

Report on the outcomes of a Short-Term Scientific Mission¹

Action number: CA16228 – European Network for Game Theory

Grantee name: Ata Atay

Details of the STSM

Title: Key players and conformity in social networks

Start and end date: 07/12/2022 to 12/02/2022

Description of the work carried out during the STSM

Description of the activities carried out during the STSM. Any deviations from the initial working plan shall also be described in this section.

The purpose of this STSM was to begin a new collaboration with Prof. Vincent Vannetelbosch and Ana Mauleon from Center for Operations Research & Econometrics (CORE) of the Université catholique de Louvain (UCLouvain). The main objective was to study networks in which there are perpetrators, victims, and authorities simultaneously. Our aim was to introduce this novelty to the existing literature based on Ballester, Calvó-Armengol, and Zenou (2006). During my visit, we have had daily meetings with Prof. Vincent Vannetelbosch and Prof. Ana Mauleon. We first developed the model and described the network game associated with our model. Our first objective was on the characterization of the Nash equilibrium. The second objective was to detect key players and derive optimal enforcement policies depending on the type of key players. Our final aim was to provide an example to illustrate our findings and discuss the results that we obtained.

Description of the STSM main achievements and planned follow-up activities

Description and assessment of whether the STSM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the STSM. Agreed plans for future follow-up collaborations shall also be described in this section.

During this STSM, we have derived the results related to our objectives. First, we introduced a new model based on Ballester, Calvó-Armengol, and Zenou (2006) and Ballaster and Zenou (2014). The novelty of our model is the social network considered. Our model takes into account the social networks where there are perpetrators, victims, and authorities simultaneously. We introduced the bullying network game for such social networks. We first derived the optimal effort level of players. Second, we introduced

¹ This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

bullying network policies. Then, we studied the optimal enforcement policies for key-players. Finally, we provide an example where we consider different social network structures and different attribute levels for players. Making use of the illustrative example, we have discussed our theoretical results. The aim was to find the player that would increase/decrease the total effort most for an introduced policy. Our results can be used by policymakers to adapt different policies for a given social network (e.g., at a school with bullying problems). Together with the theoretical results obtained during this STSM, we will now write a working paper following the results we have obtained. Considering the results obtained and its policy implications, this STSM is in line with WG1 and WG3 of the GAMENET Cost Action.

Moreover, during this STSM we have discussed several new questions on solution concepts based on stability for network formations. We hope to work on a question that we have posed during my STSM at the Center for Operations Research & Econometrics (CORE) of the Université catholique de Louvain (UCLouvain).

I sincerely thank the CA16228—GAMENET Cost Action for their support which made this visit possible.