Research Statement

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My research focuses on industrial organization, in particular, industry dynamics and market design. My job market paper investigates how firms respond to decreasing addiction and brand loyalty in tobacco markets and how that affects prices, product availability, and overall smoking rates. In addition to my job market paper, my Ph.D. thesis includes methodological work on solving dynamic games under consumer inertia and characterizing counterfactual outcomes in games with multiple equilibria. I have also worked on exploring how government-owned firms exert market power, the design of institutions to improve the allocative efficiency of water markets, and the determinants of tariff choice in electricity markets to enhance the adoption of real-time pricing.

Reducing Consumer Inertia in Tobacco Markets

In my job market paper, which is joint work with fellow PhD student Gastón López, we examine how firms' responses influence the effect of tobacco control policies on consumption. This issue is relevant and timely because, despite widespread regulation, smoking still kills over eight million people every year. One of the main reasons for the tobacco industry's resilience is consumers' dependence on the products they smoke, which we usually refer to as *consumer inertia*. There are two reasons why consumers are unlikely to stop using a product. First, tobacco creates physical and psychological dependence, making it hard for individuals to quit smoking. The second one is brand loyalty. Brand loyalty refers to the fact that buyers are unlikely to switch to a different product once they have started using a particular brand. Cigarette users are known to be very brand loyal, significantly more than in other industries. Regulators have taken notice of the importance of consumer inertia on smoking prevalence. Therefore, they are currently discussing regulatory policies to reduce both addiction and brand loyalty. For instance, the FDA is proposing to eliminate nicotine from cigarettes, its main addictive component. While we expect these types of policies to affect consumers, they will also modify firms' strategies and the way they compete in the market. Consequently, to evaluate the policy effect on consumption, it is crucial to understand whether firms' responses will undo or amplify their direct impact.

The influence of consumer inertia on firm behavior is a significant topic in industrial organization. Consumer inertia makes future demand a function of current choices. Therefore, firms consider

the long-term implications of their choices. Early theoretical work suggested that the intertemporal link of consumer preferences essentially modifies the way firms price, introduce, and retire products. However, the effects of consumer inertia on the equilibrium price level, product availability, and overall consumption are theoretically ambiguous. In this paper, we explore the empirical effect of reducing consumer inertia on equilibrium consumption in the tobacco industry. To account for both consumer and firm responses, we develop a dynamic model of competition, where consumers face addiction and brand loyalty, and firms choose prices and product portfolios. We then identify and estimate the model, using large tax fluctuations in the Uruguayan tobacco industry to identify addiction and a policy that forced 40% of the products out of the market to identify brand loyalty. Finally, we use our model to assess the effect of lowering consumer inertia on overall cigarette consumption. We find that firms' responses tend to reinforce the direct effect on consumers because the policies also discourage firms from investing in attracting new customers who would be harder to retain due to the decrease in inertia. However, we note that if the policies have a small effect on smokers' valuation of cigarettes, they can backfire by increasing competition and facilitating the entry of new products.

In an early-stage collaboration with Patricia Triunfo and Mariana Gerstenblüth, we are planning to exploit similar data and variation in the Uruguayan tobacco industry to analyze firms' pass-through to large tax oscillations and substitution to the black market.

Industry Dynamics in Markets with Inertia

While my job market paper explores the effect of addiction and brand loyalty in the tobacco industry, consumer inertia is a prevalent feature of many industries. Consumer inertia is not only present in most of the markets economists analyze but also has significant implications for firm behavior. Consumers tend to repeat their product choices throughout time because past choices determine current preferences. Firms, in turn, consider the long-term effect of their choices today. Although consumer inertia is a central aspect of consumer preferences and has large implications for firm behavior, it is seldom incorporated in the models economists use to study industry dynamics. The main reason is that it is challenging to solve dynamic games where consumers have inertia, and firms make price and participation decisions. In this in-progress thesis chapter, I develop an empirical framework to analyze industry dynamics in markets with consumer inertia and evaluate its main properties.

In my model, consumers face a cost to switch between products (which could arise from actual physical costs, brand loyalty, or other factors), and firms choose to enter, exit, and price their products. I first simulate the model in a simple setting using Markov Perfect Equilibrium (MPE) as the equilibrium concept to derive fundamental regularities of industry dynamics. Next, I stress that the MPE can hardly be an appropriate equilibrium concept for most industries: computing the MPE

with more than a few firms requires market participants to track billions of possible states. Thus, I consider an alternative equilibrium concept based on Fershtman and Pakes [2012]'s Experience Based Equilibrium (EBE) and Ifrach and Weintraub [2017]'s approximation of the MPE (moment-based Markov equilibrium, MME). I apply this equilibrium concept in a context with continuous states and where dynamic controls affect rivals' static payoffs and transitions, a feature that arises naturally in many dynamic pricing games. Under this equilibrium definition, firms condition in their own state and some market aggregates to form beliefs about rivals' states and *actions*, based on the long-term stationary industry distribution. I evaluate the effect of introducing more information and alternative approximations of beliefs over states that are not visited frequently on industry outcomes. Moreover, I compare these outcomes to the underlying MPE's steady state. In my setting, we can make this comparison, even with many firms, since it is possible to compute the steady state of the MPE without fully solving for firms' equilibrium strategies. Finally, I demonstrate the usefulness of these methods in policy design by analyzing the effect of inertia on merger evaluation, particularly on assessing the "entry defense".

Both in my job market paper and in this chapter of my thesis, I highlight that firm behavior contains valuable information about consumer dynamic preferences. Therefore, I stress that firms' actions could complement consumer data to address the traditional identification challenge between unobserved persistent preferences and structural state dependence [Heckman, 1981]. While intuitive, using firm behavior to estimate consumers' preferences in this context is challenging due to existing computational limitations to solve dynamic games efficiently and reliably. In future work, I plan to build on the intuition and methods developed in my thesis to explore possible avenues to integrate demand and supply data for joint estimation.

Bounding Outcomes in Counterfactual Analysis

In many economic settings, it is challenging to estimate the primitives of the industry and to perform counterfactual analysis because we either do not know how to compute the equilibrium of the underlying game or the game might feature multiple equilibria. These issues are especially relevant in industries where firms face dynamic incentives, like consumer inertia, learning-by-doing, or network externalities. In such cases, industry dynamics are characterized by the equilibrium of a dynamic game, known to be subject to multiplicity [Besanko et al., 2010].

In this joint work with Mar Reguant, we propose a new framework to perform counterfactual analysis. Our approach hinges on establishing credible bounds on counterfactual outcomes, ensuring they encompass any outcome sustainable in equilibrium –essentially, outcomes that align with a given set of equilibrium constraints. Our method reframes these equilibrium constraints as a relaxed mixed-integer linear program, thereby encompassing all potential equilibria. Furthermore, by introducing supplementary equilibrium constraints, the framework offers a path to refine the

range of equilibria. We illustrate the utility and versatility of this method with examples drawn from static price competition, multi-unit auctions, and dynamic games –domains where counterfactual analyses have typically been intricate.

My remaining work focuses on designing market institutions to improve efficiency and welfare.

Do Governments Engage in Price Discrimination? Evidence from a Nationalization in Argentina

In joint work with Gastón López, we explore how the nationalization of a gasoline company in Argentina affected its pricing strategy and market outcomes. We use a rich dataset of gasoline sales and prices to compare the behavior of the state-owned enterprise (SOE) with that of a profit-maximizing firm. We find that the SOE charged lower prices, reduced economic price discrimination, and increased consumer and total welfare. However, we also find that the SOE engaged in political price discrimination, favoring consumers in provinces with political ties with the firm. We also evaluate the effects of alternative policies, such as privatization and price regulation, and find meaningful trade-offs between efficiency, equity, and taxpayer costs, to the point that no policy dominates in all dimensions a planner could care about.

Misallocation of water: the role of storage

In this early-stage project with Matthew O'Keefe, we study the effects of storage on the allocative efficiency of the Australian water markets. Regulated water systems make water a storable good. In particular, the Australian water market has partially decentralized the storage choice to individual farmers. The possibility of storage allows farmers to avoid resorting to the market to smooth their water consumption while facing supply uncertainty. While it is beneficial from the individual point of view, it can lead to inefficient outcomes. First, it is usually emphasized that storage reduces average supply by increasing losses through dam spills and evaporation. We introduce a second dimension of this problem. When accessing the market is costly, storage can adversely affect overall misallocation. Concretely, storage can reduce market participation, harming market performance. While many of the current proposed storage rules lead to the internalization of physical losses, it is unclear how they influence the ability of the market to allocate resources. We develop a dynamic model of farmers' land, irrigation, water transactions, and storage decisions under uncertainty about price and water availability and use it to solve the market equilibrium. To estimate the model, we use data from Australian farmers' production decisions and actual transactions in the market. We plan to explore how alternative storage rules affect the allocative efficiency of the market. Finally, we study how these results change when we modify the costs of accessing the market.

Insurance under information frictions in the electricity market

Our ongoing research with Mar Reguant investigates how household characteristics and prefer-

ences affect their electricity tariff choice in the Spanish market, where Real Time Pricing (RTP) is an option. RTP is expected to improve efficiency in the electricity market, but consumers may be reluctant to accept the bill volatility caused by time-variant tariffs. Therefore, understanding consumer preferences is essential to evaluate the welfare impact of RTP. We use detailed household-level data to provide model-free evidence that consumers' choices are not only driven by a trade-off between mean payments and volatility but also by information frictions and inattention. We highlight that even consumers who make active choices make largely incorrect assessments of the distribution of payments under fixed and variable prices. In particular, we find that significant deviations from the expected utility framework are required to rationalize customer choices. This result underscores that information interventions cannot be directed only to inattentive consumers, but they also need to inform about the cost distribution of each alternative. Our research contributes to the literature on electricity tariff choice and consumer behavior under uncertainty, while it has policy implications for the design and implementation of RTP. As the next steps, we plan to estimate an empirical model of demand for insurance under information frictions and use it to evaluate the effect of information provision on RTP adoption.

References

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