

GUO CHEN

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EDUCATION

University of Kansas <i>Ph.D., Economics, Expected completion 2018</i> DISSERTATION: "Three Essays on Advances in Macroeconomic Theory and Modeling" Advisors: William A. Barnett (University of Kansas) and Stephen E. Spear (Carnegie Mellon University) <i>Master of Arts, Economics</i>	Lawrence, Kansas May 2014
University of Washington <i>Master of Science, Mathematics</i>	Seattle, Washington June 2012
Nanjing University <i>Bachelor of Science, Mathematics and Applied Mathematics</i> As exchange student:	Nanjing, China July 2009
University of Paris 1 Panthéon-Sorbonne <i>Exchange Student, Mathematical Models in Economics and Finance</i>	Paris, France June – July 2013
Hong Kong University of Science and Technology <i>Exchange Student, Department of Mathematics</i>	Clear Water Bay, Hong Kong September – December 2006

PROFESSIONAL SUMMARY

I'm an economics Ph.D. student with strong quantitative skills. My interest lies generally in economics and data science. I have extensive project experience in machine learning, data mining and econometrics. Equipped with strong business sense, I love analyzing and solving real world problems.

RESEARCH FIELDS

Economics: Theory, Macroeconomics	Machine learning: Bayesian Nonparametrics
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PROGRAMMING SKILLS

Programming languages: Python, Java	Other software: R, MATLAB, SAS, SQL, STATA
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PAPERS AND PUBLICATIONS

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- Economics:**
1. **"Endogenous Business Cycles in the Overlapping Generations Market Game Model"**
(Guo Chen, job market paper, 2017)
Abstract: This paper examines an overlapping generations version of the Shapley-Shubik market game model with production. We show the existence of equilibria for the model and study the price dynamics generated in the model through strategic interactions. Conditions for the existence of complex and chaotic equilibrium dynamics are characterized, which are more complicated than in the overlapping generations market game model without production. Our analysis shows that production combined with price-taking behavior by households "locks down" the ratio of output and input prices, which then smooths the model and reduces the nonlinearity that arises in the pure exchange model.
 2. **"Coordination Equilibrium, Price Stickiness and Markup Variations in the Market Game"**
(Guo Chen, Cidgem Gizem Korpeoglu and Stephen E. Spear, published in *Journal of Mathematical Economics*, Volume 72, October 2017)
Abstract: In this paper, we show that the Shapley-Shubik market game model with production naturally generates an emergent equilibration mechanism, when the number of active firms is small, that can lead to multiple coordination equilibria, and which will accommodate nominal price

rigidities, without any need for invoking menu costs or other artificial restraints on price adjustment. As such, we suggest that the market game model can provide a better micro-foundation for new Keynesian general equilibrium analysis than existing models based on monopolistic competition.

3. ***“Bifurcation of Macroeconometric Models and Robustness of Dynamical Inferences”***

(William A. Barnett and Guo Chen, published in *Foundations and Trends in Econometrics*, Vol. 8, 1-144, 2015)

Abstract: This survey provides an overview of the classes of macroeconometric models for which these experiments have so far been run and emphasizes the implications for lack of robustness of conventional dynamical inferences from macroeconometric policy simulations.

Machine learning:

1. ***“Bayesian Network-based Infinite Latent Feature Models”***

(Guo Chen, working paper)

Abstract: Indian buffet process (IBP) has been widely used to describe latent feature models that have potentially unbounded numbers of features. In this paper, we introduce a generalized IBP model with a hierarchical structure: Bayesian network-based IBP (bnIBP). Our model simultaneously infers the latent feature matrix and the clusters of objects associated with each feature, with both the number of latent features and the number of clusters associated with each feature inferred by the data.

PROJECTS

Machine Learning:

1. ***Dropout Prediction on a MOOC Learning Platform***

- Used Java and WEKA to build models to predict whether a user will drop a course following four stages: the selection of the classifier, the optimization of classifier parameters, and the selection and optimization of the feature selection methods.

2. ***Identifying Safe Loans Using Boosting***

- Used Python to do feature engineering, trained a boosted ensemble of decision-trees (gradient boosted trees) on the lending club dataset.
- Predicted whether a loan will default along with prediction probabilities (on a validation set), evaluated the trained model and compared it with a baseline.
- Found the most positive and negative loans using the learned model, explored how the number of trees influences classification performance.

3. ***Amazon Product Sentiment Analysis***

- Used Python to train a logistic regression model to predict the sentiment of product reviews and inspected the weights of the trained model.
- Made prediction of sentiment for the new product review and wrote functions to compute the accuracy of the model. Interpreted the coefficients of the model and compared multiple logistic regression models.

4. ***Text Topics Clustering Using Wiki Dataset***

- Used Python to build cluster text wiki dataset topics using K-means, Gaussian mixtures, Latent Dirichlet allocation (LDA) model and a hierarchy of clusters.
- Explored and interpreted results, including topic keywords and topic assignment for a document.

Deep Learning:

1. ***E-commerce Project—Predicting Customer Behavior***

- Trained both a neural network model and a logistic regression model with softmax to predict customer behavior with multiple labels.

2. ***Time Series Prediction Using RNN---Forecasting Google Stock Price***

- Built a recurrent neural network using Keras (LSTM) to forecast Google Stock Price. Compared with the true stock price and visualized the results.

Data Science/Data Visualization:

1. ***Course Webpage A/B Testing Project***

- Chose invariant metrics and evaluation metrics for the experiment design to test whether diverting students based on time commitment to the course will improve the overall student experience.
 - Computed number of samples, duration vs. exposure, did sanity checks and checked for practical and statistical significance. Did sign tests and made recommendation.
2. ***Crime Analytics: Visualization of Incident Reports and Prediction***
 - Used python to analyze criminal incident data from Kansas state, visualized overall patterns by time and by category. Then focused on two major cities to explore the neighborhoods with most crimes.
 - Built an XGBoost classifier to predict crimes by category. Used grid search to do the parameter tuning.

Data Mining:

1. ***Yelp Reviews Data Mining Project***
 - Explored and visualized the reviews content to understand what people have said in the reviews using topic modeling.
 - Mined the data set to understand the landscape of different types of cuisines and their similarities using cuisine map. Mined the data set to discover the popular dishes of a particular cuisine using word2vec. Mined the data set to rank restaurants for a specific dish.
 - Predicted the hygiene condition of a restaurant.
2. ***Twitter Sentiment Analysis***
 - Accessed the twitter API using python.
 - Generated new dictionary of words with sentiment scores for twitter text. Estimated the public's perception (the sentiment) of a particular term or phrase.
 - Analyzed the relationship between location and mood based on a sample of twitter data.

Econometrics:

1. ***Financial Time Series Modeling of Stock Price X***
 - Used R to explore the empirical properties of the daily price of stock X.
 - Tested for stationary and provided plots of the autocorrelation and partial autocorrelation functions, explained ARCH effect in the transformed data.
 - Adjusted and compared three ARIMA models. Predicted on the chosen model.
2. ***Evaluating the Causal Impact of the Washington State's Achievers Program on Student College Enrollment—A Comprehensive Look***
 - Used Stata to apply logistic regression and propensity score to evaluate the cause and effect relationship between the Washington State Achievers scholarship and college enrollment of students. Explored several different cases of treated and control groups. Computed ATT (average treatment effect on the treated) to make conclusions.

REFeree SERVICE

Economics: reviewer for Macroeconomic Dynamics

Machine learning: External reviewer for PAKDD2016, SDM2016, WAIM2016, KDD16, KDD17

PRESENTATIONS AND VISITS

2017: Society of Economic Measurement's Fourth Conference (MIT)

2016: ICE2016 and SITE workshop (Stanford University)

2015: 25th Annual Meeting of the Midwest Econometrics Group (St. Louis, MO), 52nd Annual Meeting of the Missouri Valley Economic Association (Kansas City, MO)

2013: Summer Workshop in Economic Theory (Paris School of Economics), 13th SAET Conference on Current Trends in Economics (MINES ParisTech)

CERTIFICATES

Machine Learning Specialization (University of Washington, Coursera), Algorithms Specialization (Stanford, Coursera), SAS Certified Base & Advanced Programmer for SAS 9