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Economics Committee

ECONOMICS COMMITTEE NEWSLETTER

Welcome

It is my pleasure to welcome you to the Winter 2020 edition of the Economics Committee Newsletter. The newsletter aims to provide a forum where members of the Antitrust Law Section and the Section's Economics Committee can share their views on topics related to the relationship of antitrust law and economics worldwide.

In this edition of the newsletter, James Nieberding discusses the use of event studies in defining geographic markets. George Korenko and Matthew Milner then discuss best practices for extracting data from parties involved in antitrust litigation.

The newsletter is intended to provoke discussion. As a result, the opinions expressed are only those of the authors and not necessarily those of the American Bar Association, the Antitrust Law Section, the Economics Committee or its subcommittees or any other individuals or entities.

I hope that you enjoy the newsletter!

Kind Regards,

Chris Ring (Ankura Consulting), Editor

To contribute an article for a future newsletter, or if you have corrections or comments, please contact Chris Ring at chris.ring@ankura.com.

Event Studies and Geographic Market Definition

By James F. Nieberding, Ph.D.*

Introduction

Event studies are an analytical tool used in a wide range of circumstances to empirically assess the economic or financial impact of unexpected events or the release of new information. They are regularly used by experts in securities matters to examine the behavior of firms' stock prices around certain events or corporate statements.[1] Event studies also are utilized in disciplines such as marketing, management, finance, accounting and economics to study a variety of phenomena.[2] Koch and Fenili (2013) discuss many examples of the use of event studies to estimate the impact of unanticipated events. They state, "There are hundreds of such studies and they span topics such as product tampering, product failures and recalls, regulatory changes, natural disasters, fraudulent acts, executive turnover, and executive compensation."[3]

The type of event study used in these applications normally focuses on the behavior of stock returns in a multiple regression framework that parameterizes the effect of the event(s) at issue. This methodology would, for example, measure the daily (or hourly) abnormal return of a stock price for a post-event trading period, where the cumulative abnormal return is the sum of the daily (or hourly) abnormal returns over a specific number of trading days (or hours). Similar stock market event studies have been used in antitrust to examine the behavior of stock returns around events such as merger announcements, the filing of an antitrust complaint by regulators, and the impact of private antitrust litigation.[4] While *non*-stock market event studies have been used to assist with geographic market definition in antitrust matters (using product prices rather than stock prices), these are best classified as econometric models of price responses based on natural experiments (in contrast to event studies that look for abnormal stock returns). This article briefly describes the use of such non-stock market event studies in geographic market definition and presents an illustrative example.

Geographic Market Definition Can Be Informed by Natural Experiments

Economists generally cannot conduct randomized controlled experiments like those done to test the efficacy of a new drug. They can, however, observe and study the effects of "natural experiments" such

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[1] *See*, e.g., Kothari, S.P. and J. B. Warner (2007), "Econometrics of Event Studies," Chapter 1 in *Handbook of Corporate Finance: Empirical Corporate Finance* (Edited by B. Espen Eckbo). For a discussion of the event study methodology used in a recent securities litigation, see Voetmann, Torben, Paul Hinton and Matthew Aharonian, "The Focus On Event Studies In Class Certification," *Law360*, December 22, 2015 (discussing the July 25, 2015 opinion of Judge Barbara M. Lynn in *The Erica P. John Fund Inc. et al. v. Halliburton Co. et al., No. 3:02CV1152M*, U.S. District Court, Northern District of Texas, Dallas Division).

[2] *See*, e.g., Allan Shampine (2019), "A Legal Practitioner's Guide to Event Studies," *The Antitrust Source*, 19(3); Johnston, Margaret (2007), "A Review of the Application of Event Studies in Marketing," *Academy of Marketing Science Review*, 11(4), pp. 1–31; MacKinlay, A. Craig (1997), "Event Studies in Economics and Finance," *Journal of Economic Literature,* Vol. XXXV, pp. 13–39; and Binder, John (1998), "The Event Study Methodology Since 1969," *Review of Quantitative Finance and Accounting*, 11(2), pp. 111–37.

[3] Koch, James V. and Robert N. Fenili (2013), "Using Event Studies to Assess the Impact of Unexpected Events," *Business Economics*, 48(1), pp. 58–66 (at p. 59).

[4] *See*, e.g., Kwoka, John and Chengyan Gu (2015), "Predicting Merger Outcomes: The Accuracy of Stock Market Event Studies, Market Structure Characteristics, and Agency Decisions," *Journal of Law and Economics*, 58, pp. 519-543; and Cichello, Michael & Douglas J. Lamdin (2006*),* "Event Studies and the Analysis of Antitrust," *International Journal of the Economics of Business*, 13(2), pp. 229-245.

as an unexpected plant outage, a natural disaster, the entry/exit of key competitors, or a change in the economic/regulatory environment.[5] With respect to geographic market delineation, suppose that a natural disaster reduces production capacity significantly for a given product in a certain region. As a result, prices for that product will increase in the affected region. An econometric analysis of price responses across different regions following such an event can allow for inferences about the geographic extent of the market. If the price effects are confined to the area in which the natural disaster occurred, this provides evidence of a narrow market. However, if the price effects are shown to have spread beyond the affected area, this provides evidence of a broader market.

A price response analysis based on a natural experiment, such as an unexpected reduction in production capacity, can affirm or deny quantitatively the hypothesis that various regions are interrelated in an economic sense. This is useful in geographic market definition because it can help shed light on, for example, whether a putative price increase above a baseline level in a given geographic area – perhaps due to a proposed merger – will generate a sufficient supply response from other geographic areas to cause prices to return to baseline (pre-merger) levels. If so, then this provides evidence of a broader geographic market as these "outside" areas ought to be included in the geographic market.[6] If an analysis based on a natural experiment finds no lasting price increase from the outage in the affected region, this is suggestive that a proposed merger in that geographic area similarly would not result in a lasting price increase. In other words, if a price-based natural experiment finds that a capacity reduction (and resultant product shortage) did not lead to a sustained price increase in the affected region due to a sufficient "outside" supply response, this would be evidence that a similar response might occur to counteract any potential price increase (or output reduction) due to a contemplated merger in that same region.

The belief that natural experiments can offer insight into the effects of proposed mergers has been expressed by antitrust regulators. For instance, former FTC Commissioner Rosch identified natural experiments (along with merger simulations) as capable of providing direct evidence on the "core question" of whether a merger is likely to be anticompetitive.[7] Hence, if a natural experiment (such as a substantial production outage) does not result in a sustained price increase in a certain geographic area, it suggests that a contemplated merger in that same area likewise would not result in such a price increase.

A price-based natural experiment using the event study framework was favorably considered by the European Commission in their review of the *Blackstone/Acetex* merger.[8] In that matter, Roeller and Stehmann (2006) discuss how the European Commission found that the price-based natural experiment (among other empirical analyses) presented by the merging parties – based upon unexpected plant

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[5] Natural experiments have long been used in antitrust and other empirical economic analyses. *See*, e.g., Coleman, M. and Langenfeld, J. (2008) "Natural Experiment Analysis in Antitrust Analysis," *Issues in Competition Law and Policy*, Wayne Dale Collins, et al, eds., Chicago: ABA Publishing (pp. 743-772).

[6] The well-recognized distinction between "economic markets" and "antitrust markets" based on geographic boundaries is not addressed here. While the latter is what concerns antitrust practitioners, the former may be what such an analysis is defining. Suffice it to say that caution must be exercised when using such a price response analysis for antitrust market definition, with the realization that an antitrust market might differ from an economic market. *See*, e.g., 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, pp. 137-154; and 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.

[7] The Past and Future of Direct Effects Evidence, Remarks of J. Thomas Rosch, Commissioner, Federal Trade Commission before the ABA Section of Antitrust Law's 59th Spring Meeting Washington, DC March 30, 2011, available at http://www.ftc.gov/speeches/rosch/110330aba-directeffects.pdf.

[8] European Commission Decision Case No. COMP/M.3625 – Blackstone/Acetex, available at http://ec.europa.eu/competition/mergers/cases/decisions/m3625_20050713_20682_en.pdf.

outages – was helpful in broadening the European Commission's initially contemplated relevant geographic market:[9]

> 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]. … 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.

Price-based natural experiments can be used to empirically "check" whether a contemplated geographic market is either too small (i.e., supply shocks appear to transmit more widely than expected under the candidate market definition) or too large (i.e., price effects are confined to a regional market and do not propagate to a larger area). The U.S. antitrust agencies state:[10]

> Evidence pointing directly toward competitive effects may arise from statistical analysis of price and quantity data related to, among other things, incumbent responses to prior events (sometimes called "natural experiments") such as entry or exit by rivals. … Evidence pertaining more directly to a merger's actual or likely competitive effects also may be useful in determining the relevant market in which effects are likely. Such evidence may identify potential relevant markets and significantly reinforce or undermine other evidence relating to market definition.

Empirical Example

As noted in *Blackstone/Acetex*, natural experiments based on unexpected supply reductions can provide a basis for testing the extent of a geographic market. For example, an unexpected outage at a major gasoline refinery will cause excess demand (and higher prices) in the area where it occurred. If the price effects of this outage are confined to the affected area, this is evidence of a regional market. However, if the price effects spread beyond the affected area, this is evidence of a broader market. In particular, if gasoline supply is diverted from areas where the outage did not occur to the affected area, then prices will decrease in the affected region but may increase in areas where the diverted supply originated. An econometric analysis of such a natural experiment will capture these price dynamics, allowing for inferences about the extent of the geographic market.[11]

An example illustrates how a price-based natural experiment using the event study framework can be implemented. Suppose there is a fire at a major gasoline refinery in Region 1 that completely shuts it down. The econometric strategy is to estimate the effect of this unexpected supply disruption in Region 1 on Region 1's gasoline prices as well as those in Regions 2, 3 and 4. The event study

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[9] Roeller, Lars-Hendrik and Oliver Stehmann (2006), "The Year 2005 at DG Competition: The Trend Towards a More Effects-Based Approach," *Review of Industrial Organization*, 29, pp. 281–304. The author was part of the economics team working on behalf of the merging parties in the *Blackstone/Acetex* merger review.

[10] *Commentary on the Horizontal Merger Guidelines*. (2006) Federal Trade Commission and U.S. Department of Justice, p. 10, available at https://www.justice.gov/atr/file/801216/download.

[11] Akin to a randomized controlled experiment, a natural experiment based on unexpected events can be expected to be independent of supply, demand and other market factors. This avoids the potential issue that unmeasured (or unobserved) factors affect prices differently in different geographic areas. However, an econometric analysis of price responses can be augmented with additional explanatory variables to account for factors (other than the unexpected event) thought to be important in price formation in different areas.

regression model regresses the daily change in gasoline prices in each region against the daily change in crude oil prices and a set of dummy variables that estimate the daily price effect in each region following the event. The estimated regression model is:

$$\Delta P_{it} = \hat{\beta}_0 + \hat{\beta}_1 \Delta C + \hat{\beta}_2 D_{it}$$

The analysis is done using the daily change in prices.[12] The dependent variable (ΔP_{it}) represents the change in the gasoline price on day *t* in region *i*. The first explanatory variable *(ΔC)* represents the daily change in crude oil prices, a common influence in gasoline prices (this is the same for all regions and may be lagged). The second explanatory variable (D_{it}) represents a dummy variable in each region (*i)* for each day (*t)* following the event.

These daily regression coefficients (D_{it}) are the ones of interest and capture the estimated daily price change in each region following the refinery outage in Region 1. Suppose these are as reported in Table 1, which lists the estimated daily price changes (in cents/gallon) in the four regions for 14 days following the refinery outage in Region 1 (statistically significant estimates are bolded).[13] Prices in each region adjust over time following Region 1's supply "shock" as market participants make changes in their production and supply decisions. The duration of the price impact of Region 1's event in each region is determined by the sum of the daily price change coefficients over time. When the cumulative sum returns to zero or becomes negative, then from a statistical point of view the price impact of the outage has ended.

As seen in Table 1, when the unplanned outage occurs in Region 1 on day 0, there is an initial short-lived price increase several days afterwards which signals to the market the need to expand output to compensate for the disruption. For example, on days 1-3 following the event in Region 1, there are significant price spikes that are later reversed by subsequent daily price declines (which are significant on days 7, 8, and 11) such that by day 13 prices have fallen to below their pre-outage level. Similar pattern are reported in Regions 2 and 3; namely, initial significant price spikes are later reversed so that prices fall to below their pre-outage level by day 12 (Region 2) and day 10 (Region 3). However, in Region 4, there are no significant daily price changes during the 14-day event window. Results like those in Table 1 would be consistent with Region 4 not belonging in the same geographic market as Regions 1, 2 and 3.

Conclusion

When price tests such as the one discussed in the article are offered as economic evidence, they are best viewed as being most informative when accompanied by other information – based on a thorough investigation of the industry under study – that either confirms or refutes the appropriateness of the proposed market definition. This sentiment is consistent with the view the U.S. Agencies have expressed on quantitative studies pertaining to merger analysis: [14]

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[12] This is the best-practice econometric approach when time-series data are trending and nonstationary. That is, it is statistically more appropriate to analyze prices in "first-differences" (such as daily price changes) rather than "levels" if the first-differenced prices are stationary but those in levels are not (assuming the variables are not cointegrated). Doing so minimizes the finding of spurious relationships among variables. Moreover, using nonstationary data in a regression model violates technical requirements crucial to the validity of the ordinary least squares (OLS) technique, and calls into question the reliability of the regression results.

[13] The regression model can be estimated using panel data techniques. Under a fixed-effects approach, the presence of highly insignificant regional fixed effects would be consistent with the regions being part of an integrated market (i.e., there is no systematic difference in price levels over time across regions). In conducting this kind of event study, it is reasonable to confine the impact analysis to a relatively narrow "window" so as to minimize the possible influence of confounding factors.

[14] *Commentary on the Horizontal Merger Guidelines*. (2006) Federal Trade Commission and U.S. Department of Justice, p. 10.

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.

Table 1: Daily Price Change Estimates

	Region 1		Region 2		Region 3		Region 4	
Days Since Event	Daily Price Δ	Cumulative Price Δ	Daily Price Δ	Cumulative Price Δ	Daily Price Δ	Cumulative Price Δ	Daily Price Δ	Cumulative Price Δ
0	0.81	0.81	-0.67	-0.67	0.09	0.09	-0.18	-0.18
1	**3.56**	4.37	0.97	0.30	**2.38**	2.47	0.79	0.61
2	**4.51**	8.88	**3.51**	3.81	**4.00**	6.47	0.09	0.70
3	**2.59**	11.47	**1.87**	5.68	-0.96	5.51	-0.18	0.52
4	1.87	13.34	**4.39**	10.07	**3.72**	9.23	0.87	1.39
5	1.54	14.88	-0.90	9.17	1.03	10.26	1.02	2.41
6	0.69	15.57	0.67	9.84	**-5.32**	4.94	-0.95	1.46
7	**-3.56**	12.01	**-4.12**	5.72	0.87	5.81	-0.32	1.14
8	**-6.84**	5.17	**-2.30**	3.42	**-3.02**	2.79	0.94	2.08
9	-1.52	3.65	-0.19	3.23	-0.11	2.68	-0.76	1.32
10	0.67	4.32	0.45	3.68	**-3.40**	-0.72	-0.81	0.51
11	**-3.50**	0.82	**-2.68**	1.00			0.12	0.63
12	-0.65	0.17	-1.17	-0.17			0.32	0.95
13	-1.50	-1.33					-0.50	0.45
14							-0.37	0.08