





Prof. R. Wattenhofer

## Sow, Bid, Reap: Fairness in Karma-Based Resource Allocation

Taking its origin in Indian religion, the concept of karma "what you sow is what you reap" has become familiar to Western popular and internet cultures.<sup>1</sup> In recent years, however, karmainspired artificial currency mechanisms have attracted considerable attention in academia since they promise to combine the efficiency of traditional monetary tools with notions of fairness in allocating public resources.

In a nutshell, a *karma economy* consists of a repeated public good allocation game, where agents with an equal initial endowment of a karma currency discover their current valuations and decide whether to access the resources using their remaining budget. The karma spent is then redistributed in a selfcontained fashion.



This dynamic closely mirrors the structure of a *competitive equilibrium with equal incomes*  $(CEEI)^2$  – a well-studied concept in the fair division literature – where each agent is given the same artificial budget and prices emerge endogenously to clear the market. CEEI mechanisms are celebrated for enforcing envy-freeness (no agent prefers another's allocation over their own) and Pareto efficiency (no one can be made better off without making someone worse off), two cornerstone fairness guarantees.

In this project, you will examine the relationship between karma allocation mechanisms and competitive equilibria with equal incomes, aiming to characterize the fairness outcomes –such as envy-freeness and efficiency – that these systems can guarantee in practice. We will have weekly meetings to discuss progress, pending questions, and the next steps.

**Requirements:** Strong motivation, ability to work independently, and interest in conducting exciting theoretical research. Solid mathematical background (ability to write valid proofs). Although not required, prior exposure to game theory is a substantial plus. Depending on the breadth of the project, coding skills might prove themselves useful. Coming up with your own original ideas is highly appreciated.

## Interested? Please contact us for more details!

Describe your motivation for the project in a few sentences, along with any relevant courses or prior projects (personal or academic).

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<sup>&</sup>lt;sup>1</sup>No, really? https://justmeme.org/karma-memes/.

<sup>&</sup>lt;sup>2</sup>See for example https://www.journals.uchicago.edu/doi/10.1086/664613.