Discussion of "Risk Preference Types, Limited Consideration, and Welfare" by Levon Barseghyan and Francesca Molinari

Cristina Gualdani*

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1 Introduction

This article is part of an impressive research agenda by the authors which develops tools to identify models of risk preferences (Barseghyan et al., 2011; 2013; 2016; 2018a; 2018b; 2021a; 2021b). Such work is prominent in industrial organisation, development, health, labour, finance, and public economics because it is pivotal to studying incentives and assessing the welfare impact of policy interventions in insurance markets. In this article, the authors provide a novel method to identify a static model of decision-making under risk, where agents choose insurance bundles over multiple lines of property coverage, belong to different preference types, display unobserved heterogeneity in attitudes towards risk, and may consider a limited amount of bundles when making their choices. This rich framework is critical for rationalising data patterns but introduces substantial econometric challenges. The

*Email: c.gualdani@qmul.ac.uk, Queen Mary University of London, London, UK.

crucial insight consists of exploiting the single crossing property (SCP) that the model features within each coverage context and an exclusion restriction to characterise the response to changes in the covariates of the choice probability of the cheapest bundle. From these elasticities, we can identify the type shares and the distribution of unobserved heterogeneity and consideration sets for each type.

I devote the first part of the discussion to summarising the identification strategy and giving context to the novelty of the arguments. In doing so, I applaud the authors for expertly and smoothly guiding us throughout their overarching research agenda to learn econometric tools that prove extremely useful for the specific setting at hand and, more generally, for employment by structural economists and other applied researchers. In the second part of the discussion, I suggest additional aspects that could play an important empirical role in the functioning of property insurance markets, namely private information about risk and supply-side issues, and pave the way for possible approaches to introduce them into the authors' framework.

2 Identification strategy

The identification of the model in this paper presents two key challenges. First, with two or more preference types, the model-implied choice probabilities are semiparametric mixtures whose components are typically underidentified without further restrictions. Second, with limited consideration, the usual reveal preference approach to identification of decision problems is not directly applicable because the agents' choice sets are unobserved by the econometrician. This article originally addresses both issues, as I summarise in what follows.

The existing non-semiparametric identification results for finite mixture models use various classes of identifying restrictions. Some papers exploit exclusion restrictions, i.e., variables that shift only some mixture components (e.g., Henry, Kitamura, and Salanié, 2014; Compiani and Kitamura, 2016; Jochmans, Henry,

and Salanié, 2017). Others assume multiple available measurements of the outcome variable, which are conditionally i.i.d., exchangeable, or Markovian (e.g., Hall and Zhou, 2003; Kashara and Shimotsu, 2009; D'Haultoeuillle and Février, 2015; Bonhomme, Jochmans, and Robin, 2016a; 2016b). Still others focus only on two mixture components (e.g., Bordes, Mottelet, and Vandekerkhove, 2006) or severely restrict the family where the mixing densities belong (e.g., Hunter, Wang, and Hettmansperger, 2007).

The strategy developed by the authors to address the mixture issue is close in spirit to the first group of works based on exclusion restrictions. In particular, the authors cleverly combine SCP with an exclusion restriction that naturally arises from the narrow bracketing assumption according to which agents make choices in isolation across coverage contexts. Simplifying the setting, suppose there are two coverage contexts, $j = \mathtt{I}, \mathtt{II}$, two alternatives per context, $1_j, 2_j$, where 1_j is the cheapest alternative, and two preference types, $t = 0, 1$. By SCP, for each preference type t and base prices $p_{\mathtt{I}}, p_{\mathtt{II}}$, a unique utility value $\mathcal{V}^{1_{\mathtt{I}},1_{\mathtt{II}}}_{2_{\mathtt{I}},1_{\mathtt{II}}}(t, p_{\mathtt{I}}, p_{\mathtt{II}})$ (resp. $\mathcal{V}^{1_{\mathtt{I}},1_{\mathtt{II}}}_{1_{\mathtt{I}},2_{\mathtt{II}}}(t, p_{\mathtt{I}}, p_{\mathtt{II}})$) makes agents indifferent between insurance bundles $\{1_{\mathtt{I}}, 1_{\mathtt{II}}\}$ and $\{2_{\mathtt{I}}, 1_{\mathtt{II}}\}$ (resp. $\{1_{\mathtt{I}}, 2_{\mathtt{II}}\}$). Further, by narrow bracketing, $\mathcal{V}^{1_{\mathtt{I}},1_{\mathtt{II}}}_{2_{\mathtt{I}},1_{\mathtt{II}}}(t, p_{\mathtt{I}}, p_{\mathtt{II}})$ (resp. $\mathcal{V}^{1_{\mathtt{I}},1_{\mathtt{II}}}_{1_{\mathtt{I}},2_{\mathtt{II}}}(t, p_{\mathtt{I}}, p_{\mathtt{II}})$) does not depend on $p_{\mathtt{II}}$ (resp. $p_{\mathtt{I}}$). The latter is the aforementioned exclusion restriction. Observe that, under full consideration, the probability of choosing the cheapest bundle $\{1_{\mathtt{I}}, 1_{\mathtt{II}}\}$ depends on the lowest indifference cutoff between $\mathcal{V}^{1_{\mathtt{I}},1_{\mathtt{II}}}_{2_{\mathtt{I}},1_{\mathtt{II}}}(t, p_{\mathtt{I}}, p_{\mathtt{II}})$ and $\mathcal{V}^{1_{\mathtt{I}},1_{\mathtt{II}}}_{1_{\mathtt{I}},2_{\mathtt{II}}}(t, p_{\mathtt{I}}, p_{\mathtt{II}})$. If the support of the base prices is sufficiently rich, we can find values of $p_{\mathtt{I}}, p_{\mathtt{II}}$ such that the two indifference cutoffs are ordered differently for different types. In turn, by differentiating with respect to $p_{\mathtt{I}}$ the probability of choosing bundle $\{1_{\mathtt{I}}, 1_{\mathtt{II}}\}$ evaluated at these base price values, we can use the exclusion restriction to get rid of the mixture components of one type and identify those of the other type.

With limited consideration, the above intuition still goes through, provided that an additional exclusion restriction is satisfied, i.e., the distribution of consideration

sets is independent of the base prices. Indeed, the probability of choosing bundle $\{1_{\mathtt{I}}, 1_{\mathtt{II}}\}$ is now a mixture over the preference types and consideration sets. By differentiating with respect to $p_{\mathtt{I}}$ the probability of choosing bundle $\{1_{\mathtt{I}}, 1_{\mathtt{II}}\}$, we isolate and identify the mixture components of one preference type via the first exclusion restriction, as under full consideration. However, unlike the full consideration case, such mixture components are multiplied by the unknown consideration probabilities, which are not differentiated because of the second exclusion restriction. These consideration probabilities can be cancelled out by assuming some homogeneity in the consideration set formation process across the two preference types and taking the ratio of derivatives between the two types.

The strategy just discussed to address limited consideration and the authors' previous articles on related topics (Barseghyan et al., 2021a; 2021b) pioneer the study of limited consideration in models of decision-making under risk and are the first to exploit SCP for identification. The proposed method broadly relates to other papers on limited consideration imposing two-way exclusion restrictions, i.e., assuming that some variables impact consideration but not utility and vice versa (Goeree, 2008; Gaynor, Propper, and Seiler, 2016; Hortaçsu, Madanizadeh, and Puller, 2017). However, it is distinguished by relying on a single excluded regressor (the base price) that affects the utility of all alternatives, rather than alternative-specific excluded regressors. For future work, I also envision the possibility of introducing arbitrary dependence between consideration sets and observed characteristics at the cost of losing point identification and, instead, achieving partial identification of the distribution of preferences and consideration sets along the lines of Barseghyan et al. (2021a).

3 The role of private information about risk

Economic theory has long argued that private information about risk may have a crucial role in insurance markets and negatively affect their functioning (e.g., Rothschild and Stiglitz, 1976; Wilson, 1977), hence the importance of allowing for it in empirical analysis. Within the framework analysed by the authors, risk-related private information can be embedded in the utility function via a latent random coefficient whose distribution is among the parameters to estimate. An additional and relatively unexplored channel to incorporate private information is through the claim probability μ_{ij} used by agent i to make her choice in coverage context j, which the authors assumed to be known (fully or up to a scalar random coefficient) by the econometrician. In what follows, I sketch two heuristic approaches that might allow us to expand the model and make some progress in the alternative direction just proposed.

The first approach considers the accident event as a state of the world which is ex-ante unknown by agents and exogenously determined by nature. Agents have a prior belief about the state of the world. Moreover, before making a choice, they can collect further information through private signals (adverse selection). Agents use these signals to update the prior, obtain a posterior, and resolve some uncertainty. A complication here is that signals are unobserved by the researcher. Therefore, the posterior claim probability μ_{ij} used to compute the expected utility does not have a specific parametric form. The researcher only knows that μ_{ij} is Bayesian-consistent with the prior. Such incompleteness makes it challenging to characterise the model-implied choice probabilities. A way to overcome this issue can be to exploit the notion of Bayes Correlated Equilibrium (Kamenica and Gentzkow, 2011; Bergemann and Morris, 2013; 2016), as already proposed in some empirical games and single-agent decision problems (Syrgkanis, Tamer, and Ziani, 2021; Magnolfi and Roncoroni, 2022; Gualdani and Sinha, 2023). In particular, a fundamental

result in the theoretical literature on robust predictions (Theorem 1 of Bergemann and Morris, 2016) is that the set of model-implied choice probabilities under all possible Bayesian-consistent posteriors is equivalent to the set of model-implied choice probabilities under the notion of (1-player) Bayes Correlated Equilibrium, where the latter is an easy-to-characterise convex set defined by linear equalities and inequalities. Via this equivalence result, it may be possible to establish (partial) identification of the primitives and counterfactuals of interest.

The second approach is concerned with the fact that insurance can affect the agents' motivation to prevent losses (ex-ante moral hazard). In particular, agent i may adjust her level of risk (namely, the claim probability μ_{ij}) through private effort, depending on the insurance plan choice. To introduce this aspect into the authors' framework, we could maintain their assumption that agent i's number of claims follows a Poisson with arrival rate λ_{ij}. However, while λ_{ij} is currently set to be a function of exogenous covariates and an error term, we would now allow agent i to choose λ_{ij} by exerting some effort, together with the choice of insurance bundle. See, for example, the model in Abbring, Chiappori, and Pinquet (2003a; 2003b). In turn, λ_{ij} can be transformed into an endogenous claim probability μ_{ij} using the Poisson probability mass function. To best support such an approach, we could also augment the framework with dynamics accounting for the fact that the sequence of choices of λ_{ij} impacts future premia. Dynamic data may also help establish identification of this more complex setting.

The authors motivate their rich framework, in particular the need of limited consideration, with the evidence that many households in the sample make suboptimal choices that are inconsistent with optimal behaviour under any commonly used model of decision making under risk, including many non-expected utility models. Further, no households are observed to choose any of a large subset of options. Limited consideration can hence help generate model-implied choice probabilities matching such striking empirical patterns. In future work, it may be interesting

to investigate if the two approaches just discussed to allow for risk-related private information could be alternative ways of thinking about the problem of reproducing data patterns.

4 The supply side

A salient question in the analysis of insurance markets is whether simplifying insurance choice by combining multiple lines of coverage into a single product is welfare-enhancing. The authors study this question in a counterfactual exercise where they investigate the implications of eliminating the auto collision and auto comprehensive insurance products as separate coverages and offering them as a combined product. As the authors' results suggest, a policy that keeps basic configurations contributes to the welfare of fully rational agents and, in some instances, behavioural agents. However, these benefits must be weighed against the impact on insurers' profits and, specifically, the fixed costs associated with keeping basic configurations, such as the costs of regulatory compliance and maintaining pricing models. If these costs are not too high, it may be preferable to keep those products, implying that their elimination is inefficient. Enriching the authors' framework with the supply side, where the set of offered insurance products and their prices are endogenously determined, might provide a deeper understanding of the trade-off.

One way to move us forward in this direction could be to draw inspiration from the flourishing literature on entry, exit, and product positioning (Ho, 2009; Holmes, 2011; Eizenberg, 2014; Wollmann, 2018; Bontemps, Gualdani, and Remmy, 2023; Houde, Newberry, and Seim, 2023). For instance, we could consider a two-stage framework, where, first, insurance companies face a discrete menu of possible insurance products and choose which of these to offer. While consumer heterogeneity provides incentives to offer multiple configurations, offering each such configuration results in fixed costs. In the second stage, the prices charged for each chosen con-

figuration are determined, and the insurance products are sold to agents. Clearly, this is just a starting point, as a more in-depth analysis is needed to model the supply side for the specific setting at hand. In this regard, the recent IO literature on health insurance can offer some guidance (e.g., Dickstein, Ho, and, Mark, 2023). Once a full demand and supply model is estimated, we can use it to evaluate the impact of adding a combined line of coverage on the set of offered insurance configurations and prices, consumer welfare, and firm performance. We can also assess the efficiency aspects of this counterfactual scenario by comparing it with an alternative setting where the company is forced to eliminate the auto collision and auto comprehensive insurance products as separate coverages and offer them only as a combined product.

5 Conclusions

The study of insurance markets is central to many fields in economics, and the authors' research agenda has made paramount progress. In particular, this article adds to the arsenal of methodologies developed by the authors to identify risk preferences. The key novelty of the model consists of allowing agents to choose insurance bundles over multiple lines of property coverage, belong to different preference types, and consider a limited amount of bundles when making their choices. Combining all these aspects in one framework is critical to reproducing observed choices and answering relevant policy questions. Possible directions for future work could include developing a deeper understanding of the role of the agents' private information about risk and supply-side issues.

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