Economics at the FTC: Horizontal Mergers and Data Security

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Abstract: This article describes aspects of the economic analyses that were performed on three matters on which economists in the Bureau of Economics at the Federal Trade Commission have worked during this past year. The first two matters were merger investigations: They (separately) involved tobacco manufacturers and food distributors. While these investigations shared some common attributes, such as the importance of the proposed divestitures, this essay demonstrates how our analysis must vary based on the types of information and the competitive concerns presented by specific transactions. The third section discusses a general economic approach to estimating consumer harm from data breaches, which is illustrated with an example of an application to a recent case.

Keywords: Antitrust, Consumer Protection, Data Security, FTC, Mergers

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I.   Introduction

A. The Bureau of Economics

The Federal Trade Commission's (FTC's) Bureau of Economics (BE) provides economic analysis in support of the FTC's two primary missions: to protect consumers; and to maintain competition. The staff of BE consists of about eighty Ph.D. economists, four financial analysts, twenty research analysts, along with a small administrative staff. Although BE generally provides independent assessments based on the economic analysis of the matter at hand, economists typically participate in investigations as members of case teams alongside attorneys. The FTC employs roughly 650 attorneys, who are employed predominantly in the Bureaus of Competition and Consumer Protection.[1]

The analyses that are performed by BE economists can help to inform a variety of enforcement, policy, and regulatory decisions. The primary role of BE is to provide economic analysis to better inform enforcement decisions while working on consumer protection and competition investigations and enforcement matters with our attorney colleagues. Second, policy-relevant economic research conducted by BE economists frequently appears in academic journals and FTC studies and reports.[2] Third, working with attorney colleagues, economists help to provide analysis of the impacts that state and federal regulations and laws could have on the competitiveness of markets and the welfare of consumers.[3]

The independent economic analysis that BE provides on law enforcement investigations is typically produced in the process of extensive investigations conducted along with FTC attorneys from the Bureau of Competition or the Bureau of Consumer Protection. The information that is generated by the economists and attorneys serves as an important input into the decisions made by the FTC Commissioners. When the Commission decides to pursue a legal challenge in court, BE economists help to develop economic evidence and, in some cases, may testify in court.

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[1] See FTC Fiscal Year 2017 Congressional Budget Justification at https://www.ftc.gov/system/files/documents/reports/fy-2017-congressional-budget-justification/2017-cbj.pdf.

[2] One example of a large Commission study on which BE economists have been working is an ongoing study of remedies in FTC merger cases, https://www.ftc.gov/news-events/press-releases/2015/01/ftc-proposes-study-merger-remedies. BE staff also disseminate articles via the BE Working Papers series (https://www.ftc.gov/policy/reports/policy-reports/economics-research/working-papers), many of which end up being the basis for articles published in academic economics journals.

[3] See, for instance, numerous advocacy comments at https://www.ftc.gov/policy/advocacy/advocacy-filings.

The economic impact of these actions can be substantial. For example, the FTC collected $2 billion in redress and disgorgement in connection with competition and consumer protection enforcement actions in 2015.[4]

U.S. merger and acquisition activity continued a recent upward trend, with 1,801 transactions reported to the U.S. Department of Justice (DOJ) and the FTC in fiscal year 2015 – up from 1,663 in fiscal year 2014.[5] Consistent with past years, a few of those transactions led to the antitrust authorities' undertaking a full-phase investigation in which a "Second Request" for additional information is sent to the merging parties. In FY2015, the FTC issued 20 Second Requests, and the DOJ issued 27.[6]

The FTC in FY2015 brought 23 merger enforcement actions, which consisted of: 17 consent orders that permitted the merger to proceed subject to certain conditions; three transactions that were abandoned or restructured during the investigations; and three transactions in which the Commission filed a complaint in federal court to enjoin the transaction. The FTC also brought five non-merger antitrust enforcement actions in FY2015, four of which were resolved with consent agreements.[7]

The FTC's consumer protection enforcers also had a busy year in 2015, bringing over one hundred enforcement actions that related to a variety of potential sources of consumer harm, including: privacy and data security risks; fraud that was targeted at specific communities; and fraud in financial marketplaces. Furthermore, the FTC logged over 3 million consumer complaints that related to problems such as debt collection, identity theft, and imposter scams.[8]

Economic research plays a very important role in BE's professional environment. Many of our economists perform academic research as part of their professional duties, and BE also encourages and disseminates competition-related research through seminars and conferences. In particular, BE organizes the annual FTC Microeconomics Conference, the eighth of which was held in November of 2015.[9] Research paper sessions, panel discussions, and keynote addresses covered such topics as: the empirical assessment of competitive effects in mergers; statistical

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[4] See https://www.ftc.gov/node/943403.
[5] FTC & Department of Justice (2016).
[6] *Ibid.* at 5.
[7] See https://www.ftc.gov/competition-enforcement-database for a table of these merger and non-merger enforcement statistics for each year starting in 1996.
[8] *Supra* note 4.
[9] Conference materials can be found at https://www.ftc.gov/news-events/events-calendar/2015/11/eighth-annual-federal-trade-commission-microeconomics-conference.

inference for policy analysis; bounded rationality; and the public policy implications of heterogeneous consumer preferences. The next FTC Microeconomics Conference will be held on November 3-4, 2016.[10] We also have an active seminar series that features academic and government researchers.

B. This Year's Article

Each year, we use our contribution to the Review of Industrial Organization's antitrust and regulation issue to share some of our work with an academic audience. This year, we discuss some of the economic analyses that were performed in two merger investigations and the economic foundations and empirical approaches that were used for assessing damages in data security breaches.

The first section discusses the econometric analysis undertaken to estimate the potential consumer harm from the loss of competition that stemmed from a proposed $27.4 billion merger between tobacco companies Reynolds American Inc. and Lorillard, Inc.[11] Prior to the merger, Reynolds marketed two of the top cigarette brands in the U.S. -- Camel and Pall Mall -- in addition to several other brands. Lorillard produced the best-selling menthol cigarette, Newport, along with several other brands. Reynolds and Lorillard were the second- and third-largest U.S. cigarette makers, behind industry leader Altria Group, Inc., which sells Marlboro cigarettes. The Commission determined that the transaction was likely to substantially lessen competition in the U.S. cigarette market. This article describes the empirical methods that were employed by BE economists to quantify that effect. To address the likely anticompetitive impact, the Commission agreed to a consent order that required the merged firm to sell certain brands to Imperial Tobacco Group, PLC.

The second section considers a merger of the top two broadline foodservice distributors in the U.S.: Sysco, and U.S Foods. The FTC alleged that the proposed merger would cause foodservice customers, including restaurants, hospitals, hotels, and schools, to be likely to face higher prices and diminished service.[12] In contrast to the tobacco merger, the Commission

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[10] For details, go to https://www.ftc.gov/news-events/events-calendar/2016/11/ninth-annual-federal-trade-commission-microeconomics-conference.

[11] For a discussion of the FTC's investigation of this merger, see FTC, Analysis of Agreement Containing Consent Order to Aid Public Comment, In the Matter of Reynolds American Inc. and Lorillard Inc. at https://www.ftc.gov/system/files/documents/cases/150526reynoldsanalysis.pdf.

[12] See the FTC's Administrative Complaint, In re Sysco Corp., Dkt. No. 9364 (F.T.C. Feb. 19, 2015), available at https://www.ftc.gov/system/files/documents/cases/150219syscopt3cmpt.pdf.

determined in this instance that a proposed divestiture would be insufficient to maintain the competition that would likely be lost via the merger. In June of 2015, after the U.S. District Court for the District of Columbia granted the Federal Trade Commission's request for a preliminary injunction, Sysco and US Foods abandoned their proposed merger. A number of challenging topics had to be addressed in this investigation. This article will discuss several of those, including price discrimination, bidding markets, and the analysis of the net effect of competitive harms and cost savings likely to be passed-through.

The final section is a discussion of data security issues and focuses on an economic analysis that can be used to estimate injuries from data breaches. The courts have held that the FTC has authority to bring data security cases under the provision of Section 5 of the FTC Act that outlaws unfair acts or practices in or affecting commerce.[13] Rather than addressing the contours of the legal responsibilities of companies to safeguard information, this section instead focuses exclusively on how to use an economic framework to assess the harm that is done when such precautions are not taken and information is compromised. As an illustrative example, this section discusses the potential application of this framework in the recent FTC case against Wyndham Worldwide Corporation for allegedly employing insufficient security protocols.

II.   Tobacco Merger: Reynolds and Lorillard

During 2014-2015, the FTC investigated Reynolds American's proposed acquisition of Lorillard. At the time, Reynolds and Lorillard were the second and third largest U.S. cigarette manufacturers, respectively. On the same day that the Reynolds/Lorillard transaction was announced, Reynolds reached an agreement to sell several cigarette brands and other assets to Imperial, the fifth largest cigarette manufacturer in the U.S. The result of these two transactions would be that Reynolds would acquire Lorillard's Newport brand, while Imperial would gain three of Reynolds' brands (Winston, Kool, and Salem) and two Lorillard brands (Maverick and blu eCigs – an electronic cigarette brand). Reynolds's other major brands are Camel and Pall Mall. The Commission accepted a consent decree that required that the firms divest the five brands to Imperial, in lieu of a challenge to the transaction.[14]

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[13] <u>FTC v. Wyndham Worldwide Corp.</u>, 799 F.3d 236 (3d Cir. 2015).
[14] See https://www.ftc.gov/system/files/documents/public_statements/644971/150526reynoldscommstatement.pdf.

As part of the investigation, BE economists used detailed data, document analysis, and testimony from the merging parties to assess the impact of the series of transactions. In this article, we discuss how the merger would change firms' unilateral pricing incentives ("unilateral effects"). However, as part of our investigation, we also considered how the merger might change firms' ability to collude tacitly ("coordinated effects"),[15] and whether the merger might create efficiencies.

A. The Theory of Harm

In many ways, the theory of harm from this merger follows that of any merger of differentiated substitutes. However, measuring the welfare impacts from this transaction presented a few additional complexities relative to those of a "typical" case.

First, the notion of "welfare effects" of a merger of firms that sell cigarettes is a potentially fraught topic. To the extent that there are negative externalities (e.g., via second hand smoke) or consumer naiveté (e.g., via imperfect information) that are associated with the consumption of cigarettes, some may assert that a merger that increases prices is in fact a laudable policy goal, albeit one that likely lies outside the purview of antitrust enforcement. As such, we focused on estimating the welfare effects that would be associated with the transaction absent these factors.

Second, even if we ignore these concerns about externalities and naiveté, this series of transactions would likely cause some consumers to be better off and some to be worse off. The reason for this is that these proposed transactions involved a reshuffling of firms' portfolios – not simply a merger of substitutes. For example, if Winston (a divested brand) and Camel are close substitutes for many consumers, the price of these brands may *go down* following the transaction, since they will no longer be combined in the same firm's portfolio of products.[16] To summarize the net economic effect of the transactions, BE economists focused on overall consumer surplus as a metric to net consumer benefits and harms.

Faced with considerable amounts of data, documents, and testimony, and limited amounts of time in which to complete the investigation, BE staff used two complementary approaches to

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[15] For more on potential industry coordination, see Ciliberto and Kuminoff (2010).

[16] The explanation for this effect is just the reverse of the typical description of how a merger of substitutes can cause prices to increase. In this instance, lowering the price of one of the substitute products becomes more profitable when the products are not jointly owned because the owner of one product has no incentive to internalize how this lower price will cannibalize the sales of the other product.

assess harm from this transaction. Both of these approaches yielded estimates of state-by-state changes in aggregate consumer surplus: First, we utilized first-order approximation methods (upward pricing pressure or "UPP") to compute a range of consumer harm estimates, each of which relied on different sets of assumptions about consumer substitution patterns. Second, by calibrating and estimating a simple demand system, we conducted a merger simulation to measure consumer and total welfare changes. The remainder of this section will discuss the UPP approach in detail, and conclude with how a merger simulation complemented our other analyses.[17]

B. Using First-Order Approximations to Compute Harm

1. Overview of method

To compute estimates of price changes and consumer harm without specifying a demand system and computing equilibrium, we utilized a first-order approximation approach that is outlined in Jaffe and Weyl (2010) and Miller et al. (2016).[18] For this analysis, we assumed the firms were engaging in Nash-Bertrand price competition.

Within that context, consider a firm f that faces the following twice-differentiable profit function:

$$\pi_f = Q_f(P)(P_f^T - MC_f) \; ,$$

where P_f^T is a $J_f \times 1$ vector of prices; $Q_f(P)$ is a $J_f \times 1$ vector of quantities that are evaluated at the market price vector P; MC_f is a $J_f \times 1$ vector of firm f's marginal cost for each product; and J_f is the number of products that are controlled by firm f prior to the transactions.

We can write a first-order approximation to the equilibrium price change that follows a transaction that modifies firm f's pre-merger product portfolio. In particular, consider an acquisition where firm f acquired a set of products from firm k and divested a set of products to firm l. As a result of the products from firm k that enter firm f's portfolio and the products that are divested to firm l (and thus leave firm f's portfolio), there is an impact on the equilibrium prices of all of the other products.

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[17] These approaches both assumed that the manufacturer sells its product directly to the consumer. In fact, the manufacturer sells to a distributer who sells to a retailer, who sells to a consumer. Given facts that were uncovered during the investigation about the ways in which prices are set in the industry, we felt that this was an appropriate simplification.

[18] Both of these approaches build on Farrell and Shapiro (2010)

The first-order approximation of the post-transaction change in the price of the products that were originally in firm f's portfolio is given by:

(1) $$\Delta P_f = T(P^0) \overbrace{[D_{fk}(P^0_k - MC_k) - D_{fl}(P^0_l - MC_l) - \Delta MC]}^{N} ,$$

where $T(P^0)$ is a $J_f \times J_f$ matrix of the pass-through rates; D_{fk} is a $J_f \times J_k$ matrix of diversion ratios (that are evaluated at pre-merger prices) from products in f's portfolio to those acquired from k; $(P^0_k - MC_k)$ is a $J_f \times 1$ vector of markup for the set of products that are acquired from k; and D_{fl} and $(P^0_l - MC_l)$ are the analogous terms for the set of products that are divested to l. ΔMC is a $J_f \times 1$ vector of the post-transactions change in marginal costs (i.e., "efficiencies"). Note that J_k is the number of products that are acquired from firm k, and J_l is the number of products divested to l. N is a $J_f \times 1$ vector of "net pricing pressure" that will be explained below.[19]

Consider D_{jm}, which is an element of the matrix D_{fk}. $D_{jm}(P^0_m - MC_m)$ is referred to as the upward pricing pressure ("UPP") that results from the combination of product j (from f's original product portfolio) and product m (that was acquired from firm k). This term has an intuitive interpretation as the value of the recaptured sales following the joining of product j and k in a common portfolio. D_{mk} gives the amount of sales that would be recaptured and $(P^0_k - MC_k)$ gives the per unit profit for each unit of recaptured sales. A similar calculation can be done for the divested products. This term -- $D_{fl}(P^0_l - MC_l)$ -- could be called the "downward pricing pressure" from the transactions.

Therefore, the N term in equation (1) gives a vector of the overall change in pricing pressure that results from this transaction. Note that this includes both the impact on firm f's prices of the divestitures to firm l and the impact of the acquisition of firm k. It also includes any reduction in marginal cost that could occur from the transaction.

$T(P^0)$ is the "pass-through" matrix and determines how the change in pricing pressure is passed through to prices. The question of how to approximate this term to assess merger impacts without specifying a demand system has received significant attention in the academic literature (Miller et al., 2016, 2017; Jaffe and Weyl, 2010). One approach to approximating this matrix is discussed below.

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[19] This derivation is based upon Jaffe and Weyl (2010) and Miller et al. (2016).

In the context of the investigation, we computed the ΔP_f vector for the pre-merger products of Reynolds, Lorillard, and Imperial. These were the products that would have a change in upward or downward pricing pressure because of the series of transactions.

Further, one can compute the change in consumer surplus using the expression $\Delta CS \approx \Delta P^T \tilde{Q}$ where ΔP^T and $\tilde{Q}$ are vectors that approximate the post-merger price change and each product's quantity respectively. For $\tilde{Q}$, there can be theoretical justifications for using pre-merger or post-merger quantities or a geometric average of the two (Jaffe and Weyl, 2010).

Therefore, this analysis of a first-order approximation of price changes and changes in consumer surplus requires four primary objects: diversion ratios; gross markups; the pass-through matrix; and cost-efficiencies. We address the first three of these in turn, and do not discuss our cost-efficiency estimates in this paper due to the confidential nature of that information.

2. Constructing Objects of Interest

a. Diversion Ratios

The first ingredients needed are diversion ratios between all affected products. First, we needed diversion ratios between all of Reynold's products and all products that enter or leave its portfolio as a part of the transactions. Second, we needed diversion ratios between all of Imperial's products and the products that enter its portfolio because of the transactions. Finally, we needed diversion ratios between the products that were initially in Lorillard's portfolio that were separated into different firms after the transactions.

The ideal diversion ratios for the first order approximations are the diversion ratios that result from a small price increase that is evaluated at the pre-merger prices. For example, to obtain D_{jm}, we ideally would observe the fraction of demand that leaves product j and that switches to product m after an exogenous increase in the price of product j.[20] However, this diversion ratio is rarely obtainable without computing a demand system, and even then one must trust the demand system estimates.[21]

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[20] Formally $D_{jm} = \left(\frac{\partial Q_j}{\partial P_j}\right)^{-1} \left(\frac{\partial Q_m}{\partial P_j}\right)$.

[21] While in some contexts it is possible to obtain a diversion ratio from a "natural experiment", this usually gives the diversion ratio when a product is removed from the choice set. While in a bargaining context like health care, this is the relevant diversion ratio (see Raval et al., 2015) in the posted price context it is not. However, specific functional

In the widely used logit demand system, the diversion ratio is proportional to the market share of the two products (Conlon and Mortimer, 2013), which can be expressed as $D_{jm} = \frac{s_m}{1-s_j}$. However, this finding is also true at the group level – in other words, we can combine individuals into small groups, and then assume proportional diversion ratios within each group – which allows for substantial flexibility across groups (Raval et al., 2015; Farrell et al., 2011). The group-level diversion ratio is expressed as $D_{jm}^g = \frac{s_m^g}{1-s_j^g}$, where s_m^g and s_j^g are m and j's shares within group g. Therefore, this approach allows for flexible substitution patterns across groups, while imposing a specific structure on substitution within each group. The aggregate diversion ratio is a weighted average of the group diversion ratios, where the weights are given by the share of each group in the share of product j.[22]

With the proprietary datasets that were obtained in the course of our investigation, we used three distinct approaches to define groups: geography, consumer type, and demography. Ideally, we would have a dataset that contains information on all three of these together in order to stratify consumers by all of these types jointly. However, as is often the case, this type of data was not available.

Therefore, given the data constraints, we looked at each of the three approaches to define groups in isolation from the others: For geography, we used store-level information on product shipments and assumed proportional substitution within the store. For consumer types, we used survey data on individuals' brand preferences and assumed proportional substitution within these brand preferences.[23] For demography, we assumed proportional substitution within demographic groups and used survey data on age, sex, and ethnicity, for example.

While each of these approaches has drawbacks -- especially when viewed in isolation -- when viewed in concert they helped to paint a clear picture of the substitution patterns in the market. Further, due to the simplicity of computing each of these approaches, we were able to present a range of harm estimates each based on a different set of plausible, but imperfect, assumptions.

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form assumptions – including logit -- imply that the diversion ratio is constant or close to constant over a range of prices, in which case a diversion ratio from a natural experiment may be informative (see Conlon and Mortimer, 2013).

[22] Formally, $D_{jm} = \sum_g w_j^g D_{jm}^g$, where w_j^g is the share of demand for product j that is purchased by group g.

[23] In this case, we put a weight of one on the diversions from the regular users of that product. For example, to compute the diversion ratio from j to m, we only used regular users of j.

b. Markups

The second major ingredients needed are the gross markups, which require information on prices and costs. Prices (which included both cross-sectional and time variation within products) and costs were estimated using information that was obtained in the investigation. We included taxes in our estimates of marginal costs, since that portion of price is not captured by the firm as profit.

c. Pass-through

The final necessary ingredient is the pass-through matrix. As our baseline harm estimate, we used the identity matrix for the pass-through matrix, which implies that the net pricing pressure is the prediction of the post-merger price change. In the absence of marginal cost shocks or a flexible demand system, it is not possible to know the "true" pass-through matrix. Therefore, we relied on results that show that for many common demand systems net pricing pressure is frequently a better predictor of post-merger price changes than a mis-specified demand system (Miller et al., 2016).

3. Potential Limitations of the UPP Analysis

This UPP analysis suffered from two limitations: one based upon our data, and the other endemic to the approach.

The nature of a first-order approximation method is that it is a local analysis. In other words, this approach computes a linear approximation to a small change from the pre-merger equilibrium. If there is significant curvature in the demand system – such that the shape of demand is very different at pre-merger and post-merger equilibrium prices -- this may not be a good approximation.

Second, when we estimated diversion ratios, we lacked information on the extent to which a price increase would cause consumers to stop smoking or reduce the number of cigarettes that they smoke per day or per week. We assumed that in response to a relatively small post-merger price increase, this would be a small effect.

C. Full Merger Simulation

To address concerns as to the limitations of the UPP analysis, we also estimated and calibrated a parametrized demand system and conducted a merger simulation using it. Within

that framework, we were able to conduct a non-local analysis and estimate substitution to the outside option. Moreover, in our welfare calculations we were able to account for changes in quantities purchased as a result of the changes in prices. The cost of the full simulation approach is that it required stronger assumptions about the nature of the substitution patterns between the products than were required for the UPP analysis.

D. Broader Lessons

In our investigation, the UPP and full simulation approaches and the differing approaches to computing diversion ratios for UPP proved to be complementary. By evaluating the predicted merger impacts using different relatively simple approaches, we were able to estimate consumer harm based upon different data sources and sets of assumptions. This approach contrasts to focusing on a single "preferred" specification, which attempts to incorporate all of the data sets in a single unified model. While in some circumstances, it is possible to devote the time and resources to analyze a single specification that includes all of the information, in this case (and in many others) it can be more effective to present a range of simple approaches. This allowed us to inform the decision-making process with the use of a range of estimates of consumer harm: Each used plausible -- but untestable within the time horizon of our investigation -- assumptions about the nature of demand.

III. Foodservice Distributor Merger: Sysco and US Foods

In December 2013, Sysco agreed to pay approximately $8 billion to acquire US Foods (USF). The two companies compete in the business of broadline foodservice distribution. They warehouse and distribute thousands of stock-keeping units (SKUs) of food products to customers that want those products delivered to their locations. This includes national customers with locations in multiple regions (including restaurant chains, hotel chains, foodservice management companies that serve food courts, and group-purchasing organizations that buy for medical facilities) as well as customers that are centered in one geographic location (including independent restaurants, amusement parks, and local governments and schools).

After a lengthy investigation, the FTC filed a complaint that alleged that the alternatives that were available to many national customers and to customers in some local areas would likely be lessened substantially by the transaction, and that the weakened bargaining position for

many customers would likely lead to consumer harm. In 2015, the FTC challenged the proposed merger between Sysco and US Foods; and after the court issued a preliminary injunction, Sysco and USF abandoned the transaction.[24]

Unlike some investigations, this case did not offer many useful natural experiments, nor sufficient exogenous variation, to conduct some of the rigorous empirical projects that were undertaken in other cases, such as the cigarette investigation discussed above. Sysco and USF were present nationwide throughout recent history, and the entry by other firms mostly took the form of incremental rollouts: slow expansions into neighboring geographies. Nonetheless, economics still played a critical role in the investigation: first, in structuring the analytic framework; and then in helping to assess the implications of various types of qualitative evidence.

A. Price Discrimination Framework

Prices in foodservice distribution can vary across customers, and may be determined via interactions that typically differ across customer types. National customers typically issue requests for proposals ("RFPs") and negotiate a number of contract terms, including: product prices; delivery frequency; per shipment distribution fees; and whether or not local clients are permitted to purchase some items from other distributors (off-contract). Meanwhile, local customers with a small number of locations are more likely to purchase from a price list, but they also have the ability to negotiate better pricing terms from the distributors' sales representatives ("reps") on some items, depending on the degree of competition among the distributors in the local market.

Foodservice distributors have a large amount of information about their customers. For example, national sales reps can compare the geographic locations of a customer's stores, the geographic locations of their own distribution centers, and the geographic locations of their rivals' distribution centers, and determine which distributors are able to serve the customer in a cost-effective manner. At the local level, foodservice distributor sales reps evaluate which products a customer was buying from other firms, and offered discounts when necessary to win the majority of the business.

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[24] See FTC Press Release at https://www.ftc.gov/news-events/press-releases/2015/07/following-syscos-abandonment-proposed-merger-us-foods-ftc-closes.

Overall, the combination of individual negotiations and the use of sales reps to evaluate each customer's specific circumstances gives distributors the ability to price discriminate.[25] Consequently, the merger was likely to have heterogeneous impacts across customers.

FTC staff interviewed a large number of different customer types to evaluate the various nuances of customer needs. It is difficult to articulate the needs of particular customers without divulging confidential information, but factors as simple as the style of restaurant (e.g., Italian versus "Gourmet") or the need for documented nutritional information and menu planning (for serving children or the elderly) could determine whether a customer had a large or small number of alternative distribution options. Clearly, the most unambiguous factor that affected customers' distributor choice was the geographic dimension. Since Sysco and USF were the only two broadline foodservice distributors with a national network of distribution centers, the FTC concluded that for many customers with a national presence, there would be a substantial reduction in the number of bidders of acceptable quality and capability.[26]

Though there was significant debate in court about the proper ways to group customers, and the quality of the alternatives for each type of customer, the Sysco case was a strong illustration of a situation that is discussed in the Horizontal Merger Guidelines:[27] a price discrimination market, where it is economically appropriate to look at harm to a subset of customers, even if other customers are not harmed.

B. Valuing Potential Harm and Potential Efficiencies

When evaluating the welfare consequences of this merger, it is useful to start with a simple procurement-auction bidding model.[28] The customer will choose the (supplier) bid with the lowest cost (highest value proposition). Let Firm 1 be the distributor with the lowest cost (highest value), Firm 2 be the distributor with the next lowest cost (next highest value), and so on. Firm 1 only needs to outbid Firm 2 barely in order to win the contract. Assume for a moment that there are some efficiencies from the transaction. Then a merger can lead to several scenarios:

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[25] When we consider price discrimination, it is important to establish that arbitrage is not possible. In this case, reselling and delivering to other customers is not practical since delivery is an essential component of the initial purchase.

[26] *Supra* note 12.

[27] See U.S. Department of Justice & the Federal Trade Commission (2010, p. 6).

[28] This is easiest to demonstrate in the context of a bidding model with full information about rivals, which can be motivated by the large amount of information that sales reps collect about customers; but similar conclusions could be drawn from auction models without full information.

(i) If Firms 1 and 2 merge, then Firm 1 only needs to outbid Firm 3, not Firm 2 in order to win the contract. If Firm 3's bid is significantly higher, Firm 1 can raise its bid (i.e., increase its price) and still win the contract. Firm 3's bid is the limiting factor regardless of whether the merger lowers Firm 1's costs.

(ii) If Firms 1 and 3 merge, the binding constraint remains Firm 2's bid for that customer, and Firm 1 can win the bid with the same offer. Again, any cost savings Firm 1 recognizes will not impact the winning bid.

(iii) If Firms 2 and 3 merge, but the merger does not change any firm's costs, Firm 1 still has to just beat Firm 2's bid to win. If the merger lowers Firm 2's costs, the merger would cause the winning bid to decrease, either because Firm 1 has to beat a more aggressive bid from Firm 2 or because Firm 2 can now offer a bid that is below Firm 1's cost. Either way, if neither of the merging firms is winning a given customer's business currently, the pass-through of cost savings is more likely.

Note that the order of bids need not be the same for every customer. It could vary for many reasons, including: which firm is the incumbent; perceptions of customer service; the locations of distribution centers; and the variety of products that are offered by the distributor.

The advantage of this simple framework is that it allowed the FTC to group customers and identify those customers that are more likely to benefit from the transaction and those that are more likely to be harmed by the transaction. Customers that were not buying from Sysco and USF currently were most likely to benefit from the transaction, while customers that viewed Sysco and USF as their top two choices were more likely to be harmed. Once BE obtained counts for the various groups based on sales data, the next question was how close the next-best alternative was to the Sysco/USF bidder that would be removed in various bidding situations. Our assessment of the magnitude of this difference relied on a number of factors.

Geography was probably the most important factor. While Sysco and USF were the only two companies with a national network, conglomerates of regional groups also sometimes would bid on national contracts. As part of this process, we evaluated evidence about the costs of managing multiple contracts and the need for product consistency if national customers chose to use a regional-supplier strategy. We also conducted a detailed analysis of distance, comparing the distances from Sysco to customers, from USF to customers, and the next-best alternative to customers.

This analysis was complicated by the fact that the merging parties signed a divestiture agreement with PFG ("Performance Food Group", a regional distributor) during the investigation to sell eleven of USF's distribution centers to PFG. While the expanded PFG network improved PFG's geographic footprint, even with the divestiture PFG remained substantially weaker than the existing Sysco and USF networks along many dimensions. For example, for Sysco's national account customers, the average distance from their locations to Sysco's distribution network and the average distance from their locations to USFs distribution network were nearly identical. In contrast, the average distance to the network that PFG would have had even after the divestiture would have been approximately 50% greater. And since distance mattered for both delivery costs and customer service (errors were easier to remedy for nearby customers), for these customers the value of the next best alternative appeared to be substantially reduced by the merger.[29]

Similar analyses compared PFG to Sysco and USF using other measures, such as: the variety of SKUs carried; customer service ratings; distributor costs (based on scale and other factors); the flexibility of distribution schedules; and the implications of current market shares for the overall quality of the next best alternative.

BE also evaluated the potential efficiencies from the transaction. As noted above, in addition to economists, the bureau staff also includes financial analysts who worked with the economists to evaluate different aspects of the efficiency claims. The economists and financial analysts focused on a number of questions, such as whether or not efficiencies are likely to be passed through to consumers and whether the efficiencies are merger-specific.

While the simple bidding model suggests that pass-through is more likely when the merging firms are the customer's second- and third-best options, and that firms would not have an incentive to pass savings along when either of the merging firms was the customer's best option, other models can result in some pass-through even in this latter situation. For instance, in a basic Nash bargaining model, if the customer learns that the best distributor has achieved substantial cost savings via a merger, the customer can negotiate for some of the additional surplus that is created by the cost savings. How much of the additional surplus the customer can obtain, and how that compares to any anticompetitive effect that the merger has on the customer's negotiating stance depend on specific details of the model. Thus, while it may be

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[29] While national customers were the most likely to see the distance to the next-best alternative increased by the merger, in some local areas the next-best alternative also would have been significantly further away if the merger had taken place.

natural to expect that pass-through would be greatest in scenario (iii) above, market characteristics may suggest that some pass-through in other scenarios is possible.

The merging firms in this transaction spent considerable effort looking for synergies and ways to cut costs if the merger had been consummated. The FTC staff determined that not all of the planned cost cutting was merger-specific. Moreover, some of the claims about scale efficiencies cut both ways: For example, if the firms claimed that they would be able to run fuller trucks or obtain better prices from manufacturers due to the increased scale from the merger, this evidence would also suggest that the next-best alternative was at a scale disadvantage and that there was significant harm from this transaction.[30] Specifically here, since Sysco and USF currently had a larger scale than the proposed PFG divestiture-enlarged network, evidence that the two merging firms expected meaningful additional scale efficiencies also provided evidence that the new PFG network would be at a scale disadvantage and that the next best alternative was (relatively) weakened in bidding situations.

Overall, BE did a complex analysis that classified different types of consumers and that evaluated the potential magnitude of harm and the potential magnitude of efficiencies that would be passed through, in order to evaluate the impact of this proposed transaction. Internally, BE modeled a number of assumptions based on the qualitative record, and assessed the magnitude of effects under different assumptions. In addition to the analysis discussed here, a variety of other analyses were conducted, including a simple share-based merger simulation.

IV.   Estimating the Harm from Data Breaches

Section 5 of the Federal Trade Commission Act prohibits "unfair or deceptive acts or practices in or affecting commerce." Starting in 2002 the Commission began enforcing Section 5 against companies with allegedly deficient cybersecurity that failed to take reasonable steps to protect consumer data against hackers. Since this time, the FTC has brought almost 60 cases

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[30] Indeed, one of the more interesting questions that arose in this case is why smaller foodservice distributors continued to exist in a market where variety and scale matter. One possible reason is that while large foodservice distributors often must carry all manufacturers in a product category to serve their large client base, smaller foodservice distributor may be able to negotiate price concessions with manufacturers in exchange for carrying and promoting only one product in various categories. Smaller distributors can then use the prices that they gain in exchange for that promotion to "get their foot in the door" with customers. Alternatively, smaller foodservice distributors may specialize in certain categories and offer different quality products in those categories.

against companies that allegedly put consumers' personal data at unreasonable risk.[31] A key issue in conducting an economics analysis of a firm's data security practices is whether the alleged deficiencies led to or were likely to lead to substantial consumer injury. This section discusses a general economic framework for thinking about consumer injury in data security cases, and how this framework might be applied in an investigation.

A.   Data Security and Potential Consumer Injury

Let us begin by incorporating concerns about data security into the traditional consumer-choice utility-maximization framework: A consumer i will purchase from seller j if the corresponding product or service gives the consumer a higher utility (u) than each of the other feasible alternatives. In evaluating alternatives, the consumer considers the expected benefit (v) and the price (p) of each product. In addition, the consumer considers the likelihood that her personal information will be stolen from the seller, how such a data breach (B) would affect her likelihood of experiencing identity theft (I), and the resulting costs (c) that are associated with identity theft.

We can express utility more formally as follows:

$$u_{ij} = v_{ij} - p_j - P(B_j)P(I_i|B_j = 1)E[c_i|I_i = 1] \ ,$$

where we have made the simplifying assumptions that all utility inputs are separately additive and that consumers are risk neutral about the potential costs of identity theft. In determining her maximum willingness-to-pay (w) for product j, the consumer compares the expected consumption benefit and potential identity theft cost that are associated with purchasing the product with her expected utility from the next best alternative a.

Based on the previous utility specification, the consumer's maximum willingness-to-pay can be expressed as:

$$w_{ij} = v_{ij} - (v_{ia} - p_a) + \left(P(B_a) - P(B_j)\right)P(I_i|B_j = 1)E[c_i|I_i = 1] \ ,$$

where we have additionally assumed that the probability of identity theft -- conditional on having one's information exposed in a data breach -- does not depend on seller characteristics. In this framework, the level of data security that is maintained by the seller is expressed as the probability that the seller will experience a data breach: $P(B)$. A firm can potentially either

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[31] See FTC Privacy and Security Update (2015) at https://www.ftc.gov/reports/privacy-data-security-update-2015.

generate or exploit misinformed consumer beliefs -- $P^*(B)$ -- about the level of that firm's data security.

Specifically, we are concerned about cases where consumers are misled or persist in erroneously believing that a firm has better data security than it does in reality: $P^*(B) < P(B)$. If we assume that the firm has a fixed supply, the willingness-to-pay of the marginal consumer m suggests that the firm is potentially able to charge the consumer the following price premium (pp) as a result of deceptive or unfair practices relating to its data security:

$$pp_j = \left(P(B_j) - P^*(B_j) \right) P(I_m|B_j = 1) E[c_m|I_m = 1] \ .$$

Developing an estimate of the price premium that results from deficient data security practices requires information on consumer beliefs -- $P^*(B)$ -- which may be difficult to obtain.

Alternatively, one can assume that the marginal consumer believes that firm j maintains some industry standard ($\bar{j}$), or average, level of data security. With this additional assumption, we can reformulate the price premium as follows:

$$pp_j = \left(P(B_j)P(I_m|B_j = 1) - P\left(B_{\bar{j}} = 1 \cap I_m = 1 \right) \right) E[c_m|I_m = 1] \ ,$$

where $P\left(B_{\bar{j}} = 1 \cap I_m = 1 \right)$ is the joint probability that the marginal consumer has her personal information stolen and subsequently experiences identity theft.

This formulation is appealing because its component inputs potentially can be estimated or inferred, which allows the calculation of the price premium that likely resulted from deficient data security practices for a particular investigation. In particular, if one assumes that the marginal consumer has rational expectations about the risks and costs associated with identity theft, then one does not need to rely on data that specifically elicits consumer beliefs. Instead, the baseline identity theft rate can be estimated using publicly available data. The expected cost that is associated with identity theft can also be estimated with the use of similar public data sources. Finally, the probability of experiencing identity theft -- conditional on having one's information stolen in a data breach -- can potentially be estimated with the use of data from the banking or credit card industry. We will further touch on the estimation of each of these inputs of the price premium calculation in the discussion of our example case that is provided below.

The last important input for calculating the deficient data security price premium is the ex-ante probability that the firm would have experienced a data breach given its data security practices. The price premium equation suggests the following lower bound for this probability:

$$P(B_j) \geq \frac{P(B_{\bar{j}} = 1 \cap I_m = 1)}{P(I_m | B_j = 1)} \ ,$$

which one could calculate and use as a benchmark in assessing the data security practices of the company and the likelihood of consumer injury. It is possible that a data security expert may be able to provide a point or bounded estimate of the likelihood that a company with similar data security practices would eventually experience a data breach. If such an estimate is not available, we can rely on the fact that this probability could be at most one and proceed with presenting an analysis with a range of plausible data breach probabilities.

One can combine the aforementioned estimated inputs as suggested by the price premium formula to produce a point or bounded estimate of the price premium that results from a given firm's deficient data security practices. In turn, this estimate can be multiplied by the total number of customers to produce an estimate of the extent of consumer injury that is attributable to a firm's data security violation.

B.   Illustrative Example in a Data Security Case

1.   Background

In this section, we consider how the economic framework that was laid out above could be applied to real world cases; we use the FTC's case against Wyndham Worldwide Corporation as an illustrative example. In *FTC v. Wyndham,* the FTC alleged that the company failed to provide reasonable and appropriate security for the customer information that it collected and maintained by engaging in a number of practices that, taken together, unreasonably and unnecessarily exposed consumers' personal data to unauthorized access and theft.[32] As a result of these alleged failures, between April 2008 and January 2010, hackers were able to gain unauthorized access to Wyndham computer networks on three separate occasions. On each occasion, these intruders used similar techniques to access personal information that was stored on system servers, including customers' payment card account numbers, expiration dates, and security codes. The FTC alleged that, after Wyndham discovered each of the first two breaches, the company failed to take appropriate steps in a reasonable timeframe to prevent the further compromise of its network.

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[32] See https://www.ftc.gov/news-events/press-releases/2012/06/ftc-files-complaint-against-wyndham-hotels-failure-protect.

Over the course of these legal proceedings, the Third Circuit Court of Appeals affirmed the federal district court's ruling that the FTC could use the prohibition on unfair practices in Section 5 of the FTC Act to challenge the alleged data security lapses that were outlined in its complaint against Wyndham.[33] Wyndham ultimately reached a settlement with the FTC under which the company agreed to establish a comprehensive information security program that is designed to protect cardholder data, conduct annual information security audits, and maintain safeguards in the connections to its franchisees' servers.

2.   Analysis

We will briefly discuss various sources of information that can be used to estimate specific inputs in the potential consumer injury calculation described above, although the specific details underlying how one would produce these estimates in a particular case would typically be confidential. The Bureau of Justice Statistics has intermittently included Identity Theft Supplements in its National Crime Victimization Survey, and the corresponding data from these surveys is a very useful starting point for assessing potential consumer injury that results from deficient data security.

For example, the 2012 Identity Theft Supplement of the National Crime Victimization Survey includes information on out-of-pocket costs and time costs that are associated with debit and credit card fraud, which can be used to estimate the expected cost that a consumer would incur as a result of identity theft. This type of data can also be used to estimate the incidence of successful credit card and debit card fraud, which -- along with information about the percentage of the population that holds debit or credit cards -- can be used to calculate the baseline identity theft rate.[34]

It is difficult to find publicly available information to estimate the likelihood of experiencing identity theft, conditional on being exposed in a data breach. One possible source of information is data from major banks and credit card companies on the transaction histories of cards that have been exposed in identified data breaches, including whether fraud was observed on the exposed cards. Estimating the probability that a given firm would experience a data

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[33] See https://www.ftc.gov/system/files/documents/cases/140407wyndhamopinion.pdf.
[34] For example, the Federal Reserve Bank of Boston's Survey of Consumer Payment Choice is one potential source of information on the percentage of households with access to different payment instruments, such as debit and credit cards. See https://www.bostonfed.org/publications/survey-of-consumer-payment-choice.aspx.

breach is also potentially difficult, but one can calculate consumer injury estimates for ranges of reasonable assumptions. In the Wyndham case, the fact that the company's system suffered multiple data breaches may suggest that this probability was unlikely to have been trivial.

Combining estimates of expected costs and different probabilities that relate to data breaches and identity theft would then allow us to estimate the likely price premium that a firm would have been able to charge as a result of the FTC Act violations that are related to data security deficiencies. Finally, multiplying the estimated price premium by the relevant number of vulnerable customers would allow one to estimate the consumer injury that is associated with the firm's allegedly deficient data security practices.[35]

V.   Conclusion

As this essay demonstrates, economists at the FTC must be prepared to consider varied modes of economic analysis to help provide policy makers with the best possible information. The broad range of issues confronted at the FTC requires an equally broad skill set within the bureau. Active interaction with the broader economics community is vital to BE fulfilling our obligation to generate thorough, reliable, and objective economic analysis.

VI.   References

Ciliberto, F., & Kuminoff, N. V. (2010). Public policy and market competition: how the Master Settlement Agreement changed the cigarette industry. The BE Journal of Economic Analysis & Policy, 10(1), 1-46.

Conlon, C. T., & Mortimer, J. H. (2013). Demand estimation under incomplete product availability. American Economic Journal: Microeconomics, 5(4), 1-30.

Farrell, J., Balan, D. J., Brand, K., & Wendling, B. W. (2011). Economics at the FTC: Hospital mergers, authorized generic drugs, and consumer credit markets. Review of Industrial Organization, 39(4), 271-296.

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[35] The approach that is laid out in this paper adopts an ex ante perspective: It assumes that each consumer who is affected by the firm's deficient data security practices is injured by the increase in the probability that his sensitive data will be stolen and then result in the consumer costs that are associated with identify theft. Under the assumptions that consumers have rational expectations with regard to the relevant probabilities and economic costs, and are risk-neutral, an equivalent estimate of consumer injury could be obtained by an ex post analysis: by calculating the harm imposed on consumers whose sensitive information was actually stolen and who thus actually experienced the consumer costs that are associated with identify theft.

Farrell, J. & Shapiro, C. (2010). Antitrust Evaluation of Horizontal Mergers: An Economic Alternative to Market Definition. The B.E. Journal of Theoretical Economics, 10(1), DOI 10.2202/1935-1704.1563

Federal Trade Commission & Department of Justice. (2016). Hart-Scott-Rodino Annual Report, Fiscal Year 2015. Retrieved October 14, 2016, from FTC Web site: https://www.ftc.gov/system/files/documents/reports/federal-trade-commission-bureau-competition-department-justice-antitrust-division-hart-scott-rodino/160801hsrreport.pdf.

Jaffe, S., & Weyl, E. G. (2013). The first-order approach to merger analysis. American Economic Journal: Microeconomics, 5(4), 188-218.

Miller, N., Remer, M., Ryan, C., & Sheu, G. (2016). Upward Pricing Pressure as a Predictor of Merger Price Effects. EAG Discussion Paper 16-2. Retrieved October 14, 2016 from DOJ Web site: https://www.justice.gov/atr/file/829271/download.

Miller, N. H., Remer, M., Ryan, C., & Sheu, G. (2017). Pass-Through and the Prediction of Merger Price Effects, Journal of Industrial Organization, forthcoming.

Raval, D., Rosenbaum, T. and Tenn, S. (2015) Semiparametric Discrete Choice Model: An Application to Hospital Mergers, mimeo.

U.S. Department of Justice & the Federal Trade Commission. (2010). Horizontal Merger Guidelines. Retrieved October 14, 2016, from FTC Web site: http://www.ftc.gov/os/2010/08/100819hmg.pdf.