Upward Pricing Pressure Screens in the New Merger Guidelines; Some Pro's and Con's

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Two Important Pro's of UPP Screens.

• Herfindahl-based screening hinges on which products are included in the denominator; a product is either "in" or "out" of the market. Markets for merger evaluation should be defined by substitution possiblities, and there are degrees of subsitutability between products.

So any screen based on a 0-1 distinction is going to be

- inadequate and

- lead to a debate about what is in the denominator which has no answer.

Among alternatives, the UPP screen is one of two that are relatively easy to use. All we need is;

- pre-merger markups,
- a diversion ratio, and possible,
- a notion of efficiencies.

Questions (adressed in reverse order).

• When do we think a UPP based analysis is (or is not) appropriate to quantify the likely deleterious effects of a horizontal merger?

• When there are problems, is their either a better, or a supplemental, framework available that can help?

• When a UPP based analysis is appropriate, how do we measure the variables we need to implement it?

• When the UPP based analysis is appropriate, and we have the variables needed to implement, can we do better than the UPP formula as provided in the guidelines?

Derivation: Merger Guidlines Formula.

Post merger firms maximize

$$[p_1 q_1(p_1,\ldots,p_J) - c_1(q_1)] + [p_2 q_2(p_1,\ldots,p_J) - c_2(q_2)],$$

which implies prices

$$p_1^m = mc_1 + \frac{1}{[\partial q_1/\partial p_1]/q_1} + (p_2^m - mc_2)\frac{\partial q_2}{\partial p_1}/\frac{\partial q_1}{\partial p_1}.$$

Pre-merger firm maximizes $p_1 q_1(p_1,\ldots,p_J) - c_1(q_1)$ which implies

$$p_1 = mc_1 + \frac{1}{[\partial q_1/\partial p_1]/q_1}$$

So

$$UPP_1 \approx p_1^m - p_1 = (p_2 - mc_2)\frac{\partial q_2}{\partial p_1}/\frac{\partial q_1}{\partial p_1} - E_1 mc_1$$

where $E_1 =$ efficiency gains in *marginal costs* and we come back to the meaning of $\approx$ below.

Comments on the derivation.

Behavioral Assumption.

- Nash in prices in both pre and post merger (or the counterfactual) situation captures the likely effect of the merger on prices faced by the consumer.

A major concern with use of the UPP formula is that this statement is not true in many important cases, and I will spend most of this talk exploring some of them.

For now, however, assume the Nash in prices assumption does quantify the likely effects of the mergers on prices and ask whether, when this is true

(i) Can we improve on the UPP formula given in the guidlines?

(ii)How do we obtain the data required to implement a UPP-like formula?

Data requirements are:

$$(\frac{\partial q_1}{\partial p_1}, \frac{\partial q_2}{\partial p_1}, \{mc_i^{t=0}, p_i^{t=0}\}_{i=1}^{2}).$$

Nash in Prices vs UPP given differentiated products.

Should we ignore other firm's pricing response (which would be needed for full merger simulation)?

Argument in guideline and papers: any response by others would increase prices further (prices are strategic complements).

This is wrong once we allow for consumer heterogenity; when the merged firm increases its price it pushes particular consumers out on the market, those that are particularly price sensitive, and this provides an incentive for third parties to lower prices (often fully counteracting the standard arguemnt for strategic complements)

However there is a practical arguement for ignoring third parties.

Were we to allow for third party responses we would have to analyze the whole market, and to do so in a non-trivial way (not assuming all products are symmetric)

- may be impossible given time constraints, and

- would back us into the question of who is in the market (though it would be nearly as crucial a determinant of outcomes).

So realistically the argument may well be between **UPP and Partial Merger Analysis.** (Office of Free Trade in London.)

- UPP solves for Δp_1 holding p_2 and all the other prices fixed. Hence the pre-merger price of good 2 enters the formula for the increment of price in good 1.

- Partial merger analysis solves jointly for the increase in (p_1, p_2), holding all other prices fixed. So the post merger price enters the formula.

However which ever one we chose we might want a **consistent derivation**. The *current derivation is inconsistent because*

- it assumes that q_1 is the same pre and post merger, even though $\partial q_1/\partial p_1 \neq 0$ (else infinite pre-merger markup).

Eliminating the inconsistency: using only available data.

Use the approximation

$$q_i^1 \approx q_i^0 + \frac{\partial q_i}{\partial p_i}\Delta p_i + \frac{\partial q_i}{\partial p_j}\Delta p_j$$

which only requires the data needed for UPP, and the UPP formula becomes

$$\Delta p_1 = \frac{1}{2}(p_2 - mc_2)\frac{\partial q_2}{\partial p_1}/\frac{\partial q_1}{\partial p_1}.$$

I.e. Exactly 50% of inconsistent UPP formula.

Adequacy of linearization. Next logical step would be to add a second order term. Jaffe and Weyl (2011) couch their analysis in a second order expansion. Requires second derivatives, and it is not clear whether we can get them without estimating a demand system (and if we do have a demand system we do not need second derivatives). Need research on

- when we should be worried about first order approximations (use estimated demand systems), and

- whether we can get adequate second order terms without estimating a demand system.

UPP vs Partial Merger Analysis.

First question is does it make a difference? Let $\rho_{1,2}$ be the product of the two diversion ratios

$$0 < \rho_{1,2} \equiv \left[\frac{\partial q_2}{\partial p_1}\frac{\partial q_1}{\partial p_2}\right] / \left[\frac{\partial q_1}{\partial p_1}\frac{\partial q_2}{\partial p_1}\right] < 1.$$

Using this and the linear approximation one can show that if we used partial merger analysis

$$\Delta p_1 =$$

$$\frac{1}{2}[1-\rho_{1,2}]^{-1}[(p_2^0-mc_2)\frac{\partial q_2}{\partial p_1}/\frac{\partial q_1}{\partial p_1}+\rho_{1,2}(p_1^0-mc_1)]$$

while when we used the corrected UPP

$$\Delta p_1 = \frac{1}{2}[(p_2^0 - mc_2)\frac{\partial q_2}{\partial p_1}/\frac{\partial q_1}{\partial p_1}.$$

E.g.: Say we worry about mergers with $\Delta p_1 \geq$ 5%, both the pre-merger markups and the diversion ratio were 30%, and $p_1 = p_2$. Then

$$\Delta p_1^{PMA} = .064p, \text{ but } \Delta p_1^{UPP} = .045p.$$

If both the diversion ratio and the markup were 25%, then both formula would be under 5%.

If both were 35% then both formula would be over 5%.

So there is a range where the difference does (and does not) matter, and it is not clear why we would not use the partial merger analysis formula if it were available.

Note also that in partial merger simulation

- Δp depends on the good's own pre-merger markup (its higher the higher the pre-merger markup),

- and partial merger analysis has added data requirements; $(\frac{\partial q_2}{\partial p_2}, \frac{\partial q_1}{\partial p_2})$. However if we needed to analyze the effect of the merger on both prices we would need these terms anyway.

Efficiency Gains in the Guidelines.

Without efficiency gains both formula would necessarily predict a price for every merger (a reason for allowing for E). The treatment in the guidelines is assymetric; they only count the efficiency gain of one product in the formula for that product. Symmetric treatment would lead to greater price rises by

$$[\frac{\partial q_2}{\partial p_1}/\frac{\partial q_1}{\partial p_1}] \times E \times mc_2.$$

If we are worried about predicting price rises, we should be adding this term.

Alternative treatment. There are good reasons to think efficiency gains are likely to vary a great deal (see below). Moreover given either formula we can find the E that would be required for a particular merger not to increase prices by more than a fixed percentage. This would make it easier to judge whether it is reasonable to expect the required efficiency gain.

Note: if we found the (E_1, E_2) that set $\Delta p = 0$ then at that E we would expect there to be no price changes by third parties, so the worry about third party price responses would be irrelevant.

Measurement Issues: Diversion Ratios and Elasticities.

Little attention given to this.

• They are skeptical of demand function estimation.

• Some emphasis given to surveys; however the two question they ask (first and second choice) do not give us what we need.

Needed questions

- Would the person switch for a small price change? This yields denominator of diversion ratio.

- If so what product would the the person switch to? This yields numerator of diversion ratio.

Neither result form first and second choice (we need to find out what the marginal puchaser, the one who would not purchase were there a small price rise would do, not what a random purchasor would do).

Notes on survey techniques.

- Little research on their validity; results in consumer markets not great (conjoint analysis).

- Time and cost needed to do an adequate job. Seem more likely to be cost-effective in upstream markets (purchasers are fewer), but this is one of those place where UPP-like formula's are unlikely to do an adequate job at the impact of the merger on either consumer prices or welfare (see below).

- Once we go to situations where UPP or partial merger analysis is unlikely to provide an adequate approximation to the effect of the merger on price increases, we will need more detail on the demand system then the surveys can provide (see below).

Measuring Costs and Markups.

Probably the best source here is exactly what they suggest

- what the firm uses for marginal costs when it makes its own plans.

Have to be careful about what they give you

- for incentive reasons, and

- to distinguish between marginal and average costs.

Fixed vs Marginal Cost. Little discussion of the difference. Disturbing in that most claims about cost savings are in central office facilities, or other seemingly fixed costs.

Raises question of objective function: do we want to use consumer surplus alone as our criteria, or weight also the producer surplus gains from cost savings (same question arises in analyzing efficiency gains and analysis below)?

Digression on indirect cost estimates.
The UPP formula assumes Nash in prices. If this is true, and we have elasticities and quantities, then we should be able to back out marginal cost from the pre-merger prices. This is easy to do, and should provide a check on whether our assumptions provide an adequate approximation. If not; either the Nash in prices, or the cost measures, are wrong.

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When is the Nash in prices assumption not likely to capture the effect of the merger on prices?

Consider just three of the possibilities.

- Mergers when product placement (or "repositioning") is relatively easy, at least within a generation of products.

- Mergers in upstream markets.

- Mergers in markets where some form of co-ordinated interaction is a possiblity.

Suggestion: start the analysis by why is the merger in the interests of the firms, and then ask what happens to consumer surplus if the firms are right.

Product placement or repositioning.

In markets where it is easy to change which products are marketed the incentive to merge is often the ability to coordinate product positions post-merger in order to increase markups.

E.g.: Nosko, Harvard thesis. Studies AMD/Intel competition in pc chips.

Cost function characteristic (within generation):
(i) chips with different CPU have about the same marginal cost (up to max CPU).
(ii) little cost to introducing a new prouct.

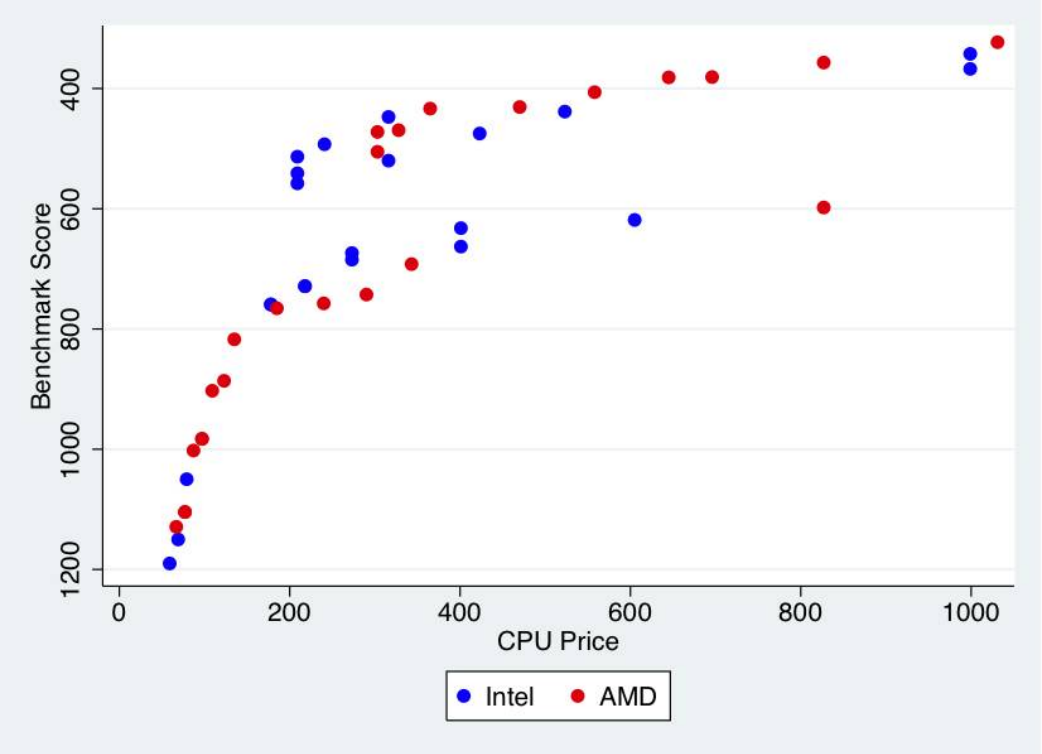
Cost + Demand Generate (from 2004 to 2009).

- Intel introduces 114 new chips (and 74 of them were swapping out chips at existing price points).

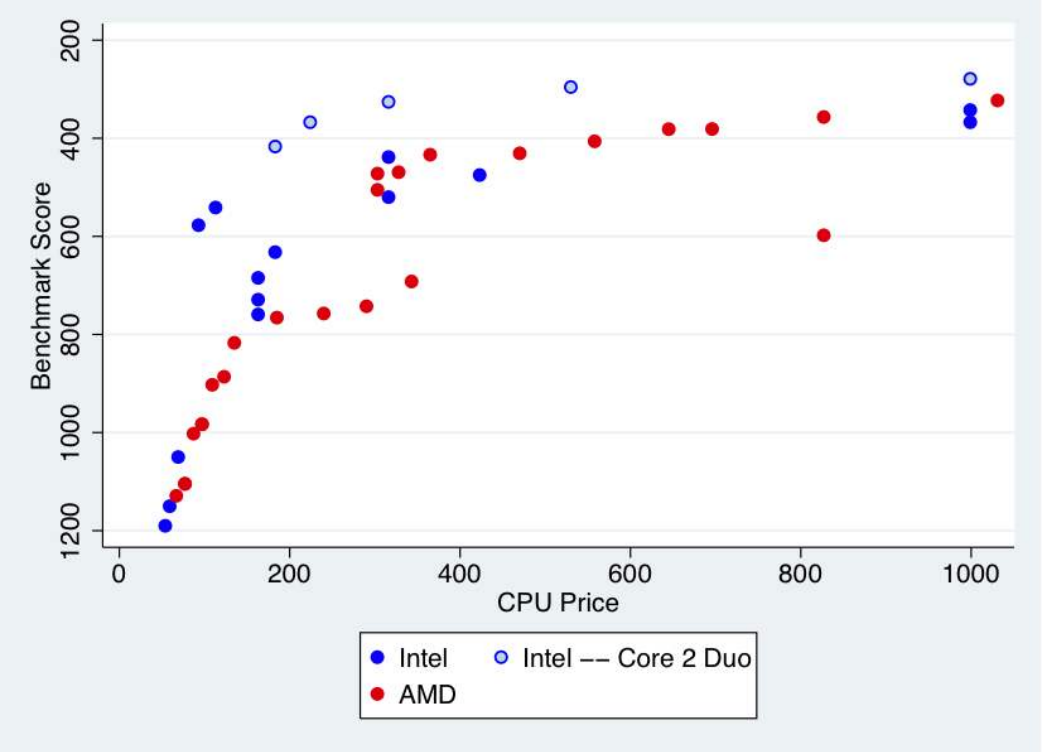
- Intel changes prices on existing products 102 times.

Product "repositioning" occurs at least as frequently as price changes on existing products.

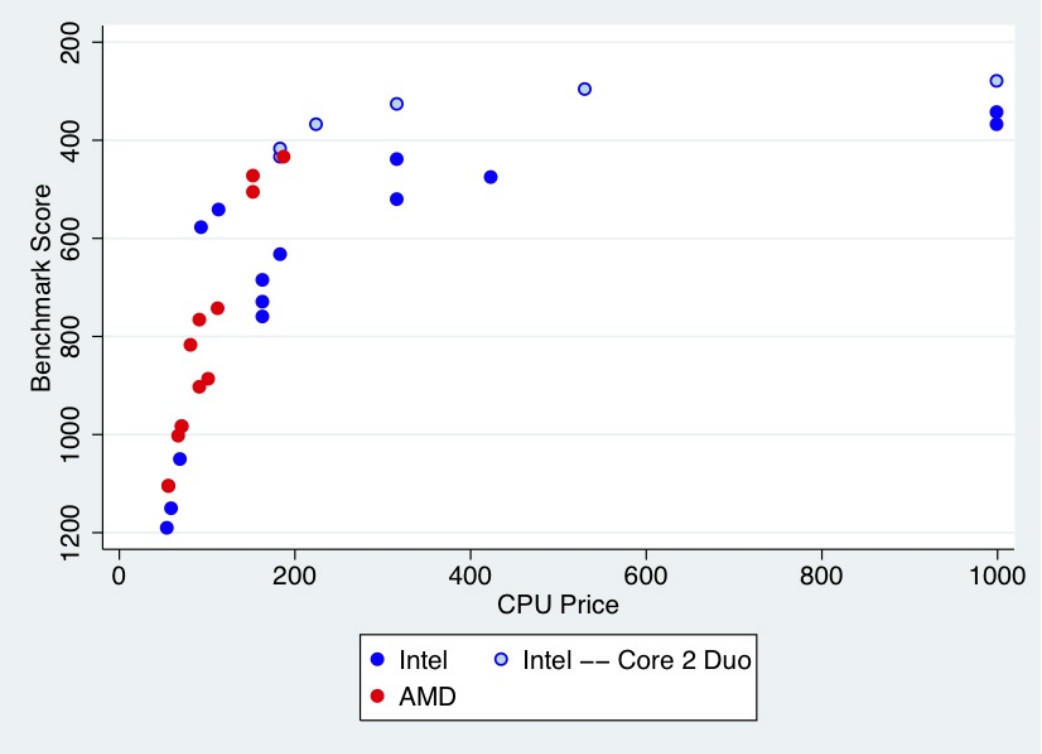
Empirical example in thesis. Introduction of Intel's Core 2 Duo, in July 2006 (lowers the cost of producing all chips, and increases max performance.)



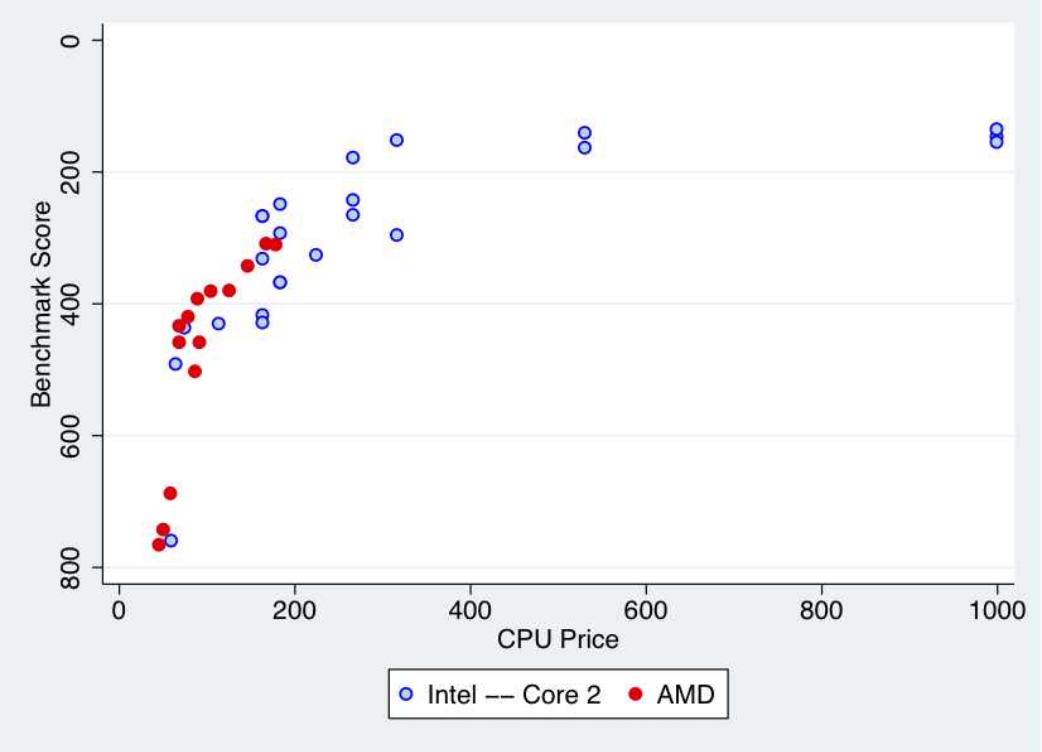
Price/Performance – June 2006



Price/Performance – July 2006



Price/Performance – Oct 2006



Price/Performance – January 2008

Graphs: Benchmarks refer to time required to complete tasks. Price=published list prices.

- In June: Intense competition at high end high-end between Intel and AMD.

- October 2006. Intel had begun introducing the Core 2 duo chips. AMD immediately withdraws all its chips from the high end of the market, and focuses on competing on the low end.

- January 2008. Within a year and half all of Intel's chips were Core 2 duo chips. The benchmark performance scores at the high end had gone up, and the only competition with AMD is at the low end.

- Intel pushes up markups (see thesis) at the high end.

Corollary: One would not be able to analyze innovative incentives without allowing for product repositioning. Merger guidelines discuss innovation, but discuss it in ways that are very similar to those used for UPP, with no consideration of repositioning incentives.

Nosko's Merger Counterfactual (or AMD exit). Intel withdraws virtually all of its low end chips; suffice with the high end chips, where markups are pushed up further. The returns to the merger are driven by product repositioning. Post merger consumer surplus dives.

Product repositioning in the merger guidelines. To the extent product repositioning is discussed in the guidelines it is as a response of third parties; where it is thought to dilute the effect of the merger on prices. This is the opposite of the effect we see here.

What should we do?

• Look for evidence of the ease of product repositioning before drawing implications from a UPP based analysis. Data on past product introductions, especially in response to changes that have occured in the industry in the past...

How do we analyze likely impacts?

Need to either estimate, or piece together, **a demand function** that enables us to evaluate the gains from repositioning (and institutional knowledge on what changes are likely to be made would also be helpful).

Horizontal Upstream markets.

Markets in which a buyer re-markets the goods or services it buys to consumers. We are told that most of the investigations of horizontal mergers are in upstream markets.

• *Nash in prices is no longer a reasonable "rest point" or equilibrium assumption.*

These markets typically have a small number of agents on each side. $\Rightarrow$ a multi-lateral bargaining situation.

Nash in prices is a model where one side sets prices and the other simply accepts them, and the UPP formula is derived from a Nash in prices assumption. So there is no intuitive (or model-based) reason for using the UPP formula here.

Merger Guidlines and Theory for Upstream Horizontal Mergers.

Treatment in Merger Guidelines.
Aware of the problem. Discuss under "price discrimination". Basic suggestion: analyze the impact of the merger on different buyers separately (with diversion ratio's).

Notice the buyers here are not consumers; so even if we get the effect on the downstream firm's costs correct we do not have the effect on consumers correct. To get the effect on consumers we need:
(i) the effect on the buyer's costs and
(ii) the pass through of those costs to consumers.

Economic Theory and the effect of the merger on buyers costs?

Theory does not have a generally accepted equilibrium notion for this situation. The bargaining outcome splits the total profits

$$\pi_B(\cdot) + \pi_S(\cdot) = \text{buyer's sales - seller's cost.}$$

between the buyer and the seller. General agreement that the change in contract terms depends on what would happen to the buyer and seller were there no contract ("outside options").

The buyer's outside option and the likely cost increase.

Depends on the nature of the downstream market; what would happen to downstream profits if one or both of the upstream products were not marketed? There is a diversion-like ratio relevant here but,

- It is a diversion-like ratio in the downstream market,
- It is between one or both of these two goods and other goods,
- It depends on where the other goods are located
  - if there are good substitutes at the retailor, then the seller's bargaining power is not likely to increase

  - if substitutes at the store are not good and there are other stores in the area that sell these or similar products, then we would expect the seller's bargaining power and hence the buyers cost to increase; however there is a question of whether the cost increase would be passed on to the consumer.

- It is not the marginal diversion ratio used in UPP analysis, but it is the diversion ratio from all consumers leaving the product. I.e. now the original survey questions are relevant, but not in the upstream market (so the survey is hard to do).

Pass through given cost increases.

There are a number of cases to consider, depending on whether "who buys from whom" changes. Say no existing contract is broken, and no new contract is established.

- Pass through of costs to consumers depends on marginal diversion ratios for both goods. A UPP-like analysis is relevant, though again, (i) in the downstream markets, and (ii) to goods outside the retail outlet.

- If the diversion ratio to goods outside the store is high, then there is expected to be limited pass through.

- These effects go in the *opposite direction*, and hence ameliorate the effect on the outside option of the buyer. The more the latter falls the greater the cost increase but the lower the pass through.

- Finaly to approximate the effects on consumer prices, we will have to consider multiple goods at multiple retailors simultaneously. $\Rightarrow$ **a need to piece together a more detailed demand curve.**

Now possible which buyer and seller contracts are formed changes; $\Rightarrow$ consumer choice sets change.

- This can either help or hurt consumers. Post merger some retailors, those who had marketed ony one of the two goods, might actually add (not subtract) products.

The Seller's Outside Option.

This depends on the seller's production capacity and on its other outlets for sale.

Now diversion-like ratios between among buyers help determine pre-merger markups (what would have happened if they had not contracted pre-merger). Post merger it depends on diversion ratios with third parties.

Diversion-like ratio come into play, and with the same sign, but the UPP formula is wrong (the right formula depends on the bargaining model).

Bargaining Outcomes and Costs of Production.

So far we have ignored the impact of the merger on production costs. Cost impacts are likely to occur for at least two reasons

- the sellers may be able to come to better terms with their input suppliers, and

- the investment incentives of sellers (who are the producers here) will change.

I want to stress the importance of considering investment ncentives (they are usually ignored). There are always dynamic effects in merger analysis, but in this case they are rather direct, and at least in the intermediate run, may dominate. This because when the sellers merge

- and their increased bargaining power generates an increase in their share of profits, they have a larger incentive to invest in cost-savings (as they internalize a larger share of them), and

- the sellers can now internalize the buisness stealing effects of their investments.

E.g.: HMO-Hospital Contracts.

Consider upstream mergers in the hospital-HMO (or hospital-ACO) market (expecting increased merger activity here because of the health care reform).

HMO/hospital contracts determine:

- which hospitals the HMO's insurees can access and

- the prices paid by the HMO to the hospital for the services the hospital renders.

Typically the patient pays little of the hospital price, though the HMO's physicians (which have a say in hospital choice) might internalize some of it depending on incentive schemes (Ho and Pakes,2011).

Impact of a hospital merger: increase the hospitals' bargaining power and share of profits. Effects on welfare depends on

- Resultant cost savings.

- To the extent that they are passed through to consumers, resultant price increases to HMO's.

Impact on prices to HMO depends on two aspects of downstream (consumer) market.

- Whether the HMO's hospital network contains other hospitals that deliver similar services in a given market. If there are, the hospital will have limited room for raising their prices post-merger (see Capps, Dranove, Satterthwaite, 2003).

- Whether there is a competing HMO that has a similar hospital network in the market. If there is the hospital will have increased bargaining power with each HMO (outside alterantive of hospital better).

Cost savings due to merger.

- Hospitals buy inputs and there are quite a number of joint purchase agreements among hospitals suggesting that bargaining power in input markets is important, and the hospital's bargaining power should go up post merger.

- Cost saving investments now are internalized to a greater extent.

- There has been a great deal of discussion about "arms races" among hospitals and the internalization of the buisness stealing effect ought to mitigate this problem.

Co-ordinated interaction.

The guidelines never made a clear statement of what is needed for the economic logic underlying co-ordinated interaction. So a lawyer or a judge would not know what to look for.

Most research here has been fairly abstract theory; but it has produced quite a bit of intuition. In particular there is general agreement that

- if there is coordinated interaction some firm has an incentive to deviate from static best response behavior, and

- They do not deviate because there is a dynamic incentive scheme in place which insures that coordination is in their best interests.

Question. What conditions are needed to support collusive prices, and how can we detect it? In particular is it likely that

- pre-merger prices reflect coordination?

- that the merger would enhance the ability to support increased coordinated interaction?

Current Research. Most formal analysis deals with identical firms in repeated situations, and would not be directly relevant; though it has generated a lot of intuitive reasoning on when it is likely to be easier to co-ordinate. I leave this intuition to the many good papers already available on this topic.

I want to focus on the limited reserach on coordination among heterogenous firms in dynamic game situations as these results have not been as widely disseminated. Two finding are that

- it is easier to support prices above static Nash best responses when firms in the industry are more evenly matched (in either the quality of their products or their cost of production),

- coordination is often signalled by current price (or bid) decisions depending on past prices (or bids).

This latter point should provide a basis for a test though distinguishing this from serially correlated unobservables can be difficult.