# Hanping Xu

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## Personal Data

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| Citizenship and Year of Birth: | Chinese \| 1996 |
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## Education

2018-Present    Ph.D. in Mathematical Economics, **National University of Singapore** (NUS), Singapore
Advisor: Prof. Yeneng Sun     GPA: 4.89/5.0

2014-2018    B.S. in Science with Honors Degree, **Sun Yat-sen University** (SYSU), Guangzhou, China
Major: Statistics

## Research interests

Game Theory, Microeconomic Theory, Mathematical Economics

## Publication

**Pareto-undominated and socially-maximal Nash equilibria with coarser traits** (with Bin Wu), Economics Letters, 215(2022) : 110464.

## Job Market Paper

**Obvious approximate symmetric equilibrium in games with many players** (Under review at Journal of Economic Theory)
with Enxian Chen and Bin Wu
*This paper was accepted for presentation at the 4th Forum for Chinese Microeconomic Theories organized by Economic Research Journal.*

Abstract: A symmetric equilibrium in a large game with a convergent sequence of finite-player games can induce a strategy profile for each finite-player game in the sequence in an obvious way. We show that such obviously induced strategy profiles form approximate symmetric equilibria for the sequence of finite-player games under a continuity assumption. This result demonstrates from a new angle that large games serve as a reasonable idealization for games with large but finitely many players. Furthermore, we show that for a large game with a convergent sequence of finite-player games, the limit distribution of any convergent sequence of (randomized) approximate equilibria in the corresponding finite-player games is induced by a symmetric equilibrium in the limit large game. Various results in the earlier literature on the relevant closed graph property in the case of pure strategies can be unified under such a general convergence result. Applications in congestion games are also presented.

## Working Papers

**Games with incomplete information: a general purification result**

with Wei He and Yeneng Sun

Abstract: We present a new purification result for Bayesian games with countably many actions, interdependent payoffs and correlated types. It is shown that the condition of coarser inter-player information characterizes the existence of purification, and also the existence of pure strategy equilibrium in these games. We demonstrate that the condition of countably many actions is tight for the purification result and pure strategy equilibrium existence. To prove the results for Bayesian games, we provide a general purification principle, which covers various earlier results as special cases.

**Large games with coarser traits and countable actions**

Abstract: We show that the coarser traits condition is both necessary and sufficient for the idealized limit property of large games with traits and countable actions. Meanwhile, we also show that the coarser traits condition is both necessary and sufficient for the existence of pure strategy Pareto-undominated socially-maximal Nash equilibria in large games with traits and countable actions. We demonstrate that the condition of countably many actions is tight.

**Does Randomization Matter in Sequential Games?**
with Enxian Chen, Wei He, and Yeneng Sun

Abstract: We provide an example to demonstrate that randomization matters in sequential games in the sense that players may obtain higher equilibrium payoffs by playing mixed strategies. In contrast, we present a fundamental property for the classic two-player zero-sum sequential games (such as chess and go), showing that realizations of mixed-strategy subgame perfect equilibria (SPE) induce pure-strategy SPEs with the same payoffs. As an application, we show a new existence result on pure-strategy SPE in such games. A universal SPE that induces all the pure-strategy SPE is constructed. Finally, we prove that the above fundamental property holds generically in sequential games.

## Teaching Experience

| National University of Singapore | MA4264: Game Theory | 2021/2022 SEM 2 |
| | MA4264: Game Theory | 2020/2021 SEM 2 |
| | MA3238: Stochastic Processes I | 2019/2020 SEM 2 |
| | MA2216: Probability | 2019/2020 SEM 1 |
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| *Teaching evaluation score* | 4.3/5.0 for Game Theory | 4.1/5.0 for Stochastic Process I |

## Presentations

2022 Society for the Advancement of Economic Theory (SAET) Conference
Presenter for "Obvious approximate symmetric equilibrium in games with many players"

2021 Society for the Advancement of Economic Theory (SAET) Conference
Presenter for "Games with incomplete information: a general purification result"

## Selected Scholarships, Honors and Awards

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| Research Scholarships, National University of Singapore | 2019, 2020, 2021, 2022 |
| Top Graduate Tutor, Department of Mathematics, National University of Singapore | 2021 |
| Outstanding Graduate Award, Sun Yat-sen University | 2018 |
| National Scholarships, China | 2015, 2016, 2017 |
| The First Prize Scholarships, Sun Yat-sen University | 2015, 2016, 2017 |

## References

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