Introduction to Pricing Analytics

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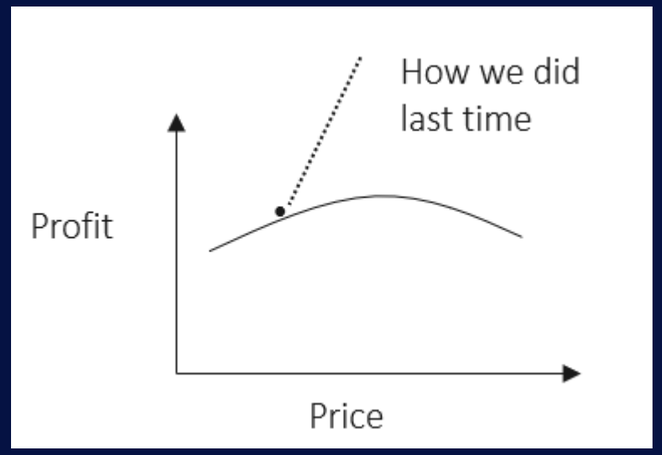
IBM

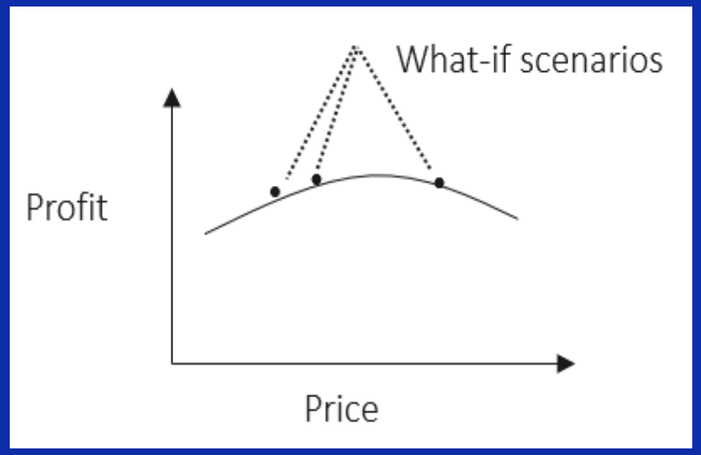
Structural Approach to Pricing

Price Strategy

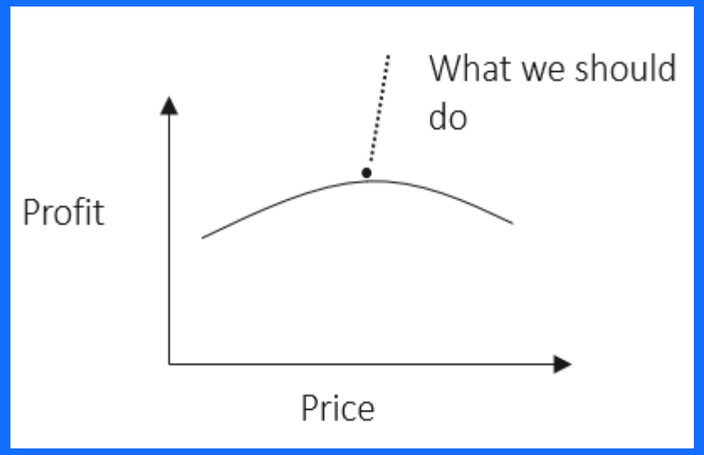
Price Visibility



Price Elasticity



Price Optimisation



Price Execution

An Example

A large consumer electronics retailer wants to increase margins through better pricing.

While televisions generate most of the company’s revenue, TV pricing is highly competitive.

Most of the company’s profits come from the sale of extended service plans (warranties).

Some Strategic Questions

- What role does competitive landscape play?
- Do you have the capability to vary prices by region/store?
- Online versus Store pricing strategy?
- What is the impact of seasonality on business performance?
- What is your current pricing structure?
- How are pricing changes executed?

Pricing KPIs for Success

Some good answers:

- Warranty Revenue
- Warranty Margin
- Warranty Cost
- Warranty Units
- Average Warranty Price

Some better answers:

- Warranty Units / TV Units [UPen]
- Warranty Rev / TV Rev [DPen]
- Warranty Profit / TV Units [CMPMUS]
- Avg Warranty Price / Avg TV Price [% Retail]

Building a Predictive Model – The Data

The company informs you that their system is set up so that warranties are priced in tiers. Based on the price range the television falls within, a set warranty price is charged for all warranties within that range.

You are asked to build a model for televisions priced between $500 - $700. Warranties are currently priced at $169.

How would you model the relationship between price & quantity using the data set shown here?

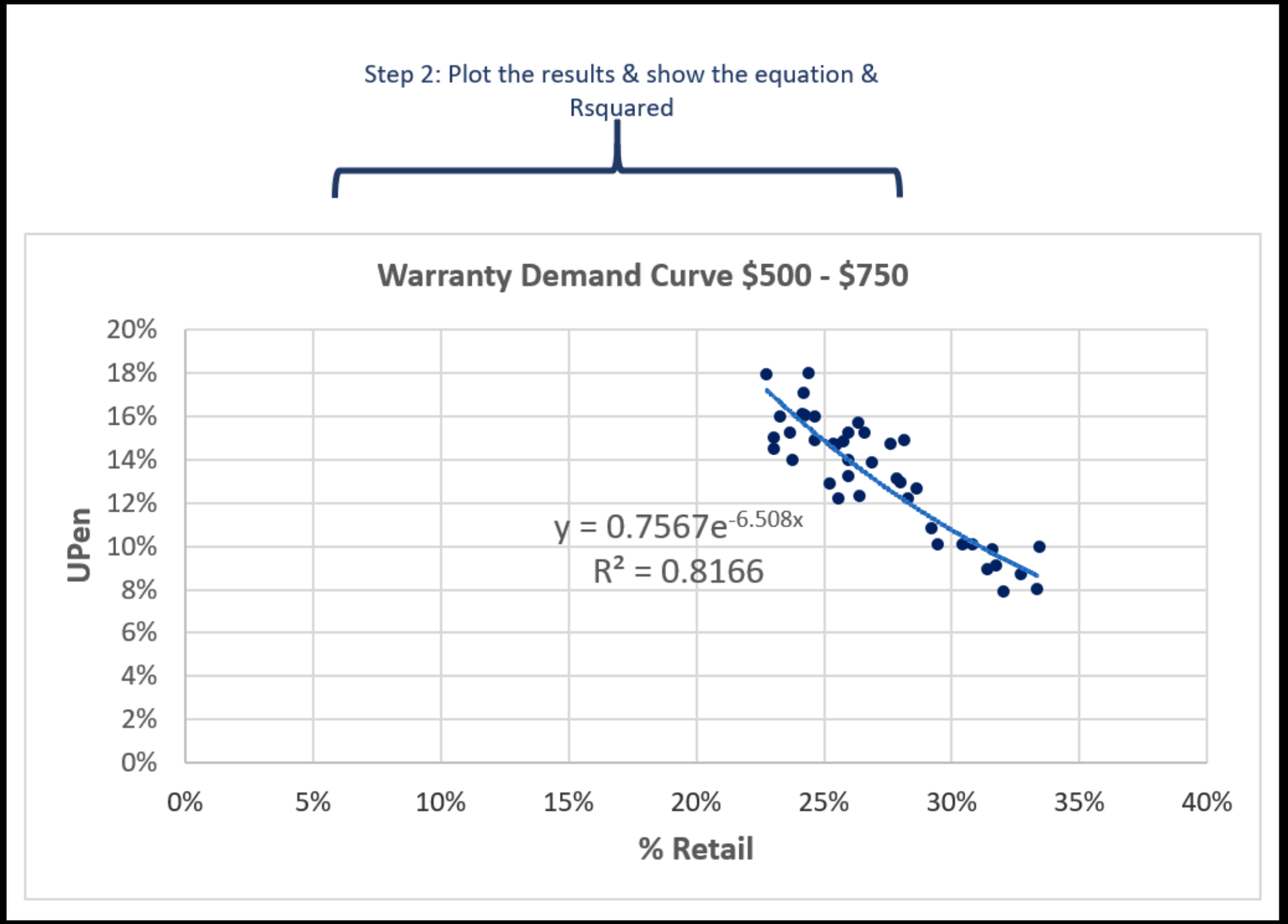
SKUS	TV Revenue	TV Units	Warranty Revenue	Warranty Units
TV1	$281,409	530	$7,140	42
TV2	$375,581	736	$10,029	59
TV3	$358,593	690	$10,199	60
TV4	$339,658	627	$9,519	56
TV5	$223,529	417	$6,460	38
TV6	$130,739	243	$4,080	24
TV7	$5,088	10	$170	1
TV8	$266,724	477	$8,160	48
TV9	$413,027	715	$12,239	72
TV10	$278,629	505	$8,669	51
TV11	$209,588	360	$6,630	39
TV17	$272,128	409	$8,500	50
TV18	$47,076	73	$1,530	9
TV23	$42,207	71	$1,530	9
TV24	$314,514	518	$11,389	67
TV25	$97,765	160	$3,570	21
TV26	$44,567	68	$1,530	9
TV27	$63,929	101	$2,380	14
TV28	$327,525	458	$10,879	64
TV29	$271,730	415	$9,859	58
TV30	$123,180	205	$4,250	25

Building a Predictive Model – Derive the Pricing KPI's

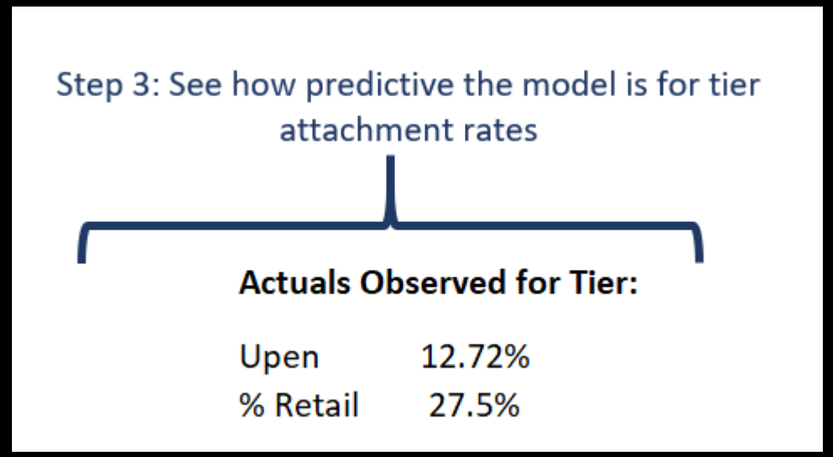
Step 1: Derive the following variables

SKUS	TV Revenue	TV Units	Warranty Revenue	Warranty Units	Avg TV Price	Avg Warranty Price	% Retail	Upen
TV1	$281,409	530	$7,140	42	$530.96	$169.99	32.02%	7.92%
TV2	$375,581	736	$10,029	59	$510.30	$169.99	33.31%	8.02%
TV3	$358,593	690	$10,199	60	$519.70	$169.99	32.71%	8.70%
TV4	$339,658	627	$9,519	56	$541.72	$169.99	31.38%	8.93%
TV5	$223,529	417	$6,460	38	$536.04	$169.99	31.71%	9.11%
TV6	$130,739	243	$4,080	24	$538.02	$169.99	31.60%	9.88%
TV7	$5,088	10	$170	1	$508.83	$169.99	33.41%	10.00%
TV8	$266,724	477	$8,160	48	$559.17	$169.99	30.40%	10.06%
TV9	$413,027	715	$12,239	72	$577.66	$169.99	29.43%	10.07%
TV10	$278,629	505	$8,669	51	$551.74	$169.99	30.81%	10.10%
TV11	$209,588	360	$6,630	39	$582.19	$169.99	29.20%	10.83%
TV17	$272,128	409	$8,500	50	$665.35	$169.99	25.55%	12.22%
TV18	$47,076	73	$1,530	9	$644.87	$169.99	26.36%	12.33%
TV23	$42,207	71	$1,530	9	$594.47	$169.99	28.60%	12.68%
TV24	$314,514	518	$11,389	67	$607.17	$169.99	28.00%	12.93%
TV25	$97,765	160	$3,570	21	$611.03	$169.99	27.82%	13.13%
TV26	$44,567	68	$1,530	9	$655.40	$169.99	25.94%	13.24%
TV27	$63,929	101	$2,380	14	$632.96	$169.99	26.86%	13.86%
TV28	$327,525	458	$10,879	64	$715.12	$169.99	23.77%	13.97%
TV29	$271,730	415	$9,859	58	$654.77	$169.99	25.96%	13.98%

Building a Predictive Model – Construct a Demand Curve



Building a Predictive Model – Validate the Results



Demand Curve:

$$UPen = 0.7567e^{-6.508 \ * \%Retail}$$

Estimated UPen using the Demand Curve:

$$Predicted\ UPen = 0.7567e^{-6.508 \ *0.275}$$

$$= 12.67\%$$

Optimisation: Solving for the Profit Optimal Price

TV Price Tier: $500 - $750	
Avg Warranty Cost:	$102.23
Model Parameters	
alpha	0.7567
beta	-6.508
Current Pricing Structure	
Warranty Price	$169.99
Avg TV Price	$627.79
% Retail	27.08%
Upen	12.72%
CMPMUS	$8.62

$$CMPMUS = \frac{\pi_w}{U_{TV}} = \frac{U_w}{U_{TV}}(P_w - C_w) = \text{UPen}\ (P_w - C_w)$$

$$UPen = \alpha e^{\beta(\frac{P_W}{P_{TV}})} \leftarrow \text{Demand Curve}$$

$$CMPMUS = \alpha e^{\beta(\frac{P_W}{P_{TV}})}\ (P_w - C_w)$$

$$\frac{\partial\ CMPMUS}{\partial\ P_W} = \frac{\alpha\beta}{P_{TV}} e^{\beta\left(\frac{P_W}{P_{TV}}\right)}(P_w - C_w) + \alpha e^{\beta(\frac{P_W}{P_{TV}})}\ (1)$$

$$= \alpha e^{\beta(\frac{P_W}{P_{TV}})}\left[\frac{\beta}{P_{TV}}(P_w - C_w) + (1)\right] = 0$$

$$\frac{\beta}{P_{TV}}(P_w - C_w) = -1$$

$$P_w = -\frac{P_{TV}}{\beta} + C_W$$

$\pi_w = warranty\ profit$

$U_w = warranty\ units$

$P_w = warranty\ price$

$C_w = warranty\ cost$

$U_{TV} = TV\ units$

$P_{TV} = TV\ price$

Optimisation: Solving for the Profit Optimal Price

$$P_w = -\frac{P_{TV}}{\beta} + C_W$$

$$P_w = -\frac{627.79}{-6.508} + 102.23$$

$$P_w = 198.69$$

TV Price Tier: $500 - $750	
Avg Warranty Cost:	$102.23
Model Parameters	
alpha	0.7567
beta	-6.508
Current Pricing Structure	
Warranty Price	$169.99
Avg TV Price	$627.79
% Retail	27.08%
Upen	12.72%
CMPMUS	$8.62

Optimised Pricing Structure:	
Warranty Price (Opt)	$198.69
Avg TV Price	$627.79
% Retail	31.65%
Upen	9.65%
CMPMUS	$9.31

$P_w = warranty\ price$

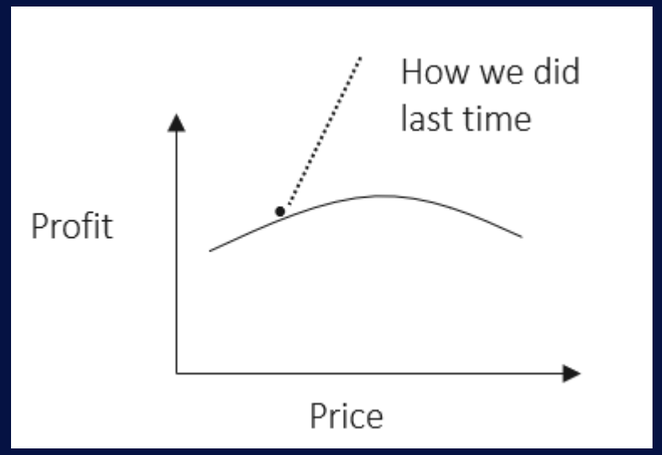
$C_w = warranty\ cost$

$P_{TV} = TV\ price$

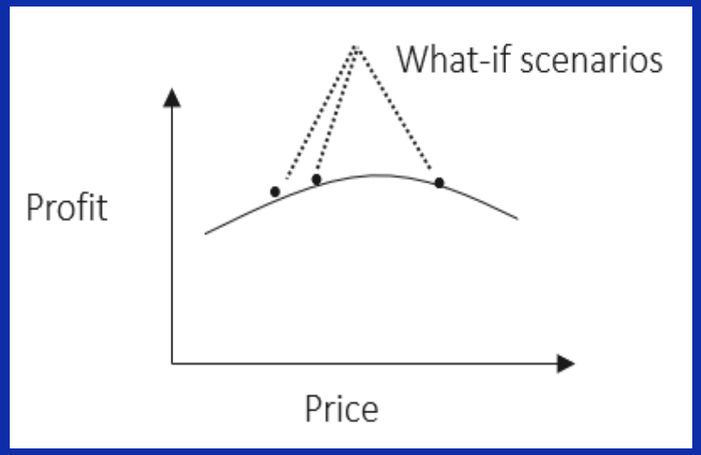
Conclusions

Price Strategy

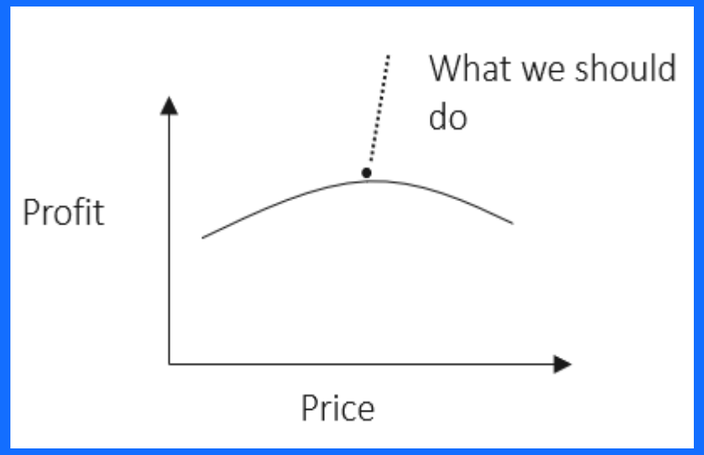
Price Visibility



Price Elasticity



Price Optimisation



Price Execution

Questions?

Thank You

For any additional questions, please feel free to reach out to:

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