The question of discounting in assessing values of future utility streams has played an important role in work in many fields in economics. Discounting is one of the key determinants affecting inter-temporal tradeoffs and making an explicit account of the distant future, encompasses therefore motives related to sustainability, transmission to offspring and altruism.

Many models of preferences over time assume the objective is given by the separable, exponentially discounted utility. Such (rational) models are normative. They prescribe how decisions should be made in order to avoid inconsistencies or non-optimal solutions e.g. Normative representations of preferences over time are also proposed by social sciences and include concepts such as just savings or sustainable development. On the contrary, behavioral models are descriptive. They try to accommodate behavior that is consistent with empirical or experimental observations. Perhaps surprisingly, behavioral discounting models implications often coincide with those coming from normative ones.

With a notable exception of exponential discounting, both kind of models of preferences over time (normative and behavioral) typically lead to time-consistency problems. That is, optimal plans under such preferences are time-inconsistent and a decision maker has no incentive to follow the optimal plan in the future. The question of design and computation of optimal among time consistent plans (so the one that will be actually followed) has received a great attention in economics. This includes important from behavioral (and numerical) perspective short memory decision rules (Markovian).

One final aspect worth stressing is an intrinsically uncertain nature of the future. That is, although the dynamic models of choice over time can be applied to both deterministic and stochastic environments, it is the latter that is of utmost importance for empirical studies. There is a number of recent papers showing that preferences over time as well as over uncertain (or stochastic) outcomes are intertwined.

Taking this literature background, the aim of the project is to: identify the impact of selected forms of behavioral discounting on existence and characterization of optimal decisions in dynamic stochastic economies, and develop tools for its constructive (and numerical) analysis including time-consistent decision rules with applications to sustainable growth.

Realization of this goals require answering few hypothesis, including: how to axiomatize and represent by a utility index various behavioral aspects of decisions making over time-uncertainty streams that are observed in experimental economics?, how do selected forms of behavioral discounting influence existence of optimal solutions in dynamic economies? how does the potential time-inconsistency of optimal decision rules affects the feasible decision set?, how does stationary structure of Markovian decision rules restrict achievable sustainability conditions in the long run? how to compute or approximate such optimal decision rules?

To achieve our goal, we will construct a utility representation of behavioral preferences representing selected features (confirmed by experimental results) of decision making in time and uncertainty. Then we will construct several models with behavioral discounting and analyze their impact on the dynamics of the economy. Realization of our project would allow economists to better understand economic dynamics resulting from various functional forms of behavioral discounting and time-inconsistencies of optimal policies as well as their numerical significance. Applications include a.o. resource and extraction economies, poverty traps, environmental protection or more generally two sector economies. Project has 7 phases, each finalized with one paper (prepared for publication in leading field journals).