# QINGSONG PAN

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## EDUCATION

Ph.D., Economics, University of Texas at Austin, May 2023 (Expected)
M.S., Economics, University of Texas at Austin, 2019
M.A., Economics, University of Texas at Austin, 2017
B.A., Economics, Shanghai Lixin University of Finance and Accounting, 2016

## REFERENCES

Daniel Ackerberg (Chair)
Department of Economics
University of Texas at Austin
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Brendan Kline
Department of Economics
University of Texas at Austin
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## TEACHING AND RESEARCH FIELDS

**Fields:** Econometrics, Industrial Organization
**Sub-Field:** Production Function Estimation

## WORKING PAPERS

1. "Identification of Gross Output Production Functions with a Nonseparable Productivity Shock" (*Job Market Paper*)

We study the nonparametric identification of gross output production functions with a nonseparable productivity shock. Our nonseparable specification relaxes the traditional assumption of Hicks neutrality that has been shown to be inconsistent with a number of data sets. It can thus capture the bias in technical change, which recent research has found relevant to many important economic questions. We first generalize the identification approach of Gandhi et al. [2020] to nonseparable models and show the identification of output elasticities. To identify the entire production function, we then impose a homogeneity assumption, which is supported by the data. Given the fact that our nonseparable models nest Hicks-neutral models, we can document the misspecification bias of the latter. Using Chilean and Colombian plant-level data, our estimates suggest that Hicks-neutral models overestimate returns to scale, overestimate output elasticities of labor, and generate biased estimates of capital intensity. Our estimates also confirm that technological change is predominantly capital biased.

2. "Nonparametric Identification Using Timing and Information Set Assumptions with an Application to Non-Hicks Neutral Productivity Shocks" with Daniel Ackerberg and Jinyong Hahn (*Under Review)*

A recent literature addresses endogeneity utilizing assumptions restricting agents' information sets when they chose endogenous variables. We consider using these identifying assumptions to identify a structural function (e.g., a demand or production function) in a fully nonparametric context. Using Imbens and Newey [2009]'s control function framework we show identification and illustrate how our model's structure permits weaker support conditions than used by Imbens and Newey. We apply our results to production function estimation, finding non-Hicks neutral shocks that generate interesting heterogeneity in output elasticities and biased technological change as defined in Acemoglu [2002] and studied in Doraszelski and Jaumandreu [2018].

3. "The Identification Power of μ-Strong Concavity Assumptions and Sensitivity Analyses"

This paper derives a set of partial identification results for the mean treatment response and the average treatment effect when the μ-strong concavity assumption is combined with the MTR or the MTR-MTS assumption. μ-strong concavity is a generalization of the usual concavity assumption and the parameter μ can be seen as a measure of the strength of concavity. By tuning the value of the parameter μ a practitioner can conduct sensitivity analyses with respect to the concavity assumption. I illustrate my findings by reanalyzing the return to schooling example of Manski and Pepper [2000].

## WORK IN PROGRESS

1. "Nonparametric Estimation of Production Functions under Shape Restrictions with an Application to Allocative Efficiency" with Daniel Ackerberg

We propose a two-step nonparametric estimator of production functions. In the first step, we estimate the productivity shock from the input demand function using sieve MLE. In the second step, we estimate the production function using Bernstein polynomials after plugging in the estimated productivity shock. The use of Bernstein polynomials makes it easy to impose theory-based shape restrictions on the production function, such as monotonicity and concavity. With the shape restrictions, our second step is a disciplined convex programming (DCP) problem, which has attractive computational properties. Applying our estimator to commonly used production datasets, we find that, while the concavity restriction does not make much difference, imposing the monotonicity restriction can greatly reduce the dispersion of the estimated marginal productivity across firms, which implies much higher efficiency of resource allocation among firms.

2. "Production Function Estimation with Quality Adjustment"

## HONORS, SCHOLARSHIPS, AND FELLOWSHIPS

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|---|---|
| 2022 – 2023 | University of Texas Summer Fellowship |
| 2021 – 2022 | University of Texas Collaborative Research Fellowship |
| 2013 – 2015 | First-Class Scholarship, Shanghai Lixin University of Finance and Accounting |

## TEACHING EXPERIENCE

| *As Teaching Assistant* | *University of Texas at Austin* |
|---|---|
| Econometrics II (PhD Course) | 2019-2022 |
| Comparative Economic System (Undergraduate Course) | 2021 |
| Econometrics (MA Course) | 2020 |
| Probability and Statistics (MA Course) | 2020 |
| Real Analysis (MA Course) | 2019 |

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| Micro Theory for Business (Undergraduate Course) | 2018-2019 |
| Introduction to Econometrics (Undergraduate Course) | 2018 |
| International Economics (MA Course) | 2017 |

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| *As Grader* | *University of Texas at Austin* |
| Structural Econometrics (PhD Course) | 2021 |

## SKILLS

*Languages*: English (fluent) , Chinese (native)
*Software*: Python, LaTex, Stata, Matlab, R