Research Methodology 03 -Data Collection-

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Chihiro Shimizu (清水千弘) シンガポール国立大学 Professor, Institute of Real Estate Studies National University of Singapore



0. Outline of Today's Lecture

METHODS OF DATA COLLECTION
 SAMPLING
 ERROR IN PROPERTY PRICE DATA

Today's Stat: Descriptive Statistics: Tabular and Graphical Presentations

Today's Case:

"Green Luxury Goods? The Economics of Eco-Labels in the Japanese Housing Market"

1. METHODS OF DATA COLLECTION

• Type of Data

- Primary data vs. secondary data
- Time series data vs. Cross-section data= Panel data
- Categorical data vs. Numerical data
- Discrete data vs. Continuous data

• <u>Methods</u>

- Qualitative vs. Quantitative Research
- Triangulation method
- Interviews

Types of Data



Measurement Levels



(1) Primary data vs. secondary data

- The reliability of managerial decisions depends on the quality of data.
- Data: Primary data vs. secondary data.
- **<u>Primary data</u>**: The data which are collected from the field under the control and supervision of an investigator is known.
- <u>Secondary data</u>: If data are collected from journals, magazines, government publications, annual reports of companies, etc.
- R. Panneerselvam (2014), "Research Methodology" Chap 2.

(2) Primary data

<u>- Observation Method</u>

-Personal Interview

• \rightarrow Personal interview is a survey method of data collection which employs a questionnaire.

• <u>-Telephone Interview</u>

• \rightarrow Telephone interview is considered to be a cost effective and dominant data collection method.

- Mail Survey

• \rightarrow Mail survey is a data collection method in which questionnaires are mailed to potential respondents.

Observation Method

- The investigator will collect data through personal observations.
- **Example1** : Survey on the organizational climate
- \rightarrow The investigator will speak to the employees at different levels of the organization, observe the behaviour of the employees to assess the organizational climate.
- **Example2**: The case of work sampling in a shop floor to determine the standard time of a job which is manufactured by a set of machines.
- \rightarrow The investigator observes the state of these machines through random sampling.

- Observation method of data collection deals with the recording of the behaviour of respondents/ sampling units.
- In this method, the investigator will observe the behaviour of the respondents in disguise.

Personal Interview

- \rightarrow Personal interview is a survey method of data collection which employs a questionnaire.
- a) Door-to-door interview.
- b) Executive interview.
- c) Mall intercept surveys.
- d) Self-administered interview.

Telephone Interview

- -The travel time of interviewers is totally eliminated.
- -The cost of travel of interviewers is also eliminated.
- -Greater possibility of reaching the customers all over the geography.
- -Total time of conducting the interview of the sample is least when compared to other methods.
- -Greater possibility of random selection of respondents among the population having telephone connection.
- -There is a greater probability of reaching the respondent unlike the nonresponse problems of personal interview.

Mail Survey

- Mail survey is a data collection method in which questionnaires are mailed to potential respondents who in turn fill and return them at their convenience. This method has the following advantages:
- -Less cost of data collection
- -Less time of data collection
- -Wider coverage of population
- -Better accuracy of data Absence of interviewer's bias.

- Disadvantage:
- -The identity of the respondents is not known to the interviewers.
- -The questionnaire may be filled in by the assistant/ family members of the respondent.
- -Some respondents may not return filled-in questionnaires.
- -There may be delay from the part of the respondents in returning the filled-in questionnaires.

(3) Secondary data.

- Secondary data are collected from sources which have been already created for the purpose of first-time use and future uses.
- a)Internal Sources of Secondary Data
- -Sales records
- -Marketing activity
- -Cost information
- -Distributor reports and feedback
- -Customer feedback.

- b) External Sources of Secondary Data
- Various external sources of secondary data are government publications, foreign government publications, journals, publications of trade associations, books, magazines, newspapers, annual reports, research reports in universities, industry handbook, publications of statistics department, census data, Singapore Agricultural Statistics, index number of wholesale prices in Singapore, Reserve Bank of Singapore, etc.
- Publications from UNESCO, WHO, ILO,UNITED NATINS, OECD, IMF, BIS.

Example of secondary data

Income category	Number of respondents (frequency)		
Low Income	300		
Medium income	200		
High income	100		

Table 2.1 Discrete Frequency Distribution

Table 2.2 Continuous Frequency Distribution

Monthly income (in rupees) (class interval)	Number of respondents (frequency)
0-5000	20
5000-10000	30
10000-15000	40
15000-20000	60
20000-25000	30
25000-30000	20

(in rupees) (class interval)	Number of respondents (frequency)	Cumulative frequency
0-5000	20	20
5000-10000	30	50
10000-15000	40	90
15000-20000	60	150
20000-25000	30	180
25000-30000	20	200

Table 2.3 Cumulative Frequency Distribution

Table 2.4 Relative Frequency Distribution

Monthly income (in rupees) (class interval)	Number of respondents (frequency)	Relative frequency
0-5000	20	20/200 = 0.10
5000-10000	30	30/200 = 0.15
10000-15000	40	40/200 = 0.20
15000-20000	60	60/200 = 0.30
20000-25000	30	30/200 = 0.15
25000-30000	20	20/200 = 0.10

Example:

- Mark Fleming, Chief Economics, First American.
- The big surprise in todays existing-home sale report was not the rebound from November, everyone expected that, but that the months supply declined dramatically. Low inventories and continued low rates is a recipe for strong price gains again in 2016.
- See. 160128Lec03_NewsUS.pdf



7:00 AM ET: The Mortgage Bankers Association (MBA) will release the results for the **mortgage purchase applications index**.

10:00 AM: **New Home Sales** for December from the Census Bureau.

This graph shows New Home Sales since 1963. The dashed line is the November sales rate.

The consensus is for a increase in sales to 500 thousand Seasonally Adjusted Annual Rate (SAAR) in December from 490 thousand in November.



OECD



IMF





BIS



http://www.oecd.org/eco/outlook/focusonhouseprices.htm



http://www.bis.org/statistics/pp_long.htm

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Banking		long series on nominal residential property prices					
Securities							
Derivatives	-	Updated 20 November 2015					
Global liquidity indi	icators	The long series on nominal residential property prices provides quarterly information on nominal residential property prices for 18 advanced economie:					
Credit to the non-fin	nancial	Our data • Long series on nominal residential property prices - data for Q2 2015 [2], including series for five emerging market countries (xlsx, 67 kb, updated 2)					
Debt service ratios		 Long series on nominal residential property prices - documentation (2) (5 pp, 102 kb) 					
External debt		The data set for the long series of nominal residential property prices can also be downloaded in a single CSV file.					
Property prices	4	The series has been constructed using data provided by various sources, including central banks, national statistical offices, research institutes, private c series can make use of different methodologies and cover different geographical areas and types of dwellings.					
Selected series (nom	ninal &	The BIS has compiled the long series on residential property prices on a best-efforts basis but cannot guarantee their accuracy.					
real) Long series (nominal	ι)	Any use of the long series shall be cited as follows: "Sources: National sources, BIS Residential Property Price database, www.bis.org/statistics/pp.htm."					
Effective exchange i	rates	Research and analysis					
Payment systems		In the September 2014 issue of the BIS Quarterly Review, the article on " <u>Residential property price statistics across the globe</u> " covered diversity in the cl property price statistics, and house prices as an input to economic analysis.					
Foreign exchange m	arkets	View more analysis					
		Contact					
		For queries regarding property price statistics, please write to property.prices\$bis.org (where "\$" denotes "@").					

http://www.imf.org/en/Data

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whats new	Popular Dala	Can be found in these online sources International Statistics (SS) - in - Borry data Induces of Provide Statistics (SS) - in - Borry data
The IMF released the third quarter	World Economic Outlook October 2015	Direction of Node Statistics (DOTS) - in e-Monry data World Economic Outlook databare (WDD)
2015 currency composition of official foreign exchange reserves (COFER)	Global Financial Stability Report October 2015	Winnenders finanzu di dai yuonty Winnender Joint external debt hab
on December 50, 2015.	Fiscal Monitor Analytical Chapter April 2015	Not sure where to find what you're looking for?
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Prices and Purcha	asing Power Parities
Productivity	
Public Sector, Tax Regulation	ation and Market
Regions and Citie	S
Science, Technol	ogy and Patents
Social Protection	and Well-being
Transport	

Welcome to OECD.Stat

OECD.Stat includes data and metadata for OECD countries and selected non-member economies.

Ways to access the data:

- By keyword using "search" (e.g. GDP, FDI, Health, unemployment, income distribution, population, labour, education,
- By selecting data in the left-hand menu (popular queries or data by theme)
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http://data.worldbank.org/



World Bank Open Data: free and open access to data about development in countries around the globe.



http://data.worldbank.org/indicator

Economy & Growth

Agriculture, value added (% of GDP)	Gross savings (% of GDP)
Cash surplus/deficit (% of GDP)	Imports of goods and services (% of GDP)
Central government debt, total (% of GDP)	Industry, value added (% of GDP)
Charges for the use of intellectual property, payments (BoP, current US\$)	Inflation, consumer prices (annual %)
Charges for the use of intellectual property, receipts (BoP, current US\$)	Inflation, GDP deflator (annual %)
Current account balance (BoP, current US\$)	Net bilateral aid flows from DAC donors, Korea, Rep. (current US\$)
Exports of goods and services (% of GDP)	Net ODA received (% of GNI)
External debt stocks, total (DOD, current US\$)	Net ODA received per capita (current US\$)
Foreign direct investment, net inflows (BoP, current US\$)	Net official development assistance received (current US\$)
GDP at market prices (current US\$)	Personal remittances, received (current US\$)
GDP growth (annual %)	Portfolio equity, net inflows (BoP, current US\$)
GDP per capita (current US\$)	Revenue, excluding grants (% of GDP)
GNI, Atlas method (current US\$)	Secondary income, other sectors, payments (BoP, current US\$)
GNI per capita, Atlas method (current US\$)	Services, etc., value added (% of GDP)
GNI per capita, PPP (current international \$)	Total debt service (% of exports of goods, services and primary income)
GNI, PPP (current international \$)	Total reserves (includes gold, current US\$)
Gross capital formation (% of GDP)	Trade in services (% of GDP)

(3) Type of numerical data.

Time Series Data: Japan

code	t	RPI	CPI	GDP	GDPPW	TPOP
JPN	2000	139.20	102.69	92.68	87.48	99.04
JPN	2001	134.16	101.87	93.01	88.01	99.28
JPN	2002	128.68	100.53	93.28	88.50	99.51
JPN	2003	120.52	100.70	94.85	90.28	99.73
JPN	2004	113.18	100.69	97.09	92.92	99.76
JPN	2005	107.95	100.42	98.35	94.72	99.77
JPN	2006	104.49	100.66	100.02	96.93	99.83
JPN	2007	103.38	100.72	102.21	99.68	99.95
JPN	2008	100.35	102.10	101.15	99.38	99.99
JPN	2009	97.87	100.73	95.55	94.70	99.98
JPN	2010	100.00	100.00	100.00	100.00	100.00

Cross- section Data:10countries in 2000.

code	t	RPI	CPI	GDP	GDPPW	TPOP
JPN	2000	139.2	102.69	92.68	87.48	99.04
KOR	2000	82.15	73.1	64.87	69.12	95.14
HKG	2000	61.95	95.83	67.09	73.88	94.89
AUS	2000	55.84	74.39	74.15	86.24	86.93
NZL	2000	61.05	77.58	77.56	88.8	88.67
DNK	2000	77.36	81.68	93.33	95.09	96.25
FIN	2000	73.42	85.88	84.5	86.81	96.51
IRL	2000	95.54	78.38	78.38	94.39	83.44
NOR	2000	64.15	81.94	86.36	96	91.85
SWE	2000	55.91	86.23	81.19	87.14	94.6
GBR	2000	62.16	81.26	84.26	90.7	93.83

Panel Data: Japan, United States, and United Kingdom from 2000-2010.

code	t	RPI	CPI	GDP	GDPPW	TPOP
JPN	2000	139.2	102.69	92.68	87.48	99.04
JPN	2001	134.16	101.87	93.01	88.01	99.28
I F N	2002		100.53	97 7X 97 119		UU 73 UU 73 UU 76
	3883	114 49	100 55		94 77 96 93 99 6x	
IPN IPN	2009	97.87	100 73	95 55	94 7	99 98
IPN	2007	100	100.75	100	100	100
	2010	(2.1)	01.26	94.26	00.7	02.02
GBK	2000	62.16	81.26	84.26	90.7	93.83
GBR	2001	66.44	82.23	86.5	92.49	94.19
				XX 6 / U/1 / 		
EBB	<i>31111</i> 2	146.58	8744	111'/ \$ý	1112 28	
GBR	2009	96.33	96.81	98.12	98.63	99.22
GBR	2010	100	100	100	100	100
USA	2000	94.51	78.97	84.96	94.27	91.22
USA	2001	100.44	81.2	85.79	93.98	92.13
I ISA	细胞系	153 \$4	×4 65		46 26	U / UX U/1 66
USA	2009	102.38	98.39	97.53	98.2	99.17
USA	2010	100	100	100	100	100

(4) Questionnaire Design

- The success of survey methods depends on the strength of the *questionnaire* used.
- A questionnaire consists of a set of <u>well-formulated</u> <u>questions</u> to probe and obtain responses from respondents.
- If the researcher is not clear about the kind of measurements to be made, then the questionnaire will suffer from ambiguous questions. So the answers to these questions will have no value for the study. This amounts to *garbage-in and garbage-out*.
- The researcher should define different <u>hypotheses</u> for various issues of the research which in turn help him/ her to decide about the measurements to be made.

Formulation of questions and format

- a) Open-ended questions,
- \rightarrow The interviewer writes the answer of the respondent verbatim.
- **b) Close-ended questions** and
- c) Structured questions.
- \rightarrow Close-ended questions are structured questions.
- -Questions with multiple responses out of which the respondents have to select one or more choices.
- -Questions with rating scale with discrete responses or continuous range.

Questions with multiple responses out of which the respondents have to select one or more choices.

What is the number of dependents with you? (a) None (b) One (c) Two (d) Three (e) Four and above.

Questions with rating scale with discrete responses or continuous range.

Question: "Joint family system leads to better GDP of a nation."

- (a) Strongly agree
- (c) Strongly disagree
- (e) Neither agree nor disagree.

- (b) Moderately agree
- (d) Moderately disagree

An extreme form of close-ended question.

Have you used any one of our company's products? (a) Yes (b) No

Example of question. : R. Panneerselvam (2014), Chap 2.

A SAMPLE QUESTIONNAIRE A study was conducted for a tele-services company to find the expectations of customers using telephone booths at Chennai and their profiles. The format of the questionnaire used in this study is presented below: QUESTIONNAIRE STUDY ON CUSTOMER EXPECTATIONS AND PROFILES OF PCO BOOTHS AT CHENNAI Address of Telephone Booth: Customer's personal profile: 1. NAME: 2. AGE: (a) Up to 18 yrs (b) 19-24 vrs (c) 25-35 yrs (d) 36-45 yrs (e) 46-55 yrs (f) More than 55 yrs. 3. GENDER: (a) Male () (b) Female (). 4. MONTHLY HOUSEHOLD INCOME: (a) Less than Rs. 5000 (b) Rs. 5000-10000 (c) Rs. 10000-15000 (d) Rs. 15000-25000 (e) More than Rs. 25000. 5. OCCUPATION: (a) Service sector (b) Government (d) Private (c) Public (e) Business (f) Student/housewife (g) Others (specify). If business, tick one of the following: (a) Trading (b) Manufacturing (c) Retail (d) Service industry (e) Others (specify). Are you operating from Chennai? Yes() No () If None, mention your base city:_



```
6. Do you have an STD/ISD connection at home/office?
   (a) If yes, why do you come to PCO booth to make calls?
   (b) If no, why?
            Go to item 8.
   7. Are you planning to get a telephone service along with a STD/ISD facility in the
    near future?
   (a) If yes, why?
   (b) If no, why?
   8. Are you aware of the charge rates at different timings?
   (a) If yes, mention them .....
   (b) No
9. At what time do you make STD calls?
   (a) Morning
                                 (b) Afternoon
                                 (d) Night
   (c) Evening
10. At what time do you make ISD calls?
   (a) Morning
                                 (b) Afternoon
   (c) Evening
                                (d) Night
11. What is your average weekly spending on PCO calls?
   (a) Less than Rs. 50
                                 (b) Rs. 50-100
   (c) Rs. 100-250
                                (d) Rs. 250-500
   (e) Rs. 500-1000
                                 (f) More than Rs. 1000
12. Are you satisfied with the billings at PCO?
   (a) Yes ()
                                 (b) No ()
   If No, give reasons:
   13. What are your general expectations from PCO billings?
   14. Have you encountered any PCO booth with tampered billings?
   (a) Yes ()
                                 (b) No ()
15. Rank your order of preference of expectation from 1-6 at PCO booths?
   (a) Good aeration ()
                                 (b) Privacy ()
```

	(c) Good seating facility ()	(d) Recreation ()						
	(e) Accurate billing ()	(f) Exact changes ().						
	Any other, specify:							
16.	"Privacy of conversation at PCO booths can be guaranteed."							
	(a) Strongly agree	(b) Moderately agree						
	(c) Strongly disagree	(d) Moderately disagree						
	(e) Neither agree nor disagree	Decrement according for provide an and						
17.	"Some may feel that coming to PCO booths to make calls is below the dignity of a person."							
	(a) Strongly agree	(b) Moderately agree						
	(c) Strongly disagree	(d) Moderately disagree						
	(e) Neither agree nor disagree.							
18.	List the inconveniences faced by you at PCO booths.							
	THANK FOR YOUR	COOPERATION						

(5) Process of Questionnaire.

- -Pre-testing of questionnaire
- Once the questionnaire is ready, it should be pre-tested through a pilot survey involving the respondents in the proposed sampling frame. This exercise is mainly intended to test the degree of understanding the meaning of the questions, difficulty in understanding the questions by the respondents if the meaning of the questions are conveyed correctly, to check the relevance of the questions, to ascertain the interest of the respondents, etc.
- -Review of questionnaire for improvements
- The purpose of pre-testing of questionnaire is to obtain information to improve its content, format and sequence. Based on the information, the questionnaire should be revised in its format, content and sequence for final use in the survey.

2. SAMPLING

- In the Singapore Constitution, it is specified that a survey meeting the previously mentioned criteria must be carried out every 10 years.
- In the decennial census, statistics are produced about a *population* by asking people questions. *No sampling*, though, is involved; data are supposed to be collected about every person in the *population*.
- →Number of people in the House of Representatives, age, how household members etc.

Examples of Populations

- Names of all registered voters in Singapore
- Incomes of all families living in Singapore
- Annual returns of all stocks traded on the Singapore Stock Exchange
- Grade point averages of all the students in NUS

Sample survey

- The measurement of public opinion for newspaper and magazine articles, the measurement of political perceptions and opinions to help political candidates in elections, and market research designed to understand consumer preferences and interests. (Survey by private sector)
- Unemployment rates, as routinely released by the Bureau of Labor Statistics, as well as many other statistics about jobs and work, are based on household surveys (Current Population Surveys) carried out by the Bureau of the Census. Parallel surveys of businesses and industries are carried out to describe production and labor force needs.
- <u>The National Health Interview Survey, Income Survey</u>
- \rightarrow <u>Sampling</u>

Population vs. Sample



3. COMPONENTS OF SURVEYS

- Like all measures in all sciences, social survey measurement is *not error free*. The procedures used to conduct a survey have a major effect on the likelihood that the resulting data will describe *accurately* what they are intended to describe.
- A sample survey brings together three different methodologies: *sampling, designing questions, and data collection.*
- Each of these activities has many applications outside of sample surveys, but their <u>combination is essential to good</u> <u>survey design</u>.

New data from Industries.

Employment-related indices in "Yellen's Dashboard"

There are a group of indices called Yellen's Dashboard in USA, which Chair Yellen uses for economic assessment. The market participants also focus on the set of economic indices.



cshimizu@nus.edu.sg

600 400

200

-200

-400

0

2013

2013

- Others

- - Monitor or Internet survey
- -Web Scribing or clipping
- -Scanner data
- -Credit card record
- -Point

Financial Times: Daily Index

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Why Shinzo Abe could nix tax hike two

Ben McLannahan Author alerts Nov 16 16:12 2 comments

For clues as to why Japan's prime minister seems very keen to avoid another consumption tax increase so soon after the last, you could look at a whole host of economic indicators – third-quarter GDP, consumer confidence surveys, industrial production or housing starts.

Or you could just examine charts put together by Tsutomu Watanabe, a Tokyo University professor who has spent much of the past six years poring over point-of-sales data from supermarkets.

A glance at his UTokyo Daily Price Indices suggests that the April 2014 tax hike – from 5 per cent to 8 per cent – has had just as chilling an effect on consumer demand as the last one, in April 1997.

Back then, when Japan lifted the tax from 3 per cent to 5 per cent, the economy was in recession within a year, with weakness exacerbated by implosions in Japan's banking sector and the effects of the regional currency crisis. Deflation took a grip not long after that.

As government officials pushed for this year's increase, they swore that the same thing could not happen again. Not only was Asia in a much better state, they said, but the Bank of Japan was pumping unprecedented amounts of liquidity and the finance ministry was easing the extra burden on households through the biggest fiscal stimulus package it could muster.

But according to Prof Watanabe's crunching of daily price data — gathered from scans of hundreds of thousands of taxable items sold at about 300 supermarkets around the country, and collected by a unit of Nückei Inc, the publishing firm — there are still strong similarities in the apparent effects of the hiles of '97 and '14.

The two indices show the same basic pattern: a confident pass-through of the full tax (and then some) in early April, an instant snap-back, then a patchy recovery which peters out by early June. Thereafter, prices are falling, year-on-year.



The '97 tax increase was recognised as a big failure but the two lines are more or less the same," says Prof Watanabe, a former BoJ official with a Harvard doctorate in economics.

Within a few months, "prices started to decline and decline."

There are some big differences between the UTokyo index and the official government CPI hasket, which shows a steady fall in underlying inflation – excluding taxes – from 1.5 per cent in April to 1.0 per cent in September. While the government tracks the price of one particular brand of shampoo, for example, the UTokyo tracks an average of about 300 brands, weighed by volume. That means it has probably had more of a downward bias than the official index in the wake of the tax increases, as it captures the effects of consumers trading down to cheaper brands.

Another important difference is that the UTokyo index includes no services or consumer durables. As such, says Prof Watanabe, it probably bears little relation to inflation expectations, which tend to show up in the price of a haircut, say, or an hour's rental of a karaoke booth. That is the variable that BoJ governor Haruhiko Kuroda has been most keen to influence, he notes, by stressing his determination to hit a 2 per cent rate of inflation.

Even so, as supermarket managers can adjust prices instantly, it is probably a better snapshot of real-time gaps between supply and demand.

And it could also signal falls ahead for the roughly 20 per cent of the official CPI basket which tracks groceries. In 1997 retailers cut prices for one-off promotions but as tough times continued, they made more permanent adjustments from November. So far this month there's been no big lurch downwards, but declines could be in the offing, says Prof Watanabe.

World Job Market



The number of job opportunities on 29 January 2015 in about 16,000 cities

The number of job opportunities



The number of job opportunities (provided by English) in some typical cities for the duration from May 2013 to March 2015.

4. EROOR IN PROPERTY PRICE DATA

• Data source:

- -Appraisal prices or Transaction prices
- -Asking prices or Transaction prices

• <u>Method:</u>

- -Repeat-Sales method
- -Hedonic method
- -Present value method
- -Matching method
- -SPAR

(1) Case 1: Property Price Indexes

Four Indices of U.S. Commercial Property Prices, 2000-14:

Stk Mkt Based, Transaction (SPAR), Transaction (Repeat-Sales), Appraisal-Based



Similar overall picture, but Stock Market Based index leads in time, and is higher frequency (daily).

Three Major Types/Sources of CPPIs in US

Index Type:	Strengths	Weaknesses
Appraisal-based	 Can be available when others not (for properties appraised more often than sold) Strong profession & tradition in some countries 	 Opinions not actual prices Tend to lag & smooth market values Can be subject to influence
Transactions- based	 Actual prices directly reflect mkt equilibrium (sup & dem) Objective info, less susceptible to manipulation 	 Requires large historical database Statistical models Can be "noisy" Can be subject to revisions
Stock Mkt-based	 REITs (or listed property "pure plays") traded in many countries Uses information efficiency & liquidity of stock mkt Leading indicator, daily updates Not dependent on individual property sales data 	 Some countries have few REITs, or short history, or thin market Information only indirect about actual property mkt Requires de-levering Reflects idiosyncrasies of stock mkt

Stock Market Based Indices

Annual Frequency Volatility of **Appraisal-based**, **Transactionbased (SPAR)**, and **Stock Market Based**...



Commercial Property Price Indexes in Japan.

Survey	Organisation	Type1	Type2	Frequency	Availability
Published Land Price Survey	The Ministry of Land, Trafic and Infrastructure	Appraisal	Price & index	Annual	1970
Urban Land Index	Japan Real Estate Association	Appraisal	Index	Bi-annually	1955
IPD Property Index	IPD: Investment Property Databank	Appraisal	Index	Monthly	2001
ARES JREIT Property Index	The Association fro Real Estate Securitization	Appraisal	Index	Quarterly	2001
MUTB-CBRE Real Estate Investment Index	Mitsubishi-UFJ Trust Bank & CB Richard Ellis	Appraisal	Index	Yearly	1968

Lessons from Japanese experience in **Bubble period**.

- What happen during "Collapse of Bubble" in Japan:
- The most typical problem was the one surrounding financial institutions' **disposal of bad loans**.
- Since no transaction-based property price index/real estate price information existed that made it possible to capture real estate market conditions, it was not possible to calculate <u>correct bad loan debt amounts</u>, and it took a long time until policy measures were implemented, <u>including the injection</u> <u>of public funds</u>.
- This was a major factor leading to the prolonged economic stagnation known as the **<u>'lost decade.''</u>**

Why J-CPPI were <u>not effective</u> in policy management?

- The question of <u>why these real estate price indexes</u>
 <u>were not effective in policy management</u> during the bubble era and the subsequent collapse process is a vital one.
- → One cause suggested during the series of policy-related discussions following the bubble's collapse was that <u>there</u> were significant errors in the real estate appraisal prices forming the raw data for creating the indexes.
- Smoothing problem, Valuation error problem, Lagging problem, Client influence problem.
- (Nishimura and Shimizu(2003), Shimizu and Nishimura(2006), (2007)

Transaction price-based index and Appraisal value based index in Tokyo.



cshimizu@nus.edu.sg

<u>Appraisal Value to Market Price ratio</u>: Appraisal value / estimated transaction price



Calendar Year

ID	Neighbourhood	Area	Land Value(Yen/m 2) at 1975	Lot size	Road Width	Nearest Station	Distance to NS	FLR	Value/Estimat e Ratio at 1975	Value/Estima te Ratio at 1987	Value/Estimat e Ratio at 1999
Point 1	Small-sized retails and financial offices mix up	Chiyoda Ward	1,250,000	163m2	27m	Kanda	150m	800%	75.98%	58.63%	126.01%
Point 2	Retails and offices mix up	Minato Ward	1,270,000	133m2	10m	Omotesando	60m	700%	71.02%	63.14%	115.56%

Lessons from Japanese experience.

- Appraisal-based information has **systematic problem**.
- This kind of problem was a major factor in the delay in disposing of bad loans at financial institutions following the bubble's collapse and one of the factors leading to the subsequent stagnation of the Japanese economy.

Aggregate error in methods of PPI estimation.

- Repeat sales price method: (Transactions)
- The depreciation problem and renovation problem
- (Diewert, 2007; Shimizu, Nishimura, and Watanabe, 2010).
- Hedonic price method: (Transactions)
- The hedonic price method, it is necessary to collect considerable property price-related attribute data.→Omitted variable bias
- Present value method: (Rent or Income)
- In the appraisal practice, appraiser usually use Discounted Cash Flow approach or Income approach. (not comparable approach using transaction prices)
- \rightarrow Present Value in neo-Classical Economic Theory

(2) Case 2: Housing prices.

Are house prices different depending on the stages in the buying/selling process?



We address this question by comparing the distributions of prices collected at different stages in the buying/selling process, including:

(1) initial asking prices listed on a magazine or online,

- (2) asking prices at which an offer is made by a buyer,
- (3) contract prices reported by realtors after mortgage approval,(4) registry prices.

Timeline in buying / selling process





Figure 5.2: Processes measured by house price sources



Source: National Statistician's Review of House Price Statistics, UK2010





NUS: Research Methodology

Quantile-Quantile Plot



cshimizu@nus.edu.sg

(3) Case 3: Aggregation Bias in Property Price Indexes



Introduction to Statistics01

- Descriptive Statistics: Tabular and Graphica Presentations
- Summarizing Qualitative Data
- Summarizing Quantitative Data



P. Newbold, W.L. Carlson, B. M. Thorne (2010),
"Statistics for Business and Economics"^{7th} edition.
Chapter 1: Describing Data / Graphical

Today's Case:

 Franz Fuerst and Chihiro Shimizu (2015), "Green Luxury Goods? The Economics of Eco-Labels in the Japanese Housing Market" IRES Working Paper(National University of Singapore), 2015-017.(Revised Dec 30)

Why Should We Focus on "Green Building"?

- The lessons learned from the recent financial crisis are that:
- 1. The world economy has undergone a major *structural adjustment*; and
- 2. Property investment have learned a number of things as a result of the financial crisis: *We have to select property very carefully for investing*.
- Shimizu, C. (2010), "What Have We Learned from the Property Bubble?," RIPESS (Reitaku Institute of Political Economics and Social Studies) Working Paper No. 35.
- 3. Whether or not a property is "environmentally friendly" or "sustainable" could become a major investment risk.
- Shimizu, C. (2010), "Will Green Buildings Be Appropriately Valued by the Market?," RIPESS (Reitaku Institute of Political Economics and Social Studies) Working Paper.

Sustainability research in real estate

- Sustainability research in real estate has reached a critical juncture. (Miller, Spivey, Florance, 2008, Fuerst and McAllister, 2011, Eichholtz, Kok and Quigley, 2010, 2011, Reichardt, Fuerst and Zietz, 2012).
- These studies are also characterised by important limitations : *specific sectors, in specific countries and over specific timeframes*
- These studies rely on a very small number of data sources: (notably from the CoStar Group) which provide a great wealth of information on property characteristics but are rather limited regarding the environmental performance and general sustainability indicators.
Researches in the residential sector.

- The residential sector has attracted *a much smaller number of academic studies* in this topic area, despite its large size and obvious relevance for both the general economy and sustainable development.
- The reasons for this *lack of empirical evidence* are not clear. Larger fragmentation of investors and a lower fraction of professional or institutional investment in the market driving the discourse around *'green value' may be a contributing factor.*
- Housing markets are *highly regulated and prone* to inefficiencies in many countries.

Previous Researches 1

- Dian and Miranowski (1989): showed that increasing energy efficiency increases housing prices.
- Banfi et al. (2005) : 13% higher rent for buildings that have adopted energy-saving measures.
- Fuerst et al (2012) : 14% premium of the highest band of the Energy Performance Certificate over the lowest band.
- Earlier, et al (2011): significant premiums for more energyefficient buildings.

Previous Researches 2

- Zheng and Kahn (2008) and Zheng, Kahn and Deng (2012): significant price premia for 'green' properties in the Chinese housing market.
- Deng, Li and Quigley (2012): substantial economic returns to green buildings in Singapore.
- Kok and Kahn (2012) as well as Hyland et al (2013): similar conclusions for the Californian and the Irish housing market respectively.

Why another 'green value' study?

- Most existing studies conducted on US and Western European markets. More evidence on Japanese markets needed.
- Yoshida & Shimizu (2010), Shimizu (2010): the new condominium market using asking prices and transaction prices.
- Small size of their sales transactions sample, the results did not reach a satisfying level of statistical reliability.
- →Extend Data source and models in considering HH (Household characteristics)

Tokyo Green Building Label

- Tokyo Metropolitan Government's Green Labeling System for Condominiums.
- Green Labeling System for Condominiums (2002, revised in 2005 & 2010), mandatory for new construction and major refurbishment to organize and publish information based on a) building insulation, b) energy efficiency & performance, c) lifespan extension (durability) and d) greening (plants etc.) of the building.
- The evaluation results for the respective items are expressed as a number of star symbols, max: ★ ★ ★.

Method: Hedonic model

$P_{(i,j,t)} = f(G_i, X_{(i,j)}, NE_k, HH_{(i,j)})$

- $P_{(i,j,t)}$: New condominium price of condominium *i* and dwelling *j* at time *t* (1: asking price, 2: transaction price)
- G_i : Green label of condominium *i*
- $X_{(i,j)}$: Building characteristics of condominium *i* & dwelling *j*
- NE_k : Location characteristics of region k
- $HH_{(i,j)}$: Buyer characteristics of condominium *i* and dwelling *j*

(Quasi) cross-sectional hedonic model with robust S.E., time fixed effects and buyer characteristics

Data

Tokyo condominium prices database with property and buyer characteristics 2001-2011 (N=48,740):

- <u>Data</u> source: Japanese Real Estate Economic Institute's database (*asking prices* & characteristics of property) combined with largescale questionnaire survey of *transaction prices* and household characteristics (Recruit., Co).
- <u>Variables:</u>

Asking price, transaction price, name of development company, development scale, size and age of property, location characteristics (coordinates, address, nearest station, distance to nearest station), building characteristics (building area, land area, building structure).

Data

Variables (continued):

- Buyer characteristics (age of buyer, annual income, size of family, etc.) gathered by <u>questionnaire survey</u> of the Recruit.
- Tenure type (leasehold types etc.)
- Property management type (24-hour etc.)
- First-month contract rate (i.e. time on market). Higher the first month contract rate, the more affordable prices are in relation to the condominium's features.

Estimation Models:

п

$$\begin{split} \log P_{(i,j,t)} &= a_0 + a_1 T_{(i,j)} + a_2 G_i + a_3 G_i T_{(i,j)} + \sum_m a_4^m X_{(i,j)}^m \\ &+ \sum_n a_5^n N E_k^n + \sum_t a_6^t D_t + \mathcal{E}_{(i,j)} \\ \log P_{(i,j,t)} &= a_0 + a_1 T_{(i,j)} + a_2 G_i - a_3 G_i T_{(i,j)} + \sum_m a_3^m X_{(i,j)}^m \\ &+ \sum_n a_4^n N E_k^n + \sum_s a_5^s H H_{(i,j)}^s + \sum_t a_6^t D_t + \mathcal{E}_{(i,j)} + \sum_t a_7^t G_i D_t - \mathcal{E}_{(i,j)} \\ \log P_{(i,j,t)} &= a_0 + a_1 T_{(i,j)} + a_2 G_i - a_3 G_i T_{(i,j)} + \sum_m a_3^m X_{(i,j)}^m \\ Model.3 \\ &+ \sum_n a_4^n N E_k^n + \sum_s a_5^s H H_{(i,j)}^s + \sum_m a_6^t D_t + \mathcal{E}_{(i,j)} + \sum_m a_7^m Model.3 \\ &+ \sum_n a_4^n N E_k^n + \sum_s a_5^s H H_{(i,j)}^s + \sum_m a_6^t D_t + \mathcal{E}_{(i,j)} + \sum_m a_7^m G_i D_t + \mathcal{E}_{(i,j)} \\ \end{split}$$

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Estimation result, *Base Model*: Model 1

	(1)	(2) Robust
	baseline	reg
	OLS	
	lp	lp
Transaction	-0.0347***	-0.0316***
price discount		
	(-27.87)	(-26.54)
Green asking	0.0609***	0.0586***
Green asking price premium	0.0609***	0.0586***
Green asking price premium	0.0609*** (18.66)	0.0586 ^{***} (18.31)
Green asking price premium	0.0609*** (18.66)	0.0586*** (18.31)
Green asking price premium Green	0.0609*** (18.66) -0.00918*	0.0586*** (18.31) -0.00948**
Green asking price premium Green transaction	0.0609*** (18.66) -0.00918*	0.0586*** (18.31) -0.00948**

Transaction Based Premium 0.0609-0.00918=0.05172

Estimation result considering *Time Effect* : Model 2

	Model 2: log(price)
Regressor	Coefficient
green2005	0.045**
green2006	0.0487***
green2007	0.0596***
green2008	0.0844***
green2009	0.096***
green2010	0.0438***
tgreen2005	-0.0486**
tgreen2006	-0.003
tgreen2007	0.010
tgreen2008	-0.034**
tgreen2009	-0.029**
tgreen2010	0.008
Property & condo attributes	Yes
Developer fixed effects	Yes
Location controls	Yes
Management fixed effects	Yes
Buyer characteristics	Yes
Time fixed effects	Yes
N	48,740
R ²	0.814

Estimated Result considering *Household's Characteristics:* Model 3.

	(1) baseline OLS	(2) Robust reg	(3) Income Q1	(4) Income Q2	(5) Income Q3	(6) Income Q4
	lp	lp	lp	lp	lp	lp
Transaction price discount	-0.0347***	-0.0316***	-0.0359***	-0.0354***	-0.0337***	-0.0343***
	(-27.87)	(-26.54)	(-11.72)	(-15.94)	(-16.16)	(-13.37)
Green asking price premium	0.0609***	0.0586***	0.0408***	0.0398***	0.0702***	0.0777***
	(18.66)	(18.31)	(3.63)	(6.74)	(13.12)	(12.45)
Green transaction price discount ²	-0.00918*	-0.00948**	-0.0158	-0.00692	-0.00936	-0.00975
			0.025	0.03288	0.06084	0.06795

Conclusions

- Compared to non-labelled properties, labelled buildings commanded a premium of 6.09% for the base asking price and 5.19% for the base transaction price (6.09% 0.9%).
- Premium appears to *rise over time* (exception: 2010)
- Green asking price premia are found to *progress with increasing incomes of buyers* (from 4% to nearly 8%).

• The average price premium observed in recorded transaction prices is mainly driven by households with above-average incomes paid for green-labelled properties.

Discussion 1: Investment Value of "Green Buildings"

- These increases in yield and prices reflect users' expectations of cost-saving effects: even if they have to pay a higher rent, there would be no significant additional burden due to a decrease in environment-related expenses.
- Thus, when we examine investments in green buildings, we need to consider direct benefits, such as the ability to increase rents and other prices due to cost-saving effects, separately from other issues.
- Constructing green buildings requires making a large initial investment in order to provide the intended green features.

Discussion 2: Environment Code

- Green labels such as BREEAM, LEED, CASBEE, and so on.
- What kind of significance do these green labels have if one tries to convert them into investment values?
- In addition, there is variation across different countries in terms of the standards that have been established.
- Currently, the property investment market is moving in the direction of globalization, and I believe it is necessary to move toward the harmonization of these international standards.

Types of Green Labels

Environmental standard	Country	Year of introductio n	Developer/ provider	Feature
BREEAM (BRE Environmental Assessment Method)	U.K.	1990	BRE (Building Research Establishment), ECD (Energy and Environment)	This system sets forth individual assessment standards for a wide range of subjects, from buildings, such as offices, commercial facilities, stand-alone houses, collective housing, schools, distribution facilities (warehouses) and courthouses, to communities. Although they are assessed differently, common standards are (1) energy efficiency (carbon dioxide emission), (2) water use efficiency, (3) materials used inside the building, (4) indoor environment (comfort and health for workers), (5) environment available on site, (6) accessibility, (7) management status, (8) contamination status, and (9) impact on the local ecology. Having started with assessments in the planning and development stages, this system has evolved to cover the management stage as well.
LEED (Leadership in Energy and Environmental Design)	U.S.A.	1996	U.S. Green Building Council	The basic concept is the same as for BREEAM. Initially intended for application in the design and development stages, this system is now comprehensive, also covering the management stage. Evaluation standards are (1) energy efficiency, (2) water use efficiency, (3) resource use efficiency and externality, (4) design, (5) respect for the landscape, and (6) environmental quality.
CASBEE (Comprehensive Assessment System for Built Environment Efficiency)	Japan	2001	IBEC (Institute for Building Environment and Energy Conservation)	The basic concept is the same as for BREEAM. Providing basic tools for design, development, existing buildings, and repair, this system sets forth standards for a wide range of subjects, from buildings to city planning. Although evaluation standards are much the same as under BREEAM and LEED, this system is unique in that buildings are assessed in terms of BEE (Building Environment Efficiency), comprised of their environmental quality (Q) and environmental load (L).
IPD: Environmental Code	U.K.	2007	IPD (Investment Property Databank)	While BREEAM, CASBEE, and LEED are focused on the potential functions of buildings, the Environmental Code focuses on their actual use status. Assessment standards are (1) energy efficiency, (2) water use efficiency, (3) waste disposal efficiency, (4) accessibility, (5) equipment, (6) indoor environment, and (7) adaptation to changes in the global environment.
IPD/IPF: Sustainable Property Index	U.K.	2009	IPD (Investment Property Databank), IPF (Investment Property Forum)	Information affecting investment performance was drawn from the IPD Environmental Code and converted into an investment performance index. The extracted assessment standards are (1) building quality, (2) accessibility, (3) energy efficiency, (4) water use efficiency, (5) waste disposal efficiency, and (6) flooding risk.
Source: http://www.breeam http://www.ipdoccupiers.co Property Index.	n.org/ for om/Default.	BREEM; h aspx?TabId=	ttp://www.usgbc.org =1632 for the IPD	DisplayPage.aspx?CategoryID=19 for LEED; http://www.ibec.or.jp/CASBEE/ for CASBEE; Environmental Code; http://www.ipd.com/Default.aspx?tabid=2215 for the IPD/IPF Sustainable

Discussion 3: Sustainability of Property

- On March 11, Japan was struck by a major earthquake. Among other things, this generated awareness of the fact that, in order to sustain property values, it is necessary to adopt strong measures not only in terms of earthquakeproofing, but also with respect to water damage, soil liquefaction, etc.
- In future, with regard to property investment, there is a need to manage investment value **sustainability and safety** in a real sense, in a way that includes **environmental risks**.

Discussion 4: Future Directions

- How to evaluate green buildings within the property appraisal system.
- This cannot be addressed simply by looking at the issue of green buildings. Broad-ranging discussion is needed, including **investment value sustainability and safety.**
- Then there is **the creation of global standards**. The issue of low carbon is not restricted to those countries that have established standards. A global perspective is needed.

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清水千弘: Chihiro Shimizu, PhD

シンガポール国立大学不動産研究センター 教授

Professor, Institute of Real Estate Studies National University of Singapore 21 Heng Mui Keng Terrace, #04-02 Singapore 119613 Tel: (65) 6601 4925 Fax: (65) 6774 1003 Email: cshimizu@nus.edu.sg Website: www.ires.nus.edu.sg