My primary research interest concerns product pricing with market power. In some cases my research is motivated by observing perplexing pricing patterns and asking what about the environment, the objectives of sellers, or biases of customers can lead to such pricing? In other cases my motivation is reversed: I am intrigued by an interesting environment or regulatory intervention and ask what are its implications for optimal pricing? In either case, I approach the problem using a combination of economic theory and empirical observation and testing.

Pricing is a broad research topic, but I am particularly interested in situations in which consumers or other relevant market participants act like real people rather than Homo economicus because they are biased, boundedly rational, or have non-standard preferences. In other words, I study questions that fall within the emerging field of Behavioral Industrial Organization.

**Dynamic nonlinear pricing:** A prime example is a branch of my research that I develop in a sequence of three papers (Grubb 2009, 2015b, Grubb and Osborne 2015) and that I describe in “Dynamic Nonlinear Pricing: biased expectations, inattention, and bill shock” (International Journal of Industrial Organization 2012). Nonlinear pricing schemes, such as volume discounts, are important tools for converting consumer surplus into profits. In the large literature on nonlinear pricing, models are predominantly static. Nevertheless, nonlinear pricing often arises in dynamic environments where consumers’ purchase decisions are spread out over time.

For instance, a cellular phone customer in the US must first choose a calling plan, which is typically a three-part tariff. A three-part tariff consists of a fixed fee, an included allowance of units with zero marginal price, and a positive marginal price for additional usage beyond the allowance. Choosing a plan involves trading off the size of monthly fees against the size of included allowances of minutes, text messages, or data. Only later does the consumer choose how many calls to make, how many texts to send, or how many gigabytes to use, which is done on a call-by-call, text-by-text, or download-by-download basis throughout the course of a month. In such a

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1Rochet and Stole (2003, Section 9) survey dynamic nonlinear pricing models with standard consumers, such as Courty and Li (2000), Spiegler (2011) surveys models with nonstandard consumers, such as DellaVigna and Malmendier (2004) and Eliaz and Spiegler (2008).
dynamic environment, consumer behavior depends importantly both on expectations about future consumption patterns (such as when choosing a calling plan) and on consumer recall about past consumption (such as when trying to recall if one has already exhausted an allowance of included minutes).

My research provides compelling evidence from both consumer behavior and firm pricing that our standard assumptions of rational expectations and perfect recall are both unrealistic and unsatisfactory for understanding nonlinear pricing in such dynamic environments. My work highlights the importance of modeling and measuring both overconfidence and inattention to understand firms’ pricing decisions and to evaluate public policies such as the Federal Communication Commission’s (FCC) recent bill-shock agreement with cellular carriers.

In “Selling to Overconfident Consumers” (American Economic Review 2009), I show that consumer overconfidence, or a tendency to overestimate the precision of demand forecasts and hence underestimate the variance of future demand, creates an incentive for both monopolists and competitive firms to offer three-part tariffs. Intuitively, three-part tariffs can be used to exploit consumer overconfidence because they are convex, and consumers who underestimate the variance of their future usage will also underestimate their average bill. I also develop an alternative explanation for observed three-part tariffs that maintains the standard common-prior assumption. This alternative explanation shows that, given the right sort of consumer heterogeneity, optimal price discrimination involves three-part tariffs. Which explanation is best may vary with the application, whether it be three-part tariffs in internet service, car leasing, or credit-card offers. To distinguish between the two theories in the case of cellular phone service pricing, I turn to a panel of cellular phone service billing records spanning 2002 to 2005. First, I show that the distribution of individuals’ monthly call volumes, and its variation across calling plans, is inconsistent with the underlying consumer heterogeneity required by the price discrimination explanation. Second, I show that consumers’ calling plan choice mistakes are consistent with overconfidence. Together, these two findings suggest that overconfidence is the best explanation for three-part tariff pricing in cellular phone service.

Grubb (2009) highlights the importance of consumers’ expectations about future consumption at the time of contracting but still assumes that there is only a single consumption choice after a contract is signed. Two more recent papers (Grubb 2015b; Grubb and Osborne 2015) relax this assumption by recognizing that consumption choices themselves are spread out over time. Consumer recall of past consumption becomes important in this richer environment, which allows me to examine the role of consumer inattention and its proposed remedy: bill-shock alerts that notify consumers when they reach consumption thresholds. Following an agreement with the FCC, US cellular service companies now issue such alerts when consumers approach or exceed usage...
allowances and similar regulation could be envisioned in other contexts. The goal of two recent papers is to understand whether these aids to individual decision making will benefit consumers or raise total welfare once firms’ equilibrium responses are taken into account: Grubb (2015b) models the effects of consumer inattention and bill-shock regulation theoretically and Grubb and Osborne (2015) evaluate bill-shock regulation in the specific context of cellular phone service via structural estimation and counterfactual simulation.

In “Consumer Inattention and Bill-Shock Regulation” (Review of Economic Studies 2015b), I show that there are at least two reasons firms would not voluntarily issue bill-shock alerts in the absence of regulatory pressure. First, pricing schemes that reward consumers for paying attention can be used to exploit consumers who naively expect to be attentive and hence overvalue the offered contracts. Such naivete about inattention endogenously leads to the overconfidence that Grubb (2009) assumes exogenously. If some consumers are attentive while others are naively inattentive, bill-shock regulation eliminates cross-subsidies between the two groups, increases social welfare, and can stiffen competition to the benefit of all consumers. Second, when consumers are sophisticated about their own inattention, firms can increase both the profitability and social efficiency of price discrimination between low and high demand consumers by abstaining from issuing alerts. In this case, I show that bill-shock regulation will harm some consumers and lower total welfare in fairly competitive markets. These contrasting results show that it is an empirical question whether bill-shock regulation will be helpful or harmful in any particular application.

In “Cellular Service Demand: Biased Beliefs, Learning, and Bill Shock” (American Economic Review 2015 with Matthew Osborne), we structurally estimate consumer biases from the cellular phone billing data introduced in Grubb (2009) and counterfactually simulate the effect of implementing the recent bill-shock agreement between cellular carriers and the FCC.

Our model is the first empirical model that can endogenously incorporate information arrival due to usage alerts under bill-shock regulation. Our results predict that, had the agreement been implemented during our sample period, it would have reduced consumer welfare by an average of $33 per person annually when endogenous prices changes are taken into account. An important reason for this negative finding is that we estimate consumers are severely overconfident. We are able to identify consumer bias because we can separately identify usage distributions (from observed usage choices) and expectations about future usage (from observed calling plan choices). Absent overconfidence, we predict that alerts would have little to no effect.

This line of research is actively ongoing in at least two respects. First, Matt Osborne and

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2 Now that the regulation has been implemented, it is possible that a study might directly measure its consequences. Matt and I began our investigation, however, as a predictive exercise in advance of implementation.
I am studying an analog of bill-shock alerts in retail banking — low balance alerts that can help checking account holders avoid unintentional overdraft fees. Our project is at a very early stage but we anticipate receiving valuable panel data on consumers’ banking transactions and low balance alerts from a personal finance software provider imminently. We anticipate being able to observe overdraft incidence before and after an (arguably exogenous) date when selected individuals begin receiving low-balance alerts. We hope this will be the first step in evaluating the potential benefits of making low-balance alerts opt-out, a policy we believe could have greater consumer benefits than the FCC’s bill-shock agreement.

Second, I have recently taken a step back to consider the “big picture” in the field of behavioral IO that encompasses this line of research. I am co-editor with Vic Tremblay of a special issue on behavioral industrial organization for the *Review of Industrial Organization*. I have written two invited papers for the special issue. The first, “Behavioral Consumers in Industrial Organization: An Overview” (2015), succinctly overviews the industrial organization literature with behavioral consumers, dividing it into three branches. I survey one branch in a second paper for the special issue, “Failing to Choose the Best Price: Theory, Evidence, and Policy” (2015). A second branch, to which my own papers are important contributions, I cover much of in “Overconfident Consumers in the Marketplace”, which is forthcoming in the *Journal of Economic Perspectives*. A contribution in this paper is that I show how a simple supply and demand analysis can be used to evaluate market consequences of various forms of overconfidence, while incorporating effects not only on the intensive margin, but also on the extensive margin, which is often neglected in the behavioral IO literature.

**Additional research:** A second branch of my research within the broad umbrella of pricing with market power concerns online display-advertising auctions. I am currently revising “Peaches, Lemons, and Cookies: Designing Auction Markets with Dispersed Information”, a 2014 working paper with Susan Athey, Ittai Abraham, and Moshe Babaioff. We find that whether the industry standard second-price auctions have lower revenue than first-price or other auction formats depends importantly on whether or not web browser cookies help advertisers identify good customers (peaches) or bad customers (lemons). I plan additional research on online display-advertising auctions in collaboration with The Rubicon Project, an auction house for online display-advertising.

Beyond the broad umbrella of pricing with market power, my secondary research interest to date is in strategic communication and reputation building. In “Developing a Reputation for Reticence” (*Journal of Economics & Management Strategy*, 2011), I show that informed experts may hide favorable information in order to protect their ability to conceal unfavorable information.
References


