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Lipschitz continuous dynamic programming with discount[☆]

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Abstract

We show that if the return function, the technological constraints and the transition function of a standard problem of stochastic dynamic programming with discount satisfy Lipschitz regularity assumptions, then the value function is Lipschitz regular.

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1. Introduction

The results of this paper stand for a class of dynamic optimization problems with infinite horizon and discount, in a stochastic setting, as described by Stokey et al. [29, Chapters 4, 9].

It is well known that, under topological assumptions (compactness and continuity) on the data of the problem (i.e., state space, return function and technological constraint correspondence), the existence, uniqueness and continuity of the value function is guaranteed.

The theory of dynamic programming with discount proceeds by completing the topological assumptions with a rather extensive block of assumptions, which we call standard assumptions, including concavity, smoothness and monotonicity of the data. Such assumptions guarantee the concavity, smoothness and numerical computability of the value function

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