Introduction to Econometrics

Lecture 0: Introduction

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Introduction: A Scientific Framework of Making Rational Choice

What is Econometrics?

Why and who should take the course?

Logistics to the Course

The Structure of Economic Data

Homework (not required)
Introduction: A Scientific Framework of Making Rational Choice
An Complex and Dynamic World

- Living in an complex and dynamic world, we need making rational decisions.
Question #1 in Textbooks: Student’s Performance and Class Size

- Economics suggests important relationships, often with policy implications, but virtually never suggests quantitative magnitudes of causal effects.
- A Classical Issue in Economics of Education: Student’s Performance and Class Size
  - Turn it into an empirical or policy question: What is the quantitative effect of reducing class size on student achievement?
  - Like by 5 student per class? or 10?
Question #2: Discrimination in the Market?

- Discrimination is the situation where people who are presumed to be equally productive or have equally productive capacity, get treated differently by the market.

- Because of their gender, their religion, sexual orientation or the color of their skin, whatever even though these characteristics are irrelevant for the purpose being considered.
  - **Racial Discrimination** in the market for Home Loans.
  - **Gender Discrimination** in Labor Market
  - **Hukou Discrimination** in China

- To see if there is a difference in the probability of being denied for otherwise identical applicants and, if so, whether this difference is large or small.
Question #3: Cigarette Taxes and Smoking?

- Cigarette smoking is a major public health concern worldwide.
  - medical expenses of caring for those made sick by smoking.
  - nonsmokers breathe secondhand cigarette smoke.
- Basic economics says: cigarette prices go up, consumption will go down.
  - But by how much? If the sales price goes up by 1%, by what percentage will the quantity of cigarettes sold decrease?
  - The percentage change in the quantity demanded resulting from a 1% increase in price is **the price elasticity of demand**, the numerical value, which economic theory can never provide.
Other Similar Questions

- Air pollution and Health?
- Credit regulation on housing price
- Coupon on products sales
- Trade War...

*Living in such a “messy” world, we need making rational decisions.*
Many decisions in economics, business and government hinge on understanding the relationship among variables in the world around us.

- Economic theory may provide clues about the direction of the answer.
- But decisions require quantitative answers to quantitative questions.

Therefore, we have develop a framework and find a practical method that provide both a numerical answer to the question and a measure of how precise the answer is.
How can we make a rational choice?

- Anecdotes (轶事) or Intuition (直觉)
- Theory (理论/逻辑推理)
  - Systematical methodology: Hypothesis, Logical deduction...
- Empirics (数据实证)
  - statistical inference from data.
An Example: Smoke and Mortality

- Anecdotes (轶事) or Intuition (直觉)
  - eg. “My grandmother smoked two packs a day and lived until she was 95 years old.”

- Theory
  - 因为香烟中含有尼古丁、焦油等致癌物，所以...

- Empirics
  - 做实验或者通过抽样调查等方式收集数据，再用统计或计量方法来验证。
Classical Theory Question: Human Capital v.s Signal

- A common phenomenon in labor markets can be observed all over the world.
  - Higher education, Better pay!

- Two classical theory to explain
  - **Human Capital**: Education improves work productivity.
  - **Signal**: Education does not increase the productivity. It simply serves as a signal of the individuals’ innate ability.

- Question: which one is right?
Hot Public Policy Debate: Minimum Wage and Unemployment

- Classical Supply-Demand Model tell us

![Minimum wage on a classical market](image)

- Unemployment
- Deadweight loss
- Labour Supply
- Labour Demand (mRPL)

- $W_{\text{min}}$
- $W^*$

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Hot Public Policy Debate: Minimum Wage and Unemployment

- One famous empirical evidence challenged the theory by Card and Krueger(1994)
- They found that increases in the minimum wage do NOT lead to job losses.
Warp Up: Theory, Empirics and Math

- Economic theories sole are not enough to explain social phenomenon.
  - It should be tested by empirical evidence.
  - When having competing theories, we need more test to justify which one is more likely right.
- When mechanism is clear, math is unnecessary, but empirical evidence is unexpendabley.
  - Having a mathematical model is better, but sometimes not necessary…
An Scientific Workflow to Analyzing

- By Intuition: Propose meaningful or interesting questions (It does matter or we care about)
- By Theory: Obtain a preliminary conclusion or proposal an hypothesis
- By Empirics: use data and quantitative methods to test your theory or conclusion.

It is the job of Econometrics
What is Econometrics?
Introduction: Econometrics

- The term is attributed to
  - *Ragnar Frisch* (1895-1973);
  - 1969 Nobel Prize co-winner (the first year for Economics)
- Although the term coins by a combination of economics and metrology, it is special enough in social science and science at that time.
“Econometrics is by no means the same as economic statistics. Nor is it identical with what we call general economic theory, although a considerable portion of this theory has a definitely quantitative character. Nor should econometrics be taken as synonymous with the application of mathematics to economics. Experience has shown that each of these three view-points, that of statistics, economic theory, and mathematics, is a necessary, but not by itself a sufficient, condition for a real understanding of the quantitative relations in modern economic life. It is the unification of all three that is powerful. And it is this unification that constitutes econometrics.”

(Ragnar Frisch, *Econometrica*, 1933, volume 1, pages 1-2)
Introduction: Econometrics

- **Trygve Haavelmo (1911-1999)**
- 1989 Nobel Prize winner
- “The method of econometric research aims, essentially, at a conjunction of economic theory and actual measurements, using the theory and technique of statistical inference as a bridge pier.”

*(Econometrica, 1944, volume 12, pages 1-2)*
Introduction: Econometrics

James Stock and Mark Watson (2014)

“Ask a half dozen econometricians what econometrics is—you could get a half dozen different answers.”

“At a broad level, it is a science and art of using economic theory and statistical techniques to analyze economic data.”
My View: In general, a series of scientific methods to searching for economic logics from data.

It could include two jobs

- Making a causal inference, such as
  - Testing economic theories.
  - Estimating causal effects.
  - Using data to give policy recommendations.

- Forecasting or predicting future values

More and more prevalence in

- other social science such as political science, sociology, law and education studies etc
- and business practice, like the hottest one: Data Science.
Social science (firstly started by Economics) is experiencing two methodological "revolutions" over the past few decades.

On the one hand, there is the "credibility revolution"

- A movement that emphasizes the goal of obtaining secure causal inferences (Angrist and Pischke, 2010)

On the other hand, there is the "Big Data revolution"

- A movement that emphasizes that how our increasing ability to produce, collect, store and analyze vast amounts of data is going to transform our understanding of the human affairs. (Schonberger, 2013)

Obviously, Econometrics are playing a key role in these two revolutions.
The name comes from computer scientists working to do aggregation on data that is too big to fit on a single machine.

**Data Science** is the umbrella term for inference in a world that is messier than in old statistic textbooks.

**Big Data** is just *Applied Data Science*, especially focused on business and industrial applications.

- Inference the structural models: Variable Selection and Dimension Reduction
- **Prediction**: Probabilistic Prediction and Classification Rules

**Big Data tools**

- partially straight out of previous statistics and econometrics classes (Cluster, Regression, and Matching)
- some are totally new (such as decision trees and neural networks).
There are many labels for what we do...

- Econometrics
- Statistics
- Data Mining/Big Data/Data Science
- Machine Learning (ML)
- Artificial Intelligence (AI)

Along this spectrum, you move from heavy focus on what things you are measuring (what real phenomena they correspond to) to a more practical ‘useful is true’ pattern discovery approach.

The similarities are much bigger than any distinctions.
Econometrics: sub-fields or sub

- Theoretical Econometrics
  - It is concerned with methods, both their properties and developing new ones.
  - It is closely related to mathematical statistics, and it states assumptions of a particular method, its properties etc.
  - We could call *theoretical econometricians* as the *producer* of econometrics.

- Applied Econometrics
  - More orientated to applied work, such as choice of technique and interpretation of research finding.
  - But it should be also based on a solid conceptual foundation and some practical experiences plus a little bit skills of computer.
  - Most of us are the *consumers* of econometrics.
Why and who should take the course?
Why and who should take the course? Why important?

Why Econometrics is so important?

- Several Common Questions about Econometrics?
  - Why should we study econometrics?
  - How is studying econometrics helpful in understanding various problems?
  - especially, can one excel in the field without learning econometrics?

- The answer to the last question is simple.
  - NO! because one hardly to learn modern economics without the knowledge of econometrics.
Why Econometrics is so important?

- Econometrics is one of three core courses required in almost every department of economics.
- Econometrics is an important research field
  - Many Noble Prize winners
Who pursue an academic career

- Congratulations! You are in one of the most promising and internationalizing areas in economic research of China.
- Master econometrics knowledge will improve your research greatly.
- Your research is judged on how convincing it is.
- Econometrics helps ensure and formalize credibility.
- Overwhelming majority of top journal articles are quantitative.
Who enter industry job market

- Who want to work in industry: mastering econometrics can help you get a good job!
- A curious phenomenon: Why did the Wall Street hire more mathematics/statistics/economics graduates than anytime in history? Overwhelming financial data to analyze
- Credit cards, POS terminals and ERP systems widely used in supermarkets, banks and factories also revolutionize the business (or management) practices in marketing, accounting, management operation etc.
- A lot of internet giants even hire economists to lead their special R&D department. Such as
  - Google
  - Microsoft
  - eBay
- Besides in finance, **Big data** are also grow vigorously in Consulting and Business areas.
Who look for fun

- Introduction to Econometrics could not be a boring and demanding variant of a mathematics course, but **interesting and having fun**.
- You can just enjoy it by thinking in an empiricist’s way in your daily life.
  - have novel ideas or new perspectives about our world.
  - Econometrics is kind of a bible or philosophy of economists.
- We will cover many very interesting stories
  - Interesting Examples
    - Eg. Crime and Abortion in *Freakonomics* written by Steven Levitt.
    - Eg. What is the value to be the president’s son (or daughter)? in *Economic Gangster* written by Raymond Fisman and Edward Miguel.
Whoever and Whatever

Whoever you would like to be or whatever you want

Every choice you make has an opportunity cost, try your best to make a wise one.

“If today were the last day of my life, would I want to do what I’m about to do today?”

Steve Jobs
Whoever and Whatever

- Whoever you would like to be or whatever you want

  If you do what you enjoy doing you'll never have to work hard.

  — Mahatma Gandhi —

- Enjoy doing something seriously and cultivate a special quality for yourself!
You **SHOULD** learn or improve several important skills during college.

- **Hard Skills**
  - Language
  - Computer

- **Soft Skills**
  - Critical Thinking
  - Presentation and Writing
  - Teamwork

Fortunately, you will learn/practice almost all above skills in our class.
Conclusion

- In a word, *Introduction to Econometrics* is a very very very important and interesting course,
  - Please think over before you take it!
  - Once you take it, please work hard on it!
  - And please enjoy working hard on it!
Logistics to the Course
About Me and our TA

- My name is **Zhaopeng Qu**
  - Position and Affiliation: *Associate Professor, Institute of Population Studies, Business School.*
  - Research Fields: *Labor Economics and Applied Econometrics*
  - Office: Room 2017, Anzhong Building
  - Office Hour: Make an appointment in advance
  - Tel: 83621349
  - Email: qu@nju.edu.cn

- **TA:** Zixuan Zhang and Yi Wang
  - graduate students
  - good at *Stata*
  - Email: jl2017f@126.com(only for homework)

- **Online resources**
  - Our Course Website: [https://byelenin.github.io/Metrics_2019/](https://byelenin.github.io/Metrics_2019/)
  - Wechat group: discuss anything about the course.
Prerequisite

- I assume that you **should** be comfortable some basic concepts of **probability theory** and **statistics**, such as
  - random variable
  - expectation
  - variance
  - probability density function, p.d.f.
  - cumulative distribution function, c.d.f
  - covariance
  - L.L.N and C.L.T
  - Estimator
  - Unbiased and Consistent
  - Asymptotic Normality
  - Hypothesis test

- We will not review these basic concepts and formulas in the lectures, may be in the recite sections by TAs (it depends). **You should review it by yourself anyway.**
Reference Textbooks

- 影印版：格致出版社 / 上海人民出版社。
- 中文版：世纪出版集团 / 上海人民出版社。
Reference Textbooks

- Supplementary textbook
Computing Tools

- The main computing tools used in the course are **Stata** and **R**, optionally.
  - **Stata** is a complete, integrated statistical package that provides everything you need for data analysis, data management, and graphics.
  - **R** is a free software and useful for statistical study and econometrics.
Reference Books for Software

- Stata Instruction
  - 任何一本中文书或英文书。

- R Instruction
  - 任何一本中文或英文书。
  - too many resources online such as Datacamp
Interesting Books for Reading

- Steven D. Levitt and Stephen J. Dubner, *SuperFreakonomics: Global Cooling, Patriotic Prostitutes, and Why Suicide Bombers Should Buy Life Insurance*, 2009.（中译本，《超爆魔鬼经济学》，斯蒂夫・列维特、斯蒂芬・都伯纳著，中信出版社，2010年1月。）
- Ian Ayres, *Super Crunchers: Why Thinking-By-Numbers is the New Way To Be Smart*, 2007.（中译本《超级数字天才》，伊恩・艾瑞斯著，中国青年出版社，2008年1月。）
What I promise to offer you

- Prepare lectures as well as possible.
- One to one interaction on topics covered in the course, especially for your own topics.
- Help you start to using Stata or R to analyze some popular data sets in China.
- A good score?
  - It depends on you.
What I expect to you

- Class participation with a little bit aggressive attitude.
  - More questions, more scores!
  - Interrupt me as often as necessary! (but I know most of you are not comfortable to this)
  - Got a dumb question? Please assume that you are the smartest person in the class, and you eventually will be!
- Read required materials and finish homeworks.
Evaluation

- Class Participation (10%)
- Homework (20%)
- Independent (or Team) Project Report (30%)
- Final Exam: (40%)
Welcome contact me and TAs

Any Questions?
The Structure of Economic Data
Introduction

Data Structure

- Cross-sectional data
- Time series data
- Pooled cross-sectional data
- Panel data
1. Cross-Sectional Data: (Main Focus)

- Units: individuals, households, firms, cities, states, countries, etc.
- Data on *multiple* agents at a *single* point in time

\[ \{x_i, y_i \ldots\}_{i=1}^{N}; \quad N = \text{Sample Size} \]

- Usually obtained by random sampling from the underlying population. It means

\[ \{x_i, y_i \perp x_j, y_j\}, \quad i \neq j \in N \]

- Cross-sectional data are widely used in economics and other social sciences:
  - labor economics
  - public finance
  - industrial economics
  - urban economics
1. Cross-Sectional Data: (Main Focus)

**TABLE 1.1** Selected Observations on Test Scores and Other Variables for California School Districts in 1999

<table>
<thead>
<tr>
<th>Observation (District Number)</th>
<th>District Average Test Score (fifth grade)</th>
<th>Student–Teacher Ratio</th>
<th>Expenditure per Pupil ($)</th>
<th>Percentage of Students Learning English</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>690.8</td>
<td>17.89</td>
<td>$6385</td>
<td>0.0%</td>
</tr>
<tr>
<td>2</td>
<td>661.2</td>
<td>21.52</td>
<td>5099</td>
<td>4.6</td>
</tr>
<tr>
<td>3</td>
<td>643.6</td>
<td>18.70</td>
<td>5502</td>
<td>30.0</td>
</tr>
<tr>
<td>4</td>
<td>647.7</td>
<td>17.36</td>
<td>7102</td>
<td>0.0</td>
</tr>
<tr>
<td>5</td>
<td>640.8</td>
<td>18.67</td>
<td>5236</td>
<td>13.9</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>418</td>
<td>645.0</td>
<td>21.89</td>
<td>4403</td>
<td>24.3</td>
</tr>
<tr>
<td>419</td>
<td>672.2</td>
<td>20.20</td>
<td>4776</td>
<td>3.0</td>
</tr>
<tr>
<td>420</td>
<td>655.8</td>
<td>19.04</td>
<td>5993</td>
<td>5.0</td>
</tr>
</tbody>
</table>

*Note: The California test score data set is described in Appendix 4.1.*

$x = STRatio; \quad y = TestScore; \quad N = 420$
2. Time Series Data: (Not Cover)

- Observations on a variable (or several variables) over time, thus data on a single agent at multiple points in time

\[ \{x_t, y_t \ldots \}^{T}_{t=1}; \ T = \text{Sample Size} \]

- Examples:
  - stock prices
  - money supply
  - consumer price index (CPI)
  - gross domestic product (GDP)
  - automobile sales

- Economic observations can rarely be assumed to be independent across time. So we have to account for the dependent nature of economic time series.
  - Data frequency: minutes, hourly, daily, weekly, monthly, quarterly, annually.
2. Time Series Data: (Not Cover)

### TABLE 1.2
Selected Observations on the Growth Rate of GDP and the Term Spread in the United States: Quarterly Data, 1960:Q1–2013:Q1

<table>
<thead>
<tr>
<th>Observation Number</th>
<th>Date (year:quarter)</th>
<th>GDP Growth Rate (% at an annual rate)</th>
<th>Term Spread (% per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1960:Q1</td>
<td>8.8%</td>
<td>0.6%</td>
</tr>
<tr>
<td>2</td>
<td>1960:Q2</td>
<td>−1.5</td>
<td>1.3</td>
</tr>
<tr>
<td>3</td>
<td>1960:Q3</td>
<td>1.0</td>
<td>1.5</td>
</tr>
<tr>
<td>4</td>
<td>1960:Q4</td>
<td>−4.9</td>
<td>1.6</td>
</tr>
<tr>
<td>5</td>
<td>1961:Q1</td>
<td>2.7</td>
<td>1.4</td>
</tr>
<tr>
<td>211</td>
<td>2012:Q3</td>
<td>2.7</td>
<td>1.5</td>
</tr>
<tr>
<td>212</td>
<td>2012:Q4</td>
<td>0.1</td>
<td>1.6</td>
</tr>
<tr>
<td>213</td>
<td>2013:Q1</td>
<td>1.1</td>
<td>1.9</td>
</tr>
</tbody>
</table>

*Note: The United States GDP and term spread data set is described in Appendix 14.1.*
3. Pool (Repeat) Cross-Sectional Data (Pseudo- Panels) (Not Cover)

- Pooled cross sections can be generated by combining two or more years cross-sectional data.
- Cross-sectional data in each year is independent with other years.
  - It means that data does not track the respondent multiple times.
  - But the data come from a same population in different time.
- For it has both cross-sectional and time series features, so allows consideration of changes in key variables over time.
- Simple pooling may also be used when the number of observations of a single cross section is small.
- It is widely used in:
  - Before-after comparisons of a government policy
  - Cohort studies
  - Cross-sectional analyses
### 3. Pool Cross-Sectional Data (Not Cover)

**Table 1.4: Pooled Cross Sections: Two Years of Housing Prices**

<table>
<thead>
<tr>
<th>obsno</th>
<th>year</th>
<th>hprice</th>
<th>proptax</th>
<th>sqft</th>
<th>bdrms</th>
<th>bthrms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1993</td>
<td>85500</td>
<td>42</td>
<td>1600</td>
<td>3</td>
<td>2.0</td>
</tr>
<tr>
<td>2</td>
<td>1993</td>
<td>67300</td>
<td>36</td>
<td>1440</td>
<td>3</td>
<td>2.5</td>
</tr>
<tr>
<td>3</td>
<td>1993</td>
<td>134000</td>
<td>38</td>
<td>2000</td>
<td>4</td>
<td>2.5</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>250</td>
<td>1993</td>
<td>243600</td>
<td>41</td>
<td>2600</td>
<td>4</td>
<td>3.0</td>
</tr>
<tr>
<td>251</td>
<td>1995</td>
<td>65000</td>
<td>16</td>
<td>1250</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>252</td>
<td>1995</td>
<td>182400</td>
<td>20</td>
<td>2200</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>253</td>
<td>1995</td>
<td>97500</td>
<td>15</td>
<td>1540</td>
<td>3</td>
<td>2.0</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>520</td>
<td>1995</td>
<td>57200</td>
<td>16</td>
<td>1100</td>
<td>2</td>
<td>1.5</td>
</tr>
</tbody>
</table>
4. Panel (or Longitudinal) Data

- Time series for each cross-sectional member in the data set, thus data on multiple agents at multiple points in time.
- The same cross-sectional units (individuals, firms, countries, etc.) are followed over a given time period.

\[ \{x_{it}, y_{it} \ldots\}^{NT}_{i=1, t=1}, \]

- Advantages of panel data:
  - Controlling for (time-invariant) unobserved characteristics
  - Consideration of the effects of lag variables
### 4. Panel (or Longitudinal) Data

**TABLE 1.3**

<table>
<thead>
<tr>
<th>Observation Number</th>
<th>State</th>
<th>Year</th>
<th>Cigarette Sales (packs per capita)</th>
<th>Average Price per Pack (including taxes)</th>
<th>Total Taxes (cigarette excise tax + sales tax)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alabama</td>
<td>1985</td>
<td>116.5</td>
<td>$1.022</td>
<td>$0.333</td>
</tr>
<tr>
<td>2</td>
<td>Arkansas</td>
<td>1985</td>
<td>128.5</td>
<td>1.015</td>
<td>0.370</td>
</tr>
<tr>
<td>3</td>
<td>Arizona</td>
<td>1985</td>
<td>104.5</td>
<td>1.086</td>
<td>0.362</td>
</tr>
<tr>
<td>47</td>
<td>West Virginia</td>
<td>1985</td>
<td>112.8</td>
<td>1.089</td>
<td>0.382</td>
</tr>
<tr>
<td>48</td>
<td>Wyoming</td>
<td>1985</td>
<td>129.4</td>
<td>0.935</td>
<td>0.240</td>
</tr>
<tr>
<td>49</td>
<td>Alabama</td>
<td>1986</td>
<td>117.2</td>
<td>1.080</td>
<td>0.334</td>
</tr>
<tr>
<td>96</td>
<td>Wyoming</td>
<td>1986</td>
<td>127.8</td>
<td>1.007</td>
<td>0.240</td>
</tr>
<tr>
<td>97</td>
<td>Alabama</td>
<td>1987</td>
<td>115.8</td>
<td>1.135</td>
<td>0.335</td>
</tr>
<tr>
<td>528</td>
<td>Wyoming</td>
<td>1995</td>
<td>112.2</td>
<td>1.585</td>
<td>0.360</td>
</tr>
</tbody>
</table>
Corresponding sub-fields or sub-course

- Micro-Econometrics
  - Cross-Sectional
  - Pool Cross Sectional
  - Short Panel (large $N$, small $T$)
- Macro-Econometrics
  - Times series
  - Long Panel (small $N$, large $T$)
Source

- Traditional Collecting Way:
  - Survey (调査)
  - Administrative data (官方业务数据)
- Collecting Data in Digital Times:
  - Mass or Big data:
    - Online documents
    - Social Media
    - Geolocations or Geographic data
  - High Frequency Data
    - Stock, future or other financial tractional data
Data in China

- **Survey Data**
  - China Household Income Project (CHIP)
  - China Family Panel Survey (CFPS)
  - China Health and Retirement Longitudinal Study (CHARLS)

- **Administrative data**:
  - Census: 全国人口普查数据; 全国 1% 人口抽样调查;
  - 工业企业数据库;
  - 海关交易数据库;

- **Online data**:
  - Taobao, JD, Tmall
  - Movie Data on Douban.com (豆瓣电影数据)
  - Air Quality: PM2.5 (空气质量数据)
  - Night-Lights Data (夜间灯光数据)
  - Land Transaction Markets (土地交易市场数据)
Homework (not required)
到如下数据库网站选择其一登记注册

- China Household Income Project (CHIP): 中国居民收入调查
- China Health and Nutrition Survey (CHNS): 中国健康与营养调查
- China Family Panel Survey (CFPS): 中国家庭追踪调查
- China Health and Retirement Longitudinal Study (CHARLS): 中国健康养老追踪调查
- Chinese General Social Survey (CGSS): 中国综合社会调查
- China Labor-force Dynamics Survey (CLDS): 中国劳动力动态调查
- China Household Financial Survey (CHFS): 中国家庭金融调查
Homework

- 了解调查的目的和主要内容，以及抽样范围、方式、样本量等等基本信息，判断该数据属于哪种数据结构。
- 下载调查的问卷，详细了解调查有哪些具体的信息。
  - 首先确定自己感兴趣的问题，然后到问卷中去寻找。
  - 或者先看问卷，找到自己感兴趣的具体信息。
  - 下载相应数据，进行初步的数据清理和统计分析 (待上机课之后)
  - 为期末的研究项目做准备。