Ups and Downs of Horizontal and Vertical Mergers

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Main Theme

- Antitrust policy can and should give full consideration to the good effects of mergers along side the potential bad effects.

- The latest generation of analytic tools (UPP or diversion ratio) are better at assessing bad effects and can integrate treatment of good effects for a net assessment of consumer impact.

Preface

- I am speaking from US experience.
  - I welcome your thoughts from experiences of Portugal and Brussels
- I am speaking mostly about horizontal mergers – vertical mergers have long been seen to offer significant benefits that agencies do balance against potential harms.
- I am also speaking mostly about unilateral competitive effects – the focus of newer tools

Of Course Mergers Can Create Benefits

- Oliver Williamson, Nobel laureate, made this point in "Economies as an Antitrust Defense: The Welfare Trade-Offs," American Economic Review, March 1968
  - Universally accepted theory, but no practical way to implement

- Of some 2000/year mergers in the US with mandatory reporting (about $80m+), only 40-50 antitrust interventions
  - The rest have “implied efficiencies!”

What Efficiencies?

- Less expensive inputs
  - Vertical mergers replace market prices for inputs with internal marginal costs.
  - Horizontal mergers enable cheaper procurement
- Production or distribution scale economies
- More effective capacity
- Elevated product quality
- Better production technology
- Better management

Regulators' Skepticism

- Are "efficiencies" verifiable?
- Are "efficiencies" merger-specific?
- Are procurement cost savings from socially costly exercise of monopsony power?
- Can't better management be hired?
- Can't scale economies and capacity be attained through organic pro-competitive growth?
- Why can't product quality be improved alone?
- AND besides, we cannot conclude that efficiencies outweigh the anticompetitive effects of concern!!

The UPP Framework Allows Integrated Treatment

- The 2010 US Horizontal Merger Guidelines elevated Upward Pricing Pressure (UPP) as the preferred tool over concentration in assessing mergers between sellers of differentiated products.

- The Guidelines signal the mathematics of UPP and simultaneous papers by the agencies' chief economists provided the details. These details show how to integrate UPP with cost-saving efficiencies, and extensions by me and others cover further efficiencies.

The UPP Perspective In Words

- Before the merger, the chosen prices are presumed to have maximized profits unilaterally.
- They balanced two forces:
  - Opportunity to earn more per sale by raising price further above marginal cost
  - Loss of margin between price and marginal cost on sales that would be lost from that price rise.
- The merger may alter those forces and send them out of their pre-merger balance. The “price pressure” can be deduced by assessing the alterations in the forces.

The UPP Perspective (cont)

- One change – some lost sales from raising price are no longer a total loss – but rather diversion to products newly acquired through the merger.
- This change alters the balance by the amount of such diverted sales times their price-cost margin.
- This change creates upward price pressure.
- The profit value of diverted sales is normalized by the amount of the product's sales lost due to the price rise, valued at their market price.
- This is the definition of the gross upward pricing pressure index:

The GUPPI

$GUPPI_1$ =

(diverted sales)x($markup_2$)/(lost sales)x($price_1$)

=

{(diverted sales)/(lost sales)}x{($markup_2$)/($price_1$)}

=

{the diversion ratio}x{($markup_2$)/($price_1$)}

The diversion ratio is the fraction of lost sales from a price rise that diverts to the other product, joined by the merger.

Large GUPPI: pressure to raise price post merger

Calibrating the GUPPI

- With linear demand functions, and no other changes, half of the GUPPI is the percentage change in price that would result from the merger.
  - So GUPPI < 10% implies price rise < 5%, holding all else constant (unrealistically).

- The US FTC and DOJ generally but unofficially take 5-10% as safe harbor levels of the GUPPI.

Extensions of UPP Analysis Incorporating Possible Merger Benefits

$$\text{GUPPI} = \frac{(P_2^0 - c_2^0)\delta_{12}}{P_1^0} > \frac{\mu + v_1 + c_1^0 - c_1}{P_1^0}. \quad ??$$

The GUPPI is offset or reversed by three additive effects:

- **savings in non-capacity marginal costs,**
- **the increase in product quality**
- **the elimination of the effective marginal cost of capacity.**

Each as a percent of pre-merger price

If these outweigh the GUPPI, there is Downward Price Pressure from the merger and it benefits consumers!

Some of My Favorite Examples

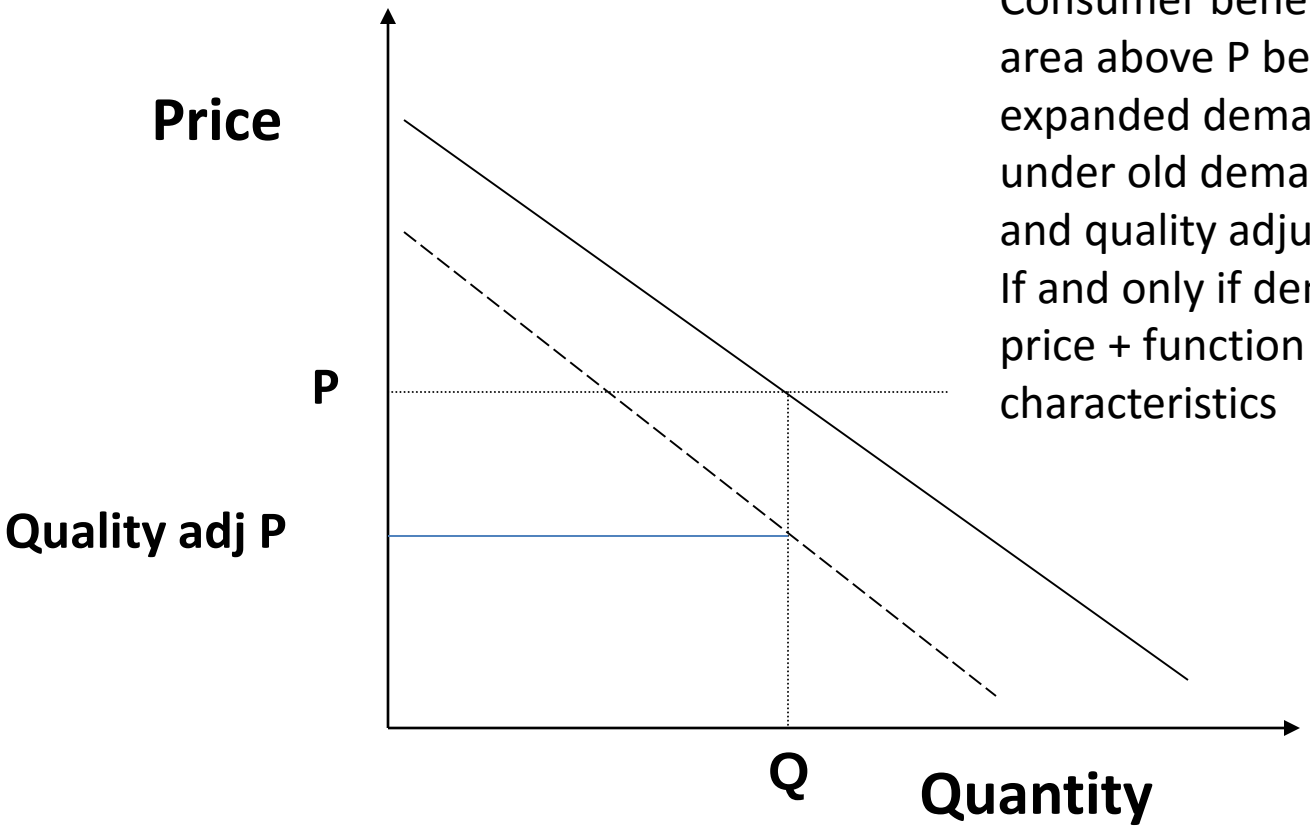
- DirecTV proposed merger with EchoStar
- Only two satellite TV services in US
- We measured diversion ratio from exit surveys, comparisons of time series of subscriber lists and econometric nested-logit demand estimation.
- All methods yielded similar diversion ratios that were consistent with $S_2/(1 - S_1)$, where the shares were of satellite, cable and over-the-air TV total consumers. These were 13% and 10%, with safe harbor GUPPIs.
- DOJ stopped the merger using very narrow markets.

- Assessing diversion ratio between two leading supermarket tabloids proposing to merge, the *Star* and the *Inquirer.* Correlations among weekly sales data suggest high diversion between each tabloid and TVGuide and People Magazine, but little between them. The merger was allowed.
- When Coca Cola was removed from groceries in Brussels for several weeks due to safety issue, diversion was extremely diverse across beverages.
- The two branded hop-on-hop-off bus lines in NYC combined. When one of them did not operate due to a religious holiday, the diversion was close to 100%. Yet lets of other tourist options in conventional relevant market, and consumer quality significantly increased. Large divestitures of buses and bus-stop rights were ordered.
- Broadcast advertising purchases divert from sport to sport, rather than staying within each sport.

Agencies NOT Generally Convinced About Cost and Capacity Efficiencies

- Proposed Merger of ATT & T-Mobile was blocked because the claimed alleviation of capacity constraints was deemed not merger-specific, although would have outweighed the GUPPIs.
- Proposed hospital merger was litigated by the FTC and the local District Court found that capacity savings would outweigh any anticompetitive effects, as measured by GUPPIs. The Appellate Court overturned.
- Proposed merger of health insurers was litigated by DOJ despite savings in hospital costs about triple the GUPPIs. DOJ claimed efficiencies were not verifiable, and the Court agreed, while also claiming savings were from monopsony power.

Assessing Value of a Quality Increase



Consumer benefit = consumer surplus area above P between old and expanded demand curves = area under old demand curve between P and quality adjusted P,
If and only if demand is a function of price + function of quality characteristics

Robert Willig, "Incremental Consumer's Surplus and Hedonic Price Adjustment," *Journal of Economic Theory*, V. 17, No. 2, (April 1978).

Measuring Increases in Service Quality

- Partners (a large consortium of providers including Massachusetts General and Brigham and Women's Hospitals) proposed to acquire South Shore Hospital (SSH) and committed to invest finances, medical personnel, expertise and IT, as it had with prior acquisitions of North Shore Medical Center (NSMC) and Newton Wellesley Hospital (NWH).
- A reasonable prediction of impacts of the merger on quality of service would be extrapolation from the earlier impacts of Partners' acquisitions of NSMC and NWH.
- Controlling econometrically for their own and surrounding trends, their acquisitions increased their demand by some 21-30%. Applying this effect to SSH yields a quality increase valued at $1000-$2600 per commercial patient discharge.
- DOJ did not block, but a Massachusetts court did ….

Application to Airlines Services

- Consumers substantially value the qualities of airline services that are created by network effects.
  - We measure these values from their impacts on consumer demands for different itineraries, along with price, using the theory of consumer welfare and demand.
- Itineraries on carriers with bigger richer networks are more valuable to consumers, and have lower quality adjusted consumer prices.
- Taking quality into account is essential for policy assessments of practices that alter airlines' networks, like airport presence, international alliances and mergers.

Network Effects' Qualities of Service

- Connectivity –- how may places are accessible on the carrier from origin airport
  - Non-stops and one-stops counted separately
- Convenience – how long between desired departure time and actual arrival time
  - On average over distribution of desired departure times
- Schedule frequency
- Non-stop service
- Antitrust immune alliances vs code-share vs interline

Demand Model Parameter Estimates

<explaining shares of tickets for each itinerary on an O-to-D route from its price and quality characteristics>

	Coefficient	Std. Err	Valuation	Std. Err
ρ_A	0.1014	0.0082		
ρ_0	0.2753	0.0115		
ln(Frequency)	0.1191	0.0081	32.39	
Average Fare ($ one-way)	-0.0037	0.0001	-1.00	0.00
ln(Inconvenience) (hours)	-0.0717	0.0098	-19.48	2.57
Network Size (# nonstop connections)	0.0018	0.0001	0.48	0.02
Network Size (# one-stop connections)	0.0001	0.0000	0.02	0.01
Non-stop	0.2880	0.0224	78.29	5.97
Distance (miles 000s)	-0.0678	0.0197	-18.43	5.34
Distance-squared	-0.0079	0.0026	-2.14	0.71
Average connection time (minutes)	-0.0003	0.0000	-0.08	0.01
Codeshare	-0.0373	0.0097	-10.14	2.63

Increasing daily frequency by 33% (e.g., from 3 to 4 flights per day) is equivalent to a $9.32 reduction in fare.

Reducing the time required to get to a destination (relative to the consumer's desired departure time) from, for example, 6 to 3 hours is worth as much to consumers as (approximately) a $13.51 reduction in the fare

A consumer's increased preference for an airline serving 25 additional destinations (with nonstop service) is equivalent to that associated with a $12.03 reduction in fare.

Example from DL/NW

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Route	**Type**	**Passengers (MM)**	**Revenues ($ MM)**	**Change in Inconvenience* (hours)**	**Change in Destinations Served Non-stop***	**Net Change in Consumer Welfare ($ MM)**	**Ratio of Net Change in Consumer Welfare to Revenue**
ATLDTW	3 -> 2	0.23	$35.80	-0.7	52.2	$7.72	21.55%
ATLMEM	3 -> 2	0.12	$16.50	-0.6	19.3	$2.84	17.18%
ATLMSP	3 -> 2	0.22	$38.00	-0.6	45.4	$8.44	22.22%
CN2DTW	2 -> 1	0.01	$1.68	-0.6	45.8	$0.12	6.89%
CN2MSP	2 -> 1	0.05	$15.30	-1.2	37.0	$0.39	2.57%
DTWATL	3 -> 2	0.23	$35.30	-0.7	40.8	$6.72	19.05%
DTWCN2	2 -> 1	0.01	$1.57	-0.9	58.3	$0.13	8.53%
DTWNY3	2 -> 1	0.44	$73.20	-0.2	5.2	$2.03	2.78%
DTWSLC	2 -> 1	0.04	$10.30	-1.0	42.6	$0.90	8.67%
MEMATL	3 -> 2	0.13	$17.30	-0.8	41.1	$3.91	22.56%
MSPATL	3 -> 2	0.21	$37.20	-0.7	42.8	$6.86	18.44%
MSPCN2	2 -> 1	0.05	$15.80	-0.8	41.5	$0.70	4.46%
MSPNY3	3 -> 2	0.37	$91.90	-0.6	5.6	$4.30	4.68%
MSPSLC	2 -> 1	0.05	$15.30	-0.7	31.5	$1.06	6.90%
NY3DTW	2 -> 1	0.44	$73.10	-0.2	17.2	$4.11	5.63%
NY3MSP	3 -> 2	0.37	$92.60	-0.5	17.1	$4.11	4.44%
SLCDTW	2 -> 1	0.04	$10.40	-1.0	22.1	$0.24	2.31%
SLCMSP	2 -> 1	0.05	$15.50	-0.4	30.5	$0.18	1.17%
2 -> 1	2 -> 1	1.18	$232.00	-0.4	17.2	$9.87	4.25%
3 -> 2	3 -> 2	1.89	$365.00	-0.6	30.0	$44.89	12.31%
All Routes		369.50	$69,800.00			$390.74	0.56%

Overlapping Routes in Delta-Northwest Merger

Type	Competitor Change	Number of Routes	Total Passengers (mil)	Total Revenue (mil)
Nonstop	2->1	4	0.25	$66.69
	3->2	3	1.17	$180.64
	4->3	3	1.99	$391.84
	4+	2	3.21	$457.39
Nonstop Total		*12*	*6.62*	*$1,096.56*
Connecting	2->1	83	0.82	$188.20
	3->2	395	4.08	$965.40
	4->3	224	2.91	$653.50
Connecting Total		*702*	*7.81*	*$1,807.10*
Nonstop and Connecting Overlaps		714	14.43	$2,903.66

Source:

Authors calculations based on DB1B data for YE 4Q2007

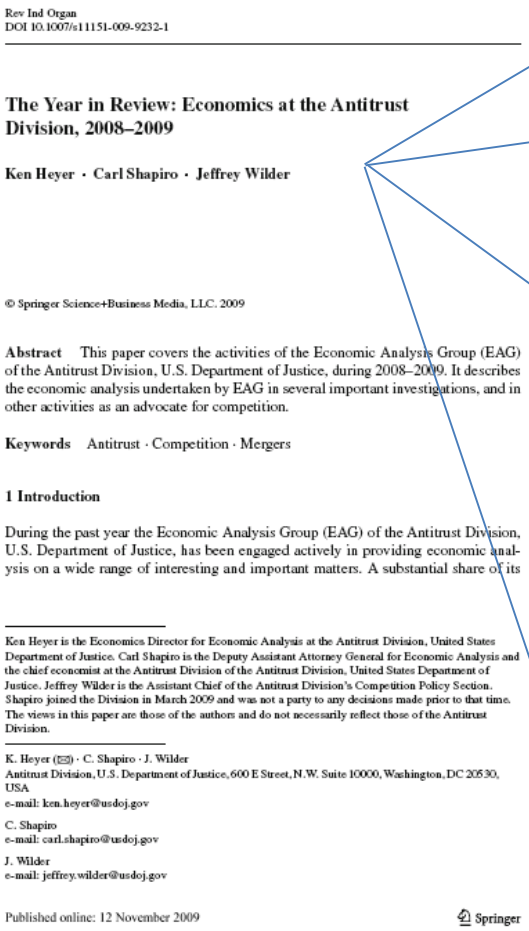
Notes:

Non-stop overlaps defined as city-pairs on which both carriers flew at least five nonstop flights per week

Connecting overlaps defined as city-pairs on which each carrier accounted for at least 10% of passengers and combined they account for at least 40%

Other competitors have at least a 10% share

Evaluating Airline Mergers



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The Year in Review: Economics at the Antitrust Division, 2008–2009

Ken Heyer · Carl Shapiro · Jeffrey Wilder

Abstract This paper covers the activities of the Economic Analysis Group (EAG) of the Antitrust Division, U.S. Department of Justice, during 2008–2009. It describes the economic analysis undertaken by EAG in several important investigations, and in other activities as an advocate for competition.

Keywords Antitrust · Competition · Mergers

1 Introduction

During the past year the Economic Analysis Group (EAG) of the Antitrust Division, U.S. Department of Justice, has been engaged actively in providing economic analysis on a wide range of interesting and important matters. A substantial share of its

Ken Heyer is the Economics Director for Economic Analysis at the Antitrust Division, United States Department of Justice. Carl Shapiro is the Deputy Assistant Attorney General for Economic Analysis and the chief economist at the Antitrust Division of the Antitrust Division, United States Department of Justice. Jeffrey Wilder is the Assistant Chief of the Antitrust Division's Competition Policy Section. Shapiro joined the Division in March 2009 and was not a party to any decisions made prior to that time. The views in this paper are those of the authors and do not necessarily reflect those of the Antitrust Division.

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"[T]he proposed merger might generate consumer benefits by facilitating schedule improvements, by allowing for a more efficient allocation of aircraft across the network, and through marketing synergies that could make the merged carrier's service more attractive to consumers… Our best estimates of the likely increases in consumer welfare significantly exceeded the feared harm to consumers in the overlap routes served by the two carriers. On this basis we concluded that the merger was likely procompetitive and ought not be challenged."

Ken Heyer, Carl Shapiro, Jeffrey Wilder (2009), "The Year in Review: Economics at the Antitrust Division, 2008-2009," Rev Ind Organ at 7-8 (reviewing DL/NW merger).

Evaluating Airline Alliances

- Demand studies by the airlines and through outside econometrics have shown that international alliances have important impacts on quality of service perceived by passengers.
- Itineraries over antitrust immune allied carriers have historically had considerably greater value than both interline and code-shared itineraries.
- This added value is significantly reduced but not eliminated over routes with “carve-out” segments
- These benefits of antitrust immunity must be weighed against any anticompetitive effects of concern due to reduced competition.

Approaches to Measure Diversion Ratio

- Proportional to market shares -- in logit model, but not in nested logit model – need to test!
- Estimated diversion ratios in the parties' documents – market research
- Actual customer movements (subscriber data)
- Natural experiments
- Win-loss data
- Bidding data
- Survey data
- Conjoint analysis
- Econometric estimates of demand systems (own- and cross-price elasticities)

A Baseline Measurement

The diversion ratio would be

[% share of product 2]/[100% – % share of product 1]

if the differentiated products in the relevant market are not perceived to be clustered in terms of their characteristics that influence demand, as in Logit models of demand. Then, diversion from product 1 to product 2 is proportionate to the share of product 2 among the purchases that were not of product 1; i.e. the diversion ratio between a product with a 40% share and a product with a 15% share would be 15%/60% = 25%.

But watch impacts on diversion from entry of new products and repositioning of incumbent products – not separate factors but part of assessing the diversion ratio!

Monopsony

- Market power isn't limited to the sellers of a product: it also can be held by buyers
- A ***monopsony*** market has a single buyer
- Analysis of monopsony parallels the analysis of monopoly
- A monopsonist faces an upward-sloping supply curve
  - By lowering the quantity he buys, can pay less
- Monopsonist can think either in terms of what price to pay or in terms of how many units to employ

Marginal Expenditure

- A monopsonist's marginal expenditure, ME, is the extra cost per marginal unit of an input
- Consider a small city in which the hospital is the only employer of nurses
- The hospital's marginal expenditure has two parts
  - The input expansion effect: the marginal nurse costs W
  - Given the upward-sloping supply curve, the hospital must increase the wage by (ΔW/ΔQ) to hire another nurse
  - Since the hospital must pay Q nurses this higher wage, the wage increase raises nursing costs by (ΔW/ΔQ) Q
- So ME is larger than W since the total effect is:

$$ME = W + (\Delta W / \Delta Q)Q$$

Monopsony Profit Maximization

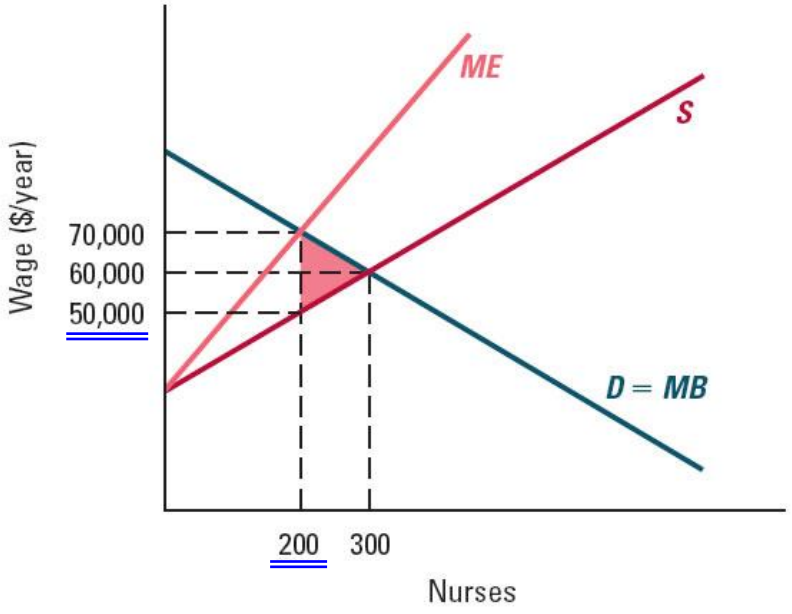
- The monopsonist's profit-maximizing choice equates its marginal benefit from the input with its marginal expenditure for the input.

- Result is lower price and quantity than if the firm were a price taker for the input – i.e. had competitors for the purchasing of the input.

- Thus a hallmark of exercise of monopsony power is reduction of output.

Monopsony

- Profit-maximizing outcome:
  - Occurs where marginal expenditure curve crosses the demand curve
  - Firm hires 200 nurses
  - Wage is $50,000
- Deadweight loss is red-shaded area



The Guidelines' UPP Formulation Is Incomplete In Important Ways

- The UPP model in the Guidelines looks only at the upward pricing pressure arising from the merger based on the value of diverted sales (in terms of diversion ratios and margins).
- Since Werden (1996) and recent Farrell and Shapiro, it has become known that marginal cost savings due to the merger offset or reverse UPP, and are measured on the same scale.
- The basic Guidelines' UPP model does not cover three key situations, significant here, where the merger:
  - improves quality of one or both parties' offerings
  - alleviates a capacity constraint that limits output
  - alleviates a capacity constraint that creates congestion that diminishes quality and confines output

Extensions of the UPP Model Are Important to Identifying Competitive Effects

- Each of these merger effects can be integrated into the UPP framework -- they conceptually can lead to the merger reducing quality-adjusted prices and raising consumer welfare.

- The downward price effects are every bit as important and theoretically reliable in the net UPP calculation as are the possible upward pressures from diversion and margins.

- Even where the effects cannot, for reasons of data limitations or otherwise, be fully quantified at this time, enforcement decisions properly should account for both the existence, and estimated magnitudes, of these effects.

Analytic Treatment – Marginal Cost Efficiencies

(Greg Werden, Farrell & Shapiro)

$$\frac{\partial \Pi^m}{\partial P_1}\Big|_{pre-merger} = (P_1^0 - c_1)D_1^1(P_1^0, P_2^0) + D^1(P_1^0, P_2^0) + (P_2^0 - c_2^0)D_1^2(P_1^0, P_2^0) =$$

$$\frac{\partial \Pi^1}{\partial P_1}\Big|_{pre-merger} + (c_1^0 - c_1)D_1^1(P_1^0, P_2^0) + (P_2^0 - c_2^0)D_1^2(P_1^0, P_2^0) =$$

$$(c_1^0 - c_1)D_1^1(P_1^0, P_2^0) + (P_2^0 - c_2^0)D_1^2(P_1^0, P_2^0)$$

This is positive so that there is UPP (in this model) iff the GUPPI exceeds the marginal cost savings

$$\frac{(P_2^0 - c_2^0)D_1^2(P_1^0, P_2^0)}{-P_1^0 D_1^1(P_1^0, P_2^0)} > \frac{c_1^0 - c_1}{P_1^0}$$

Extension 1: Quality Enhancement

- <drawn from Willig, R. "Unilateral Competitive Effects of Mergers: Upward Pricing Pressure, Product Quality, and Other Extensions." Forthcoming, *Review of Industrial Organization*.>

Here, the demands for good 1 and 2 are

$D^1(P_1 - v_1, P_2 - v_2) \equiv D^1(H_1, H_2)$ and $D^2(P_1 - v_1, P_2 - v_2) \equiv D^2(H_1, H_2)$.

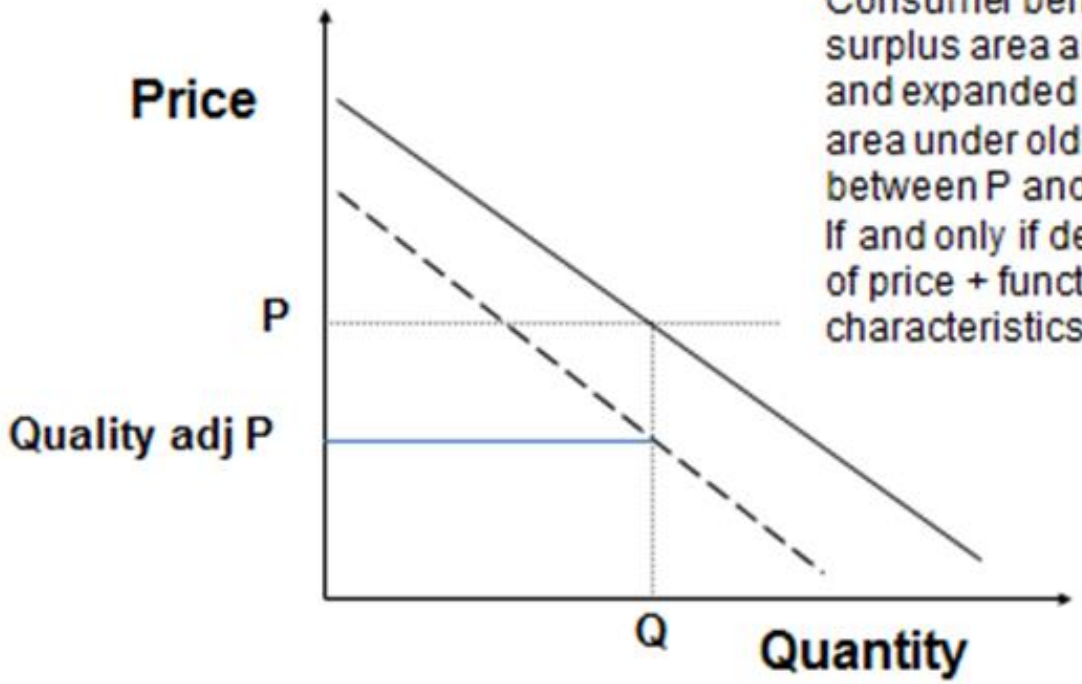
$H_i = P_i - v_i$ are the "hedonic," or quality-adjusted prices for the products after the merger, where v_i is the value of the improvement in the quality of product i, per unit, for each consumer, brought about by the merger.

- There is UPP on the *quality adjusted price* only if the GUPPI exceeds the unit value of the quality improvement, plus the savings in marginal cost due to the merger.

$$\frac{(P_2^0 - c_2^0)\delta_{12}}{P_1^0} > \frac{v_1 + c_1^0 - c_1}{P_1^0}.$$

Quality-Adjusted Prices

Quality Rises



Consumer benefit = consumer surplus area above P between old and expanded demand curves = area under old demand curve between P and quality adjusted P, If and only if demand is a function of price + function of quality characteristics

Robert Willig, "Incremental Consumer's Surplus and Hedonic Price Adjustment," *Journal of Economic Theory*, V. 17, No. 2, (April 1978).

Extension 2: Capacity Constraint Eliminated

- If one, or both, firms pre-merger face binding capacity constraints, the firm(s) price above their otherwise profit-maximizing levels to suppress demands that could not be fulfilled.
- Removing the capacity constraint through the merger creates the incentive to lower prices

Pre-merger, the Lagrangian for the profit of firm 1 is:

$$\Pi^1 = (P_1 - c_1^0)D^1(P_1, P_2) + \mu\left[K - D^1(P_1, P_2)\right]$$

Here, there is net UPP only if the GUPPI exceeds the marginal cost-savings from the merger plus the shadow price on the capacity constraint pre-merger.

$$\frac{(P_2^0 - c_2^0)\delta_{12}}{P_1^0} > \frac{\mu + c_1^0 - c_1}{P_1^0}.$$

Extension 3: Alleviating Congestion Constraints

- Here, pre-merger investment allows increased output at a given quality level, or improved quality at a given output level, or some profit maximizing combination of the two.

The Lagrangian for the maximization of firm 1's profits pre-merger is:

$$\Pi^1 = (P_1 - c_1^0)D^1(P_1 - \nu_1, P_2 - \nu_2) - rI + \mu\left[K(\nu_1, I) - D^1(P_1 - \nu_1, P_2 - \nu_2)\right].$$

The corresponding first order conditions are:

$$\frac{\partial \pi^1}{\partial P_1} = (P_1^0 - c_1^0)D_1^1(P_1^0, P_2^0) + D^1(P_1^0, P_2^0) - \mu D_1^1(P_1^0, P_2^0) = 0$$

$$\frac{\partial \pi^1}{\partial \nu_1} = -(P_1^0 - c_1^0)D_1^1(P_1^0, P_2^0) + \mu K_\nu + \mu D_1^1(P_1^0, P_2^0) = 0$$

$$\frac{\partial \pi^1}{\partial I} = \mu K_I - r = 0$$

From these it follows that the pre-merger marginal capacity cost, i.e. the additional recurrent cost of the incremental capacity needed to handle incremental output at constant quality, is

$$\frac{d\left(rI\right)}{dK} = \frac{r}{K_I} = \mu$$

It also follows that

$$D^1(P_1^0, P_2^0) + \mu K_v = 0\,.$$

Consequently, $\mu = \dfrac{-D^1(P_1^0, P_2^0)}{K_v}$, the number of units supplied times the diminution in product quality that results from adding a unit of output, without bolstering investment in capacity.

The merger causes the capacity constraint to become unbinding, so that post-merger, product 1's quality rises by ν_1, and μ becomes 0. Evaluation of the derivative of the merged firm's profit function with respect to H_1 at pre-merger prices shows that there is UPP iff

$$\frac{(P_2^0 - c_2^0)\delta_{12}}{P_1^0} > \frac{\mu + \nu_1 + c_1^0 - c_1}{P_1^0}.$$

Where the merger eliminates congestion of capacity that impacts product quality, the GUPPI is offset or reversed by three additive effects:

- **savings in non-capacity marginal costs,**
- **the increase in product quality**
- **the elimination of the effective marginal cost of capacity that drove higher prices pre-merger.**