Financial Analysis of Pricing Decisions

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Pricing—Class 3

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Goals of Financial Analysis of Pricing Decisions

A useful financial analysis involves an accurate identification of the true cost of sales, and determination of the effect of sales changes on profitability.

The goal of financial analysis is to identify the tradeoffs between the levels of price and sales volume that will increase profits.

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Financial Analysis of Pricing Decisions

1. Determine the Contribution Margin.

How much money do I "make" per dingy to put toward overhead?

2. Calculate the Break-even Sales Change for the price change (or difference).

How many dingies do I need to sell at the new price to "make" the same amount?

3. Calculate the Profit Implications of sales changes greater or less than the Break-even Sales Change.

How much profit do I make if I sell more or less than the breakeven?

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Determine the Contribution Margin

Per Unit		Total
	Price	Sales Revenue
-	Incremental Variable Costs	- Total Variable Costs
=	Contribution Margin ($)	= Total Contribution ($)

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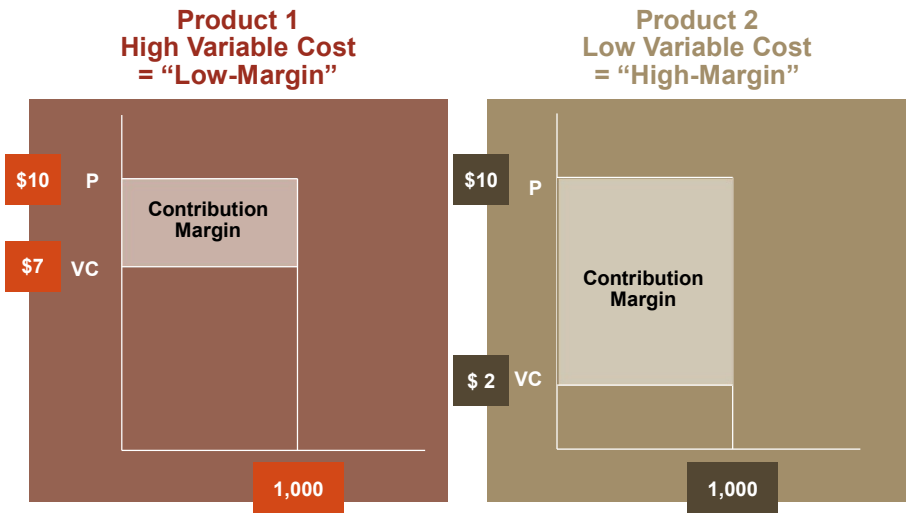
Where is the Profit?



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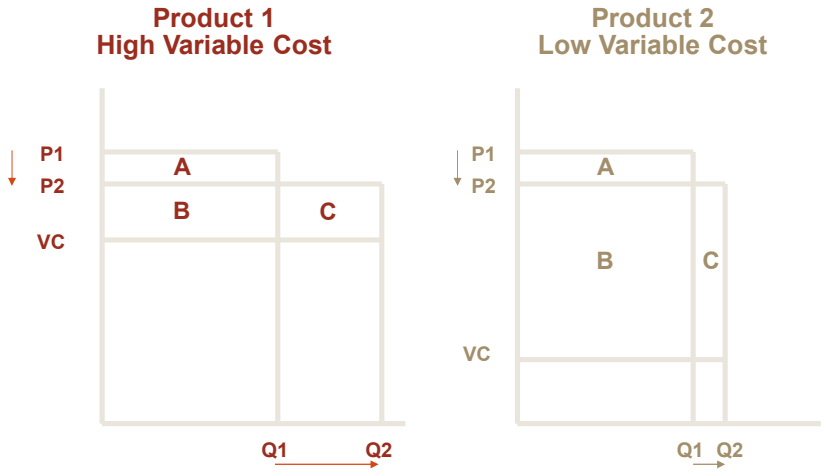
Breakeven Sales Change
10% Price Decrease



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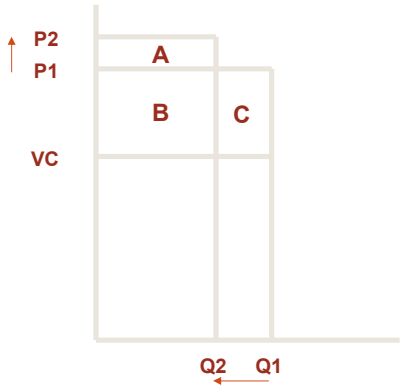
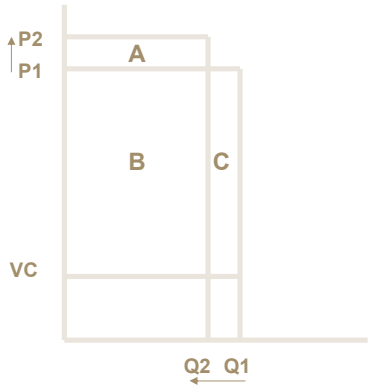
Breakeven Sales Change
10% Price Increase

Product 1
High Variable Cost



Product 2
Low Variable Cost



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The Breakeven Sales Change

The change that would sustain the same level of profit contribution at the new price as was achieved at the original price. A higher level of sales will produce higher profitability; a lower level of sales, lower profitability.

Key Questions

1. By how much must sales volume increase to profit from a price cut?
2. What loss in sales volume can be absorbed and still enable us to profit from a price increase?

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Calculating The % Breakeven Sales Change

The % Breakeven Sales Change

$$\%\text{BE Sales Change} = \frac{-\text{ Price Change}}{\text{CM + Price Change}}$$

Or, $\frac{-\Delta P}{CM + \Delta P}$

The Unit Breakeven Sales Change

Unit BE Sales Change = % BE Sales Change x Initial Sales Volume

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Breakeven Sales Change
An Illustration

How much would sales have to increase to make a 5% price reduction profitable for the following product:

- Current Price $10
- Current Sales (monthly) 1000 units
- Variable Cost Per Unit $8
- Fixed Overhead (monthly) $1,600
- Profit (monthly) $400

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Breakeven Sales Change
An Illustration

Calculating the % BE Sales Change:

$$\%\text{BE Sales Change} = \frac{-(-.05)}{.20 + (-.05)} \times 100 = 33.3\%$$

Calculating the unit BE Sales Change:

Unit BE Sales Change = .333 x 1,000 = 333 Units

The price cut will be profitable only if it results in an increase in weekly sales volume of more than 33.3%. The company must now sell at least 1,333 units weekly to maintain the same level of profitability it had achieved before the price reduction.

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Evaluating Profit Implications

Calculating Actual Changes In Profit:

Change in Profit =
[Actual Unit Sales Change - Unit BE Sales Change] x New $CM per unit

or,

Change in Profit =
[Actual % Sales Change - % BE Sales Change] x Baseline Unit Sales x New $CM per unit

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Profit Implications
An Illustration

Calculating Actual Changes in Profit

For A 25% Actual Sales Increase:

Change in Profit =

[250 units - 333 units] x $1.50/unit = - $125

For a 40% Actual Sales Increase:

Change in Profit =

[400 units - 333 units] x $1.50/unit = + $100

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Healthy Spring Water – *1a1 and 1a2*

The Healthy Spring Water Company sells bottled water for offices and homes. The price of the water is $20 per 10-gallon bottle and the company currently sells 2,000 bottles per day. Following is a summary of the company's income and costs per day.

Sales Revenue	**$40,000**
Incremental Variable Costs	**$16,000**
Non-Incremental Fixed Costs	**$20,000**

Note: You can assume that variable costs are constant so that the average of them is the variable cost relevant for a change in sales.

1. What is the maximum sales loss (in % and units) that Healthy Spring could tolerate before a 20% price increase would fail to make a contribution to profit? (That is, what is the basic breakeven sales change?)

2. By how much would Healthy Spring's contribution increase if its sales declined by 15% following the price increase?

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Healthy Spring
20% Price Increase

Price	$20
VC	$8
CM	$12
CM%	60%
ΔP =	+$4

$$BE = \frac{-\Delta P}{CM + \Delta P}$$

$$BE = \frac{-4}{12 + 4}$$

BE = - 25%

BE units = - 500

Source: Nagle and Holden IM (2002).

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Healthy Spring
Profit Impact of -15% Sales Change

Old CM	$12
New CM	$16
CMnew	$16
Actual Sales Δ	-300
BE Sales Δ	-500

Δ in Contrib =
(Actual Δ - BE Δ)*CMnew

Δ in Contrib = (-300 - -500)*16

Δ in Contrib = $3,200

Source: Nagle and Holden IM (2002).

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BE Calculations With a Change in Variable Cost

$$\text{\% BE Sales Change (with a Change in VC)} = \frac{\text{- Change in CM}}{\text{CM + Change in CM}}$$

$$= \frac{\text{- (Change in Price - Change in VC)}}{\text{CM + (Change in Price - Change in VC)}}$$

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Healthy Springs *1(b)*

For Healthy Spring to reposition itself as a premium water, management believes that it will have to upgrade the packaging of its product.

The company will deliver the water in glass rather than plastic bottles and the bottles will have to be "safety sealed" to ensure their cleanliness until the covering is removed in the customer's home.

These changes will add $1.00 per bottle to the variable cost of sales.

Given this increase in variable cost, what is the maximum amount of sales that Healthy Spring could afford to lose and still profit from repositioning its water at a 20% higher price?

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Healthy Spring
20% Price Increase w/Change in VC

Price	$20
VC old	$8
VC new	$9
CM old	$12
CM new	$15
ΔP =	+$4
ΔVC =	+$1
ΔCM =	+$3

$$BE = \frac{-\Delta CM}{CM + \Delta CM}$$

$$BE = \frac{-3}{12 + 3}$$

BE = - 20%
BE units = - 400

Source: Nagle and Holden IM (2002).

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BE Calculations With a Change in FC

Unit BE Sales Change (with Incremental FC) = Unit BE Sales Change + $\frac{\text{\$ Change in Fixed Costs}}{\text{New \$ CM}}$

OR . . .

% BE Sales Change (with Incremental FC) = % BE Sales Change + $\frac{\text{\$ Change in Fixed Costs}}{\text{New \$ CM x Initial Sales}}$

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BE Calculations With a Change in FC = *1c*

To reposition its water as a premium product, Healthy Spring will require an increase in its advertising and promotion budget of $900 daily.

What is the maximum sales loss that Healthy Spring could tolerate before a 20% price increase would fail to increase its net profit?

(That is, what is the breakeven sales change, including the incremental fixed cost of the advertising campaign?)

Assume here that they have also incorporated the packaging changes requiring incremental variable costs from the previous calculation

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Healthy Spring
BE w/Incremental FC

Assume here that they have also incorporated the packaging changes requiring incremental variable costs from the previous calculation.

$$BE = \frac{-\Delta CM}{CM + \Delta CM}$$

$$BE = \frac{-3}{12 + 3}$$

BE = - 20%

BE units = - 400

BE w/IFC = BE unit + ΔFC/CMnew

BE units = - 400

ΔFC = $900

CM new = $15

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Healthy Spring
BE w/Incremental FC

Assume here that they have also incorporated the packaging changes requiring incremental variable costs from the previous calculation.

$$BE = \frac{-\Delta CM}{CM + \Delta CM}$$

$$BE = \frac{-3}{12 + 3}$$

$$BE = -20\%$$

$$BE\ units = -400$$

BE w/IFC =
BE unit + ΔFC/CMnew

BE w/IFC =
-400 + $900/$15

BE w/IFC =
-400 + 60

BE w/IFC = -340 units

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Healthy Springs Problem 2
Facing New Competition

Here return to the original baseline scenario, presented at the beginning of Problem 1

Over the past decade, the Healthy Spring Water Company's sales grew rapidly due to increasing concerns about water quality. In recent years, however, the company's sales have been stagnant. The problem is that the market for spring water grew large enough that grocery stores began to carry it, at prices somewhat below those of Healthy Spring. Consequently, the grocery stores are enjoying most of the benefit of continued growth in this market.

The management of Healthy Spring is considering whether a 10% price cut might be justified to renew its competitiveness in this market. At present, the company's capacity to deliver water fully utilizes its five delivery trucks. To serve more customers, the company would have to add one or more additional trucks and drivers. Each truck could deliver up to an additional 400 bottles daily, at a daily operating cost (including wages, depreciation, fuel, and maintenance) of $500.

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Healthy Springs Problem 2
Facing New Competition

Here return to the original baseline scenario, presented at the beginning of Problem 1

Following is a review of the company's current operating data:

Price	$20 per bottle
Sales	2,000 units
Sales Revenue	$40,000
Incremental Variable Costs	$16,000
Fixed Costs	$20,000

P = $20, ΔP = - 10%
VC = $8/unit
ΔFC = $500/truck

Again, treat the variable costs as constant so that the average is the variable cost relevant for a change in sales.

1. What is the minimum sales gain that this company would require to make a 10% price cut profitable?
2. 2.If the actual sales gain following the 10% price reduction were 700 bottles per day, what would be the Change in Profit resulting from the price change?

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Healthy Spring
Problem 2: Breakeven Calculation

Here return to the original baseline scenario, presented at the beginning of Problem 1

$$BE = \frac{-\Delta P}{CM + \Delta P}$$

$$BE = \frac{-(-2)}{12 + (-2)}$$

BE = + 20%
BE units = + 400

To deliver 400 more units requires another truck:

BE w/IFC =
BE unit + ΔFC/CMnew

BE w/IFC =
400 + $500/$10 = 450

However, to deliver 450 more requires a second additional truck:

BE w/IFC =
450 + $500/$10 = 500

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Healthy Spring
Problem 2: Change in Profit Calculation

Old CM	$12
New CM	$10
CMnew	$10
Actual Sales Δ	+700
BE Sales Δ	+500

Δ in Contrib =
(Actual Δ - BE Δ)*CMnew

Δ in Contrib =
(700 - 500)*10

Δ in Contrib =
$2,000

Source: Nagle and Holden IM (2002).

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Financial Analysis for Reactive Pricing

The % breakeven sales change
(for a **reactive** price change)

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$$\%\text{BE Sales Change} = \frac{\text{Price Change}}{\text{CM}}$$

Or, $\frac{\Delta P}{CM}$

How many sales can I lose if I don't match my competitor's price cut.
How many sales do I have to gain before I would be better off matching my competitor's price increase?

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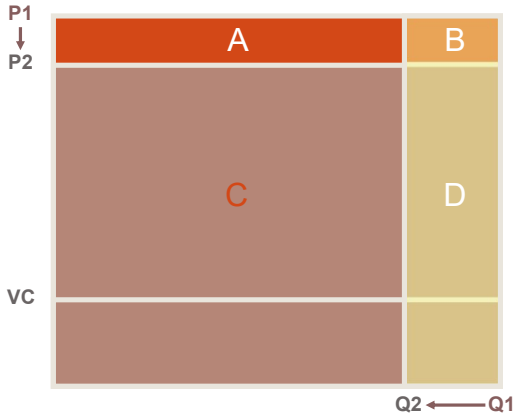
Reactive Breakeven. Competitor Cuts Price. Should you hold or match?

Losses vs Losses

Which loss is greater?
A + B (match)
or
B + D (don't)

If I match, I lose A+B.
If I don't match, I lose B + D



Adapted from: Smith (2010)

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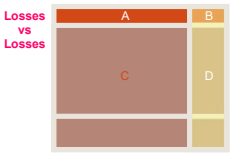
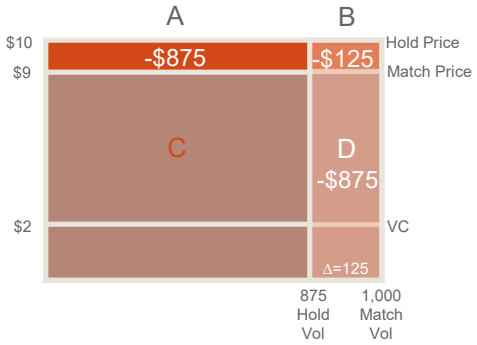
Reactive Breakeven Competitor Cuts Price 10% Calculating the BE



Breakeven
A + B
=
B + D



BE = ΔP/CM

BE = -10%/80%

= -12.5%

For example:
If ΔVol = - 40% Match
If ΔVol = - 5% Hold

Adapted from: Smith (2010)

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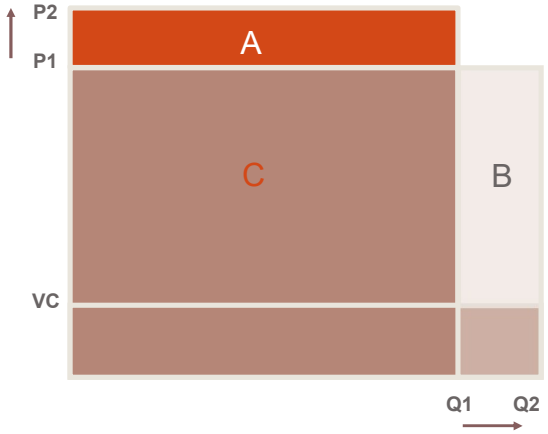
Reactive Breakeven
Competitor Raises Price
Should you hold or match?



Gains vs Gains

Which gain is greater?
A: Match and lose volume;
or
or B: Don't match and pick up volume

Adapted from: Smith (2010)

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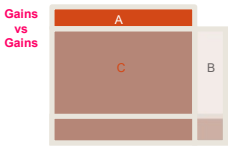
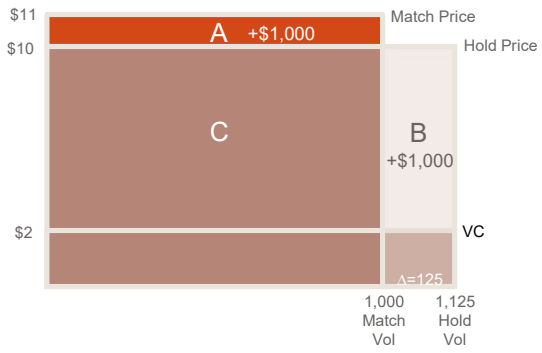
Reactive Breakeven
Competitor Raises Price 10%
Calculating the BE



Breakeven A = B



BE = ΔP/CM

BE = 10%/80%

= +12.5%

For example:
If ΔVol = + 5% Match
If ΔVol = + 40% Hold

Source: Smith (2010)

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Simulating Actual Change in Profit Scenarios

Break-even Sales Change Summary	Baseline	Proposed Price Change
Price/unit	$10.00	$9.50
% Price Change		-5%
$ Contribution/unit	$4.50	$4.00
% Contribution	45%	42%
Break-even sales change (%)		12.5%
Break-even sales change (units)		500
Total sales volume (units)	4,000	4,500
Total contribution	$18,000	$18,000

(Actual Δ - BE Δ) x CMnew

(0 – 500) x $4 = - $2,000

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Break-even Sales Change Simulated Scenarios

Simulated Scenarios	% Change in Actual Sales Volume	Unit Change in Actual Sales Volume	Change in Contribution After Price Change	Incremental Fixed Costs	Total Change in Profit After Price Change
1	0.0	0	-2000	800	-2,800
2	5.0	200	-1200	800	-2,000
3	10.0	400	-400	800	-1,200
4	12.5	500	0	800	-800
5	17.5	700	800	800	0
6	20.0	800	1,200	800	400
7	25.0	1,000	2,000	800	1,200
8	30.0	1,200	2,800	1,600	1,200
9	40.0	1,600	4,400	1,600	2,800

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Simulating Actual Change in Profit Scenarios… *With Incremental Fixed Costs*

Break-even Sales Change Summary	Baseline	Proposed Price Change
Price/unit	$10.00	$9.50
% Price Change		-5%
$ Contribution/unit	$4.50	$4.00
% Contribution	45%	42%
Break-even sales change (%)		12.5%
Break-even sales change (units)		500
Total sales volume (units)	4,000	4,500
Total contribution	$18,000	$18,000

(Actual Δ - BE Δ) x CMnew

(0 – 500) x $4 = - $2,000

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Break-even Sales Change Simulated Scenarios

Simulated Scenarios	% Change in Actual Sales Volume	Unit Change in Actual Sales Volume	Change in Contribution After Price Change	Incremental Fixed Costs	Total Change in Profit After Price Change
1	0.0	0	-2000	800	-2,800
2	5.0	200	-1200	800	-2,000
3	10.0	400	-400	800	-1,200
4	12.5	500	0	800	-800
5	17.5	700	800	800	0
6	20.0	800	1,200	800	400
7	25.0	1,000	2,000	800	1,200
8	30.0	1,200	2,800	1,600	1,200
9	40.0	1,600	4,400	1,600	2,800

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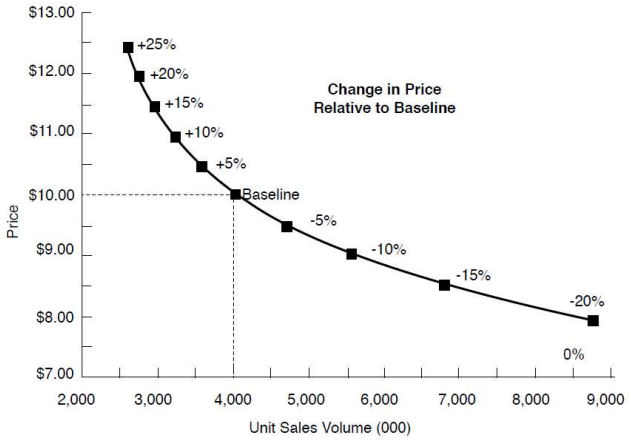
The Constant Profit Curve

Westside Manufacturing
For Potential Price Change Scenarios Ranging From -25% to +25%



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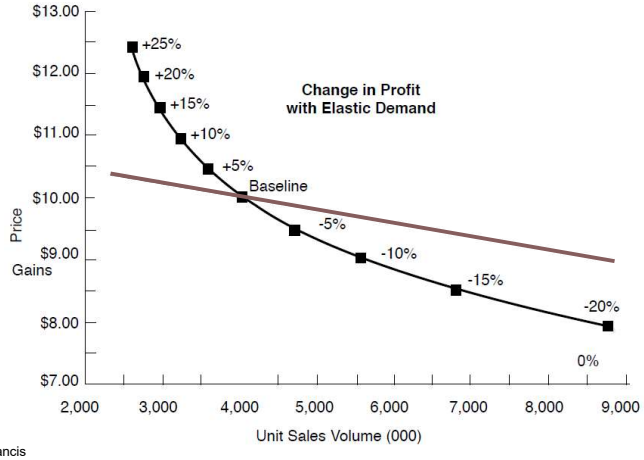
The Constant Profit Curve and Elastic Demand

Westside Manufacturing
Price Sensitivity of Market Demand – Demand More Elastic



Source: Taylor & Francis

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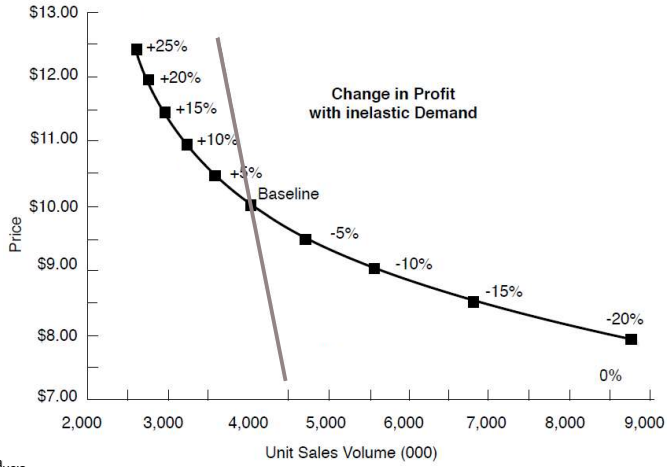
The Constant Profit Curve and Inelastic Demand

Westside Manufacturing

Price Sensitivity of Market Demand – Demand More Inelastic



Source: Taylor & Fra.....

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Tools For Financial Analysis of Pricing

1. BE Sales Change – Basic Calculation
2. Calculating Actual Change in Profit
3. BE Sales Change – With Change in Variable Costs
4. BE Sales Change – With Incremental Fixed Costs
5. BE Sales Change for Reactive Price Change
6. Simulating Change in Profit Scenarios
7. Constant Profit Curves (with Demand Curve Overlay)

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Financial Analysis
Summary

- Hard Numbers vs. Soft Judgment
- The Pricing Process
- It is better to make an imperfect judgment that includes all the relevant information, than to make a precise decision based upon ignorance of the relevant information or self-deception about its importance

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