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Lecture Syllabus

Ganesh Viswanath-Natraj

IB9YW0: Fintech: Digital Currencies and Decentralised Finance
Warwick Business School

Wednesday 15th January, 2025

Organisation

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- Ganesh Viswanath-Natraj
- Email: ganesh.viswanath-natraj@wbs.ac.uk
- Research interests: Foreign exchange and cryptocurrency markets. Some of the questions I investigate:
  1. How do we improve the design of stablecoins, a class of cryptocurrencies pegged to the dollar?
  2. Can decentralized finance be a more effective way of organising financial markets?
  3. What are the macroeconomic and financial stability implications of introducing digital currencies.
- Check out my web page for general interest articles and research papers. `https://ganeshvnatraj.netlify.app`

Organisation-Class Times

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- Lecture: Wednesday 11am-1pm, 1.007
- Seminar: Wednesday 4pm-5pm, 2.007
- Office Hours: Wednesday 5pm-6:30pm 2.209 WBS
- Seminars will expand on the theory in lectures with some data analysis exercises. Minimal programming (eg. in Python) is required for seminar.

Organisation- Assessment

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- Group Project (20%): Groups of 3-4, presentation and final report submission due in final week.
  - Each group will investigate a different topic in digital currencies and decentralized finance.
  - Group presentations during week 10 lecture, Wednesday 12 March, 2024
  - Final report due May 7th (online myWBS submission).
- Final Exam (70%)
  - Exam will cover all topics: mainly theory/essay. style questions and discussion of key readings.
- Participation mark (10%):
  - 4 quizzes each worth 2.5% of grade due every 2 weeks.
  - First quiz due end of **Week 4: 11:59pm Sunday February 2nd**.

Lecture Topics

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1. Economics of blockchain: Blockchain design, Bitcoin proof of work. Economic limits of blockchain.
2. Blockchain scaling and cryptocurrency pricing: Lightning network, cryptocurrency asset pricing models, fundamentals, retail trading vs vehicle currency role.
3. Introduction to DeFi: Introduction to smart contracts, primitives of Ethereum blockchain.
4. Stablecoins: Peg mechanisms, arbitrage design, risk management, Terra-Luna collapse.

Lecture Topics

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5. DeFi Applications: DAI stablecoin, oracles, governance, tokenized real world assets.
6. Decentralized Exchanges I: Automated Market Maker design, market efficiency. Determinants of liquidity provision.
7. Decentralized Exchanges II: Uniswap V2 vs V3, decentralized vs centralized exchanges, miner extractable value. DeFi and traditional markets.
8. DeFi Lending Protocols: Compound and Aave, interest rate rules, leverage trading and connection to futures markets.
9. CBDCs: China e-CNY, digital pound project.

Course references

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- There is no textbook required for this class, but here are some references for supplementary reading (optional).
  1. Lipton, Alexander, and Adrien Treccani. Blockchain and distributed ledgers: Mathematics, technology, and economics. World Scientific, 2021.
  2. Narayanan, Arvind, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.
  3. Harvey, Campbell R., Ashwin Ramachandran, and Joey Santoro. DeFi and the Future of Finance. John Wiley & Sons, 2021.
  4. Buterin, V. (2022). Proof of stake: The making of Ethereum and the philosophy of blockchains. Seven Stories Press.
- Lectures will use a combination of textbook, scientific (journal) articles and online references where appropriate.

Course references

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There are a lot of open course materials with some topics of overlap. If you find some additional resources please let me know!

1. Blockchain and Decentralised Finance Lecture Notes: Cam Harvey Duke
2. Decentralised Finance Lecture Notes: Berkeley
3. Blockchain and Decentralised Finance Lecture Notes: Andreas Park Toronto
4. Decentralised Finance Lecture Notes: Anthony Lee Zhang Chicago

Additional resources include blockchain websites (eg. blockchain.com, coinmetrics, and crypto news and data websites like cryptoslate, coindesk, kaiko and articles on medium.com.