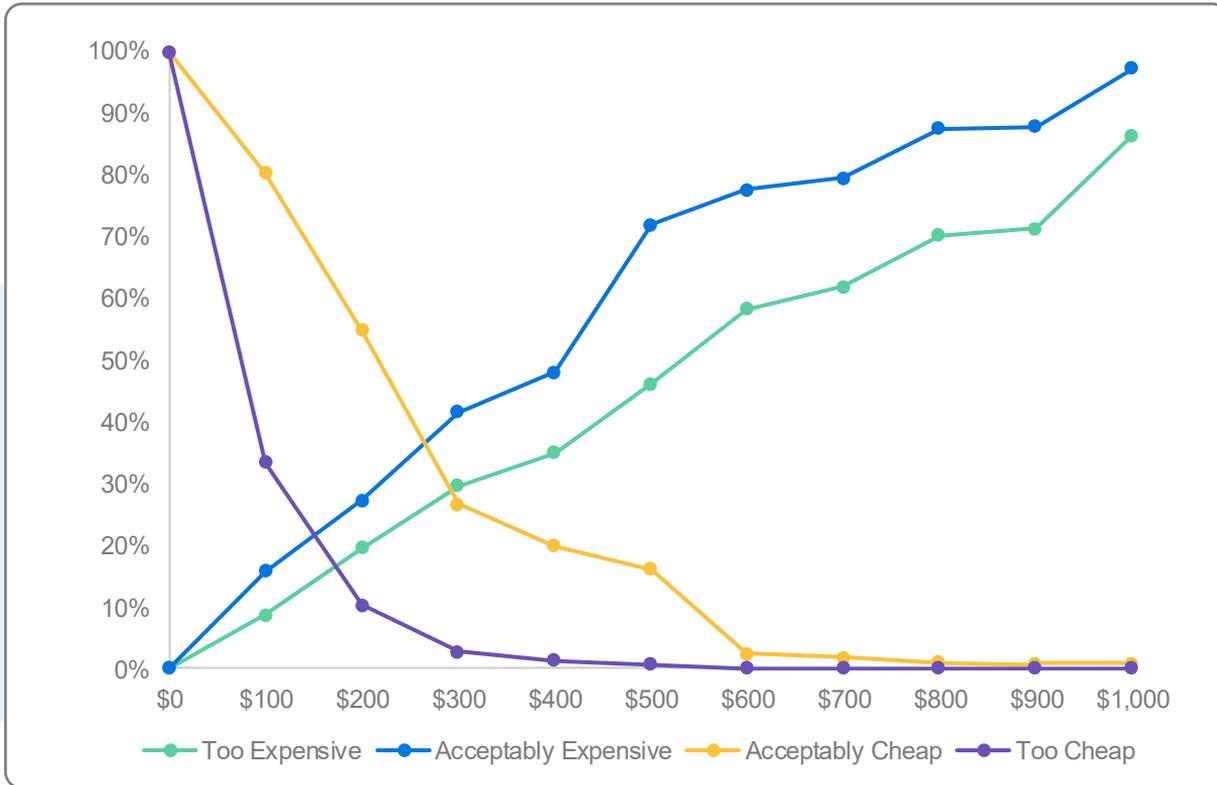
- Basic version uses four simple questions
 - At what price would Item X be so inexpensive that you would doubt its quality? <Too Cheap>
 - At what price would you consider Item X a good value? <Acceptably Cheap>
 - At what price is Item X beginning to get expensive, but you would still consider buying it? <Acceptably Expensive>
 - At what price would Item X be so expensive you would never consider it? <Too Expensive>
- If you can, show respondents competitive products and pricing so they can establish better market context.

Notes: the “Too Cheap” and “Too Expensive” price points are optional. Actual wording and order of the questions can vary.

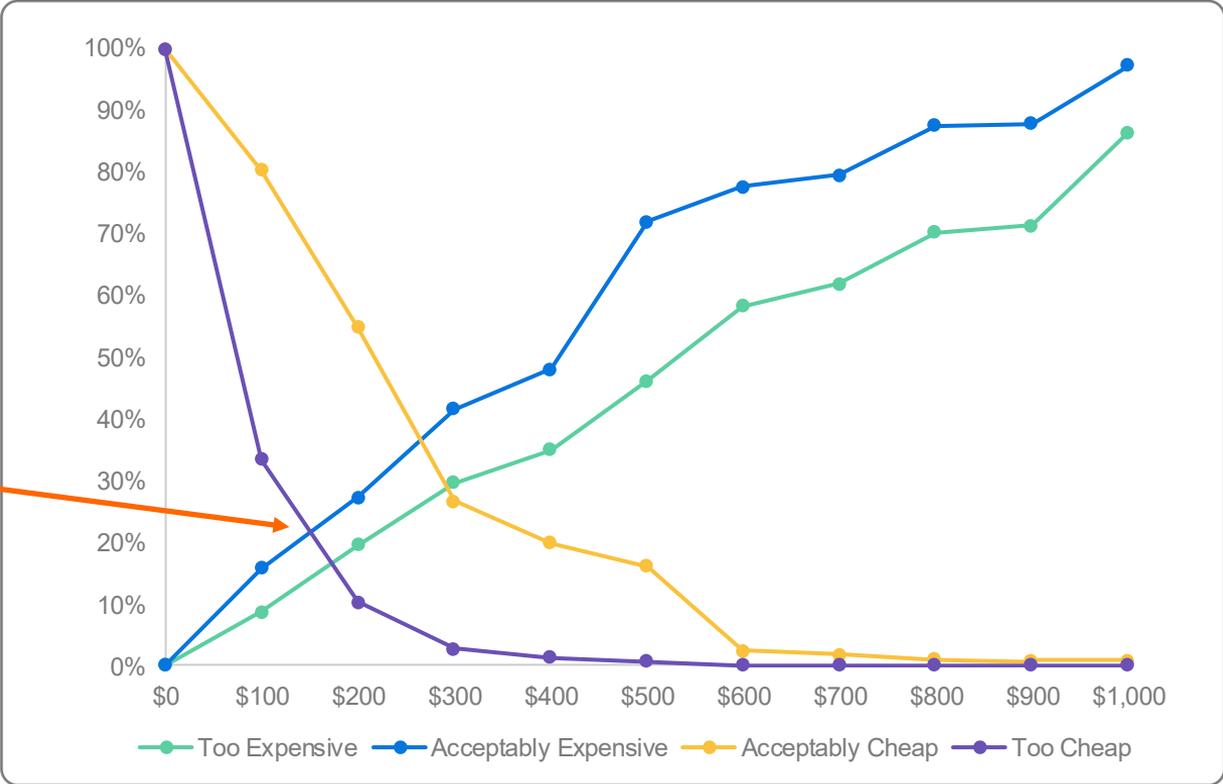


PSM – Traditional Approach

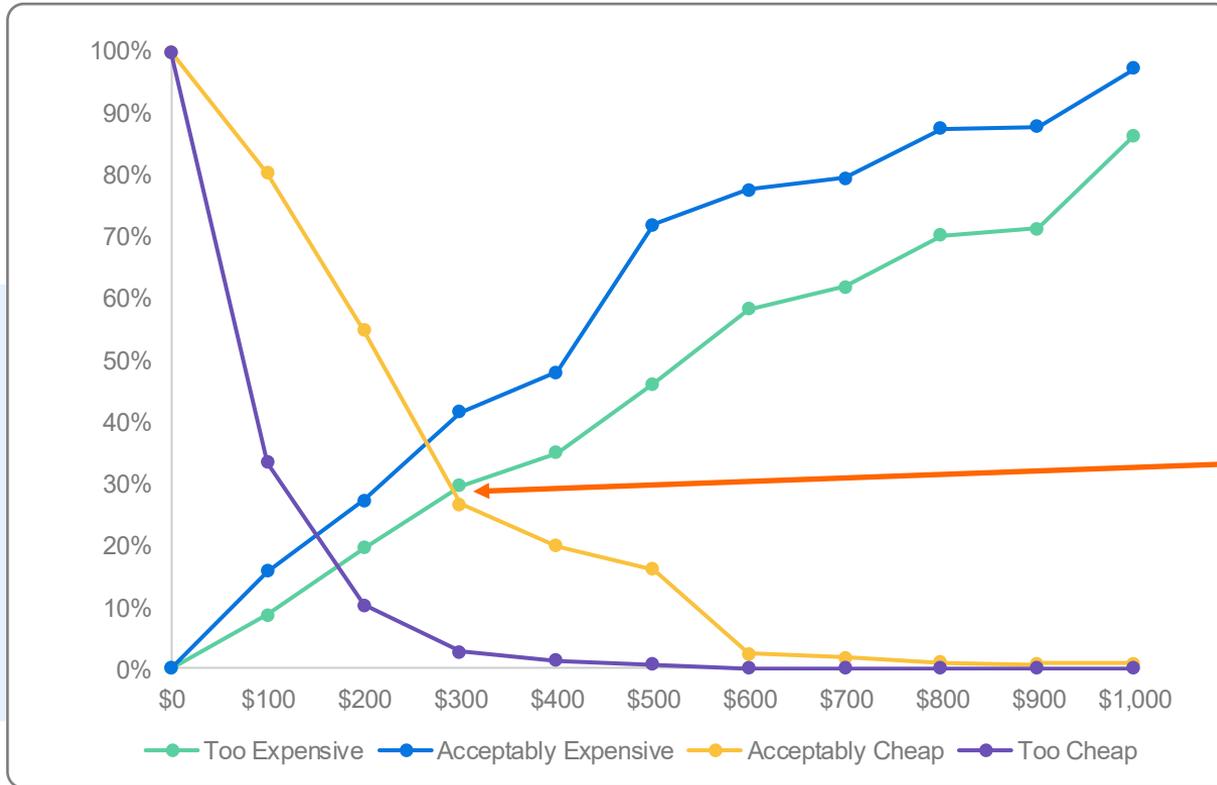
Interpretation focuses on intersections of cumulative plots



Point of Marginal Cheapness (PMC)

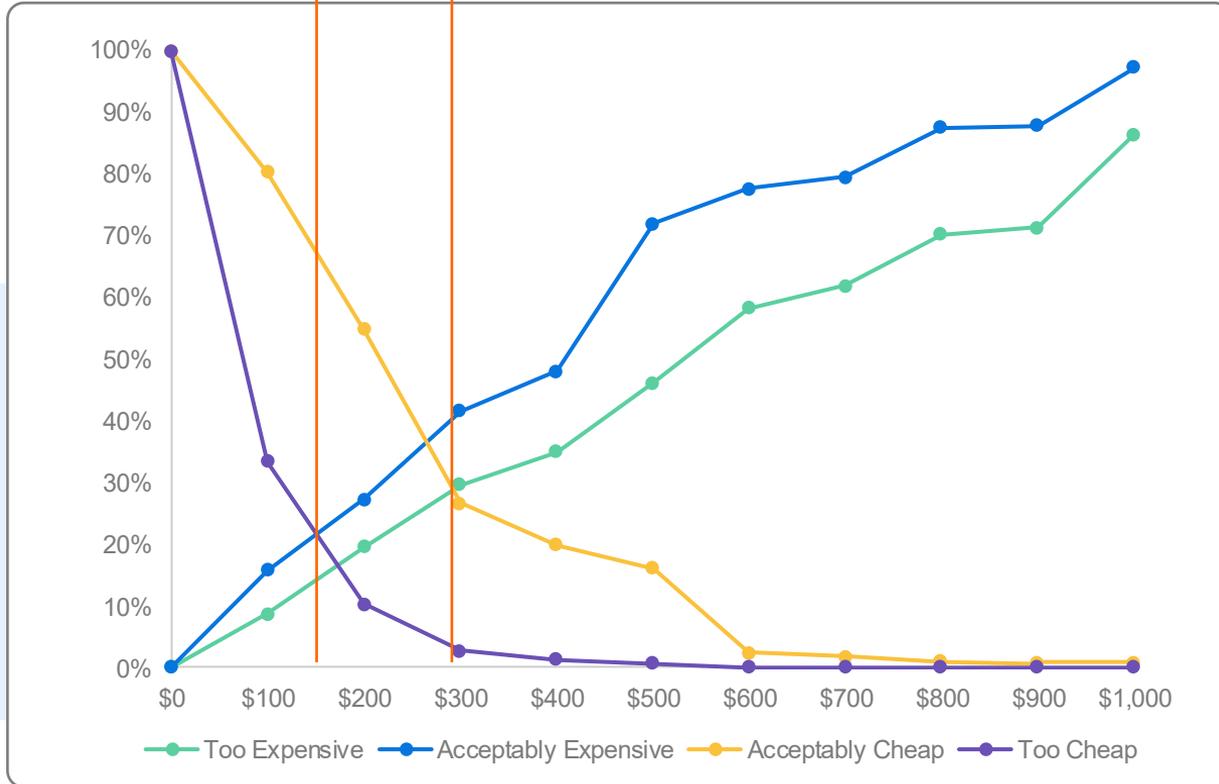


Point of Marginal Expensiveness (PME)

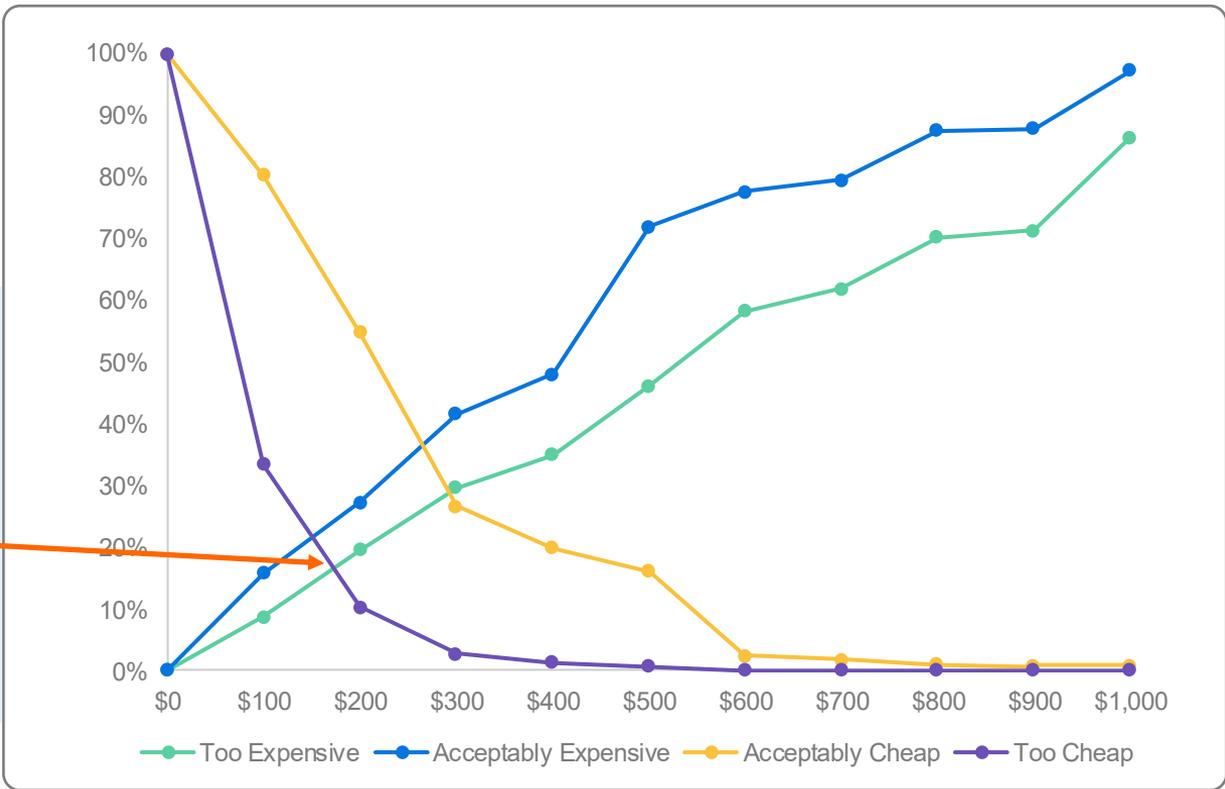


Acceptable Price Range

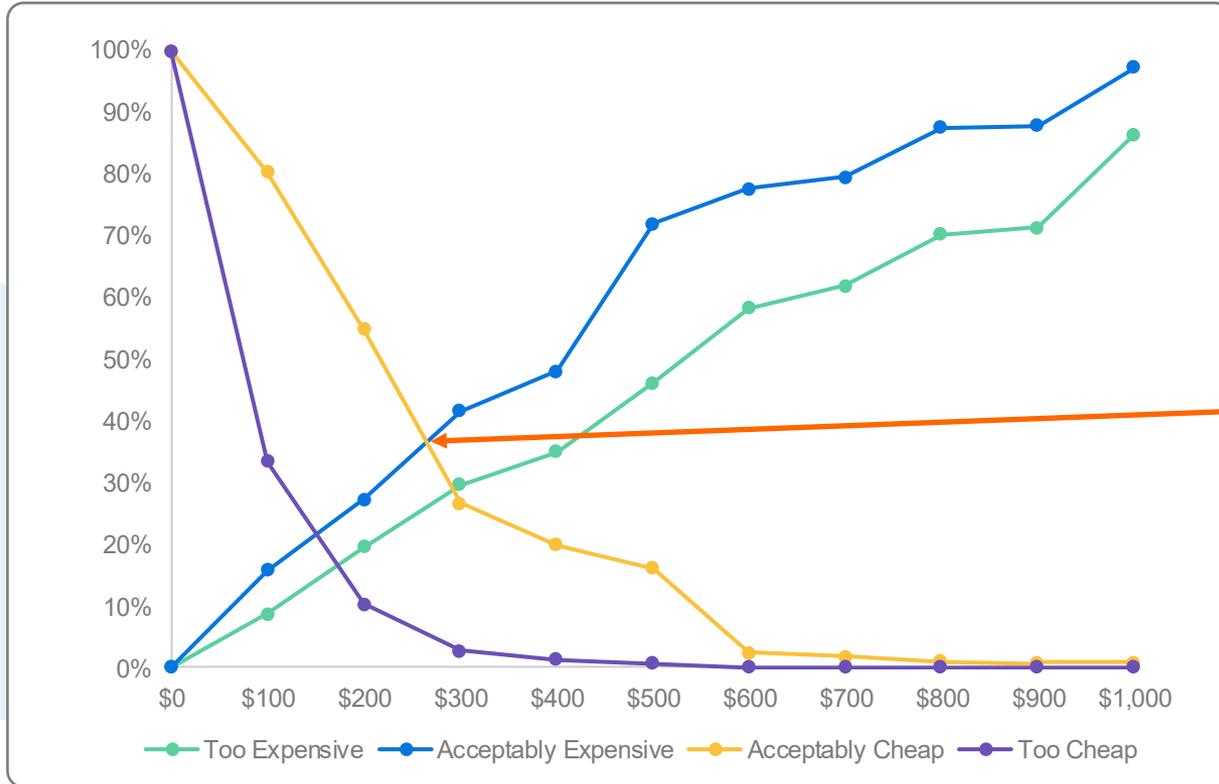
\$150-\$292



Optimal Price Point (OPP)



Indifference Price Point (IPP)



Problems

- PSM lacks empirical support – it's not been rigorously tested against other forms of pricing research
- Some of the elements (the “too cheap” question) even conflict with economic theory
- A better measurement of price expectations than it is a measure of price sensitivity
- Maybe it is enough to identify a price range and to pretend that intersections with technical-sounding names mean something
- But we can improve it a bit...



Newton, Miller, Smith Extension

- You can generate additional outputs by asking a follow-up rating scale purchase intention questions at the expensive and inexpensive (interior) price points (Newton, Miller and Smith 1993)
 - Definitely would buy
 - Probably would buy
 - Might or might not buy
 - Probably would NOT buy
 - Definitely would NOT buy
- Often we deflate the 5 point purchase intent scale (e.g., in consumer packaged goods we might use 75%, 25%, 10%, 0%, 0%)



Example (6 pieces of data from each resp)

Smith says

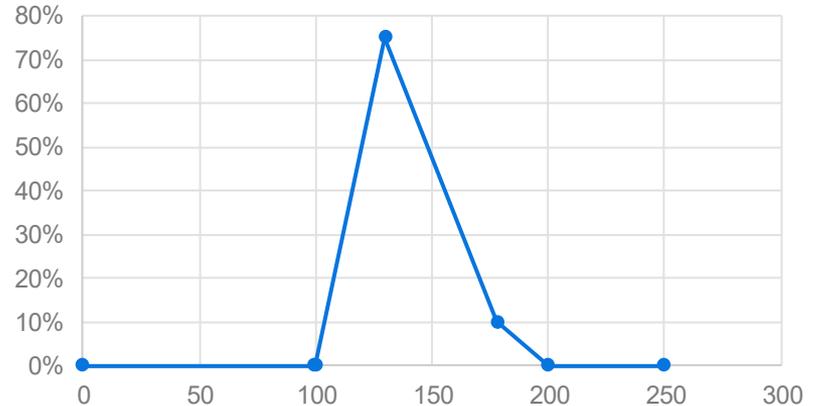
- \$100 is too cheap and \$200 is too expensive
- She definitely would buy (75% probability) at her acceptably cheap price of \$130
- She might or might not buy (10% probability) at her acceptably expensive price of \$175



Example

- NMS extension puts Smith's purchase probability at
- 0% for prices below \$100 and above \$200
- Interpolate between 0% and 75% for prices between \$100 and \$130
- Interpolate between 75% and 10% in the range of \$130 to \$175
- Interpolate between 10% and 0% for prices between \$175 and \$200

Smith's Reported and Inferred Purchase Intentions



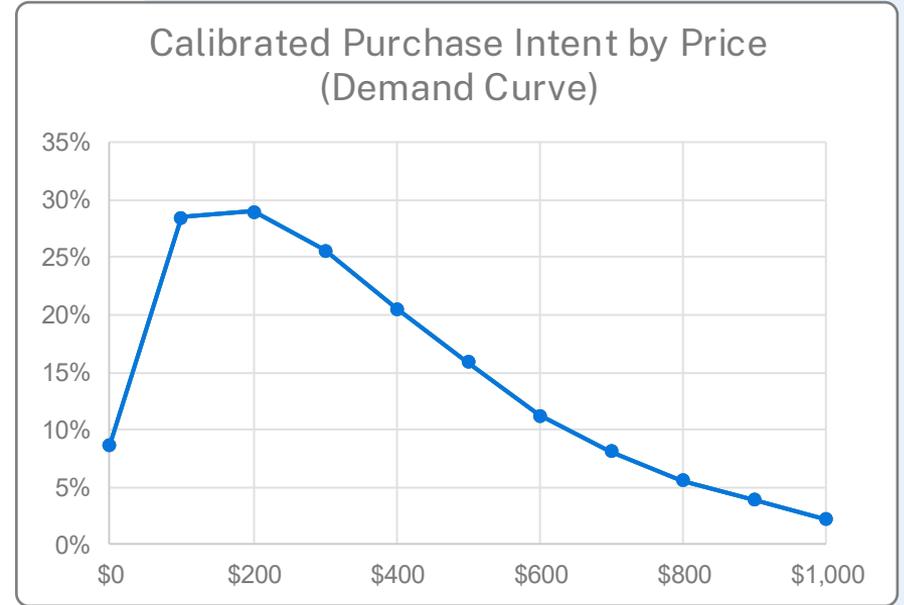
Additional Outputs

- Next, we average these probabilities across respondents for each price point in the range we're studying
- This math allows us to plot ...
 - Purchase intention by price point
 - Revenue by price point (by multiplying the price point by the probability of buying at that price, summed across respondents)



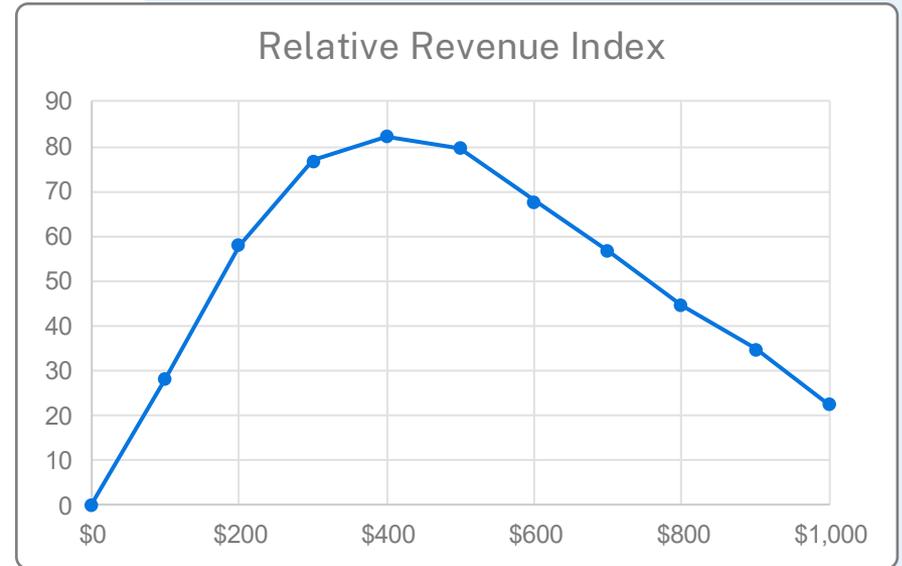
Purchase Intent by Price Point

- Purchase intention plateaus between \$100 and \$200 and peaks at \$200



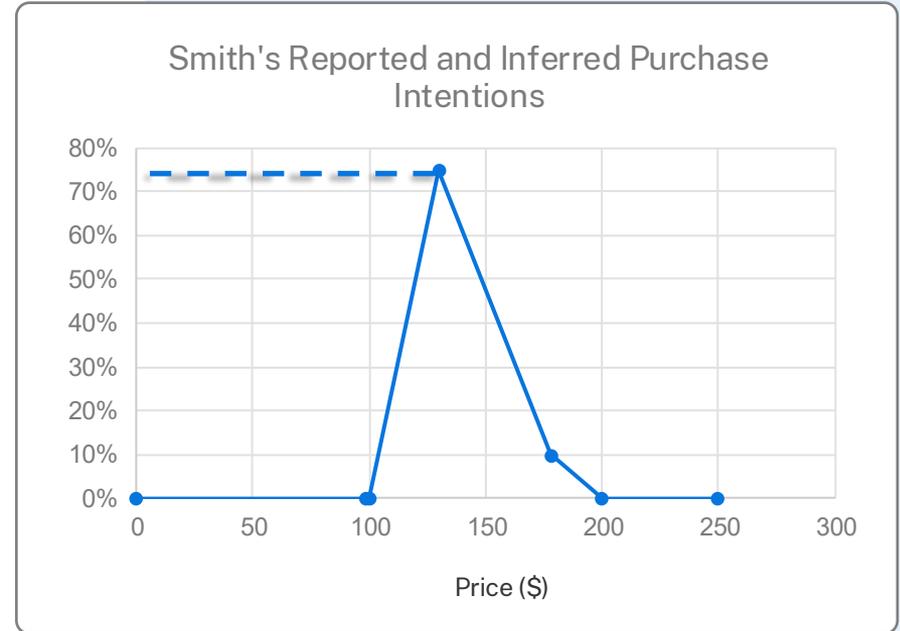
Relative Revenue by Price Point

- Price rises faster than purchase intent declines up until \$400, the peak revenue
- Revenues plateau somewhat in the range of \$250 to \$500



Modified NMS...

- The assumption that purchase intent falls to zero at the “Too Cheap” price and left of that seems to violate standard economic principles
- A modification is to assume purchase intent stays the same at the Acceptably Cheap price and left of that price... (see dotted line below)
- Which leads to slightly lower recommended “optimal price” compared to original NMS



Advantages of Van Westendorp PSM

- Quick for respondents to answer (~ 1 min)
- Can be useful for new-to-the-world products when you don't have a good feel for the appropriate price range
- With the Newton-Miller-Smith extension, you can get a read on purchase intent across the price range
- Sample size requirements not as large as the other methods; no need to get a lot of precision on this exploratory method anyway (use it to establish a price range to test later with stronger methods)



Weaknesses of Van Westendorp PSM

Weaknesses:

- Typically only focuses on one product concept
- Traditional "line-crossing" interpretation is weak (but the NMS extension of asking 5-pt purchase likelihood questions on the two middle price points helps)
- Doesn't put the respondent into the realistic market mindset of comparing multiple alternatives and prices



Excel Simulator for VW-PSM with NMS

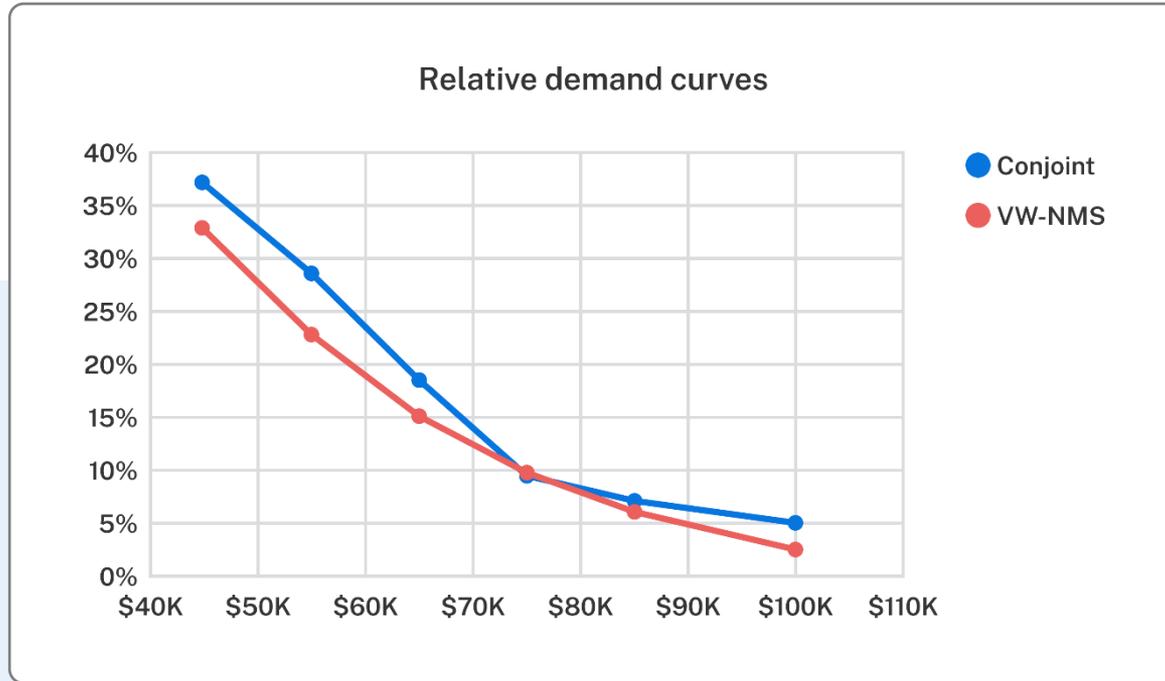
<https://sawtoothsoftware.com/resources/software-downloads/tools/van-westendorp-price-sensitivity-meter>

Just paste in the 6 answers (4 prices and 2 purchase intent responses) for each respondent into the spreadsheet.



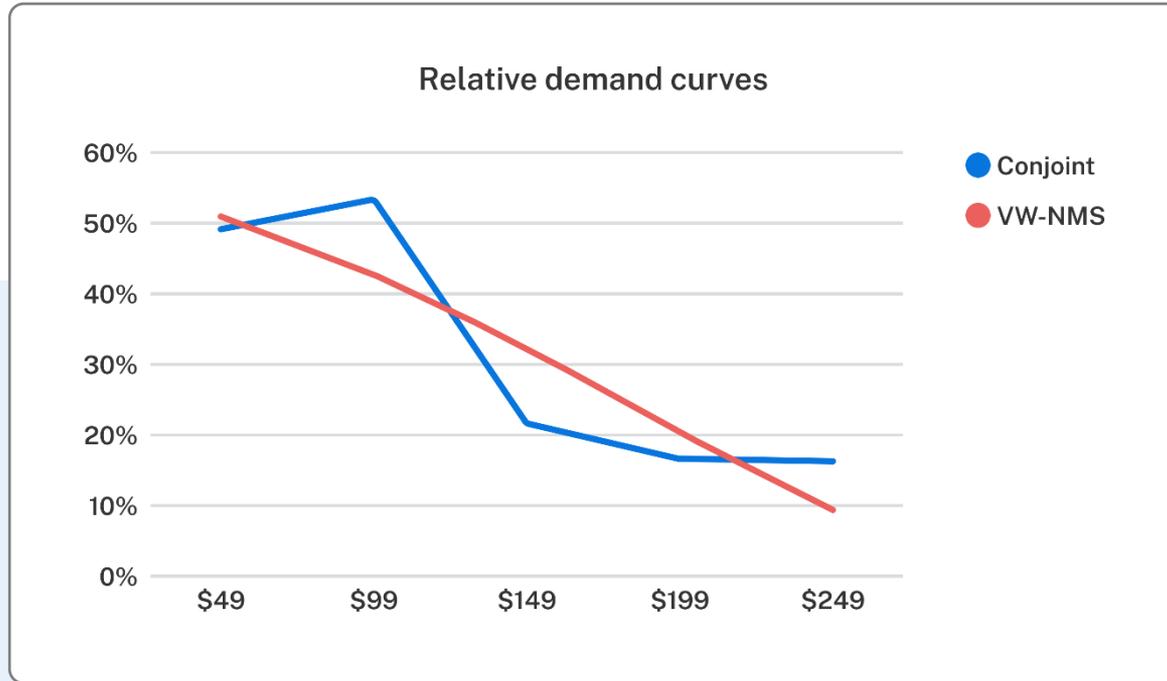
Comparing CBC and Van Westendorp + NMS

Electric Vehicle (EV) Study:



Comparing CBC and Van Westendorp + NMS

Wireless Speakers Study



Not A-B... A-Gazillion Testing!

Conjoint (Choice Experiments):

- Ask potential buyers what they would choose
- Show 100s or 1000s of realistic-looking products and pricing combinations (across people)

Example Conjoint Question

Which would you choose?

1/8

| | |
|--------------------------------|--------------------------------|
| Chevy Camaro | Ford Mustang |
| Red | Blue |
| 6-cylinder (0-60 in 6 seconds) | 4-cylinder (0-60 in 8 seconds) |
| \$32,000 | \$30,000 |

Example Conjoint Question

Which would you choose?

2/8

| | |
|--------------------------------|--------------------------------|
| Chevy Camaro | Ford Mustang |
| Blue | Red |
| 6-cylinder (0-60 in 6 seconds) | 8-cylinder (0-60 in 4 seconds) |
| \$34,000 | \$40,000 |

A “None” Option Often Included...

Which would you choose?

Chevy Camaro

Blue

6-cylinder (0-60 in 6
seconds)

\$34,000

Ford Mustang

Red

8-cylinder (0-60 in 4
seconds)

\$40,000

None: I wouldn't
choose either of
these

The Choice Model

- It's a fair and balanced experiment, so we can statistically tease out which product features and prices were driving people's choices
 - Compute preference scores (utilities) that predict/explain what people chose
- We can predict what they'd choose for 1000s or millions of potential new market scenarios

The Market Simulator

- Decision-Making “what-if” tool often delivered in Excel.
- With this tiny conjoint analysis attribute list, there are still >1000 possible competitive scenarios that can be simulated.

| Attributes: | | Option 1: | Option 2: |
|--------------------|--------------------------|------------------|------------------|
| Make: | Camaro or Mustang | Camaro | Mustang |
| Color: | Blue or Red | Blue | Red |
| Engine: | 6 cylinder or 8 cylinder | 6 cylinder | 8 cylinder |
| Price: | \$30,000 - \$40,000 | \$32,000 | \$40,000 |
| %Share: | | 34% | 66% |

Sample Quality and Data Cleaning

- Cannot emphasize enough how important **quality of sample** is for survey-based pricing research...
- Interview people in the market to buy
- Use all the standard procedures for identifying bots, speeders, fraudsters, inconsistent respondents
- If you fail to clean the data, you will understate price sensitivity for the techniques we've discussed today
- The quality of the sample **may matter more to the value (accuracy) of the research than the choice of the survey-based pricing method!**



Summary

- Assuming enough respondent time (~2-5 minutes), budget for additional questionnaire design and analysis time, **conjoint analysis (CBC) is best and more comprehensive**
- If you have limited resources and limited respondent time, VW (with NMS PI extension) and Monadic experiments are **compromises, yet are useful for specific situations**



Thank You for Listening!

— Bryan Orme

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