

Evolution towards Press-Dyson equilibrium in the Prisoner's Dilemma

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Abstract

According to the Press-Dyson mathematical prediction on the two-person prisoner's dilemma game, there exist a strategy, namely extortion strategy, using which one (called as extorter) can extortionate the co-player. In the equilibrium state of the game, a extorter does not provide full cooperate but the co-player will, and then the extorter can receive an excessive share of surplus. Empirically, the realty of the theoretical prediction is not clear. To explore the evolutionary processes of the humans strategy facing such extorter, we conducted the economic experiments of long-run (about 500 rounds) repeated game. We found that, human subjects will constantly increase cooperation rates, meanwhile the extorters can win the excessive share of surplus. In evolutionary selection views, the obedient human strategy are more profitable to survive. The speed of adjustments being slow, but the game will constantly converge toward Press-Dyson equilibrium.

Keywords:

Prisoner dilemma game; repeated game; Nash equilibrium;

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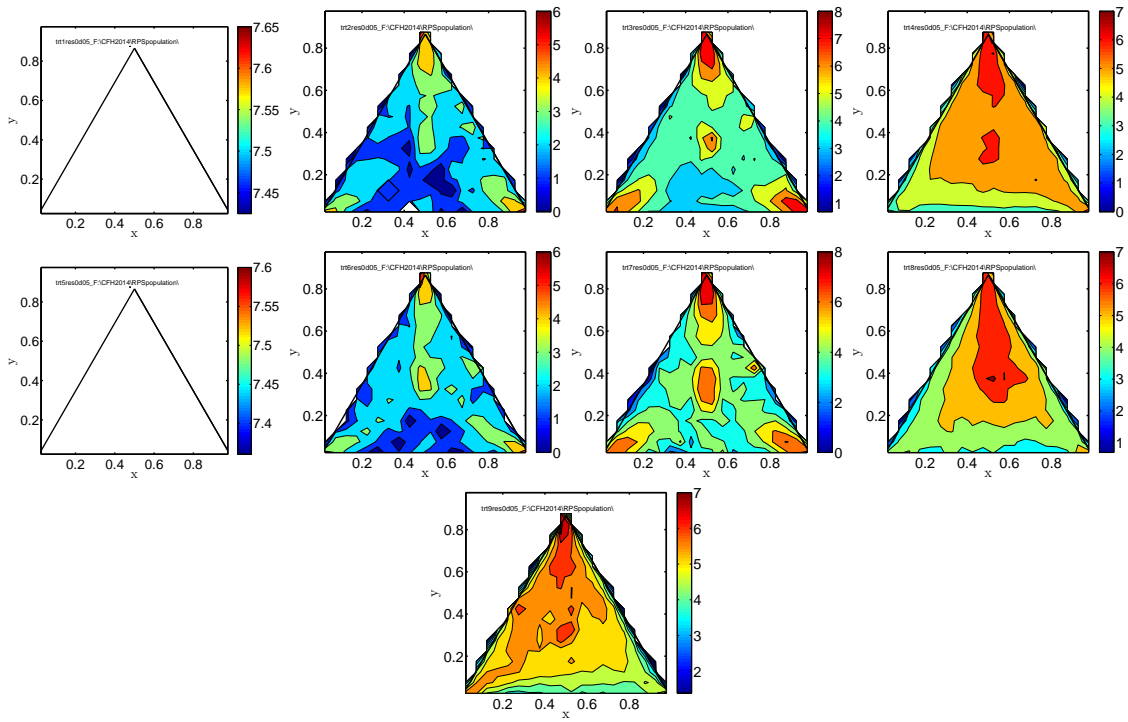


Figure 1: individual position V_AM.atCFH2014.ini.m

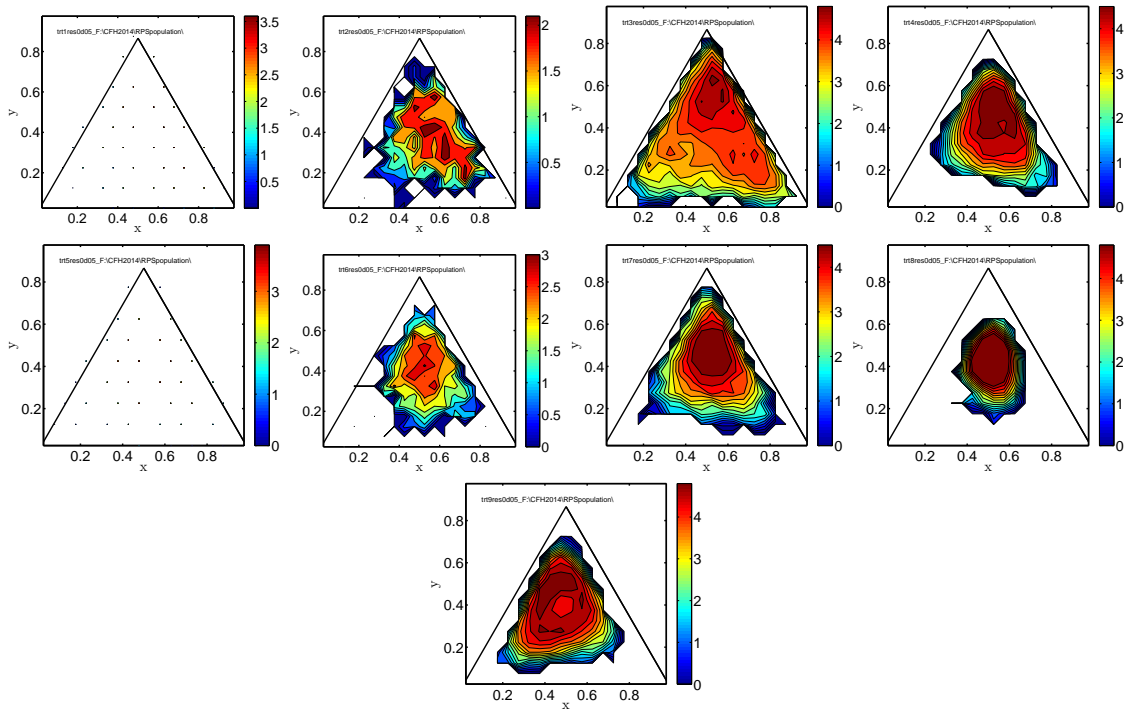


Figure 2: social state distribution (社会态分布) V_AM.atCFH2014nt1.m

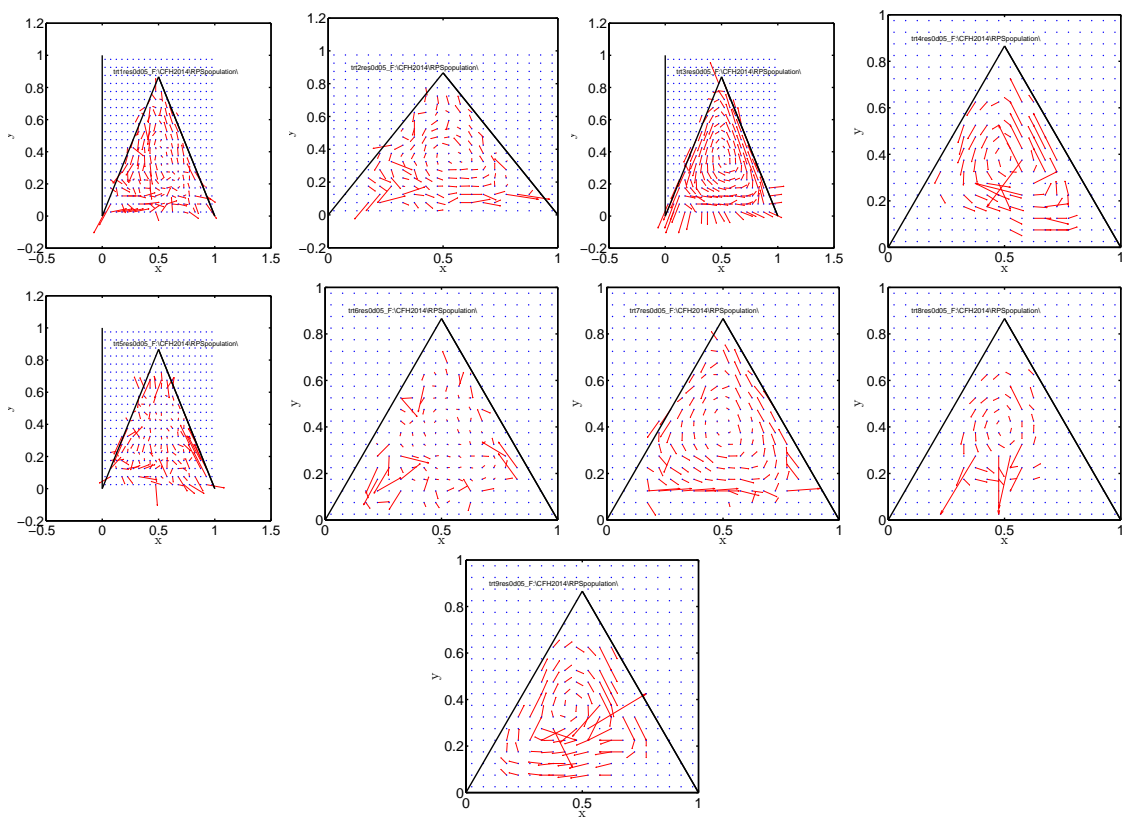


Figure 3: v V_AM_atCFH2014nt1.m

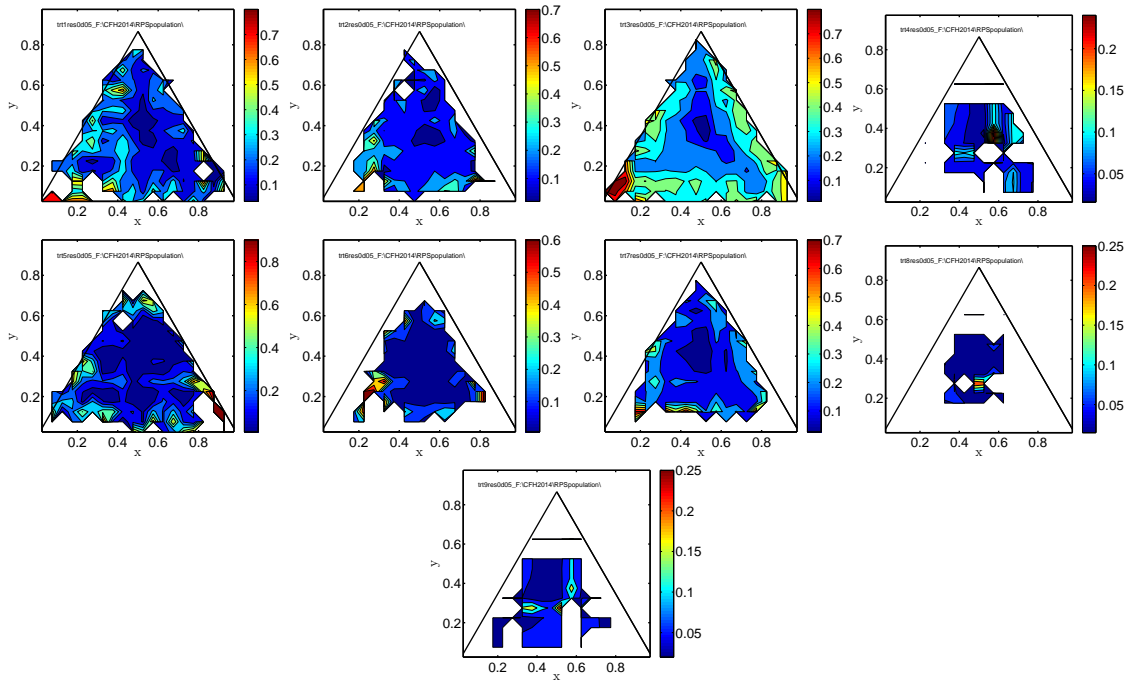


Figure 4: Speed pattern $V_AM_atCFH2014nt1.m$

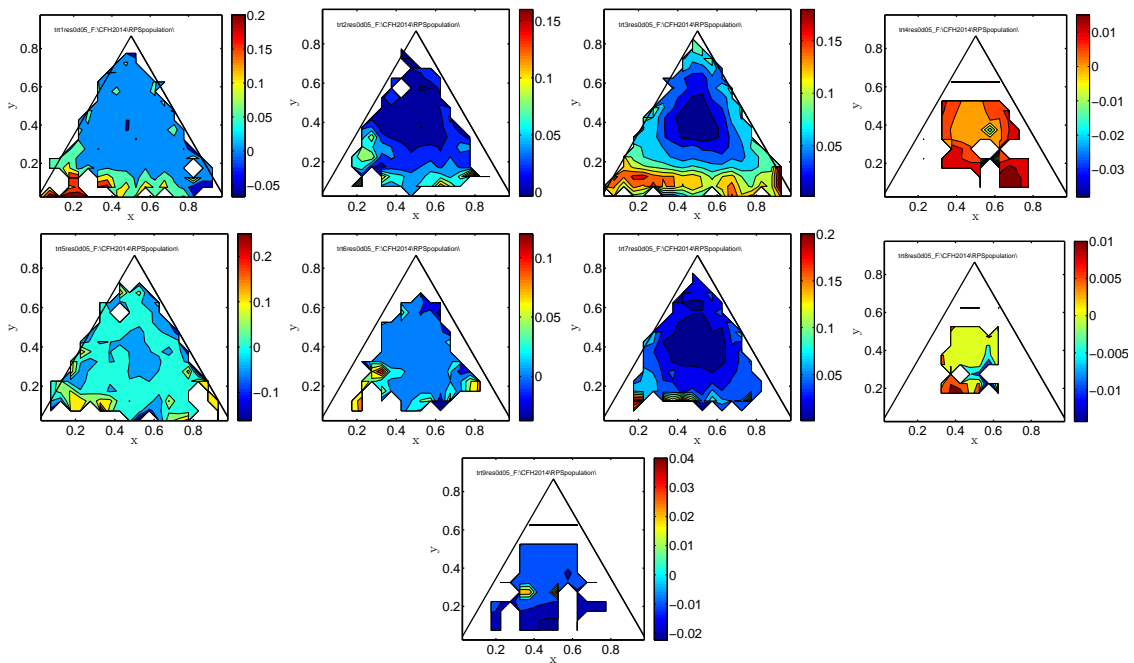


Figure 5: $L_V_AM_atCFH2014nt1.m$

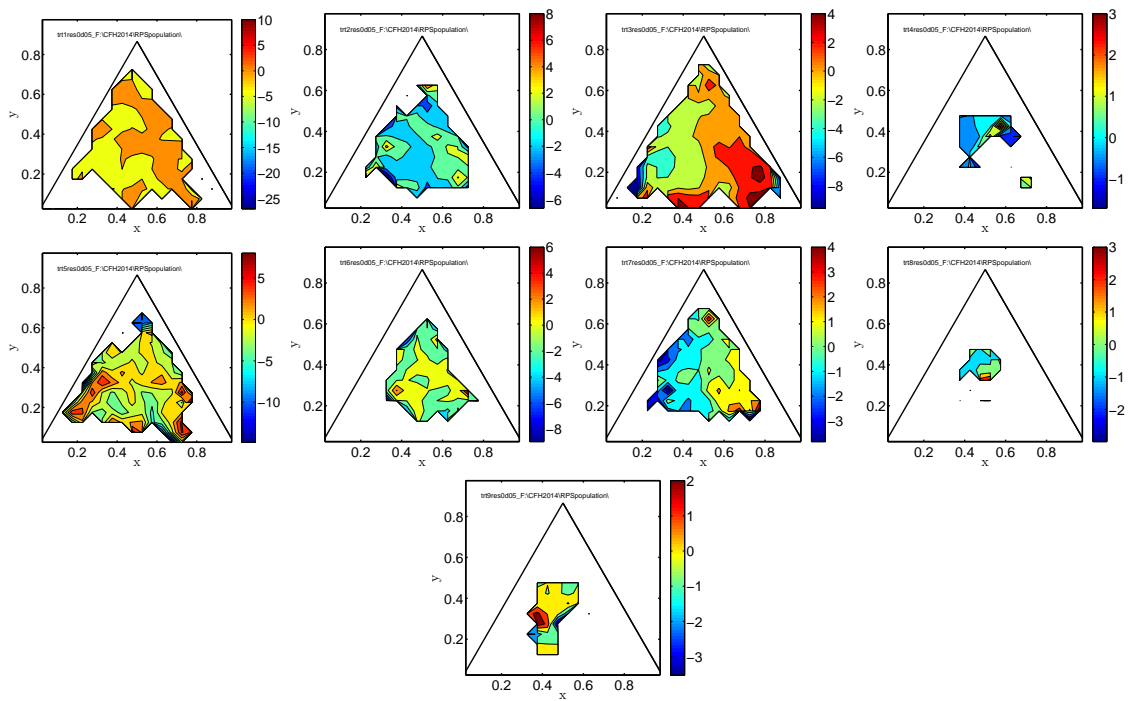


Figure 6: Curl V_AM.atCFH2014nt1.m