

Contagion in Graphons

SELMAN EROL^{*}, Carnegie Mellon University, United States

FRANCESCA PARISE[†], MIT, United States

ALEXANDER TEYTELBOYM[‡], University of Oxford, United Kingdom

We consider a threshold contagion process over networks sampled from a graphon, which we interpret as a stochastic network formation model. We investigate whether the contagion outcome in the sampled networks can be predicted by only exploiting information about the graphon. To do so, we formally define a threshold contagion process on a graphon. Our main results show that contagion in large but finite sampled networks is well approximated by contagion in a graphon. We illustrate our results by providing analytical characterizations for the extent of contagion and for optimal seeding policies in graphons with finite and with infinite agent types.

CCS Concepts: • **Networks** → **Network economics**; **Network economics**; • **Applied computing** → **Economics**.

Additional Key Words and Phrases: contagion, graphons, complex contagion, threshold model, stochastic block models, sensitive infection regions

ACM Reference Format:

Selman Erol, Francesca Parise, and Alexander Teytelboym. 2020. Contagion in Graphons. In *Proceedings of the 21st ACM Conference on Economics and Computation (EC '20)*, July 13–17, 2020, Virtual Event, Hungary. ACM, New York, NY, USA, 1 page. <https://doi.org/10.1145/3391403.3399515>

^{*}erol@cmu.edu

[†]parisef@mit.edu

[‡]alexander.teytelboym@economics.ox.ac.uk

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

EC '20, July 13–17, 2020, Virtual Event, Hungary

© 2020 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-7975-5/20/07.

<https://doi.org/10.1145/3391403.3399515>