

Game On: Social Networks and Markets

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Gamification and Influencers in Finance: An Experiment

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Overview

- Two papers about the same topics (gamification) ...
- ... but at *different stages* and with *two different approaches*
 - **Model** : **set of assumptions**, and then the resolution of the model gives some formulas that help understanding what we observe on the market
 - **(Laboratory) Experiment** : participants selected on specific criteria and following **given instructions**
- Both methods are used to control/minimize endogeneity issues in economics/finance
 - **Model** : **closed-form formulas** between variables of interest
 - **Experiment** : we control **exogenous stimuli** that affect participants

Model (I)

- **How to initially set the model assumptions ?**
- Start from stylized facts – GameStop story (and others)
- Find the easiest way to translate this in “equations”
- Solve the equations to obtain the closed-form (or numerical) solutions – and do *comparative statics*
- Trade-off :
 - simple “equations” are easy to solve but do not replicate all stylized fact
 - Complex “equations” cannot be solved in closed-form
- Resource : Financial literature (De Goot, 1974,

Model (II)

- Important assumption : **belief formation in a social network**
- Difficulty : how agents are connected ? Strongly connected ?
- Solution : (Adjacency) **Matrix** ... with a lot of interesting mathematical property ... (eigenvalues, power, ...)
- Many Interesting results : “The communication of naïve agents stills matters Determines the though leadership of the various fanatic and rational agent” (Proposition 1)
- Importance of education (Proposition 2) / role of influencers / ...

Experiment (I)

- **How to initially design the experiment ?**
- Design sets the “rules” of the game a priori from examples
- Participants play the game
- Researchers collect data and comment
- Trade-off:
 - Simple “rules” easy to understand but produce poor dataset
 - Complex “rules” generate rich dataset but with a risk ...
- Resource: Financial literature (Langer and Weber, 2008,

Experiment (II)

- Important assumption : **Gamification with (private and) social badges**
- Difficulty : how participants are connected ?
- Solution : (Social) **badges** to copy what is observed in practice on trading platforms
- Many Interesting results : risk taking is increased when gamification is achieved on the risky asset allocations
- Importance of gender / role of Influencers / ...

Comment 1 (Model) – When $N \rightarrow \infty$

- The A matrix connects all the agents in the economy (N)
- In the case of large social networks, can we obtain some asymptotic results when $N \rightarrow \infty$? or $(N_f + N_l + N_s) / N_n \rightarrow k$?
- When $N \rightarrow \infty$, the A matrix may be represented by a functional operator (i.e. matrix in infinite dimension)
- Under some regularity assumptions, this operator has an (infinite) discrete spectrum (eigenvalues)
- And with a continuum of agents (density in a L^2 space) ?

Comment 2 (Model) – When $t \rightarrow \infty$

- The A matrix powered t times (A^t) describes how information/influence circulates within the network (after t "connections") – related of the speed of diffusion
- This discrete time dynamics is driven by a very important mathematical object – the infinitesimal operator (limit of $1/t A^t$ when $t \rightarrow 0$)
- Example of diffusion processes characterized by drift and volatility functions
- Useful for a continuous time version of the model ?

Comment 3 (Experiment) – Beauty contest

- Importance of past performance (badges) versus overall performance in risk taking ?
- Mutual fund example with Morningstar ratings (relative ratings within a category)
- Risk taking increases when ratings (relative performance) is low
- Social badges captures just a part of this effect
- Other ways to communicate relative performance to participants through an index of overall performance ? Full league tables available for all participants ?

Comment 4 (Experiment) – Social network

- Information in the network only circulates through (social) badges ... (distribution of badges among the participants)
- Difficult to measure the influence of one specific participant in the game in this setup
- Could we imagine a more complex design with a social network used by participants to share information ?
- Example of the NextWise Challenge (<https://www.nextwise.fr/>) launched with Dauphine as founding partners in 2021 – an investment game augmented with a social network