**Graham Joncas** – **Reference Letter (Applying for Ph.D in Computer Science)**

- plan to research formal verification: proving that software (/markets) are bug-free

- very little work applying formal verification in economics — will be pioneer in the field

- direct applications to financial software (HFT, central banks); more theoretical applications in mechanism design, e.g. using model-checking to show if an auction/market can be exploited

- career goals: economics ∩ computer science; research; collaborating with others in CS/econ/logic

**Thesis**

- Used geography data and TSLS regression to analyze the effect of county density on the tax rate

- Bears on wider question of how China could sustain rapid economic growth despite poor institutions — namely, by local governments competing with one another (via pro-business policy) for firm investment.

- Found that areas with favorable geographic conditions (high agricultural productivity, smooth terrain) tend to have more counties; that OLS understates the effect of county density on the tax rate, compared to the TSLS estimator which is 2.5 times higher; and that poverty counties’ geographic conditions are not uniformly worse than other counties, but some poverty counties have good agriculture and bad terrain.

- [optional] Wrote a recursive function to calculate county density based on adjacency data, rather than the more tedious standard method (i.e. the number of counties within a 100km2 circle).

**Tax Class**

- In China's Taxation and Fiscal Policy class, wrote a term paper on using genetic algorithms for tax policy

- Three use cases: 1) as an agent-based model to examine tax evasion; 2) as an optimization technique for reforming the tax code; 3) as a combinatorial method to simulate tax avoidance.

**Globalization Class (Optional)**

- Wrote paper on interstellar trade theory, did presentations on semiconductor industry and WeChat

**Other**

- During MA at Fudan, received Excellent Academic Performance (EAP) Scholarship

- while at Fudan, attended conferences on formal logic at Tsinghua University and Zhejiang University.

- while a student at Fudan, attended short courses by visiting scholars on nonparametric econometrics and quantitative dynamic models; sat in on courses on modal logic and computability theory.

- spent free time at Fudan learning to code, studying algorithms, graph theory, dynamic programming

- paper using text analysis with R to compare Hugo award and Nebula award-winning short stories was accepted at DADH 2018: 9th International Conference of Digital Archives & Digital Humanities

- Interest in applying machine learning to economic problems (e.g. classifier algorithms to distinguish poverty vs. non-poverty counties); did presentation on neural networks in development economics