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ON THE UNIQUENESS OF THE NASH EQUILIBRIUM IN STOCHASTIC GAMES OF CAPITAL ACCUMULATION ON A GRAPH

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ABSTRACT. The main purpose of this work is the study of the application of controlled random fields given on a finite non-oriented graph described in [1], to the problem of the uniqueness of the Nash-equilibrium for stochastic capital accumulation games with many players. The players are located at the vertices of the interaction graph Γ , the edges represent the connections between the players. We assume that the decisions of the players are synchronized using a standard assumption of decision making in discrete time sequential games.

The problem of the existence of the Nash equilibrium for this type of games is considered in the work [2]. In order to show the existence of a single equilibrium, additional conditions on transitional probabilities and utility functions apply.

The direct impetus for writing this article was the work of Balbus, Nowak [3] and Wiećek [4] based on the results of Amir [5]. In this paper we summarize the results of Balbus, Nowak [3] and Wiećek [4] on a multidimensional model: players are concentrated at the vertices of a finite graph that determines their local interaction. Such a generalization makes it possible to use in real economic models with "neighborhood dependence" (for example, see [6]) for describe the process of capital accumulation.

Keyword: Markov decision process, stochastic game, Nash equilibrium, capital accumulation, random fields, local interaction.

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