Merger Typology

Horizontal	Vertical	Conglomerate
-Substantial overlap of business (same mkts or closely related mkts).	-Businesses are related up or down production (supply) chain	-Nominally unrelated businesses BUT, vary lots in degree of unrelatedness
Examples: --Boeing/McDonnell Douglas --Staples/Office Depot --BP Amaco/ARCO --Exxon/Mobil	Examples: -Time-Warner/Turner: Cable programming and cable systems -GM & Fisher Auto Body -Coca-Cola/ independent bottlers	Examples: -RJR Tobacco/Nabisco LBO (food products) -TWT/AOL

Alternatives to Mergers/Acquisitions

(1) **Direct Investment**:
   Expand or enter market directly by investment, not acquisition
(2) **Leveraged Buyouts, Management Buyouts** (LBOs & MBOs):
   Change management or control structure without necessarily reorganizing production/firm
(3) **Strategic Alliances, Joint Ventures**:
   Coordinate activities without changing ownership of firm's assets

Motivations for Mergers

1. Market Power
   - Horizontal mergers: take out competitor
   - Vertical mergers: concerns about foreclosure of competitors, mkt power extension
   - This is the focus of U.S. merger policy: prevent monopoly, make oligopoly coordination more difficult.

2. Efficiencies
   - "synergies" in costs (econ of scale, scope?)
   - align management incentives with shareholder interests (LBOs?)
   - internal capital market access
   - management change: replace inferior/inefficient management
     --used to be called x-inefficiency; now "suboptimal" effort, deviations from cost-minimization
     --why not just fire management? managerial entrenchment?

3 Financial/Pecuniary Gains
   - Tax advantages to combination
   - diversify to reduce bankruptcy costs
   - contract abrogation (especially labor, pension)

4. Information Asymmetry : undervalued target

5. Management objectives/self-interest
   - managerial aggrandisement
   - increase compensation (function of size), power, control
   - "winner's curse" : believe they can pick undetected "winners," though this may be illusionary (Richard Roll "hubris")
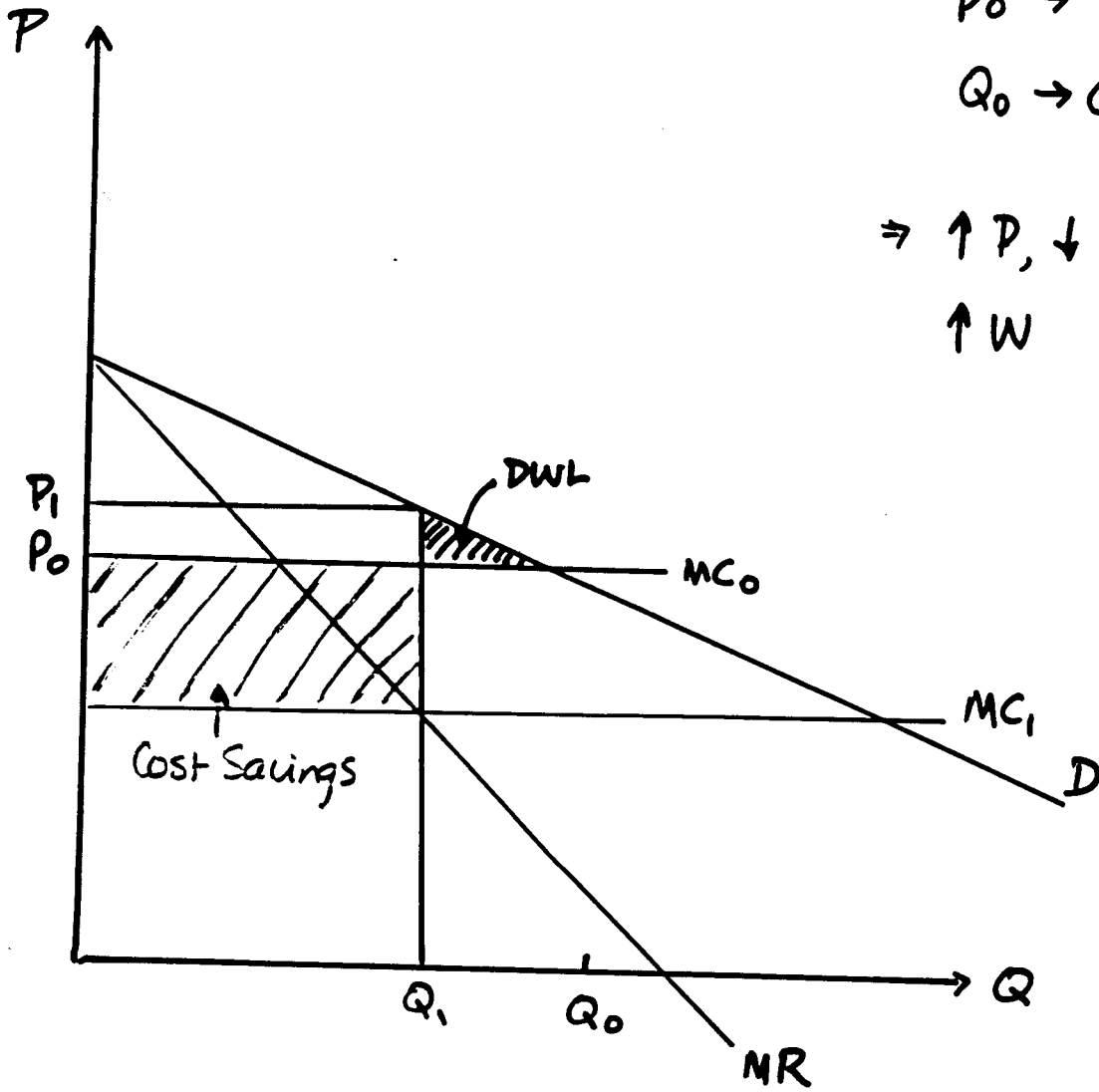
Efficiency v. Market Power
Trade-off

Merger: $MC_0 \to MC_1$

$P_0 \to P_1$

$Q_0 \to Q_1$

$\Rightarrow \uparrow P, \downarrow Q$

$\uparrow W$

Williamson Diagram

Farrell & Shapiro, 1990 AER

Question: What are the welfare effects of a horizontal merger in the context of a Cournot model?

Question: Can we develop simple guidelines and how do these compare to existing merger policy?

Basic Approach:

$$\Delta \text{Welfare} = \quad \Delta\pi^m \quad + \quad \Delta\pi^o + \Delta CS$$
$$= \text{private gains} \quad + \quad \text{"external effects" of merger}$$
$$\text{from merger}$$

Consider effect of "infinitesimal merger"
(merger is integral of infinitesimal merger sequence)

Model
Cournot competition

N firms; C_i = marginal costs of firm i
x_i = output of firm I
$dx_i = \Delta x_i$

Result 1:   sign dW = sign (½ dH/H + dX/X)

Implications: i) Mergers that increase output are more likely to enhance welfare, all else equal

ii) Mergers that increase Herfindahl are more likely to increase welfare, all else equal.

Farrell and Shapiro (1990 AER)

Result: $dW \sim \left[\frac{1}{2}\frac{dH}{H} + \frac{dX}{X}\right]$

Derivation: (1) $dW = \sum_{i=1}^{n}(P - MC_i) \cdot dx_i$ $\left\{ \text{See Ex 5.8 Tirole} \right.$

Cournot F.O.C $\Rightarrow$ $P - X_j P' - MC_j = \emptyset$

$\Rightarrow$ (2) $dW = \sum_{i=1}^{n} -P' X_j \cdot dX_j$

Herfindahl: $H = \sum_{i=1}^{n} S_i^2 = \sum_{i=1}^{n}\left(\frac{X_i}{X}\right)^2$

$dH = \sum_{i=1}^{n}\frac{\partial H}{\partial x_i} dx_i$

$\frac{\partial H}{\partial x_j} = 2\frac{X_j}{X}\cdot\frac{1}{X} + \sum_{i=1}^{n} 2\left(\frac{X_i}{X}\right)\left(-\frac{X_i}{X^2}\right)$

$\Rightarrow$ $dH = \frac{2}{X}\left[\sum_{j=1}^{n}\frac{X_j}{X}\cdot dX_j - H\sum_{j=1}^{n}dx_j\right]$

$\Rightarrow$ $\sum_{j=1}^{n}X_j dX_j = \frac{dH}{2}\cdot X^2 + H \cdot dX \cdot X$

Substitute into (2):

$dW = \underbrace{-P' X^2 H}_{>0}\left[\frac{1}{2}\frac{dH}{H} + \frac{dX}{X}\right]$

$\Rightarrow$ $\text{sign}(dW) = \text{sign}\left(\frac{1}{2}\frac{dH}{H} + \frac{dX}{X}\right)$

What's going on here?

In an asymmetric Cournot model, low share firms have low shares because their marginal costs are high.

=> Want highest share firm to increase its share (because it has lowest cost)

=> Want to shut down low share firms (little surplus from their activity)

Result 2:   If there are no synergies, a merger will raise price. Why?

No synergies <=> no change in production possibilities, costs unchanged

Merged firm joint output falls (produce less than pre-merger because now account for ΔP effect on merger partner's output now)

Total output moves in same direction as merged firm's output (see Lemma)

Example Policy Results

Prop. 5:   Under some reasonably general conditions, moderate size mergers that raise price and are privately profitable increase welfare.

Prop. 7: Under some reasonably general conditions, imposing or tightening an import quota when the import share is low will raise welfare.

Cournot Merger Game

Pre−Merger

	Marginal Cost	Quantities		Share	Profit
Firm 1	0.15	0.37		0.25	0.1369
Firm 2	0.15	0.37		0.25	0.1369
Firm 3	0.15	0.37		0.25	0.1369
Firm 4	0.15	0.37		0.25	0.1369
					0.5476

$P = 2 - Q$ Total Quantity 1.48   HHI = 2500

Market Price = 0.52 Total Profit = 0.5476

Post−Merger

	Marginal Cost	Quantities		Shares	Profits
Firm 1	0.15	0.4625		0.33333333	0.21390625
Firm 2	0.15	0.4625		0.33333333	0.21390625
Firm 3	0.15	0.4625		0.33333333	0.21390625

Total Quantity 1.3875 HHI = 3333.33333

Market Price = 0.6125 Total Profit = 0.64171875

Welfare

Delta CS	−0.1326218
Delta Profit I	−0.0598937
Delta Profit O	0.1540125
Net External	0.02139062
Delta Welfare	−0.0385031

Cournot Merger Game

Pre−Merger

	Marginal Cost	Quantities	Share	Profit
Firm 1	0.15	0.52	0.39097744	0.2704
Firm 2	0.25	0.42	0.31578947	0.1764
Firm 3	0.35	0.32	0.24060150	0.1024
Firm 4	0.6	0.07	0.05263157	0.0049
				0.5541

$P = 2 - Q$ Total Quantity   1.33   HHI = 3132.45519

Market Price = 0.67   Total Profit = 0.5541

Post−Merger

	Marginal Cost	Quantities	Shares	Profits
Firm 1	0.05	0.6125	0.45794392	0.37515625
Firm 2	0.25	0.4125	0.30841121	0.17015625
Firm 3	0.35	0.3125	0.23364485	0.09765625

Total Quantity   1.3375   HHI = 3594.20036

Market Price = 0.6625   Total Profit = 0.64296875

Welfare

Delta CS	0.01000312
Delta Profit I	0.09985625
Delta Profit O	−0.0109875
Net External	−0.0009843
Delta Welfare	0.09887187

Cournot Merger Game

Pre−Merger

	Marginal Cost	Quantities		Share	Profit
Firm 1	0.1	0.52		0.37681159	0.2704
Firm 2	0.2	0.42		0.30434782	0.1764
Firm 3	0.3	0.32		0.23188405	0.1024
Firm 4	0.5	0.12		0.08695652	0.0144
					0.5636

$P = 2 - Q$ Total Quantity 1.38 HHI = 2959.46229

Market Price = 0.62 Total Profit = 0.5636

Post−Merger

	Marginal Cost	Quantities		Shares	Profits
Firm 1	0.1	0.55		0.40740740	0.3025
Firm 2	0.2	0.45		0.33333333	0.2025
Firm 3	0.3	0.35		0.25925925	0.1225

Total Quantity 1.35 HHI = 3443.07270

Market Price = 0.65 Total Profit = 0.6275

Welfare

Delta CS	−0.04095
Delta Profit I	0.0177
Delta Profit O	0.0462
Net External	0.00525
Delta Welfare	0.02295

Some Remaining Questions

1. Is Cournot the right model?

- Welfare implications of Δshare, ΔHHI don't necessarily generalize to other models of competition (strategic substitutes v. strategic complements)

- But could re-do the analysis with appropriate alternative model (e.g. Willig, BPEA, 1991)

2. Is focus on "unilateral effects" appropriate?

- Implicit assumption that model of competition is unaffected by merger:
    Once Cournot, always Cournot?

- Policy seems concerned with both "coordinated" and unilateral effects:
    implicit "Stigler" concern that coordination becomes easier with fewer, larger firms

3. What about market dynamics?

- Difficult to model, but ultimately important (especially wrt entry)

What is the empirical evidence on merger effects?

<u>Two caveats:</u>

1. Selection:
   - we observe only a subset of potential mergers
   - can't infer effect of current policy from study of current mergers (Lucas critique)

2. Counterfactual:
   - merger effects relative to what?
   - benchmarking what would have happened without the merger can be difficult

<u>What question is being asked?</u>

I.O.: Do mergers increase P (market power) and/or decrease costs (efficiency)?

Corporate Finance: Are mergers good for shareholders? For corporate governance?

<u>Types of empirical evidence</u>

Bulk of studies rely on stock market data, measure (at best) ex ante anticipated effects of merger

A few look (credibly) at ex post outcomes

Empirical Studies of Merger Effects

1. Target firm shareholders gain (unanimous result)

2. Acquiring firms shareholders average no gain or loss at time of acquisition (some studies positive, some 0, some negative effect; almost all small in magnitude). Why?

3. Rivals' performance at time of acquisition is mixed. How much reflects estimates of the true economic effect, how much is a statistical artifact of the study (e.g., McAfee & Williams, 1988)?

4. Merged firm's actual performance post-merger?

    - Relatively little good empirical evidence here
    - On profits: average post-merger performance not spectacular
        But: we would like more careful analyses to rely upon
        Healy, Palepu, & Ruback, (Journal of Financial Economics, 1992, & 1992 Working Paper)
    - Some studies use direct measures of price, investment, other ex post indicators (e.g. Pesendorfer, 1998, on investment)

Table 3

Announcement Period Abnormal Returns by Decade, 1973–1998

	1973–79	1980–89	1990–98	1973–98
Combined				
[−1, +1]	1.5%	2.6%[a]	1.4%[a]	1.8%[a]
[−20, Close]	0.1%	3.2%	1.6%	1.9%
Target				
[−1, +1]	16.0%[a]	16.0%[a]	15.9%[a]	16.0%[a]
[−20, Close]	24.8%[a]	23.9%[a]	23.3%[a]	23.8%[a]
Acquirer				
[−1, +1]	−0.3%	−0.4%	−1.0%	−0.7%
[−20, Close]	−4.5%	−3.1%	−3.9%	−3.8%
No. Obs.	598	1,226	1,864	3,688

Note: Statistical significance at the 5 percent level is denoted by [a].

Andrade et al.

Table 6

Pre- and Post-Merger Abnormal Operating Performance (AOP)

$t - 1$	$t + 1$	$t + 2$
2.92%[a]	3.27%[a]	3.15%[a]
[2,012]	[2,101]	[1,796]

$$AOP(t + 1) = a + b\, AOP(t - 1)$$

A	b	R^2
1.07%[a]	0.804[a]	0.551[a]

Note: Statistical significance at the 5 percent level is denoted by [a].

Table 2

Summary statistics on industry-adjusted cash flow returns for acquirers and combined
target and acquirer firms in the five years following takeover, and
the stock premium paid by acquirers to target stockholders[a]

Transaction characteristics (Number of deals)	Acquirers' cash flow returns		Premium paid to target stockholders	
	Given actual target premium		Assuming zero target premium	Premium paid to target stockholders
	Median (%)	Percent positive	Median (%)	Median (%)
Attitude:				
Friendly (35)	2.6[e]	64[e]	4.2[d]	35
Hostile (15)	0.0	53	2.0	45
Target and acquirer business relation:				
Related businesses (14)	2.7[e]	85[d]	4.2[e]	29
Semi-related businesses (18)	1.5	56	3.3	43
Unrelated businesses (18)	-0.6	47	2.0	42
Form of payment:				
Stock and debt securities (23)	3.2[d]	82[d]	4.4[d]	27
Cash and debt securities (17)	1.0	59	3.4	45
Cash and stock (10)	-2.1	30	0.2	44

[a] The takeovers are completed in the period 1979 to mid-1984. Operating cash flow return on assets are sales less cost of sales less selling and administrative expenses plus depreciation, divided by the market value of assets at the beginning of the year. Industry-adjusted returns are computed for each acquirer and year as the difference between the sample firm value in that year and median values for other firms in the same industry (defined by *Value Line* in year -1). Industry returns are weighted averages of target and acquirer industry returns, with the weights being the relative asset values of the acquirer and target firms in year -1. The target stock premium is the return to target stockholders from 5 days before the first acquisition announcement to the date the target stock is delisted, less the market return in this period.

[b] Post-takeover returns before target premiums are acquirer post-takeover operating cash flows as a percentage of beginning assets excluding the value of the premium paid to target stockholders. Post-takeover returns after target premiums are acquirer post-takeover operating cash flows as a percentage of beginning assets including the value of the premium paid to target stockholders.

[c] Strategic takeovers are defined as friendly deals between firms in related or semi-related businesses, that are financed with stock and debt securities. Financial takeovers are hostile deals between firms in unrelated or semi-related businesses, that are financed with cash and securities.

[d] Significantly different from zero at the 1% level using a two-tailed test

[e] Significantly different from zero at the 5% level using a two-tailed test

Asset Market Valuation

Basic model: Finance

$$V_t = \sum_{s=t}^{\infty} \frac{Div_s}{(1+r)^s}$$

where   V =   value of the firm = PDV of dividend stream

             Div = dividends

             r =   risk-adjusted discount rate

If Div grows at a constant rate, g, and r is constant over time,

$$V_t = \frac{Div_t}{r - g}$$

Basic model: IO

$$V_t = \int_t^{\infty} \left[(P_s - AC_s) \cdot F(K_s, L_s) + rK_s - \dot{K}_s \right] e^{-r(s-t)} ds$$

where   V =   PDV(Revenues - Costs - Investments)

                =   PDV ("free cash flows")

             F(K,L) =   production function (output)

             K =   value of capital stock ("replacement cost")

If r and g are constant, and there is no technological change,

$$V_t = K_t + \Pi_0$$

where $\Pi_0 = \dfrac{(P_t - AC_t) \cdot F(K_t, L_t)}{r - g}$

Tobin's q: $q = \dfrac{V}{K} = 1 + \dfrac{\Pi_0}{K}$