

VICTOR CHERNOZHUKOV

Ford International Professor

Department of Economics + Center for Statistics and Data Science
Massachusetts Institute of Technology

50 Memorial Drive, E52-361B; Cambridge, MA 02142, USA; E-mail: vchern at mit.edu. Web: www.mit.edu/~vchern

EDUCATION

Stanford University, Ph.D. Economics, 2000. Dissertation: Conditional Extremes and Near-Extremes: Concepts, Inference, and Economic Applications. Committee: T. Amemiya, P. Bajari, T. MaCurdy.

University of Illinois at Urbana-Champaign, M.S. Statistics, 1997

CURRENT ACADEMIC POSITIONS

Massachusetts Institute of Technology, Department of Economics & Center for Statistics and Data Science, Professor, 2008-present

New Economic School, Moscow, Professor by Courtesy, 2010-present

PREVIOUS ACADEMIC POSITIONS

University of Chicago, Department of Economics, Visiting Associate Professor, Spring 2007

Massachusetts Institute of Technology, Department of Economics, Associate Professor, 2005-2008

Massachusetts Institute of Technology, Department of Economics, Assistant Professor, 2000-2005

ACADEMIC SERVICE

Co-Editor Econometrics Journal; Economic Theory; Econometric Theory (past);

Co-author of the Dual Ph.D. degree in Statistics + X at MIT — new Ph.D. program by the Institute for Data, Systems, and Society and Departments of Economics, Mathematics, and others;

Co-author of the new B.S. degree 6-14 in Computer Science, Economics, and Data Science at MIT;

Inaugural Moderator; Econometrics ArXiv (launch September 2017);

INDUSTRY SERVICE

Amazon. Com (Central Economics); Independent Consultant, 2015-present

The State Street Corporation (Operational Risk Division); Independent Consultant, 2009-2012;

AWARDS and HONORS

American Academy of Arts and Sciences, Fellow, Elected in 2016.

The E.J. Hannan Lecturer, The Australasian Econometric Society Meeting, 2016

The Best Graduate Teacher, MIT Economics Department, Elected by Economics Graduate Student Association, 2015.

Inaugural Cowles Foundation Lecturer, North American Econometric Society Meeting, 2009

Fellow of the Econometric Society, Elected in 2009

International Fellow, University College London, CEMMAP, 2009-present

Alfred P. Sloan Research Fellowship, 2005-2007
Castle-Krob Career Development Chair, 2004-2007
Center for Advanced Behavioral Studies, Eligible Fellow, 2005-2008
Arnold Zellner Award, 2005
Selection Committee: D. Andrews, B. Hansen, G. Koop, and A. Lewbel.
Alfred P. Sloan Doctoral Dissertation Fellowship, 1999-2000
American Collegiate Consortium Scholar, 1993-1994

MAJOR GRANTS

National Science Foundation, 2002-present

RESEARCH

- I. **Estimation and Causal Inference with High-Dimensional Data Using Machine Learning.** Modeling, estimation, and inference with high-dimensional data in economics. Focus on program evaluation and causal inference with high-dimensional data using modern methods a.k.a. "machine learning." Empirical Applications. [24, 25, 26, 27, 30, 31, 34, 36, 37, 38, 39, 40, 41, 42, 45, 47, 50, 51, 53, 54, 55, 57, 58, 60, 61, 62, 63, 64, 68, 69, 70, 72, 74, 75, 76, 77, 79, 84, 86, 87, 88, 89]
- II. **Quantile and Distributional Methods in Economics.** Instrumental quantile methods. Quantile and distribution regressions. Counterfactual analysis. Empirical Applications. [2, 5, 6, 9, 10, 12, 16, 18, 21, 24, 29, 32, 33, 35, 44, 45, 48, 52, 56, 57, 59, 64, 65, 67, 69, 71, 72, 73, 75, 80, 81, 83, 85, 90]
- III. **Moment Inequalities, Partial Identification, Set Estimation.** Set identification analysis, estimation, and inference in partially identified models, especially moment inequality models. [13, 14, 15, 16, 22, 27, 28, 29, 43, 46, 49, 52, 66, 68, 81, 85]
- IV. **Quasi-Bayesian Estimation.** A computationally attractive alternative to the extremum estimation in structural econometric models. Computational complexity analysis. Sandwich formulas to correct Bayesian inference. [3, 4, 18, 38]
- V. **Shape Restrictions in Econometric Models.** Exploiting shape restrictions to improve estimation and inference on structural functions, including conditional and structural quantile functions, growth curves, and Edgeworth and Cornish-Fisher expansions. [19, 20, 21, 66, 72, 73, 82]
- VI. **Extremes and Nonstandard Models.** Model and inference for extreme and near-extreme conditional quantiles. Applications to market and birthweight risks. Estimation and inference in models of equilibrium search, standard auction models, and production frontiers. [1, 4, 7, 23]

BOOKS

Handbook of Quantile Regression; with Roger Koenker et. al.; 2017; CRC Press.

Modern Data Analysis in Economics: A First Course, (draft); with I. Fernandez-Val;

Machine Learning of Structural, Causal, and Treatment Effects; with. C. Hansen and M. Spindler; in preparation

PAPERS: www.mit.edu/~vchern

Published or submitted papers:

1. "Conditional Value-at-Risk: Aspects of Modeling and Estimation," with L. Umantsev, **Empirical Economics**, 26, pp. 271-293, 2001.
2. "Three-step Censored Quantile Regression and Extramarital Affairs," with H. Hong, **Journal of the American Statistical Association**, 2002.
3. "An MCMC Approach to Classical Estimation," with H. Hong, **Journal of Econometrics**, 2003.

Awarded the 2005 Biannual Arnold Zellner Award.

Selection Committee: D. Andrews, B. Hansen, G. Koop, and A. Lewbel.

4. "Likelihood Inference in a Class of Non-Regular Econometric Models," with H. Hong, **Econometrica**, vol.72 (2), pp. 1445-1480, 2004.
5. "The Impact of 401(k) Participation on the Wealth Distribution: An Instrumental Quantile Regression Analysis," with C. Hansen, **The Review of Economics and Statistics**, 2004.
6. "An Instrumental Variable Model of Quantile Treatment Effects," with C. Hansen, **Econometrica**, 2005.
7. "Extremal Quantile Regression," **The Annals of Statistics**, 2005.
8. "Subsampling Inference on Quantile Regression Processes (with an Application to a Re-employment Experiment)," with I. Fernandez-Val, **Sankhya**, 2005.
9. "Inference on Instrumental Quantile Processes for Structural and Treatment Effect Models," with C. Hansen, **Journal of Econometrics**, 2006.
10. "Quantile Regression under Misspecification and the U. S. Wage Structure," with J. Angrist and I. Fernandez-Val, **Econometrica**, 2006.
11. "Estimation and Inference on Parameter Sets in Econometric Models," with H. Hong and E. Tamer, **Econometrica**, 2007.
12. "Extremal Quantiles and Value-at-Risk", with Songzi Du, 2007, **Palgrave Dictionary of Economics**.

13. "Instrumental Variable Identification and Estimation of Non-separable Models," 2007, with G. Imbens and W. Newey, **Journal of Econometrics**.
14. "The Reduced Form: A Simple Approach to Inference with Weak Instruments", with C. Hansen, **Economics Letters**, 2007.
15. "Instrumental Quantile Regression: A Robust Inference Approach," C. Hansen, **Journal of Econometrics**, 2007.
16. "Finite-Sample Inference in Quantile Regression Models," with C. Hansen and M. Jansson, **Journal of Econometrics**, 2007.
17. "Admissible Tests for Instrumental Regression," with C. Hansen and M. Jansson, **Econometric Theory**, 2008.
18. "Computational Complexity of MCMC-Based Estimators in Large Samples," with A. Belloni, **The Annals of Statistics**, 2009.
19. "Improving Point and Interval Estimators of Monotonic Functions by Rearrangement," with I. Fernandez-Val and A. Galichon, **Biometrika**, 2009.
20. "Quantile and Probability Curves without Crossing," with I. Fernandez-Val and A. Galichon, **Econometrica**, 2010.
21. "Rearranging Edgeworth-Cornish-Fisher Expansions," with I. Fernandez-Val and A. Galichon, **Economic Theory**, 2010.
22. "Sensitivity and Set-Identification Analysis of the Regression Model with Tobin Regressors", with T. Stocker and R. Rigobon, **Quantitative Economics**, 2010.
23. "Inference for Extremal Quantile Regression Models, with an Application to Market and Birthweight Risks," with I. Fernandez-Val, **The Review of Economic Studies**, 2011
24. "L1-Penalized Quantile Regression in High-Dimensional Sparse Models," with A. Belloni, **The Annals of Statistics**, 2011.
25. "High-Dimensional Sparse Econometric Models: An Introduction," with A. Belloni, **Springer Lecture Notes**, 2011. (Refereed)
26. "Square Root Lasso: Pivotal Recovery of Sparse Functions via Conic Programming", with A. Belloni and L. Wang, **Biometrika**, 2011.
27. "Sparse Models and Methods for Instrumental Regression with Application to Eminent Domain", with A. Belloni, C. Hansen, D. Chen, **Econometrica**, 2012.
28. "Intersection Bounds: Estimation and Inference," with S. Lee and A. Rosen, **Econometrica**, 2013.

29. "Average and Quantile Effects in Nonlinear Panel Data Models," with J. Hahn, I. Fernandez-Val, W. Newey, **Econometrica**, 2013.
30. "Least Squares after Model Selection in High-Dimensional Linear Regression Model", with A. Belloni, **Bernoulli**, 2013. (Arxiv 2009).
31. "Inference Methods for High-Dimensional Sparse Econometric Models," with A. Belloni and C. Hansen, World Congress of Econometric Society 2010, **Advances in Economics and Econometrics**, 2011.

Invited lecture presented at the World Congress of Econometric Society in 2010, with discussion by S. Bonhomme.
32. "Quantile Models with Endogeneity", with C. Hansen, invited article, **Annual Review of Economics**, (5) 2013.
33. "Inference on Counterfactual Distributions," I. Fernandez-Val and B. Melly, **Econometrica**, 2013.
34. "Gaussian Approximations and Gaussian Multiplier Bootstrap for Maxima of Sums of High-Dimensional Random Vectors", with D. Chetverikov and K. Kato, **Annals of Statistics**, 2013
35. "Identification in Semiparametric and Nonparametric Conditional Moment Models", with X. Chen, S. Lee, and W. Newey, **Econometrica**, 2014.
36. "Comparison and Anti-Concentration Bounds for Maxima of Gaussian Vectors", with D. Chetverikov and K. Kato. **Probability Theory and Related Fields**, 2015 (ArXiv 2013)
37. "Inference on Treatment Effects with High-Dimensional Controls, with Application to Abortion and Crime", with A. Belloni and C. Hansen. **The Review of Economic Studies**, 2014 (ArXiv 2011)
38. "Posterior Inference in Curved Exponential Families under Increasing Dimension", with A. Belloni, **Econometrics Journal**, 2014.
39. "Pivotal Estimation via Square-Root Lasso in Non-parametric Regression", with A. Belloni and L. Wang. **Annals of Statistics**, 2014. (Arxiv 2011)
40. "Inference on Structural and Treatment Effects with High-Dimensional Data", with A. Belloni and C. Hansen. **Journal of Economic Perspectives**, 2014.
41. "Gaussian Approximation of Suprema of Empirical Processes", with D. Chetverikov and K. Kato. **Annals of Statistics**, 2014.
42. "Anti-Concentration and Confidence Bands in Nonparametric Problems", with D. Chetverikov and K. Kato. **Annals of Statistics**, 2014.

43. "Inference on Sets in Finance," with E. Kokatulum and K. Menzel, **Quantitative Economics**, 2015.
44. "Quantile Regression under Censoring and Endogeneity," with I. Fernandez-Val and A. Kowalski. **Journal of Econometrics**, 2015.
45. "Uniform Post-Selection Inference in LAD regression and other Z-estimation Problems," with A. Belloni and K. Kato, **Biometrika**, 2014.
46. "Fragility of Asymptotic Agreement under Bayesian Learning," with D. Acemoglu and M. Yildiz. **Theoretical Economics**, 2015.
47. "Some New Asymptotic Theory for Least Squares Series Estimators," with A. Belloni, D. Chetverikov, and K. Kato. **Journal of Econometrics**, 2015.
48. "Nonparametric Identification in Panels using Quantiles," with I. Fernandez-Val, W. Newey et. al., **Journal of Econometrics**, 2015.
49. "Implementing Intersection Bounds in Stata," with W. Kim, S. Lee, A. Rosen, **Stata Journal**, 2015.
50. "Post-Selection and Post-Regularization Inference in Large Linear Models with Many Controls and Instruments," with C. Hansen and M. Spindler, **American Economic Review**, Papers and Proceeding, 2015
51. "Post-Selection and Post-Regularization Inference: An Elementary, General Approach," with C. Hansen and M. Spindler, **Annual Review of Economics**, 2015.
52. "Censored Quantile Instrumental Variable Estimation with Stata," with I. Fernandez-Val, Sukjin Han, Amanda Kowalski.
53. "Honest Confidence Regions for High-Dimensional Sparse Generalized Linear Models," **Journal of Business and Economic Statistics**, 2016, with A. Belloni and W. Ying
54. "Inference on Treatment Effects with High-Dimensional Panel Data, with an Application to Gun Control," **Journal of Business and Economic Statistics**, 2016, with D. Kozbur, and C. Hansen
55. "Empirical and Gaussian Bootstraps for Suprema of Empirical Processes of Increasing Complexity, and Related Gaussian Couplings," with D. Chetverikov and K. Kato, **Stochastic Processes and Their Applications**, 2016. Memorial Issue in honor of Evarist Gine.
56. "Vector Quantile Regression," with G. Carlier and A. Galichon, **Annals of Statistics**, 2016
57. "Program Evaluation with High-Dimensional Data," with A. Belloni, C. Hansen, I. Fernandez-Val, **Econometrica**, 2017

58. "A Lava Attack on the Recovery of Sums of Sparse and Dense Signals", with C. Hansen and Y. Liao, **Annals of Statistics**, 2017
59. "Monge-Kantorovich Depth, Quantiles, and Ranks", with A. Galichon, M. Hallin, M. Henry, 2014, **Annals of Statistics**, 2017
60. "Central Limit Theorems and Bootstrap in High Dimensions", with D. Chetverikov and K. Kato, 2015, **Annals of Probability**, 2017
61. "Double/Debiased/Neyman Machine Learning for Treatment Effects", with Denis Chetverikov, Mert Demirer, Esther Duflo, Christian Hansen, and Whitney Newey, **American Economic Review, Papers & Proceedings**, 2017
62. "Double/De-Biased Machine Learning for Treatment and Causal Parameters", with Denis Chetverikov, Mert Demirer, Esther Duflo, Christian Hansen, Whitney Newey, and James Robins, **Econometrics Journal**, 2017+
63. "HDM: High-Dimensional Metrics", an R-package at r-project.org, accompanied by a vignette and a refereed paper published in **R Journal**, 2017, with C. Hansen, M. Spindler
64. "Quantreg.nonpar: An R Package for Performing Nonparametric Series Quantile Regression", **R Journal**, 2017; with M. Lipsitz, I. Fernandez-Val, A. Belloni
65. "Counterfactual: An R Package for Counterfactual Analysis", an R-package at r-project.org, **R Journal**, 2018; with Mingli Chen, Iván Fernández-Val, Blaise Melly
66. "Constrained Moment Conditions Models", submitted, with A. Santos and W. Newey, R & R, **Econometrica**, 2016.
67. "The Sorted Effects Method: Discovering Heterogeneous Partial Effects Beyond Their Averages", R & R, **Econometrica**, with I. Fernandez-Val and Y. Luo
68. "Inference with Very Many Moment Inequalities", submitted, with D. Chetverikov and K. Kato, 2013, R & R **Review of Economics Studies**
69. "Robust Inference in Approximately Sparse Quantile Regression Models", with A. Belloni and K. Kato, forthcoming **Journal of the American Statistical Association**
70. "Uniformly Valid Post-Regularization Confidence Regions for Many Functional Parameters in Z-Estimation Framework", ArXiv 2015, forthcoming **Annals of Statistics**, with A. Alexandre Belloni, Victor Chernozhukov, Denis Chetverikov, Ying Wei
71. "Vector quantile regression beyond correct specification," with G. Carlier and A. Galichon, to appear, **Journal of Multivariate Analysis**.
72. "Conditional Quantile Processes based on Series or Many Regressors (with an Application to Gasoline Demand)," with A. Belloni & D. Chetverikov & I. Fernandez-Val, 2013. Submitted, R & R **J. Econometrics**

73. "Generic Inference on Quantile and Quantile Effect Functions for Discrete Outcomes", with Iván Fernández-Val, Blaise Melly, Kaspar Wüthrich. R & R **Journal of the American Statistical Association** . Submitted.
74. "Locally Robust Semi-parametric Estimation", with Juan Carlos Escanciano, Hidehiko Ichimura, Whitney K. Newey, James Robins; ArXiv
75. "Quantile Graphical Models: Prediction and Conditional Independence with Applications to Systemic Risk", with A. Belloni and M. Chen; ArXiv
76. "Confidence Bands for Coefficients in High-Dimensional Linear Models with Errors-in-Variables," with A. Belloni, A. Kaul; R &R, Annals of Statistics;
77. "Pivotal Estimation via Self-Normalization for High-Dimensional Linear Models with Errors in Variables"; with A. Belloni, A. Kaul, M. Rosenbaum, A. Tsybakov; ArXiv
78. "Nonseparable Multinomial Choice Models in Cross-Section and Panel Data"; with I. Fernandez-Val and W. Newey; ArXiv
79. "On Cross-Validated Lasso", with D. Chetverikov and Z. Liao; ArXiv;
80. "Single Market Nonparametric Identification of Multi-Attribute Hedonic Equilibrium Models", with A. Galichon M. Henry, B. Pass, 2015; ArXiv
81. "Best Linear Approximations to Set-Identified Functions (with an Application to Gender Wage Gap)", 2009, with A. Chandraksekhar, F. Molinari , and P. Schrimpf; ArXiv
82. "Generic Shape-Restricted Inference by Reshaping Point and Intervals Estimators", with I. Fernandez-Val and Y. Luo, 2013
83. "Network and Panel Quantile Effects via Distribution Regression", with I. Fernandez-Val and M. Weidner; ArXiv 2018
84. "Inference in High-Dimensional Sparse Linear Structural Equation Models", with A. Belloni et. al.; ArXiv 2018
85. "Distribution Regression with Sample Selection," with I. Fernandez-Val and Siyi Luo; draft;
86. "Inference on Best Linear Predictors in Semi-Supervised Settings", with V. Semenova; draft in ArXiv 2016
87. "Discovery of Heterogeneous Treatment Effects in Randomized Experiments", with E. Duflo, M. Demirer; I. Fernandez-Val; ArXiv 2017
88. "Exact and Robust Conformal Inference Method for Counterfactual and Synthetic Controls", with Yinchu Zhu and Kaspar Wuthrich; ArXiv 2017

89. ``Orthogonal Machine Learning for Demand Estimation: High-Dimensional Causal Inference in Dynamic Panels,’’ with V. Sememova, M. Goldman, M. Taddy
90. ``Semi-Parametric Estimation of Structural Functions in Nonseparable Triangular Models,’’ with I. Fernandez-Val, W. Newey, S. Stouli, Francis Vella; ArXiv 2017
91. ``Detailed Proof of Nazarov’s Inequality,’’ with K. Kato and D. Chetverikov; 2017; ArXiv only.