

Final Review

Introduction to Econometrics, Spring 2023

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Information

- Exam Time: to be arranged
- Location: to be arranged
- Books and notes are not allowed. A calculator is an optional.
- You can also bring a **paper English-Chinese dictionary** rather than electronic one if you want use it.
- All questions are in English. And answers in either Chinese or English (or in both) can be accepted.
- **Time Management** is critical. Do not spend too much time on a single question.

Review: Review Lecture 0

- What is econometrics?
- Data Structure:
 - Cross section
 - Times series
 - Pool-Cross sections
 - Panel Data
- *Micro-Econometrics v.s Macro-Econometrics*

Review Lecture 1

- Main Missions of Empirical Work: Causality v.s. Forecasting
- A framework of Causal Inference
 - Rubin Causal Model
 - Randomized trial as the benchmark
 - RCT does not work in reality?
- Basic Probability and Statistics
 - LLW and CLT
 - Statistical Inference
 - Point estimation: Estimator and Estimate
 - Three Characteristics of an Estimator
 - Properties of the sample mean and the sample variance
 - Hypothesis Testing and P-Value
 - Confidence Interval and significance level
- Estimate and Hypothesis Tests for the Difference Between Two Means

Review Lecture 2

- Simple OLS:
 - OLS estimator β
 - R squares
- The Least Squares Assumptions:
 - Assumption 1
 - Assumption 2
 - Assumption 3
- Properties of the OLS estimator
 - The OLS estimator is unbiased, consistent and has asymptotically normal sampling distribution.

Review Lecture 3

- Multiple OLS Regression: Estimation
 - OVB Bias
 - Perfect multicollinearity: Assumption 4
 - Interpretation of coefficients
 - Partitioned regression: proof unbiasedness and consistence
 - Adjusted R-Squares
 - Categorical variables as X

Review Lecture 4

- Statistical Inference of β
 - *standard error of β*
 - Hypothesis concerning β
 - Confidence interval
- Multiple Regression: Hypotheses tests
 - Heteroskedasticity & homoskedasticity
 - Testing hypothesis on 2 or more coefficients: F-test

Review Lecture 5: Nonlinear Regression

- Polynomials, Logarithmic transformations and Interactions
 - How to explain these estimate coefficients?

Review Lecture 6: Binary Dependent Variable

- LPM, Logit and Probit
 - explain the estimate coefficient
 - Marginal effect
 - The pseudo-R²

Review Lecture 7 Assessing Regression Studies

- Internal validity v.s External validity
- Threats to internal validity
 - **Omitted variables bias**
 - Function form misspecification
 - **Measurement error**
 - Simultaneous causality
 - **Missing Data and Sample Selection**
 - **Heteroskedasticity and/or correlated error terms**
 - Significant coefficients

Review Lecture 8: Instrumental Variables

- Two assumptions:
- Statistical properties of 2SLS estimator
- Checking Instrument Validity
 - first stage: weak instrument
 - institutional background to argue
 - reduced form: exclusive restriction
 - more IVs: overidentification test
- Heterogeneous effect and LATE

Review Lecture 9: Regression Discontinuity Design

- RDD: Basic Ideas and Types
- Basic assumptions
- Check Validity of RDD

Review Lecture 10: Fixed Effects Model

- Fixed effect: assumption and estimation
- Fixed effect model meets measurement Error

Review Lecture 11: DID

- DID: basic idea and assumption
- TWFE variations and DID specifications.

Review Lecture 12: Matching and SCM

- Matching: basic idea and assumption
- Matching v.s OLS
- SCM: basic idea and assumption

Stay hungry. Stay foolish.

Steve Jobs

quote fancy



KEEP
CALM
AND
GOOD
LUCK