

# LUCAS (ZHENG) ZHANG

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## EDUCATION

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Ph.D. in Economics, University of California, Los Angeles, June 2023 (Expected)

- Fields: Econometrics, Applied Economics
- Advisors: Andres Santos, Denis Chetverikov, Rosa Matzkin

B.A. in Economics, University of California, Berkeley, May 2017

- Advisors: Joseph Farrell, Yuriy Gorodnichenko
- Highest Honor in Economics
- Highest Distinction in General Scholarship

## JOB MARKET PAPER

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- ◇ “Cross-Validated Conditional Density Estimation and Nonparametric Continuous Difference-in-Differences Models” [\[Link\]](#)

**Abstract:** In this paper, we study the conditional density estimation based on a representation using the orthonormal series expansion. In this series representation, each term takes the form of a multiplication of the basis term and its conditional expectation. For high-dimensional conditioning variables with suitable structures, these conditional expectations can be estimated using various machine learning methods. We propose a data-driven method of selecting the series terms based on a modified cross-validation procedure and we establish an oracle inequality on the estimation error of such estimator. The conditional densities have a wide range of applications in various fields in economics, and we add to this literature a new application of nonparametric difference-in-differences models with continuous treatments. For this application, we establish the identification, estimation, and inference results under the double/debiased machine learning framework, and we illustrate our methods by revisiting an empirical study (Duflo (2001)) of a large policy intervention in Indonesia.

## WORKING PAPERS

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- ◇ “Approximate Sparsity Class and Minimax Estimation”

**Abstract:** Motivated by the orthogonal series estimation for densities in  $L^2([0, 1], \mu)$ , in this project we consider a new class of functions that we call the approximate sparsity class. This new class is characterized by the rate of decay of the individual Fourier coefficients for a given orthonormal basis. We establish bounds on the  $L^2([0, 1], \mu)$  metric entropy of such class, with which we establish the minimax rate of convergence. For the density subset in this class, we propose an adaptive density estimator based on hard-thresholding that achieves this minimax rate up to a log term.

## SERVICE AND EXPERIENCE

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### Research Assistant

- UCLA: Winter 2019, 2020, 2021  
Project(s): cross-validation; big-data; non-separable models  
Reference(s): Denis Chetverikov, Zhipeng Liao, Rosa Matzkin
- UC Berkeley: 2016-2017  
Project(s): microfinance; government spending multiplier  
Reference(s): Joseph Farrell, Yuriy Gorodnichenko

### Teach Assistant Consultant, UCLA Economics Department, 2021-2023

- Co-facilitate with the vice chair on the development and training of new TAs;
- Support TAs in the department through consultation, observations, and providing feedback.

## HONORS AND AWARDS

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### UCLA

- Dissertation Year Fellowship, 2022-2023
- Distinguished TA Award, 2018, 2020, 2021, 2022
- Graduate Summer Research Mentorship (GSRM), 2019
- University Fellowship, 2017-2018

### UC Berkeley

- Phi Beta Kappa, 2017
- Berkeley Club of Hong Kong Scholarship, 2017
- International Student Tuition Grant, 2017
- URAP Summer Research Award, 2016

## TEACHING

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### Instructor

- Introduction to Econometrics, Summer 2020, 2021, 2022 (Undergraduate, UCLA)

### Teaching Assistant

- Introduction to Econometrics; Intermediate Microeconomics; Pricing and Strategy (Undergraduate, UCLA)
- Econometrics: Linear Models and Nonparametric Methods (PhD Courses, UCLA)

## REFERENCES

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Andres Santos (Chair)  
Department of Economics  
UCLA  
andres@econ.ucla.edu

Rosa Matzkin (Co-Chair)  
Department of Economics  
UCLA  
Matzkin@econ.ucla.edu

Denis Chetverikov  
Department of Economics  
UCLA  
chetverikov@econ.ucla.edu

## OTHERS

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English; Mandarin Chinese; on F-1 Visa

Python; R; Matlab; Stata; LaTeX