

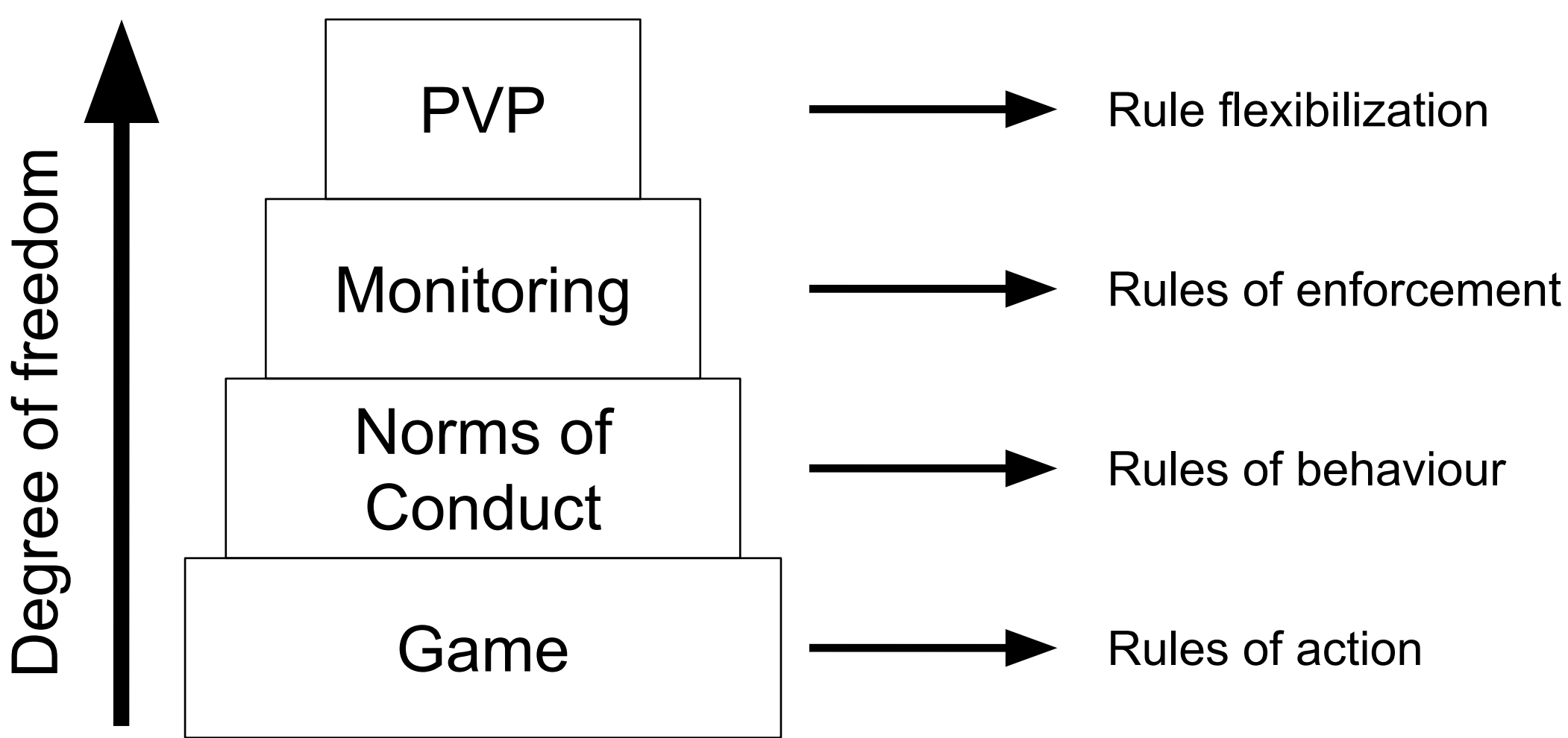
THE PRINCIPLED VIOLATION OF POLICY: NORM FLEXIBILIZATION IN OPEN SELF-ORGANISING SYSTEMS

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MOTIVATION

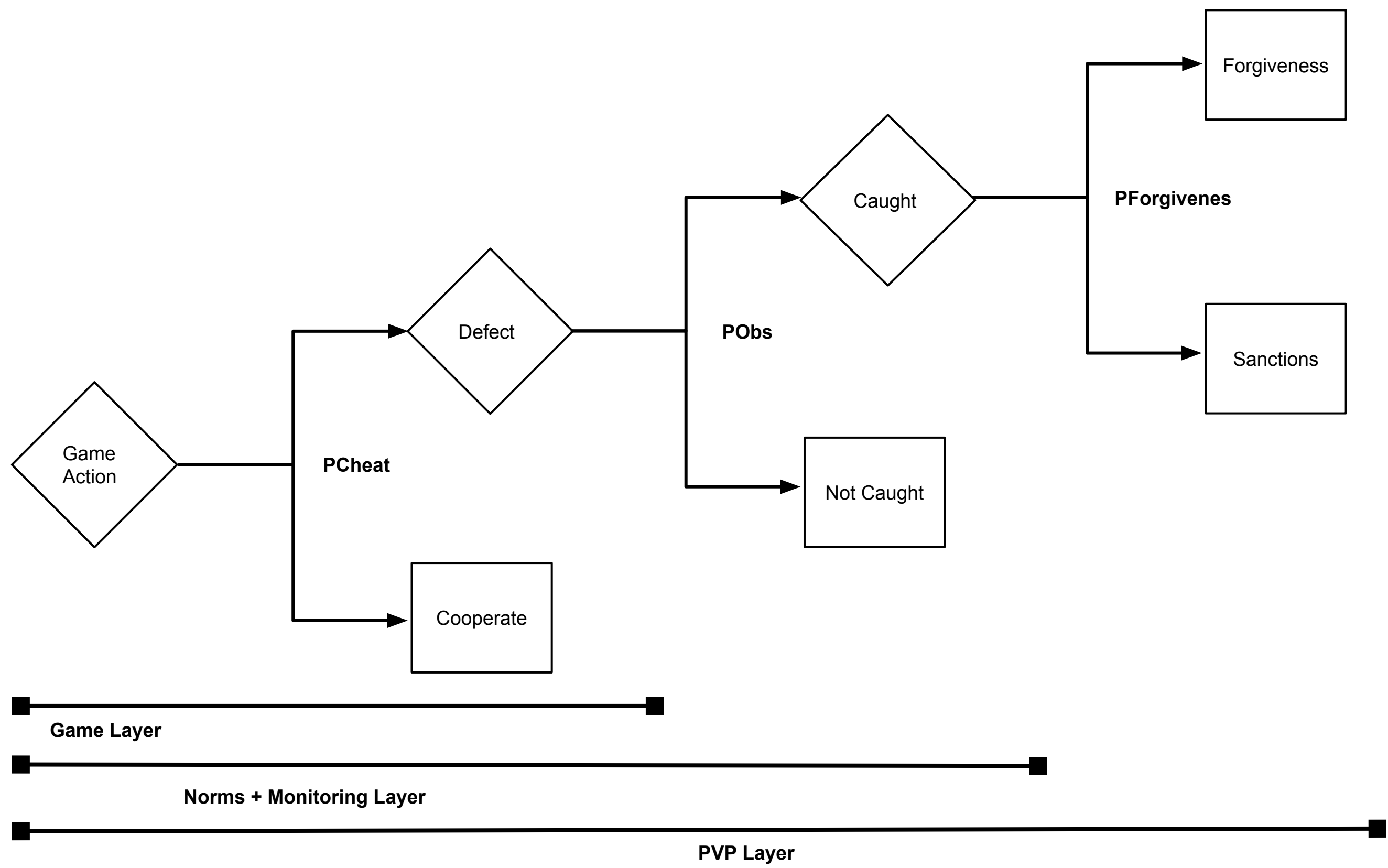
- **Rules and norms** in open systems attempt to guarantee its well functioning and prevent selfish (e.g. free-riding) or unsustainable (e.g. tragedy of the commons) behaviour.
- **Sanctioning** structures prevent and punish non-compliance enforcing conformity.
- To what extent sanctioning strategies really have **beneficial effects** in socio-technical systems?
- In what extent full norm compliance is a desirable outcome and at what **cost**?

LAYERS OF SOCIETY SIMULATION



Principled Violation of Policy - *The active and intentional decision of an agent of not applying a policy to which it is entitled.*

SETUP: *LPG'* WITH SANCTIONS AND FORGIVENESS



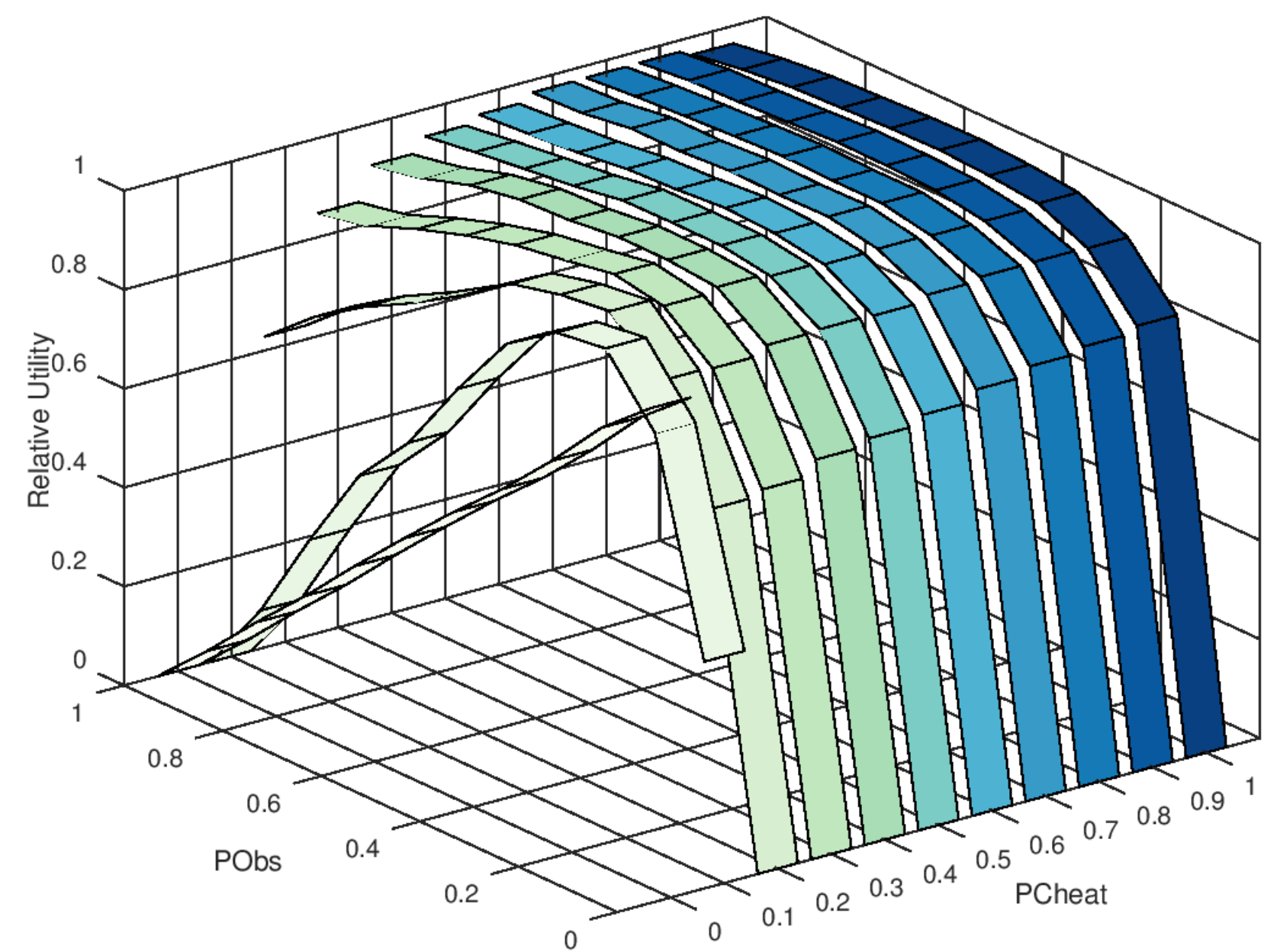
- Common-pool resource management scenario
- Linear Public Goods **game** (*LPG'*)
 - Agents produce and consume resources
 - Cooperation to a common-pool is voluntary
 - Individual resources are allocated from the common-pool
- **Norms:**
 - Agents must provide all its generation to the common-pool
- **Sanctioning system:**
 - Non-cooperation is liable to punishment and sanctioning
 - Mandatory Non-repudiation: agents can't reject sanctions
 - Selective Non-application: the issue of sanctions is optional

AGENTS' BEHAVIOURAL PARAMETERS

- **PCheat**: probability of non-cooperative behaviour
- **PObs**: frequency of monitoring for non-compliant events
- **PForg**: probability of not issuing a sanction upon an observed non-compliant event

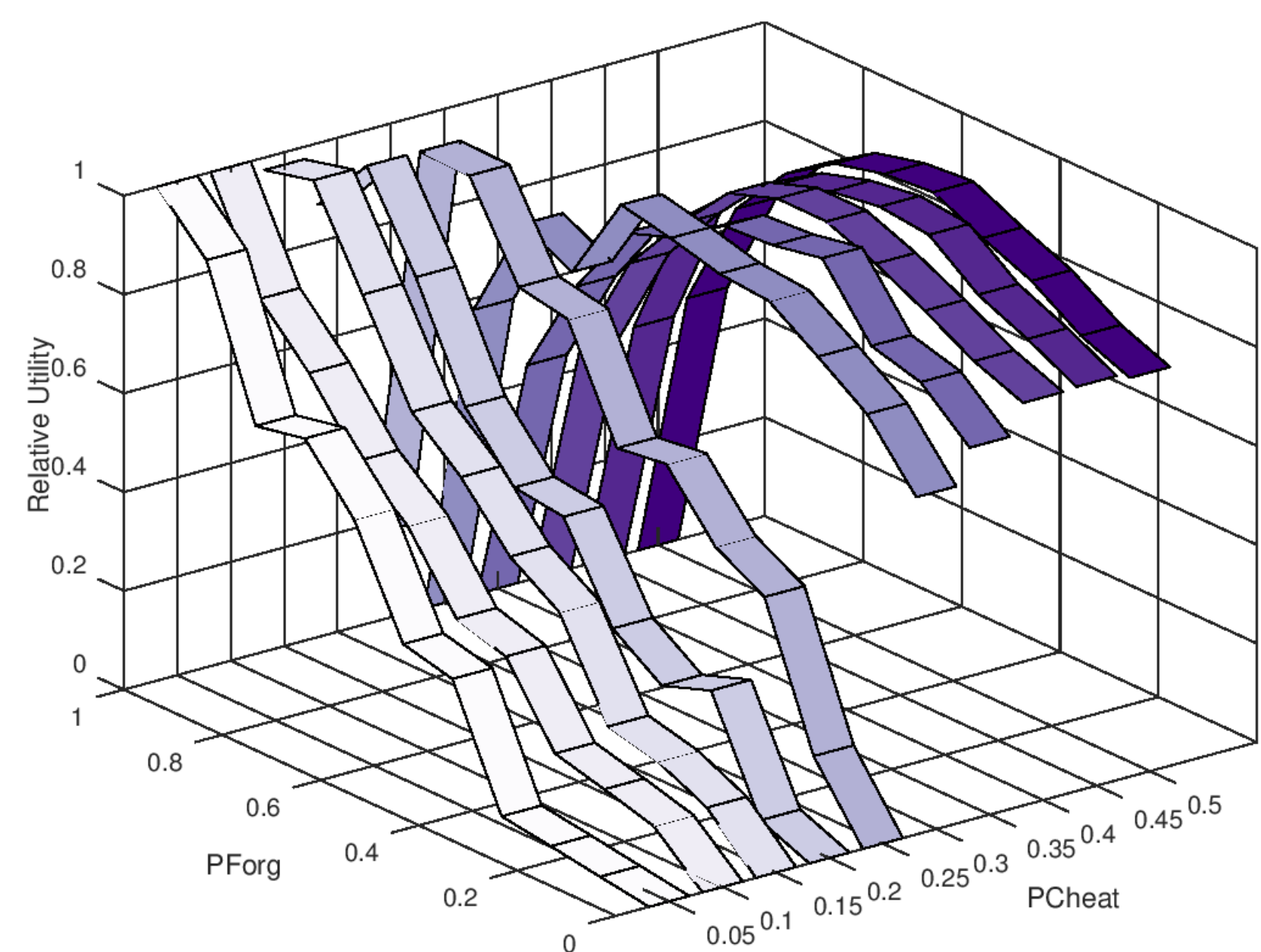
EXPERIMENTAL RESULTS

A - PVP IS COST EFFECTIVE



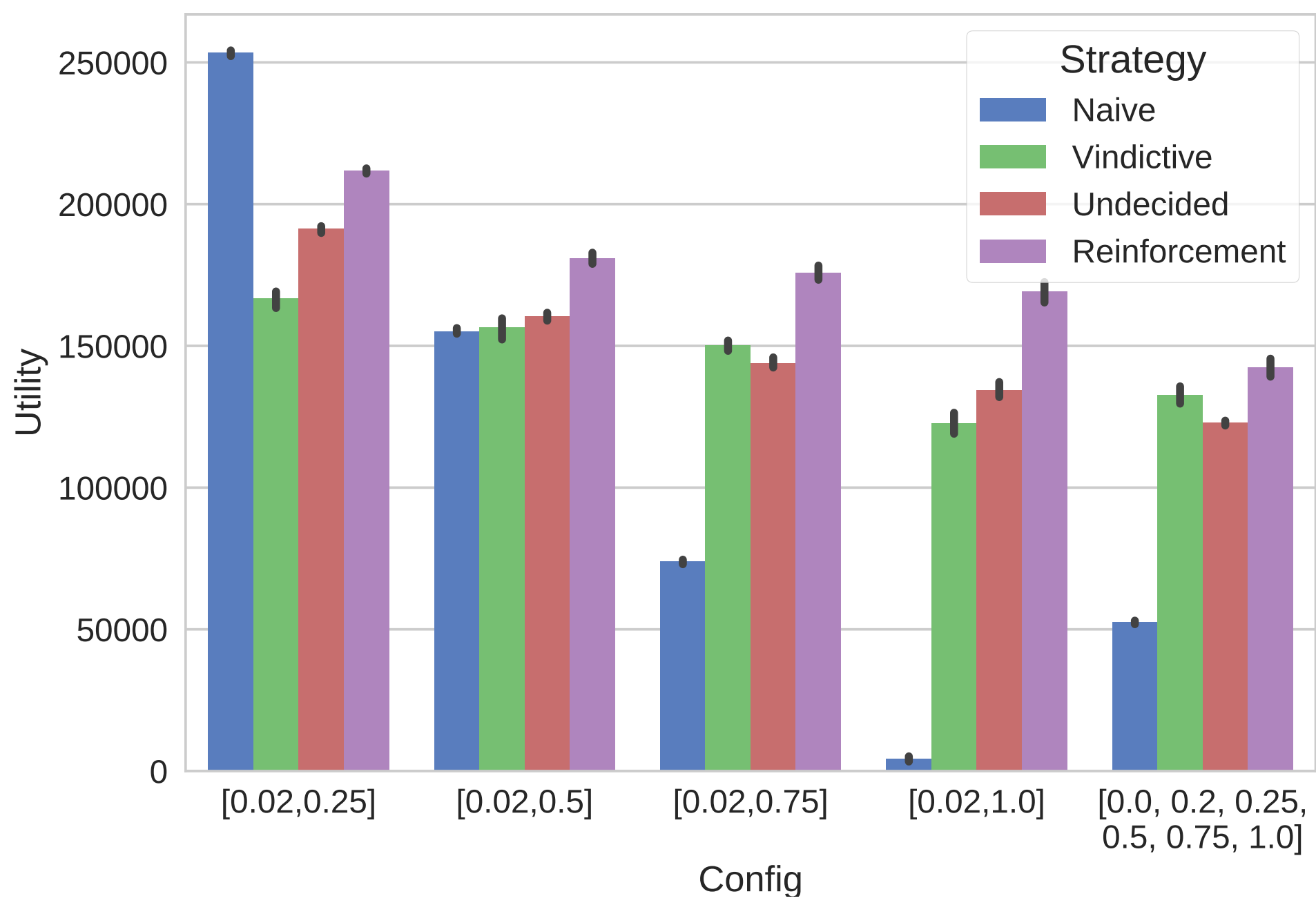
If monitoring has costs, depending on the levels of non-compliance (*PCheat*), increasing the monitoring frequency (*PObs*) has small or negative effect on general utility.

B - PVP IS TOLERANT AND RESILIENT TO ACCIDENTS



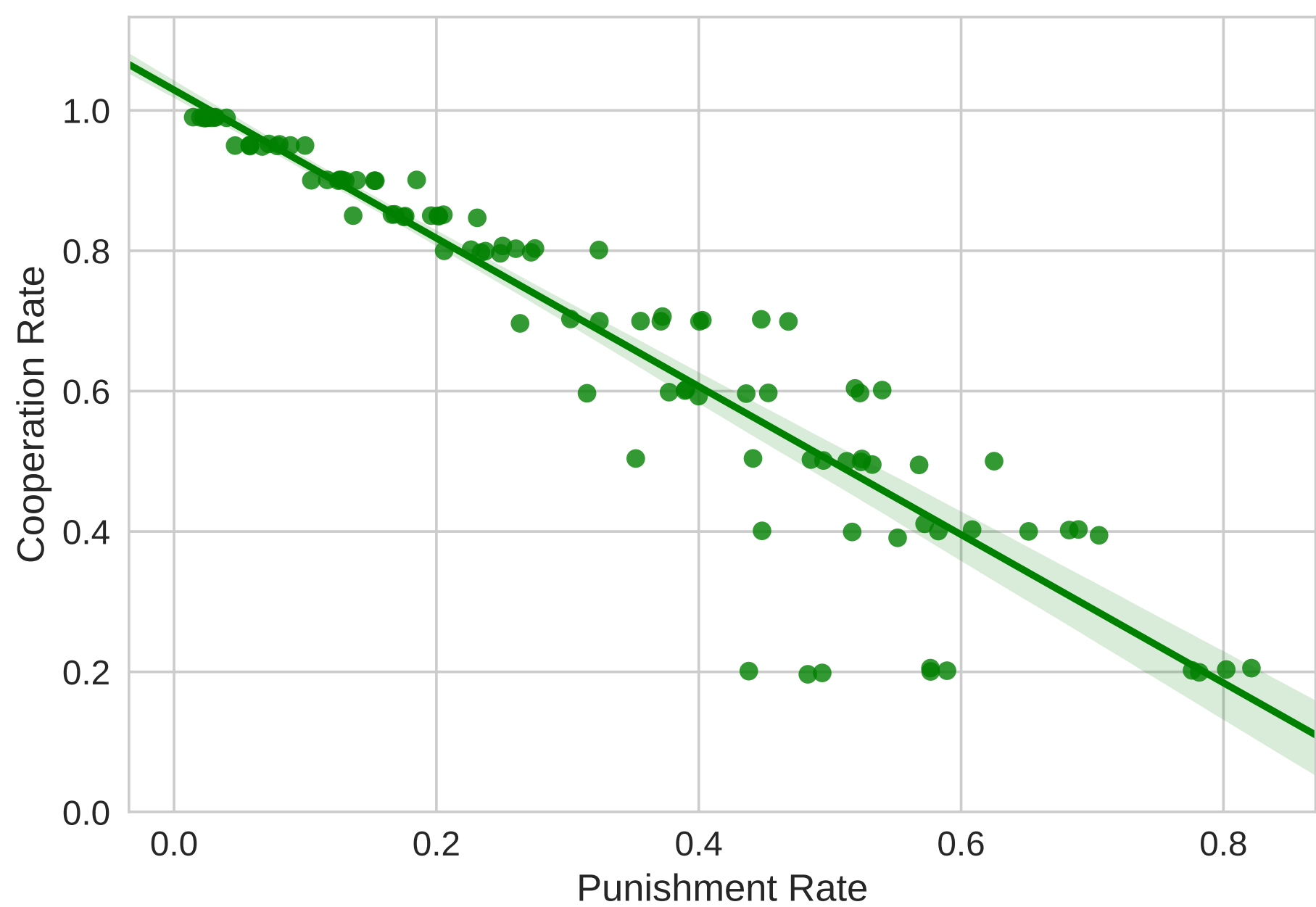
When levels of non-compliance (*PCheat*) are low, punishment can be counter-productive, as it might not distinguish accidents and might exclude collaborative agents.

C - PVP IS ADAPTABLE TO DIFFERENT SCENARIOS AND BEHAVIOURS



Compared to fixed policy strategies, flexible strategy (reinforcement, in graph) is able to achieve overall better results, for different scenarios of non-compliance.

D - PVP AS A TOOL FOR JUSTICE PERCEPTION



In scenarios where PVP is learned and exercised, agents with high levels of cooperation receive proportionally less sanctions than the ones who do not cooperate as often.