

## TOPICS IN ECONOMIC THEORY

The research of Professors Evren and Savochkin focuses on decision theory. Students are encouraged to find their own research ideas on theoretical economics or theoretical political economy, which may or may not be related to decision theory. Below we provide a brief introduction to decision theory and list some sample research projects.

A major purpose of decision theory literature is to propose alternative decision making models that provide a more accurate description of economic agents' behavior as observed in experiments and empirical studies. For example, recently, scholars proposed plethora of models that accommodate the famous "paradoxes" of Allais and Ellsberg. Alternative models that dispense with the completeness axiom of classical utility theory have also attracted considerable attention. Despite the theoretical and normative appeal of these models, in applied work, potential uses of alternative models proposed by decision theorists have not yet been studied thoroughly. Therefore, thinking about potential applications of alternative models proposed in decision theory literature can lead to many interesting research topics. The first two projects below are of this sort. The third project focuses on a relatively small but important question of studying the dynamic properties of Klibanoff, Marinacci, Mukerji's (2005) model of smooth ambiguity.

Interested students can also work on political economy projects under Prof. Evren's supervision. Especially, voters' behavior in political elections is a fundamental topic that he is interested in. The last project below is about generalization of his earlier findings on the problem of voter turnout in large, costly elections.

### *Rational Expectations Equilibria with Non-Standard Preference Relations*

In real economic life, trade and related activities take place under imperfect information. (For example, we buy flight tickets without knowing whether the flight in question will be delayed or not.) While people may have private information about the underlying state of the world, prices themselves may also convey relevant information. (For example, a cheaper ticket might indicate a higher likelihood of delay.) The notion of rational expectations equilibrium (henceforth, REE) require agents to take into account not only their private information, but also the information that is revealed by prices. In turn, equilibrium prices depend on agents' information. This cyclic nature of the notion of REE makes it problematic to obtain general conditions that are sufficient for the existence of a REE. Scholars made considerable progress in understanding the problem of equilibrium existence under classical expected utility hypothesis. The best known results in this direction establish the existence of equilibrium prices that fully reveal all information that is available at the outset if (i) the number of commodities is larger than that of potential states of the world; (ii) preference parameters belong to a generic set (i.e., a set of full measure). (See, e.g., Radner, 1979; Allen, 1981.)

On the other hand, the class of expected utility preferences is a very special (i.e., non-generic) class, which undermines these results on "generic" existence. For example, would the generic existence result survive if we were to assume that the agents have "maxmin preferences" of Gilboa and Schmeidler (1989), or more generally, "variational preferences" of Maccheroni et al. (2006)? (Maxmin and variational preferences are best known models that accommodate Ellsberg paradox, and both generalize the expected utility model.)

Perhaps more interestingly, in general, it is well-known that incompleteness of agents' preference relations simplifies the problem of equilibrium existence. (For example, Roemer (1999) shows

that modeling political parties' preferences with an incomplete binary relation leads to the existence of an equilibrium in a political game that typically has no equilibrium when parties' preferences are complete.) However, this issue has not been studied within the context of REE. It seems natural to expect that allowing agents' preferences to be incomplete may help obtaining new existence results. To gain insight, it should first be noted that an agent with an incomplete preference relation can be modeled as a collection of various "selves," each with a complete preference relation. Thus, the set of equilibria of an economy with incomplete preference relations can often be described as the *union* of equilibria of various economies, each corresponding to a different specification of agents' selves. In turn, this union of sets may well be nonempty, even when almost all member sets are empty.

### ***Models with Asymmetric Information and Non-Standard Preferences over Uncertainty***

The objective of this broad research topic in applied theory is to introduce non-standard preferences over uncertainty to the problems of signaling, insurance, adverse selection, mechanism design. The examples of preferences that can be used in this exercise are maxmin, variational, smooth ambiguity (Klibanoff, Marinacci, Mukerji, 2005), or general uncertainty averse preferences (Cerrei-Vioglio et al, 2011). For recent work on this topic, see Auster (2013) and references therein.

### ***Dynamic Properties of the KMM model***

The smooth ambiguity model of Klibanoff, Marinacci, Mukerji (2005) is widely used in applications as the paper has several hundred citations. However, the properties of this model in a multi-period setting are not understood well. In particular, there is no consensus about the reasonable ways to do updating in this model when new information arrives. It is also not immediately clear to what extent (and in what sense) it is possible to achieve dynamic consistency in this model. The objective of the project is to formulate normative requirements for updating of this type of preferences, and deduce its implications for the agent's beliefs. For background reading, see Gumen and Savochkin (2013).

### ***A General Formula on the Magnitude of Pivot Probabilities Under Aggregate Uncertainty***

In a large election, the probability of changing the winner with a single vote (pivot probability) is small, but how small it is depends on the statistical distribution of voters' types. In particular, when voter types are independently and identically distributed, then, typically, pivot probabilities decline at an exponential rate with the number of voters. This, in turn, makes it impossible to "rationalize" observed turnout levels with reasonable specification of preference parameters, as voting is a time consuming, costly activity, which practically becomes a waste of time with such small pivot probabilities.

On the other hand, there are some results which show that pivot probabilities are only inversely proportional to the number of voters if there is aggregate uncertainty regarding voters' types. By "aggregate uncertainty," practically, I mean any unknown parameter that uniformly influences the types of a large set of voters. An earlier result in this direction is proved, independently, by Good and Mayer (1975), and Chamberlain and Rothschild (1981). An important shortcoming of Good-Mayer formula is that it does not allow for abstention, i.e., each citizen is assumed to cast a vote. Recently, Evren (2012) proved an alternative version that allows for abstention, but aggregate uncertainty in Evren's analysis has a very special form. Specifically, Evren assumes that a randomly chosen voter who prefers a given candidate  $i$  is altruistic with probability  $q_i$ , and that  $q_i$  is unknown. One could think of many other forms of aggregate uncertainty. For example, it would be equally sensible to assume that a randomly chosen voter prefers a given candidate with an unknown probability. Moreover, these two types of aggregate uncertainty may also coexist. Therefore, it would certainly be useful to provide an extension of Evren's formula that

does not rely on the details of the form of aggregate uncertainty. Thereby, one could also generalize Evren's other findings on turnout levels in large elections.

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