

Sector Allocation Catch Share System: Game Theoretic Approach for Sector Behavior Analysis

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Abstract

Sector allocation catch share system is where a share of total fishing quota is allocated to a group of fishermen called sector. Whether or not to join a sector is voluntary, and as such there are sector members and non-members coexisting in the same fishery, where the latter will remain in a common pool fishery. The main question of this paper is: How will the sector behave under such circumstance? A sector may fish with the non-members, thereby intensifying the competition to drive out the non-members quickly; or it might avoid the competition altogether while non-members are fishing and wait until they are done, anecdotal evidence exists for both of these cases. What is the dynamically optimal strategy for sectors? Are there multiple optimal strategies depending on the environment it operates, and if so what are the influencing factors? This paper develops a microeconomic model of fishermen, behavior under sector allocation program based on the differential game theory, and solves for dynamic equilibrium in aim to answer above questions. The model begins by assuming the group size of a sector remains constant, but later relaxes this assumption to allow members flow in and out of the sector. The latter has a unique tradeoff, which while relative profitability between the sector members and non-members will dictate the flow of membership, the profitability itself is an inversely related function of membership size. As such, equilibrium conditions for sector membership size will also be considered.