Economics at the FTC: Physician Acquisitions, Standard Essential Patents, and Accuracy of Credit Reporting

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Abstract Economists at the Federal Trade Commission pursue the agency's competition and consumer protection missions. In this year's essay, with respect to antitrust we discuss the analysis that is used in two areas where the Commission has recently been active: physician combinations and standard essential patents (SEPs). In consumer protection, we discuss the FTC's recently released national study of the accuracy of consumer credit reports.

Keywords Antitrust · Consumer protection · Credit accuracy · FTC · Physician combinations · Standard essential patents

1 Introduction

The Bureau of Economics (BE) at the FTC is tasked with providing economic analysis to support the FTC's three-pronged mission: enforcing competition law, protecting consumers, and advocating for sound competition policies. BE is composed of over 80 PhD economists, several accountants, and research and support staff. Economists work on case teams with attorneys from our sister bureaus: the Bureau of Competition (for antitrust matters) and the Bureau of Consumer Protection (for eponymous concerns). However, BE provides independent assessments and recommendations to the Commission.

The majority of our resources are devoted to evaluations of pending mergers and acquisitions (M&As), which are largely, but not exclusively driven by the notification requirements of the Hart-Scott-Rodino (HSR) Act. However, we also devote substantial resources to investigations of alleged anticompetitive conduct (e.g., how Google displays its search results; pay-for-delay deals between branded pharmaceutical manufacturers and would-be

generic entrants), and competition policy efforts (e.g., developing a policy for evaluating Accountable Care Organizations). In addition, approximately 22 economists work full-time on consumer protection investigations and related policy and research.

During fiscal year 2012, U.S. merger and acquisition (M&A) activity held steady, with 1,429 transactions that were reported to the DOJ and FTC, as compared to 1,450 in fiscal year 2011. M&A activity is highly cyclical: Over the past decade, these figures have ranged between 716 (in 2009) and 2,201 (in 2007). The vast majority of proposed mergers are cleared within the "waiting period" that is imposed by the HSR Act (usually 30 days; 15 for cash-tender offers or bankruptcy sales). During FY 2012, the FTC opened 20 formal merger investigations, and brought a total of 25 merger enforcement actions (some of which were initiated in preceding years). Fifteen of these actions involved consent orders (permitting the transaction to proceed, albeit with modifications), seven transactions were abandoned or restructured during (and perhaps as a result of) the investigations, and three prompted administrative litigation (OSF Healthcare System/Rockford Health System, Graco/Illinois Tool Works, and Omnicare/Pharmerica).[1]

The Bureau of Economics also undertakes significant research activities throughout the year. Many of our economists perform academic research alongside their professional duties, and we also sponsor and disseminate competition-related research through seminars and conferences.

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[1] FTC & DOJ Hart-Scott-Rodino Annual Report, Fiscal Year 2012. Retrieved from http://www.ftc.gov/os/2013/04/130430hsrreport.pdf

In November 2012, we hosted our 5th annual Microeconomics Conference. Topics included the economics of privacy, the effects of Internet-based advertising on search and product quality, and structural models of firm entry and conduct. We also have an active seminar series featuring academic and government researchers.

Each year, we use the forum that is provided by the *Review of Industrial Organization*'s antitrust and regulation issue to share some of our work with an academic audience. This year, we highlight an empirical method for evaluating physician combinations, a conceptual and theoretical model underlying some of our investigations into conduct by holders of so-called "standard-essential patents," and our recent study of the accuracy of consumer credit reports.

Our section on physician combinations begins with a brief review of the Commission's conceptual approach to evaluating hospital mergers, as we adopt a similar approach in the physician setting. However, markets for physician services present a different set of challenges in terms of bringing the model to the data. Specifically, we have found it computationally infeasible to replicate the same process that has been utilized in the evaluation of hospital mergers. We propose an alternative that is consistent with the overall modeling framework and enables us to generate the statistics that we require to evaluate the potential for any given transaction to generate anticompetitive harm.

The second section discusses the Commission's recent activities concerning standard-essential patents (SEPs). Many standards, particularly in the high-tech sector, include a large number of patented technologies.[2] Standard-setting organizations (SSOs) commonly seek

[2] For example, recent litigation between Microsoft and Motorola disclosed that complex industry standards, such as the H.264 video coding standard or the 802.11 WiFi standard, can require the use of hundreds or thousands of SEPs held by dozens of patent holders. *Microsoft Corp. v. Motorola, Inc.*, 2013 WL 2211217 at *11 (W.D. Wash. Apr. 25, 2013).

commitments from patent holders to license these patented technologies on "fair, reasonable, and non-discriminatory" (FRAND) terms, often as a *quid pro quo* for including the patented technology in the standard. In recent years, some standard-essential patent-holders have garnered substantial attention for committing to license their SEPs on FRAND terms, and then seeking injunctions or exclusion orders prohibiting the sale of products that infringe their patents. This behavior can raise competitive concerns. In this section we discuss the economic underpinnings of this concern, building on a model that was developed by Shapiro (2010).

The third and final section describes a national study of the accuracy of consumer credit reports. This study, mandated by the 2003 Fair and Accurate Credit Transactions Act (FACT Act), finds that 21 percent of consumers have errors in one or more of their credit reports (there are three credit reporting agencies, hence up to three reports per consumer). For 5 percent of consumers, the impact is large enough that these consumers may be deemed ineligible or face less favorable terms for loans.

2. An Empirical Approach to Evaluating Physician Mergers

Each year, the FTC evaluates a large number of hospital mergers. As we discussed in our 2011 review article (hereafter Farrell et al., 2011), our approach to evaluating these proposed (or consummated) transactions incorporates theoretical and empirical advances that have been developed over the past decade. In this installment, we discuss an extension to our methodology that enables us to apply it to physician services markets. We begin by reviewing the conceptual framework that underpins the analysis that is performed in the hospital setting and discuss the challenges that arise in applying the standard empirical approach used for hospital markets to physician markets.

Next, we describe how we adjust the methodology to address these unique issues. Our solution incorporates a very flexible model of patient choice and permits us to derive the outputs that we require to evaluate a combination, all at low computational cost. We show the circumstances under which this approach yields identical results to those produced with the original methodology: i.e., estimating the demand system. Last, we discuss our experience in implementing this approach.

2.1 A Brief Review of Bilateral Bargaining between Insurers and Providers

The interaction between providers and medical insurers ("payers") determines the nature of competition in markets for provider services (Capps et al., 2003; Town and Vistnes, 2001). Payers assemble networks of providers, such as hospitals and physician groups, and secure discounts for their services. Payers sell network access, together with other complementary services, such as claims processing, utilization review, and (in the case of full insurance) the commitment to pay for medical services that are actually consumed, to local employers and individuals. Payers compete for customers in part by attempting to offer networks with desirable features, such as a large selection of available providers at low prices (or health insurance premiums).

Providers and payers negotiate over in-network provider prices. If bilateral bargaining breaks down, the payer excludes the provider from its network. Network exclusion is unattractive to both sides, since providers may lose patients and payers may lose customers. The division of rents that are created by network inclusion depends on the relative unattractiveness of each party's outside option. The leverage of the payer derives from its ability to steer members away from the provider with which it is bargaining. The leverage of the provider derives from its

contribution to consumers' willingness-to-pay (WTP) for the network. If two parties to a merger are substitutes (i.e., have non-zero diversion ratios), then the willingness-to-pay for the merged entity will exceed the sum of the willingness-to-pay for the individual parties so long as there are no perfect substitutes to the merged entity in the market. Such an increase in WTP raises the providers' leverage in a negotiation and can increase the negotiated in-network price.

Determining whether providers are substitutes requires appropriate data and a model of consumer behavior. A recent strain of the economic literature has developed discrete choice models of patients' choices of hospitals. These models can be used to estimate diversion ratios and the change in the WTP resulting from a particular provider combination. We now discuss how these models are specified and what modifications are needed to adapt them to the physician setting.

2.2 Estimating Patient Choice for Physician Services

To evaluate the possible effects of a provider combination, we require a model of how patients select providers. In the hospital setting, we estimate discrete choice models using patient-level discharge data. These data include very detailed information about both the hospital and the patient. For example, discharge records frequently include the age, gender, 5-digit zip code of the patient's residence, and an indicator of the health of the patient.[3] Providers are identified by name and address, and these identifying characteristics can be used to match with additional data

[3] Hospital data frequently includes the Diagnosis Related Group (DRG) code that is used for Medicare billing purposes, and physician claims data frequently includes an array of condition codes that are identified using the International Classification of Disease Code version 9 (ICD-9).

about the hospitals from other sources: e.g., services offered, number of beds, hospital ownership status.

Whereas most states gather hospital discharge data directly from hospitals (as opposed to gathering these data from insurers) and make these data available to researchers, data on office-based services is much more difficult to obtain. The FTC has acquired such data for investigational purposes in a number of settings, including specialty surgical centers, outpatient kidney dialysis centers, and physician services. Like the public hospital discharge databases, these data are provided at the patient-encounter level and include a substantial amount of patient detail, along with a provider identifier that can often be matched to public information on providers. Unlike the public hospital discharge databases, payer claims data include the privately-negotiated transaction price for each encounter, which is known as the "allowed amount."

In office-based provider cases, the FTC acquires insurer claims data for provider services at the episodic level (i.e., a visit for office-based care, or a discharge for inpatient care). Typically, we request data from all of the significant insurers in the geographic area of interest, with the objective of assembling a near-census of commercially insured encounters. Office-based physician claims generally include the address at which the encounter occurred (which is significant because many physicians operate in multiple locations), the practice's tax identification code, and a National Provider Indentifier (NPI), which is a nine-digit person-specific identifier. The NPI provides enough information to identify key characteristics of providers, including the name, birth year, sex, and specialty of the physician from public sources.[4]

[4] The identification of a physician to a specific practice – i.e., to a "firm" – may require third-party subpoenas.

The analysis of patient choice begins by specifying the utility function for patient i, who is faced with a choice of providers, indexed by $j \in J$. Patient utility from each provider choice is modeled as a function of z_{ij}, which represents a vector of provider characteristics and interactions of patient and provider characteristics.[5] If we add in an error term, the utility for patient i from selecting provider j can be expressed as

$$U_{ij} = z_{ij}\delta + \varepsilon_{ij}, \quad (1)$$

where δ is a vector of parameters to be estimated. In hospital markets, z often includes hospital characteristics (such as indicators for hospital zip code), as well as interactions between patient and hospital characteristics (such as distance of the patient to the hospital). Under the standard assumption that the error term is distributed Type I extreme value, the model is a conditional logit, and the parameters can be estimated via standard maximum likelihood techniques (MLE).

Estimation of the choice model in markets with as few as 50 providers often becomes computationally intensive because of richly-specified underlying utility models. For example, it is common to include provider-specific fixed effects, and to interact these with indicators for each patient zip code-DRG-age-gender combination. Most practical challenges can be addressed, however, by utilizing a randomly selected subset of the data and/or limiting the number of explanatory variables. The computational burden of a physician choice model can be prohibitive, because the number of potential providers, J, is so much larger than for a hospital-choice model, and every patient i generates J rows of data. For example, it is not uncommon for a local geographic area to have fewer than ten or twenty general acute care hospitals, but several

[5] Because uninteracted patient characteristics shift the utility of all of a patient's choices equally, they do not affect choice probabilities and therefore cannot be identified in discrete choice analysis.

hundred physicians. A further contribution to the data challenges that are associated with estimating a discrete choice model in the physician setting is the fact that many physicians perform services at multiple locations, and each physician-location combination is best considered a unique provider choice given the well-documented role of provider location in determining provider choice.

The approach that we describe below enables us to produce the key outputs that we desire from the patient choice model – i.e., willingness-to-pay estimates (in "utils") and diversion ratios – without estimating the underlying parameters of the utility function.[6]

2.3 An Application to Physician Mergers

To apply the methodology described in Farrell et al. (2011) to the physician market, we assume that patients can be partitioned into mutually-exclusive and collectively-exhaustive microsegments, which are denoted $g \in G$. That is, each patient i is a member of a single microsegment g. An alternative interpretation is that all patients in microsegment g share identical values of relevant patient characteristics. The total number of patients in microsegment g is represented by I_g. We use the term "microshare" to refer to each provider's share of patients in each microsegment. Our model allows the utility that is generated by each provider j to vary by microsegment.

Let z_{ij} be a Jx1 vector of 0s with a 1 in the jth row, and let δ^g be a Jx1 vector of parameters, where the jth row gives the mean utility of selecting provider j. For a given

[6] We note that some research questions may require such parameter estimates: for example, if one wanted to estimate the welfare effects from altering the services that are offered by a particular practice.

patient i, we refer to the patient's segment as $g = g(i)$. Because all patients in segment g share the same characteristics, we can rewrite the utility generated by choice j in terms of $z_{ij} = z_j^g$. For a patient $i \in I_g$, equation (1) can be rewritten as

(2) $$U_{ij} = z_j^{g\prime}\delta^g + \varepsilon_{ij}$$

(or, equivalently, $U_{ij} = \delta_j^g + \varepsilon_{ij}$).

This model is very flexible with respect to provider characteristics. For example, one can include indicator variables for every physician-location combination (e.g., Dr. Smith in zipcode 12345, and Dr. Smith in zipcode 12346). Such variables can capture a large number of observable and unobservable provider characteristics, and the g-specific parameters allow each microsegment to value these characteristics differently. Physician-location dummy variables alone absorb all fixed physician characteristics such as physician birth year, gender, spoken language, specialty, reputation, and practice group, as well as common location preferences.

With respect to patient characteristics, the model is as flexible as the set of characteristics that determine the segments g. Practitioners might define segments using interactions of patient characteristics, such as medical condition, age, gender, residential location (i.e., zip code), and household composition. Although the model does not explicitly allow for continuous patient characteristics, one can often discretize these characteristics (e.g., age can be binned into categories).[7]

[7] The flexibility of the model comes at the expense of substantial data requirements. Robust estimation requires a sufficient sample size to construct market shares within each segment g. Our proposed segments are interactions of zip codes, medical condition codes (i.e., ICD9 or DRG codes), age, and gender. This set of variables could easily result in tens of thousands of segments. In practice, we have found that this limitation is less of an issue in physician markets than in hospital markets.

Next, we show how the parameter estimates that are obtained from estimating equation (2) by maximum likelihood generate the same predicted provider choice probabilities as can be obtained by volume-weighted sums of the microshares. Intuitively, this is so because the utility function consists solely of mutually-exclusive indicator variables, and MLE estimates of the parameters on such indicators are derived from market shares within each microsegement (i.e., the microshares). Because the statistics of interest for merger analysis are constructed using predicted market shares (Farrell et al., 2011), we can simply use volume-weighted sums of the microshares to generate what we need.

2.4 Equivalence of Logit Model and Microshare Estimates

To see the equivalence of the results that are obtained from estimating (2) and predicting each provider's market share (i.e., the standard approach applied in hospital settings) versus simply constructing volume-weighted sums of observed microshares, we write out the likelihood function for the set of observed patient choices. Define $d_{ij} = 1$ if patient i selects provider j, and $d_{ij} = 0$ otherwise. Under the assumption that errors are distributed Type 1 extreme value, the log likelihood function is

$$\log L = \sum_{i \in I} \sum_{j \in J} d_{ij} \log\left(\frac{\exp(z_{ij}\delta_j^g)}{\sum_{k \in J} \exp(z_{ik}\delta_k^g)}\right). \tag{3}$$

Substituting $z_{ij} = z_j^g$ and rewriting to reflect segments yields

$$\log L = \sum_{g \in G} \sum_{i \in I_g} \sum_{j \in J} d_{ij} \log\left(\frac{\exp(z_j^g \delta_j^g)}{\sum_{k \in J} \exp(z_k^g \delta_k^g)}\right), \tag{3'}$$

which illustrates that the log likelihood can be maximized independently for each segment g.

Therefore, for simplicity we consider the optimization problem for just one segment g.

The predicted probability that patients in microsegment g select provider j, conditional upon parameter estimates δ^g, can be written as

$$s_j(\delta_j^g) = \frac{\exp(z_j^g \delta_j^g)}{\sum_{k \in J} \exp(z_k^g \delta_k^g)}. \quad (4)$$

Define $s(\delta^g)$ as the vector of provider shares such that row j consists of $s_j(\delta_j^g)$. The first-order condition to maximize equation (3') with respect to δ_j^g is

$$\sum_{i \in I_g} d_{ij} z_j^g - \sum_{i \in I_g} \sum_{k \in J} d_{ik} z_j^g s_j(\delta_j^g) = 0. \quad (5)$$

Shifting the second term to the right-hand side, we obtain

$$\sum_{i \in I_g} d_{ij} z_j^g = \sum_{i \in I_g} \sum_{k \in J} d_{ik} z_j^g s_j(\delta_j^g) \ . \quad (6)$$

The above can be simplified to an expression that provides an intuitive relationship between microshares and the predicted probability estimates

$$\sum_{i \in I_g} d_{ij} = \sum_{i \in I_g} \sum_{k \in J} d_{ik} s_j(\delta_j^g) = I_g s_j(\delta_j^g). \quad (7)$$

Dividing both sides by I_g, this equation implies

$$\frac{\sum_{i \in I_g} d_{ij}}{I_g} = \frac{\exp(z_j^g \delta_j^g)}{\sum_{k \in J} \exp(z_k^g \delta_k^g)}. \quad (8)$$

Equation (8) illustrates that the values for δ^g that maximize the likelihood function are obtained by setting the expected choice probabilities (i.e., the right-hand side of equation (8)) equal to the microshares (i.e., the left-hand side of equation (8)). In other words, the microshares and the parametric estimation procedure provide equivalent within-segment choice probability estimates.

2.5 Applying the microshare methodology

As discussed in Farrell et al. (2011), two metrics that are commonly used to evaluate the competitive effects of provider combinations are WTP (originally derived in Capps et al., 2003) and diversion ratios. Because both of these are constructed from predicted choice probability estimates, which we have just shown to be equivalent to microshares when utility is specified as in equation (2), we can compute these metrics with minimal computational effort.

In a logit model, the within-segment diversion from provider A to provider B is defined as

$$div_{A,B}^{g} = \frac{s_g^B}{1 - s_g^A} . \tag{9}$$

The aggregate diversion ratio can be constructed using the within-segment diversions. The overall diversion from provider A to provider B is a weighted sum of the within-segment diversions across segments, where the weights, w_g^A , are the proportion of provider A 's events (e.g., physician visits) that originate from patient segment g .

The WTP statistic is a system-level statistic that depends on all providers j that are affiliated with system k . The within-segment share of system k , denoted s_g^k , is the sum of shares for each provider j that is a member of system k . Per Capps et al. (2003), the WTP statistic for system k can therefore be written as

$$WTP_k = \sum_g N_g \ln(\frac{1}{1 - s_k}) . \tag{10}$$

Since WTP sums across each patient in a market, the aggregation is weighted by the observed number of visits in the segment, N_g.

In recent cases, we have successfully calculated these statistics. The next step of interest is predicting the price effects of physician combinations. This "merger simulation" exercise involves calculating a price index for each provider, and then relating providers' prices to pre-merger WTP measures using a regression analysis described in Farrell et al. (2011). The regression coefficient is then applied to the predicted change in WTP that results from the combination in question.

The construction of price indices for healthcare services can be difficult. Providers offer many heterogeneous services, and coding and billing practices vary. In addition, in some settings, the pricing of distinct services may be negotiated simultaneously. For example, a health system that includes hospitals and physicians may simultaneously negotiate the pricing of inpatient, outpatient, ancillary, and physician office services. Insofar as negotiations involve trading off less favorable pricing for one service in exchange for more favorable pricing for another, the price of specific services may not accurately reflect the bargaining leverage that is attributable to that service.[8]

Linking price to WTP in physician markets may also present some challenges. In markets with many relatively small physician groups, insurance payers may not always negotiate over prices. Some payers offer a fixed rate—essentially, a posted price—to a large class of providers, perhaps because bargaining is too costly for arrangements that involve small providers and/or a uniform pricing policy facilitates a tougher bargaining stance. Since WTP is derived from a bilateral bargaining model, this practice may make it difficult to apply the WTP framework to

[8] Joint negotiations do not imply that these distinct services are in the same relevant product market.

these providers. To address this issue, we have generally explored the relationship between WTP and price for larger providers, such as hospitals, because large providers are more likely to engage in individualized bargaining.[9]

Although our discussion above has focused on physician markets, we continue to refine our understanding and application of WTP bargaining methodology more generally. This includes developing approaches that better incorporate health plans' recent attempts to utilize nuanced patient-steering mechanisms, such as plan designs that include significant co-insurance, high deductibles, and/or tiered co-payment structures.

3. Economic Analysis of Standard Essential Patents

Standard setting involves cooperation among firms to select a common technology for a given product feature. Standards are prevalent in settings with significant network externalities, such as wireless communication or broadcasting technologies. Although a *de facto* standard may emerge from a non-cooperative process, a collaborative approach (i.e., such as that fostered by standard-setting organizations) can ensure prompt agreement on technical specifications and facilitate selection of a low-cost solution (adjusted for quality). The cooperation that takes place as part of the standard-setting process may therefore be welfare improving, as it hastens the resolution of uncertainty for consumers and producers, while permitting *ex ante* competition among rivals that vie to have their technologies included in a standard. Patented technologies are often declared essential to certain standards, which has given rise to the term "standard essential patents" (SEPs).

[9] Notwithstanding this consideration, diversion ratios (which are derived from the patient choice model that is also used to calculate WTP) are still likely to be informative in analyzing combinations.

Once a standard has been adopted and widely implemented in an industry, there is an incentive for a SEP-holder to exploit the market power that has been conferred not by the patent's intrinsic *ex ante* value, but by the *ex post* value that reflects the patent's essentiality to the standard. To guard against this "patent hold-up," many standard-setting organizations require firms to agree to license SEPs on fair, reasonable and non-discriminatory (FRAND) terms. Indeed, standard-setting organizations have traditionally faced only limited antitrust scrutiny owing to such pledges, which (if fulfilled) enable consumers to reap the benefits of standards. When firms do not honor commitments to license on FRAND terms, the selected standard may be ex-post suboptimal, network externalities may be abridged because of slower adoption and follow-on innovation, and final goods prices may be higher. Such behavior has attracted the attention of the FTC and the DOJ.

Parties may be unable to agree on FRAND rates and licensing terms. When this occurs, some SEP holders have asked a district court to issue an injunction, or the International Trade Commission (ITC) to issue an exclusion order, for infringement of the FRAND-encumbered SEPs.[10] The FTC has taken a particular interest in cases where an injunction or exclusion order is sought for infringement of a FRAND-encumbered SEP. In this section, we review the FTC's recent activity relating to SEPs and describe the economic framework underlying our thinking about SEPs. We tailor Shapiro's (2010) model of royalty negotiations for non-essential patents under the threat of injunctions to reflect the economic characteristics of SEPs.

[10] The Supreme Court's 2006 *eBay* decision, which eliminated the presumption of injunctive relief for patent cases, has made it more difficult for patent holders to obtain injunctions in federal courts: *eBay, Inc. v. MercExchange, L.L.C.*, 126 S. Ct. 1837, 1839 (2006).

3.1 Recent FTC Activity Relating to SEPs

The Commission has long been active in the area of standard setting and continues to be active in this space.[11] Most recently, the Commission entered into consent decrees with Bosch and Google for conduct that related to SEPs. In early 2013, the Commission accepted a final consent agreement resolving concerns that related to Bosch's proposed acquisition of SPX's automotive air conditioning recovery, recycling, and recharging (ACRRR) equipment business.[12] In addition to requiring a divestiture to resolve competition concerns arising from the merger, the consent agreement included a remedy for SPX's conduct relating to SEPs. SPX had indicated earlier to the SAE standard-setting body that certain of its patents may potentially be essential to standards for ACRRR equipment that were developed by SAE and agreed to license those SEPs either royalty-free or on a FRAND basis. SPX later sought injunctions on its SEPs against implementers of those standards – including Bosch. The remedy for this conduct contained in the consent agreement requires Bosch to withdraw from the lawsuits initiated by SPX and to offer a royalty-free license for its SEPs to implementers of the ACRRR equipment standards.

In July 2013, the Commission finalized a settlement with Google and its subsidiary, Motorola Mobility, with regard to conduct that related to SEPs.[13] Motorola Mobility had indicated to various standards bodies – including ETSI, IEEE, and ITU – that it had patents that are essential or that may become essential to the cellular, Wi Fi, and video compression

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[11] See, for example, Commission enforcement actions against Dell (available at http://www.ftc.gov/opa/1995/11/dell.shtm), Unocal (available at http://www.ftc.gov/os/adjpro/d9305/index.shtm), Rambus (available at http://www.ftc.gov/os/adjpro/d9302/index.shtm), and NData (available at http://www.ftc.gov/os/caselist/0510094/index.shtm).

[12] See, http://www.ftc.gov/os/caselist/1210081/index.shtm.

[13] See, http://www.ftc.gov/os/caselist/1210120/index.shtm

standards that were under development by these organizations, and agreed to license its SEPs on FRAND terms. Motorola Mobility later sought injunctions and exclusion orders on its SEPs against several implementers of the standards, including Apple, Microsoft, and RIM. Google continued the lawsuits after its acquisition of Motorola Mobility in 2012. Per the Commission's Final Order, Google may not obtain or enforce an injunction or exclusion order from a current proceeding. In addition, henceforth Google must make arbitration offers and allow potential licensees to seek a FRAND determination in federal court prior to seeking injunctions or exclusion orders from the ITC.

The Commission has also been engaged in advocacy relating to SEPs. In particular, the Commission filed public interest letters with the ITC in two cases where Motorola Mobility has sought exclusion orders against Apple and Microsoft for infringing Motorola Mobility's SEPs.[14] In those letters the Commission argued that seeking an exclusion order with respect to SEPs that are covered by a FRAND commitment may result in patent hold-up and deter innovation. The Commission made similar arguments in an amicus brief in the private litigation between Motorola Mobility and Apple in the Court of Appeals for the Federal Circuit.[15] In the brief, the Commission argued that the possibility of patent hold-up should be taken into consideration when deciding whether to grant an injunction on a SEP.

3.2 A Model of Royalty Negotiations

[14] See, for example, http://www.ftc.gov/os/2012/06/1206ftcgamingconsole.pdf. Commissioner, now Chairwoman, Ramirez made similar arguments in her testimony before the Senate Judiciary Committee in 2012 (available at http://www.ftc.gov/os/testimony/120711standardpatents.pdf).

[15] See, http://www.ftc.gov/os/2012/12/121205apple-motorolaamicusbrief.pdf.

In this section, we examine how the threat of an injunction affects the bargaining dynamic between a patentee and a potential licensee of a SEP. We begin by outlining the benchmark model that is presented in Shapiro (2010), which he uses to illustrate hold-up in the context of non-essential patents. We show that a SEP is a special case of this model, and solve for the equilibrium royalty rate for a SEP. Given that the key distinction between a non-essential and an essential patent is that product redesign is possible (if costly) in the former case, it follows that the hold-up problem is exacerbated for SEPs.

3.2.1 A Benchmark Case: Royalty Negotiations Under the Threat of an Injunction, With Zero Litigation or Redesign Costs

In Shapiro's setup, there is a downstream firm (D) that has already developed a product that incorporates a patented innovation (held by P, the patentee). The product can be sold at a margin *m* and unit sales are represented by *X.* The innovation creates value *v*: i.e., if the product did not incorporate the patented innovation, it would generate margins of *m*-*v.* The parties engage in Nash bargaining over a royalty rate *r,* with D's bargaining parameter represented by β. If they do not agree, then P sues D for infringement and wins with probability θ. If the patentee wins, then D redesigns its product to exclude the patented innovation. If there are no litigation or redesign costs, the royalty rate is $\bar{r} = \beta\theta v$, and firm payoffs are $\bar{\Pi}_P = \beta\theta v X$, and $\bar{\Pi}_D = (m - \beta\theta v) X$. Thus, P's payoff depends on the probability that its patent is upheld as well as on the value it generates; there is no hold-up problem.

3.3 Holdup when Patents are Essential

Hold-up (i.e., the appropriation of surplus that is derived from another party's investments) arises when one or both parties make(s) costly sunk investments; e.g., when redesign or litigation costs are nonzero. Shapiro derives the equilibrium royalty rate when redesign costs are finite; here we solve the game when redesign is impossible, as is the case for a product that incorporates a SEP. As in the benchmark case, there are two stages of play: the first stage, in which P and D negotiate over a royalty rate; and the second stage (which only takes place if the parties fail to agree in the first stage), in which P sues D and wins with probability θ.

The game is solved by backward induction, beginning with the negotiation that takes place after P has been awarded an injunction. When a patent is essential, redesign is not possible: If an injunction is awarded, then the parties agree to a royalty rate or both earn a payoff of zero. Since D cannot redesign its product, all of its margins are subject to appropriation by P. Denoting the duration of the pre-injunction period by 0<T<1, and normalizing the life of the patent to equal 1, the royalty in this stage is $r' = \beta m$, and the firm payoffs are $\Pi'_P = \beta m(1-T)X$, and $\Pi'_D = (1-\beta)m(1-T)X$.

In the post-injunction period, the patentee appropriates the entire margin that is generated by the downstream product, discounted by its bargaining skill.

Note that the court will set a royalty rate s for past infringement. This royalty rate is incorporated into the pre-injunction Nash objective function, which can be written as follows:

$$W = \left(rX - \left(\theta\left(sT + r'(1-T)\right)X - C_P\right)\right)^{\beta} * \left((m-r)X - \left(mXT - C_D - \theta\left(sT - (m-r')(1-T)\right)X + (1-\theta)m(1-T)X\right)\right)^{1-\beta}, \quad (11)$$

where C_P and C_D denote litigation costs for the patentee and downstream firm, respectively. Welfare is maximized by maximizing the product of each party's surplus from agreement,

weighted by its bargaining power. The first term represents the surplus to P from an agreement. If the parties agree to royalty *r,* then P earns rX. If not, then P sues D, incurs litigation costs CP, and with probability θ is awarded damages of sT and earns a royalty rate r' for all post-injunction sales. The second term illustrates D's payoff from agreement, which is (m-r)X, less its payoff from the alternative in which it is sued. Note that with probability $1 - \theta$, the patent is found invalid or not infringed, and D pays nothing to the patentee.

The resulting royalty and firm payoffs for the entire game, assuming the court sets *s* at the benchmark royalty are

$$r^* = \beta\theta\left(vT + (1-T)m\right) + \frac{\beta C_D - (1-\beta)C_P}{X}, \tag{12}$$

$$\Pi_P^* = \beta\theta\left(vT + (1-T)m\right)X + \beta C_D - (1-\beta)C_P, \tag{13}$$

$$\Pi_D^* = \left(\left(1 - \beta\theta(1-T)\right)m - \beta\theta vT\right)X - \beta C_D + (1-\beta)C_P. \tag{14}$$

The first term in the equilibrium royalty rate is equal to the benchmark royalty during the duration of litigation and the full margin during the remaining period, scaled by the patentee's bargaining skill and the probability that the patent is valid and infringed. The second term reflects the patentee's "net bargaining advantage associated purely with [the] fact that failure to reach a licensing agreement will impose litigation costs on both parties" (Shapiro, 2010, p. 293) and may be positive or negative, depending on the patentee's bargaining skill and the relative litigation costs. This term will be zero for $\beta = 1/2$ and $C_P = C_D$, and we assume it is so in order to focus on the first term, which reflects the patent-related hold up. This holdup arises from the downstream firm's inability to redesign its product and remain compliant with the standard.

The patentee's additional payoff due to hold-up, measured relative to the benchmark payoff, is

$$\frac{\Pi_P^* - \bar{\Pi}_P}{\bar{\Pi}_P} = \frac{(m-v)}{v}(1-T). \tag{15}$$

This ratio reveals two insights. First, as Shapiro observes (in deriving such a ratio for the case with finite redesign costs), patent hold-up is larger the *smaller* is the contribution of the patented innovation to the overall value that is created by the downstream product. The reason is that the patentee can potentially claim *all* surplus, regardless of how much it contributes to the product's value. Second, patent hold-up is larger the *shorter* the duration of litigation. To see why, imagine that litigation is concluded instantaneously. In that case, if P sues, then with probability θ it appropriates the full margin on the downstream product for the patent's entire lifetime. The longer the duration of litigation, the less time for P potentially to appropriate this large amount of surplus. Note further that (15) must weakly exceed the comparable ratio for the case in which redesign costs are finite (i.e., non-essential patents), as in that case the downstream firm has the option of not ceding *all* of its margins if an injunction is awarded.

In sum, the ability for SEP-holders to seek injunctions on sales of downstream products enables them to appropriate some of the surplus that is created by the downstream firm's innovation: The ex-post surplus that is extracted exceeds the ex-ante surplus that P would have captured if a negotiation had taken place prior to D's sunk investment. The degree of holdup is greater the smaller is the *ex ante* contribution of the patent to the total product value (i.e., *v*), and the shorter is the expected duration of litigation relative to the sales life of the product.

3.4 Conclusions

When patentees have access to injunctive relief, they stand to negotiate royalty rates and other more favorable licensing terms that reflect more than the *ex ante* value of their innovations: The value that their innovations generate prior to a downstream firm's irreversible and costly

commitment to incorporate the patented innovation. Higher royalty rates lead to less downstream adoption and add-on innovations. In the case of SEPs, this implies that consumers are deprived of the full benefits that are associated with standard setting, and that patentees receive returns that reflect the market power conferred upon them by a collaborative agreement with rivals. There are also adverse dynamic implications of holdup. It may discourage firms from relying on the standard-setting process and thereby deprive consumers of the substantial pro-competitive benefits of standardized technology.

4 Accuracy of Credit Reporting

Once used primarily for granting loans, the information that is held by credit reporting agencies (CRAs) and the credit scores that are derived from credit histories are increasingly being used in other transactions. For example, credit information is incorporated into firms' decisions about how to price and whether to grant telecommunications services and insurance. Given the wide use of credit reports for multiple purposes, the accuracy and completeness of the data that are contained in them are of great importance to consumers and the economy.

In 2003, Congress passed the Fair and Accurate Credit Transactions Act (FACT Act), which is an amendment to the Fair Credit Reporting Act (FCRA), and which contains a number of provisions that are designed to enhance the accuracy and completeness of credit reports.[16] Section 319 of the FACT Act required the FTC to conduct an ongoing study of the accuracy and completeness of consumer credit reports. In December 2012, the FTC submitted its fifth interim

[16] For a more complete discussion of the Fair Credit Reporting Act of 1970 (FCRA) and the relevant amendments of 1996 and the 2003 FACT Act, please see the FTC (2004) or the FTC (2011).

report (FTC, 2012) to Congress that described the results of its national study of consumer credit reporting accuracy. A final report is due in December 2014.

4.1 Background

The U.S. credit reporting industry consists primarily of three national CRAs that maintain a wide range of information on approximately 200 million consumers.[17] Creditors and others voluntarily submit information to these repositories of information, which then consolidate the data into credit reports. Users of credit reports analyze the data and other information to assess the risk that is posed by credit applicants, often employing sophisticated predictive models that are obtained from third parties and that produce credit scores for each individual.[18] This flow of information enables credit grantors and others to make fast and generally reliable decisions about a consumer's eligibility for various products and services, allowing eligible consumers to obtain a desired service or product within minutes of applying.

For products or services where the credit rating determines approval or denial, an inaccuracy in a credit report could cause the consumer to be rejected rather than accepted (or vice versa). For other products, such as credit and insurance, consumer credit reports are widely used to set pricing or other terms (i.e., "risk-based pricing"). For these products, an inaccuracy

[17] There exist other types of consumer reporting agencies, but these are not the focus of this study. For more on the credit reporting industry, see Avery et al. (2003) or Pratt (2003).

[18] Scoring products (sometimes referred to as "risk scores" or "credit scores") are constructed personal indexes that are based on analyses of historical consumer credit history and performance data and that can be used for predictive modeling. When a consumer applies for credit or insurance, the models use information in the consumer's credit history to predict the risk that is posed by that consumer. The risk is typically summarized in a numerical score.

could cause the consumer to pay a higher (or lower) price. At the market level, the accuracy of credit ratings affects lenders' ability to estimate default risk and to tailor interest rates and credit terms to the risks that are presented by individual borrowers.

Prior studies of credit report accuracy essentially fall into three categories: consumer surveys; studies that are based on dispute statistics (i.e., data that are related to instances in which consumers disputed their credit reports); and studies that are based on anonymous data about a large number of individual consumers that are provided by the CRAs. The FTC's review of prior studies determined that, although each approach provides some useful information about credit report accuracy and completeness, none provides a comprehensive view (FTC, 2004).[19] More recently, a consulting firm that was retained by the credit reporting industry issued a study on credit report accuracy (Turner et al., 2011).

4.2 Study Methodology

The FTC study of credit report accuracy was the first national study that was designed to engage all of the primary groups that participate in the credit reporting and scoring process: consumers, lenders/data furnishers, the Fair Isaac Corporation (FICO), and the national credit reporting agencies.[20]

[19] In its 2003 review of data on credit report errors, the Government Accountability Office (GAO, 2003) concluded that the current consumer survey research was of limited value in determining the frequency of errors in credit reports.

[20] The FTC contracted with a research team to conduct two pilot studies and collect the data for the main study that is described in the report to Congress. The research team included members from the University of Missouri, St. Louis (UMSL), the University of Arizona, and the Fair Isaac Corporation. The contractor produced statistical tabulations of errors at the case (consumer) level, individual credit report level, and credit report item level. At the

4.2.1 Recruiting of Participants

The overall design of the study was informed by the results of two pilot studies. In those studies we learned that consumers with low credit scores were less likely to participate in the study and that these consumers were also more likely to have errors on their credit reports. Thus, the solicitation process was designed to recruit a participant sample that was representative of the credit scores of the population of interest (consumers with scorable credit histories at the three national CRAs). The FTC staff obtained a random sample of over 170,000 consumers (the sampling frame) from the CRAs that included the consumers' VantageScore.[21] Due to variation in response rates, the FTC staff sent proportionally more invitations to individuals with below-average credit scores to ensure that these consumers were adequately represented in the study.[22]

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conclusion of the study, the contractor provided data in a de-identified format as well as an in-depth report that summarized the findings. Economists in the Bureau of Economics at the FTC independently analyzed the data and draft the public report to Congress.

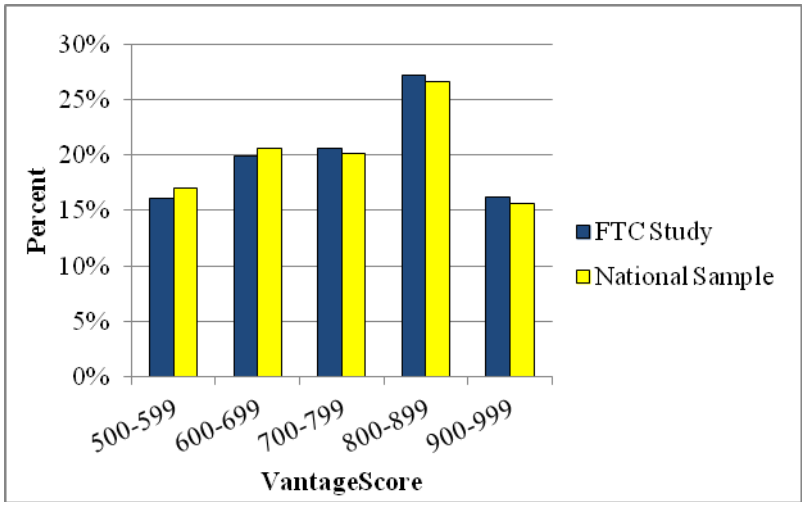
[21] VantageScores that were provided by the CRAs were used to generate a sample that was representative of the national distribution of consumers with credit reports and VantageScores. For the actual scoring of credit reports, FICO analysts provided FICO®Scores, which are used by the majority of lenders. There are a number of differences between VantageScore and FICO credit scores, including different scales: VantageScores range from 500-999, and FICO credit scores range from 300 to 850. FICO scores could not be used for recruitment purposes, because it was cost prohibitive to buy 170,000 FICO credit scores.

[22] For example, the response rate for consumers with a VantageScore between 500 and 519 was 2.2%, and the response rate for consumers with a credit score in the 960-980 range was 6.7%. In addition to sending proportionally more invitation letters, the level of compensation differed. Potential participants with VantageScores below the

As the set of participants developed, VantageScores of the participant sample to date were analyzed and compared to the distribution of VantageScores in the sampling frame. The sampling was sequentially adjusted so that the ultimate sample of approximately 1,000 participants is representative in credit scores.[23]

In Figure 1 below, we show the distribution of VantageScores for FTC Study participants and the national distribution of VantageScores that were estimated from the random sample provided by the three CRA databases. This conformity of credit scores with the sampling frame distribution helped ensure that the underlying credit reports of the solicited consumers were reflective of credit reports in general.

Figure 1 Percent of Credit Reports in VantageScore Ranges



sampling frame average were offered $75 to participate, and those with above-average VantageScores were offered $25 to participate.

[23] There were 10 mailing waves of invitation letters. The waves were constructed so that consumers in below-average credit score categories received more invitations to participate.

In spite of the close match between the sample and population distributions of credit scores, the sample subjects may not be representative of consumers with credit reports in other dimensions. Participation in the study was voluntary and required a moderate time commitment, as well as disclosure of personal data. Various credit and non-credit data on non-respondents were collected to evaluate this concern. Upon comparing participants and non-participants on multiple dimensions, we found participants to be similar to non-participants in the majority of factors that might impact credit scores. To the extent that significant differences are present, we expect the potential biases to be modest.

4.2.2 Review and Rescoring of Credit Reports

With the consumers' permission, the contractor obtained credit reports from the three national CRAs and engaged the participants in an in-depth phone review of their credit reports.[24] The focus of the review was to identify potential errors that could have a material effect on a person's credit score (i.e., potentially material errors).[25] If the consumer did not identify potential errors,

[24] An individual's study ID was the only identifier used in communications between FTC staff and the study contractors about any respondent, potential respondent, or non-respondent. The FTC published a Privacy Impact Assessment (PIA), which gives a full review of the procedures that were used in this study. Importantly, the procedures ensured that the study does not collect, maintain, or review any sensitive information in identifiable form.

[25] The phrase "confirmed material error" refers to material information on a credit report that a consumer alleges to be erroneous in this study and is altered as a result of the FCRA dispute process (discussed below).

the study process ended for that participant. For the consumers who did identify a potentially material error, the study associate noted the exact nature of the error and how the information should appear if corrected. At the end of the phone interview, all consumers completed an exit survey to collect basic information about the consumer's demographic, household, and financial characteristics.

If a consumer identified an error that might affect her credit score, the study associate prepared a dispute letter for each relevant CRA that stated the exact nature of the error and specified how the error should be corrected. The study associate mailed the stamped dispute letters to the consumer, along with a stamped postcard to be sent to the research contractor when the letter was mailed. The contractor also provided FICO with a copy of the relevant credit reports and the disputed information. That is, in parallel with the actual dispute process, FICO analysts pulled the original credit report and calculated a revised FICO® Score that represented the consumer's FICO score on the credit report if every alleged error was corrected by the CRA, as instructed by the consumer.

After allowing enough time for the dispute process, the contractor obtained new credit reports to assess whether the alleged errors disputed by the consumer were changed by the CRAs.[26] The new credit reports were compared with the original credit reports and the study

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[26] The FCRA requires the CRA to address the consumer dispute within 30 days. The study associates waited a minimum of eight weeks to ensure the CRA had adequate time to address the consumer dispute. In some cases, the study team/UMSL was unable to redraw new credit reports for the consumer. This was due to technical reasons, such as the consumer file not containing enough recent activity to be scored. The study team attempted to contact all the consumers with this issue, so that the consumers could redraw their own report, but were unsuccessful in reaching all the relevant consumers. Overall there were a total of 13 consumers for whom UMSL was unable to

associate determined whether the dispute process had resulted in changes to the credit report.[27] Upon reviewing the new credit report, there were three possibilities: (1) no changes were made to the credit report; (2) all requested changes were made to the credit report; or (3) only some of the requested changes were made to the credit report. If all requested changes or no requested changes were made, the relevant FICO score already existed for the credit report. For those reports that only had some of the requested changes imposed, a second rescoring was necessary.[28]

4.3 Results

We present measures of credit report accuracy at both the *participant* level and the *report* level. Because each participant drew three credit reports (one from each CRA), the level at which we describe errors is an important distinction. For example, if two people out of ten possible are found to have errors, then we would say the participant level error rate is 20%. However, those ten people have a total of 30 possible credit reports. If the two people each found errors only in

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redraw all three new credit reports (but for 12 of these consumers, the study team was able to draw one or two credit reports).

[27] Consumers were informed by the study team of the results of the dispute process, as well as by the CRAs in keeping with FCRA requirements.

[28] The study associates evaluated the actual modifications that were made to the report and whether the changes could potentially affect a score. If the imposed changes could affect the credit score, the study associate transmitted the details to FICO. A FICO analyst then revised the file with the actual changes imposed on the report and calculated a second revised score.

one of their three possible reports, then there would be two out of 30 reports with errors and a report level error rate of 6.7%.

4.3.1 Overall Error Rates

Table 1 provides the error rates at both the *report* and *participant* level. There are 1,001 participants who completed an interview with the contractor.[29] Of these participants, 263 identified alleged errors that were potentially material (using the criteria established above) on at least one credit report. From this set of cases with potentially material errors, one participant confirmed that he/she had chosen not to file a dispute, 262 confirmed that they intended to file a dispute, and the contractor received confirmation from 239 participants that disputes were filed.[30] Thus, the maximum potential error rate for consumers if all identified potentially material errors were confirmed as legitimate would be 263/1,001 = 26.3% of participants.

[TABLE 1 HERE]

[29] A total of 1,003 interviews were completed, but two participants provided information that was deemed unreliable and thus were dropped from the analysis.

[30] Although the contractor did not receive confirmation from 23 participants, it is still possible that these individuals filed disputes. The contractor made multiple attempts to contact the 23 individuals who did not confirm sending dispute letters to learn whether they had filed a dispute. In fact, when the new credit report(s) were redrawn, ten of the 23 participants with unknown dispute status had changes made to their credit report(s) regarding the disputed items, suggesting that at least these ten individuals filed the dispute letters. For this reason, we utilize the full set of 263 participants with potentially material errors when calculating error rates.

We recognize that not every alleged error is in fact an error. After receiving a dispute letter from the consumer, the CRA investigates the alleged error. If the disputed information is confirmed as accurate by the data furnisher, then no changes are made to the credit report. If the disputed information is not confirmed by the data furnisher as accurate, the CRA alters the credit report. It is worth noting that this study counts only errors that are modified by the CRA as "confirmed errors."[31] In some cases, a CRA may not modify the alleged error, and the consumer continues to dispute the information. In other cases, the CRA may change the item in a way that addresses the consumer's dispute but is different from how the consumer indicated the account should be changed (e.g., a consumer asks for a balance on a credit card to be changed to zero and the CRA simply removes the account entirely).

4.3.2 Changes in Credit Score

Table 2 presents the change in credit score at the participant level. A consumer who reviewed three credit reports may have found no errors and thus may have had no disputes. Alternatively, a consumer may have disputed with one, two, or all three CRAs. For example, a consumer who disputed with two CRAs may have one credit report that has a score change of 5 points and another credit report with a score change of 12 points. For this reason, we present Table 2 below with data on the percentage of cases that had a maximum score change within a given category.

[31] Although we use the language "confirmed error," we only observe whether an item was modified in response to a consumer dispute. In some cases, data furnishers may automatically change the data in accordance with the dispute or are unable to confirm the original data and must modify the information. We infer that a modification in response to a consumer dispute is evidence that the consumer's dispute is valid and refer to these cases as containing confirmed errors.

Table 2 shows that 3.2% of consumers who reviewed their credit report(s) with a study associate identified a potentially material error and had a maximum score increase (out of possibly three score changes) of 1-9 points, and another 3.1% of consumers had a maximum score change of 10-19 points.

[TABLE 2 HERE]

We also provide the credit score changes at the report level. Of the 399 reports that were modified in response to the consumer filing a dispute with a CRA, there are 211 reports where the FICO credit scores for that report changed.[32] Table 3 below presents the impact on credit report scores that resulted from the consumer disputes. The majority of disputes (361 out of 572, or 63%) did not result in a credit score change. Column 2 of Table 3 shows that, overall, 6.6% of all credit reports had an increase in score following the consumer dispute.[33] Conditional on disputing (572 credit reports), 34.1% experienced a score increase and 2.7% of the 572 disputed

[32] Recall that the study's scoring process used the original file to isolate the change in score for a report due only to changes that were made in response to the consumer dispute (i.e., no new information is contained in the credit report other than the modifications made by the CRA in response to the dispute).

[33] There is no established rule or threshold for classifying the significance of a credit score change as minor or major, because the impact of a change in score is dependent on the current score. That is, a 25 point change in FICO score that keeps the consumer in a particular credit risk category may not have a large impact on the person's likelihood of receiving credit. On the other hand, a one-point change in credit score that moves a consumer from one risk tier to the next may have a large impact on the consumer's access to credit or on the products and rates that the consumer is able to secure.

reports experienced a score decrease.[34]

[TABLE 3 HERE]

4.4 Discussion

The FTC Accuracy study evaluated the accuracy of 1,001 voluntary study participants' credit reports. We documented the outcomes of the 262 participants who challenged at least one credit report item through the FCRA dispute resolution process. As a result of the dispute process, 206 individuals had at least one credit report altered, and 129 consumers experienced a credit score change on at least one report. At the report level, 399 reports were modified, and 211 reports experienced a change in credit score. The score decreased for 16 reports, and many of the 195 positive score changes were moderate; half of the 195 positive score changes were less than 15 points. However, for a small number of participants, credit score changes were large; 27 participants had at least one of their three credit scores increase by more than 50 points.

Although much can be learned from this study with regard to error rates, it is important to recognize the study's limitations: First, the study was designed to identify errors that may be potentially harming consumers (i.e., negative information that was inaccurate). Although some

[34] The study associates advised consumers that filing a dispute could result in either an increase or decrease in the credit score. In cases where the only information in dispute would potentially lower the score (such as decreasing the credit history length, increasing credit utilization, or decreasing the diversity of credit mix), the study associate referred the participant to the FICO help desk to inquire about the implications of filing a dispute. In the study that was conducted by the Political and Economic Research Council (PERC) (Turner et al., 2011), without a study associate to help identify errors and file dispute letters, 1.26% of all reports had a decrease in score. The FTC study found that 0.54% of all reports (16 of 2,968 reports) had a decrease in score.

inaccuracies in credit reports may benefit consumers, this study made only a limited effort to identify or correct these errors. Therefore, while 16 reports (0.54% of all reports) experienced a decrease in credit score as a result of the dispute process, this almost certainly represents a lower bound on the estimate of potential inaccuracies on credit reports that currently increase the credit score of consumers. In addition, when calculating error rates, we limit the definition of a confirmed error to those instances when the CRA modified a report in response to a dispute. There were 56 consumers who had no changes made to their report in response to their dispute and another 109 consumers whose reports were modified but some disputed items remained as originally specified on the reports. If true errors remained on these consumers' reports after completing the dispute process, that inaccuracy was not reflected in the study's error rate, and further, this would suggest that the current FCRA dispute process may not be serving these consumers well. We are able to estimate the change in credit score if all reports were modified as requested by the consumer; we find that 12% of credit reports would see an increase in credit score, if all disputed items were modified, as opposed to the 7% that saw an increase in credit score through the actual dispute process.

Overall, the results of the study suggest that 21% of the participants have inaccuracies on their credit reports, and 13% of the credit reports have inaccuracies. For approximately 5% of consumers, the impact is large enough that these consumers may be deemed ineligible or face less favorable terms for loans. Frequently, there is no change in the credit score of the report (63% of disputed reports do not change score). However, the impact is large for some consumers: Roughly 1% of the reports in the sample experienced a credit score increase of more than 50 points, and this percentage doubles if every consumer allegation were modified as requested. Consumers who are concerned that their credit reports may contain errors should

continue to examine their credit reports regularly through the use of https://www.annualcreditreport.com and follow the FCRA dispute process when inaccuracies are identified.

5 Conclusion

The foregoing provides a window into the work of the FTC's Bureau of Economics. Our efforts in the healthcare, intellectual property, and credit reporting sectors reflect our commitment to apply, extend, and develop state-of-the-art economic analyses in pursuit of the FTC's mission.

Table 1 Data Summary

Category	Number	Percentage
Participants		
Number of *participants* with reliable data	1,001	--
Participants who identified potentially material errors and had dispute letters prepared by UMSL	263*	26.3%
Participants with potentially material disputes who confirmed mailing dispute letters	239	23.9%
Participants with changes made to at least one credit report when report is redrawn after dispute letter mailed	206	20.6%
Participants who had at least one credit score change in response to a dispute	129	12.9%
Reports		
Number of credit *reports* reviewed with study associate	2,968**	--
Total number of *dispute letters* sent to CRAs (for both potentially material and non-material errors)	708	23.9%
Total number of *dispute letters* prepared by study associates for potentially material errors	572	19.3%
Reports with changes made when report is redrawn after dispute letter mailed	399	13.4%
Reports with credit score change in response to dispute	211	7.1%
Percent of credit *reports* with no identified potentially material errors	--	81%
Percent of credit *reports* with no identified potentially material errors and no credit score change	--	87%

Notes: *One person had dispute letters prepared, but the individual decided not to dispute. Therefore, the maximum number of cases with disputes filed is 262.
**If every participant had initially drawn and reviewed three credit reports, the total number of reports reviewed would be 3,003. However, there were 31 participants where the study associate/consumer was unable to draw all three initial reports. Most of these were due to technical issues with one CRA, because at the time of the study the CRA had discontinued its standard service with FICO.

Table 2 Consumer Level Score Changes

Change	Percentage of Participants who had a Maximum Score Change of
25+ point decrease	0.0%
20-24 point decrease	0.0%
10-19 point decrease	0.1%
1-9 point decrease	0.8%
None	N/A
1-9 point increase	3.2%
10-19 point increase	3.1%
20-24 point increase	0.9%
25-49 point increase	2.1%
50-99 point increase	2.3%
100+ point increase	0.4%

Note: There are a total of 1,001 participants in the study. Consumers may have disputed with multiple bureaus, and multiple reports may have experienced changes in score (or no changes in score). While this table provides the percentage whose maximum score change is within the given ranges, these consumers may have had smaller score changes, or zero point score changes, on their other disputed reports. Note that 74% of participants did not find any material errors in their credit histories; hence these account for the majority of the 87.1% of participants with no score changes.

Table 3 Report Level Score Changes

		(1)	(2)	(3)
Change	**Reports**	**Percent of All Reports**	**Percent of Disputed Reports**	**Percent of Modified Reports**
25+ point decrease	0	0.0%	0.0%	0.0%
20-24 point decrease	0	0.0%	0.0%	0.0%
10-19 point decrease	2	0.1%	0.3%	0.5%
1-9 point decrease	14	0.5%	2.4%	3.5%
None	361	12.2%	63.1%	N/A
1-9 point increase	66	2.2%	11.5%	16.5%
10-19 point increase	55	1.9%	9.6%	13.8%
20-24 point increase	12	0.4%	2.1%	3.0%
25-49 point increase	30	1.0%	5.2%	7.5%
50-99 point increase	28	0.9%	4.9%	7.0%
100+ point increase	4	0.1%	0.7%	1.0%

Note: In addition to the 2,968 reports that were reviewed with the study associate (all reports), this table includes percentages that were calculated for the 572 reports with potentially material errors disputed, and percentages that were calculated for the 399 reports with modifications following the dispute process that were inferred to have at least one material error.

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