

## Evolution of corruption in democratic states

**Alberto Pinto**<sup>1,2</sup>, Atefeh Afsar<sup>1,2</sup>, Elvio Accinelli<sup>2</sup>, Filipe Martins<sup>1,2</sup>, Bruno M. P. M. Oliveira<sup>2,4</sup>

<sup>1</sup> Departamento de Matemática, Universidade do Porto, Portugal.

<sup>2</sup> Laboratory of Artificial Intelligence and Decision Support - LIAAD, INESC, Portugal

<sup>3</sup> Universidad Autónoma de San Luis Potosí, México.

<sup>4</sup> Faculdade de Ciências da Nutrição e Alimentação da Universidade do Porto, Portugal

In this paper, with the goal of analysing the evolution of corruption, we introduce an evolutionary game theoretic dynamical model describing the interaction of citizens with government and officials or bureaucrats of the state in a democratic country. We study and interpret the socio-political and economical characteristics of a society and their relationships with the evolution of corruption by means of the parameters of the model. These parameters represent the strength and weaknesses of the political institutions and of the agents of the game. We show the existence of a stable heteroclinic corruption cycle with increasing and decreasing periods of corruption by the government and officials. Citizen's voting power is the main mechanism provoking the decreasing periods in corruption. However, in a weak democratic state, the lack of political choices or vote buying might lead to a self-reinforcing mechanism of corruption where corruption is endemic and that may be seen as a social trap.