The Role of Price Tests in Market Definition

(A Comment Pertaining to #2b and #4 of the Questions for Public Comment)

HMG Review Project – Comment, Project No. P092900

James F. Nieberding, Ph.D.
LECG, LLC[1]

November 9, 2009

Issue: Should The Guidelines Include A Discussion Of The Role That Price Tests Can Play In Identifying Substitute Products To Complement the Hypothetical Monopolist Test For Market Definition?

****

Recommendation: Since the release of the Horizontal Merger Guidelines ("Guidelines"), a body of literature has developed concerning various "price tests" routinely used in the delineation of markets in competition analysis. These empirical tests include price correlations, Granger causality,[2] cointegration and stationarity analysis,[3] and econometric models of price responses based on natural experiments.[4] These price tests are based on the premise that if products are in the same market, then their prices ought to be systematically related. If not, then shocks to one of the prices should not have an impact on the other prices. In instances where reliable price data are available, and economic evidence indicates that price tests are appropriate, price tests can assist with market definition in identifying substitute products while

[1] Nieberding is a Principal at LECG in the global competition practice. The views expressed are those of the author and should not be construed as representing the position of LECG or other experts in LECG.

[2] The Granger test can determine how much of the variability in current prices in one region is explained by past (or "lagged") prices from that region and then determines how much additional variation can be explained by controlling for past prices in other regions. If past values of prices from other regions significantly enhance the prediction of the current price in the region at issue, then prices from the other regions are said to "Granger cause" prices in the region at issue. A finding that prices from other regions affect those in the region at issue would provide statistical evidence consistent with a broad geographic market.

[3] Cointegration is a statistical technique that estimates whether various time series (e.g., prices in different regions) systematically adjust back to an equilibrium relationship even in the presence of trending variables. If two or more regional price series are found to be cointegrated, then their relative values do not move too far apart from their longer-run equilibrium relationship and they systematically return to that relationship after temporary short-run disturbances. Accordingly, cointegrated prices are consistent with a longer-run equilibrium relationship among the prices in different regions, and support a conclusion that the regions are part of the same geographic market

[4] The first three techniques are "pure" price tests in that they generally restrict the analysis to only the prices under study, whereas a natural experiment may be done in the context of a broader econometric model.

the basic aspects of the Guidelines are retained. Price-based tests can provide empirical evidence that, together with other economic evidence for the merger under review, could narrow, broaden, or affirm candidate markets based upon the hypothetical monopolist test. Used in conjunction with the hypothetical monopolist test, price-based tests could result in a more accurate and efficient merger review process. As a result, the Guidelines would benefit from a discussion about price tests and how they might inform the market definition process.

Analysis To Support Recommendation: As an example, when contemplating a geographic market, price tests can be applied to price from different geographic areas to empirically test the hypothesis that different regions are interrelated in an economic sense. If two or more regions are part of an integrated market, then prices in these regions should follow a similar pattern, or be systematically related in an equilibrium relationship, over time. However, if price tests find persistent price differences among the regions under study, this provides evidence consistent with separate, not integrated, markets. Suppose, for example, that a tsunami significantly reduces production capacity for a given product in a certain region. As a result, prices for that product increase in the affected area. An econometric analysis of the price responses across different regions might allow for inferences about the geographic extent of the market. That is, a price test based upon this natural experiment may also allow for inferences about the extent of this geographic market. If the price effects are confined to the area affected by the tsunami, this would be consistent with the notion of a regional market. However, if the price effects of the unexpected capacity reduction are shown to spread from one geographic area to other geographic areas, this would be consistent with a geographic market broader than just the affected region. Such an analysis can empirically test whether the relatively higher prices in the affected region generate a sufficient supply response from other geographic areas to constrain prices in the affected region. If so, then this provides evidence of an broader market in that these "outside" areas might reasonably be included in the geographic market.

The natural experiment described above, and the resulting price increase in the affected region, is similar to a hypothetical monopolist in the affected region attempting to increase prices above some pre-merger level. In fact, a price-based natural experiment similar to that described was favorably considered by the European Commission in their review of the *Blackstone / Acetex* merger. In that matter, Roeller and Stehmann (2006) discuss how the European Commission found that the natural experiment presented by the merging parties (based upon unexpected plant outages) was helpful in broadening the European Commission's initially contemplated relevant geographic market:

> Such natural experiments can be a suitable empirical methodology to shed light on the source of existing competitive constraints that are likely to impede the exercise of market power. … Unexpected outages, though short-lived, may provide some indication about the source of the competitive constraint faced by producers located in the EEA [European Economic Area]. … These various empirical analyses have enabled the Commission to determine that the EEA did not constitute a distinct geographic market.

The strengths and weaknesses of the various price tests used in market definition are well documented in the literature.[5] For example, one weakness is that the results of price tests may be driven in part (or in full) by the effect of common factors/influences affecting the prices under study. If so, then a finding that prices from different regions are related might not necessarily show that these regions are part of the same market, but might merely reflect parallel movements of common influences in each region over time. Unless the influence of common factors is controlled for, one cannot be sure whether the results of price tests are spurious or valid. A recognized benefit to using price tests is that they can be conducted with information only on prices. These data often are more readily available in a time-constrained merger investigation

[5] This Comment lists some of this literature as references.

than are data on firms' quantities, which would be necessary (along with prices) for estimating a demand system from which own-price and cross-price elasticities could be obtained.

A more fundamental issue about price tests is whether or not they are able to identify relevant markets for antitrust purposes. There is a well recognized distinction between "economic markets" and "antitrust markets" particularly with respect to geographic boundaries. The latter is what concerns antitrust practitioners but the former may be what price tests actually are defining. The issue that has arisen about price tests is whether they are able to help define antitrust markets in which competitive effects and market power can be analyzed.

The geographic extent of an economic market is determined by arbitrage and transportation costs, though it may be somewhat difficult to find a clear "gap" between products that would indicate whether or not a particular product is "in" or "out" of a contemplated geographic market.[6] The concept of an antitrust market from the Guidelines involves the delineation of a product and geographic space within which market power by a hypothetical monopolist can be exercised. But, as many have noted, there may not be a clear correspondence between what the Guidelines call antitrust markets and what economists usually understand economic markets to be. Relevant antitrust markets can be smaller or larger than the corresponding economic markets. For example, an antitrust market could be larger than the economic market where, due to an absence of entry barriers, firms from outside an industry would enter quickly in response to a SSNIP. Price tests alone would be unable to identify such a competitive constraint. As noted in a report commissioned by the UK's Office of Fair Trading ("OFT") (1999), "What needs to be determined in defining an antitrust market is whether two

[6] As noted in Church, J. and Ware R. (2000), Cournot's definition of an economic market is still the one accepted today (An economic market is "the entire territory of which parts are so united by the relations of unrestricted commerce that the prices there take the same level throughout, with ease and rapidity.") A similar definition of an economic markets was advanced by Alfred Marshall, who defined it as an area in which "prices of the same goods tend to equality with due allowance for transportation costs" (as quoted in Scheffman, D. and Spiller P. (1987)).

areas that are in the same market at historical prices would still be in the same market if the producers in one area would increase their price by some significant and non-transitory amount. This question cannot be answered by looking at price movements alone."

Despite the debate about the utility of price tests in defining antitrust markets, price tests do appear in merger analysis, usually as a component of a broader antitrust market-delineation study. As noted by Coe and Krause (2008), "[p]rice-based tests of market delineation remain popular for preliminary work in antitrust cases despite existing criticisms." Boshoff (2006) states, "In sum, tests of price co-movement have been criticized in the literature, but continue to be employed by competition analysts due to their simplicity and the data constraints that prohibit more advanced analysis, such as estimation of elasticities."

Competition authorities, and economists who work for them, have also recognized the usefulness of price-based tests in market delineation. For example, the OFT (1999) states,

> All techniques based on the analysis of prices alone, including co-integration techniques, are very useful to define **economic** markets, but they should be used with care when establishing relevant **antitrust** markets. … Although the analysis of prices alone is not sufficient to establish whether a market is not an antitrust market, it is often the case that no other data but time series of prices are available to the analyst. In that case, the techniques developed in this chapter [dynamic price regressions and cointegration analysis] should be used, as they are the most correct ones from a statistical point of view. (emphasis in original)

And, as stated by Haldrup (2003),

> We are aware that the concept of an anti-trust market as defined by the SSNIP-methodology is different from the concept of an economic market. … Even though we realize that the market concepts are different, we will maintain that much useful information can be extracted from [price tests] based on the economic market concept, that is relevant for the anti-trust market and that cannot be extracted in any other way.

However, as the OFT (1999) cautions,

> The fact that the price of a certain product or area is found to affect prices of other products or areas is not sufficient proof that those products or areas are in the same **antitrust** market. … This question cannot be answered by looking at price movements alone. (emphasis in original).

Hosken and Taylor (2004), both FTC economists, state "there are clear advantages to using a cointegration analysis to look at market definition." These authors believe that despite the recognized shortcomings of certain price tests, "price relationship tests of Forni and others can be useful complements to more traditional inputs to the market definition exercise." That is, price tests can be most informative when accompanied by other analyses based on the Guidelines' approach to market definition, and by a thorough investigation of the economics of industry under study. This sentiment regarding the usefulness of quantitative techniques in market definition is echoed by the FTC and DOJ in their Commentary on the Horizontal Merger Guidelines (2006):

> To be probative, of course, such data analyses must be based on accepted economic principles, valid statistical techniques, and reliable data. Moreover, the Agencies accord weight to such analyses only within the context of the full investigatory record, including information and testimony received from customers and other industry participants and from business documents.

Roeller and Stehmann (2006) state that in the *Blackstone / Acetex* merger review, the European Commission determined that the price-based tests submitted on behalf of the merging parties were useful in helping them form an opinion on the relevant geographic market:[7]

> The investigation became an interesting example for the role of quantitative analysis to delineate antitrust markets. While the definition of product markets did not pose any challenge, one of the key issues was the delineation of the relevant geographic market for each product affected by the transaction. … These various empirical analyses have enabled the Commission to determine that the EEA did not constitute a distinct geographic market. The relevant geographic market had to include at least North America as well.

Durand and Rabassa (2005), two economists at the European Commission who worked on *Blackstone / Acetex*, attest to the usefulness of the price-based tests in helping define the relevant geographic market :

> The econometric studies submitted by the parties were reviewed and extended by the member of the CET [Chief Economist Team]. These various empirical analyses have enabled the Commission to determine that the EEA did not constitute a distinct geographic market. The relevant geographic market had to include at least North America as well.

[7] The author, part of the economics team working on behalf of the merging parties, co-authored a 2005 submission to DG COMP in *Blackstone / Acetex* entitled, "Price tests for geographic market definition: Cointegration analysis and Granger causality applied to VAM and acetic acid prices," by James Langenfeld, Mary Coleman, and James Nieberding. See Commission Decision Case No COMP/M.3625 - Blackstone/Acetex, available at http://ec.europa.eu/competition/mergers/cases/decisions/m3625_20050713_20682_en.pdf (at footnote 14).

While some price tests might be more informative than others in assisting with market definition, none are individually determinative. However, when properly used as a supplement to the hypothetical monopolist test, price tests can aid in setting the framework for defining markets for antitrust analysis in which competitive effects can be analyzed. For example, as in *Blackstone / Acetex*, price tests can be used to empirically "check" whether a contemplated geographic market is too small (i.e., supply shocks appear to transmit more widely than expected under the candidate market definition). They also can check if a proposed geographic market is too large (i.e., price effects are confined to a regional market and do not propagate to the larger proposed area). Price tests can also inform the analysis on *how* to expand a market if a proposed market is believed to be too narrow. That is, if shocks appear to propagate to prices more widely than expected given an initial market definition, price tests might reveal where to look for substitution. For example, suppose two additional markets (A and B) are believed to belong in a candidate market. If price tests reveal that supply shocks transmit from the candidate market to B (and perhaps vice versa) but not A, then B is the next best alternative.

A statement by Mncube et. al. (2006) of the Competition Commission of South Africa provides an appropriate summary regarding the use of price-based tests in defining relevant markets:

> In spite of all the limitations, price tests can yield valuable information. … The use of price tests can bring confidence to an analyst especially if the different tests point in the same direction and support the documentary evidence and industry practices.

References

Audy, E. and Erutku, C. (2005) "Price Tests to Define Markets: An Application to Wholesale Gasoline in Canada," Journal of Industry, Competition and Trade, 5(2), pp. 137-154. Downloadable at http://www.springerlink.com/content/q50168v154871228/

Boshoff, W. H. (2006), "Quantitative Competition Analysis: Stationarity Tests in Geographic Market Definition," Stellenbosch Economic Working Papers: 17/06. Available at http://www.ekon.sun.ac.za/wpapers/2006/wp172006/wp-17-2006.pdf

Cartwright, P. A., Kamerschen, D. R., and M. Huang (1989) "Price Correlation and Granger Causality Tests for Market Definition," Review of Industrial Organization 4, pp. 79-98. Downloadable at http://www.springerlink.com/content/ar5033p6lk458258/

Coe, P.J. and Krause, D. (2008) "An Analysis of Price-Based Tests of Antitrust Market Delineation," Journal of Competition Law & Economics, 4(4), pp. 983-1007. Downloadable at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1318125

Coleman, M. and Langenfeld, J. (2008) "Natural Experiment Analysis in Antitrust Analysis: The Use of *Daubert* Criteria to Evaluate its Relevance and Reliability," in ABA Section of Antitrust Law, Issues in Competition Law and Policy, Wayne Dale Collins, et al, eds.

Commentary on the Horizontal Merger Guidelines (2006), U.S. Department of Justice and Federal Trade Commission. Available at http://www.justice.gov/atr/public/guidelines/215247.htm

Church, J. and Ware R. (2000) Industrial Organization, A Strategic Approach. Irwin McGraw-Hill.

Durand, B. and Rabassa, V. (2005) "The Role of Quantitative Analysis to Delineate Antitrust Markets: An Example. Blackstone/Acetex," Competition Policy News 3, pp. 118–122. Available at http://ec.europa.eu/competition/publications/cpn/cpn2005_3.pdf

Engle, R. and Granger, W. (1987) "Co-Integration and Error Correction: Representation, Estimation, and Testing," Econometrics, 55(2), pp. 251-276.

Forni, M. (2004) "Using Stationarity Tests in Antitrust Market Definition," American Law and Economics Review, 6(2), pp. 441-464. Downloadable at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=305420

Haldrup, N, (2003) "Empirical Analysis of Price Data in the Delineation of the Relevant Geographical Market in Competition Analysis." University of Aarhus, Economics Working Paper No. 2003-09. Downloadable at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=429120

Hosken, D. and Taylor, C. (2004) "Discussion of 'Using Stationarity Tests in Antitrust Market Definition,'" American Law and Economics Review, 6(2), pp. 465-475. Downloadable at http://aler.oxfordjournals.org/cgi/content/extract/6/2/465

Mncube, L., Khumalo, J., Mokolo, R., and Njisane, Y. (2008) "Use of Price Correlation and Stationarity Analysis in Market Definition" Lessons From a Recent Merger." Policy and Research Division, Competition Commission of South Africa. Available at http://web.wits.ac.za/NR/rdonlyres/37777DEF-BA14-432C-A1DD-085889BC7BBB/0/Mncube_PricetestsConferencepaper_3_.pdf

Quantitative Techniques in Competition Analysis, (1999) Prepared for the Office of Fair Trading by LECG Ltd. Available at http://www.oft.gov.uk/shared_oft/reports/comp_policy/oft266.pdf

Roeller, L.H. and Stehmann, O. (2006) "The Year 2005 at DG Competition: The Trend Toward a More Effects-Based Approach," Review of Industrial Organization, 29, pp. 281-304. Available at http://ec.europa.eu/dgs/competition/economist/competition2005.pdf

Slade, M. (1986) "Exogeneity Tests of Market Boundaries Applied to Petroleum Products," Journal of Industrial Economics, 34(3), pp. 291-303. Downloadable at http://econpapers.repec.org/article/blajindec/v_3a34_3ay_3a1986_3ai_3a3_3ap_3a291-303.htm

Scheffman, D. and Spiller P. (1987) "Geographic Market Definition Under the U.S. Department of Merger Guidelines," Journal of Law and Economics, 30(1), pp. 123-147. Downloadable at http://econpapers.repec.org/RePEc:ucp:jlawec:v:30:y:1987:i:1:p:123-47

Warell, L. (2005) "Defining Geographic Coal Markets Using Price Data and Shipments Data," Energy Policy, 33(17), pp. 2216-2230. Available at http://www.kkv.se/upload/Filer/Forskare-studenter/projekt/2001/proj122-2001_1.pdf

Werden, G. and Froeb, L. (1993) "Correlation, Causality, and All that Jazz: The Inherent Shortcomings of Price Tests for Antitrust Market Delineation," Review of Industrial Organization, 8, pp. 329-353.