Research Statement

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My research agenda focuses on empirically modeling the behavior of consumers and firms, and the impact, effectiveness and design of public policy, in imperfectly competitive markets. Markets are often characterized by the presence of many differentiated products, substantial heterogeneity in consumer choice, and large, typically multi-product, firms that are likely to exercise market power. Many public policy interventions are undertaken in such oligopolistic environments. Often these interventions seek explicitly to discourage behavior that creates social costs, for example, green and sin taxes, or to encourage behavior with positive spillovers, for instance, subsidies for R&D. The impact of such policies depends crucially on the equilibrium interactions of consumers and firms.

A central objective of my research agenda is to use empirically rich treatments of markets to assess the impacts and optimal design of public policy interventions under imperfect competition. Key to this is linking theory to data, devising credible identification strategies, and harnessing detailed micro data sets and cutting edge econometric analysis to estimate the interactions between demand and supply in these markets.

Optimal policy design

My job market paper, "**Corrective tax design in oligopoly**", studies the optimal design of taxes levied on externality generating products in markets characterized by product differentiation, strategic firms and imperfect competition. In this setting there are distortions associated with the exercise of market power, as well as with externalities. We show how the canonical corrective tax prescriptions, derived under perfect competition, are altered in this setting, and that the optimal rate can be expressed as an intuitive function of the nature of externalities, the degree of market power among externality generating products and among substitute products, and how consumers substitute across these products. We embed a detailed model of consumer demand and oligopoly pricing competition, estimated using micro data on the UK non-alcoholic drinks market, into the tax design framework and compute the optimal rate of tax on sugar sweetened beverages. We show that, although sugar sweetened beverages have substantial positive price-cost margins, there is nonetheless a case for levying a positive tax rate on these products in part because in equilibrium consumers switch to other imperfectly competitive products. Nevertheless, the optimal rate lies below the rate a planner that ignores distortions associated with the exercise of market power and aims at full internalization of externalities would set, and results in a welfare gain that is 2.5 times as large. We also show how market structure interacts with optimal tax policy, and that more competitive market structures are associated with larger gains from optimal corrective taxes.

My job market paper relates to prior work, "**Tax design in the alcohol market**", which focuses on the design of externality correcting taxes under perfect competition and considers how non-linearities in consumption externalities can lead to welfare gains from differentiating tax rates across the different sources of externalities. We estimate consumer choice in the alcohol market and show that tastes for different products and price responsiveness are correlated with the marginal externalities that consumers' alcohol consumption creates. This leads to the possibility of realizing significant welfare gains from optimally differentiating tax rates across different sources of ethanol (e.g. strong spirits, wine, etc.), compared with setting a single ethanol tax rate.

Strategic firms may respond to tax by re-optimizing product attributes, in addition to prices. For instance, a tax levied directly on a specific product attribute creates incentives for a firm to redesign its products. How this plays out in practice depends on the structure of the tax, the strength of consumer preferences for the attribute, the cost of redesign, and the actions of competitors. The recently adopted sugar sweetened beverage tax in the UK has a schedule with notches that has encouraged product reformulation to lower sugar content. In **future work** I will exploit the change in firms' product portfolios observed as this policy was enacted to estimate a model of the decisions firms make over their choice of product sugar content, and will extend my agenda on optimal tax design in oligopoly to incorporate this dimension of firm behavior.

Impact of tax policy in equilibrium models

Imperative to the use of equilibrium models of consumer choice and oligopoly competition for credible policy analysis is that they are sufficiently rich to capture realistic patterns of behavior. I have a number of papers that are motivated by policy questions of first order importance, and that entail building flexible empirical models of agent choice.

It is well established that the random coefficient logit model is capable of flexibly capturing aggregate patterns of consumer substitution across products in response to price changes. In "**Ownership of intellectual property and corporate taxation**" we introduce this model to the public economics literature on firm location choice. Our interest is in what factors influence where multinational firms choose to legally own their patents. Our estimates show significant heterogeneity in firms' responsiveness to corporate tax changes, and in the relative value they place on location specific characteristics, and indicate that recent reforms that give preferential tax treatment to income from patents are likely to lead to significant changes in patterns of patent holding across countries.

In some contexts it is important to go beyond capturing aggregate patterns of switching in response to price changes, and to estimate exactly how switching patterns vary across different groups. In "**How well targeted are soda taxes?**" we use longitudinal data on individuals' purchases on-the-go (i.e. for consumption outside the home)

to estimate a model of consumer choice over soft drinks and consider whether a tax on sugar sweetened drinks would be successful in lowering the sugar intake of those groups targeted by policymakers. In contrast to the standard approach to modeling preference heterogeneity through random coefficients, we model consumer preferences as individual level parameters that we estimate. Doing this has significant advantages for assessing whether a policy change, such as a tax, is well targeted and how regressive it is, as it avoids the need to make assumptions restricting or ruling out correlation in consumer preferences and attributes. This allows us to directly relate individual level predictions of the impact of policy change to consumer characteristics in a flexible way, and hence assess precisely which individuals are affected by policy change. We show that soda taxes are well targeted at consumption of young individuals, but not at those with poor overall diets.

A commonly made assumption in discrete choice modeling is that preferences for goods in the market of interest are quasi-linear, which means income differences out when the decision maker compares the utility of choosing different options. Researchers often reintroduce income into the model as a linear shifter of preferences for some product attributes (usually price). In "**Income effects and the welfare consequences of tax in differentiated product oligopoly**" we show the empirical value of modeling income effects in discrete choice demand models. We illustrate that this has the advantage of relaxing restrictions on the curvature of consumer demands, and through this market level demands, an important determinant of equilibrium pass-through of tax, and it allows the model to capture non-linearities in the consumer welfare consequences of tax across the income distribution.

Empirical work on consumer choice and firm pricing of products in a specific grocery market typically abstracts from interactions with broader shopping choices, for instance, over which store the consumer chooses to shop in and what goods to buy outside the market of interest. Yet fixed costs of visiting a store and patterns of substitutability and complementary across grocery categories make such demand interactions likely, with important consequences for the optimal pricing decisions of retailers. In **on-going work** we develop an empirical model that integrates consumer product choice in the market for beer and cider, with broader aspects of their shopping decision (store choice and demand for other groceries). Our aim is to consider whether retailers engage in practices such as below-cost selling of beer and cider to raise demand for other grocery categories, and how cross market interactions influence retailers' pricing response to alcohol taxes.

Advertising

In many consumer goods markets firms invest heavily in advertising as a means of attracting consumers and raising profits. Often policymakers seek to regulate the content

and restrict the use of advertising with a view to influencing consumer choice. In "**The effects of banning advertising in junk food markets**" we study whether banning junk food advertising would lead to improved diet quality. We exploit household specific measures of exposure to television advertising to identify the impact of advertising exposure on consumer choice for potato chips. We allow for the possibility that advertising is predatory (stealing market share from rivals) or cooperative (raising demand for a set of products broader than those directly advertised), that it shifts the sensitivity to price changes and preferences for nutrients, and that it has long-lasting affects on demand. Using the model of consumer choice, along with a model of firm pricing competition, we simulate the effects of banning advertising on the market equilibrium. We show that banning advertising, holding prices fixed, leads to a reduction in the quantity of potato chips sold of around 15%. However, one effect of advertising on demand is to lower consumer sensitivity to price, reducing the slope of market demands. Therefore, the ban acts to make the market more competitive and firms respond to the ban by, on average, lowering their prices. Lower prices lead to an offsetting increase in demand, meaning, in equilibrium, that the advertising ban lowers the quantity of potato chips sold by around 10%.

Considering the impacts of an advertising ban substantially simplifies solving for the counterfactual market equilibrium, as it avoids the need to solve the dynamic advertising choices of the oligopolistic firms in the market. In **on-going work** we are extending this line of research by modeling firms' optimal advertising choices. This will allow us to capture firms' optimal advertising response to policy change, such as the introduction of taxes or partial restrictions on advertising. A challenge in this work is dealing with the high dimensionality of advertising choices (firms advertise their brands in many ways) and the dynamic oligopoly competition among firms. By explicitly modeling the intermediary role of advertising agencies and harnessing rich data, and developments in modeling dynamic games, we are making significant progress on this problem.

Policy impact

A common thread of my research is that it both pushes forward the academic frontier and delivers evidence informative to policy design. As a consequence I am regularly asked to speak with senior policymakers and have given input into decisions including over the design of alcohol policy and restrictions on advertising of junk foods to children. I have also given evidence to parliamentary committees and have often had my research feature in both broadcast media and the press.

References

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On-going work

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