Behavioral Health Economics and Competition Policy *

Jonathan Kolstad
Univ. of California – Berkeley, NBER

Robert Town
Univ. of Texas-Austin, NBER

February 10, 2022

Abstract

In this paper we discuss the role of behavioral biases in the health care sector and how those biases may impact effective competition policy. We describe behavioral biases in insurance markets, provider and health care delivery, prescribing behavior and medical device implantation choices. In particular, we focus on how the presence of these biases shape competitive outcomes and how the failure to incorporate these biases in the analysis can lead to erroneous conclusions for competition policy. We conclude by constructing a simple bargaining model of hospital/medical technology price negotiations when medical device firms can distort physician devices choices. We show that in the context of this model, failure to account for behavioral biases leads to incorrect conclusions regarding the impact of a device merger.

*We thank Amitabh Chandra, Bryan Chu, Sanjog Misra and participants of the Stigler Center's Health Care Competition Conference for very helpful comments.

1 Introduction

One of the most striking shifts in economics over the last two decades is the rise of behavioral economics. The impact of behavioral economics has spread widely throughout the field and has significantly influenced the study of health economics and industrial organization (IO). The impact of behavioral economics on health economics is not surprising given that this sub-field has a long history stretching back to Arrow (1963) of incorporating non-standard objective functions, information frictions, and behavioral biases into its canonical models.[1] While IO took longer to embrace behavioral economics, over the last decade there has been an explosion of behavioral IO work.[2] Despite burgeoning and robust behavioral literatures in both health economics and IO, there has been comparatively little work on the competition policy implications of behavioral economics in medical care and health insurance settings.[3]

In this paper, we provide an overview the competition policy relevant behavioral economics research in health economics. We distill the lessons from this research and discuss how they apply to competition policy analysis in the health care sector. We focus on four different classes of biased decision making in health care: 1) Biased health insurance choices; 2) Biased choices in care seeking and delivery; 3) Biased choices in prescribing behavior and consumption decisions; and 4) Care and insurance quality informational barriers that can address biased decision making.

The health care sector is currently facing many competition challenges that have attracted the attention of competition policy markers. Hospitals, physician organizations, and health insurers typically compete in concentrated markets, and over the last two decades market concentration has increased substantially for hospitals and physicians organizations (Fulton, 2017). US Pharmaceutical prices are much higher than in other comparable countries suggesting that drug manufacturers (or perhaps others in the drug supply chain) are exercising market power.[4] Vertical integration is on the rise across the entire sector: hos-

[1] See, Chandra et al. (2019a) for a review of the behavioral economics literature on health insurance choice.

[2] See Heidhues and Kőszegi (2018) for an excellent review of this literature.

[3] Even more broadly, it is safe to say that there is little economics work on the broad implications of behavioral IO for competition policy. Exceptions are Armstrong and Huck (2014) and Martin (2018). That being said, Behavioral Antitrust has been a small but active area in law journals since 2002 (Tor (2002)).

[4] See, "A Painful Pill to Swallow: U.S. vs. International Prescription Drug Prices," US House of Representatives Ways and Means Committee, September 2019, https://waysandmeans.house.gov.

pital systems are acquiring physician practices, insurers are buying physician groups, and pharmacy chains are purchasing insurers. Private equity firms have been acquiring physician practices and nursing homes raising the specter of increased rent seeking with these acquisitions. President Biden's executive order promoting competition competition in the American economy specifically targets the health care sector as an area of focus.[5]

As we discuss in detail below, there is a significant body of empirical work that shows the standard neoclassical assumptions of a rational consumer (or firm behavior) are sometimes poor approximations to reality in many health insurance and health care settings. Economic analysis for antitrust or other competition policy analysis is often a 'but-for' exercise. What is likely to occur but-for the merger? What is likely to occur but-for an organization's conduct? Accounting for the actual behavior of economic agents, whether it is "behavioral" or not, in the analysis of mergers or organizational conduct is clearly central if these but-for predictions are to be as accurate as possible. In this paper, we discuss how the empirical findings from the behavioral economics literature in health economics can affect these but-for calculations.

The precise nature of behavioral deviations as well the particulars of their impact on merger analysis do vary by market and setting, often substantially. Nevertheless, we highlight one important and general role for behavioral deviations in merger analysis: the gap between observed demand and unbiased or true demand. We refer to the latter as the "value curve" following Handel et al. (2019) which is a measure of experienced utility of an unbiased individual (e.g. someone who has had information frictions corrected/eliminated). A central component of any merger analysis is computing a demand elasticity. Whether estimating mark-ups, computing pass through, determining market definitions, assessing entry and product offerings, or numerous other critical analyses, demand elasticities are often an essential ingredient. We discuss the implications of biased measures of demand as well as some approaches to addressing mis-measurement. The centrality of this issue underscores the importance of bringing merger policy in line with the now well documented realities of consumer behavior in health care markets, and beyond.

[5]See, https://www.whitehouse.gov/briefing-room/presidential-actions/2021/07/09/executive-order-on-promoting-competition-in-the-american-economy/

For the purposes of this paper, we discuss the impact of both "informational frictions" and "mental gaps" on health care decision makers. Informational frictions refers to the costs of acquiring and processing information while mental gaps refers to psychological distortions to information-gathering, attention, and information processing (Handel and Schwartzstein (2018a)). We include both classes of distortions as it can be very difficult to disentangle the relevant mechanism behind distorted decision making, and both mechanisms can be exploited by suppliers in similar ways often leading to similar implications for competition policy. Where the specific mechanism is well identified or matters for policy, we will attempt to be clear on that point.

One of the central themes that arises is that the presence of significant behavioral biases likely affects the impact of market concentration on prices and quality. However, the exact nature of this impact differs by setting. In some settings, these biases exacerbate the impact of market power. For example, we write down a simple model of medical device competition over prices and marketing in the presence of behavioral biases, and the magnitude of a merger's impact is positively related to the magnitude of the bias. In other settings like direct to consumer drug advertising for statins, collusion in advertising may improve welfare (Shapiro, 2018). This observation justifies a aggressive and thoughtful incorporation of behavioral economic modelling in the competitive analysis when frictions are meaningful. Importantly, this also suggests that the marginal impact of horizontal mergers on welfare could be greater or less than implied by the presumptive harm standard embedded in the US Department of Justice (DOJ) and Federal Trade Commission's (FTC) *Horizontal Merger Guidelines*. Of course, how this all plays out in any competition policy matter depends on the exact institutional details, the nature of competition, and behavioral frictions.

The rest of the paper has the following structure. We begin by presenting a framework for considering competition policy in the health economy where behavioral biases are relevant. We then discuss the role of biases in health insurance choice and highlight how such biases affect the analysis of competition. In Section 4, we examine the role of behavioral biases in provider choices and quality setting. Section 5 examines how pharmaceutical and device firms leverage behavioral biases in prescribing behavior and device choice and how these efforts can distort physician and patient decision-marking. In Section 6 we codify some of

the themes of the literature by constructing a simple bargaining model of hospital/medical technology price negotiations when medical device firms can distort physician devices choices. We show that in the context of this model, failure to account for behavioral biases leads to incorrect conclusions regarding the impact of a device merger. Section 7 concludes.

2 A Simple Health Care Economy

To facilitate our discussion, we follow Gaynor et al. (2015) and consider a stylized model of the areas in which competition policy impacts health care markets. This simplification leaves much important detail out but provides a framework to guide our discussion. We focus our attention on the simple model they develop and ask where behavioral consumers change the implications of the model of competition and outcomes.

We begin with a provider market in which hospitals and doctors make decisions about investments in quality. These decisions include whether to make significant capital investments, whether to adopt new technologies, the choice of particular drugs or devices, treatment styles, and the allocation of effort from physicians across hospitals, amongst others. This first stage is critical in determining many of the factors that influence the cost and quality of health care, notably technology adoption and quality investments. From a competition policy perspective, we can think of this stage as being dictated by horizontal competition in the provider market as well as the demand for services by quality and price. Based on the outcome of this first stage, providers then bargain with insurers to determine the prices and networks insurers can offer. In the third stage, insurers choose premiums and compete with each other in markets ranging from private Medicare and Medicaid benefits for enrollees over 65 or with low incomes, to employer-sponsored insurance (ESHI) coverage or direct-to-consumer insurance marketplaces, notably the ACA exchanges. Fourth, consumers take the offerings available to them into account and choose an insurance product. Finally, in a fifth stage, individuals realized different levels of illness and require health care, yielding utility/consumer welfare from the health care system.

Gaynor et al. (2015) demonstrate the important role played by competition at each stage of this simplified model of the health care economy and how competition determines con-

sumer welfare. Importantly, as we show below, each stage of the model depends critically on assumptions of informed, active consumers revealing preferences and competitive optimizing firms/hospitals/doctors. Behavioral frictions call these assumptions into question at each stage and, therefore, yield different conclusions for the impact of competition on welfare.

For example, when patients consistently under-value quality because it is difficult to assess or measures this yields i) lower investments in quality by providers, ii) insurer networks that include fewer high quality providers given the premium, and iii) inefficient access to higher quality treatment that ultimately reduces health. Alternatively, consider the well-documented misweighting of premiums relative to cost sharing by consumers in insurance markets (Abaluck and Gruber (2011)). When this is the case we expect the third and fourth stage of competition to focus on lowering (relatively observable) premiums and increasing (less observed) cost sharing. Furthermore, if we combine the two we might expect competition not to yield lower cost, higher quality insurance/networks but instead low premium coverage that offers fewer providers of lower quality, with less generous coverage when people become sick. This simple example underscores the ways in which competition need not yield the same returns as in a conventional model when consumers are behavioral. We now turn to more detail by market/setting in the health care economy.

3 Biases in Insurance Markets

A defining feature of any developed economy health care market is the role played by insurance. Insurance in the U.S. takes on different forms — provided by the government, purchased from a private exchange or accessed through an employer – but the economic rationale is the same. Risk averse individuals want to insure against illness that is relatively rare and costly (Arrow (1963)) and, over multiple periods, want to limit "reclassification risk" that would raise future premiums for someone who becomes ill (Handel et al. (2015)). Countries have taken varied approaches to achieving these goals including single-payer systems in which the government provides both insurance and runs care delivery (e.g. the UK), government provision of insurance with a separately run health care delivery system (e.g. Canada) and market-based approaches relying on some form of "managed competition" (e.g.

the Netherlands, Switzerland). In the U.S., private insurance, and choice of private insurer, is a fundamental feature of the health care system.

Most Americans under 65 access insurance through employers who offer private insurance plans. Low-income Americans access care through Medicaid, which increasingly relies on private Medicaid managed care organizations to provide coverage. The ACA developed insurance marketplaces ("exchanges") to offer private insurance products both to those eligible for some form of subsidy (between 138% and 400% of the FPL) and for those at higher incomes who could not access coverage through an employer. Even for those above 65, where traditional Medicare is provided directly by the government, private insurance markets play a critical role via drug insurance (Medicare Part D) and Medicare Advantage which allows enrollees to choose a private managed care plan.

A consistent theme through all of the complexity of U.S. health insurance market is the reliance, implicit or explicit, on private insurance to i) provide insurance coverage and ii) to innovate by lowering cost, raising quality of care or both (e.g. by identifying effective treatments and incentivizing the use of them). Thus, competition and market structure in the health insurance market matters intrinsically for the cost and quality of insurance coverage itself but is also one of the fundamental factors determining how U.S. health *care* is delivered and the health of the population more broadly.

In this section, we consider the critical role of insurance competition taking into account consumer frictions and behavioral decision making. The central challenge is that behavioral consumers' choices do not reflect underlying utility (experienced utility upon enrollment). Accordingly, demand is not the same sufficient statistic for welfare analysis that is traditionally assumed. This has first order implications for market function. First, holding fixed the products offered and pricing there is a welfare loss from mis-allocation of consumers to products/surplus. Second, we expect wasteful investments/effort by insurers to design plans and enter markets where behavioral features affect demand more. Third, and more generally, we do not expect demand side signals to facilitate entry and innovation in insurance markets as we would in traditional product markets. Combined, these welfare consequence are large given the role played by private insurance competition in health care.

3.1 Choice Quality, Frictions and Competition

The reliance on the provision of private insurance through markets is rooted in conventional assumptions of competitive markets.[6] If consumers are effective at making choices and there are a sufficient number of competing products, we expect better matches of enrollees to products they value, lower prices (premiums) and investments in improved product quality over time. In contrast, a large and growing body of research calls into question the ability of consumers to make effective, efficient choices in health insurance markets (see, e.g., Domurat et al. (2021), Handel and Kolstad (2015), Handel and Schwartzstein (2018b), Spinnewijn (2017), Handel (2013a), Chandra et al. (2019b)).

To see why, it is informative to consider the difficulty implicit in the "rational" model of choosing an insurance product. An individual prefers coverage that protects her in the event she becomes ill, which must be forecast. Each different insurance product offers different levels of financial coverage — measured by the share of cost covered by a plan for a particular health outcome — and non-financial coverage — e.g. the doctors available in the covered network who treat a condition. In most cases financial coverage depends on a non-linear contract that changes cost sharing depending on current costs as well as prior spending. Furthermore, prices in this case are determined by a hard to assess price for a service scaled by a cost sharing amount. Finally, add to this the fact that each different condition is hard to forecast and the difficulty implied by an informed model of consumer choice should become clear.

This setting — in some contrast to the mental acuity implied by the neoclassical model — is rife with features for which behavioral economics has proven to be a far more effective model of decision making: considering low probability events, forecasting distributions based on a history, comparing across choice sets where some elements are easier to observe (e.g. premium) than others (e.g. out-of-pocket spending if you get sick). These factors can enter in numerous ways, impacting some or all of the key features of insurance demand including i) forecasting expenditures/risk, ii) understanding benefit design and iii) considering non-financial plan features such as network or hassle costs.[7]

[6] Adapting competition to account for market failures of health care has led to the idea of "managed competition" (Enthoven (1993)).

[7] For a more formal treatment of the sources of uncertainty when frictions affect choice in the standard

3.2 Magnitude of Average Choice Frictions and Errors

How important are such frictions and choice errors in practice? A large literature has developed demonstrating that the average consumer consistently leaves significant sums of money on the table when choosing health insurance. The focus on financial choice error — notably the choice of fully dominated plan options — reflects, in part, the focus on identification in economics; it is easier to demonstrate dominance on financial dimensions where we can assume vertical preferences.[8] We speculate that non-price/cost choice errors are also commonplace and have important implications for welfare by impacting health care utilization and health. We also note that this paper is not a review of the large literature on choice frictions. Thus we focus on a set of representative papers from different settings.

An example of this literature in the employer-sponsored insurance setting is Handel and Kolstad (2015) who study choices at a large firm offering a relatively simple choice between a comprehensive PPO option and a High Deductible Health Plan (HDHP). The two plans are only distinguished on financial features (they are offered by the same insurer using the same network of providers). They combine administrative claims data with detailed survey data on beliefs and understanding of decision makers. The addition of the survey data is used to demonstrate i) the importance of information frictions in choice and ii) the degree to which consumer preferences are mis-specified without accounting for these factors. The magnitude of the results are striking. For example, consumers who erroneously believe that the network of providers is better in the PPO (recall they are identical) are willing to pay an average of $2,267 for the PPO. More generally, when aggregating the information frictions, measured by the survey respondents who mis-report or do not know the features of either plan, consumers are willing to pay an average of $1,694 for the PPO, even though ex post utility is unaffected upon enrollment. Accounting for frictions of this type also changes the estimated preferences of individuals that are key to determining demand and, therefore, consumer surplus in insurance markets (e.g. large differences in risk preference estimates).

These effects have critical implications for merger analysis. Taking preferences/demand

model of insurance demand see Handel and Kolstad (2015).

[8]The existence of many dominated options also points to a potentially important role for information frictions in determining equilibrium market outcomes (Liu and Sydnor (2022)). Furthermore, Marone and Sabety (2022) demonstrate that offering vertical choice in health insurance markets need not enhance welfare.

as given, without accounting for information frictions, generates large differences in measures of consumer surplus associated with price/premium changes or changes in product offerings. For example, Handel and Kolstad (2015) consider a policy counterfactual that is relevant, though they do not study this in the context of merger analysis. They demonstrate that accounting for information frictions changes the optimal level of cost sharing significantly (in practice this means whether to move to a HDHP). That same counterfactual, though, could be used to measure the value of product variety to employers or on insurance exchanges, a central question in merger analysis.

3.3 Inertia and Competition

There are many forms of choice frictions and their economic foundations vary. A particularly important one that has been well documented empirically is inertia (see e.g. Handel (2013a)). Inertia has two important implications for market function. First, when enrollees do not switch plans if other products offer greater surplus welfare is diminished. Second, if the supply side of the market accounts for inertia they can systematically raise prices, diminish quality or both for plans with more inert consumers (e.g. those who have stayed longer). That is, competition can turn from effort to offer better options and competition on price to investing in holding onto profitable, inert consumers and increasing mark-ups.

Saltzman et al. (2021) study the role of inertia in affecting consumer choices as well as the supply side response and its implication for competition California's ACA exchange.[9] Like earlier work, they find a key role for inertia in plan choices. The average magnitude of inertia in determining willingess to pay is the equivalent of 44% of plan premiums. Accordingly, consumers are made worse off given the existing prices and quantities. However, the authors take an important additional step to model market equilibrium prices and mark-ups. This allows them to measure the role played by inertia in changing market power. They estimate that inertia increases market power substantially, raising prices by 13.2%. This work demonstrates the importance of accounting for inertia in evaluating the returns to competition, merger policy and market design issue in insurance markets.[10]

[9]The market is relatively concentrated with four firms dominating.

[10]These effects ignore whether inertia or switching costs are welfare relevant. The answer to this does not affect the impacts of intertia on market power but does matter in evaluating competition policy since

Inertia represents a potentially fruitful avenue to integrate behavioral factors into assessments of competition in insurance markets more generally. The particular form of choice friction is relatively easily estimated empirically (see e.g. Handel (2013b)). Furthermore, as Saltzman et al. (2021) show, these estimates can be integrated into conventional models of competition and market power.

3.4 Inequality and Choice Quality

To this point, we have focused our attention on *average* choice errors. Underlying heterogeneity in choice frictions, however, has important implications for competition policy, notably when and where competition will generate improvements in consumer surplus.

A small literature has developed accounting for heterogeneity in choice frictions in insurance markets. Fang et al. (2008) use survey data from the HRS to show the cognitive ability has important implications for plan choice in the market for Medicare Supplemental coverage, in this case driving advantageous selection. Sorensen (2006) uses detailed data from the University of California to document an important role for social learning in health plan choices. These papers, however, largely abstract away from the role of competition or, put differently, the returns to offering choice/facilitating competition when there are heterogeneous choice frictions.

Handel et al. (2020) assess these issues in one setting using rich administrative data on the entire population of the Netherlands who choose health insurance products from a competitive set of private insurance options.[11] The paper focuses on a single aspect of the insurance choice — the decision to take a higher deductible and a lower premium — allowing them to identify choice errors directly because these choices are offered within each different brand of product. As with much of the prior work, they find large average choice frictions in which enrollees leave significant surplus on the table. They link detailed administrative data on socio-demographic factors allow them to assess the correlations between underlying mea-

consumer costs associated with switching would need to be taken into account in the latter situation.

[11]The Netherlands is a setting of intrinsic interest in understanding competition in health insurance markets. It is one of the best examples of regulators explicitly developing a market-based, managed competition model to provide health insurance coverage for an entire population. The market has seen a robust set of insurers offering products and been a leader in developing risk adjustment and other market stabilization tools.

sures of human and financial capital and choice quality. They find a strong socio-economic gradients with respect to choice quality. While higher income and net worth individuals are able to gain significantly more surplus, these differences are almost entirely explained by educational attainment, notably, more advanced degrees in more quantitative fields. They also estimate the causal effects of social networks at work and in the community as well as inter-generational transfers of choice capital within the family. All of these factors impact consumers decisions and, therefore, whether they are able to gain the surplus generated by offering greater product choice.

Underlying choice inequality means the returns to competition vary significantly. Accounting for choice quality heterogeneity they show that the returns to offering choice (i.e. adding the high deductible option beyond the basic benefit) improve welfare on average. However, they then consider an inequality averse policy maker's social welfare function empirically (Atkinson et al. (1970)) showing that it dramatically lowers the returns to competition. For example, the welfare loss from limiting choice to only the low-deductible option is reduced by 60% for an inequality averse decision maker compared to basing decisions on the average welfare impact.

The literature on inequality in decision quality is relatively small but has been shown to impact a number of critical markets for competition policy. For example, work on retirement savings decisions (Chetty et al. (2014) and mortgage markets (Andersen et al. (2020)) largely focuses on documenting heterogeneity in choice quality but does not consider the implications of these findings in an equilibrium of a competitive market.

A unifying feature of all of the work on heterogeneity in consumer decision quality is a reliance on rich administrative data.[12] Chetty et al. (2014), Andersen et al. (2020) and Handel et al. (2020) all rely on detailed administrative "register data" collected, most notably, by Scandinavian countries. More generally, this work underscores the important value that linking data from outside of the health care sphere (e.g. education, income, etc.) to health care decisions and health outcomes can play in assessing health care markets.

[12]Fang et al. (2008) are an exception. They use detailed survey data, though they are limited to a small sample.

3.5 Behavioral Economics, Choices and Technology

The systemic role played by behavioral decision making and choice frictions in health insurance markets mean that the design of the choice environment has important implications for competition. In practice, these issue take the form of user experience (UX) design for online marketplaces. Issues of information and UX design have been studied in eCommerce settings more generally (see Tadelis (2016) for a review). In health insurance markets, there are a specific set of UX concerns that include i) the information presented to consumers ii) the default ordering based on plan attributes and iii) additional decision support (Ericson and Starc (2012), Ericson and Starc (2016)).

The potential for technology solutions to help match enrollees to products represents an important area of consideration for competition policy. For example, if an algorithm is much more effective than individual enrollees at matching them to plans providing greater surplus, it may be optimal to use a "smart default" approach in which an individual is enrolled in the plan predicted to be best for them unless they actively opt out. This approach accounts for the inherent choice difficulties and turns inertia and inattention into a tool to improve decision making. Doing so, however, means that the algorithm chosen plays an outsized role in determining market share and the form of competition. Thus, understanding the link between technology and underlying demand will likely become a key area in assessing how effective competition is in insurance markets. Furthermore, competition policy in insurance markets may need to focus more on assessing platform competition *between* marketplaces than on competition amongst health insurers.

Gruber et al. (2020) study the introduction of a sophisticated decision support technology in the market for Medicare Advantage. In their setting enrollments are made by experienced insurance brokers, allowing them to assess the degree to which human skill can overcome choice errors/improve matching of enrollees to products. They find that in the absence of decision support, even skilled agents exhibit precisely the kinds of heuristic-based choice errors that have been found in the literature. For example, the average broker recommendation weights $1 in premiums approximately 7 times more than $1 in cost sharing for a plan. They also put little weight on risk protective benefits of plans. After the introduction of

decision support enrollees improve decision making, saving an average of $278 per enrollee, and completely correct the mis-weighting of premium versus out-of-pocket spending. These results suggest that technology fundamentally shifted the nature of demand in the market and has important implications of the nature of competition.

The potential value of such decision support/UX raises the question of when and how we expect marketplaces/platforms to adopt such technology and whether competition will facilitate technology investments of this kind. To date, there appears to be little competition among marketplaces that focus on convincing consumers they will get higher quality plan matches. [13]

One explanation for the relative lack of competition over search/recommendations/UX is the difficulty in identifying a high quality marketplace/platform market. Given the nature of the choice and information frictions/behavioral decision making, it may be difficult for consumers to judge the quality of a plan recommendation system. Since insurance decisions depend on an expected risk distribution the surplus maximizing approach is to optimize recommendations/choices *ex ante*. Feedback on the quality of recommendation, however, comes in the form of an *ex post* realization of experienced utility in a plan for a specific individual. Take a simple example with three levels of plan coverage, bronze, silver and gold for simplicity. Let's further suppose that ex ante, given a risk averse enrollee the silver is the best option. In practice, given the skewness of health care spending enrollees are either going to spend little or nother, making the bronze option look optimal (or that they overpaid for silver) or they will spend a lot making the gold plan look better (leaving an experience of "under-insurance").

In this case, a marketplace that consistently recommends the silver plan should not expect to gain market share and, worse, would likely lose out to a simple one that always recommended the bronze with a low premium as most enrollees are health/low cost in a given year. Furthermore, individuals typically make a decision only annually making any learning relatively slow. Contrast this with competition in the market for search engine technology. An individual repeatedly searches for many terms and can quickly learn which is providing

[13] We acknowledge, though, that this is an observational statement and there is little systematic data on these issues.

more effective recommendations. Future work that explores conditions under which we can expect competition to generate technology/market solutions that improve behavioral consumer matches to complex products seem particularly important for competition policy in the health insurance market.

3.6 Competition when Cost Sharing is a Shrouded Attribute

One of the consistent results of the empirical work on behavioral economics and insurance choice is the relative under-weighting of OOP cost relative to premium. Abaluck and Gruber (2011) pioneered this approach demonstrating that seniors enrolling in PDP coverage (Medicare Part D) consistently weight premium far more than OOP for drugs that they currently take. The rational, forward looking model would imply equivalent weights. Subsequent work demonstrated that seniors do not learn/improve choices over time in Medicare Part D (Abaluck and Gruber (2016)) and that experienced brokers exhibit similar mis-weighting of attributes in Medicare Advantage markets leading to large financial choice errors (Gruber et al. (2020)). This specific form of behavioral bias provides a relatively simple setting to demonstrate the implications of behavioral economics for competition and merger policy. More generally, we can think of premium and cost sharing for a known prescription (thereby eliminating the risk aspect of choice in our simple setting) as a case of "shrouded attributes" (Gabaix and Laibson (2006)).

Suppose that we want to consider the competitiveness of an insurance market or evaluate the impact of a merger of two insurance plans. Standard analysis would focus on a measure competition (e.g. the market share of the merging parties and the implied concentration) and the impact on prices. In most cases premiums are taken as the primary measure of the price of insurance. If, however, enrollees treat OOP cost as a shrouded attribute, demand is relatively inelastic to changes in OOP and relatively elastic with respect to premium.

In that case, we expect *more* competition over premiums than in the standard model. Furthermore, as competition lowers premiums we expect greater cost sharing. In this case, competition may appear to be generating substantial consumer surplus in the form of lower premiums but lower premiums do not actually reflect improvements in consumers surplus because they are offset by increased cost sharing.

Such offsetting behavior could even be exacerbated by competition. If shrouded attributes in benefit design require investment to produce, competition can generate effort by plans to shroud more attributes *reducing* consumer welfare and creating deadweight loss from fixed investments, even if premiums decline. Furthermore, the profit generated by consumer choice errors can increase entry or investment in marketing yielding inefficient business stealing and redundant fixed costs (Mankiw and Whinston (1986))

3.7 Improving Competition Policy with Behavioral Economics

The widespread and systematic shortcomings in consumer choice have three broad implications for market function and merger policy. The direct effect is to reduce consumer surplus/match quality conditional on the set of products offered. Second, we do not expect the same supply-side response in terms of quality improvement, investment or price competition as in a conventional market. Third, empirical measures of consumer preferences and demand can be mis-specified if one cannot account for information frictions and choice errors.

The third issue — that we cannot easily measure true preferences to evaluate market conditions — is a broad issue in considering behavioral economics in application. One response has been to argue that in the absence of data to identify behavioral frictions one must rely on the neoclassical framework. This response, though widespread, is not particularly convincing in many markets. The evidence for health insurance markets is overwhelming. Therefore, what might one do, particularly when there is a need to implement merger analyses in practice?

Here we propose a set of approaches that have been demonstrated to be effective in the literature and seem plausible as solutions in analyzing proposed policy or evaluating competition in health insurance markets. If anything, taking these approaches could be made easier in practice such as assessing antitrust cases where discovery makes data acquisition, in general, easier than for academic economists.

- *Gather addition data on frictions/beliefs:* Handel and Kolstad (2015) develop an approach that relies on linking survey data on beliefs and information to traditional

administrative claims data, of the type typically used in analysis. They develop a survey that is rooted in an understanding of the setting as well as the underlying model of insurance choice. For example, if the model being used to analyze the impact of a merger focuses on the impact of provider availability/network one could focus questions on how enrollees understand the network options provided to them at baseline. Implementing such surveys also allows for simple correlational analysis that compares choices with different relative information in the cross section as well as "structural" evaluation of choices by linking survey data to actual behavior through the lens of a choice model. Survey data gathering is also relatively straightforward and can be done on a representative subset of the population. It is also important to note that, even without directly linking survey data to administrative data, survey data can be used to measure informational and behavioral factors affecting insurance choice (see e.g. Loewenstein et al. (2013)).

- *Focus on settings where choices are more informed:* An alternate approach is to focus evaluation on markets or particular settings where it is *a priori* reasonable to assume consumers are more informed or there is less room for frictions or choice errors. This approach has been widely used to account for/measure inertia by focusing on consumers who make "active choices." In many cases, new enrollees or certain choice environment designs change or eliminate defaults. In evaluating preferences an analyst can give more weight to these settings to estimate preferences without inertia or to estimate the magnitude of inertia (see Beshears et al. (2019) for a useful discussion of choice environments and active choice).

- *Measure information frictions and behavioral decision making experimentally in the setting of interest:* A further approach that can be considered in evaluating mergers in insurance markets is to actually implement an intervention. Bhargava et al. (2017) demonstrate this approach but it seems plausible that this could also be done in a particular setting where a merger is being evaluated to better understand the existence and magnitude or information frictions or choice errors. Loewenstein et al. (2013) also provide a useful example of how surveys can be used to measure choice quality but

also incorporate experimental variation to evaluate counterfactual environments with choice error.

4 Biases in Provider and Care Choices

Going back at least to Arrow (1963), behavioral economics (or limited information as it was described in 1963) has played a central role in economists understanding of the supply and demand of physician services. The very nature of the practice of medicine requires a highly skilled individual to provide a recommendation, often with significant uncertainty, to a patient facing a high stakes, probabilistic decision (Dawes et al. (1989)). Furthermore, the doctor is both an agent in the clinical decision and the one selling the product (McGuire (2000)). Taken together, the standard assumptions of the first and second welfare theorems are not met, and the manner in which competition impacts price and quality require different models and analysis (Arrow (1963)).

Yet, despite the well documented role for behavioral economics and information frictions in health care markets the treatment of mergers and competition policy more generally is remarkably conventional. Whether assessing airline merger or the acquisition of an oncology practice by a local hospital, the issues of competitive harm focus on the pricing impact of the merger (accounting for potential efficiencies) and the impact on the quality of service/care. We believe there are a number of straightforward applications of behavioral economics that lend themselves to improving competition policy and merger analysis in provider markets and also to better understanding the limits and opportunities for competition in health care provider markets.

We also note that we only scratch the surface of a large literature on the market failures and behavioral economics of provider markets. In part because of the nature of the market there is a large literature taking into account these issues. Here we seek to identify some important themes, provide motivating examples, particularly from empirical work, and tie these to merger policy.

The central observation we make is that merger analysis, policy design and the value of competition hinge on the role of demand. Insofar as consumers are unable to assess

key elements of a choice or make trade-offs in a provider market (e.g. quality of care and price) critical elements of any evaluation, including but not limited to, market definitions, elasticities and consumer surplus calculations, will be altered.

4.1 Provider Competition and Quality

There is a large literature on competition in health care markets over quality (see e.g. Gaynor and Vogt (2000) and Gaynor et al. (2015)). Here we replicate the simple models developed in Gaynor and Vogt (2000) and Gaynor et al. (2015) allowing us to highlight where behavioral consumers change the relationship between competition and equilibrium quality, both positively and normatively, and, thereby merger analysis.

We begin by considering a provider, i, facing administratively set price $\bar{p}$. Profits for the provider can be described as follows:

$$\pi_i = \bar{p}q_i - c(q_i, z_i) - F \tag{1}$$

where q_i is provider i's demand, $c()$ is a function capturing variable cost, z_i is quality and F captures fixed cost. From equation (1) we can derive demand for provide i as:

$$q_i = s_i(z_i, z_{-i})D(z_i, z_{-i}) \tag{2}$$

where s_i is provider i's market share and $D()$ is market demand. From this we can recover the equilibrium quality function:

$$z_i^e = z(\bar{p}, c_q, c_z, s_i, D) \tag{3}$$

where c_q and c_z reflect the marginal cost of quantity and quality respectively.

Equation (3) implies an empirical model that can be used for merger analysis (e.g. how might increased competition impact cost and quality of care?).[14] The critical elements in (3), both theoretically and empirically, determining quality are (implicitly) the quality elasticity

[14]As Gaynor et al. (2015) show, the resulting empirical specification mirrors the traditional paradigm of IO and merger analysis: the structure-conduct-performance (SCP) model.

of demand for both market share and overall demand. These are the primitives, however, where behavioral frictions impact consumer choices and potentially drive an important gap between the observed demand — what can be estimated from traditional data on market shares using cost and demand shifters and variation in competitive forces — and the unbiased demand/value curve for quality.

4.2 Physician Inputs and Competition

An important role in determining behavior by the supply side of the provider market is the role played by physicians. Competition policy generally treats hospitals, physician practices, etc. as firms, in the neoclassical sense. In practice, however, physicians play an outsized role in the decisions made by these entities. Therefore, objective functions may well reflect alternative objectives. At a simple level, that includes non-profit firms, a well studied issue in economics and often considered in competition policy (Newhouse (1970), Sloan (2000)). We may also want to consider physicians having alternative objective functions such as intrinsic motivation to improve quality or provide better care, independent of the returns to doing so (see e.g. Kolstad (2013)). These kinds of incentives lead to higher quality than implied by demand alone and change the implications of changes in competition or other policies to enhance competition (e.g. information provision).

Taking physician inputs into quality product can impact central questions for competition, quality and efficiency. For example, in markets when administratively set prices are above marginal cost, competition increases quality. Quality improvements increase consumer surplus but need not enhance welfare when quality improvement depends on large fixed costs of entry (e.g. developing a new cardiac surgery center to attract patients). The potential for market failures associated with this form of quality competition falls directly from a model of optimizing providers (hospitals or doctors) competing for informed patients who prefer higher quality.[15] The inefficiency comes from excess entry and the associated incurred fixed costs where new firms are able to steal business because they offer higher quality products (as in Mankiw and Whinston (1986)). This issue is exacerbated in health care when poorly

[15]Optimization applies to either traditional profit maximization or most models of non-profit behavior where the provider prefers surplus to invest in their objectives (see e.g. Newhouse (1970)).

informed patients can be guided by physicians to demand more care to cover fixed costs of entry (see e.g. Robinson and Luft (1985)). In this case, competition leads to the so-called "medical arms race" model which is characterized by redundant fixed cost and increased demand inducement to cover those costs.

Hospitals, by and large, do not employ physicians. Instead, they effectively offer facilities, and care occurring in a hospital includes a payment for the facility and the physician. While hospitals cannot pay doctors directly, they have a number of non-price mechanisms to attract and retain physicians (e.g. operating room investments or time, high quality nurses, etc.). Thus, because hospitals must attract physicians to produce quality the hospital objectives and form of competition depend on the availability of doctors and resources needed to attract them. Cutler et al. (2010) develop and test a simple model of the impact of competition on entry and quality based on this simple observation. They extend the classic framework of Mankiw and Whinston (1986) to account for the relative scarcity of high quality physicians. They show that, when high quality physicians are scarce, hospital entry leads to increased competition over scarce, high quality surgeons. The reallocation to those physicians improves quality. Taking these quality improvements into account offsets the additional fixed cost associated with entry and competition.

5 Competition and Biases in Pharmaceutical and Medical Devices Markets

Medical technology (pharmaceutical and medical devices) comprise approximately 16% (over $600b) of total US health care expenditures. Despite Food and Drug Administration (FDA) regulations that require manufacturers to conduct safety and efficacy studies, in the real world, patient specific health benefit of a given drug and device treatment is often difficult for the prescription writing agent (e.g. doctors, nurse practitioners, and physician's assistants) and their patients to know.[16] These informational frictions open the door for biased decision-making by both providers, in their prescribing and device selection behavior, as well as

[16]For ease of exposition, we will often refer to the class of prescription writing agents as physicians as they account for the vast majority of written scripts.

consumers in seeking and adhering to prescriptions. This informational and decision-making setting gives device and pharmaceutical manufacturers incentive to better inform these actors as well as providing a target rich environment for exploitation of biases. In this subsection, we discuss the evidence on the role of informational frictions and biases in affecting provider and patient decision making, how manufacturers respond to these frictions, and, ultimately, how these frictions impact competition policy analysis in these sectors.

5.1 Frictions in Prescribing Behavior and Consumption

To treat a given ailment, patients rely on health care providers to write prescriptions for the most effective drug (net of out-of-pocket costs and side-effects). This can be a challenging task for prescribers for at least three reasons. First, the confidence interval on the expected effectiveness of a given drug may not be particularly tight. Of course, drugs undergo clinical trials but the information generated from those trials might be limited because imprecision in the estimated efficacy or the enrolled patient population might differ from the broader patient population (e.g. pregnant women). Second, conditional on observables, patients can have heterogeneous responses to the treatment. A drug that works well for one patient may be inefficacious for another observably similar patient. Third, the prescriber may not have good on-label treatment options and may be considering an off-label use of the drug where no or limited clinical trial information may be available. Off-label use accounts for at least 20% of prescriptions with an estimated 73% of off-label use having no clinical support (Radley et al. (2006), Lat et al. (2011)). More broadly, over one third of the elderly fill an inappropriate prescription in any given month (Jirón et al., 2016).

Patients have limited ability to independently shop and compare drugs as they need a prescription prior to acquiring a pharmaceutical, and a prescription is available only through a licensed provider. Despite their reliance on providers, patients, as the ultimate end consumer, also face informational frictions that affect both their behavior in seeking treatment and adhering to that treatment once its been prescribed. These frictions can interact in complex ways with provider frictions to affect drug consumption.

Given these informational frictions, it is not surprising that pharmaceutical companies have healthy marketing budgets that seek to influence the decision-making of both pre-

scribers and patients. In 2016, the global top 15 pharmaceutical companies spent 20.5% of their revenue on marketing (Jacob, 2018). These marketing activities can be broken down into four categories: 1) direct-to-consumer advertisements; 2) direct marketing, detailing, and consulting payments to physicians; 3) couponing and other patient pay discounts; 4) sponsorship of continuing education programs. We focus on (1) and (2) above as these programs meaningfully leverage physician and patient informational and behavioral frictions.

5.1.1 Physician Detailing

Detailing is the personalized marketing of pharmaceuticals by drug manufacturers through their sales representatives to physicians. Highly trained sales reps provide information, meals, gifts, drug samples, travel and consulting/teaching fees to physicians in order to persuade them to write more prescriptions for their company's drugs. On average, pharmaceutical companies spend over $20,000 annually per physician on marketing efforts (Weiss, 2010). Drug detailing has a long history dating to the 1850s, no doubt because, as we discuss below, it effectively changes prescribing physician behavior (Smith, 1968). While detailing has long been practiced, it is nevertheless a controversial activity. Advocates claim that the this promotion activity provides valuable information to physicians which results in more effective prescribing, while detractors argue that it distorts physician prescribing behavior away from maximizing patient welfare. Anthropologists have characterized this relationship between manufacturer, rep and physician as akin to a Maori gifting cycle whereby each actor gifts something to another actor who in turn then gifts to another actor until the cycle is complete (Oldani, 2004). The role of detailing has also been highlighted as contributing to the opioid crises where physician prescribing played a central role (Van Zee, 2009, Schnell, 2017, Fernandez and Zejcirovic, 2018). The role that detailing plays in affecting competition policy analysis depends to a large degree on whether these activities are consumer surplus enhancing or detracting.

There are two necessary (but not sufficient) conditions for pharmaceutical manufacture detailing to reduce consumer welfare. First, agency must play a role in physician behavior. That is, physicians leverage their informational advantage over patients by considering their own welfare in addition to the patient's in their prescribing behavior. Second, detailing

needs to affect prescribing behavior. This second condition is surely satisfied given the large pharmaceutical detailing budgets.

There is ample evidence of a wedge between physicians actual prescribing behavior and the patient's optimal prescription, and that wedge is driven, in part, by physician agency. For example, Iizuka (2012) finds that Japanese doctors are imperfect agents for their patients and that the doctor-patient agency relationship plays an important role in generic adoption decisions. Importantly, he finds that the choice between generic and brand-name drugs is influenced by the difference in the markup that doctors earn between the two versions. He also notes that there is significant heterogeneity in prescribing behavior and state-dependence plays an important role in prescribing behavior. While documenting meaningful physician agency in prescribing, this paper does not directly address detailing. More recently, Schnell (2017) also documents meaningful physician agency in opioid prescribing behavior.

There is also ample evidence that physician detailing affects prescribing behavior. Berndt et al. (1995) find a sales elasticity of .55 for detailing visits. Using fixed-effects approach Datta and Dave (2017) finds a perhaps implausibly (from a pharmaceutical company ROI perspective) low detailing elasticity of .06. David et al. (2010) find that evidence that increased levels of drug promotion and advertising lead to increased reporting of adverse drug events for certain conditions.

In 2010, the US Congress passed and the President signed the Physician Payment Sunshine Act. This law required the public reporting of payments and gifts between pharmaceutical and device manufacturers and physicians. Using this information, Grennan et al. (2018) study the impact of gifted meals on cardiologists prescribing behavior for statins. The authors use variation in organizational openness to physician detailing to identify the impact of detailing. Academic medical centers often have restrictions on the ability of their physicians to receive gifts from pharmaceutical sales reps.

Grennan et al. (2018) find that that the average payment to physicians increases prescribing of the focal drug by 73 percent.[17] Furthermore, then examine the impact of these meals in manufacturer/insurer bargaining framework. They show that banning meals would increase consumer surplus 6%. In some ways these consumer surplus estimate is likely a best

[17]Carey et al. (2021) find directionally similar results.

case scenario as statins are very effective drugs and likely under provided.

Given the pharmaceutical firms large amount of spending on detailing physicians combined with the insights from the standard models of provider agency, it is not surprising that detailing alters physician behavior and likely reduces patient welfare. Two facts however are surprising. First, the size of the detailing effect is quite large – physician behavior meaningfully shifted simply by comping them an occasional meal. Second and perhaps more concerning, physicians do not appear to believe that their prescribing behavior is being influenced by sales reps (Madhavan et al., 1997, Steinman et al., 2001, Chimonas et al., 2007). It is this last fact that gives detailing a behavioral economics dimension.

What are the implications of the impact of detailing for competition policy? First, given that we interpret the literature as implying that, on net, detailing reduces patient welfare, transactions that reduce detailing via merger specific mechanisms may be counted as an efficiency. This efficiency effect could also potentially be attributed to physician group or pharmaceutical manufacturer conduct. Second, and somewhat related, competitive initiatives that increase the availability of high quality pharmaceutical efficacy information for physicians can generate benefits (Schnell and Currie, 2018).

5.1.2 Direct-to-consumer advertising

Since 1997, pharmaceutical manufacturers have been able to advertise their products direct to consumers. Direct-to-consumer advertising (DTCA) is controversial (Ventola, 2011). Advocates argue that it provides consumers with useful information on potential treatments and can encourage drug regimen compliance (Wosinska, 2005). That is, DTCA may correct for a behavioral bias in patient drug consumption decisions. Opponents contend that drug ads provide distorted information on a drug's effectiveness and minimizes the potential side-effects leaving consumers with a more biased view on the drug's net benefit. Under this view, DTCA would encourage drug over consumption. Fortunately, high quality detailed data is available to answer how DTCA impacts providers, pharmaceutical manufacturers and, ultimately, patients.

Pharmaceutical manufacturers use different marketing strategies for the drugs they produce. Most drugs have very little to no DTCA advertising. Many of the therapeutic cate-

gories where there is significant DTCA are under-diagnosed, under-treated and poor patient adherence therapeutic areas. This simple observation suggests that DTCA might expand demand by improving adherence and nudge patients to initiate treatment by visiting their physician. Of course, DTCA may also induce over and inappropriate prescribing even in categories where there is under-diagnosed and poor adherence therapeutic classes.

Consistent with the idea that DTCA nudges patients toward greater adherence, Wosinska (2005) finds that hyperlipidemia patients who began drug therapy following high category advertising were more adherent. Advertising also has an inter-temporal, category-wide effect on compliance. For example, Liu and Gupta (2011) study the impact of DTCA for hyperlipidemia drugs. They find that DTCA expenditures have a positive and long-term effect on the number of visits to physicians by newly diagnosed hyperlipidemia patient with significant heterogeneity across patient sub-groups. They also find significant spillovers in ad expenditures whereby a drug's ads not only positively affects its prescriptions but also for its competitors. Importantly, they find that the economic benefits of DTCA in terms of life years saved by preventing cardiovascular disease are considerably larger than the costs of advertising.

Using variation in ad expenditures driven by the local political cycles Sinkinson and Starc (2019), estimate the impact of DTCA on drug consumption and adherence for statins (e.g. Lipitor and Crestor) using both reduced form and structural methods. They also find meaningful spillovers from DTCA. They find that $6,631 increase in spending on statin DTCA generates one more Quality Adjusted Life Year (QALY), which is well below most cost effective thresholds for a health intervention to be cost effective. That is, at least in the case of statins, DTCA appears to nudge patients to the doctor's office to receive cost-effective treatments for a under-diagnosed condition. Shapiro (2018) also estimates across drug DTCA spillovers for antidepressants.

There is reason to believe that the statins example is likely a best case scenario for DTCA. Statins are a very cost effective drug. For less effective drugs, DTCA might not we as welfare enhancing and lead to an increase in inappropriate drug consumption. Along these lines, David et al. (2010) also finds that an increases in DTCA leads to an increase in reported adverse drug reactions.

The evidence seems to point to pharmaceutical promotion activity has a complex impact on patient welfare. Physician detailing appears to takes advantage of physician cognitive biases leading to increased socially sub-optimal prescribing behavior. On the other hand and at least in some important cases, DTCA seems to overcome patient frictions/biases leading more patients given appropriate prescriptions and improved welfare. Of course, what is missing in these analyses for our purposes is an analysis of the impact of competitive forces on patient welfare through its affect on promotional activity. The only paper which we are aware that touches on this question is Shapiro (2018) where he calibrates a supply system and examines if pharmaceutical manufacturers were allowed to collude on advertising how would it affect equilibrium advertising levels. Here, Shapiro (2018) finds that collusion increases advertising compared to the perfectly competitive outcome. As advertising is welfare enhancing in this case, DTCA collusion leads to welfare increases.

5.2 Frictions in Medical Devices Implantation

One of the darker secrets in the surgical profession is the role that medical device sales representatives play in the actual implantation of devices. During surgeries that require the implantation of devices, sales representatives from the device manufacture are often in the operating room assisting surgeons (Fury et al., 2016, Johnson and Hutchison, 2018). As one device rep stated, "I worked in joint construction [where] it's accepted, it's common practice ... that the device rep be there for the entire surgery" (O'Connor et al., 2016). Not only are the device reps in the operating room during surgery, they often play an significant role during surgery. A survey of sales representatives found that 88% provided verbal instruction to a surgical team during a surgery, and 21% had direct physical contact with a surgical team or patient during a surgery (Bedard et al., 2014). These sales representatives often have no formal medical training except through company sponsored education programs, and patients, in general, are unaware of their presence (Sillender, 2006).

Sales reps play a dual role in this ecosystem. They are technical advisors and marketers. The presence of sales reps in the OR creates clear ethical as well as economic concerns. First, it is important to note that the reps, on average, add value to the procedure. They have deep knowledge of their complicated products that they can impart to the surgeon. Reps

are also responsible for ensuring that all the instruments and components needed for each surgery on their schedule are on hand and ready for use. The device reps contend they observe surgeries because they are experts on particular devices and their accompanying toolkits, which often include hundreds of wrenches, screws and other hardware to aid in installation. That entails assessing and accessing hospital inventory, as well as bringing their own products and tools. In addition, reps must plan for the possibility that alternative sizes, instruments, and components will be needed during the surgery. The complexity of even the very common place surgeries like knee and hip replacements are significant. Orthopedists estimated that they used about 100 implantable devices, not including the other tools used during any given surgery (O'Connor et al., 2016).

While there are advantages of having the reps in the surgical suite to offer technical assistance and detailed product information, given their dual role includes marketers, there are obvious concerns (Pollner et al., 2019). Ultimately, reps are there to promote their company's devices and increase the number that are implanted. In addition to providing technical support, device reps attend surgeries to strengthen their relationships with particular surgeons and thereby increase the cost of switching brands and promote the use of higher margin devices (O'Connor et al., 2016, Burns et al., 2009). The limited existing evidence, not surprisingly, indicates that the presence of sales reps results in increased use of their companies products (Sudarsky et al., 2013). As one sales representative stated: "When I worked as a sales rep, I wasn't paid a salary. It was all commission. I was paid twelve and a half percent of every dollar that went in ... And doctors kind of know that ... they understand that the rep is just trying to earn a living. They feel somewhat obligated to use the most expensive device because they obviously called you in for it" (O'Connor et al., 2016).

Physicians are also conflicted about the role of device sales representatives with many citing concerns over conflict of interest and the ability of sales reps to bias surgeon decision-making (Moed and Israel, 2017). Interestingly and similar to the detailing discussed above, while surgeons are concerned about reps influencing their colleagues decisions they view themselves as immune from the reps influence. This, in turn, suggests that device reps are able to leverage physician behavioral biases into greater product loyalty.

The presence of device representatives in clinical areas is just one aspect of a set of

interrelated marketing activities. Like the pharmaceutical sector, the medical device firms also make direct payments to physicians. During 2014–17 vendors promoting medical devices paid $904 million to 196,624 physicians (30 percent of active physicians) each year, on average (Bergman et al., 2021). Approximately half of these payments are for royalty, licensing and investment fees. That is, unlike the pharmaceutical sector, physicians are often paid for technical contributions they make to the design of devices. Most of these payments are targeted toward surgeons, and, within surgeons, the payment is increasing in the dollar volume of their practice. Nevertheless, half of these payments are not tied to physician innovation activities.

While there is limited research on the impact of direct payments from device manufactures to physicians, evidence suggests that they affect physician behavior. Smieliauskas (2016) exploits a policy shock, whereby government monitoring of payments to joint replacement surgeons resulted in declines of over 60% in both total payments and in the number of physicians receiving payments from 2007 to 2008. Using hospital discharge data from three states, he finds that the loss of payments leads physicians to switch 7 percentage points of their device utilization from their sponsoring firms' devices to other firms' devices, an effect which is concentrated among surgeons with low switching costs.

In our view, there is pretty clear evidence that medical device manufacturers leverage physician behavioral biases to sell more products. However, several relationships that are central for competition policy guidance are less clear. First, the welfare impact of these marketing activities is not clear. Sales reps do provide a value added service. However, a reduction in sales rep activities can be offset by increased physician and surgical staff training. In fact, interviews with surgeons suggest that the current approach whereby surgeons lean on sale reps causes surgeons and staff to under-invest in their skills.

Second, the role of competition in affecting these marketing activities and/or the impact of these marketing activities in affecting equilibrium outcomes is not very clear. While sales reps work to increase device company switching costs and presumably reduce physician price elasticity of demand (which is quite low (Grennan, 2013)), hospital purchasing departments can and do bargain directly with device manufacturers. The effect of sales reps on those negotiations outside of their impact on physician preferences is unclear. Grennan and Swanson

(2020) finds that medical device prices vary considerablely across hospitals and greater hospital transparency into the distribution of prices reduces bargained prices albeit modestly. Craig et al. (2021) also document that there is wide variation in device prices but that hospital mergers do not affect those prices. This lack of a competitive impact certainly could be driven by physician's having strong preferences for devices as a result of their relationships with reps and those preferences play a significant role in bargaining outcomes. There is some discussion in the literature of how increased competition between device manufacturers in the previous decades led them to more aggressively deploy sales reps in order to increase switching costs. However, these causal assessments are merely anecdotal.

6 Illustrating the Impact of Behavioral Biases on Competition Policy: Merger Effects

In the previous sections we discussed several dimensions in which behavioral biases affect market outcomes in the health insurance and medical technology sector. We also noted the lack of literature examining the impact of these behavioral biases on equilibrium market outcomes. In these section, we attempt to take the points made above and apply them to the assessment of the competitive impact of horizontal mergers. Specifically, we develop a simple model of hospital price negotiations for medical devices where the device manufacturer can engage in marketing activities (sales reps) to shift physician behavior and where the hospital is partially aware of the distortions created by sales reps.

In our setup, we assume there are several orthopedic device manufacturers that produce a differentiated joint replacement device. For now, each firm produces one product. The devices are challenging to implant and the procedure requires a lengthy surgery requiring many different tools. Because of the challenges in implanting the device, manufacturers deploy a costly team of sales representatives to assist surgeons during the procedure. Physicians who implant the device are perfectly price insensitive and select a device to install based on their choice set of available devices (which are determined by the hospital), the marketing efforts of the manufacturers and their idiosyncratic preferences over the devices. Hospitals negotiate

with device manufacturers over the price of the device. We formalize this setting with the following heuristic model.

Consider a market with $m = 1, \dots M$ manufacturers, $j = 1, \dots, J$ hospitals. Let $\mathcal{J}_s$ denote the set of hospitals and let $\mathcal{N}_j$ denote hospital j's the set of device manufactures that they have contracted with which surgeons can use those devices in the hospital.

The game has two stages. In the first stage, manufacturers determine their hospital specific marketing efforts, r_{jm}, taking into account its the impact in on the second stage bargaining. In the second stage, manufacturers and hospital systems negotiate over the payments paid by the hospitals to the device manufacturer. The hospital's payoff (at the first stage) from reaching an agreement with manufacturer m is given by:

$$V_{jm}(\mathcal{N}_j) = v_j(\mathcal{N}_j) - v_j(\mathcal{N}_j \setminus m), \tag{4}$$

where $v_j(\mathcal{N}_j)$ is the gross perceived utility that the hospital achieves with all agreements with manufacturers and $v_j(\mathcal{N}_j \setminus m)$ is the gross utility the hospital earns in the absence of an agreement with manufacturer m. We assume that there are I_j possible patients in hospital j. The utility the hospital receives from implanting a given device is $u_{jm} = \xi_m + \beta r_{jm} + e_{jm}$ where $\beta \in [0, 1]$ captures the percentage of the marketing effort that creates value for the hospital and e_{jm} is a Type I Extreme Value iid draw. Because only part of the marketing efforts are of value, there is the potential for distortion in device use. Furthermore, we also assume that the hospital cannot perfectly observe $\xi_m + \beta r_{jm}$ directly and must infer it from physician behavior with an adjustment for their priors on the distortionary impact of sales reps. The utility physician f receives from implanting a given device is $w_{fm} = \xi_m + r_{jm} + u_{fm}$ which implies that $s_{jm} = \frac{exp(\xi_m + r_{jm})}{\sum_k exp(\xi_k + r_{jk})}$. The realized share differs from the hospitals optimal device share as a function of β. As $\beta \to 1$ this distortion goes to zero. We assume there is an outside option, $m = 0$, of not implanting any device where $u_{j0} = 0$ and $r_{j0} = 0$.

For a given supplier network, let $q_{jm} = s_{jm} I_j$ be the expected number of patients that seek care at hospital j and mc_m be manufacturer m's constant marginal cost. For simplicity, if no agreement is reached between the hospital and the manufacturer, the manufacturer does not implant their product in any of the hospital's patients although its marketing expenditures

are sunk. We also assume that surgeons are perfectly inelastic to the negotiated price when selecting a device to implant. Thus, the net value to the manufacturer m for reaching an agreement with hospital j is $R_{jm} - mc_m q_{jm}$, where R_{sm} is the negotiated fixed transfer.

The transfer price is determined by "Nash-in-Nash" (NiN) bargaining. That is, each bilateral negotiation solves the Nash bargaining solution, embedded inside a Nash equilibrium where the parties to each negotiation treat the outcomes of other negotiations as fixed. The Nash bargaining solution selects the transfer that maximizes the (weighted) product of the surplus from trade relative to the alternative of no trade. We write:

$$R^*_{jm} = \arg\max_z (V_{jm}(\mathcal{N}_m) - z)^{1-\theta_{jm}} (z - mc_m q_{jm})^{\theta_{jm}}. \tag{5}$$

where $\theta_{jm} \in [0,1], \forall j, m$ are the Nash bargaining weights, which, following Grennan (2013), we call θ the bargaining ability of the hospital relative to the device manufacturer (which itself could be viewed as a behavioral economic parameter but that is not our principle focus of this analysis). A value of $\theta_{sm} = 0$ gives all the weight to the hospital, while $\theta_{jm} = 1$ gives all the bargaining ability to the device manufacturer. Solving this optimization problem and dividing by the expected quantity yields the per-treatment transfer price for each hospital system:

$$p_{jm} = \frac{R^*_{jm}}{q_{jm}} = (1 - \theta_{jm}) mc_j + \theta_{jm} \frac{V_m(j, \mathcal{N}_m)}{q_{jm}}. \tag{6}$$

The first term on the right side of (6) is the marginal cost of the manufacturer multiplied by $1 - \theta_{jm}$. This is the threat point or value without a contract. When $\theta_{jm} = 0$ (i.e., the hospital has all the bargaining ability) the negotiated price will equal this cost: even when the hospital has all the power, the device manufacturer will not accept less than marginal cost. The second term is the gross hospital surplus from the trade, multiplied by θ_{jm}. The hospital will not agree to pay more than this surplus. Therefore, this is what it gets paid when the manufacturer has all the bargaining power. For $\theta \in (0,1)$, negotiations result in a weighted average of these two extremes, where the weights depend on the relative bargaining power. 0

There are two sources of distortion in our setup. First, the value that surgeons and the hospital places on sales reps efforts differ and physicians make the device choice. Second,

hospitals are not able to accurately assess how far from optimal is the physicians behavior. If the second distortion was not present then $V_{jm}\mathcal{N}_j)$ is given by:

$$\hat{V}_{jm}(\mathcal{N}_j) = I_j \left(ln \left(\frac{1}{1 - s_{jm}} \right) \right). \tag{7}$$

If the hospitals are perfectly aware of the distortion then the device's contribution value is given by:

$$\tilde{V}_{jm}(\mathcal{N}_j) = I_j \left(ln \left(\frac{1}{1 - \tilde{s}_{jm}} \right) \right). \tag{8}$$

Where $\tilde{s}_{jm}$ is the shares that would realize if devices where selected to maximize the hospital's utility. Letting $\gamma \in [0, 1]$ denote the fraction of the distortion that the hospital is cognizant, the relevant value of $V_j(\mathcal{N}_j)$ for the bargaining problem is:

$$V_{jm}(\mathcal{N}_j) = \hat{V}_{jm}(\mathcal{N}_j) + \gamma(\tilde{V}_{jm}(\mathcal{N}_j) - \hat{V}_{jm}(\mathcal{N}_j)) \tag{9}$$

We denote the distortion by $d_{mj} = \gamma(\tilde{V}_{jm}(\mathcal{N}_j) - \hat{V}_{jm}(\mathcal{N}_j)$. As $\gamma \to 1$ the second distortion disappears from the bargaining problem and the pricing outcome is determined by the hospital's actual value of an agreement.

Now, we turn to the device manufacturer's problem of setting r_{mj}. The device manufacturer's profit is given by: $(p_{jm}(r_{jm}) - mc_j)s_{jm}(r_{jm})I - c(r_{jm})$ where $c(r_{jm})$ is the sales rep cost function with $c' > 0$. Substituting the different share equations into (9) and (6) then into the the manufacturers profit function and differentiating yields the following first-order conditions for the optimal marketing effort:

$$\theta[(s_{jm} + \gamma(\alpha\tilde{s}_{jm} - s_{jm}) - s_{jm}(1 - s_{jm})mc_m)] - c'(r_{jm}) = 0. \tag{10}$$

A couple of observations are worth making. First, bargaining ability affects marketing efforts. The higher the device manufacturers ability the more it spends on marketing. Second, the more the hospital is aware of the distortion the lower are marketing expenditures. Third, the impact of a device merger depends on the substitutability between the products, the relative bargaining abilities, as well as the degree of hospitals awareness of the degree of the

distortion induced by sales reps.

Because analytic solutions are not readily available, we turn to simulations to get a sense of the interactions between competition, bargaining ability, and awareness bias. That is, we solve for the equilibrium under different paramaterizations and simulate the impact of a merger between two of the manufacturers. In this simulation, we assume there are four devices with $\xi = \{.12, .11, .1, .095\}$, $c(r_{jm}) = .05r_{jm}^2$, and $\alpha = .5$. We examine the equilibrium before and after a merger between manufacturers 1 and 2 under different values of θ, the bargaining ability parameter, and γ, the distortion awareness parameter.

Table 1 presents the results from these simulations. The impact of the merger depends on both θ and γ. The fact that the impact of the merger depends on θ is not surprising as this is standard in bargaining frameworks. However, as hospitals become more aware of the agency problem caused by device firms utilizing sales reps, the impact of the merger is lessened. In this simple model, the presence of behavioral frictions exacerbates the price impact of the merger. Perhaps more interesting, the relationship between the price effect and the welfare depends on the parameters. For $\theta = .15$, the hospital has high relative bargaining ability and, for this reason, the merger does not meaningfully impact its welfare even though under some specifications price increases approach 5%. The reason for this is marketing efforts (which are distortionary) decline. Even with $\theta = .15$, an increase in γ, the hospital's awareness of the distortion, reduces the harmful impact of the merger. However, for $\theta = .85$ (e.g. the device firms are better relative bargainers), the pattern is more acute. With low hospital distortion awareness ($\gamma = .1$), the merger results in significant increases in price (8%) and decreases in hospital welfare (7%). Again, as awareness increases, the harmful impacts of the merger (from the hospital's perspective) decline.

While this model is highly stylized and the simulation parameterized using reasonable but not empirically derived values, it nevertheless highlights an important point. In the presence of meaningful consumer biases, standard competition analysis that ignores these biases can lead one to the wrong conclusion regarding the merger's impact. The competition agencies may not challenge a merger where the competitive price impact is under 5% which is always the case when $\gamma = .9$ corresponding to an environment that is similar to standard models of competition. Focusing on the $\theta = .5$ case, a common assumption in bargaining

Table 1: Merger Simulation Results

θ	γ	% Δ Price	% Δ Welfare	% Δ Marketing
0.15	0.1	4.85	-0.89	-1.32
0.15	0.5	3.81	-0.73	-1.73
0.15	0.9	2.78	-0.57	-2.46
0.5	0.1	7.38	-3.70	-1.52
0.5	0.5	5.49	-2.86	-1.81
0.5	0.9	3.95	-2.28	-2.60
0.85	0.1	8.31	-6.99	-1.55
0.85	0.5	7.27	-8.05	-2.49
0.85	0.9	4.34	-4.73	-2.64

games and sometimes assumed by the agencies in their own merger analysis, when $\gamma = .9$, the merger impact is quite small and the agencies may well give this merger a pass. However, when behavioral frictions are present ($\gamma = .5$ or .1), then the price impact of the merger may well lead to the agencies to challenge the merger.

7 Next Steps for Making Progress

Above we documented the current state of the literature and argued that there is overwhelming evidence that behavioral frictions often meaningfully affect both demand and supply responses in the health insurance and health care sectors. We also showed that effective competition policy should account for these frictions when they are important but, at least to date, economic analysis in antitrust matters typically has not done so. This raises two obvious questions: Why hasn't behavioral economics been more integrated into competition policy in health care markets, and what work needs to be done to reduce the barriers in incorporating more behavioral economics into health care competition policy?

It is worth noting that in digital markets, behavioral economics can play a central role the the competitive analysis. In particular, because consumers are often not active choosers of their digital services, it is argued, default settings can be manipulated by firms to affect market outcomes. As such, default settings can be used as a tool, perhaps illegally, to entrench

incumbent firms.[18] The digital markets experience shows that it is possible to incorporate behavioral economic phenomena into the competitive economic analysis in important cases. What is not known is how the courts will receive those arguments.

At the risk of repeating the standard concluding mantra of so much academic work, "More research is needed," it is certainly true here that more research is needed. As the discussion above makes clear, behavioral economics is relevant for understanding how health care markets function, however, with only a few notable exceptions, there is little equilibrium analysis of the interactions of market power and behavioral responses in these settings. Thus, while it seems likely that the assessments of the competitive impact of some mergers or conduct will be affected by the incorporation of behavioral response, we don't know the magnitude nor breadth of its importance. Currently, the agencies and the courts have little guidance from the literature on how to best incorporate the impact of behavioral responses on the competition policy question at hand.

What are the impediments for more research on market outcomes in health care settings? First, as noted above, while standard data sets (e.g. administrative claims) in health economics can identify behavioral anomalies, identifying the underlying mechanisms often requires the merging of additional information. For example, survey information in combination with claims data can illuminate the underlying behavioral mechanisms. For a number of reasons including privacy concerns, it is rare that researchers unilaterally can merge claims information with survey data and still maintain the granularity necessary for market analysis. For this reasons, we believe a broader externally funded research effort whereby survey questions that can illuminate behavioral biases linked to claims data as has been done to examine other demographic phenomena in health care is warranted. For example, the Health and Retirement Survey has been linked to Medicare claims data.

Second, there are meaningful methodological challenges that the profession needs to solve before clear policy guidance can be issued. While progress is being made (see, e.g., Bernheim (2016)), there is still work to be done in order for the profession to agree on standard welfare metrics in behavioral choice settings. Finally, we note that the implementation of a coherent

[18]See, for example, *United States, State of Arkansas, State of Florida, State of Georgia, State of Indiana, Commonwealth of Kentucky, State of Louisiana, State of Mississippi, State of Missouri, State of Montana, State of South Carolina and State of Texas v. Google LLC.*, Case 1:20-cv-03010.

framework to assess firm behavior in the health care sector will only lead to better policy if the courts are able to understand and apply them. Stigler Center (2019) argues that the courts' hostility toward new economic thinking is an impediment towards effective antitrust policy toward digital platforms. In so far as that is true, it will be important to translate and disseminate the this new research in a way that the courts can clearly understand and apply.

8 Conclusions

In this paper, we highlight some important behavioral economic frictions in health insurance and health care choices and outline how these frictions can affect competition policy analyses. We view this work as highlighting the importance of the issue. One of the important observations that we make is that while there is substantial evidence of behavioral frictions in this sector, there is comparatively little research analyzing exactly how these frictions affect competitive interactions that can give the enforcement community guidance on how the standard analysis should incorporate the role of these frictions. We provide an example of the impact of behavioral responses by analyzing a medical technology merger in a simple model with behavioral frictions and show that the presence of these frictions matter for assessing the price and welfare impact of the merger. We hope our work here will stimulate more research into the behavioral health economics and competition policy.

References

Abaluck, J. and Gruber, J. (2011). Choice inconsistencies among the elderly: evidence from plan choice in the medicare part d program. *American Economic Review*, 101(4):1180–1210.

Abaluck, J. and Gruber, J. (2016). Evolving choice inconsistencies in choice of prescription drug insurance. *American Economic Review*, 106(8):2145–84.

Andersen, S., Campbell, J. Y., Nielsen, K. M., and Ramadorai, T. (2020). Sources of inaction in household finance: Evidence from the danish mortgage market. *American Economic Review*, 110(10):3184–3230.

Armstrong, M. and Huck, S. (2014). Behavioral economics and antitrust. In *The Oxford Handbook of International Antitrust Economics, Volume 1*, page 205. Oxford University Press.

Arrow, K. J. (1963). Uncertainty and the welfare economics of medical care. *The American Economic Review*, 53(5):941–973.

Atkinson, A. B. et al. (1970). On the measurement of inequality. *Journal of economic theory*, 2(3):244–263.

Bedard, J., Moore, C. D., and Shelton, W. (2014). A survey of healthcare industry representatives' participation in surgery: some new ethical concerns. *The Journal of clinical ethics*, 25(3):238–244.

Bergman, A., Grennan, M., and Swanson, A. (2021). Medical device firm payments to physicians exceed what drug companies pay physicians, target surgical specialists: Study examines payments medical device firms pay to physicians. *Health Affairs*, 40(4):603–612.

Berndt, E. R., Bui, L., Reiley, D. R., and Urban, G. L. (1995). Information, marketing, and pricing in the us antiulcer drug market. *The American Economic Review*, 85(2):100–105.

Bernheim, B. D. (2016). The good, the bad, and the ugly: A unified approach to behavioral welfare economics1. *Journal of Benefit-Cost Analysis*, 7(1):12–68.

Beshears, J., Choi, J. J., Laibson, D., and Madrian, B. C. (2019). Active choice, implicit defaults, and the incentive to choose. *Organizational Behavior and Human Decision Processes*.

Bhargava, S., Loewenstein, G., and Sydnor, J. (2017). Choose to lose: Health plan choices from a menu with dominated option. *The Quarterly Journal of Economics*, 132(3):1319–1372.

Burns, L. R., Housman, M. G., Booth Jr, R. E., and Koenig, A. (2009). Implant vendors and hospitals: competing influences over product choice by orthopedic surgeons. *Health care management review*, 34(1):2–18.

Carey, C., Lieber, E. M., and Miller, S. (2021). Drug firms' payments and physicians' prescribing behavior in medicare part d. *Journal of Public Economics*, 197:104402.

Chandra, A., Handel, B., and Schwartzstein, J. (2019a). Behavioral economics and healthcare markets. In *Handbook of Behavioral Economics: Applications and Foundations 1*, volume 2, pages 459–502. Elsevier.

Chandra, A., Handel, B., and Schwartzstein, J. (2019b). Behavioral economics and healthcare markets. *Hadbook of Behavioral Economics - Applications and Foundations Vol. 2*, pages 459–502.

Chetty, R., Friedman, J. N., Leth-Petersen, S., Nielsen, T. H., and Olsen, T. (2014). Active vs. passive decisions and crowd-out in retirement savings accounts: Evidence from denmark. *The Quarterly Journal of Economics*, 129(3):1141–1219.

Chimonas, S., Brennan, T. A., and Rothman, D. J. (2007). Physicians and drug representatives: exploring the dynamics of the relationship. *Journal of General Internal Medicine*, 22(2):184–190.

Craig, S. V., Grennan, M., and Swanson, A. (2021). Mergers and marginal costs: New evidence on hospital buyer power. *The RAND Journal of Economics*, 52(1):151–178.

Cutler, D. M., Huckman, R. S., and Kolstad, J. T. (2010). Input constraints and the efficiency of entry: Lessons from cardiac surgery. *American Economic Journal: Economic Policy*, 2(1):51–76.

Datta, A. and Dave, D. (2017). Effects of physician-directed pharmaceutical promotion on prescription behaviors: longitudinal evidence. *Health Economics*, 26(4):450–468.

David, G., Markowitz, S., and Richards-Shubik, S. (2010). The effects of pharmaceutical marketing and promotion on adverse drug events and regulation. *American Economic Journal: Economic Policy*, 2(4):1–25.

Dawes, R. M., Faust, D., and Meehl, P. E. (1989). Clinical versus actuarial judgment. *Science*, 243(4899):1668–1674.

Domurat, R., Menashe, I., and Yin, W. (2021). The role of behavioral frictions in health insurance marketplace enrollment and risk: Evidence from a field experiment. *American Economic Review*, 111(5):1549–74.

Enthoven, A. C. (1993). The history and principles of managed competition. *Health affairs*, 12(suppl 1):24–48.

Ericson, K. M. and Starc, A. (2012). Heuristics and heterogeneity in health insurance exchanges: Evidence from the massachusetts connector. *American Economic Review*, 102(3):493–97.

Ericson, K. M. M. and Starc, A. (2016). How product standardization affects choice: Evidence from the massachusetts health insurance exchange. *Journal of Health Economics*, 50:71–85.

Fang, H., Keane, M. P., and Silverman, D. (2008). Sources of advantageous selection: Evidence from the medigap insurance market. *Journal of political Economy*, 116(2):303–350.

Fernandez, F. and Zejcirovic, D. (2018). The role of pharmaceutical promotion to physicians in the opioid epidemic. Technical report, Mimeo.

Fulton, B. D. (2017). Health care market concentration trends in the united states: evidence and policy responses. *Health Affairs*, 36(9):1530–1538.

Fury, M. S., Schott, T. H., Bhashym, A. R., and Goh, B. C. (2016). The interaction between industry, orthopaedic surgical practice, and residency education: A roundtable discussion with drs. james kang, mitchel harris, george dyer, and john wright. *The Orthopaedic Journal at Harvard Medical School*, 20:69–77.

Gabaix, X. and Laibson, D. (2006). Shrouded attributes, consumer myopia, and information suppression in competitive markets. *The Quarterly Journal of Economics*, 121(2):505–540.

Gaynor, M., Ho, K., and Town, R. J. (2015). The industrial organization of health-care markets. *Journal of Economic Literature*, 53(2):235–84.

Gaynor, M. and Vogt, W. B. (2000). Antitrust and competition in health care markets. *Handbook of health economics*, 1:1405–1487.

Grennan, M. (2013). Price discrimination and bargaining: Empirical evidence from medical devices. *American Economic Review*, 103(1):145–77.

Grennan, M., Myers, K., Swanson, A., and Chatterji, A. (2018). Physician-industry interactions: Persuasion and welfare. Technical report, National Bureau of Economic Research.

Grennan, M. and Swanson, A. (2020). Transparency and negotiated prices: The value of information in hospital-supplier bargaining. *Journal of Political Economy*, 128(4):1234–1268.

Gruber, J., Handel, B. R., Kina, S. H., and Kolstad, J. T. (2020). Managing intelligence: Skilled experts and ai in markets for complex products. Technical report, National Bureau of Economic Research.

Handel, B. (2013a). Adverse selection and inertia in health insurance markets: When nudging hurts. *American Economic Review*, 103(7):2643–2682.

Handel, B., Hendel, I., and Whinston, M. D. (2015). Equilibria in health exchanges: Adverse selection versus reclassification risk. *Econometrica*, 83(4):1261–1313.

Handel, B. and Schwartzstein, J. (2018a). Frictions or mental gaps: what's behind the information we (don't) use and when do we care? *Journal of Economic Perspectives*, 32(1):155–78.

Handel, B. and Schwartzstein, J. (2018b). Frictions or mental gaps: what's behind the information we (don't) use and when do we care? *Journal of Economic Perspectives*, 32(1):155–78.

Handel, B. R. (2013b). Adverse selection and inertia in health insurance markets: When nudging hurts. *American Economic Review*, 103(7):2643–82.

Handel, B. R. and Kolstad, J. T. (2015). Health insurance for" humans": Information frictions, plan choice, and consumer welfare. *American Economic Review*, 105(8):2449–2500.

Handel, B. R., Kolstad, J. T., Minten, T., and Spinnewijn, J. (2020). The social determinants of choice quality: evidence from health insurance in the netherlands. Technical report, National Bureau of Economic Research.

Handel, B. R., Kolstad, J. T., and Spinnewijn, J. (2019). Information frictions and adverse selection: Policy interventions in health insurance markets. *Review of Economics and Statistics*, 101(2):326–340.

Heidhues, P. and Kőszegi, B. (2018). Behavioral industrial organization. *Handbook of Behavioral Economics: Applications and Foundations 1*, 1:517–612.

Iizuka, T. (2012). Physician agency and adoption of generic pharmaceuticals. *American Economic Review*, 102(6):2826–58.

Jacob, N. T. (2018). Drug promotion practices: A review. *British journal of clinical pharmacology*, 84(8):1659–1667.

Jirón, M., Pate, V., Hanson, L. C., Lund, J. L., Jonsson Funk, M., and Stürmer, T. (2016). Trends in prevalence and determinants of potentially inappropriate prescribing in the united states: 2007 to 2012. *Journal of the American Geriatrics Society*, 64(4):788–797.

Johnson, J. and Hutchison, K. (2018). They know how to work it, that's their focus in life: The complex role of industry representatives in surgical innovation. *Journal of Empirical Research on Human Research Ethics*, 13(5):461–474.

Kolstad, J. T. (2013). Information and quality when motivation is intrinsic: Evidence from surgeon report cards. *American Economic Review*, 103(7):2875–2910.

Lat, I., Micek, S., Janzen, J., Cohen, H., Olsen, K., and Haas, C. (2011). Off-label medication use in adult critical care patients. *Journal of critical care*, 26(1):89–94.

Liu, C. and Sydnor, J. (2022). Dominated options in health insurance plans. *American Economic Journal: Economic Policy*, 14(1):277–300.

Liu, Q. and Gupta, S. (2011). The impact of direct-to-consumer advertising of prescription drugs on physician visits and drug requests: Empirical findings and public policy implications. *International Journal of research in Marketing*, 28(3):205–217.

Loewenstein, G., Friedman, J. Y., McGill, B., Ahmad, S., Linck, S., Sinkula, S., Beshears, J., Choi, J. J., Kolstad, J., Laibson, D., et al. (2013). Consumers' misunderstanding of health insurance. *Journal of Health Economics*, 32(5):850–862.

Madhavan, S., Amonkar, M., Elliott, D., Burke, K., and Gore, P. (1997). The gift relationship between pharmaceutical companies and physicians: an exploratory survey of physicians. *Journal of Clinical Pharmacy and Therapeutics*, 22(3):207–218.

Mankiw, N. G. and Whinston, M. D. (1986). Free entry and social inefficiency. *The RAND Journal of Economics*, pages 48–58.

Marone, V. R. and Sabety, A. (2022). When should there be vertical choice in health insurance markets? *American Economic Review*, 112(1):304–42.

Martin, S. (2018). Behavioral antitrust. *Handbook of Behavioral Industrial Organization*.

McGuire, T. G. (2000). Physician agency. *Handbook of health economics*, 1:461–536.

Moed, B. R. and Israel, H. A. (2017). Device sales representatives in the operating room: do we really need or want them? a survey of orthopaedic trauma surgeons. *Journal of orthopaedic trauma*, 31(9):e296–e300.

Newhouse, J. P. (1970). Toward a theory of nonprofit institutions: An economic model of a hospital. *The American economic review*, 60(1):64–74.

Oldani, M. J. (2004). Thick prescriptions: toward an interpretation of pharmaceutical sales practices. *Medical Anthropology Quarterly*, 18(3):325–356.

O'Connor, B., Pollner, F., and Fugh-Berman, A. (2016). Salespeople in the surgical suite: relationships between surgeons and medical device representatives. *PLoS One*, 11(8):e0158510.

Pollner, F., O'Connor, B., and Fugh-Berman, A. (2019). Should medical device representatives assist surgeons? *Journal of evaluation in clinical practice*, 25(6).

Radley, D. C., Finkelstein, S. N., and Stafford, R. S. (2006). Off-label prescribing among office-based physicians. *Archives of internal medicine*, 166(9):1021–1026.

Robinson, J. C. and Luft, H. S. (1985). The impact of hospital market structure on patient volume, average length of stay, and the cost of care. *Journal of Health economics*, 4(4):333–356.

Saltzman, E., Swanson, A., and Polsky, D. (2021). Inertia, market power, and adverse selection in health insurance: Evidence from the aca exchanges. Technical report, National Bureau of Economic Research.

Schnell, M. (2017). Physician behavior in the presence of a secondary market: The case of prescription opioids. Technical report, Mimeo.

Schnell, M. and Currie, J. (2018). Addressing the opioid epidemic: is there a role for physician education? *American Journal of Health Economics*, 4(3):383–410.

Shapiro, B. T. (2018). Positive spillovers and free riding in advertising of prescription pharmaceuticals: The case of antidepressants. *Journal of political economy*, 126(1):381–437.

Sillender, M. (2006). Can patients be sure they are fully informed when representatives of surgical equipment manufacturers attend their operations? *Journal of medical ethics*, 32(7):395–397.

Sinkinson, M. and Starc, A. (2019). Ask your doctor? direct-to-consumer advertising of pharmaceuticals. *The Review of Economic Studies*, 86(2):836–881.

Sloan, F. A. (2000). Not-for-profit ownership and hospital behavior. *Handbook of health economics*, 1:1141–1174.

Smieliauskas, F. (2016). Conflicts of interest in medical technology markets: evidence from orthopedic surgery. *Health economics*, 25(6):723–739.

Smith, M. C. (1968). *Principles of pharmaceutical marketing*. Lea and Febiger.

Sorensen, A. T. (2006). Social learning and health plan choice. *The Rand journal of economics*, 37(4):929–945.

Spinnewijn, J. (2017). Heterogeneity, demand for insurance and adverse selection. *American Economic Journal: Economic Policy*, 9(1):308–343.

Steinman, M. A., Shlipak, M. G., and McPhee, S. J. (2001). Of principles and pens: attitudes and practices of medicine housestaff toward pharmaceutical industry promotions. *The American Journal of Medicine*, 110(7):551–557.

Stigler Center (2019). Stigler committee on digital platforms: Final report. *Stigler Center Sitio web: https://www. chicagobooth. edu/-/media/research/stigler/pdfs/digital-platforms—committee-report—stigler-center. pdf*.

Sudarsky, D., Charania, J., Inman, A., D'Alfonso, S., and Lavi, S. (2013). The impact of industry representative's visits on utilization of coronary stents. *American heart journal*, 166(2):258–265.

Tadelis, S. (2016). Reputation and feedback systems in online platform markets. *Annual Review of Economics*, 8:321–340.

Tor, A. (2002). The fable of entry: Bounded rationality, market discipline, and legal policy. *Michigan Law Review*, 101(2):482–568.

Van Zee, A. (2009). The promotion and marketing of oxycontin: commercial triumph, public health tragedy. *American Journal of Public Health*, 99(2):221–227.

Ventola, C. L. (2011). Direct-to-consumer pharmaceutical advertising: therapeutic or toxic? *Pharmacy and Therapeutics*, 36(10):669.

Weiss, J. (2010). Medical marketing in the united states: a prescription for reform. *Geo. Wash. L. Rev.*, 79:260.

Wosinska, M. (2005). Direct-to-consumer advertising and drug therapy compliance. *Journal of Marketing Research*, 42(3):323–332.