CLASS SIDES

H&R Block/TaxACT

Merger Antitrust Law

Fall 2017 Georgetown University Law Center

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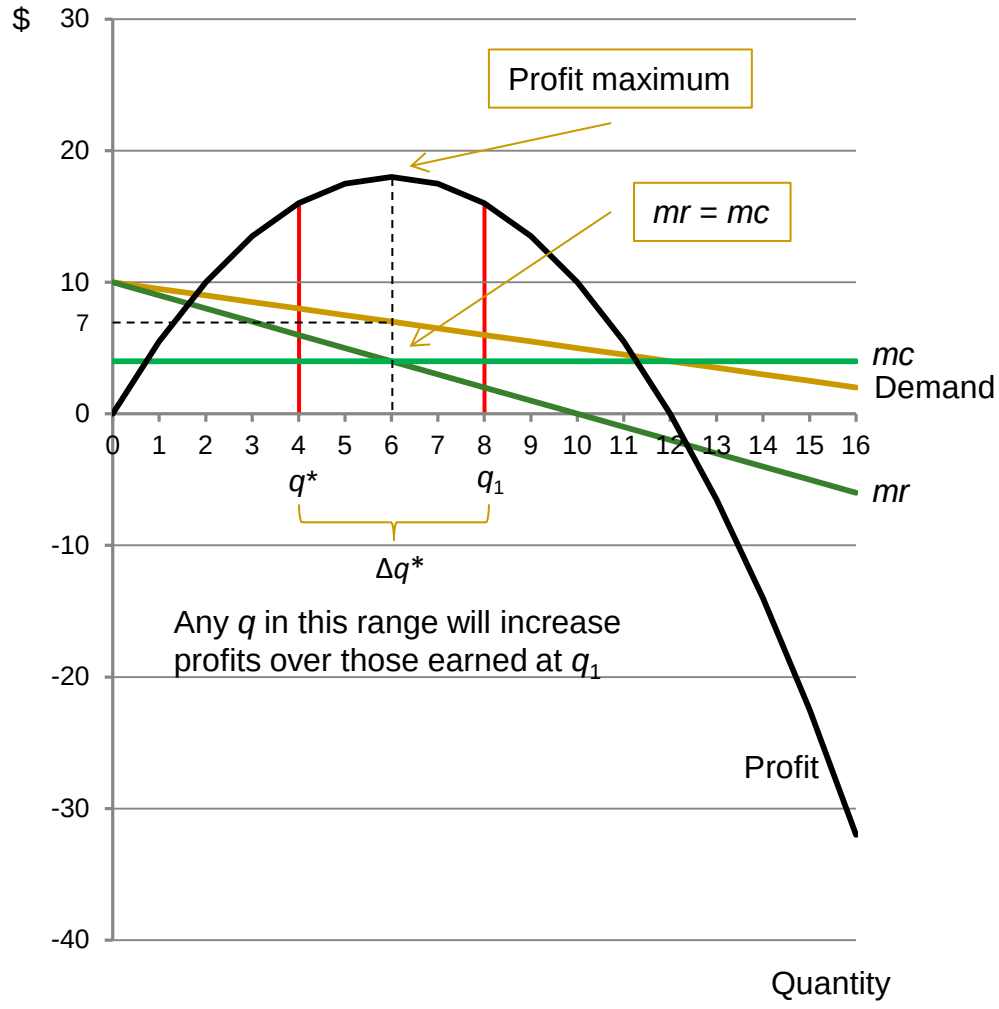
Market Definition
(Critical Loss Analysis)

Critical loss

- The basic idea



Recall this diagram from Unit 4. The curves result from the inverse demand function $q = 20 – 2p$. While we originally saw this demand function in the context of a monopolist, we can reinterpret here as the aggregate demand function for the industry (where all firm produce identical products and have identical, constant marginal costs). The profit curve then shows aggregate profits for the firms in the market.

Suppose competition among the firms in the market yields an aggregate output q_1, a quantity above the profit-maximizing level. The hypothetical monopolist tests asks whether a hypothetical monopolist can profitably raise profits by some SSNIP. An increase in price will decrease the quantity demand, so q will move to the left. The critical loss is the Δq^* so that the profits at $q^*=q_1-\Delta q^*$ are equal to the profits at q_1. Note that the profits at q^* are not the profit maximum.

Critical loss

- Formulas for critical loss
  - We can express the critical loss Δq^* algebraically in two equivalent ways:[1]
    - As an equality of total profits after and before the price increase:

$$(p + \Delta p - c)(q - \Delta q^*) = (p - c)q$$

Breakeven condition

    - As an equality of the gross gain in profits on retained sales and the gross loss in profits from lost sales:

Gain on retained sales

$$\Delta p\,(q - \Delta q^*) = (p - c)\,\Delta q^*$$

Loss of margin on lost sales

      - Note: Critical loss is a function of q, that is, the magnitude of q^* depends on the starting point q as well as on p and c
  - Solving for Δq^* provides a formula for the critical loss in absolute units:

$$\Delta q^* = \frac{q\Delta p}{(p + \Delta p) - c}$$

or in percentage terms:

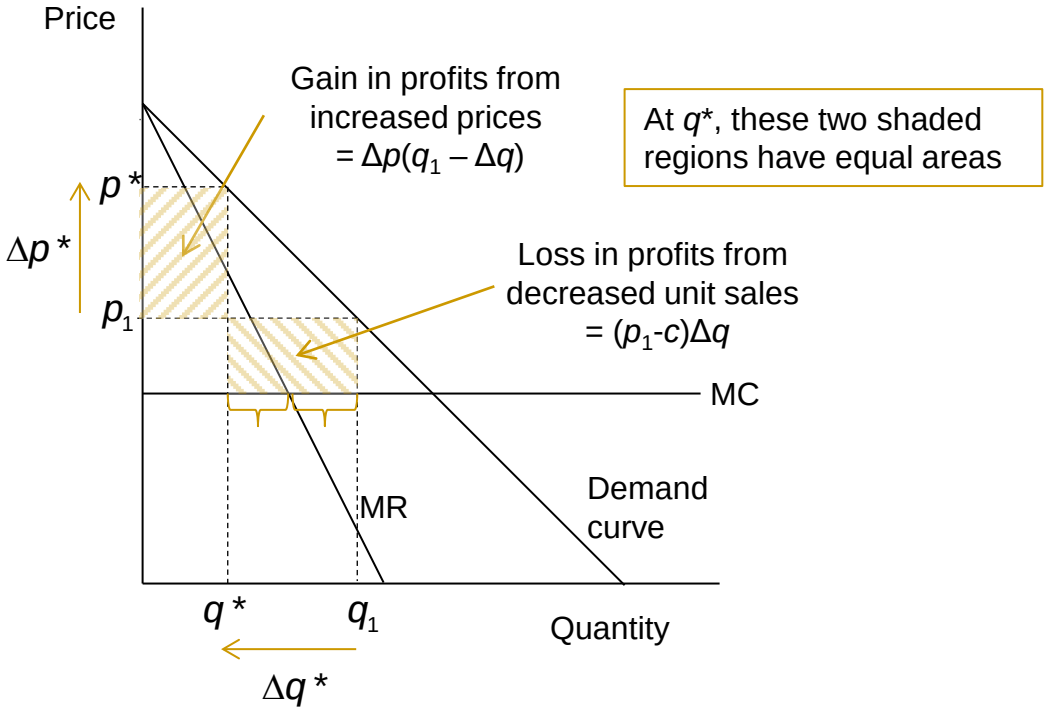
$$\frac{\Delta q^*}{q} = \frac{\Delta p}{(p + \Delta p) - c} = \frac{\frac{\Delta p}{p}}{\frac{\Delta p}{p} + \frac{p - c}{p}} = \frac{\delta}{\delta + m}$$

Where δ is the percentage price increase and m is the percentage gross margin

[1] This assumes zero fixed costs and constant marginal costs.

Critical loss

- Formulas for critical loss



NB: The profit-maximizing quantity lies equidistant between q^* and q_1

Critical loss and market definition

- The basic idea
  - Recall that under the hypothetical monopolist test, a candidate market is a relevant market if a hypothetical monopolist could profitably raise prices in the candidate market by a SSNIP.
    - So for any candidate market with prevailing aggregate output q and price p and a SSNIP Δp, then if the change in output Δq is less than the critical loss Δq^* a hypothetical monopolist could profitably raise price by the SSNIP and the candidate market is a relevant market
  - Algorithm
    1. Start with a product of the merging firm
       - Or a product of the merging firm together with other closely related products (as in H&R Block/TaxACT)
    2. Assume a hypothetical monopolist over the group of products—the "candidate market"—and raise price by a SSNIP
    3. Compare actual loss Δq to critical loss Δq^*,
       - If the actual loss $\Delta q < \Delta q^*$, then a hypothetical monopolist could profitably raise prices by the SSNIP and the product grouping is a relevant market
         - Whether the SSNIP is profitable will be determined by the candidate market's *own-elasticity of demand*
       - If the actual loss $\Delta q \geq \Delta q^*$, then a hypothetical monopolist could not profitably raise prices the product grouping is not a relevant market → add to the product group another product with a high cross-elasticity of demand/diversion ratio and repeat Steps 2 and 3.
         - If the SSNIP is not profitable, the additional product to include the candidate market is determined by the *cross-elasticity of demand* between the products in the candidate market and the products outside the candidate market

Critical loss and market definition

- Example 1
  - Products A and B are being tested as a candidate market. Each sells for $100, has an incremental cost of $60, and sells 1200 units. When the price for both products is increased by $5, each firm loses 100 units to outside the market. Do A and B constitute a relevant market under the 2010 Guidelines?

Parameters			**Critical loss calculations**		**Critical loss**	
Price	p	100	Gain = (Q+ΔQ)Δp			
Cost	c	60	Q + ΔQ	2200	$\Delta q^* = \frac{q\Delta p}{(p+\Delta p)-c}$	
Gross margin	m	40	Δp	5		
Market output	Q	2400	Gain	11000		
SSNIP	Δp	5	Loss = mΔQ			
Customer loss	ΔQ	-200	ΔQ	-200	qΔp	12000
			m	40	(p+Δp)-c	45
			Loss	-8000	CL	266.6667
			Net	3000		

From the breakeven condition (see earlier slide)

Conclusion: Since the gain exceeds the loss, a hypothetical monopolist of A and B could profitably raise price by 5% and so A and B are a relevant market

Critical loss and market definition

- Example 1A
  - We can also analyze Example 1 in terms of the percentage critical loss:

Summary:

P=$100

C=$60

Margin = $40

Total market $Q = q_1 + q_2 = 2400$

Percentage margin $m = \frac{p-c}{p} = \frac{100-60}{100} = 40.0\%$

SSNIP $\delta = 5\%$

Percentage critical loss $CL = \frac{\delta}{\delta + m} = \frac{5\%}{5\% + 40\%} = 11.1\%$

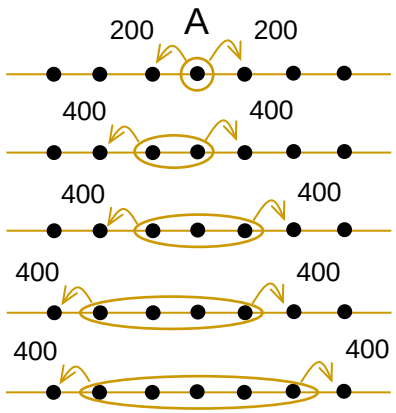
Percentage actual loss $L = \frac{100+100}{2400} = 8.33\%$

Conclusion: Since the percentage actual loss *L* does not exceed the percentage critical loss *CL*, a hypothetical monopolist of A and B could profitably raise price by 5% and so A and B are a relevant market

Critical loss and market definition

- Example 2: Gas stations on a road
  - Assume that there is an identical gas station every mile on a straight road. Each gas stations charges $3.25 per gallon, has an incremental costs of $2.50, and sells 1000 gallons. When the price at a station is increased by 5% (holding the price at all other gas stations constant), the station loses 400 customers. No customer will travel more than one mile, however, to avoid a 5% price increase. For a given station A, what is the relevant market?

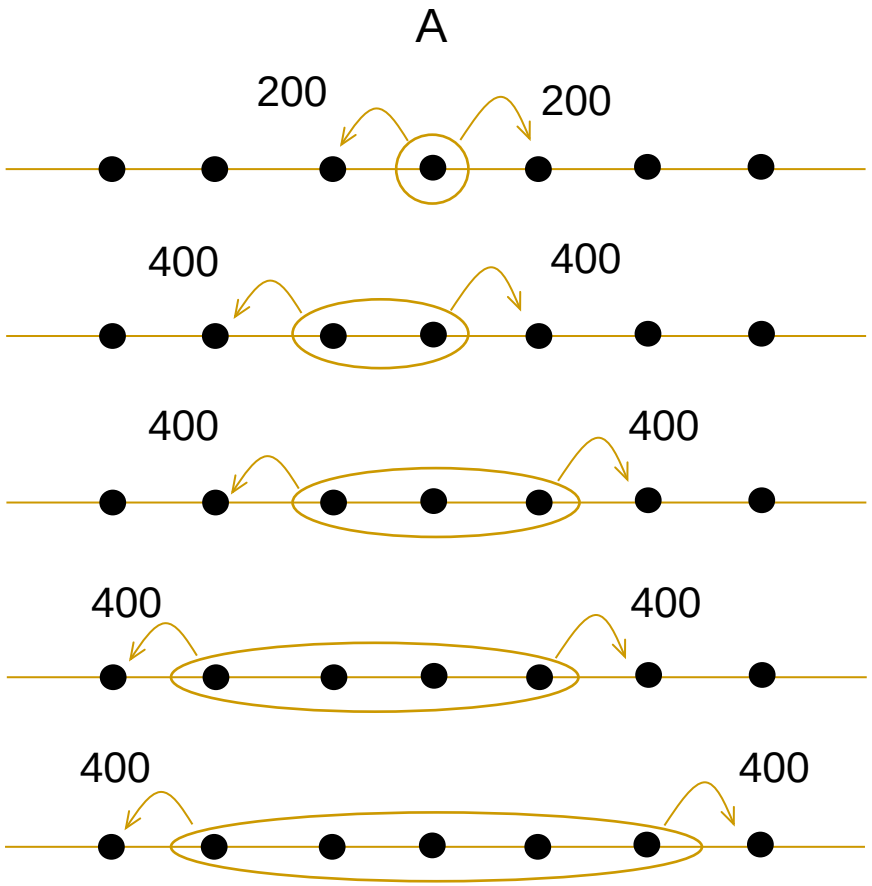
Price	p	3.25
Cost	c	2.50
Gross margin	m	0.75
Percentage SSNIP		5.0%
Actual SSNIP		0.1625
Customers/station		1000
Customer loss		400



Stations in the market	Q	ΔQ	Gain	Loss	Net
1	1000	400	97.50	300.00	-202.50
2	2000	800	195.00	600.00	-405.00
3	3000	800	357.50	600.00	-242.50
4	4000	800	520.00	600.00	-80.00
5	5000	800	682.50	600.00	82.50

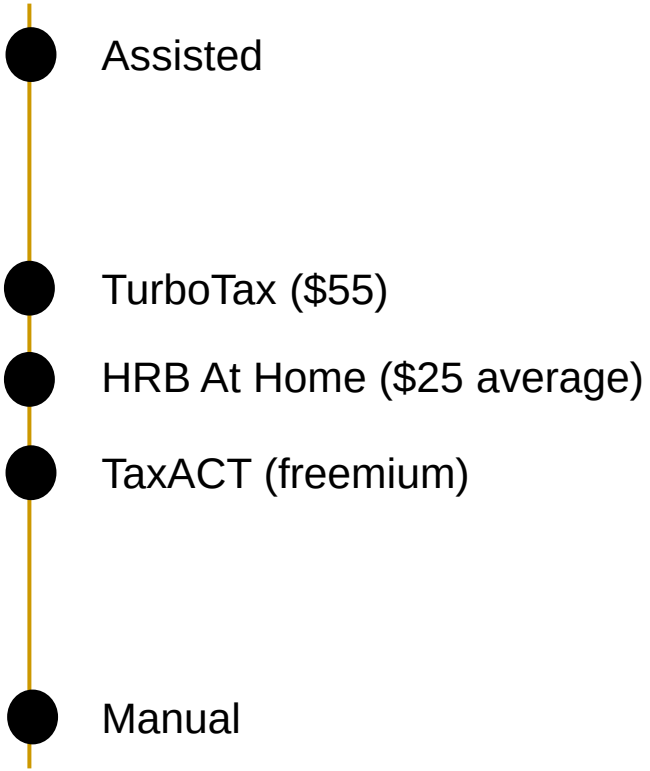
Critical loss and market definition

- Example 2: Gas stations on a road



Critical loss and market definition

- Example 3—TaxACT



Critical loss and market definition

- The homogeneous products case—Determining the critical loss
  - Recall that the critical loss Δq* satisfies the breakeven condition for total profits:

$$(p + \Delta p - c)(q - \Delta q^*) = (p - c)q$$

NB: Always watch the signs on Δ*q*. Here, Δ*q* is *subtracted* from *q*, so Δ*q* is a positive number.

Rearrange to isolate Δ*q**:

$$\Delta q^* = q - \frac{(p-c)q}{p + \Delta p - c}$$

Divide by *q* and simplify:

$$CL = \frac{\Delta q^*}{q} = \frac{\Delta p}{\Delta p + (p-c)} = \frac{\Delta p / p}{\Delta p / p + (p-c)/p} = \frac{\delta}{\delta + m}$$

So the candidate market will be a relevant market if the monopolist's percentage actual loss *L* is less than the critical loss *CL* for the SSNIP:

$$L \equiv \frac{\Delta q}{q} < \frac{\Delta q^*}{q} = CL$$

Or

$$L < \frac{\delta}{\delta + m}$$

Critical loss and market definition

- The homogeneous products case—Estimating actual loss
  - We can further refine this result in a homogenous product space where—
    - Premerger pricing satisfies the Lerner Condition ($\varepsilon = 1/m$), and
    - All demand functions are linear in price in the vicinity of the premerger equilibrium point
  - First-order approximation of actual loss:

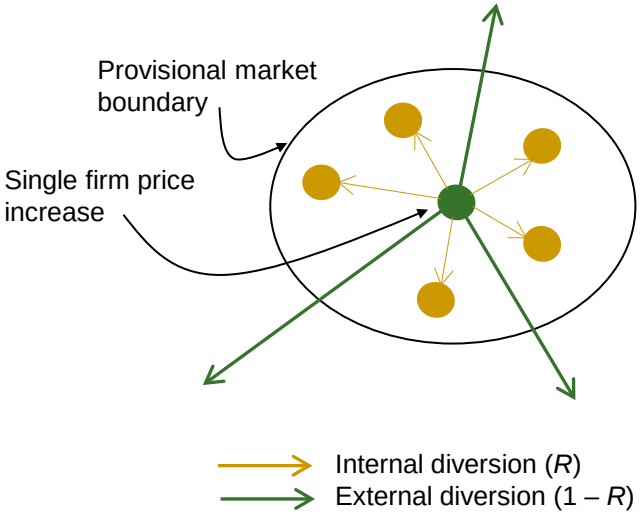
$$\frac{\frac{\Delta q}{q}}{\frac{\Delta p}{p}} \equiv \varepsilon \Rightarrow \frac{\Delta q}{q} \cong \frac{\Delta p}{p}\varepsilon$$

where ε is the residual own-elasticity of demand of the monopolist

that is, the percentage actual loss is approximately equal to the percentage price change times the own-elasticity of demand

"Aggregate diversion ratio"

- Aggregate diversion ratio
  - Definition
    - The percentage of total sales lost by a product in the wake of a uniform SSNIP that is captured by all of the other products inside the provisional market.



    - *Key result*: If the aggregate diversion ratio is greater than or equal to the critical loss, the provision market satisfies the hypothetical monopolist test:

$$R \equiv \frac{\Delta q_{inside}}{\Delta q} \geq \frac{\Delta q^*}{q} = \frac{\delta}{\delta + m} \Rightarrow \text{ Hypothetical monopolist test is satisfied}$$

"Aggregate diversion ratio"

- Extension to single product recapture rates
  - Define the critical recapture rate R* as:

$$R^* = \frac{\delta}{\delta + m}.$$

  - Conjecture:

$$\text{If } \min_i R_i \geq R^*, \text{ then } R \geq R^* \text{ and so } L < CL.$$

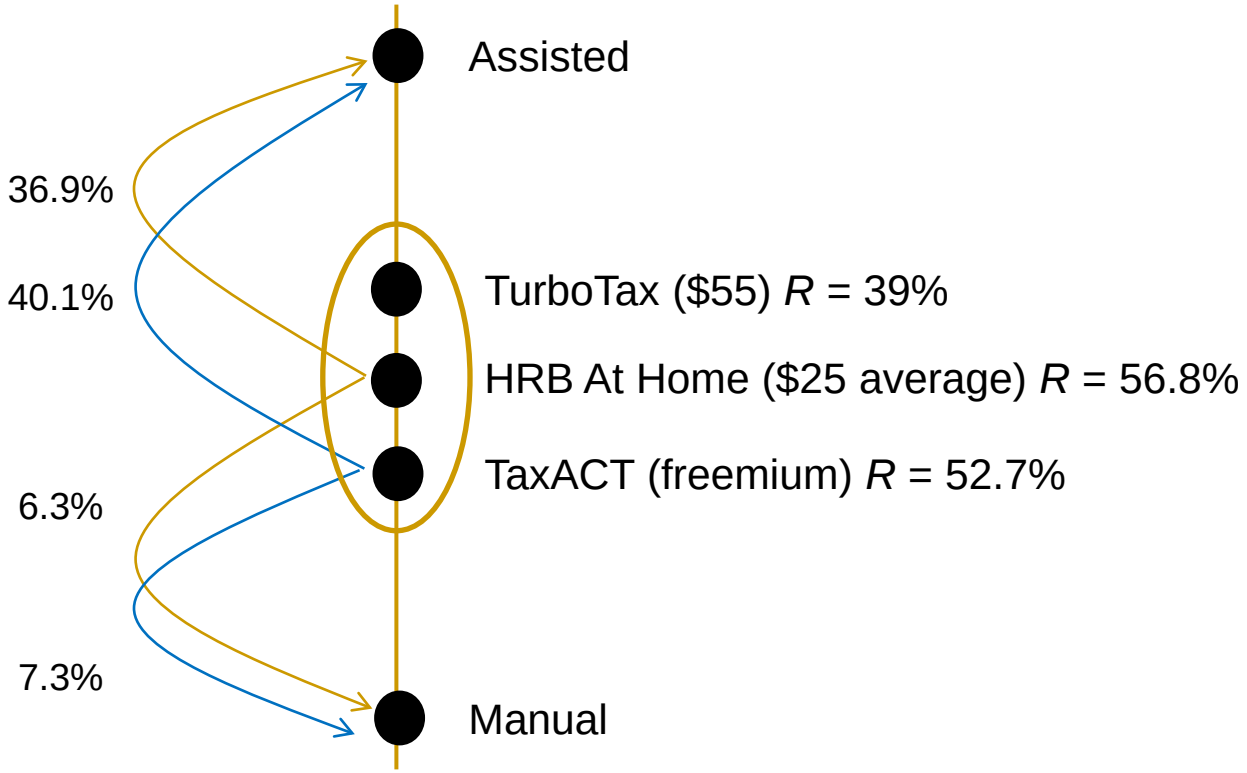
  - Example
    - Assume a three-product candidate market. Each product has a margin of 35%. Assume a uniform SSNIP of 5% across all products. Then R^* = 12.5%. Suppose that the SSNIP generates the following recapture rates:

Product	q	Δq	Recapture Units	Recapture Rate (R)
A	300	90	20	22.22%
B	400	125	40	32.00%
C	500	200	35	17.50%
Total	1200	415	95	22.89%

    - Applying extension, since the smallest R_i (17.5%) is greater than R* (12.5%), a hypothetical monopolist can profitably sustain a 5% uniform price and so the three products are a relevant market

“Aggregate diversion ratio”

- Warren-Bolton analysis in H&R Block/TaxACT



"Aggregate diversion ratio"

- Warren-Bolton analysis in H&R Block/TaxACT
  - Question: Is DDIY a market?
  - Critical loss (*CL*): Use percentage critical loss formula
    - Starting point: Start with DDIY products (HRB, TaxACT, and TurboTax)
    - SSNIP (δ): 10%
    - Gross margin (*m*): 50% on each product

$$CL = \frac{\delta}{\delta + m} = \frac{10\%}{10\% + 50\%} = 16.7\%$$

  - Actual loss: Use Aggregate diversion ratio method (recapture rate *R*)
    - Test: If $R \geq CL$, then product grouping is a market
    - Using IRS switching data as a proxy for *R*, Warrant-Bolton found:
      - HRB: $R = 57\%$
      - TaxACT: $R = 53\%$
      - TurboTax: $R = 39\%$
    - Warren-Bolton concluded that, since each $R > CL$, a hypothetical monopolist of the DDIY product could profitably raise price by a SSNIP and therefore DDIY was a relevant product market

Anticompetitive Effects

The *PNB* presumption

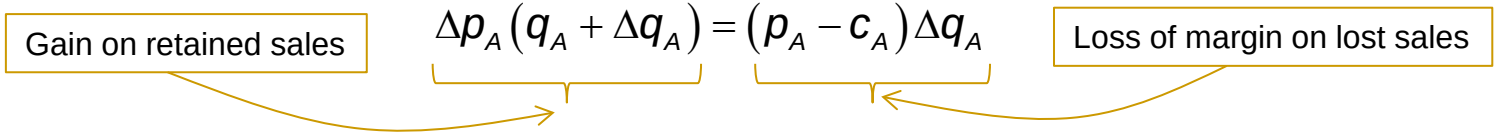
	Premerger Shares	HHI Contribution	
Intuit	62.2%	3869	The square of the firm's market share
HRB	15.6%	243	
TaxACT	12.8%	164	
Others (6)	9.4%	15	Residual share (9.4%) divided by 6 firms and added six times
	100.0%	4291	The sum of the squared shares of all of the firms in the market
Combined share	28.4%		
Premerger HHI		4291	
Delta		400	2 × HRB share × Intuit share
Postmerger HHI		4691	

"Violates" the 2010 Guidelines:
Postmerger HHI exceeds 2500 and delta exceeds 200

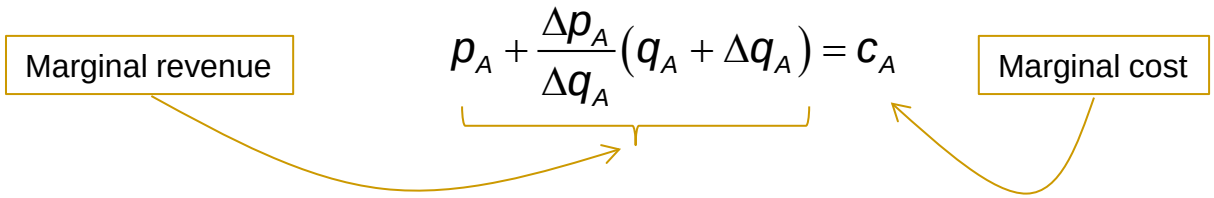
Note: Court appears to have assumed that six equal-sized firms are in the "other" category

Unilateral effects

- Remember the breakeven condition for firm A:



Rearranging:



Now increase q by Δq (and so lower p by Δp). Some of the increased sales come from firm B. Call this $\Delta q_{B \to A}$. Firm B loses its margin on those sales:

Firm B's loss of margin: $\Delta q_{B \to A}(p_B - c_B)$

Suppose that A and B merge. Now A must take into account B's loss of margin when increasing A's sales volume. This reduces the combined firm's marginal revenue, and so requires the merged firm to reduce output and raise price to reequilibrate marginal revenue and marginal cost

Unilateral effects

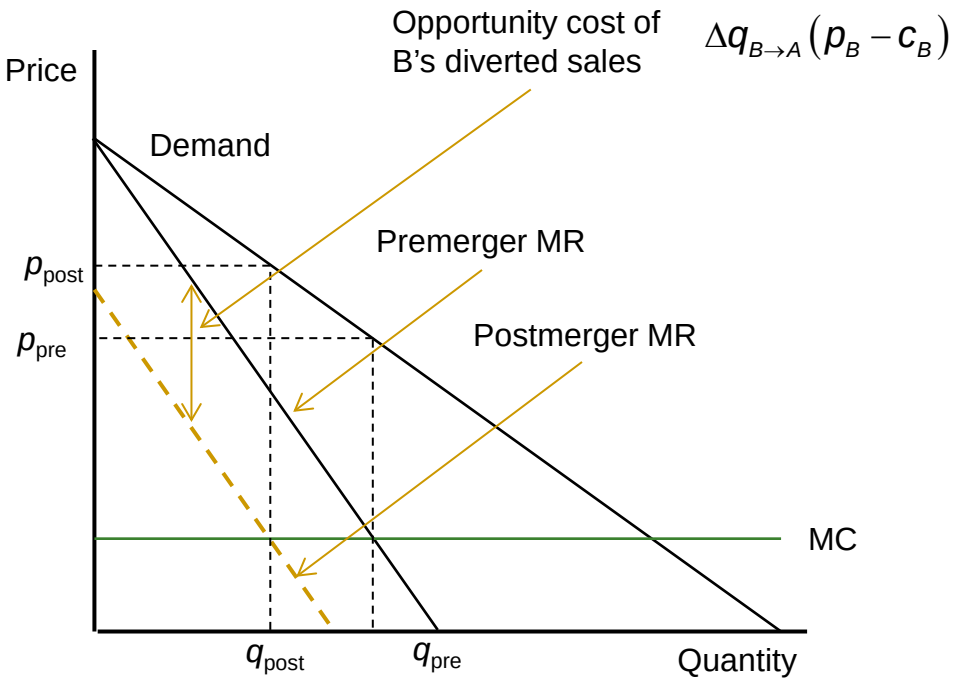
- Look at the merged firm breakeven condition (holding B's price constant and allocating all profits and losses to A):

$$\underset{+}{p_A} + \underset{-}{\frac{\Delta p_A}{\Delta q_A}}\underset{+}{\left(q_A + \Delta q_A\right)} + \underset{-}{\Delta q_{B\to A}}\underset{+}{\left(p_B - c_B\right)} = c_A$$

Opportunity cost re Firm B

  - The signs above the terms assume that A is *increasing* output
  - Note that the opportunity cost for Firm B is *negative*
    - This means that at Firm A's premerger levels of output and price, Firm A's postmerger marginal revenue is *less* than its marginal cost
    - Consequently, to achieve marginal revenue = marginal cost, firm A must decrease output and increase price
  - Note also that the magnitude of the opportunity cost—and hence the amount that A must decrease output and increase price is directly related to:
    - The diversion of products from B to A ($\Delta q_{B\to A}$)
    - Firm B's margin ($p_B - c_B$)

Unilateral effects



Unilateral effects

Firm 1
(producing Product 1)

Assume linear demand (p = price intercept minus quantity)

Price intercept	300	
Marginal cost	20	(constant)
Margin	140	

(price minus marginal cost at premerger profit-maximizing price)

Recapture of Products from Diverted Sales to Firm 2

Diversion ratio	0.3	
Firm 2 margin	140	(assume the same as Firm 1 at premerger price)

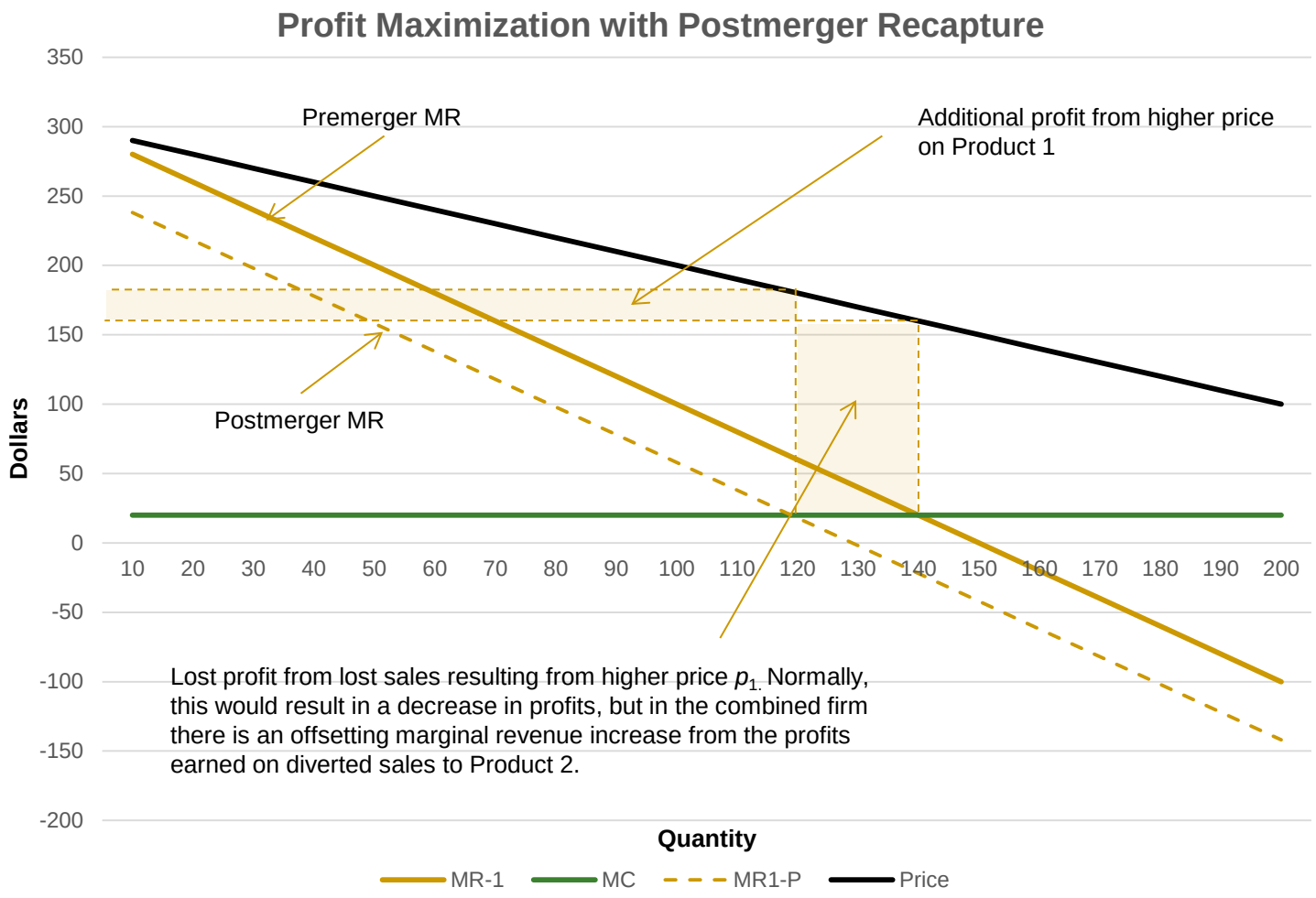
PREMERGER

Price	Quantity	Revenue	MR	Cost	MC	Profit	Margin (p - mc)
0	300	0	-300	6000	20	-6000	-20
10	290	2900	-280	5800	20	-2900	-10
20	280	5600	-260	5600	20	0	0
30	270	8100	-240	5400	20	2700	10
40	260	10400	-220	5200	20	5200	20
50	250	12500	-200	5000	20	7500	30
60	240	14400	-180	4800	20	9600	40
70	230	16100	-160	4600	20	11500	50
80	220	17600	-140	4400	20	13200	60
90	210	18900	-120	4200	20	14700	70
100	200	20000	-100	4000	20	16000	80
110	190	20900	-80	3800	20	17100	90
120	180	21600	-60	3600	20	18000	100
130	170	22100	-40	3400	20	18700	110
140	160	22400	-20	3200	20	19200	120
150	150	22500	0	3000	20	19500	130
160	140	22400	20	2800	20	19600	140
170	130	22100	40	2600	20	19500	150
180	120	21600	60	2400	20	19200	160
190	110	20900	80	2200	20	18700	170
200	100	20000	100	2000	20	18000	180
210	90	18900	120	1800	20	17100	190
220	80	17600	140	1600	20	16000	200
230	70	16100	160	1400	20	14700	210
240	60	14400	180	1200	20	13200	220
250	50	12500	200	1000	20	11500	230
260	40	10400	220	800	20	9600	240
270	30	8100	240	600	20	7500	250
280	20	5600	260	400	20	5200	260
290	10	2900	280	200	20	2700	270

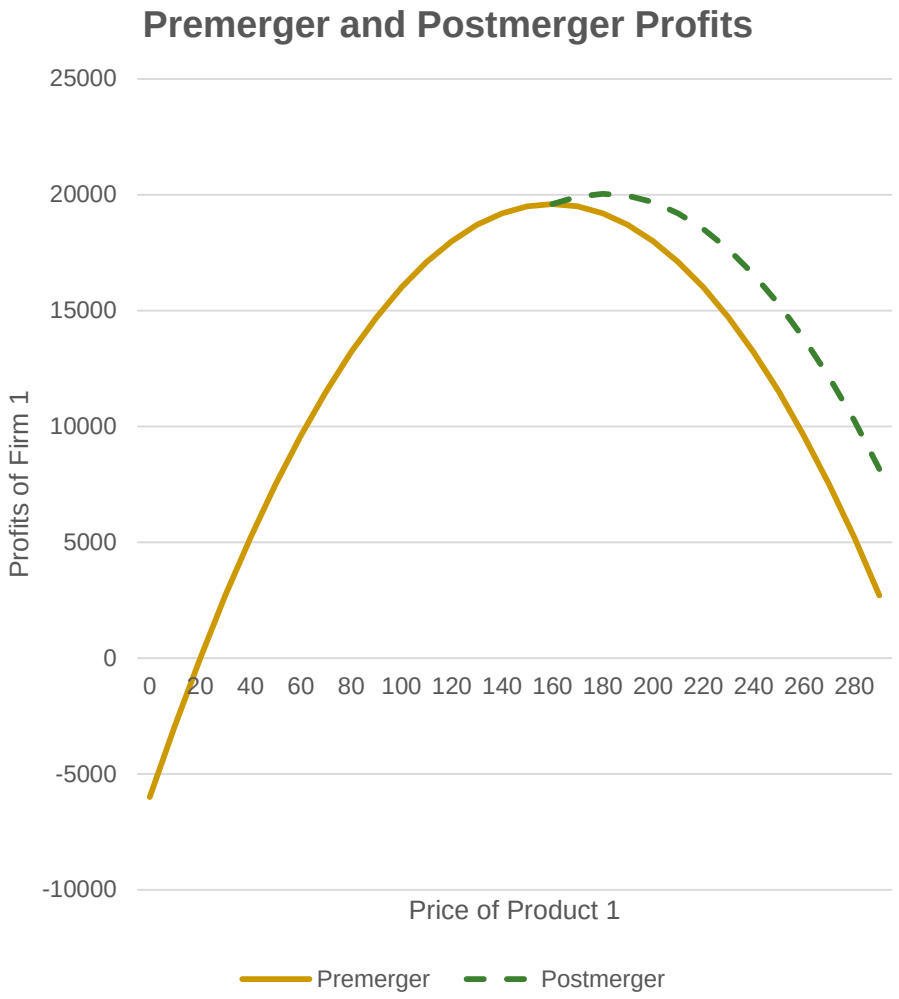
POSTMERGER RECAPTURE
(holding Firm 2's price constant at the premerger level)

Firm 1 Lost units	Lost profits	Diversion to Firm 2	Profit Recapture	Post-merger Profit	Difference
0	0	0	0	19600	0
10	100	3	420	19920	320
20	400	6	840	20040	440
30	900	9	1260	19960	360
40	1600	12	1680	19680	80
50	2500	15	2100	19200	-400
60	3600	18	2520	18520	-1080
70	4900	21	2940	17640	-1960
80	6400	24	3360	16560	-3040
90	8100	27	3780	15280	-4320
100	10000	30	4200	13800	-5800
110	12100	33	4620	12120	-7480
120	14400	36	5040	10240	-9360
130	16900	39	5460	8160	-11440

Unilateral effects



Unilateral effects



Unilateral effects

- General requirements
  - The products of the merging parties are close substitutes for one another
    - That is, they have high cross-elasticities of demand with one another
  - The products of (most) other firms are much more distant substitutes
    - That is, they have low cross-elasticities of demand with the products of the merging firms
  - Repositioning into the product of the merging firms is difficult
    - That is, other incumbent firms and new entrants in the market cannot easily change their product's attributes or introduce a new product that would be a close substitute to the products of the merging firm
- Specific Guidelines requirements
  - 1992: Merging companies had to be each other's closest competitors and the combined firm had to have a market share of at least 35%
    - *Problem*: Some cabining was necessary, since otherwise the unilateral effects theory applies too broadly to any merger where the combining firms have positive cross-elasticity with one another and a positive margin and the market exhibits barriers to entry and repositioning
  - 2010: Eliminated both the closest substitute and 35% share requirements

Unilateral effects

- Example
  - Nestlé-Dreyer's in the super-premium segment of an all ice cream market

Super-Premium Ice Cream (1)
(all channels)

	Sales	Share	HHI
Ben & Jerry's	$254.40	42.4%	1797.76
Nestlé	$219.00	36.5%	1332.25
Dreyer's	$114.60	19.1%	364.81
Others	$12.00	2.0%	4
	$600.00	100.0%	3498.82
Combined share		55.6%	
Premerger HHI			3,501
Delta			1,396
Postmerger HHI			4,897

All Ice Cream (2)
(supermarket sales in 2002)

	Sales	Share	HHI
Store brands (10)	$997.2	23.0%	53
Dreyer's	$795.4	18.4%	339
Breyer's	$686.8	15.9%	253
Blue Bell	$253.4	5.8%	34
Ben & Jerry's	$199.8	4.6%	21
Nestle	$192.7	4.4%	19
Wells Diary	$136.9	3.2%	10
Armour Swift	$106.7	2.5%	6
Turkey Hill	$105.2	2.4%	6
Marigold Foods	$88.2	2.0%	4
Others (10)	$769.1	17.8%	32
	$4,331.4	100.0%	776
Combined share		22.8%	
Premerger HHI			776
Delta			162
Post-merger			938

[1] Complaint, *In re* Nestlé Holdings, Inc., 136 F.T.C. 791 (2003) (settled by consent decree).
[2] Sherri Day, *Nestlé and Dreyer's to Merge in $2.4 Billion Deal, Creating Top U.S. Ice Cream Seller*, N.Y. Times, June 18, 2002.

Diversion ratios

- Diversion ratios
  - Definition (when firm A raises in price):

$$D_{A\to B} \equiv D_{AB} = \frac{\Delta q_B}{\Delta q_A}$$

where firm A loses total sales of Δq_A, of which Δq_B go to firm B

- *Careful*:
  - The story we told to motivate unilateral effects had A's price *decreasing*
  - The definition of diversion ratios is motivated by A's price *increasing*

GUPPIs

- Gross Upward Pricing Pressure Index (GUPPI)
  - Definition:

$$GUPPI_A = \frac{\text{value of profits from sales diverted to product B}}{\text{value of all sales lost by product A}} = \frac{\Delta q_B \left(p_B - c_B\right)}{\Delta q_A p_{A1}}$$

  - Let $m_B = \frac{p_B - c_B}{p_B}$ the percentage gross margin of product B and DR_{AB} be the diversion ration between product A and product B. Then:

$$GUPPI_A == \frac{\Delta q_B}{\Delta q_A} \frac{\left(p_B - c_B\right)}{p_B} \frac{p_B}{p_A} = D_{AB} m_B \frac{p_B}{p_A}$$

    which is the usual form of the expression for a GUPPI
  - Section 6.1 of the 2010 DOJ/FTC Horizontal Merger Guidelines implicitly creates of measure of this type

GUPPIs

- Relation to profit-maximizing price increases
  - Assumptions
    - Linear residual demand curves
    - Equal diversion ratios ($D_{12} = D_{21} = D$)
    - Equal marginal costs, equal prices, and equal market shares
    - Bertrand competition the GUPPI gives the profit-maximizing price increase postmerger under the unilateral effects theory
  - Proposition:
    - The profit-maximizing price increase for product 1 leaving the price of product 2 at its premerger level:

$$\frac{\Delta p_1^*}{p_1} = \frac{GUPPI}{(1-D)} = \frac{Dm}{(1-D)}$$

    - The profit-maximizing price increase for both product 1 and product 2 when raising the price of both products:

$$\frac{\Delta p_1^*}{p_1} = \frac{\Delta p_2^*}{p_2} = \frac{GUPPI}{2(1-D)} = \frac{Dm}{2(1-D)}$$

GUPPIs

- Relation to profit-maximizing price increases
  - Example 5 of the 2010 DOJ/FTC Horizontal Merger Guidelines

> Products A and B are being tested as a candidate market. Each sells for $100, has an incremental cost of $60, and sells 1200 units. For every dollar increase in the price of Product A, for any given price of Product B, Product A loses twenty units of sales to products outside the candidate market and ten units of sales to Product B, and likewise for Product B. Under these conditions, economic analysis shows that a hypothetical profit-maximizing monopolist controlling Products A and B would raise both of their prices by ten percent, to $110.

  - How do the Guidelines predict that the profit-maximizing price will increase by $10?
    - Summary of parameters

$$p = \$100 \qquad c = \$60$$

$$D = 1/3 \qquad m = \frac{p-c}{p} = 0.4$$

    - The market exhibits linear demand and complete symmetry, so

$$\frac{\Delta p_1^*}{p_1} = \frac{\Delta p_2^*}{p_2} = \frac{Dm}{2(1-D)} = \frac{(1/3)(0.4)}{2(1-1/3)} = 0.10 \quad \text{or } 10\%$$