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A BRIEF ANALYSIS OF POLICY AND LITIGATION

FTC Complaint Against Intel

Allison M. Holt

Allison M. Holt, a Senior Economist in EI's Washington, D.C. office, has extensive experience in competitive analysis and in analyzing pricing data in class certification, price fixing cases, and damages analysis.

In December, the Federal Trade Commission (FTC) filed suit against Intel charging it with a "systematic campaign to shut out rivals' competing microchips by cutting off their access to the marketplace." The FTC claims that Intel, which currently has about 80 percent of the worldwide CPU (central processing unit) market, used threats, bundled price discounts and other incentives to foreclose competition from rival chip manufacturers. Intel allegedly used its dominance in the market for the microprocessing chips that constitute a computer's CPU to prevent GPU (graphics processing unit) chips manufactured by competitors, such as Advanced Micro Devices and Nvidia, from gaining a foothold in the market. The FTC also alleges that Intel intentionally designed software that would hinder the performance of competitors' chips.

Intel responded to the complaint with a statement that the FTC case was "based largely on claims that the FTC added at the last minute and has not investigated." It further responded that it operates in a highly competitive market that has benefitted consumers through robust innovation and declining prices.

In the suit, the FTC claims that, when customers with patent rights for microprocessing technologies declined to license to Intel, Intel repeatedly sought to punish such customers by refusing to provide them with pre-release information. To enable its customers to provide the most up-to-date technology in their products, Intel would provide favored customers access to the technical information necessary to design computer systems around a new Intel microprocessor before the release of that chip. In this way, as soon as Intel introduced the chip, favored computer manufacturers would be able to market their products as having the latest technology.

This complaint also seems to be an attempt by the FTC to more strictly regulate volume discounts and bundling discounts provided by firms with market power. Firms often give volume discounts to large customers, but the FTC claims that Intel offered volume discounts only to certain customers specifically to eliminate competition in the CPU market. In addition, according to the FTC, Intel charged a bundled price for its CPU and chipset with integrated graphics that was below-cost to eliminate competition from Nvidia. The FTC complaint defines cost as "average variable cost plus an appropriate level of contribution towards sunk costs," while many economists believe that in the short run a firm need only cover its variable costs.

Also In This Issue

Innovations in Hospital Merger Simulation

David A. Argue and Richard T. Shin

Despite a lengthy history of failures to block hospital mergers in court, the antitrust agencies continue to be interested in their competitive implications. Among the insights that come from recent FTC investigations of hospital mergers is that the FTC staff has developed a new form of merger simulation model. The new model has, for the most part, not been publicly aired by the FTC staff, but its basic structure is evident. The merger simulation model closely follows the theoretical "two-stage" theory of hospital competition embraced by the FTC in its retrospective review of the Evanston Northwestern-Highland Park Hospital merger, but it uses a novel approach for conducting the simulation. If the new merger simulation approach withstands scrutiny, it will be a very powerful enforcement tool because it gives direct, though simulated, evidence and does not depend upon the often controversial issue of market definition.

In the first stage of the two-stage theoretical model used by the FTC staff, hospitals and health plans negotiate over the price at which a plan will accept a hospital into its network. Logically, hospitals and health plans arrive at prices that reflect the relative value added to the network by each hospital. In the second stage, enrollees who become ill must choose a hospital from among those in their previously chosen network, and they are assumed to choose entirely based on non-price factors (*e.g.*, hospital's location, services, reputation, staff physicians). Thus, while hospitals compete on price to join a network in the first stage, they compete on non-price attributes in the second stage to attract enrollees who have become ill. The key to the simulation is first to estimate consumer preferences for hospitals as revealed in their second-stage choice of hospital, then to use that information to estimate prices from the first-stage negotiation between hospitals and health plans.

In the bilateral price negotiations over the first-stage price, each hospital negotiates using bargaining power it possesses from offering incremental value to enrollees who choose the network. The amount of incremental value is affected by the alternative hospitals that are already in the network or that might be added to the network. A different type of hospital (*e.g.*, a children's hospital) may bring more incremental value to enrollees than would one of many community hospitals. The more readily available in-network substitutes are, the less incremental value another hospital adds, and the more constrained on price is the bargaining position of a new hospital being considered for the network.

David A. Argue is a Principal in EI's Washington, DC office. He has analyzed competition in health care areas, including hospitals, physician practices, ambulatory surgery centers, health insurance, and pharmaceuticals. He has also taught health economics at Johns Hopkins University.

Richard T. Shin is a Senior Vice President in EI's Washington, DC office. He has experience in demand estimation and merger simulation in various industries including health care . *A more detailed version of this article appears in the Fall 2009 issue of* Antitrust.

The most interesting scenario from an antitrust perspective concerns hospitals that are similar to each other but different from other hospitals that are either in the network or are available to join the network. Because of their differentiation from the in-network hospitals, the incremental value to enrollees of including either hospital would be significant. Thus, either hospital likely is able to negotiate a price that is higher than its costs. Each one's bargaining power is attenuated, however, by the ability of the health plan to choose its rival. A merger of these two hospitals increases the combined hospitals' bargaining strength because it eliminates competition from a close substitute.

The incremental value a hospital brings to a network is reflected in the health plan's willingness to pay to include that hospital. Willingness to pay (WTP) can be estimated econometrically with data on patient characteristics and hospital characteristics. To determine whether one configuration of a hospital network yields greater satisfaction to enrollees than another, WTP is calculated for each network configuration. In effect, calculating the difference in WTP is the basis for understanding how a hospital merger may enable the merged entity to acquire increased leverage over payors.

continued on page 4

Sensitivity Analysis in Economic Modeling

Stuart D. Gurrea and Jonathan A. Neuberger

Sensitivity analysis examines how changes in the assumptions of an economic model affect its predictions. By definition, an economic model is a simplified mathematical representation of a complex interaction of economic variables, and as such is built upon certain assumptions. These assumptions, which include the structural specification of the model and the values of its parameters, are made to best approximate the phenomenon the model attempts to capture. At the same time, however, a model's assumptions are typically subject to uncertainty and error. For example, variables' current values often are not known with precision, and their future values may change. A properly designed sensitivity analysis can be a powerful modeling tool that contributes to an understanding of the relationships between the assumptions of an economic model and its results. Moreover, such an analysis can help validate the model's predictions even given uncertainty about its assumptions. An incorrectly designed sensitivity analysis, however, can be used to support a flawed model and can lead to wrong conclusions. Accordingly, it is essential to design this analysis carefully.

The first step in designing a sensitivity analysis involves selecting the assumptions that will be tested. For example, a model of financial risk management may rely on assumptions about the extent to which returns on different assets are correlated. Sensitivity analysis can be used to test how different values of such "cross-correlations" affect risk. Because economic systems are complex and frequently consist of many interrelated variables, it may be appropriate to test the effects of changing more than one variable at a time. In these circumstances, understanding the relationships among variables is important for designing a sensitivity analysis because, if variables are correlated, a change to one variable is likely to be accompanied by changes to one or more other variables. If, for instance, larger values of one variable are likely to be associated with larger values of another variable, then it is more realistic to consider simultaneous changes that affect both variables in the same direction. In the financial risk model, for example, higher levels of market risk may be associated with higher cross-correlations between certain asset classes. Sensitivity analyses of market risk may require increasing the extent of covariant risk between assets to capture these effects.

EI Senior Economist Stuart D. Gurrea has extensive experience in constructing and assessing economic models. His consulting experience includes the analysis of antitrust matters, calculation of damages, and performing financial analyses.

EI Principal Jonathan A. Neuberger specializes in financial economics, valuation, and damages analysis in complex commercial litigation assignments across a broad range of industries. He also has extensive experience in constructing and assessing economic models.

Sensitivity analyses can assess changes not only in the parameters of the model, but also in the specification of the model. Specification changes may include the addition of constraints, changes in functional form, etc. As with the selection of parameters, introducing combined changes to the structure of the model may be justified by a systematic relationship between structural characteristics. In the example above, widespread securitization of mortgage assets during the past decade may require modifying risk management models to account separately for housing-related events that may affect portfolio risk.

The second step in the design of a sensitivity analysis entails selecting the alternative values or specifications. Simple proximity or other arbitrary criteria alone cannot guide the analysis. For example, examining the model assuming parameter values that are close to the "base case" assumptions may not be informative if these values are unlikely or if other likely values are excluded from the analysis. Selecting the appropriate set of alternative values requires examining the distribution of alternatives, including both the range of possible values and the probability of these alternatives. For example, risk management practitioners often test their model results using variability observed over the previous year. In a more uncertain environment, however, it may be useful to model variation over longer periods of time, perhaps over three

continued on page 4

Innovations in Hospital Merger Simulation

continued from page 2

Once the incremental value of adding a hospital to a network or removing a hospital from a network (with or without replacement) is estimated, the price effect from the merger can be estimated from each payor's claims data. Price is assumed to be a function of WTP, patient demographics, length of stay, discharge status, admit source, and other factors. The change in price due to the merger is calculated using the estimated relationship between price and WTP and the change in WTP induced by the merger.

The new approach to hospital merger simulation is conceptually compelling, but it is not without shortcomings. First, the model explicitly assumes away health plans' use of financial incentives to steer patients among in-network hospitals. Instead, the model assumes that hospitals will either be included in or excluded from a network, and that plan members pay the same prices at each in-network hospital. Second, reflecting a problem that exists in much analysis of health care services, the simulation model does not incorporate quality improvements stemming from the merger. Third, the model does not account for the likelihood of entry or repositioning that may occur in response to an attempt to increase price or reduce quality from competitive levels. While a model need not explain everything to be useful, insofar as factors as important as quality changes or entry cannot be incorporated into the model, they must be evaluated outside of the model. Fourth, competition in the payor market is not explicitly incorporated in the simulation model. This omission is evident in the tension between the assumption that hospitals maximize profits but health plans maximize enrollees' satisfaction given that payment from enrollees is fixed.

The FTC staff's new hospital merger simulation model differs significantly from previous approaches. It takes advantage of the distinctive characteristics of hospital services markets in a creative approach to the long-sought goal of predicting price changes prior to a merger's occurrence. The new simulation model has not yet undergone substantial public review and critique, but it holds promise as an innovative approach to an old problem. It remains to be seen, however, how significantly its shortcomings affect its usefulness.

Sensitivity Analysis in Economic Modeling

continued from page 3

or even five years. While it may be impractical to simulate the model for all possible alternative parameter values, the analysis should consider at least the alternatives that are likely to occur. Without sufficient knowledge of the underlying distribution of parameter values, the model's conclusions may need to be qualified or limited in scope, and they may even be too imprecise to be useful.

Flaws in the available data often motivate sensitivity analyses. But uncertainty regarding a variable's value is different than uncertainty regarding the range or distribution of that value. For example, you might not observe the exact value of a particular cross-correlation between assets, but you may be relatively certain that it falls in the range of 0.3 and 0.7. Because the conclusions that can be derived from a sensitivity analysis depend on knowledge of the underlying distribution of possible values, sensitivity analyses can be informative even when data are imprecise or insufficient. Nonetheless, if no information about the distribution of likely alternative values is available, sensitivity analysis may offer little, if any, information about the robustness of the model.

When correctly designed, a sensitivity analysis is a valuable modeling tool because it may provide information on the robustness of a model's predictions. That information can help validate an economic model in the presence of uncertainty. A sensitivity analysis also can contribute to the specification of a model by assessing the individual contribution of a variable and the need to include it or not. Moreover, a sensitivity analysis can help interpret the results of a model. For example, a sensitivity analysis may help identify thresholds for certain variables that trigger outcomes of interest. In the case of a risk management model, cross-correlations above a particular value may be associated with significantly higher losses that require higher reserves or a different investment approach. Also, to the extent that the outcomes of a sensitivity analysis yield the probabilities of different results, users of the model can assess the upside and downside risks associated with alternative scenarios.

EI News and Notes

First major criminal trial related to the global financial crisis

EI President Jonathan L. Walker testified for the defense at the federal criminal trial of two former Bear Stearns hedge fund managers accused of fraud and insider trading. This trial was the first stemming from federal investigations related to the collapse of the subprime mortgage market and the ensuing global financial crisis. Dr. Walker testified regarding the hedge funds' operations, in particular liquidity, and cash flows around the time of the alleged fraud. A jury acquitted both managers of all charges. The defendants were represented by the law firm of Williams and Connolly.

Judgment in Dairyland Power Cooperative Case

EI Principal Jonathan A. Neuberger testified in the Court of Federal Claims for the defendant in *Dairyland Power Cooperative v. The United States*. Dr. Neuberger was retained by the U.S. Department of Justice to analyze how the organization of a hypothetical market would affect prices and plaintiff's damages claim. He concluded that plaintiff's predictions were unreliable because gains from trade in this hypothetical market were attributed solely to buyers, rather than being shared between buyers and sellers. The judge reduced by half the damages claim associated with this market and cited Dr. Neuberger's testimony in support of his ruling.

Comments on Natural Gas Contracts

The Commodity Futures Trading Commission (CFTC) issued Notices of Intent to determine whether 15 natural gas financial basis contracts traded on the Intercontinental Exchange (ICE) are Significant Price Discovery Contracts (SPDCs). EI Principal John R. Morris filed comments with the CFTC based upon his 20 years studying the natural gas industry and his extensive experience studying natural gas transaction data from ICE. Dr. Morris showed that actual transaction data indicate that the contracts do not meet CFTC standards for SPDCs.

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OFFICES:

1200 New Hampshire Avenue, NW
Suite 400
Washington, DC 20036
[p] (202) 223-4700
[f] (202) 296-7138

5980 Horton Street
Suite 250
Emeryville, CA 94608
[p] (510) 547-6910
[f] (510) 547-5162

www.ei.com

President
Jonathan L. Walker

Editor
Henry B. McFarland

Layout
Gregory E. Wurz

in association with
The Allen Consulting Group in Australia