International Conference on Real Estate Statistics 2026

Date: February 19-20, 2026
Venue: Shinagawa Prince Hotel, 4-10-30 Takanawa, Minato-ku, Tokyo 108-8611, Japan

International Monetary Fund(IMF), Bank for International Settlements (BIS) / Irving Fisher Committee on Central Bank Statistics (IFC), OECD, Eurostat, Bank of Japan, and Hitotsubashi University

With the support of: Statistics Bureau of Japan (SBJ), Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Japan, Reitaku University.

Property Bubbles and Official Property Price Indices in Japan

19.February. 2026

Chihiro Shimizu
Hitotsubashi University

(with the Ministry of Land, Infrastructure, Transport and Tourism, Japan)

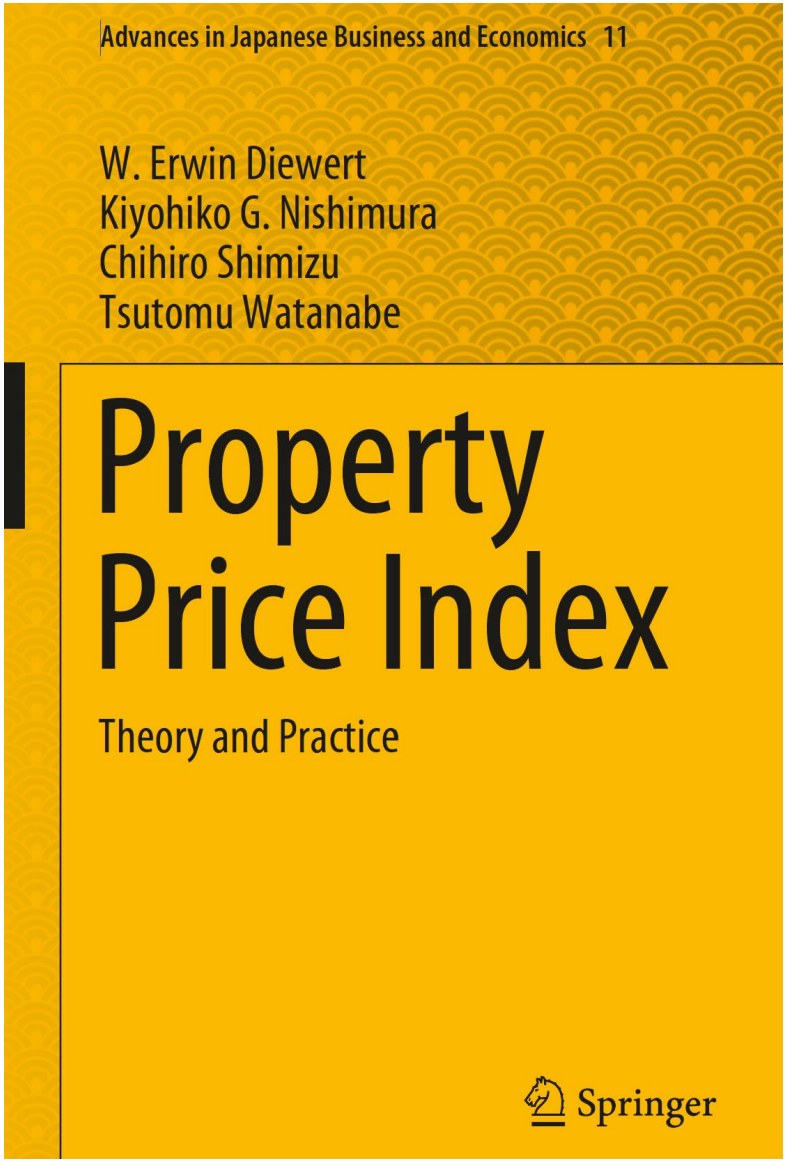
Workshop on Property Price Indices and Real Estate Statistics

- **Day 1: February 19**
- Session 1: Challenges and Overview
- Session 2: RPPI Compilation — Country Practices and Challenges
- Session 3: RPPI Compilation — Data, Coverage, and Comparability
- Session 4: CPPI Compilation — Country Practices and Challenges
- Session 5: CPPI Compilation — Data, Coverage, and Comparability
- 18:00- Cocktail
- 19:00- Conference Dinner

Workshop on Property Price Indices and Real Estate Statistics

- **Day 2: February 20**
- Session 6: Data Sources, Big Data, and Innovation
- Session 7: Methodological Innovations — Integrating Real Estate Indices into CPI and SNA
- Session 8: Emerging Challenges in Property Price Measurement
- Session 9: Property Price Index Compilation — Practical Implementation and Lessons Learned
- Session 10: Wrap-up Panel — IMF · BIS · OECD · Eurostat · BOJ

- International Conference on Real Estate Statistics 2026 - HiAS CURES



Part I Index Theory for Property Price Indexes

1. International Policy Discussion in Property Price Indices
2. Theoretical Background of Hedonic Measure and Repeat Sales Measure-Survey-

Part II Empirical Studies for Property Price Indexes

3. A Comparison of Alternative Approaches to Measuring House Price Inflation
4. Estimation of Residential Property Price Index: Methodology and Data Sources
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Part III Housing Services in CPI and SNA

6. Measuring the Services of Durables and Owner Occupied Housing
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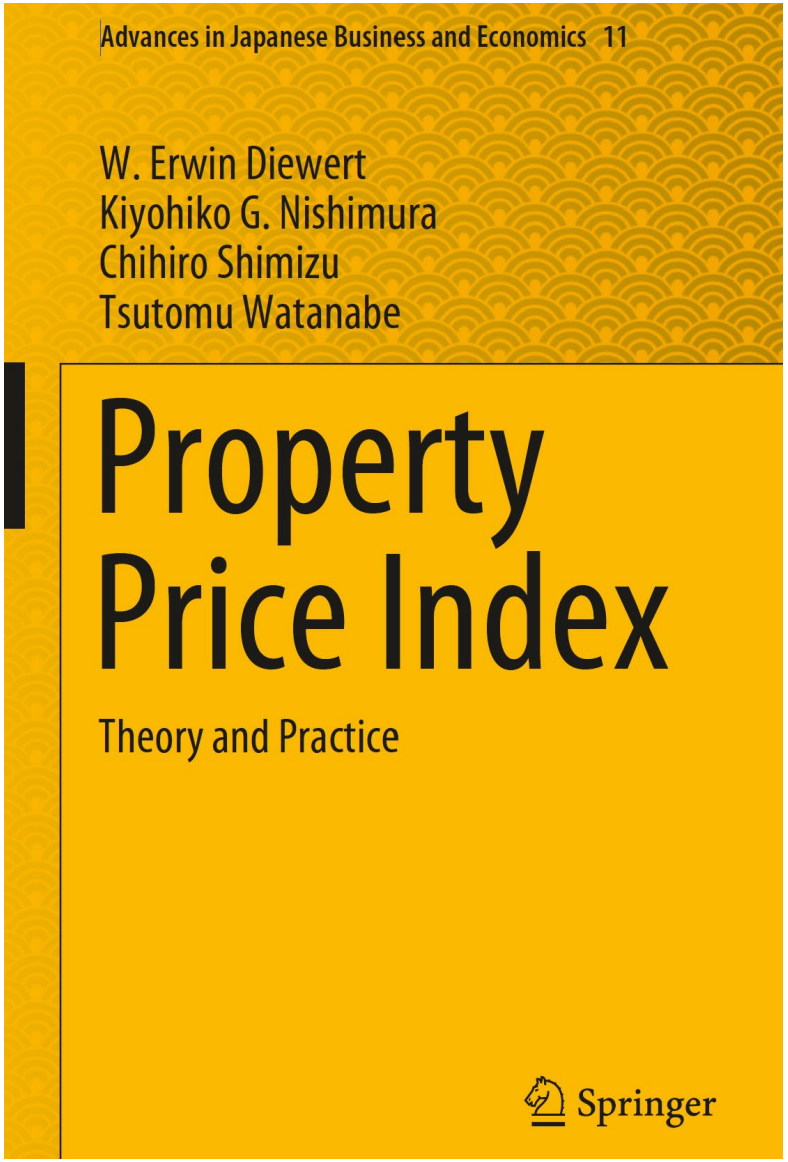
8. Imputed Rent for OOH in National Account

Session 1: Challenges and Overview

- **Session 1: Challenges and Overview**
- **Chair:** Ichiro Muto – Bank of Japan, Irving Fisher Committee (IFC)
- **Barra Casey** – International Monetary Fund
- **Bruno Tissot** – Bank for International Settlements, Irving Fisher Committee (IFC)
- **Annabelle Mourougane** – OECD
- **Rui Evangelista** – Eurostat



Part I Index Theory for Property Price Indexes

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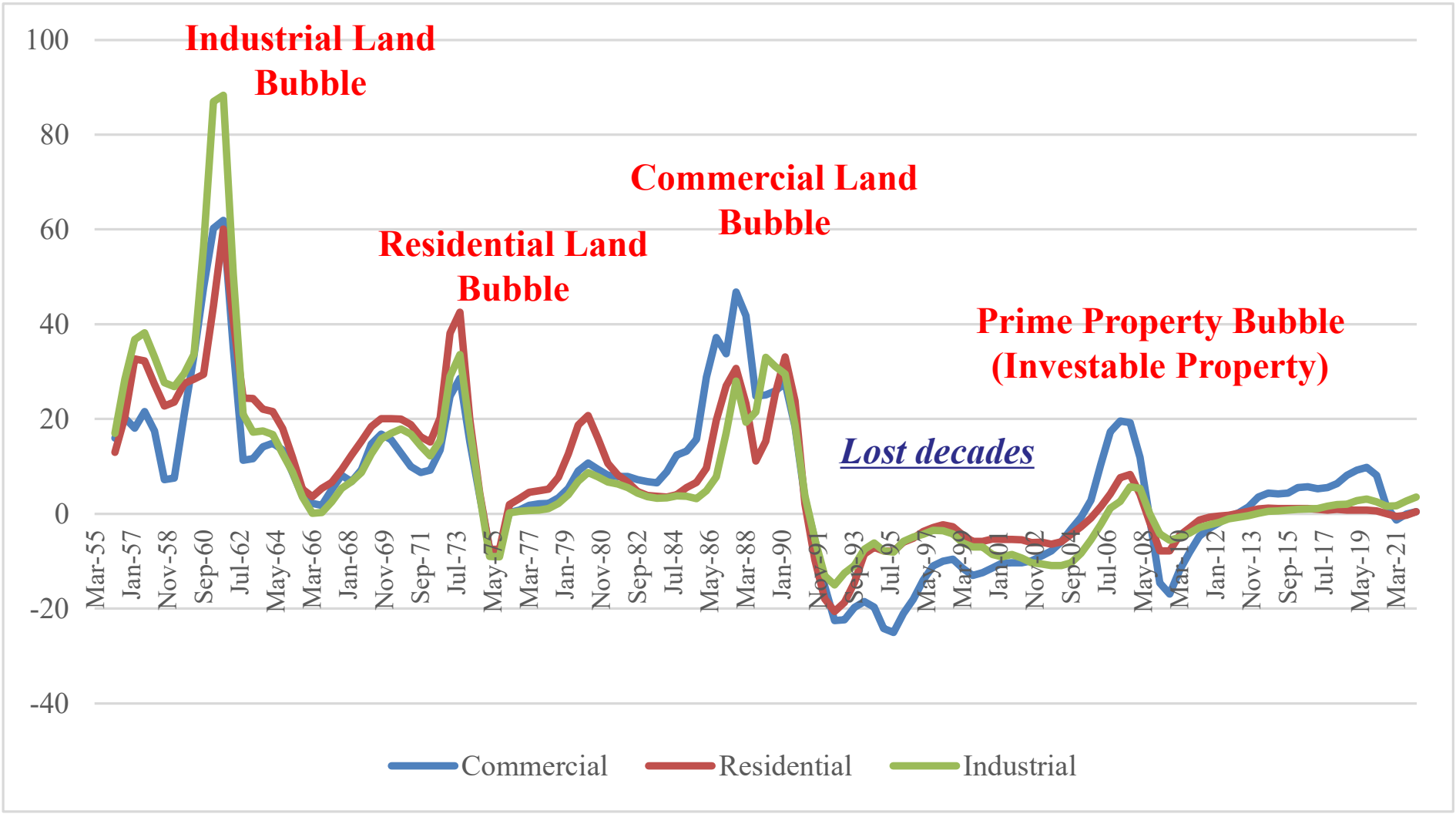
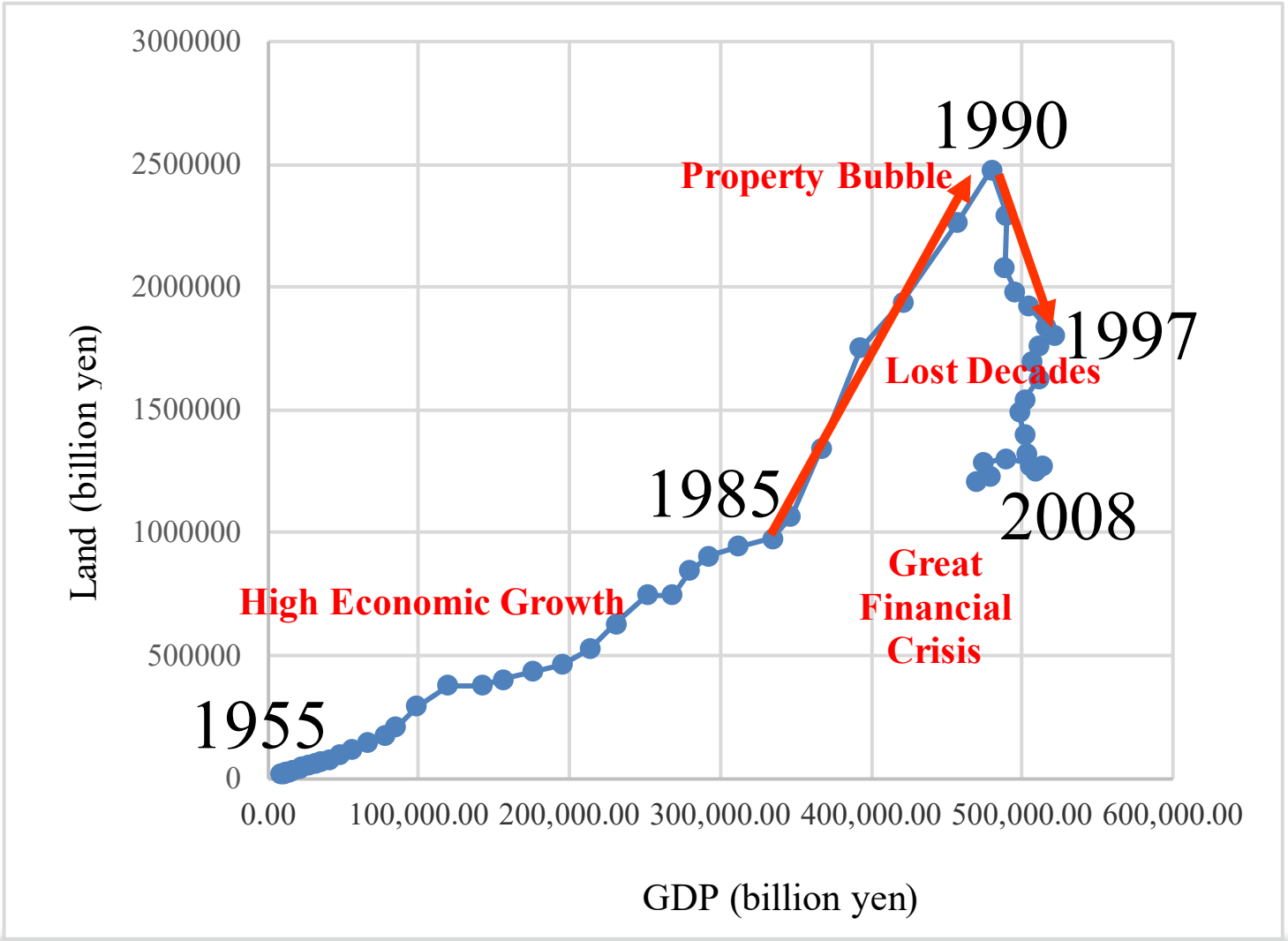
Property Bubbles in Japan.



National Wealth Survey (国富調査): 1955 and 1970.

Lessons from Japanese 20th century Property Bubbles.



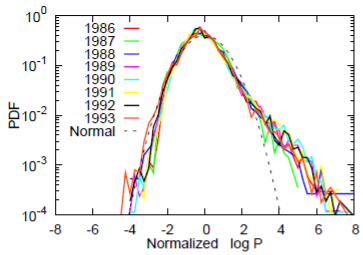
Eurostat-IAOS-IFC Conference on Residential Property Price Indices, BIS, Basel, 11-12 November 2009

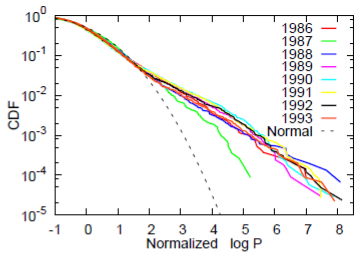
On the Evolution of the House Price Distribution

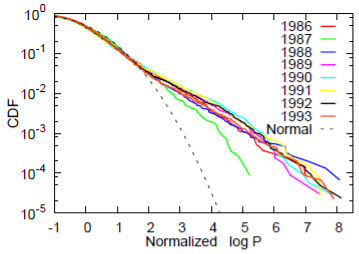
Chihiro Shimizu

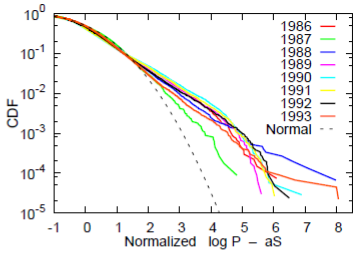
November 12, 2009

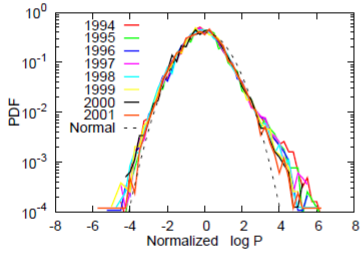
Property Bubbles and Price Distributions

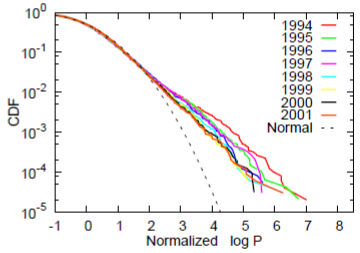


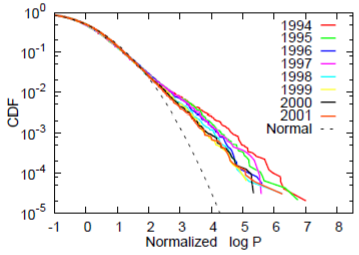


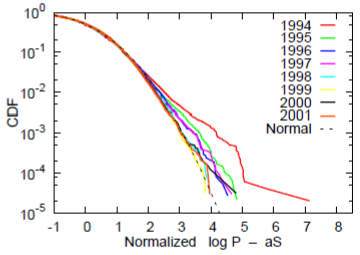


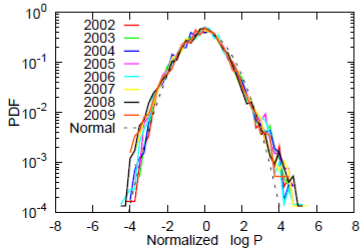


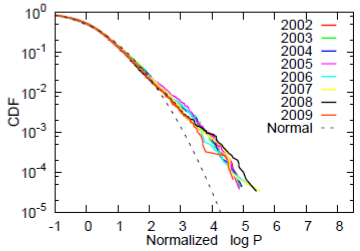


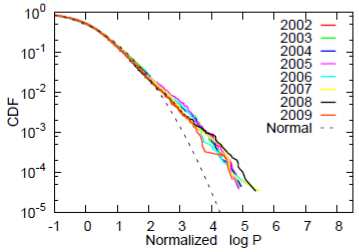


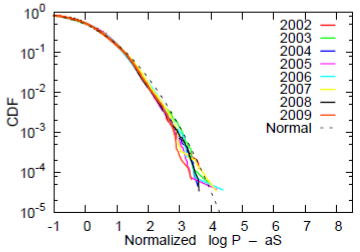












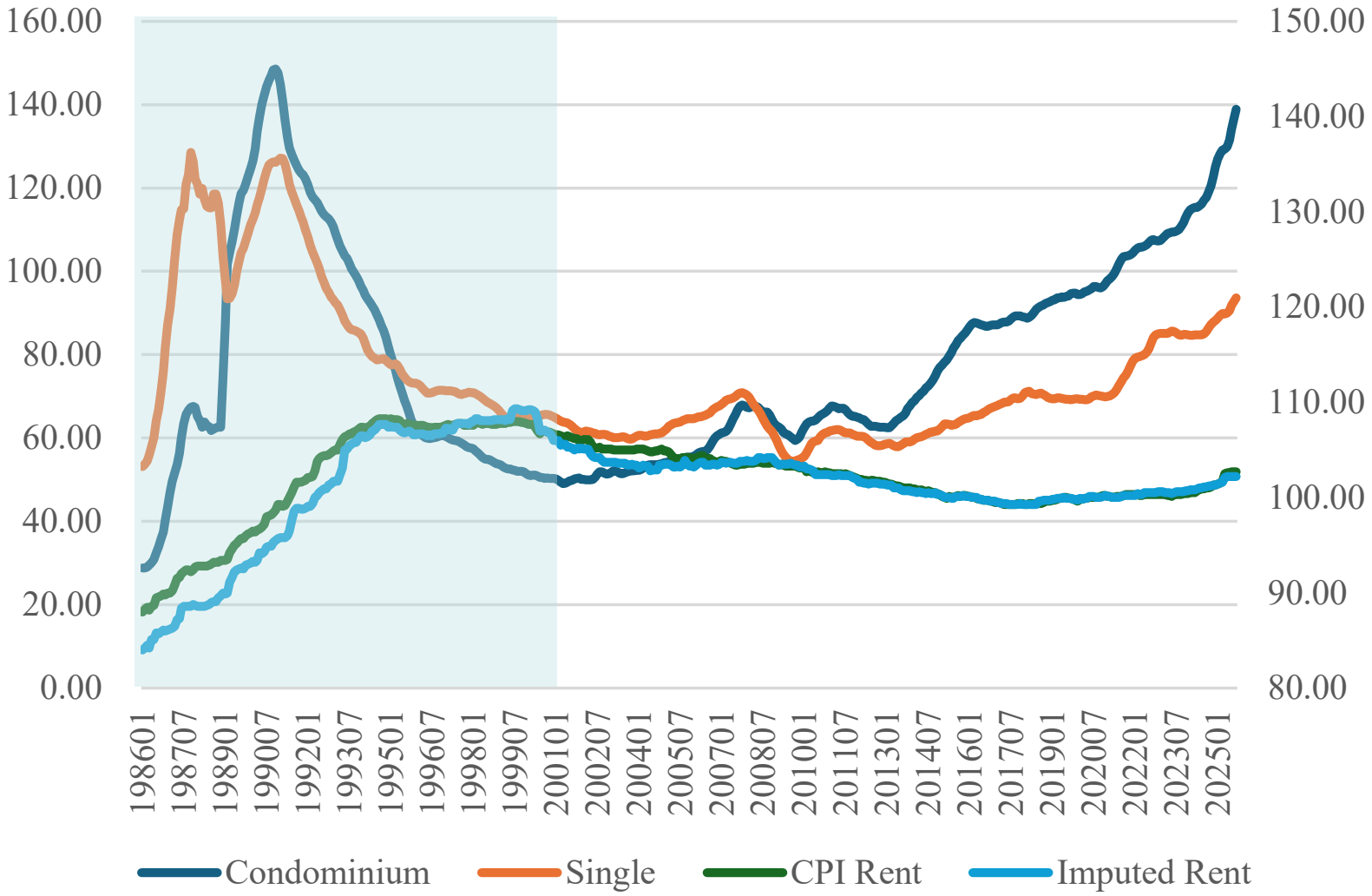
Lessons from Japanese experience in *Bubble period*.

- ***Q1. Why didn't BOJ change their policy?***
  - BOJ was largely delayed in policy enforcement.(1990)
- ***Q2. Why did we need long time for disposal bad loan in financial sector?***
  - It was not possible to calculate **correct bad loan debt amounts**, and it took a long time until policy measures were implemented, **including the injection of *public funds***.
- **→"*Lost decades*." BIS Conference 2009.**
- ***Q3. How much did property prices rise in bubble period and drop after the collapse of bubble?***

Response to Question 1.

- ***Q1. Why didn't BOJ change their policy?***
- ***Q2. Why did we need long time for disposal bad loan in financial sector?***
- ***Q3. How much did property prices rise in bubble period and drop after the collapse of bubble?***

Rigidity of Housing Rent.



Residential Rents and Price Rigidity:
Micro Structure and Macro Consequences

December 17, 2008

Chihiro Shimizu

Meeting of the Group of Experts on Consumer Price Indices Geneva, 30 May – 1 June 2012 (UNITED NATIONS))

The Estimation of Owner Occupied Housing Indexes using the RPPI: The Case of Tokyo

May 30, 2012

Chihiro Shimizu

Contents lists available at ScienceDirect

Journal of The Japanese and International Economies

journal homepage: www.elsevier.com/locate/jjie

Residential rents and price rigidity: Micro structure and macro consequences

Chihiro Shimizu [a,*], Kiyohiko G. Nishimura [b], Tsutomu Watanabe [c]

[a] The International School of Economics and Business Administration, Reitaku University, Hikarigaoka 2-1-1, Kashiwa-city, Chiba 277-8686, Japan
[b] Bank of Japan, Hongoku-cho 2-2-1, Chuo-Ku, Tokyo 103-8660, Japan
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JEL classifications:
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R20

Keywords:
Housing rents
Price stickiness
Time-dependent pricing
State-dependent pricing
Adjustment hazard

ABSTRACT

Shimizu, Chihiro, Nishimura, Kiyohiko G., and Watanabe, Tsutomu—Residential rents and price rigidity: Micro structure and macro consequences

Why was the Japanese consumer price index for rents so stable even during the period of the housing bubble in the 1980s? To address this question, we use a unique micro price dataset which we have compiled from individual listings (or transactions) in a widely circulated real estate advertisement magazine. This dataset contains more than 700,000 listings of housing rents over the last 20 years. We start from the analysis of microeconomic rigidity and then investigate its implications for aggregate price dynamics, closely following the empirical strategy proposed by Caballero (Caballero and Engel, 2007). We find that 90% of the units in our dataset had no change in rents per year, indicating that rent stickiness is three times as high as in the United States. We also find that the probability of rent adjustment depends little on the deviation of the actual rent from its target level, suggesting that rent adjustments are not state-dependent but time-dependent. These two results indicate that both the intensive and extensive margins of rent adjustments are small, resulting in a slow response of the CPI for rent to aggregate shocks. We show that the CPI inflation rate would have been higher by 1% point during the bubble period, and lower by more than 1% point during the period following the burst of the bubble, if Japanese housing rents were as flexible as those in the United States. *J. Japanese Int. Economies* **24** (2) (2010) 282–299. The International School of Economics and Business Administration, Reitaku University,

Contents lists available at ScienceDirect

Journal of Housing Economics

journal homepage: www.elsevier.com/locate/jhec

Housing rent rigidity under downward pressure: Unit-level longitudinal evidence from Tokyo

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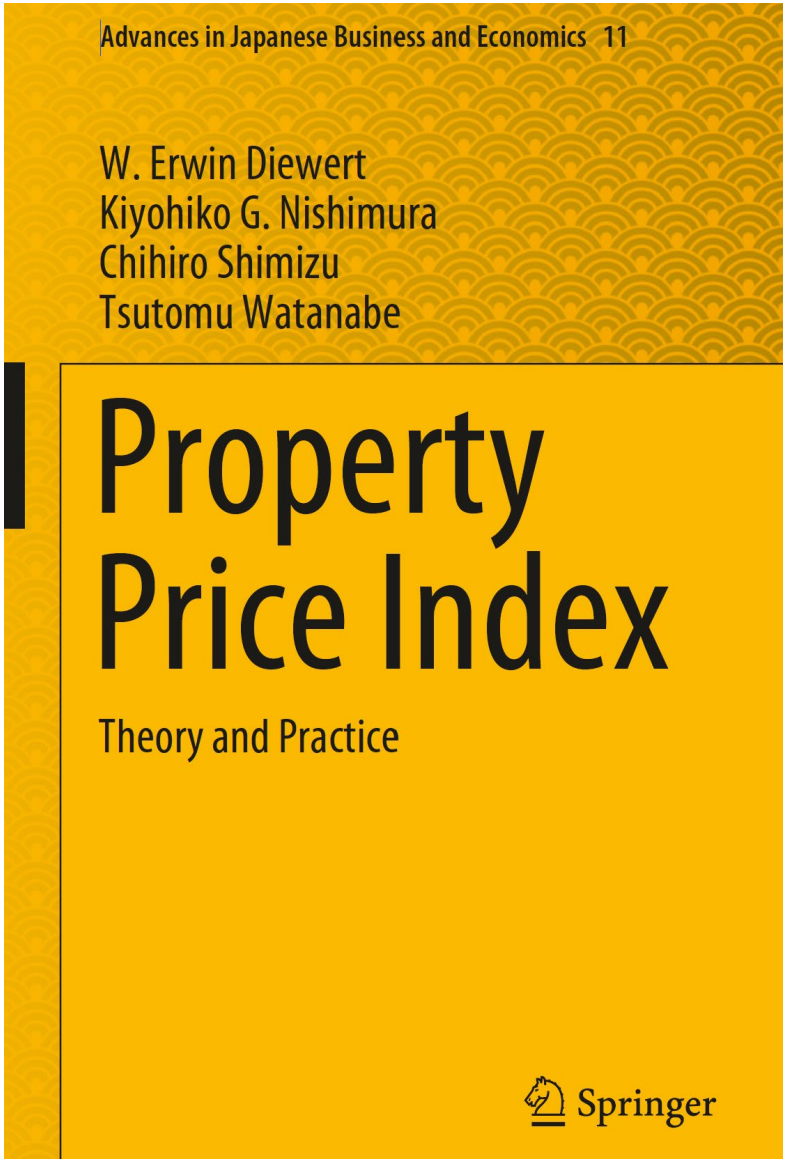
ARTICLE INFO

JEL Classification:
E30
R30

Keywords:
Price rigidity
Housing rents
Rental contract
Vacancy
Time/state-dependent pricing

ABSTRACT

This paper documents housing rent rigidity under downward pressure, using the monthly household/room-level movement of housing rents through tenancies and vacancies in Tokyo during the period 2000Q1–2017Q2. The consistent overall rent rigidity exists because of the small extensive margin (limited adjustment opportunity) and small intensive margin (rare adjustment in the contract renewal stage). We observe rent rigidity leading to a "tenure surcharge," that is, sitting tenants pay higher rents than the market rent level because the alternative—high moving costs for tenants—is less attractive. The downward rent rigidity obviously cannot rationalize the conventional explanation of upward rent rigidity in an inflationary context, such as depreciation and/or tenure discount. We show, however, that landlords care about retaining good long-term tenants by offering a small discount during the tenancy, along with a small degree of time/state-dependent adjustments.



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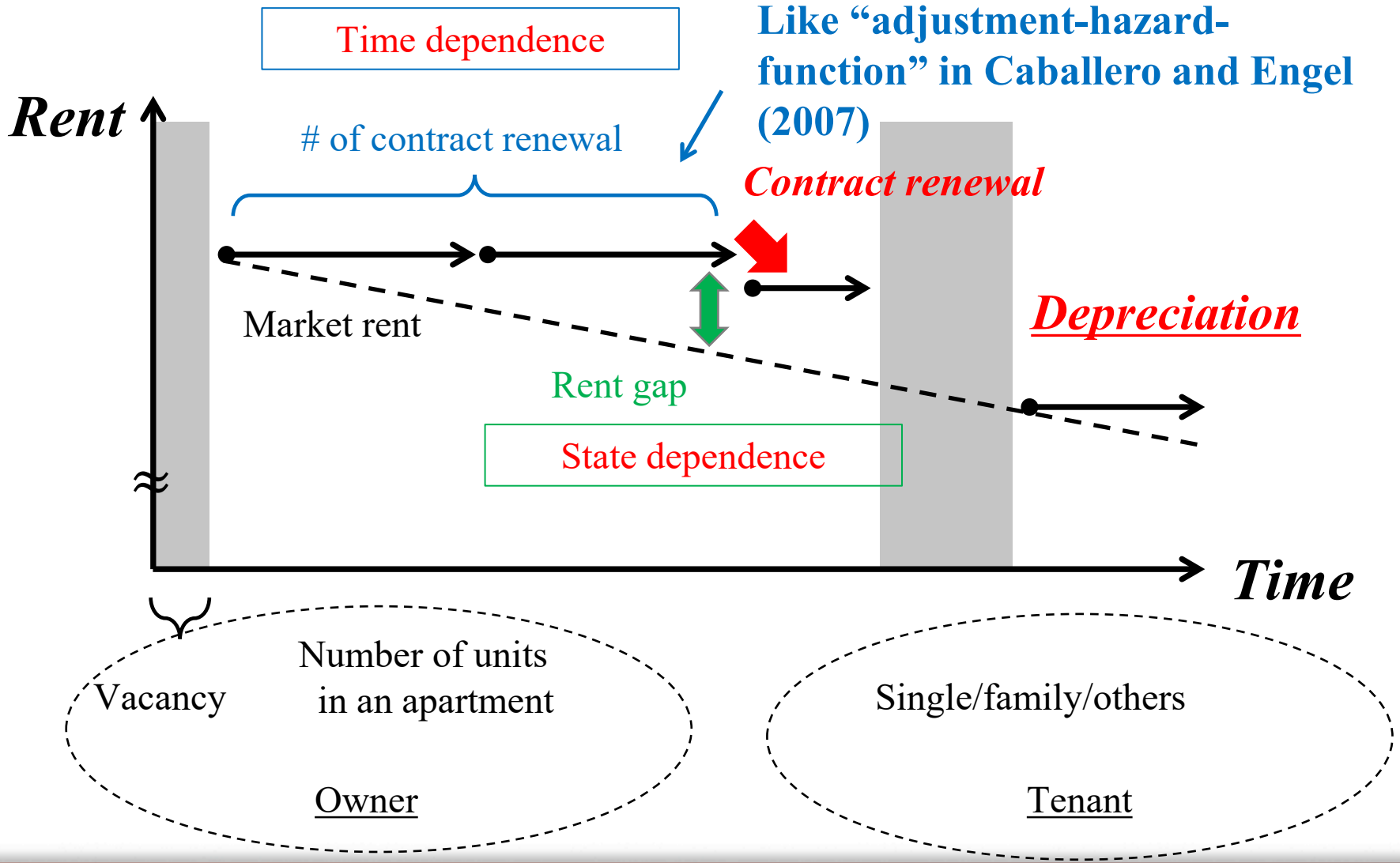
Economic Measurement and Housing Market/Macroeconomics.

- **Housing lies on the *borderline* between consumption goods and investment assets.**
- **Goodhart & Hofmann (2007; 2008):**
  - Goodhart, C., & Hofmann, B. (2007). *House Prices and the Macroeconomy.* Oxford University Press.
  - Goodhart, C., & Hofmann, B. (2008). "House prices, money, credit, and the macroeconomy." *Oxford Review of Economic Policy*, 24(1), 180-205.
  - Housing is the "***Nexus***" connecting the service market (CPI) and the asset market (Credit/Finance).
- **The Problem:**
  - Standard CPI focuses only on the ***Consumption side*** (Rental Equivalence).
  - Missing Link: It ignores the ***Financial side*** (Interest rates, Leverage, Expectations) driving boom-bust cycles.

Rent adjustment mechanism at contract *renewal.*



State-Dependent or Time-Dependent Pricing:

Caballero-Engel's definition of price flexibility

Target Rent Level: Hedonic

Price Gap

Probability of rent adjustments

$$\Delta \log R_{it}^{*} = \Delta \xi_t + \nu_{it}$$

$$X_{it} \equiv \log R_{it-1} - \log R_{it}^{*}$$

$$\Lambda(x) \equiv \Pr(\Delta R_{it} \neq 0 \mid X_{it} = x)$$

Caballero-Engel(1993)

:Adjustment Hazard Function

$$\lim_{\Delta \xi_t \to 0} \frac{\Delta \log R_t}{\Delta \xi_t} = \int \Lambda(x) h(x) dx + \int x \Lambda'(x) h(x) dx$$

Caballero-Engel's measure of price flexibility | **Intensive margin** | **Extensive margin**

Caballero-Engel(2007)

$$\Lambda(x) = \Pr(\Delta R_{it} \neq 0 \mid I_{it}^{N} = 1, X_{it} = x) \Pr(I_{it}^{N} = 1 \mid X_{it} = x)$$

Tenant *Turnover*

$$+ \Pr(\Delta R_{it} \neq 0 \mid I_{it}^{R} = 1, X_{it} = x) \Pr(I_{it}^{R} = 1 \mid X_{it} = x)$$

Tenant *Renewal*

Adjustment Hazard Functions

	$x \in (-0.4,-0.2]$	$x \in (-0.2,0.0]$	$x \in (0.0,0.2]$	$x \in (0.2,0.4]$
$\Pr(I_{it}^N = 1 \mid X_{it} = x)$	**0.172**	**0.176**	**0.184**	**0.203**
$\Pr(I_{it}^R = 1 \mid X_{it} = x)$	**0.459**	**0.335**	**0.345**	**0.288**
$\Pr(\Delta R_{it} \neq 0 \mid I_{it}^N = 1, X_{it} = x)$	**0.194**	**0.250**	**0.269**	**0.267**
$\Pr(\Delta R_{it} \neq 0 \mid I_{it}^R = 1, X_{it} = x)$	**0.036**	**0.024**	**0.035**	**0.014**
$\Lambda(x)$	**0.050**	**0.052**	**0.062**	**0.058**
$h(x)$	**0.012**	**0.627**	**0.304**	**0.050**

Intensive margin:

$$\int \Lambda(x)h(x)dx = 0.055$$

Extensive margin:

$$\int x\Lambda'(x)h(x)dx = 0.004$$

Caballero-Engel's measure of price flexibility

$$\lim_{\Delta\xi_t \to 0} \frac{\Delta \log R_t}{\Delta \xi_t} = 0.059$$

Three major methods.

- **Acquisition Approach.**
  - Ignore the problem of distributing the initial cost of the durable over the useful life of the good and allocate the entire charge to the period of purchase. As noted above, this is known as the ***acquisitions approach*** and it is the present approach used by Consumer Price Index statisticians for all durables with the exception of housing.
- **Rental Equivalent Approach.**
  - In the ***rental equivalence approach***, a period price is imputed for the durable which is equal to the ***rental price*** or ***leasing price*** of an equivalent consumer durable for the same period of time.
- **User Cost Approach.**
  - In the ***user cost approach***, the initial purchase cost of the durable is decomposed into two parts: one part which reflects ***an estimated cost of using the services*** of the durable for the period and another part, which is regarded as an investment, which must earn ***some exogenous rate of return***.

The measurement dilemma in CPI.

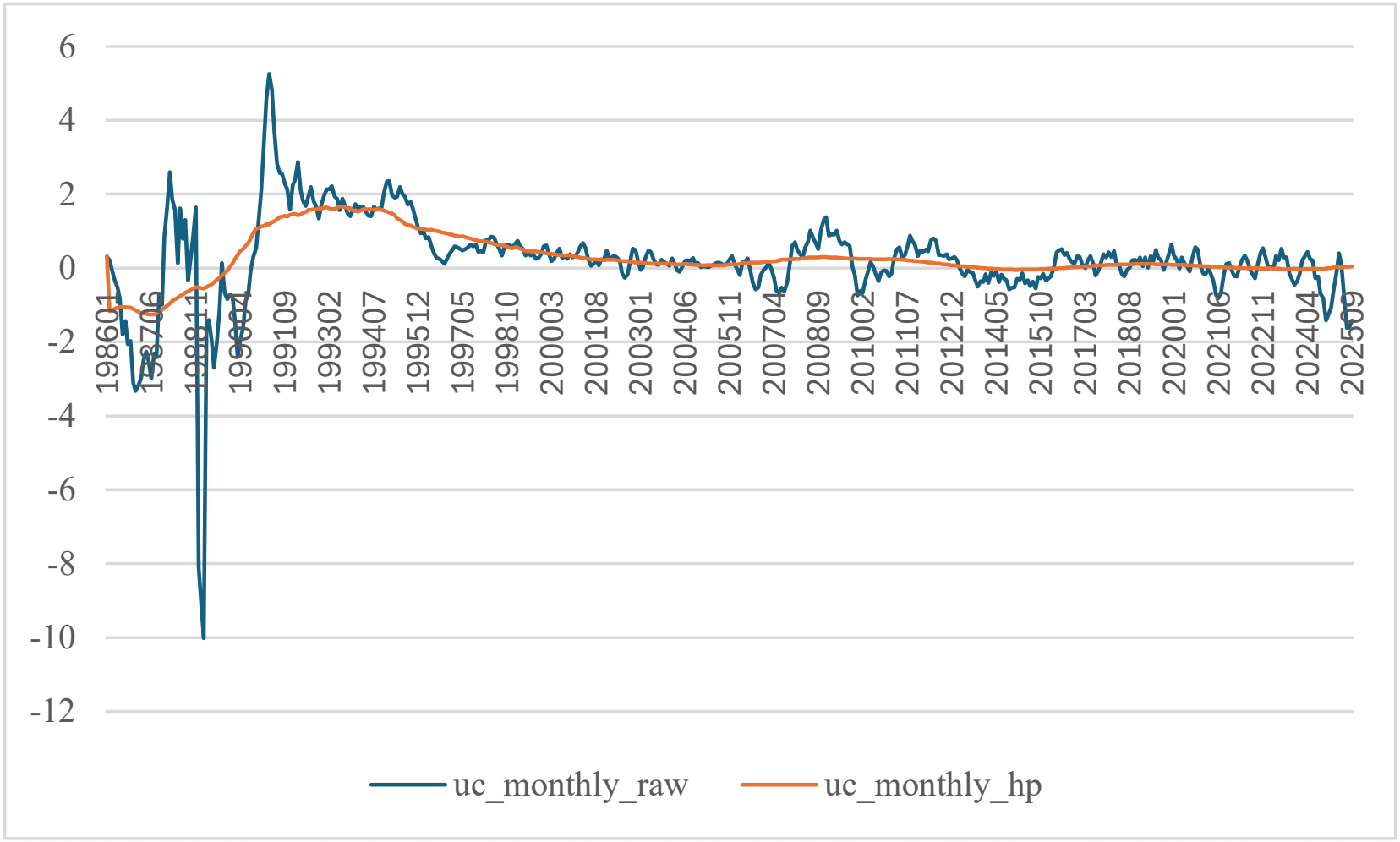
- Treat OOH with two layers, not one:
  - Welfare layer: **service-*flow*** price
  - Financial layer: **holding-*cost*** price
- Goal: a framework that keeps objects distinct, yet links them to CPI measurement and incentives.

Conceptual: ***welfare*** vs ***financial*** objects made explicit and measurable.

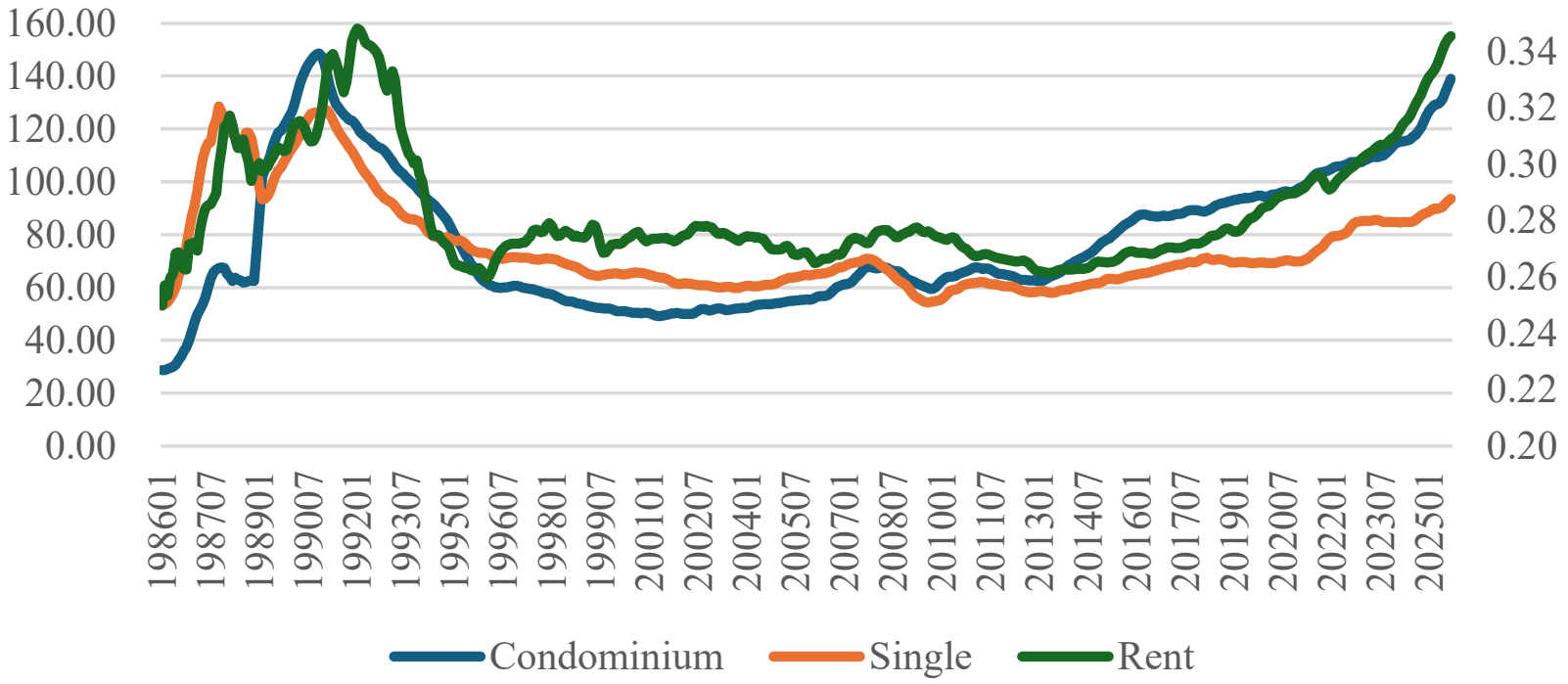
Property Bubbles and User cost.

- **Glaeser (2025)** *"CPI and Housing"* argues that when asset prices surge, the standard **User Cost (UC)** formula becomes ***unstable or misleading***.
  - $UC_t = P_t(r_t + \delta + \tau_t + m_t - E_t[\pi_{t+1}])$
- **Problems identified, Expectational dominance:**
  - When speculative expectations $E_t[\pi_{t+1}]$ rise sharply, ***UC*** → negative, implying an *infinite willingness to buy*—clearly unrealistic.
- **Policy distortion:**
  - CPI weights based on ***UC*** understate inflation because the imputed shelter cost falls just when housing prices boom.
- **Timing mismatch:**
  - The standard UC assumes ex-post realized capital gains are small and smooth. In bubbles, capital gains are volatile and financed by leverage.

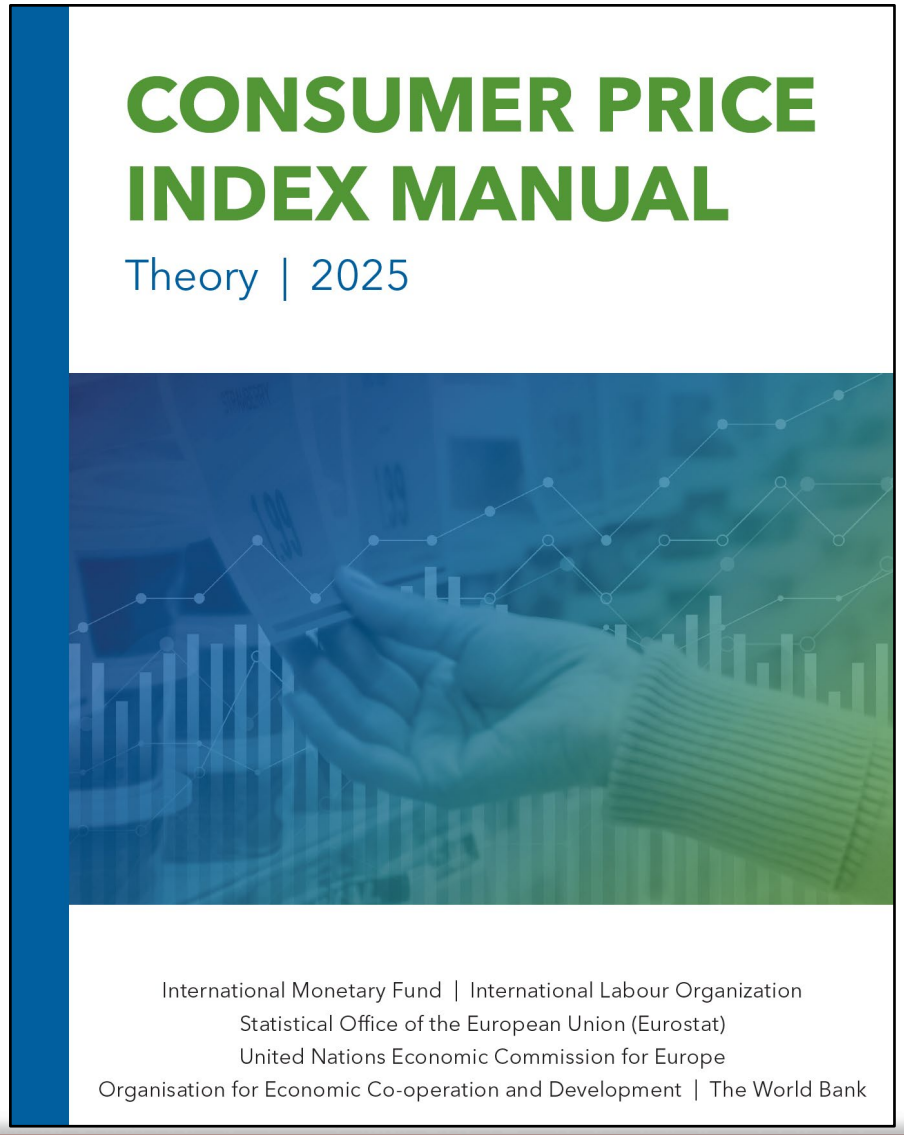
Basic User Cost with Alternative Asset inflation rate.



Housing Prices and Housing Rent (*new signed*).



Chapter 10: The Treatment of Durable Goods and Housing



Session 2: RPPI Compilation — Country Practices and Challenges

- **Chair:** Barra Casey – International Monetary Fund
- *Compilation of Armenia's Residential Property Price Index*
  Presenter: Tigran Baghdasaryan / Central Bank of Armenia
- *The Housing Market and Housing Price Indices in South Korea*
  Presenter: Dongwoo Ko / Bank of Korea
- *Is Euro-Area Monetary Policy Doomed to Overshoot? Consequences of Omitting Owner —Occupied Housing from the HICP*
  Presenter: Robert Hill & Miriam Steurer / University of Graz and Hitotsubashi University

Response to Question 2 and 3.

- *Q1. Why didn't BOJ change their policy?*
- *Q2. Why did we need long time for disposal bad loan in financial sector?*
- *Q3. How much did property prices rise in bubble period and drop after the collapse of bubble?*

Property Price Indices in Japan.

Survey	Organisation	Use	Source	Data	Frequency	Availability*
Japan Commercial Property Price Index	**Ministry of Land, Infrastructure, Transport and Tourism**	**Office, Retail, Logistics, Hotel and Land**	**Transaction price**	**Index**	**Quarterly**	**2008 (Tokyo, Osaka, Nagoya1985)**
Land Market Value Publication (Published Land Price: PLP)	Ministry of Land, Infrastructure, Transport and Tourism	Land for commercial, residential and industrial real estate	**Assessment value**	Appraisal value per unit and average change rate	Annual	1970
Urban Land Price Index	Japan Real Estate Institute	Land for commercial, residential and industrial real estate	**Assessment value**	Average change rate	Biannual	1955
ARES Japan Property Index	THE ASSOCIATION FOR REAL ESTATE SECURITIZATION	Office, Residential, Retail, Logistics, Hotel and others	**Appraisal value**	Return	Monthly	2001
MSCI-IPD Japan Monthly Property Index	IPD: Investment Property Databank	Office, Residential, Retail, Logistics, Hotel and others	**Appraisal value**	Return	Monthly	2001

*Availability means that the data is available from this year.

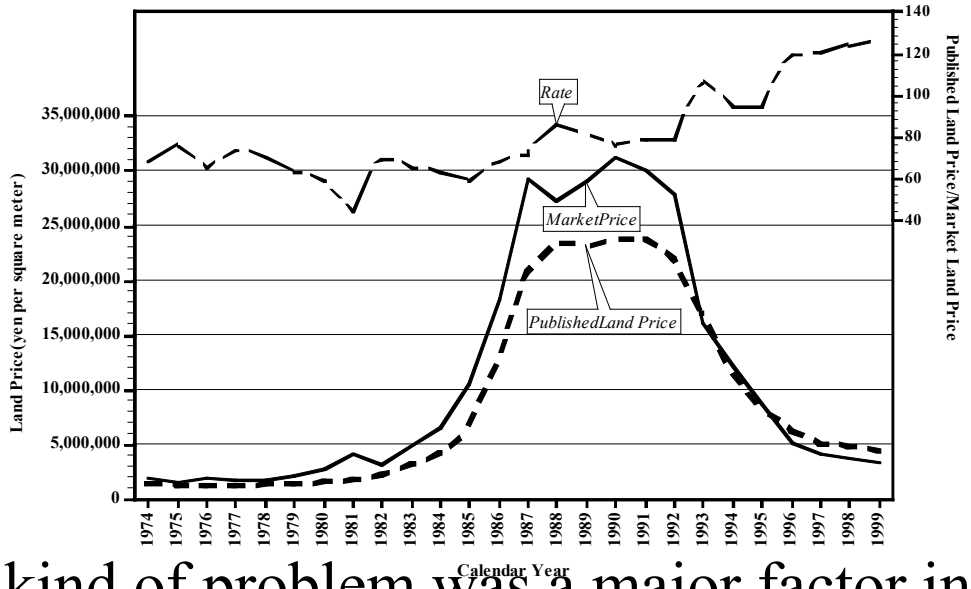
Why J-PPI were *not effective* in policy management?

- The question of **why these real estate price indexes were not effective in policy management** 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 **there 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)

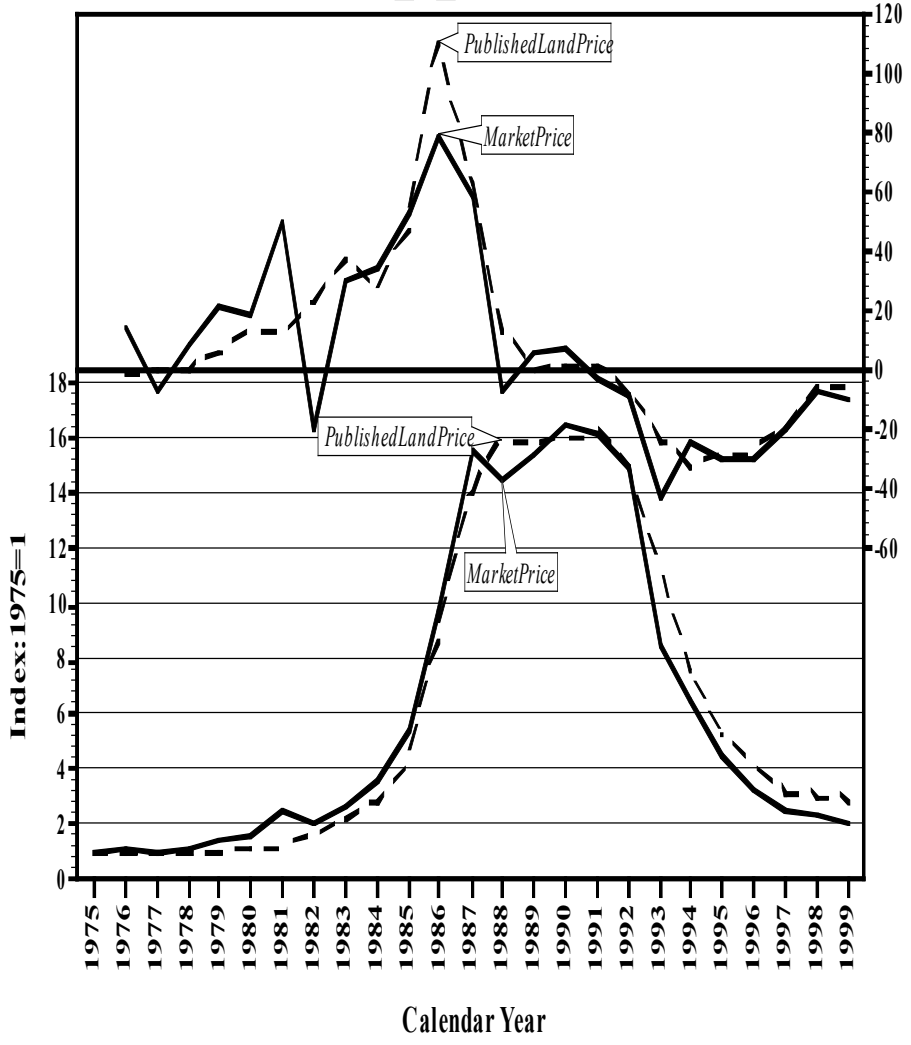
Lessons from Japanese experience.

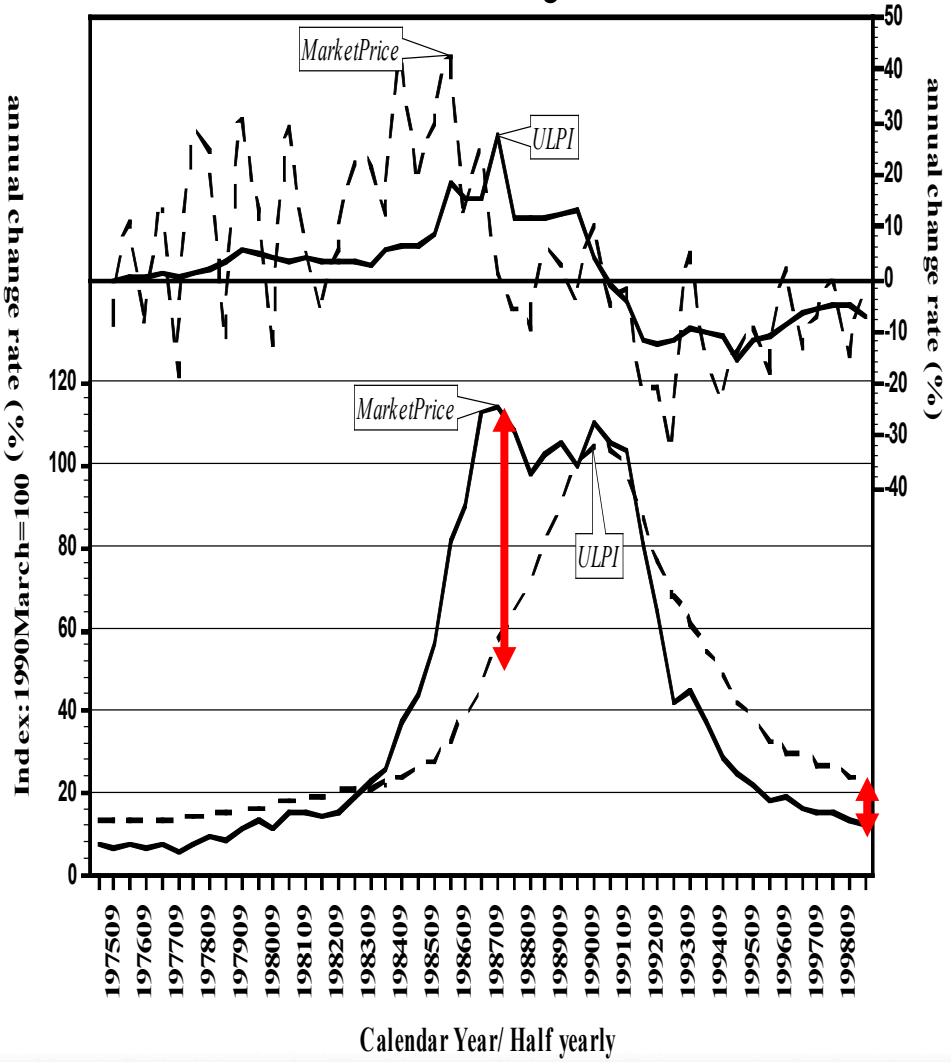
- 1. Appraisal/Assessment based information has ***systematic problem.***
  - Smoothing problem, ***Valuation error problem***, Lagging problem, Client influence problem. (Nishimura and Shimizu(2003), Shimizu and Nishimura(2006), (2007)



- 2. This kind of problem was a major factor in the delay in disposing of bad loans at financial institutions and **one of the factors leading to the subsequent stagnation of the economy.**

Lagging Problem: Transaction price-based index and Appraisal value based index in Tokyo.





Journal of Real Estate Finance and Economics (forthcoming)

Pricing structure in Tokyo metropolitan land markets and its structural changes:

pre-bubble, bubble, and post-bubble periods

Chihiro SHIMIZU
Kiyohiko G NISHIMURA

Abstract

In this paper, we estimate hedonic price equations of Japanese commercial and residential land prices for a 25-year period and to investigate possible structural changes in these price equations. Our price equations are based on transaction prices, not appraised land values, of commercial land in Central Business Districts of Tokyo (Chiyoda Ward, Chuo Ward, and Minato Ward), and residential land of its suburb (Setagaya Ward). We find that price structure differs substantially among locations, reflecting differences in supplier pricing and end-user preferences. We also find significant structural changes in price structure, identifying pre-bubble, bubble and post-bubble periods.

Key Words: Quality-adjusted real estate price index, hedonic approach, bubble economy, structure change, Switching Regression Model

JEL Codes: R33 - Nonagricultural and Nonresidential Real Estate Markets

The current issue and full text archive of this journal is available at
www.emeraldinsight.com/1463-578X.htm

JPIF
24,2

150

Received May 2005
Accepted September 2005

Biases in appraisal land price information: the case of Japan

Chihiro Shimizu
The International Economics and Business Department, Reitaku-University, Kashiwa City, Japan, and
Kiyohiko G. Nishimura
Bank of Japan, Tokyo, Japan

Abstract

Purpose – This paper seeks to investigate the nature and magnitude of the distortion in appraisal land price information according to change in the market, with a special focus on the Government's Published Land Prices.

Design/methodology/approach – In Japan, there is an item of land price information, so-called Koji-Chika (PLPS: Published Land Price Information System), that is a survey of fair market value by the qualified appraisers. The valuation error of this land price information was analyzed using the following method. First, hedonic price indices were constructed based on both actual transaction prices and the Published Land Prices, they were then compared to detect possible distortions in the governmental price information. Also the possibility of structural change in the Japanese real estate markets was studied and its effect on price indices was considered. Analysis of the Tokyo metropolitan area in Japan took place between 1975 and 1999

Findings – Large and systematic discrepancies between actual transaction prices and the Published Land Prices were identified, which might suggest that there are serious problems in the governmental information system. It is believed that it is necessary to consider this issue in the context of the entire real estate appraisal system in Japan.

Research limitations/implications – Limitations stem from the nature of Japanese data. Future research will seek to look at values on an IPD index.

Originality/value – The land market in Tokyo experienced a so-called Bubble economy, and the rapid rise and fall of the land price were generated for this period.

Keywords Real estate, Smoothing methods, Market value, Japan

Paper type Research paper

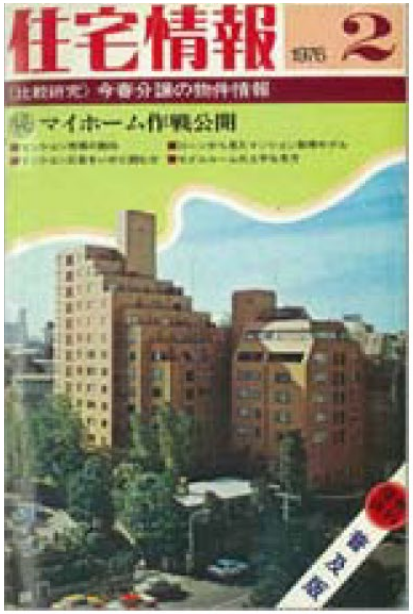
Efficiency, Price / Rent Ratio and Bubbles.

BOJ MONETARY AND ECONOMIC STUDIES · VOL.11 NO.1 · JULY 1993

Efficiency of the Tokyo Housing Market

TAKATOSHI ITO and KEIKO NOSSE HIRONO

In analyzing the dynamics of Tokyo housing price, we have compiled annual micro data sets from individual listings in a widely-circulated real estate advertising magazine. A data set compiled from "properties for investment" lists both asking (sales) prices and rents for the same properties. With such data, a price-rent ratio is directly observable and expected capital gains before tax and commissions found to be just less than 90% in ten years. The "repeatedly-listed properties for investment" data set, a subset of the first, contains only those units in the same buildings after a one-year interval. In this data set, price, rent, and ex post capital gains are all observable. They are used to show that ex post returns on housing investment in the last four years were actually rather modest. The data sets for "housing for sale" and "housing for rent" sections were separately used for hedonic regressions, from which we constructed hedonic price and rent indexes. These regressions show the effects of various determinants of housing prices and rents. The time (year) dummy variables in the hedonic regressions give estimates of price and rent increases in the last 11 years in Tokyo. According to these estimates, prices increased 85-90% over the 1981–92 period, while rents increased about 65%. The price-(annual) rent ratio appears to have fluctuated between 17 and 32 around the stable ratio. Finally, the weak-form efficiency of excess returns on housing is rejected. However, the conclusion is tentative considering the short sample.



Recruit Co. Ltd

Real estate agents

Owner of a house

Session 7: Methodological Innovations — Integrating Real Estate Indices into CPI and SNA

- **Chair:** Yusuf Kenan BAĞIR – Central Bank of the Republic of Türkiye

- *Land Price Index and Land–Structure Decomposition*
  Presenter: Stefan Hofbauer / Statistics Austria
- *Empirical Analysis of the Impact of Age-Related Property Depreciation on Office Rents*
- Presenter: Sahoko Furuta (with Kimiaki Shinozaki / Bank of Japan)
- *Spatial Heterogeneity in Price-to-Rent Ratios in Tokyo, 1986–2025*
- **Presenter: Xiangyu Guo / Tsinghua University (with Jiro Yoshida / Pennsylvania State University, Takatoshi Ito / Columbia University and Chihiro Shimizu / Hitotsubashi University)**

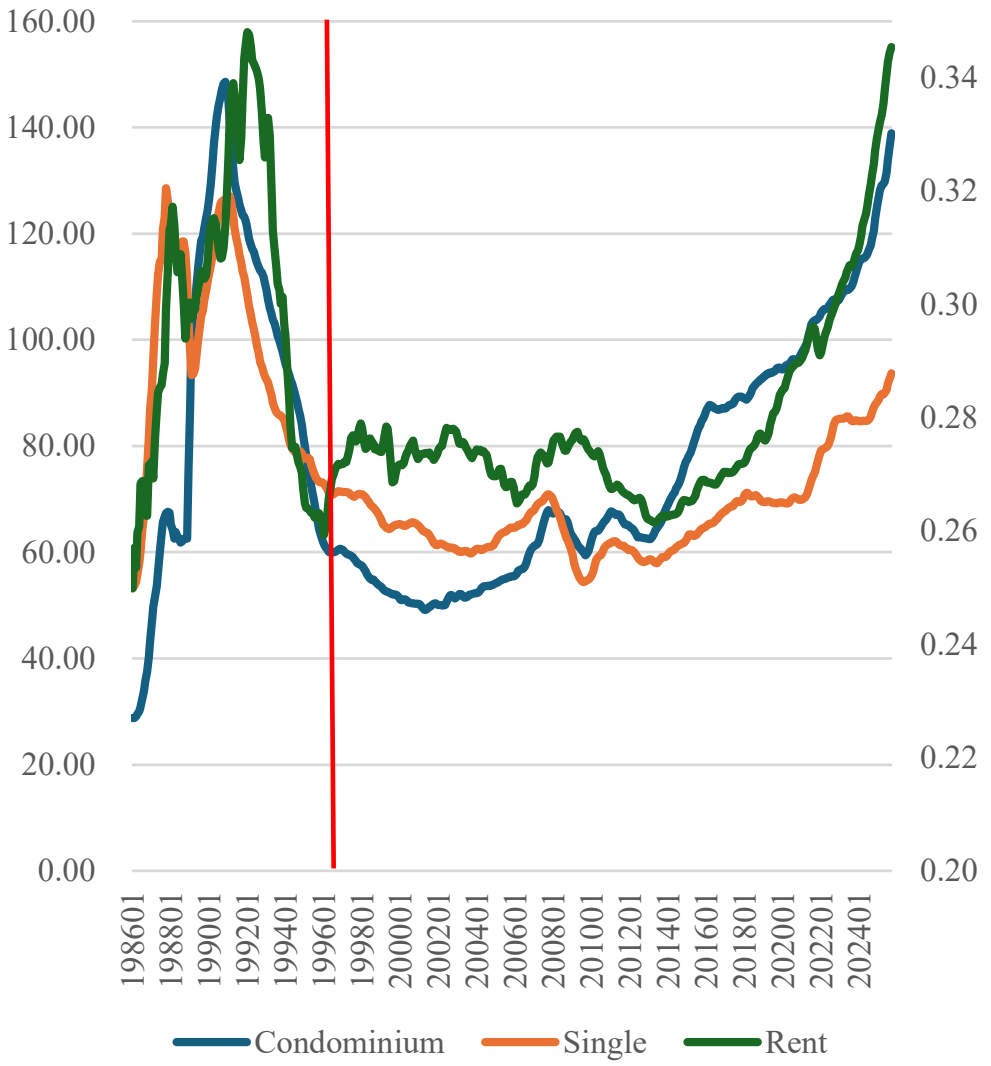
Transaction Based-Property Price Index in Japan.

- 1996 Start New PPI Project (National Rent Survey and Transaction based PPI)
- Dec. 1997 Release *Rolling window PPI* (Havor Analytics)

- Dec. 2009 Started J-RPPI Project .

- May 2011 Release RPPI Handbook.(2013)

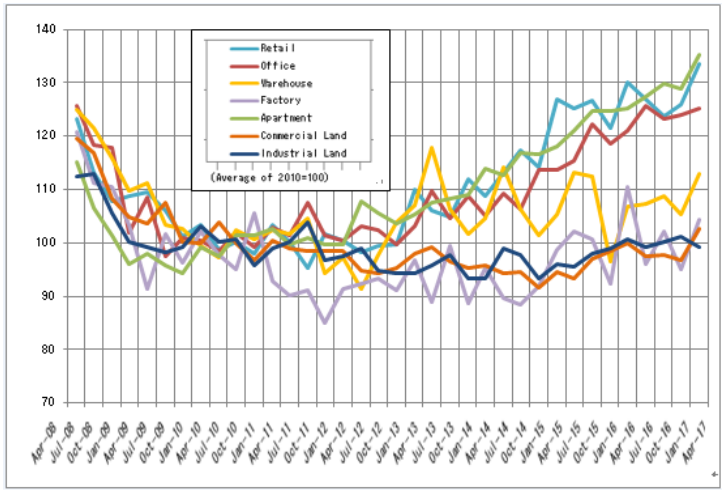
- Aug. 2012 Release J-RPPI. 2015 Switch J-RPPI as official series
- Mar. 2016 Release J-CPPI.
- 2018 Switch J-CPPI as official series.



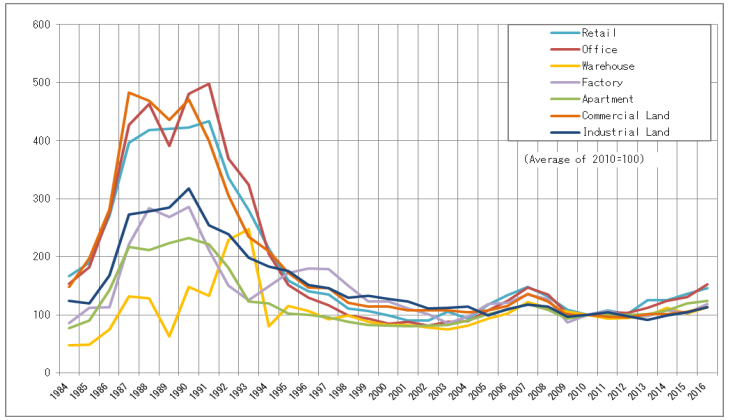
Figures for the JCPPI and the JRPPI

JCPPI

Nationwide (since April 2008)

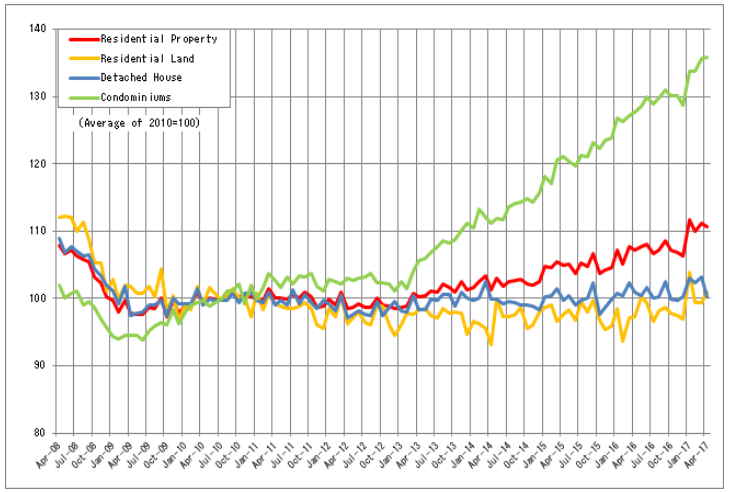


Tokyo (since April 1984)

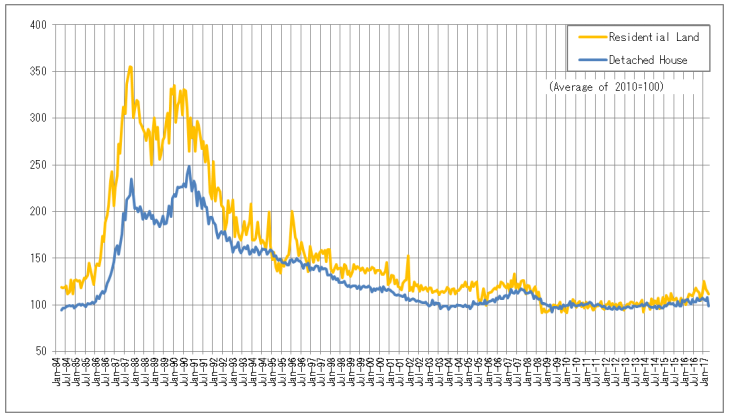


JRPPI

Nationwide (since April 2008)

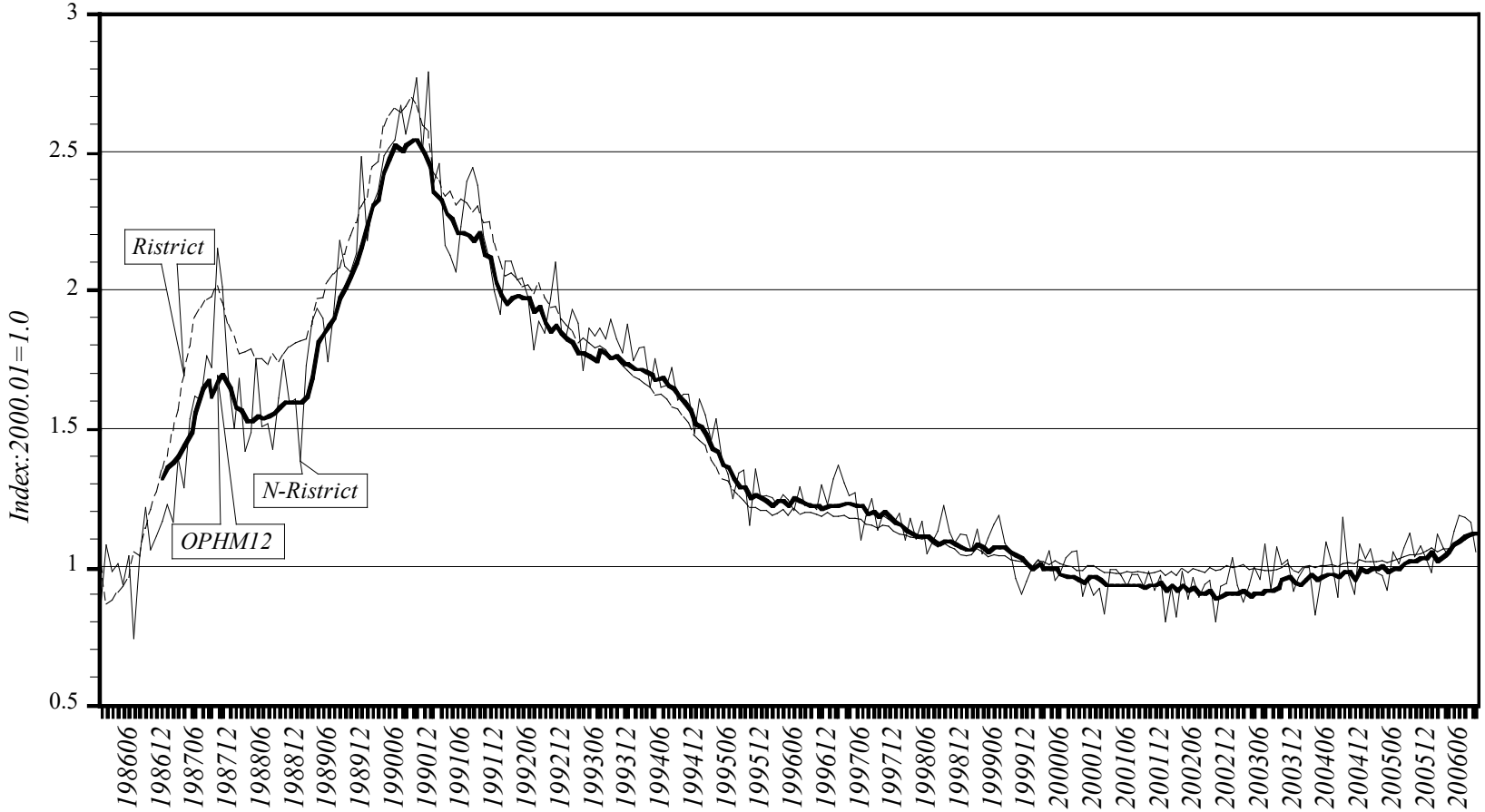


Tokyo (since April 1984)



Note: Figures for the JCPPI and the JRPPI before March 2008 are calculated in cooperation with the Tokyo Association of Real Estate Appraisers.

Method: Rolling window (w=13) *and Time dummy PPI.*



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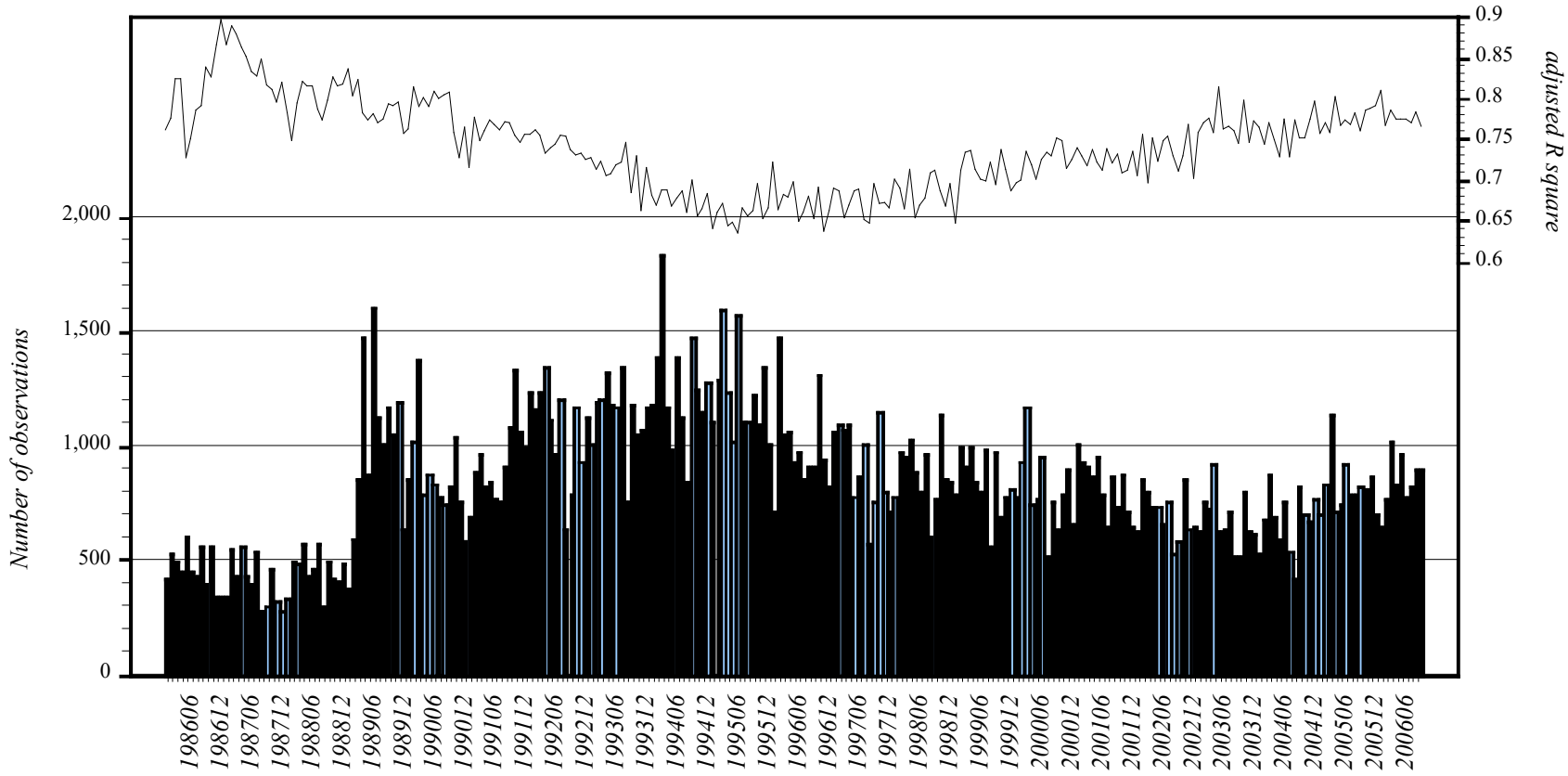
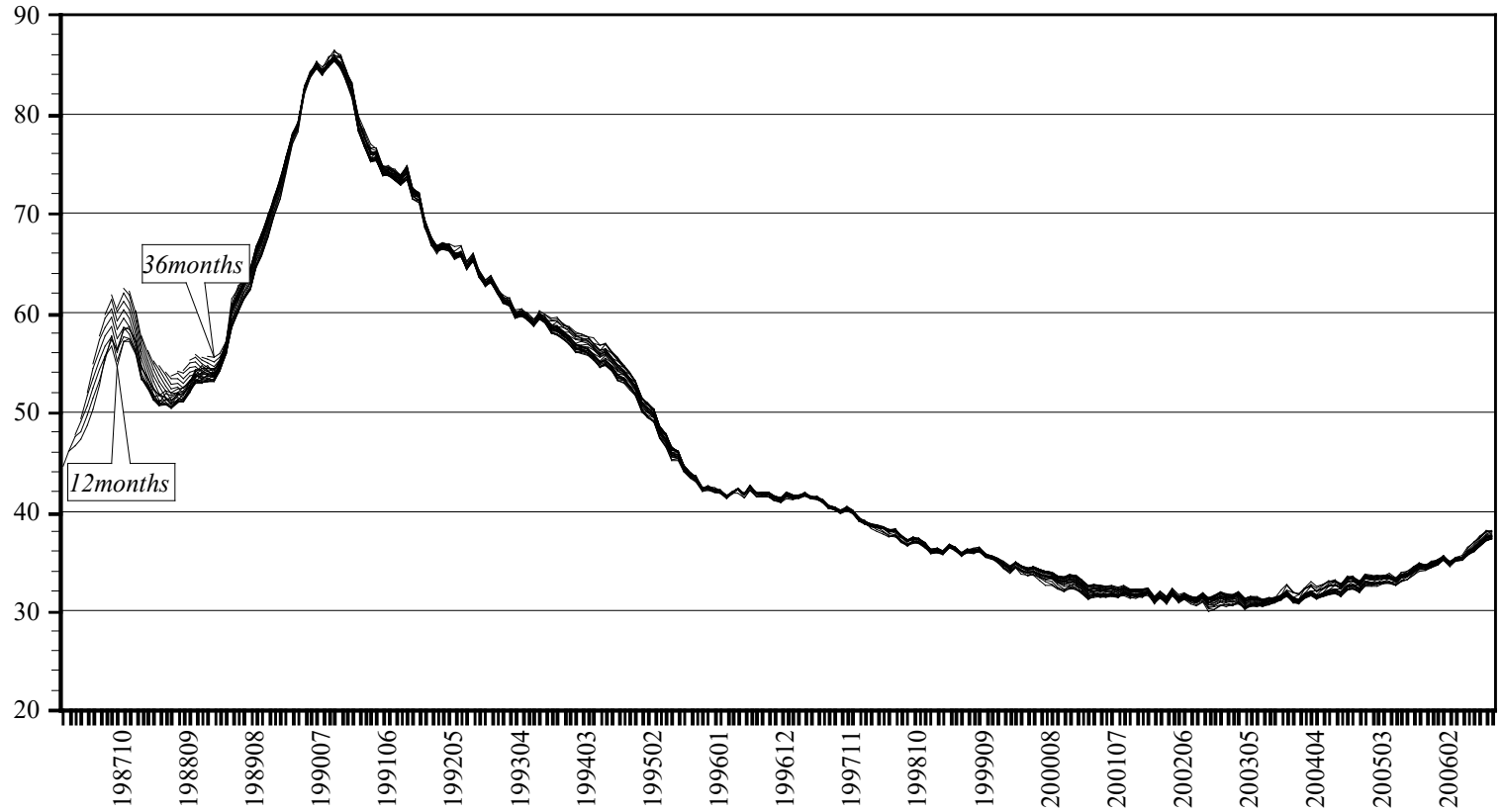
Transaction volume.

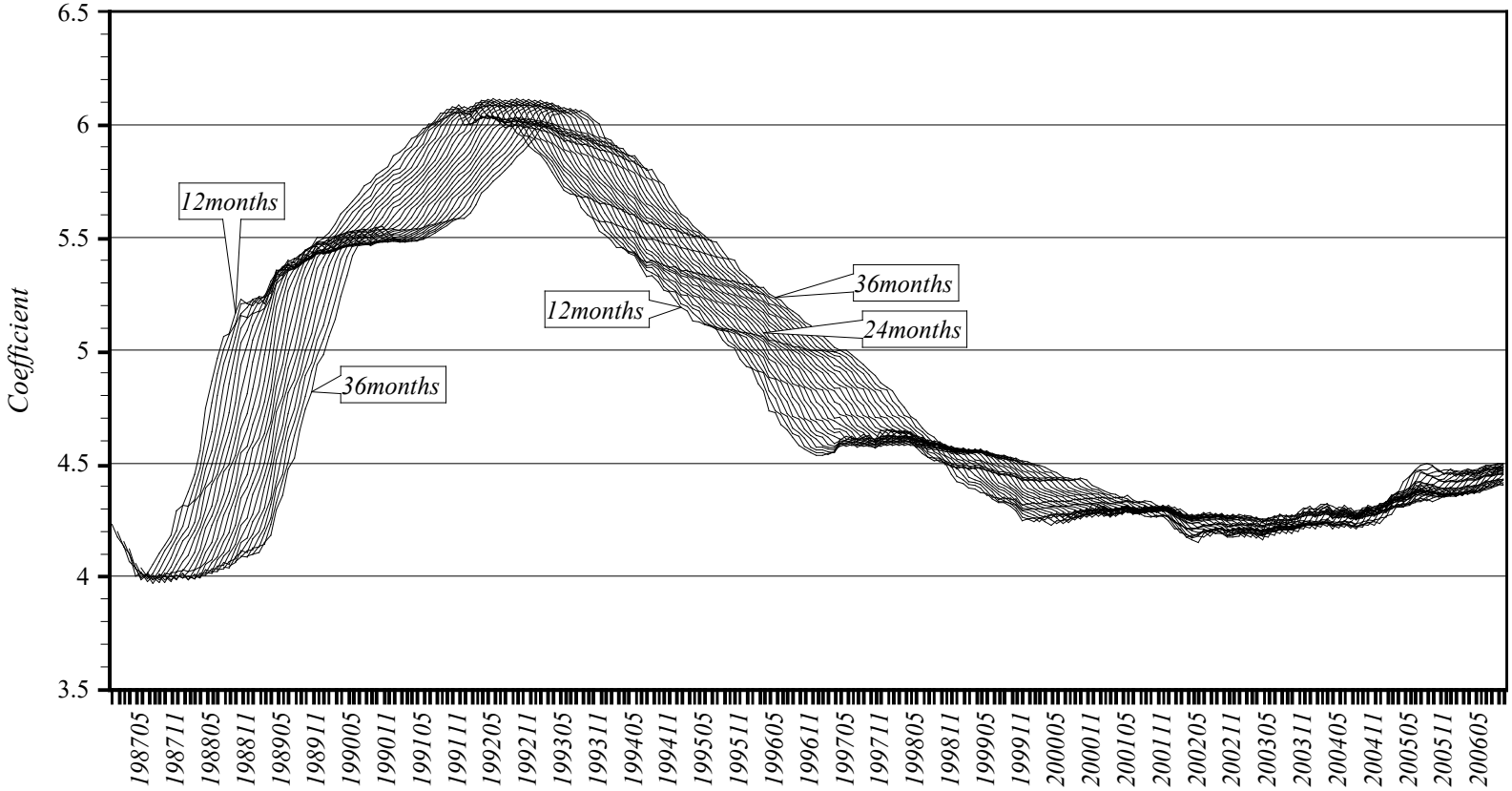


Rolling window Indexes: w=12-36.

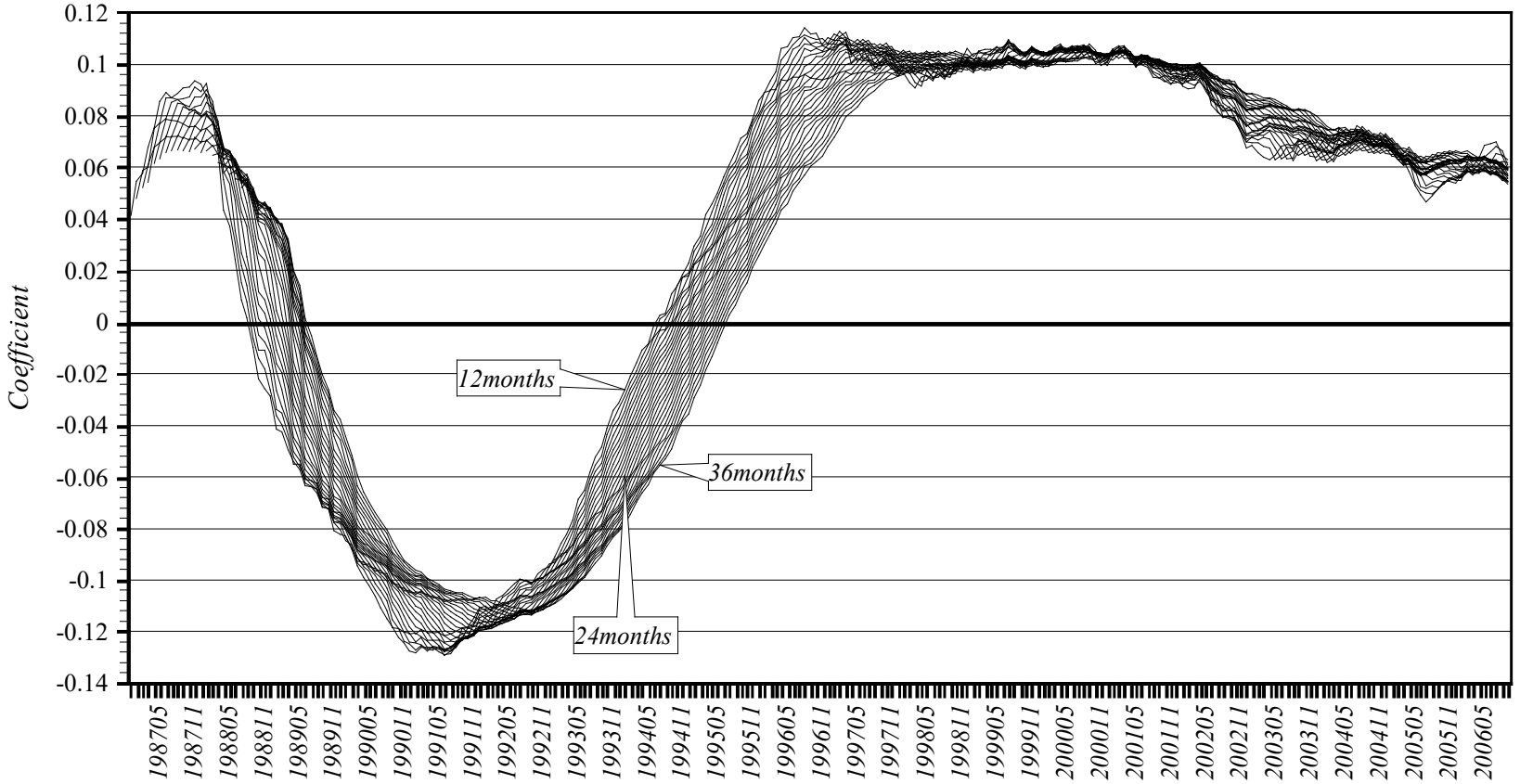


43

Constant terms.



Size


0.12
0.1
0.08
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.12
-0.14
Coefficient
12months
36months
24months
198705
198711
198805
198811
198905
198911
199005
199011
199105
199111
199205
199211
199305
199311
199405
199411
199505
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199605
199611
199705
199711
199805
199811
199905
199911
200005
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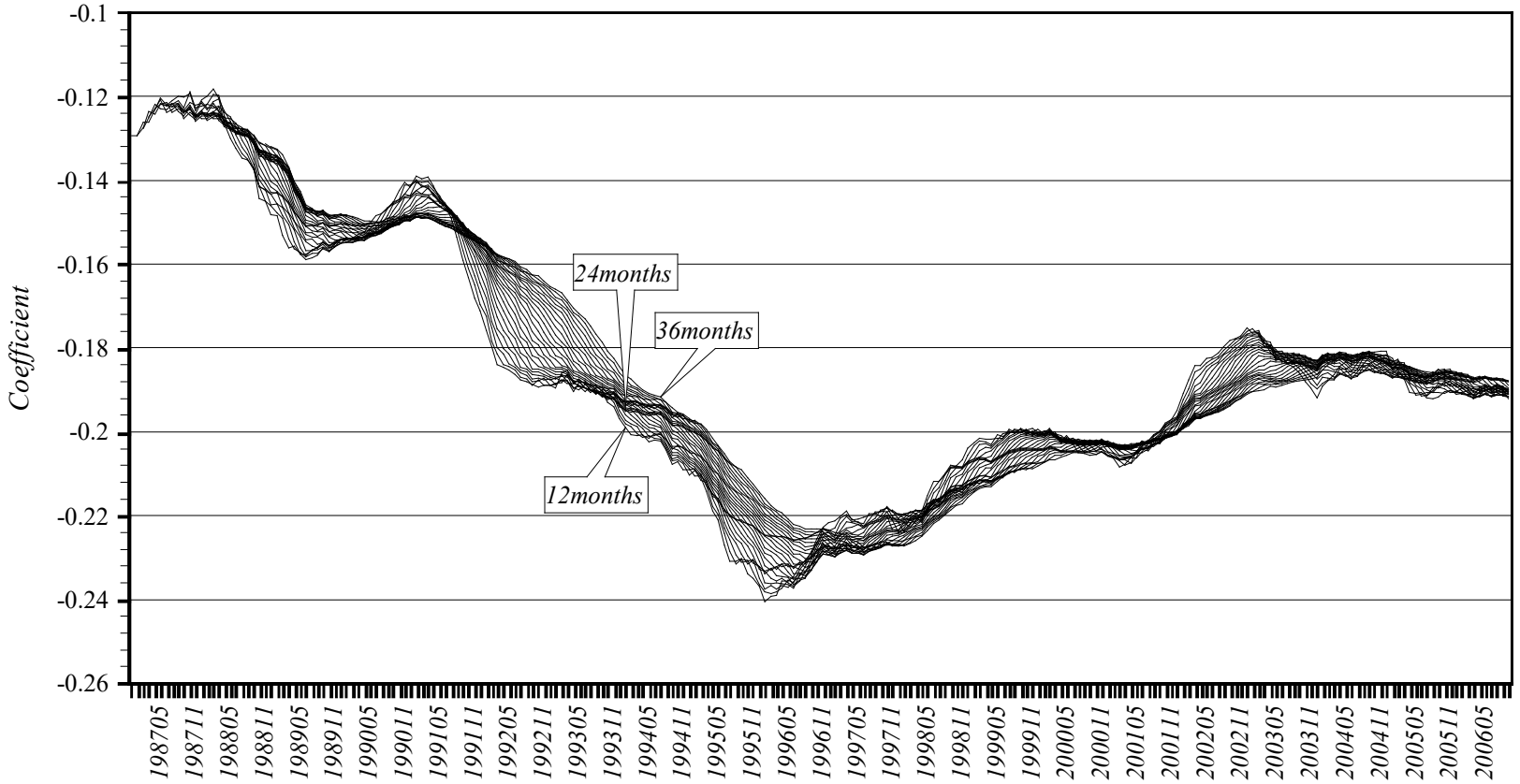
200211
200305
200311
200405
200411
200505
200511
200605

45

Age.


-0.1
-0.12
-0.14
-0.16
-0.18
-0.2
-0.22
-0.24
-0.26
Coefficient
24months
36months
12months
198705
198711
198805
198811
198905
198911
199005
199011
199105
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199205
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199905
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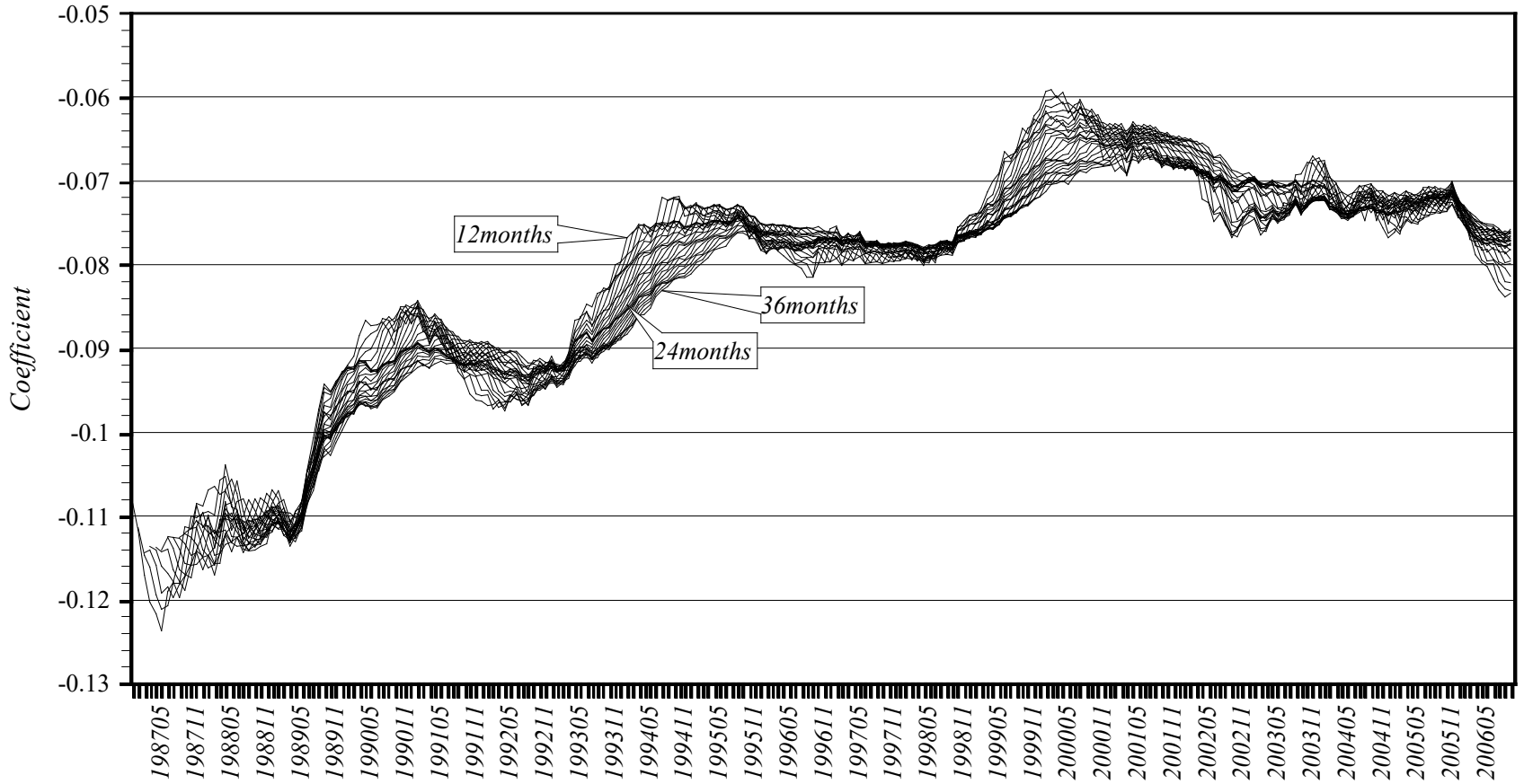
200511
200605

46

Distance to Station.



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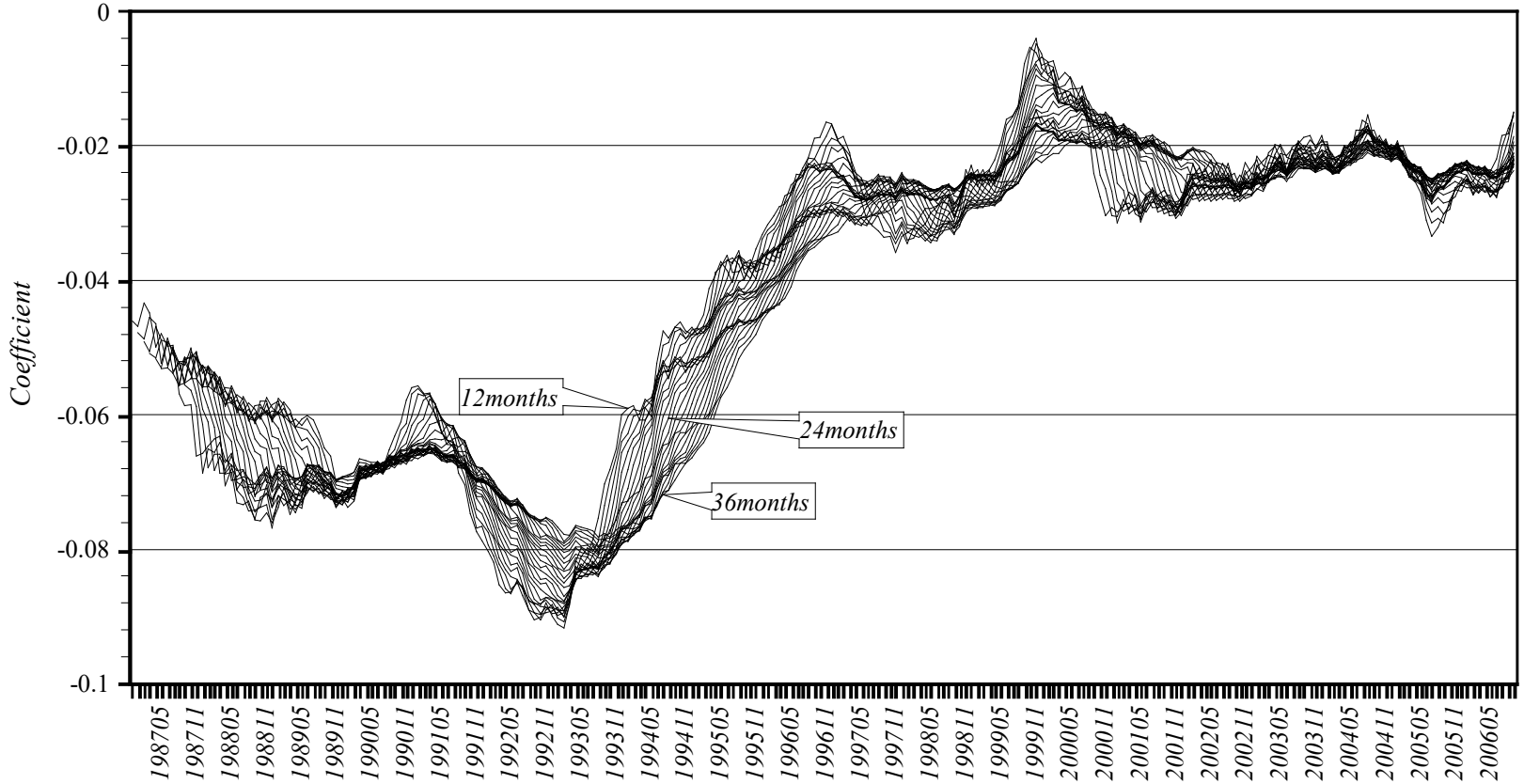
Time to CBD.



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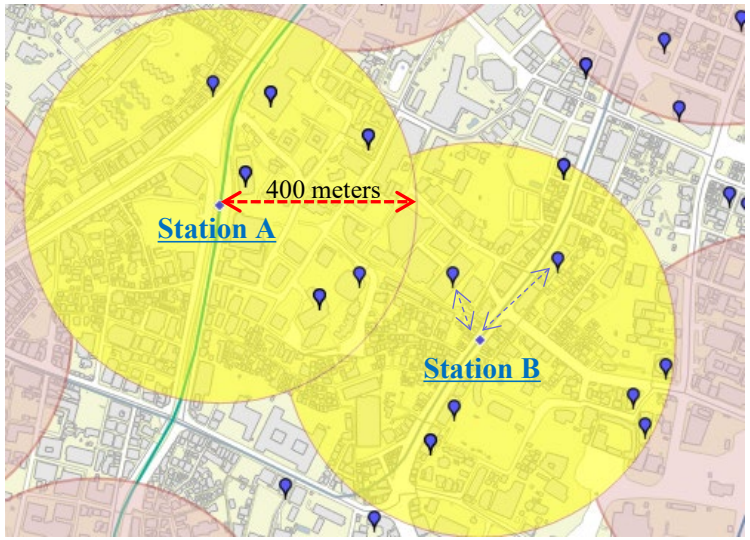
Characteristics in Properties.

Attribute	Explanatory variable	Type of land and structure						
		Retail	Office	Warehouse	Factory	Apartment	Commercial land	Industrial land
Building	Total floor area	○	○	○	○	○	–	–
	Age	○	○	○	○	○	–	–
	Structure (dummy)	○	○	○	○	○	–	–
Location	Land area	○	○	○	○	○	○	○
	Distance from the nearest station	○	○	○	○	○	○	○
	Distance from the main station	○	○	○	○	○	○	○
	Number of railway stations available within 400 meters	○	○	–	–	–	○	○
	Distance from the nearest highway exit	–	–	○	○	–	–	○
	Distance from the nearest national route	–	–	○	○	–	–	○
	District by land use (dummy)	○	○	○	○	○	○	○
	Administration area (dummy)	○	○	○	○	○	○	○
Others	Sold by auction (dummy)	○	○	○	○	○	○	○
	Buyer (dummy)	○	○	○	○	○	○	○
	Seller (dummy)	○	○	○	○	○	○	○

Note: As explanatory variables, attributes of land and buildings that statistically explain prices of commercial land and properties are selected. In addition, from a practical viewpoint, ease of data collection and quantification are important factors in selecting explanatory variables.

Geographic Information System (GIS).

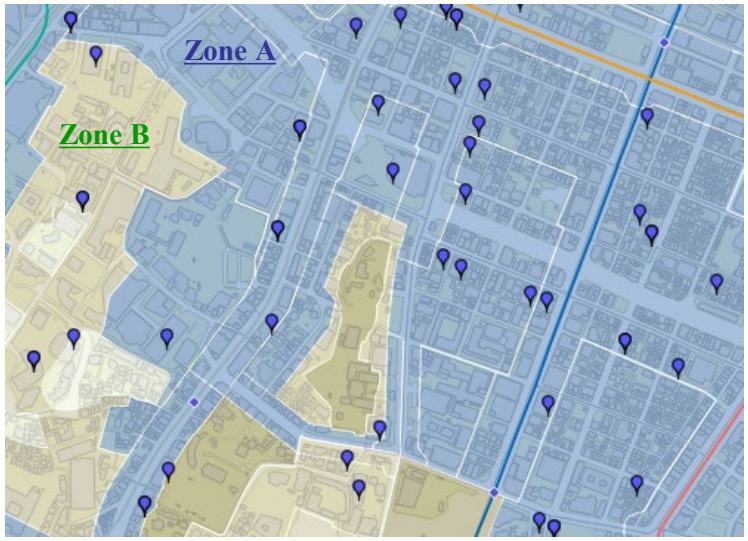


Input data:

- Property sites transacted (points)
- Railway stations (points)
- National routes (polylines)
- Highway exits (points)
- Districts by land use (polygons)

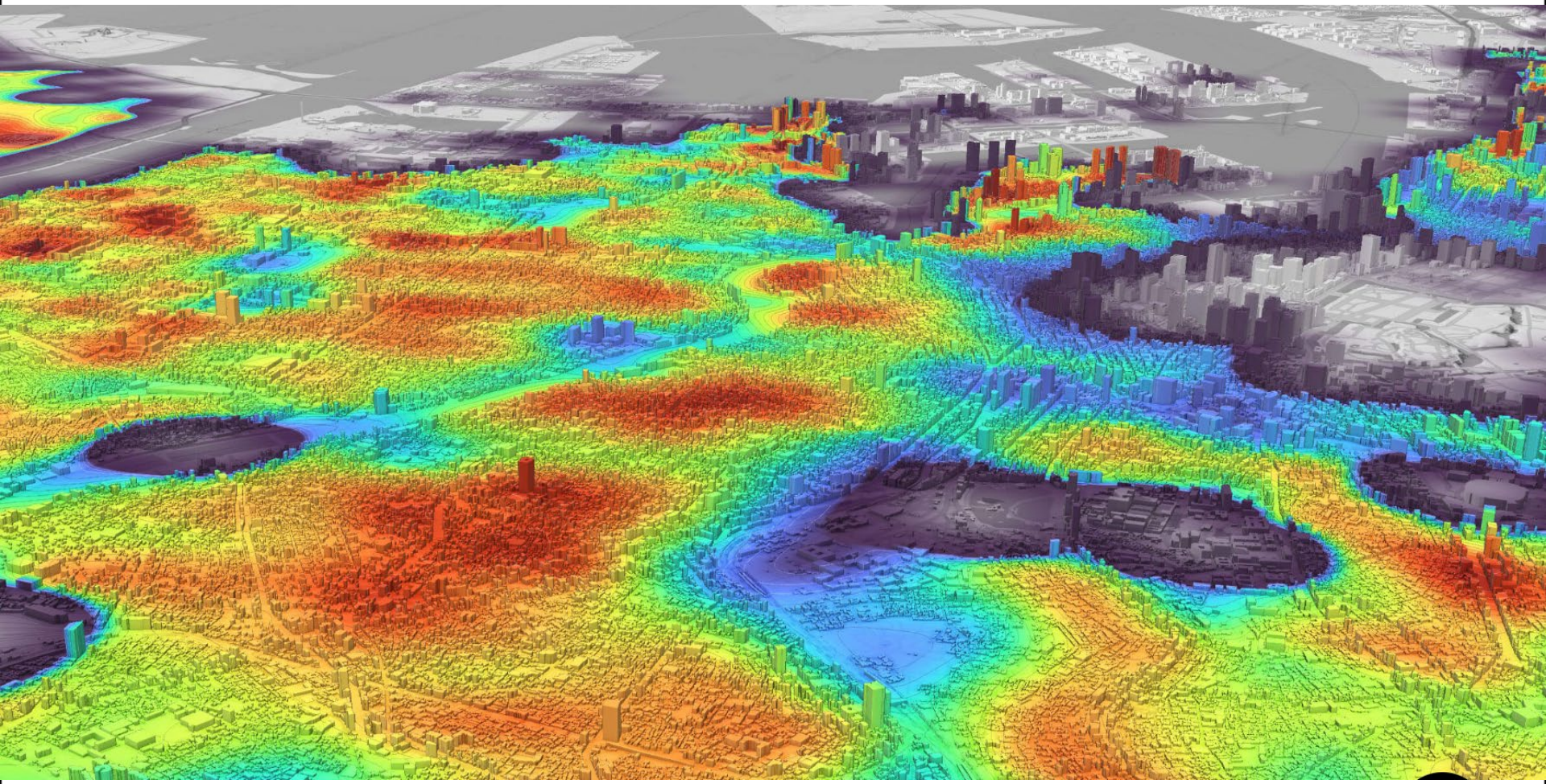
Output data (explanatory variables):

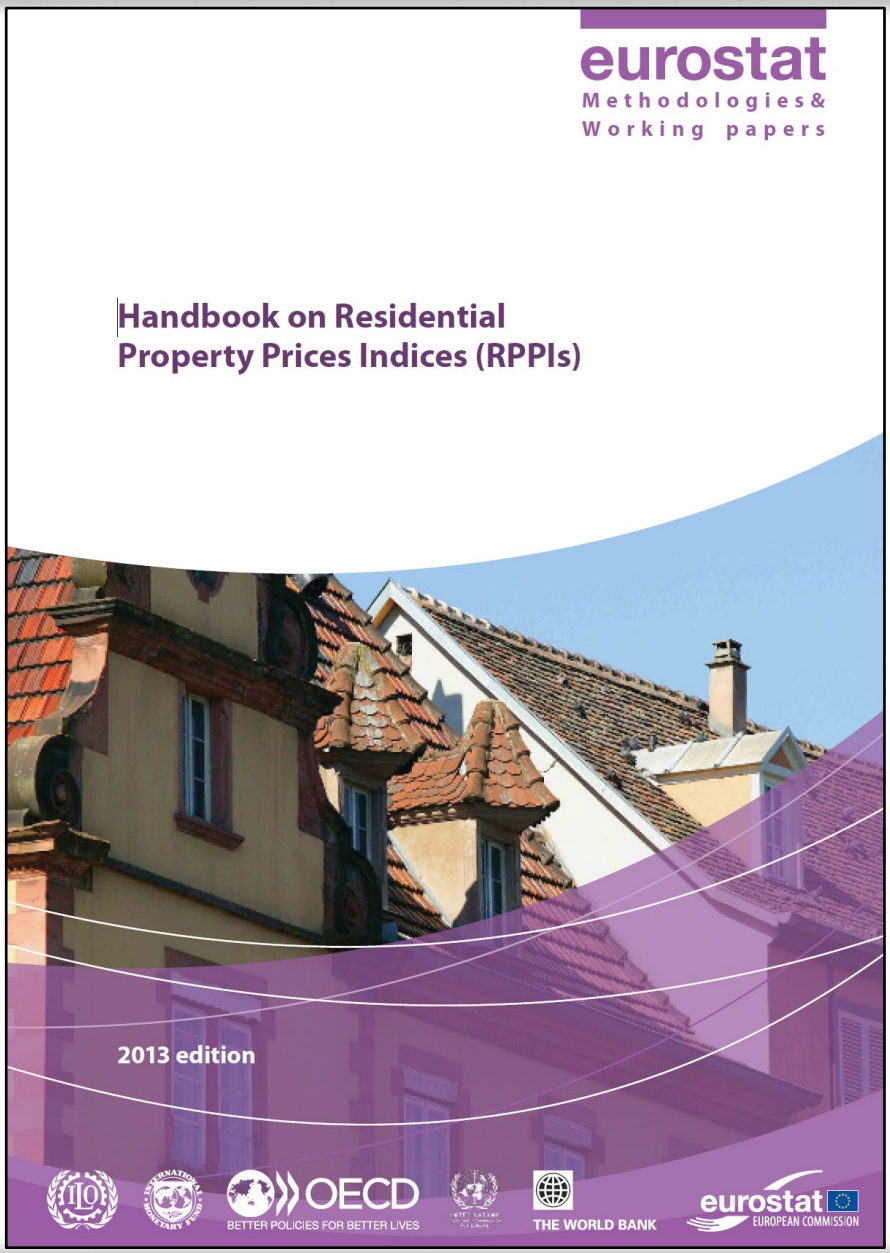
- Distance from the nearest station, and main station
- Number of railway stations available within 400 meters
- Distance from the nearest highway exit
- Distance from the nearest national route
- District by land use (zone code)



Source: Ministry of Land, Infrastructure, Transport and Tourism, "National Land Numerical Information."

GIS system by MLIT: PLATEAU.




eurostat
Methodologies&
Working papers
Handbook on Residential
Property Prices Indices (RPPIs)
2013 edition
OECD
BETTER POLICIES FOR BETTER LIVES
THE WORLD BANK
eurostat
EUROPEAN COMMISSION

Residential Property Price Indices Handbook 2012

- 1. Introduction
- 2. Uses of Residential Property Price Indices
- 3. Elements for a Conceptual Framework
- **4. Stratification or Mix Adjustment Methods**
- **5. hedonic Regression Methods**
- **6. Repeat Sales Methods**
- **7. Appraisal-Based Methods**

Methods

- 8. Decomposing an RPPI into Land and Structures Components
- **9. Data Sources**

Data

- 10. Methods Currently Used
- 11. Empirical Examples
- 12. Recommendations

House Prices and Rents in Tokyo
- A Comparison of Repeat-sales and Hedonic measures-

Chihiro Shimizu

May 28, 2009

Jahrbücher f. Nationalökonomie u. Statistik (Lucius & Lucius, Stuttgart 2010) Bd. (Vol.) 230/6

Housing Prices in Tokyo: A Comparison of Hedonic and Repeat Sales Measures

By Chihiro Shimizu, Chiba/Japan, Kiyohiko G. Nishimura and Tsutomu Watanabe, Tokyo/Japan*

JEL C43, C81, R21, R31

Hedonic price index, repeat sales price index, aggregation bias, housing depreciation.

Summary

Do indexes of house prices behave differently depending on the estimation method? If so, to what extent? To address these questions, we use a unique dataset that we compiled from individual listings in a widely circulated real estate advertisement magazine. The dataset contains more than 470,000 listings of housing prices between 1986 and 2008, including the period of the housing bubble and its burst. We find that there exists a substantial discrepancy in terms of turning points between hedonic and repeat sales indexes, even though the hedonic index is adjusted for structural changes and the repeat sales index is adjusted in the way Case and Shiller suggested. Specifically, the repeat sales measure signals turning points later than the hedonic measure: for example, the hedonic measure of condominium prices bottomed out at the beginning of 2002, while the corresponding repeat sales measure exhibits a reversal only in the spring of 2004. This discrepancy cannot be fully removed even if we adjust the repeat sales index for depreciation.

Alternative Housing Models for Tokyo:

- **Five Measures.**(RPPI handbook: Chapter 5 & 6.)

- **1). The Standard *Hedonic Regression* Model.**

- **2). The Standard *Repeat Sales* Model.**

- **3). Heteroskedasticity Adjustments to the *Repeat Sales* Index.→Case-Shiller Repeat Sales Index.**

- **4). Age Adjustments to the *Repeat Sales* Index.**

- **5). Rolling Window *Hedonic Regressions*: Structural Change Adjustments to the Hedonic Index.**

J Real Estate Finan Econ
DOI 10.1007/s11146-017-9631-2

CrossMark

Separating the Age Effect from a Repeat Sales Index: Land and Structure Decomposition

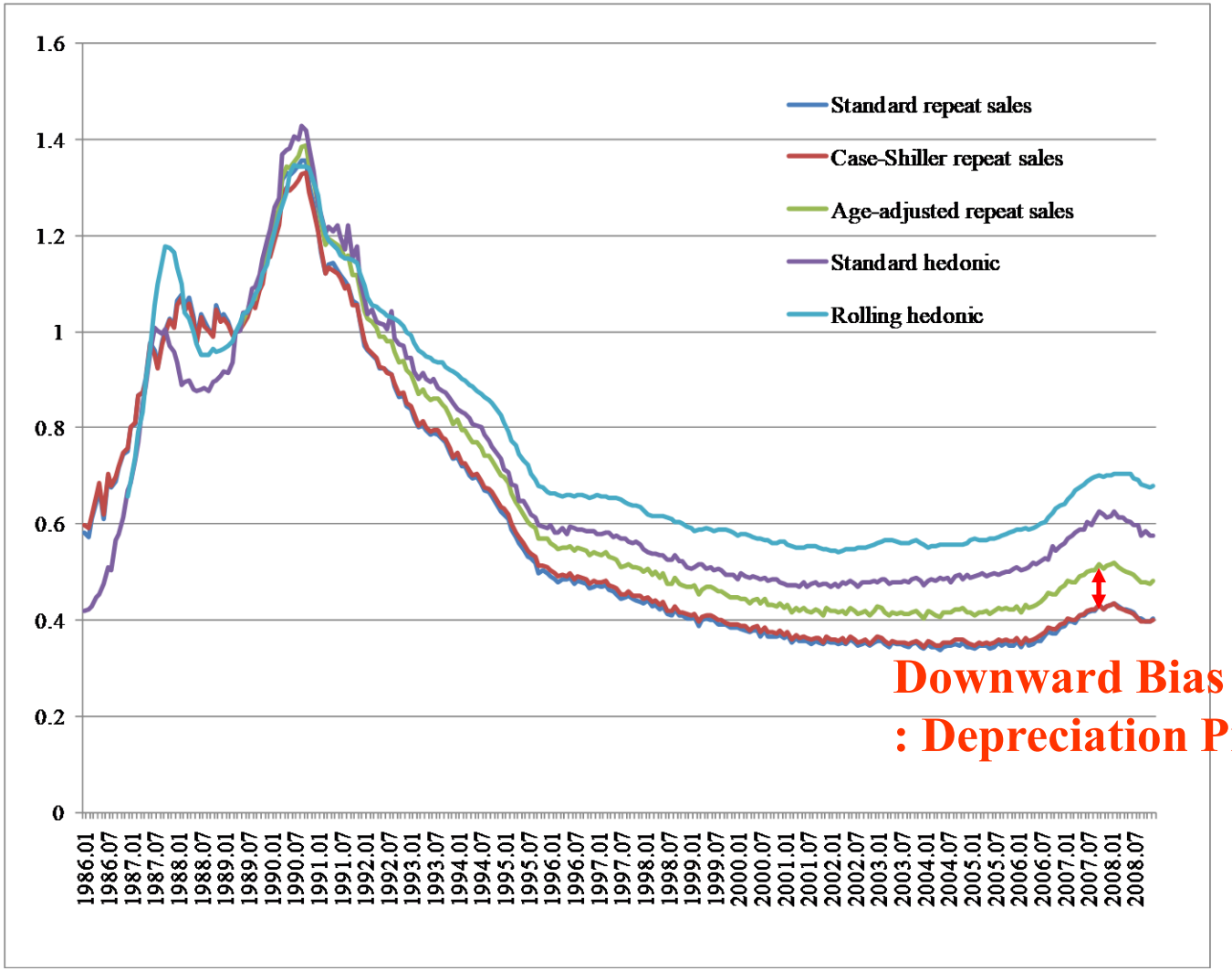
Siu Kei Wong[1] · K. W. Chau[1] · K. Karato[2] · C. Shimizu[3]

© Springer Science+Business Media, LLC 2017

Abstract Since real estate is heterogeneous and not all its quality attributes are observable, the repeat sales model pioneered by Bailey et al. (1963) has become one of the standard methods to estimate a constant-quality price index. The model, however, fails to adjust for depreciation, as age and time between sales have an exact linear relationship. This paper proposes a new method to estimate an age-adjusted repeat sales index by decomposing property value into land and structure components. As depreciation is more relevant to the structure than land, the property's depreciation rate should depend on the relative size of land and structure. The larger the land component, the lower the depreciation rate of the property. This new method is applied to property transactions in Hong Kong and Tokyo. Hong Kong is shown to have a higher depreciation rate based on a fixed structure-to-property value ratio, while the resulting age adjustment is larger in Tokyo because its land value has shrunken over time.

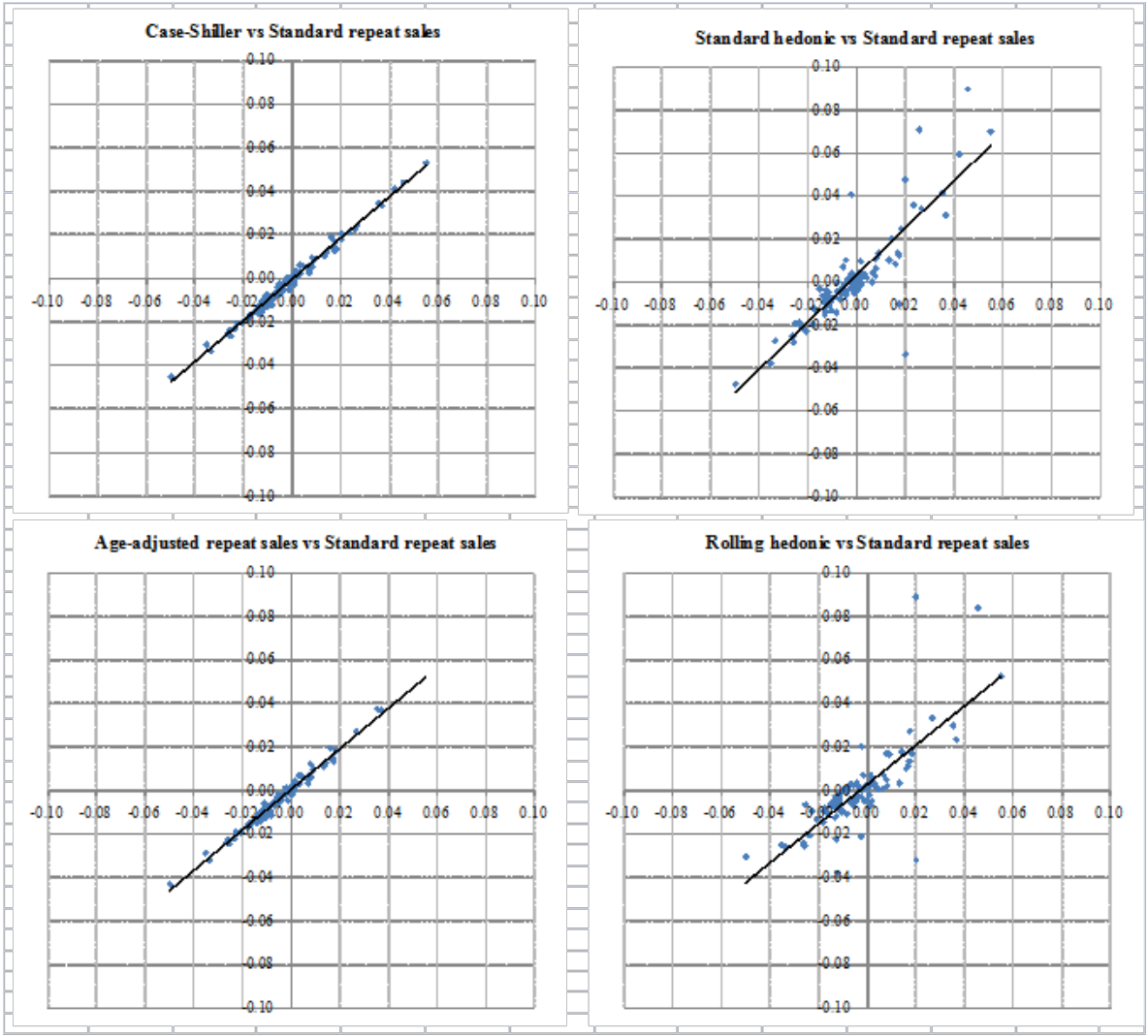
Keywords Price index · Repeat sales · Depreciation · Land value · Structure value

Estimated five indices for condominiums



Downward Bias
: Depreciation Problem

Comparison of the five indexes in terms of the quarterly growth rate



Pairwise Granger-causality tests

Condominiums

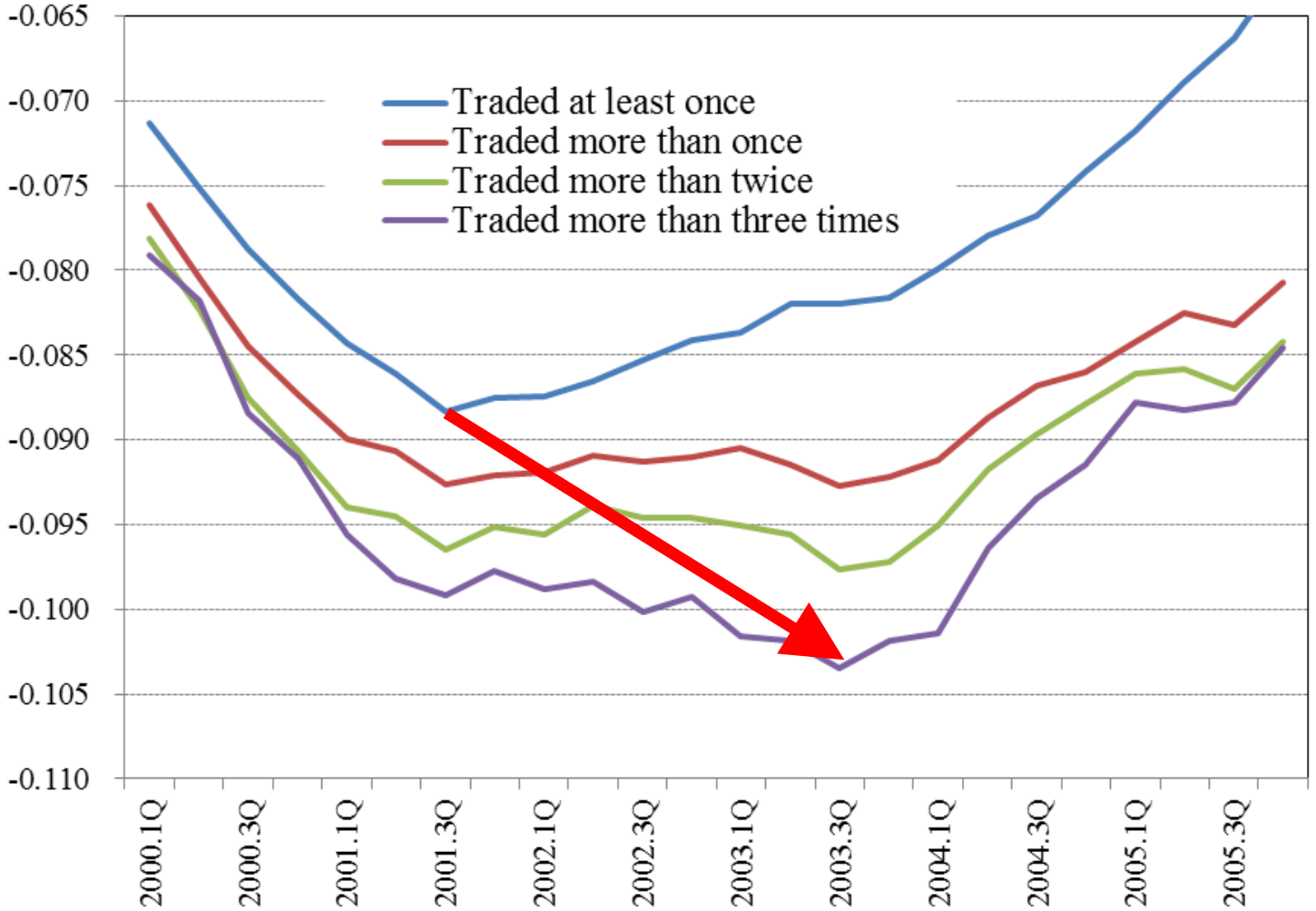
	Standard repeat sales	Case-Shiller repeat sales	Age-adjusted repeat sales	Standard hedonic	Rolling hedonic
Standard repeat sales		0.0120	0.0019	0.0039	0.0000
Case-Shiller RS	0.2018		n.a.	0.0398	0.0000
Age-adjusted RS	0.0568	n.a.		0.1258	0.0000
Standard hedonic	0.0004	0.0001	0.0000		0.0000
Rolling hedonic	0.0053	0.0082	0.0022	0.1528	

Single family houses

	Standard repeat sales	Case-Shiller repeat sales	Age-adjusted repeat sales	Standard hedonic	Rolling hedonic
Standard repeat sales		0.2726	0.4345	0.1919	0.0048
Case-Shiller RS	0.2397		n.a.	0.1810	0.0088
Age-adjusted RS	0.3275	n.a.		0.1962	0.0078
Standard hedonic	0.0028	0.0028	0.0027		0.0048
Rolling hedonic	0.0812	0.0784	0.0781	0.1089	

Note: The number in each cell represents the p-value associated with the null hypothesis that the variable in the row does not Granger-cause the variable in the column.

Hedonic indexes estimated using repeat-sales samples



Workshop on "Residential Property Price Indices" organized by Statistics Netherlands.

House Prices at Different Stages in Buying/Selling Process

Chihiro Shimizu

February 11.2011

House Prices at Different Stages in Buying/Selling Process

Chihiro Shimizu

May 5, 2011

Regional Science and Urban Economics 59 (2016) 37–53

Contents lists available at ScienceDirect

Regional Science and Urban Economics

journal homepage: www.elsevier.com/locate/regec

House prices at different stages of the buying/selling process☆

Chihiro Shimizu [a,*], Kiyohiko G. Nishimura [b], Tsutomu Watanabe [b]

[a] Institute of Real Estate Studies, National University of Singapore, 21 Heng Mui Keng Terrace, #04-02, 119613 Singapore
[b] Faculty of Economics, The University of Tokyo

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R31
C10

Keywords:
House price index
Quantile regressions
Hedonic regressions
Quality adjustment
Goodness-of-fit tests

ABSTRACT

In constructing a housing price index, one has to make at least two important choices. The first is the choice among alternative estimation methods. The second is the choice among different data sources of house prices. The choice of the dataset has been regarded as critically important from a practical viewpoint, but has not been discussed much in the literature. This study seeks to fill this gap by comparing the distributions of prices collected at different stages of the house buying/selling process, including (1) asking prices at which properties are initially listed in a magazine, (2) asking prices when an offer for a property is eventually made and the listing is removed from the magazine, (3) contract prices reported by realtors after mortgage approval, and (4) registry prices. These four prices are collected by different parties and recorded in different datasets. We find that there exist substantial differences between the distributions of the four prices, as well as between the distributions of house attributes. However, once quality differences are controlled for, only small differences remain between the different house price distributions. This suggests that prices collected at different stages of the house buying/selling process are still comparable, and therefore useful in constructing a house price index, as long as they are quality adjusted in an appropriate manner.

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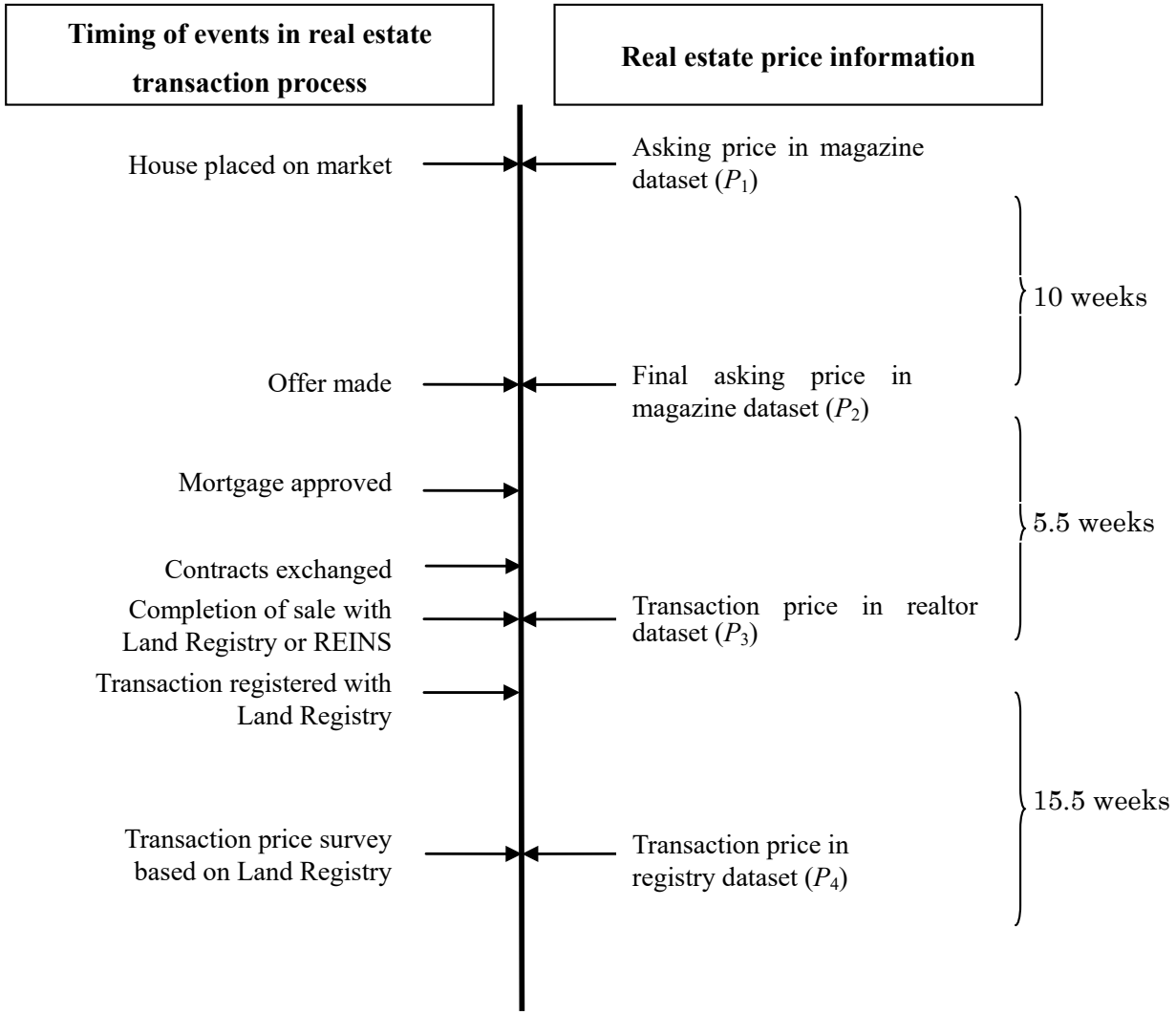
The Selection of Data Sources for the Construction of Housing Price Indexes

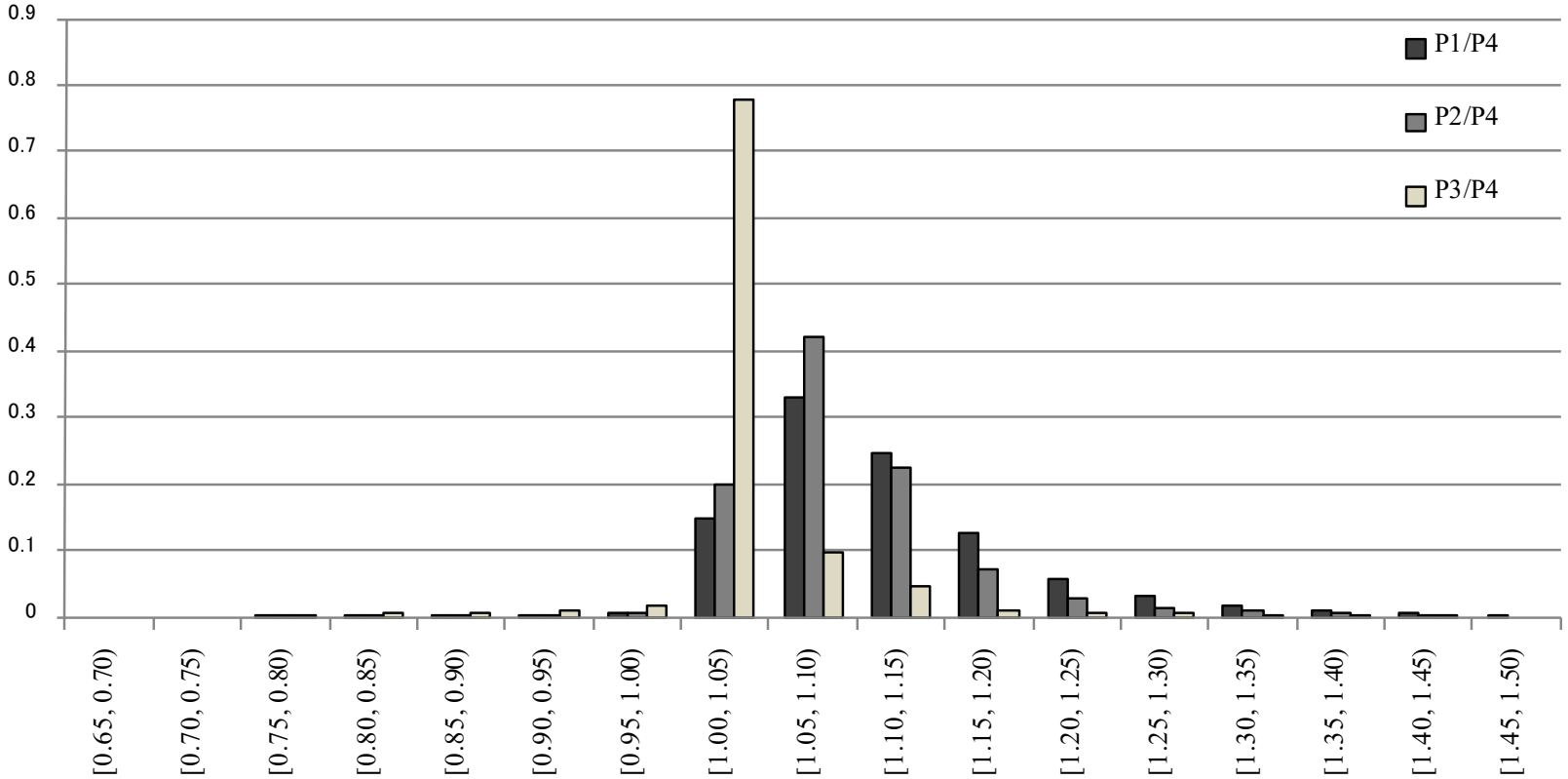
- Are house prices different depending on the stages of the buying/selling process?

- We address this question by comparing the distributions of prices collected at different stages of the buying/selling process, including:
- **(1) initial asking prices listed on a magazine or website,**
- **(2) asking prices at which an offer is made by a buyer,**
- **(3) contract prices reported by realtors after mortgage approval,**
- **(4) registry prices.**

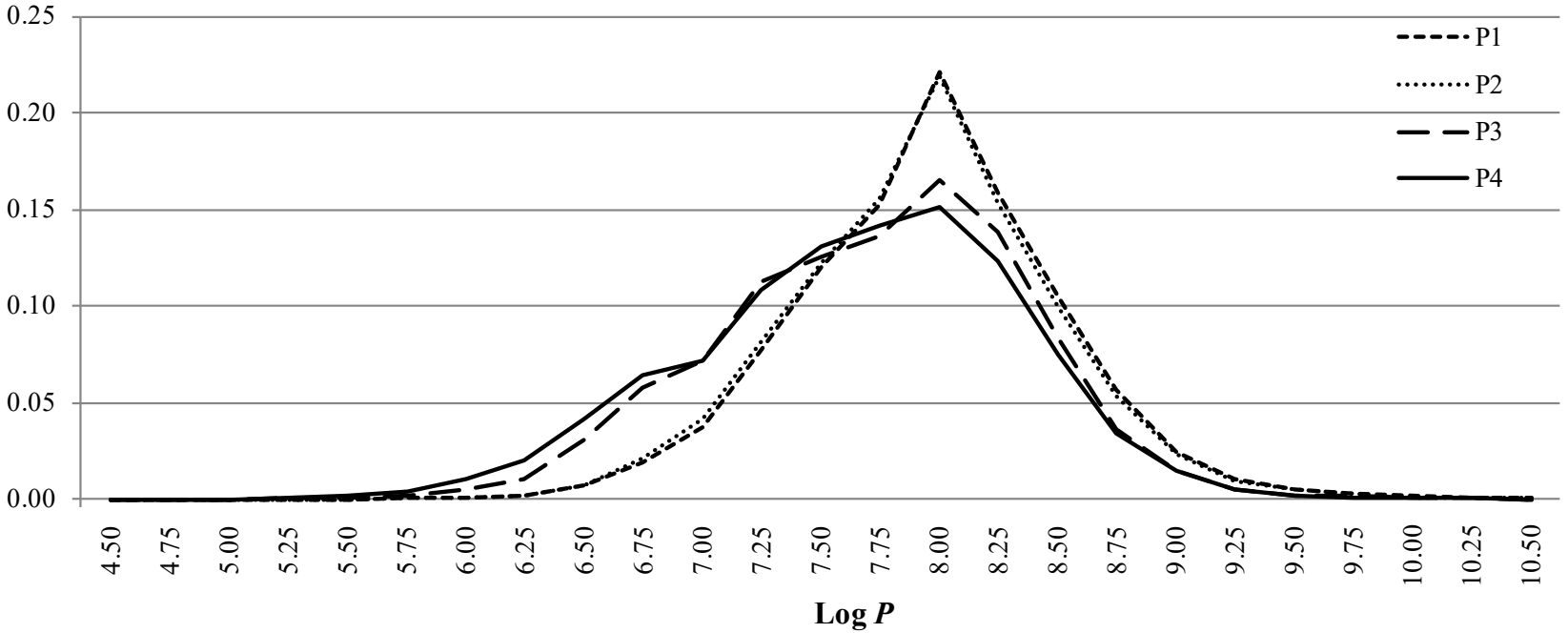
House purchase timeline



Densities for relative prices

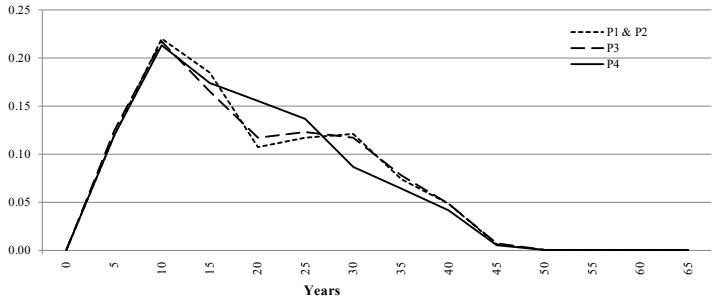


Price densities for P_1, P_2, P_3, and P_4

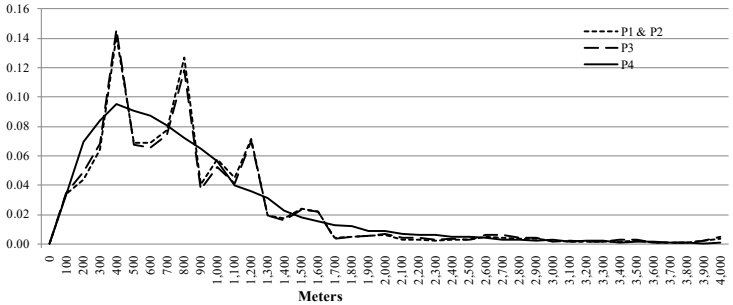


Density functions for house attributes

FS **: Floor space**



AGE **: Age of building**



DS **: Distance to the nearest station**

Two methods for *quality adjustment*

1. Intersection approach

- Using address information, we identify houses that are commonly observed in two or three datasets. Then we look at price distribution for the intersection sample.
- This idea is quite similar to the one adopted in the repeat sales method.

2. Quantile hedonic approach

- We apply quantile hedonic regression to the raw data. Then we use the estimated quantile coefficients and the distribution of various house attributes to conduct quality adjustment.
- This method is proposed by Machado and Mata (2005), and applied housing data by McMillen (2008)

New model for RPPI using quantile hedonic model.

- For inter-regional comparison with price level and time trend in house prices, we should focus on the distribution of House prices

$$F_t(p) = \int_{-\infty}^{\infty} F_t(p \mid z) u_t(z) dz$$

- $F_t(p)$ denotes the cumulative distribution function (CDF) of the log of house prices at period t.

- $F_t(p \mid z)$ denotes the conditional CDF of the log of house prices at period t , given a vector of house attributes, z.

Price changes between t1 and t2.

$$F_1(p) = \int_{-\infty}^{\infty} F_1(p \mid z) u_1(z) dz$$

$$F_2(p) = \int_{-\infty}^{\infty} F_2(p \mid z) u_2(z) dz$$

↓ Quality-adjusted Price change

$$F_2(p) - F_1(p) = \int_{-\infty}^{\infty} \left[F_2(p \mid z) - F_1(p \mid z) \right] u_1(z) dz$$

$$+ \int_{-\infty}^{\infty} F_2(p \mid z) \left[u_2(z) - u_1(z) \right] dz$$

Price change from the difference of qualities in t1 and t2

Quality adjutment between t1 and t2.

$$F_1(p) = \int_{-\infty}^{\infty} F_1(p \mid z) u_1(z) dz$$

$$F_2(p) = \int_{-\infty}^{\infty} F_2(p \mid z) u_2(z) dz$$

↓ Quality-adjusted Price change

$$F_2(p) - F_1(p) = \int_{-\infty}^{\infty} \left[F_2(p \mid z) - F_1(p \mid z) \right] u_1(z) dz$$

$$+ \int_{-\infty}^{\infty} F_2(p \mid z) \left[u_2(z) - u_1(z) \right] dz$$

Control or remove quality differences

Empirical model using Quantile hedonic approach.

$$Q_i^{\theta}(p \mid z) = z\beta_i(\theta) \quad : \theta \in (0,1)$$

$Q_i^{\theta}(p \mid z)$: θ-*th* quantile of $F_i(p \mid z)$

$\beta_i(\theta)$: the quantile regression coefficient

z : housing attributes

Differences between price distributions t1-t2.

$$F_i(p \mid z) \quad \rightarrow \quad p = z\hat{\beta}_i(\theta)$$

$$P_1 : F_1(p \mid z) \quad \rightarrow \quad p_1 = z_1\hat{\beta}_1(\theta)$$

$$P_4 : F_4(p \mid z) \quad \rightarrow \quad p_4 = z_4\hat{\beta}_4(\theta)$$

$$\hat{F}_1(p) \equiv \int_{-\infty}^{\infty} \hat{F}_1(p \mid z) u_1(z) dz;$$

$$\hat{F}_4(p) \equiv \int_{-\infty}^{\infty} \hat{F}_4(p \mid z) u_4(z) dz$$

Decompose of distribution

- We calculate the distribution of P:

$$p_{11} = z_{1b} \cdot \hat{\beta}_1(b),$$

$$p_{44} = z_{4b} \cdot \hat{\beta}_4(b),$$

$$p_{14} = z_{1b} \cdot \hat{\beta}_4(b)$$

(a)Coefficient differences: $p_{44} - p_{14}$,

(b)Variables differences: $p_{11} - p_{14}$,

↓

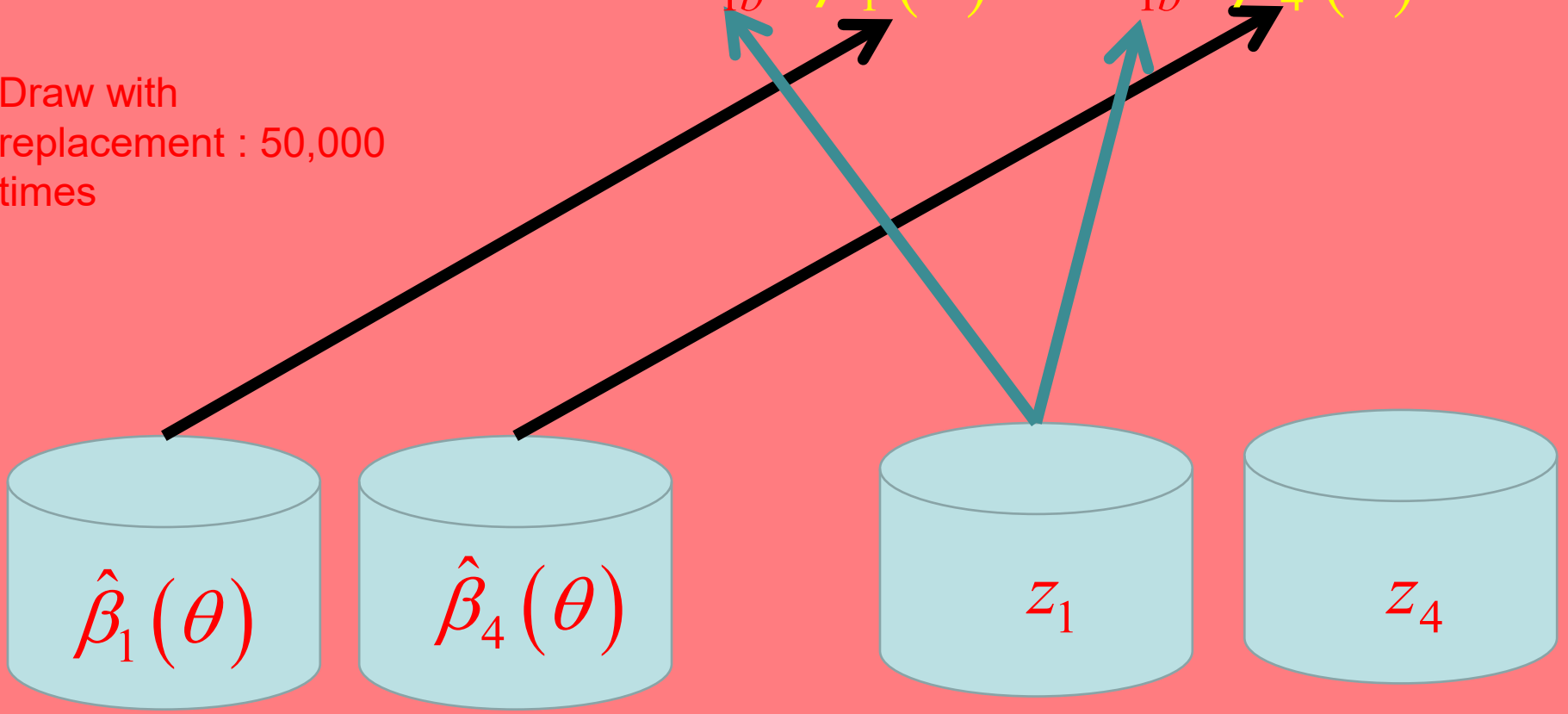
(a)+(b):Total differences: $p_{11} - p_{44}$,

(a) Coefficient differences

(P_1)

Coefficient differences: $z_{1b} \cdot \hat{\beta}_1(b) - \cdot z_{1b} \cdot \hat{\beta}_4(b)$

Draw with replacement : 50,000 times



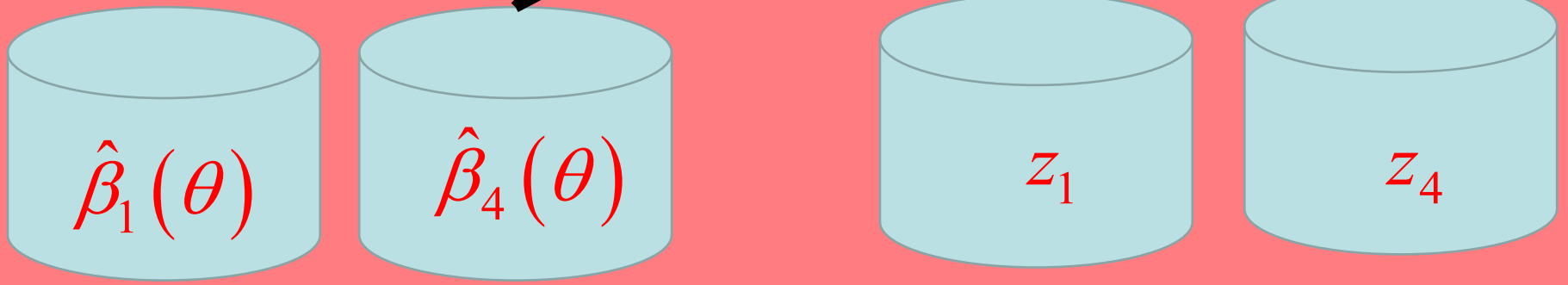
Variables differences

Variables differences:

(P_4)

$$z_{4b} \cdot \hat{\beta}_4(b) - \cdot z_{1b} \cdot \hat{\beta}_4(b)$$

Draw with replacement : 50,000 times

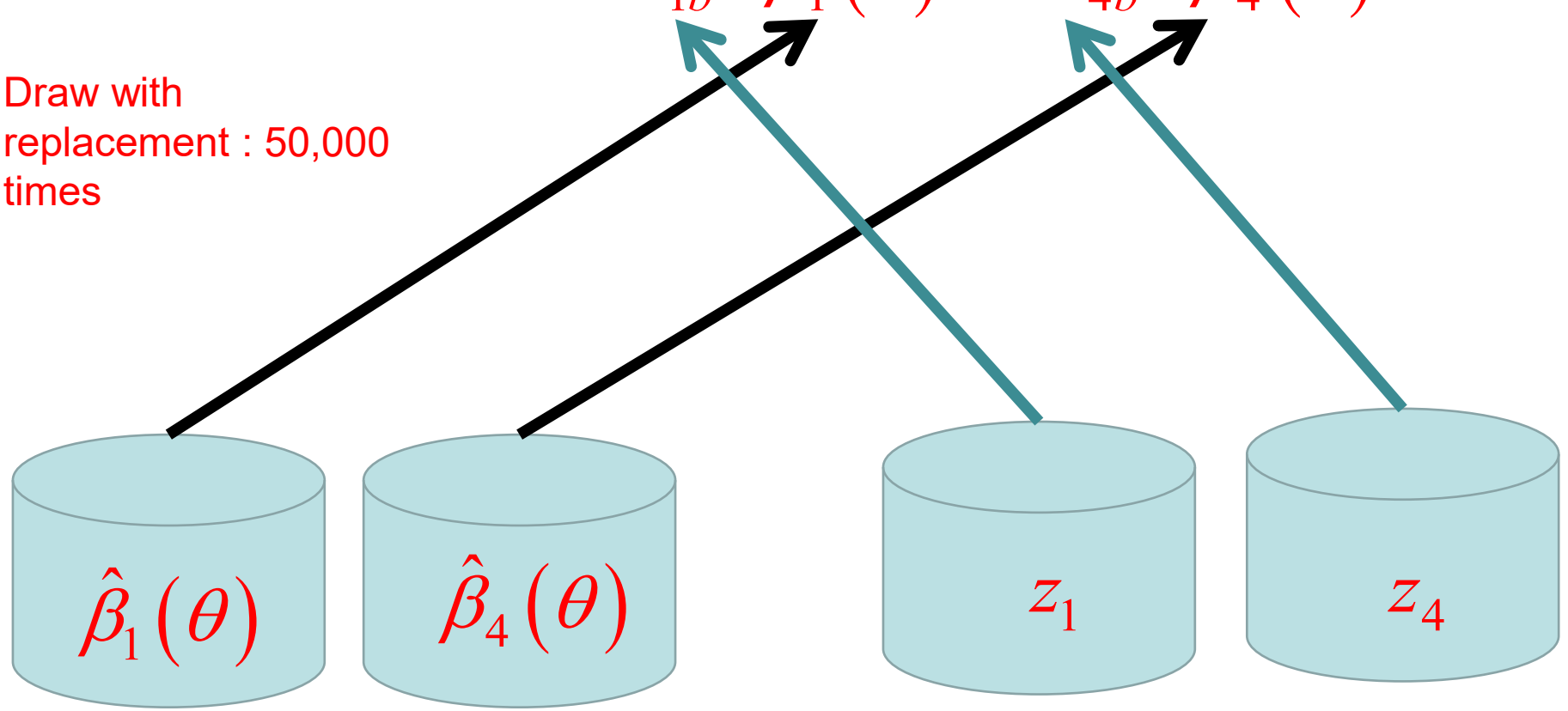


Total differences

Total differences: $z_{1b}^{\bullet}\hat{\beta}_1(b) - z_{4b}^{\bullet}\hat{\beta}_4(b)$

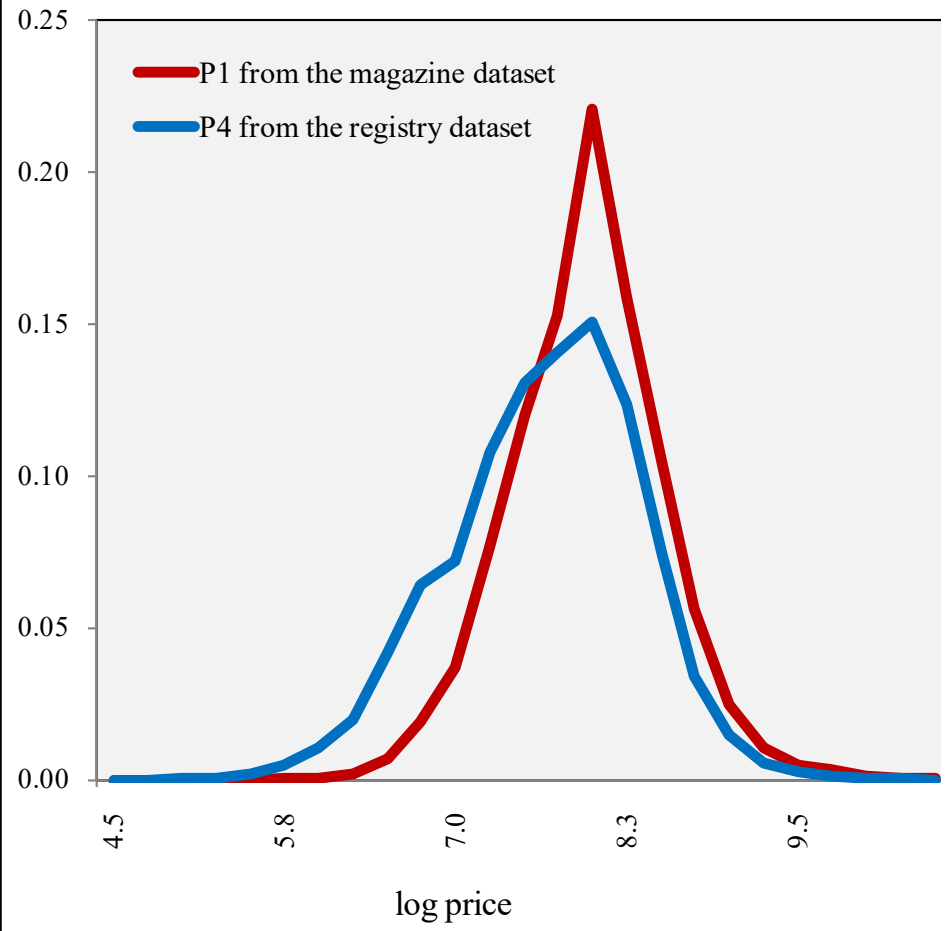
(P_1) (P_4)

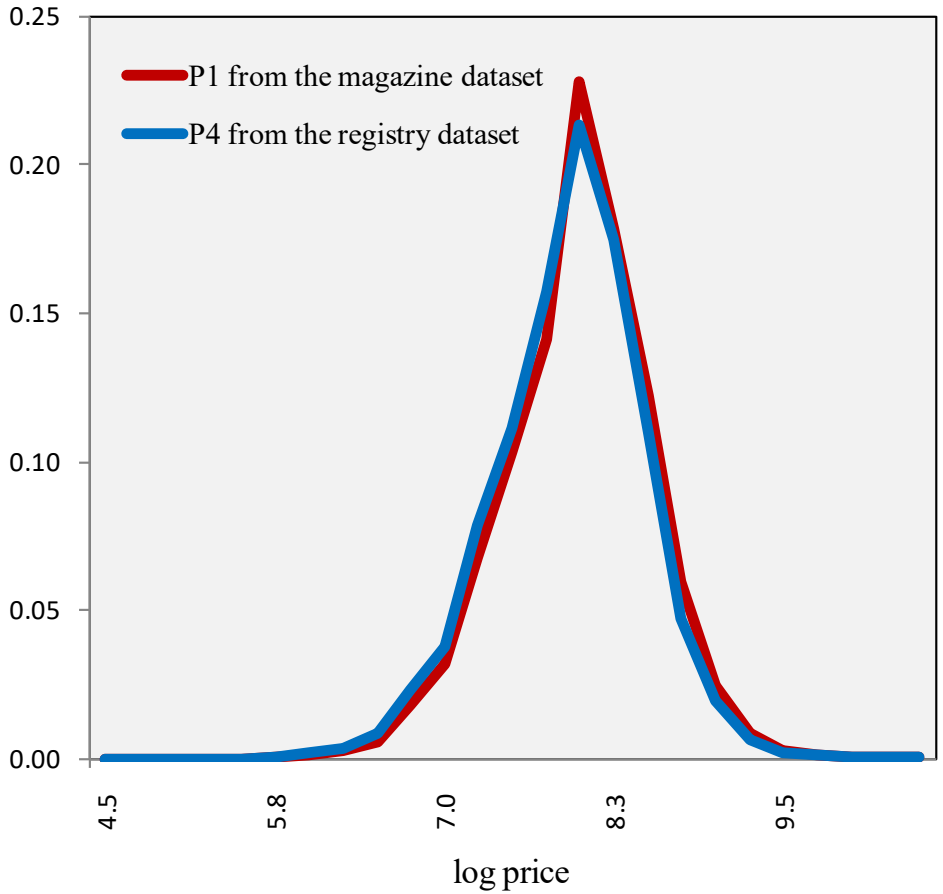
Draw with replacement : 50,000 times



Price distributions for the ***raw data***

Price distributions for the quality adjusted data by the intersection approach





OECD Workshop on House Price Statistics 2014 (OECD, Paris, France)

Residential Property Price Indexes in Japan
-Outline of Official Japanese RPPI-

March 25, 2014

Chihiro Shimizu

Second IMF Statistical Forum,
Statistics for Policymaking Identifying Macroeconomic and Financial Vulnerabilities
Session IV, Real Estate Prices—Availability, Importance, and New Developments

Discussion of Robert Shiller (Yale University) & Mick Silver (IMF)

Real Estate Prices—Availability, Importance, and New Developments

Japanese experience and New challenge

November 18, 2014

Chihiro Shimizu

一橋大学
Hitotsubashi University

International Conference on Real Estate Statistics, Eurostat 2019, Feb 20-22.

Residential Property Price Index in Japan:
Discussion in Methodology and Data Sources

European Convention Center, Luxembourg

Feb 20, 2019

Chihiro Shimizu

Session 3: RPPI Compilation — Data, Coverage, and Comparability

- **Chair:** Naohito Abe – Hitotsubashi University
- *Cleaning the Whole House: Address Reconstruction and Spatial Matching*
  Presenter: Marcell Granát / National Bank of Hungary, Eötvös Loránd University and ECB
- *Development of the Philippine Hedonic Residential Property Price Index*
  Presenter: Willa Boots Tolo / Bangko Sentral ng Pilipinas
- *A Timely House Price Index for Belgium*
- Presenter: Peter Reusens / National Bank of Belgium

Commercial property price indicators: sources, methods and issues

2017 edition

STATISTICAL REPORTS

eurostat

International Conference on Commercial Property Price Indicators on 10-11 May 2012 in the European Central Bank (Frankfurt)

Biases in Commercial Property Price Indexes

Session1. May 10, 2012

Chihiro Shimizu

What is Commercial property?

PROFESSOR CHIHIRO SHIMIZU

CPPI Handbook 2nd Draft Chapter 4

PREPARATION OF AN INTERNATIONAL HANDBOOK ON COMMERCIAL PROPERTY PRICE INDICATORS

Frankfurt, 29-30 September 2014

Workshop on Commercial Property Price Indices,
Turkey 2018

Session II: CPPI Data Sources and Transaction/Appraisal Based Indices

Biases in Commercial Property Price Indexes

Cappadocia, Turkey
Central Bank of the Republic of Turkey

May 7, 2018

Chihiro Shimizu

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1. What is commercial Property?

- Before considering property price indexes, let us first define "What Property is".
- Property is one of the most significant **non-financial assets**.
- What's more, its economic role changes depending on the entity that *owns* and *uses* it.
- Entities that *own* property are *households*, *firms*, and *governments*, and *use* differs for each one.

Classification

- Commercial properties are very heterogeneous. Heterogeneity exists not only at the individual asset level, but at an aggregate level in populations of properties that effectively trade in distinct asset market segments.
- To construct useful CPPIs it is crucial to recognize this type of aggregate level heterogeneity and market segmentation, because different price dynamics can prevail across different market segments. Prices in one market segment might be rising at the same time those in another segment are falling. If you mix the two segments (or "populations") together without care and attention, then you may think nothing is happening to prices in either market.

CLASSIFICATION IN BUSINESS.

- Building usage type "sectors," geographic location "markets," and the perceived physical quality and/or size "class" of the individual properties. .
- **Sectors**: offices, retail, industrial (including logistics) and rental residential.
- **Geographic Regions & Markets**: geographical divisions, within the metropolitan region or not, etc.
- **Property Physical Quality & Size Classes**: Class A (sometimes referred to as "prime" or "premium" or "institutional quality") or Class B.

DEFINITION

National Accounts Concepts		Market Output	Non-Market Output	Own-Use
	RPPI and CPPI concepts	Commercial	Non Commercial	Owner Occupied Housing
Dwelling + land underlying dwelling	Residential Property	**Commercial Residential Property**		Owner Occupied Housing
	Social Housing		Social Housing	
Building other than dwelling, land underlying	Office Property	**Commercial Real Estate**	Non-Market Real Estate	
	Retail Property	**Commercial Real Estate**	Non-Market Real Estate	
	Industrial Property	**Commercial Real Estate**	Non-Market Real Estate	
Other Structures				

MARKETABLE OR DATA AVAILABLE.

Market output

		Urban area	Own use	Non-Urban area
Dwelling + land underlying dwelling	Residential Property	**A**	na.	C
Building other than dwelling, land underlying	Office Property	**A**	B	C
	Retail Property	**A**	B	C
	Industrial Property	**A**	B	C
Agriculture land		na.		D

A: Rich transactions and income or rent data.
B: Poor transactions and rich income or rent data.
C: Poor transactions and income or rent data.
D: Strong regulation for conversion and transaction.

JOURNAL OF ECONOMIC SURVEYS

doi: 10.1111/joes.12117

COMMERCIAL PROPERTY PRICE INDEXES AND THE SYSTEM OF NATIONAL ACCOUNTS

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University of British Columbia and UNSW

Kevin J. Fox*
UNSW

Chihiro Shimizu
National University of Singapore

Abstract. This paper studies the problems associated with the construction of price indexes for commercial properties that could be used in the System of National Accounts (SNA). Property price indexes are required for the stocks of commercial properties in the Balance Sheets of the country. Related service price indexes for the land and structure input components of a commercial property are required in the Production Accounts of the country if the Multifactor Productivity of the Commercial Property Industry is calculated as part of the SNA. The paper reviews existing methods for constructing an overall Commercial Property Price Index (CPPI) and concludes that most methods are biased (due to their neglect of depreciation) and more importantly, not able to provide separate land and structure subindexes. A class of hedonic regression models that is not subject to these problems is discussed.

Keywords. Commercial property price indexes; Net operating income; Discounted cash flow; System of National Accounts; Balance sheets; Methods of depreciation; Land and structure prices; Hedonic regressions; Repeat sales method

The Builder's Model

- (1) $V_{tn} = \alpha_t L_{tn} + \beta_t S_{tn} + \varepsilon_{tn}$; $t = 1,...,44$; $n = 1,...,N(t)$.

- The ***builder's model*** for valuing a commercial property postulates that the value of a commercial property is the sum of two components:
- ***the value of the land*** which the structure sits on **plus** ***the value of the commercial structure*****.**
- The total cost of the property after the structure is completed will be equal to **the floor space area of the structure**, say **S** square meters, times the **building cost** per square meter, **β** say, plus **the cost of the land**, which will be equal to the cost per square meter, **α** say, times **the area of the land site, L**.

The Builder's Model

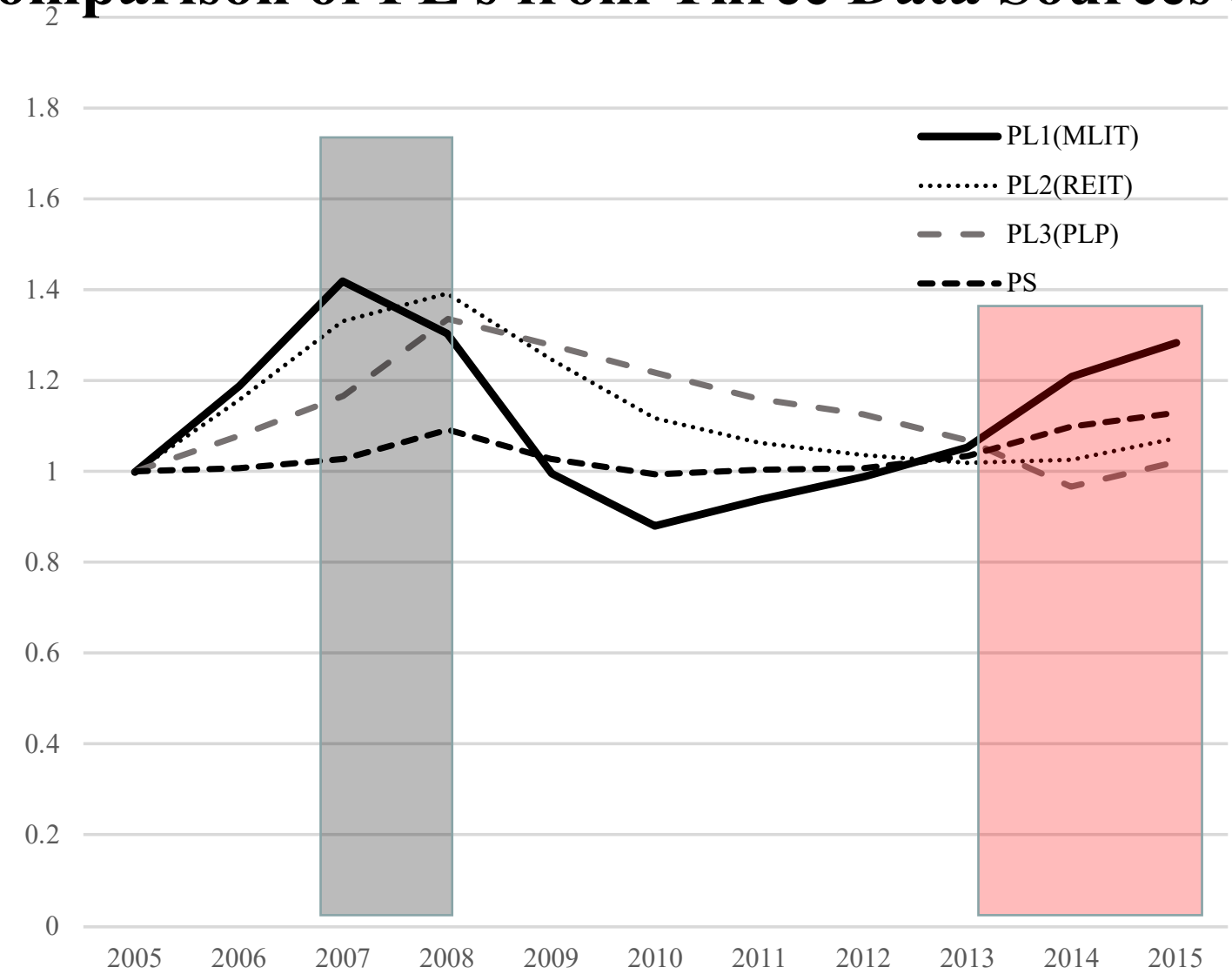
- **For older structures, we modify eq (1) and allow for *geometric depreciation* of the structure:**

(2) $V_{tn} = \alpha_t L_{tn} + \beta_t(1 - \delta_t)^{A(t,n)} S_{tn} + \varepsilon_{tn}$;

where the parameter δ_t reflects the ***net depreciation rate*** as the structure ages one additional period and

- L_{tn} is **the unit's share of the total land plot area of the structure,** α_t is the price of land (per meter squared), β_t is the price of commercial space (per meter squared), **A(t,n) is the age** of the structure in years and S_{tn} is the floor space of the unit (in square meters).
- δ_t is regarded as a ***net depreciation rate*** because it is equal to a "true" gross structure depreciation rate less an average renovations appreciation rate.

Comparison of PL's from Three Data Sources and PS



Macroeconomic Dynamics, **19**, 2015, 1659–1714. Printed in the United States of America.
doi:10.1017/S1365100514000042

RESIDENTIAL PROPERTY PRICE INDICES FOR TOKYO

ERWIN DIEWERT
University of British Columbia
and
University of New South Wales

CHIHIRO SHIMIZU
Reitaku University
and
University of British Columbia

This paper uses hedonic regression techniques to decompose the price of a house into land and structure components using real estate sales data for Tokyo. To get sensible results, a nonlinear regression model using data that covered multiple time periods was used. Collinearity between the amounts of land and structure in each residential property leads to inaccurate estimates for the land and structure value of a property. This collinearity problem was solved by using exogenous information on the rate of growth of construction costs in Tokyo in order to get useful constant-quality subindices for the price of land and structures separately.

Keywords: House Price Indexes, Land and Structure Components, Time Dummy Hedonic Regressions, Spline Functions, Flexible Functional Forms, Fisher Ideal Indexes

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Hedonic regression models for Tokyo condominium sales

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System of National Accounts
Balance Sheets
Methods of depreciation
Land and structure price indexes
Hedonic regressions

ABSTRACT

The paper fits a hedonic regression model to the sales of condominium units in Tokyo over the period 2000–2015. The problem is complicated by the need to decompose the selling price of a unit into a component that can be attributed to the structure area of the unit and another component that can be attributed to the unit's share of land value. There is very little information on the value of condominium land and so this paper develops a methodology for reducing this knowledge gap. The paper extends the builder's model which was developed in Eurostat (2013). Characteristics which prove to be important in explaining condominium prices are: the floor space area of the unit, the total land area of the building, the number of units in the building, the total number of stories in the building, the height of the sold unit, the age of the structure and the amount of excess land. The paper also derives an estimate for the annual geometric structure depreciation rate for condominiums in Tokyo.

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the review of income and wealth

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ALTERNATIVE APPROACHES TO COMMERCIAL PROPERTY PRICE INDEXES FOR TOKYO

BY ERWIN DIEWERT

University of British Columbia

AND

CHIHIRO SHIMIZU*

National University of Singapore

The paper studies the problems associated with the construction of price indexes for commercial properties that could be used in the System of National Accounts. Property price indexes are required for the stocks of commercial properties in the balance sheets and related price indexes for the land and structure components of a commercial property are required in the balance sheet accounts for the calculation of the Multifactor Productivity of the Commercial Property Industry. The paper uses a variant of the builder's model that has been used to cqnstruct Residential Property Price Indexes. Geometric depreciation rates are estimated for commercial offices in Tokyo using assessment data for REIT. The problems associated with the decomposition of property value into land and structure components are addressed. The problems associated with depreciating capital expenditures on buildings and with measuring the loss of asset value due to early retirement of the structure are also addressed.

JEL Codes: C2, C23, C43

Keywords: commercial property price indexes, System of National Accounts, balance sheets, methods of depreciation, land and structure price indexes

the review of income and wealth

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ALTERNATIVE LAND-PRICE INDEXES FOR COMMERCIAL PROPERTIES IN TOKYO

BY ERWIN DIEWERT

The University of British Columbia and The University of New South Wales

AND

CHIHIRO SHIMIZU*

University of Tokyo and Nihon University

The System of National Accounts (SNA) requires separate estimates for the land and structure components of a commercial property. Using transactions data for the sales of office buildings in Tokyo, a hedonic regression model (the "builder's model") was estimated and this model generated an overall property price index as well as subindexes for the land and structure components of the office buildings. The builder's model was also estimated using appraisal data on office building real estate investment trusts (REITs) for Tokyo. These hedonic regression models also generated estimates for net depreciation rates, which can be compared. Finally, the Japanese government constructs annual official land prices for commercial properties based on appraised values. The paper compares these official land prices with the land prices generated by the hedonic regression models based on transactions data and on REIT data. The results reveal that commercial property indexes based on appraisal and assessment prices lag behind the indexes based on transaction prices.

JEL Codes: C2, C23, C43, D12, E31, R21

Keywords: commercial property price indexes, transaction-based indexes, appraisal prices, assessment prices, land- and structure-price indexes, hedonic regressions

Session 4: CPPI Compilation — Country Practices and Challenges

- **Chair:** Bruno Tissot – Bank for International Settlements, Irving Fisher Committee (IFC)

- *CREating Indices: Developing the First Public Data-Based CPPI for France*
  Presenter: Etienne de l'Estoile / Banque de France
- *Quarterly CPPIs Using Bank Transaction Data*
  Presenter: Thomas Knetsch / Deutsche Bundesbank
- *Transaction-Based Commercial Real Estate Indices and the Role of Portfolio Sales*
  Presenter: Alicia N. Rambaldi / University of Queensland

Session 5: CPPI Compilation — Data, Coverage, and Comparability

- **Chair:** Robert Hill – University of Graz and Hitotsubashi University
- *A Rent Index for Commercial Properties in Türkiye*
  Presenter: Duygu Konukçu Çelik / Central Bank of the Republic of Türkiye
- *Property Price Indices in Indonesia: Measurement and Recent Developments*
  Presenter: *Vita Rosiana Dewi* (with Muhammad Azkaenza/ Bank Indonesia)
- *Revisiting lead-lag relationships in commercial real estate property price indices*
  Presenter: Marc Francke / Amsterdam University

Output Constructing Building Price Index

Journal of Official Statistics, Vol. 39, No. 2, 2023, pp. 229–251, http://dx.doi.org/10.2478/JOS-2023-0011

Constructing Building Price Index Using Administrative Data

Masahiro Higo[1], *Yumi Saita*[2], *Chihiro Shimizu*[3], *and Yuta Tachi*[4]

Improving the accuracy of deflators is crucial for measuring real GDP and growth rates. However, construction prices are often difficult to measure. This study uses the stratification and hedonic methods to estimate price indices. The estimated indices are based on the actual transaction prices of buildings (contract prices) obtained from the Statistics on Building Starts survey information from the administrative sector in Japan. Compared with the construction cost deflator (CCD), calculated by compounding input costs, the estimated output price indices show higher rates of increase during the economic expansion phase after 2013. This suggests that the profit surge in the construction sector observed in that period is not fully reflected in the CCD. Furthermore, the difference between the two "output-type" indices obtained by stratification and hedonic methods shrinks when the estimation methods are precisely configured.

Key words: Building price index; stratification method; hedonic method; Japan; administrative data.

New explanatory variables.

- "Emerging explanatory variables for real estate price indices:“
  - Climate change resilience (e.g., flood risk management)
  - Earthquake resistance
  - **Energy performance** (efficiency ratings)
  - **Buyer characteristics** (e.g., foreign vs. domestic status)

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Green luxury goods? The economics of eco-labels in the Japanese housing market☆

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Japanese housing market
Hedonic models
Ecolabelling
Willingness to pay

ABSTRACT

Fuerst, Franz, and Shimizu, Chihiro—Green luxury goods? The economics of eco-labels in the Japanese housing market

Using a unique transaction database of condominiums in the Tokyo metropolitan area and a hedonic analytical framework, we find that eco-labelled buildings command a small but significant premium on both the asking and transaction prices. This finding is consistent with results from other countries but in contrast to these studies, the present analysis also incorporates buyer characteristics which provide further information on the sources of demand for eco-labelled real estate. A separate estimation by subgroups reveals that the price premium is primarily driven by wealthier households that exhibit a higher willingness-to-pay for eco-labelled condominiums, both as a total amount and as a fraction of the total sales price. Less affluent households are also shown to pay higher prices for the eco label but the effect is less pronounced. The results indicate that capitalised utility bill savings are likely to account for a large proportion of the observed premium but the higher premium paid by affluent households suggests that more intangible benefits of living in a green building may also play a role.

sustainability

MDPI

Article

Green Premium in the Tokyo Office Rent Market

Junichiro Onishi [1,*], Yongheng Deng [2] and Chihiro Shimizu [3]

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[3] Center for Spatial Information Science, The University of Tokyo, Chiba 277-8568, Japan; cshimizu@csis.u-tokyo.ac.jp
* Correspondence: junichiro@xymax.co.jp; Tel.: +81-3-3596-1477

Abstract: More than 10 years have passed since studies on green buildings gained attention in the academic and industrial literature. Many studies report the economic value of green buildings, mainly in the U.S. and European markets. An empirical clarification of the dynamics of green premiums has significant implications for future urban sustainability. This study constructed a dataset of Tokyo office rents from 2009 to 2019. We estimated the green office rental premium using a hedonic approach. Our results show that, on average, an office property with a green label gains a premium of approximately 6.5% on contract rents. The Tokyo office market is heterogeneous, and endogeneity is an issue when identifying the green premium. We addressed the endogeneity issue

CHAPTER 7

check for updates

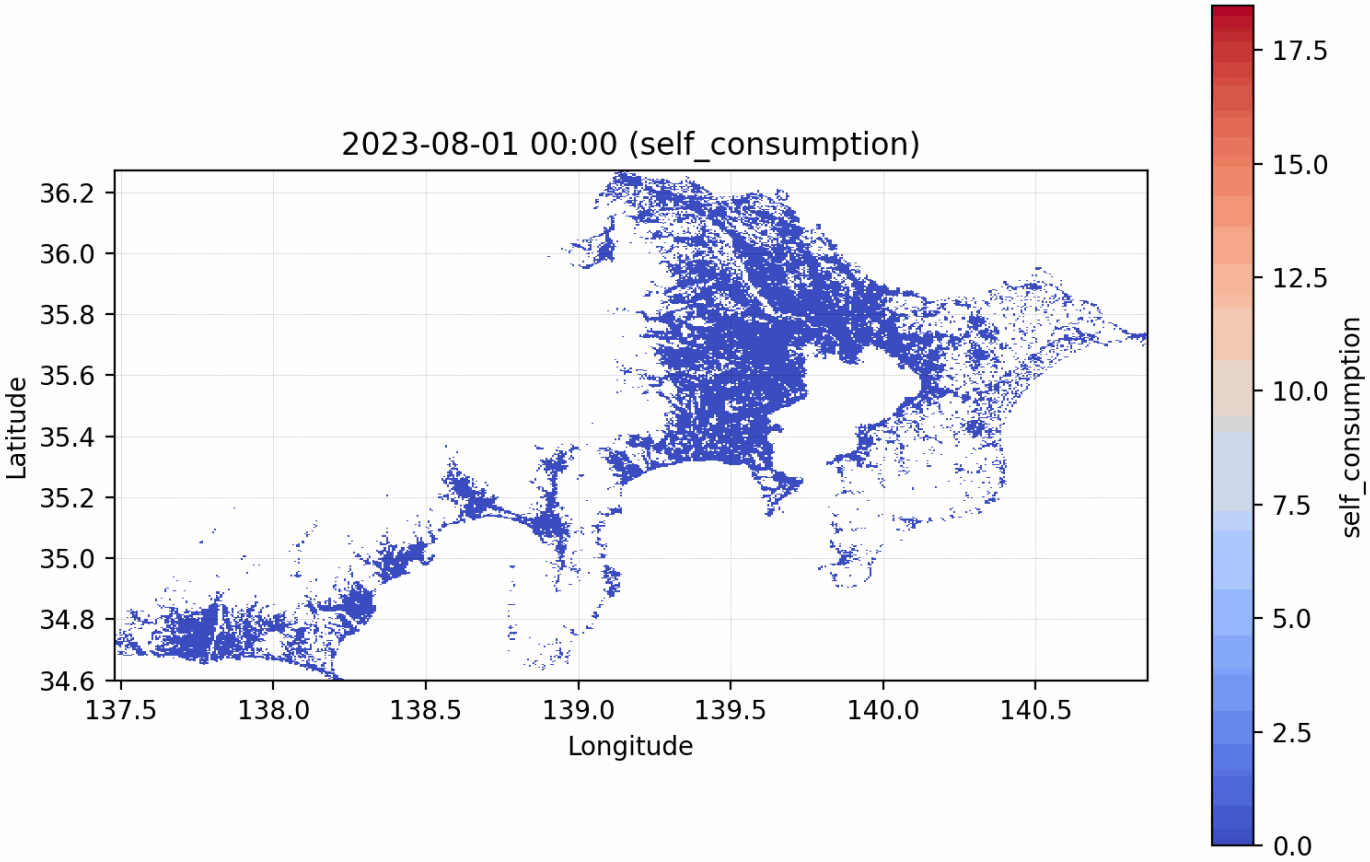
Energy Efficiency and Green Building Markets in Japan

Jiro Yoshida, Junichiro Onishi and Chihiro Shimizu

7.1 Introduction

This chapter presents a review of the existing studies on Japanese green buildings and a new empirical analysis of the relation between office rents, green building labels, and the actual energy use. Economic analysis of green buildings started with studies on the US market. Early studies use the US data and identify positive associations between green building labels and property prices (e.g., Eichholtz et al. 2009). Higher property prices can be a result of higher rental rates (e.g., Eichholtz et al. 2009) and higher occupancy rates (e.g., Fuerst and McAllister 2009, 2011a, b; Wiley et al. 2010). Subsequent studies use data from other countries and

Real Energy Consumption per 30 min.



Foreign buyers impact.

Contents lists available at ScienceDirect

Journal of Financial Economics

journal homepage: www.elsevier.com/locate/jfec

Gravity, counterparties, and foreign investment☆

Cristian Badarinza[a,d], Tarun Ramadorai[b,d,*], Chihiro Shimizu[c]

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[b] Imperial College, London, UK
[c] University of Tokyo, Japan
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ABSTRACT

We propose a new explanation for the persistence of gravity in international investment flows based on new facts about large cross-border commercial real estate transactions. Buyers in these transactions preferentially match with counterparties from own or proximate countries; such affinity-based matching helps alleviate financial investment frictions. We set up and structurally estimate a model of capital allocation in a decentralized market with an investment friction, which delivers the price, volume, and counterparty matching patterns in the data. The model shows that if clusters of high-affinity counterparties lie along historical routes, as in the data, preferential matching can perpetuate gravity relationships.

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Do Foreign Buyers Pay More Than Domestic Buyers? Evidence from International Transaction-Level Data

Daisuke Miyakawa[1] · Chihiro Shimizu[2] · Iichiro Uesugi[3]

Accepted: 14 December 2022
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Abstract

In this paper, we examine the role of international capital flows in real estate prices by quantifying the extent foreign buyers overpay for their realty investments as well as the spillover effect of such behavior on property prices domestic buyers pay. Using a unique dataset accounting for about 30,000 realty investment transactions in Australia, Canada, France, Hong Kong, Japan, the Netherlands, the United Kingdom, and the United States, we find the following. First, foreign investors pay significantly higher prices than domestic investors, even after taking a wide variety of controls into account. Second, this paying over the odds becomes smaller the larger the buyers' exposure to realty investments in the host countries. These results indicate that foreign investors are overcharged when they are less informed about the property market and that the extent to which they are overcharged decreases the more investment experience they have. Third, we did not find any significant spillover effects from overpaying by foreign investors to real estate prices in host countries. This finding is consistent with a group of extant studies employing aggregate-level data to examine the link between international capital flows and real estate prices.

Keywords Realty Prices · Transaction Data · Geographical Location · Spillover Effects

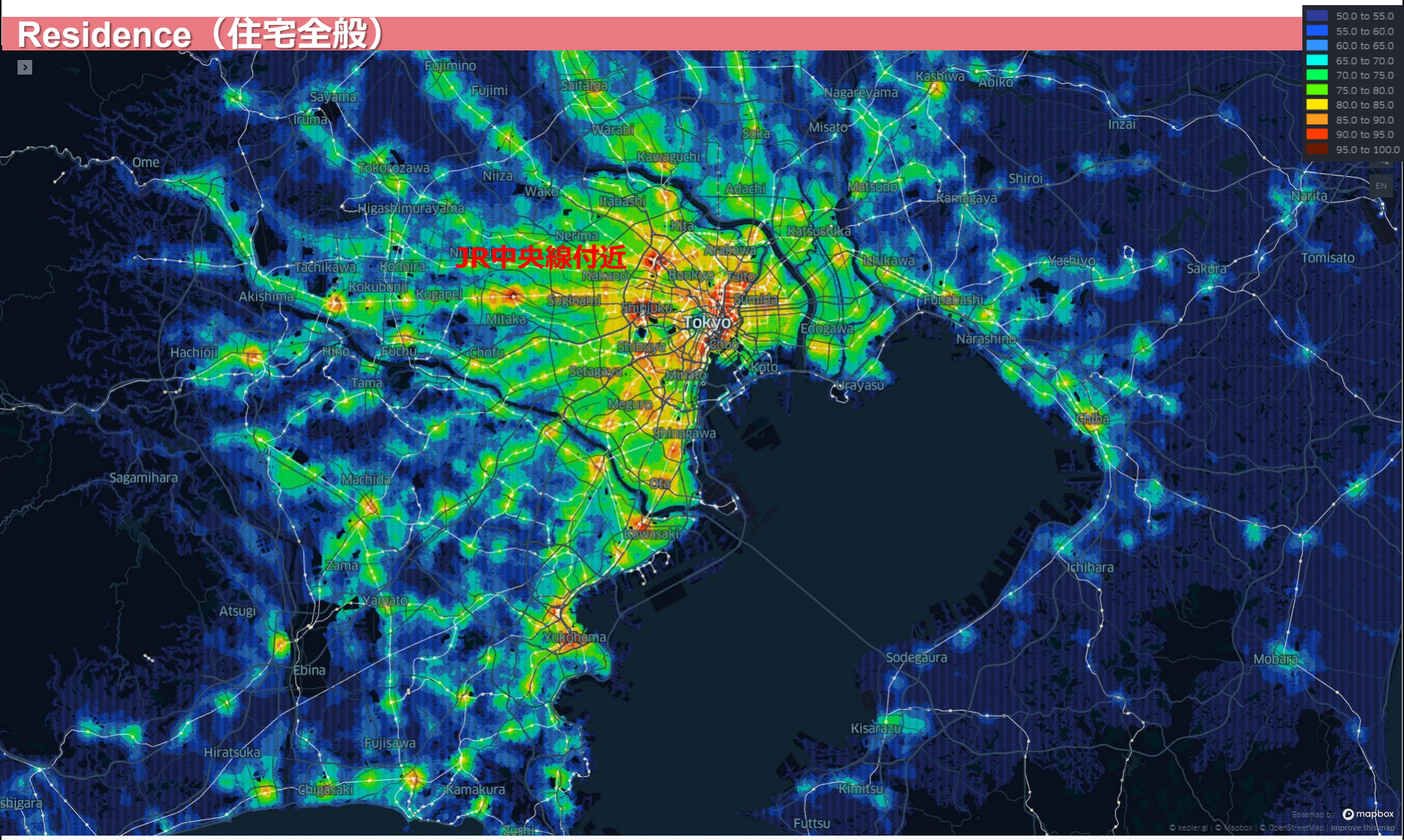
JEL Classification D83 · F21 · G12 · R30

Machine learning and New Data.

- "***Advances in machine learning*** and the availability of ***high-precision POI*** (Point of Interest) data, ***street view imagery***, and ***web-scraped data*** have enabled the integration of novel explanatory variables into real estate price indices."

Walkability Index.

Residence（住宅全般）



Estimation results of *subjective impression scores*: "*Safety*"

High

Low

Estimation results of *subjective impression scores* : "*Greenery*"

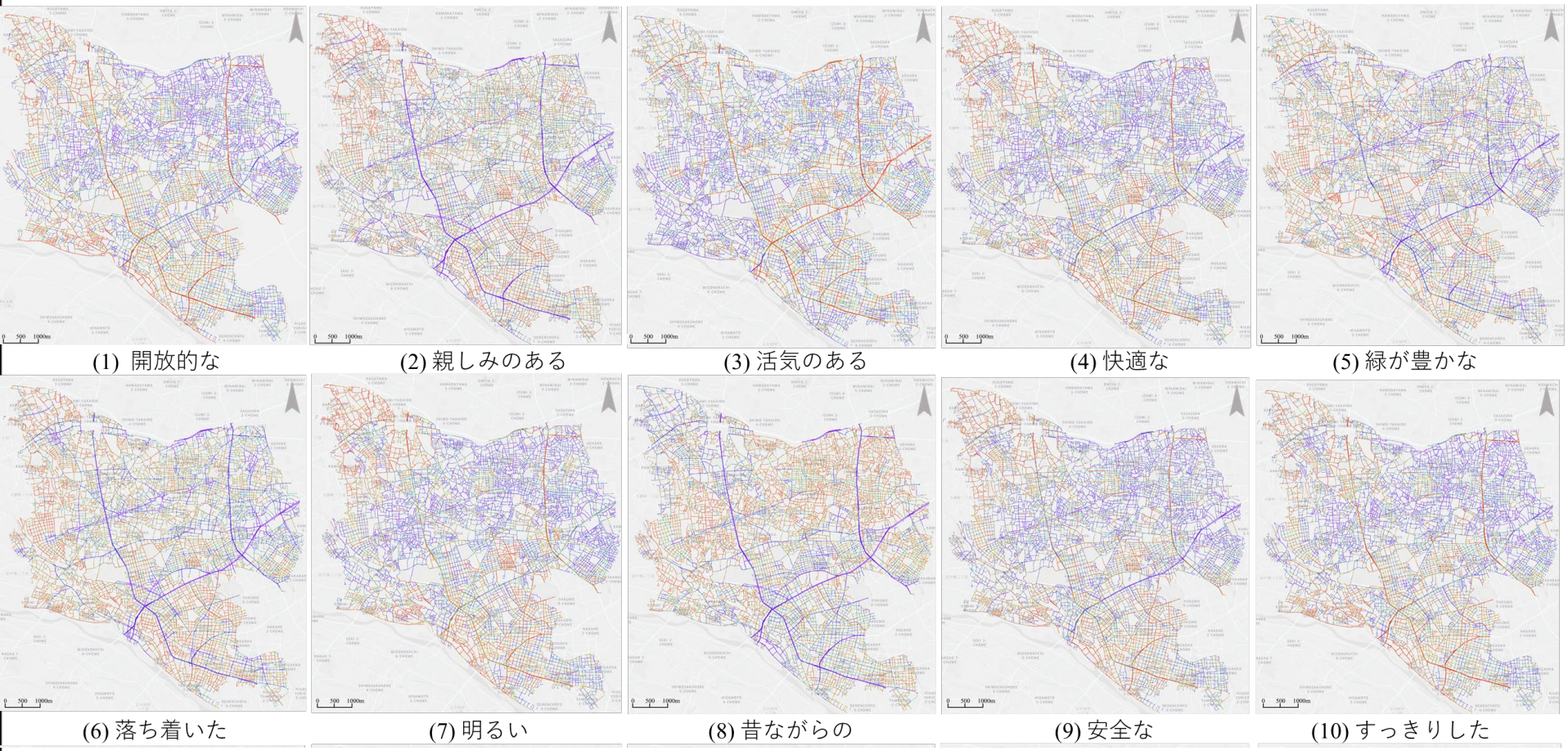
High

Low

Subjective impression scores from View of Street.

Stated preference

Negative Positive



(1) 開放的な (2) 親しみのある (3) 活気のある (4) 快適な (5) 緑が豊かな

(6) 落ち着いた (7) 明るい (8) 昔ながらの (9) 安全な (10) すっきりした

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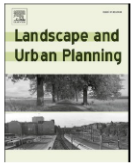

Evaluating the subjective perceptions of streetscapes using street-view images

Yoshiki Ogawa [a,*], Takuya Oki [b], Chenbo Zhao [c], Yoshihide Sekimoto [a], Chihiro Shimizu [d]

[a] Center for Spatial Information Science (CSIS), The University of Tokyo, 153-8505 Tokyo, Japan
[b] School of Environment and Society, Tokyo Institute of Technology, 152-8550 Tokyo, Japan
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[d] Social Data Science, Hitotsubashi University, 186-8601 Tokyo, Japan

HIGHLIGHTS

- Measured 22 subjective perception scores from street-view images.
- Model considers the relationships among all subjective perception evaluation items.
- Modeled subjective perceptions with high accuracy and low computation cost.
- The 22 subjective perceptions were classified into four classes (attractive, old-fashioned, calm, and lively)
- Identified landscape elements that affect each subjective perception class.

ARTICLE INFO

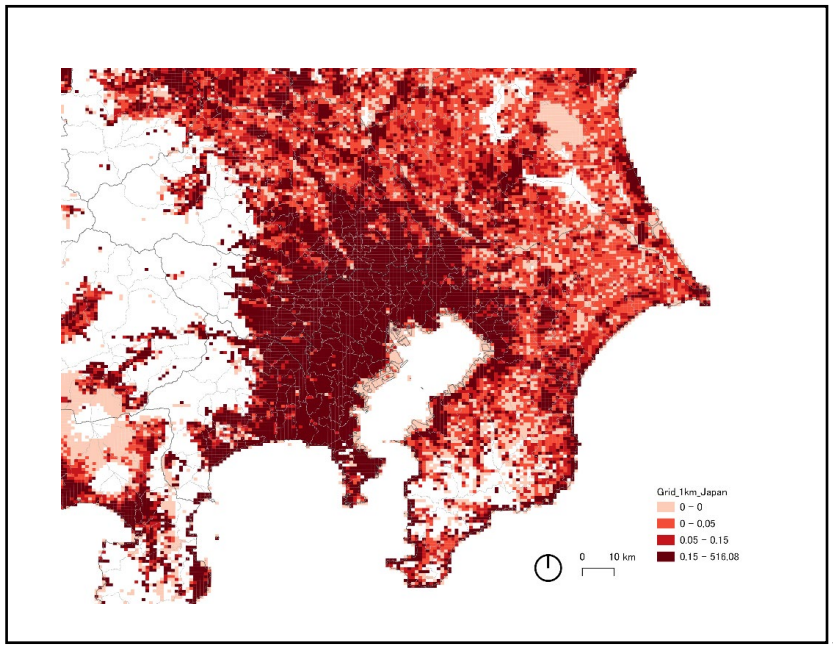
Keywords:
Subjective perceptions
Web questionnaire survey
Deep learning
Multilabel classification
ℓ1-regularized sparse modeling
Landscape element

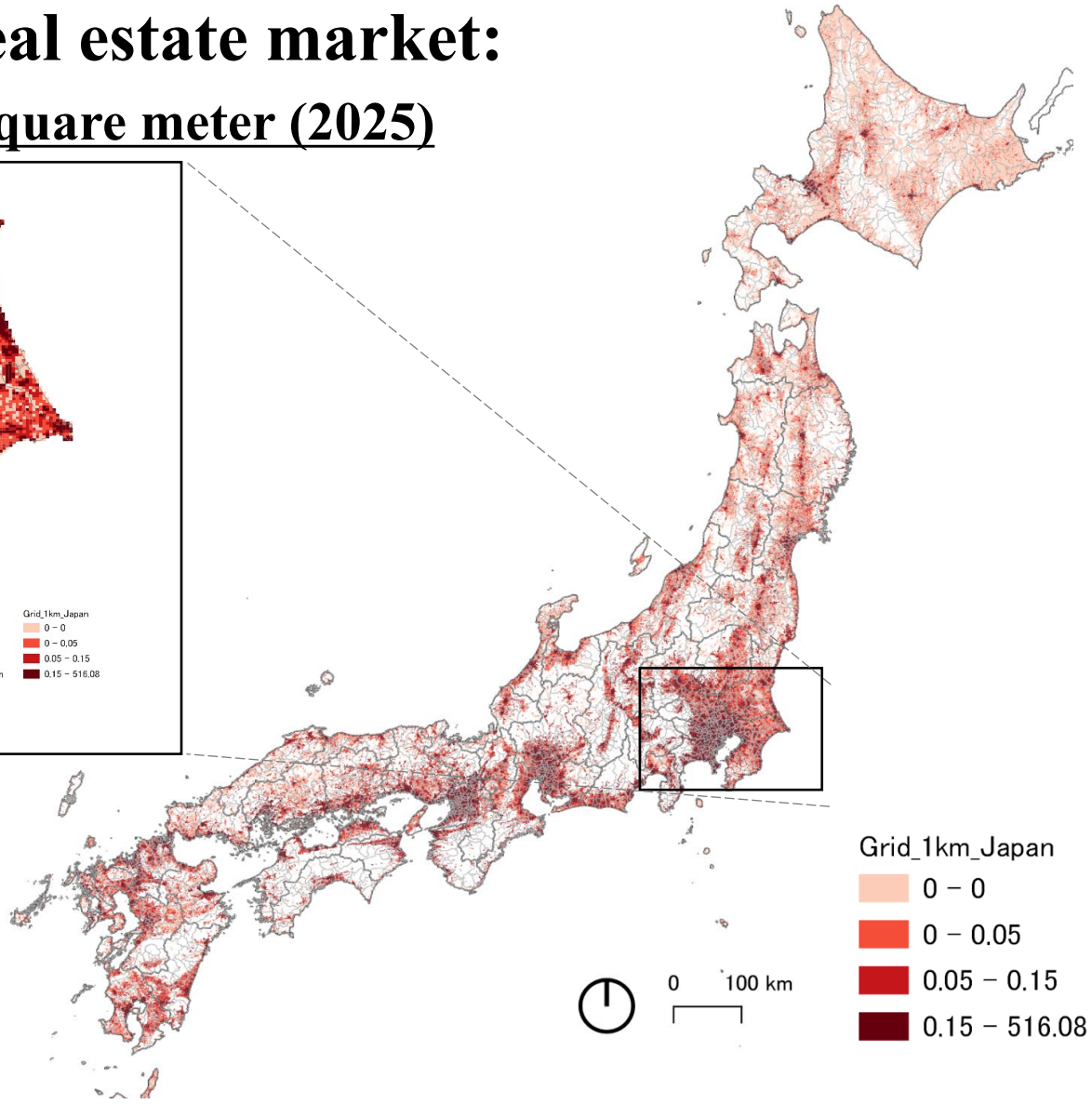
ABSTRACT

Developing a model to evaluate urban streetscapes based on subjective perceptions is important for quantitative understanding. However, previous studies have only considered limited types of subjective perceptions, neglecting the relationships between them. Further, accurately measuring subjective perception with low computational costs for large-scale urban regions at high spatial resolutions has been difficult. We present a deep-learning-based multilabel classification model that can measure 22 subjective perceptions scores from street-view images. This model uses the results of a web questionnaire survey encompassing 22 subjective perceptions, with 8.8 million responses. Our model demonstrates high accuracy (0.80–0.91) in measuring subjective perception scores from street-view images and achieves low computational cost by training on 22 subjective perception relationships. The 22 subjective perceptions were analyzed using PCA and k-means analysis. By categorizing the 22 subjective perceptions into a two-dimensional space visualized and grouped into distinct groups—positive, negative, calm, and lively—we unearthed vital insights into the intricate nuances of human perception. In addition, the study used semantic segmentation to extract landscape elements from street-view images and applied ℓ1-regularized sparse modeling to identify the landscape elements structurally correlating with each subjective perception class. The analysis revealed that only seven out of nineteen landscape elements significantly correlated with subjective impressions, and these effects varied by class. Notably, sky coverage positively influences positive subjective perceptions, such as attractiveness and calmness, but negatively affects lively impressions. The proposed model can be used to map the overall image of a city and identify landscape design issues in community development design.

Liquidity in the real estate market:

Land Registrations per square meter (2025)





Session 6: Data Sources, Big Data, and Innovation

- **Chair:** Marc Francke – University of Amsterdam and Hitotsubashi University
- *Advancing Housing Market Statistics in Europe Using Web-Scraped Data*
  Presenter: Rui Evangelista / Eurostat
- *Developing a Residential Property Price Index for Egypt Using Big Data Sources*
- Presenter: Kareem Tarek and Youssef Reda / Central Bank of Egypt
- *Using machine learning to aggregate apartment prices: comparing the performance of different Luxembourg indices*
- Presenter: David Kremer / Banque centrale du Luxembourg

High-Resolution Indices.

- **"Growing Need for High-Resolution Indices:"**
  - **High spatial granularity** (e.g., neighborhood-level analysis)
  - **Fine temporal granularity** (e.g., weekly or daily updates)

DOI: 10.1111/1540-6229.12338

ORIGINAL ARTICLE

WILEY

Decompositions of house price distributions over time: The rise and fall of Tokyo house prices

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[2] Center for Spatial Information Science, University of Tokyo, Kashiwa, Chiba

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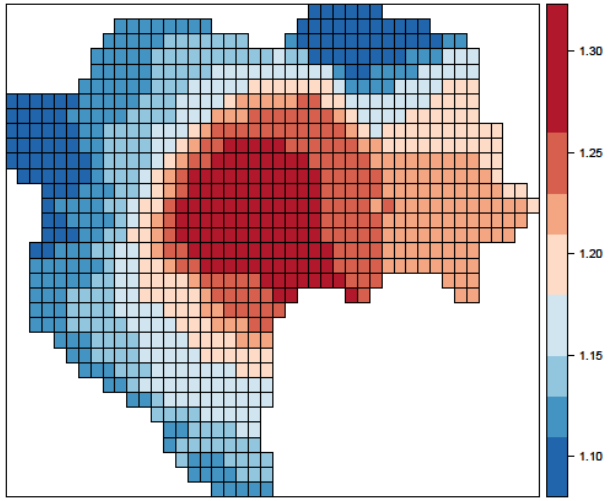
Abstract

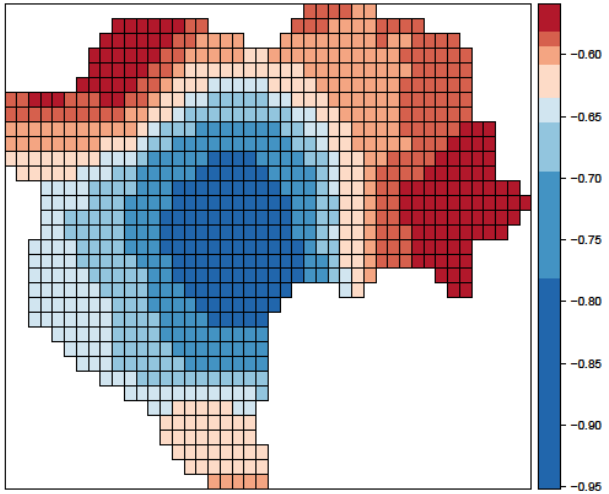
We use recentered influence function regressions to decompose the differences in the distribution of sales prices across five stages of the business cycle in Tokyo for 1986–2016. Tokyo's housing market went through a period of rapid appreciation in prices during this time, followed by a long period of decline and a more recent increase. We find that a substantial portion of the change in the distribution of condominium prices across time periods is due to the natural aging of the housing stock, but also due to the location of the sales and the tendency for units to get larger over time.

KEYWORDS
decomposition, house price indices, quantile regression, recentered influence functions

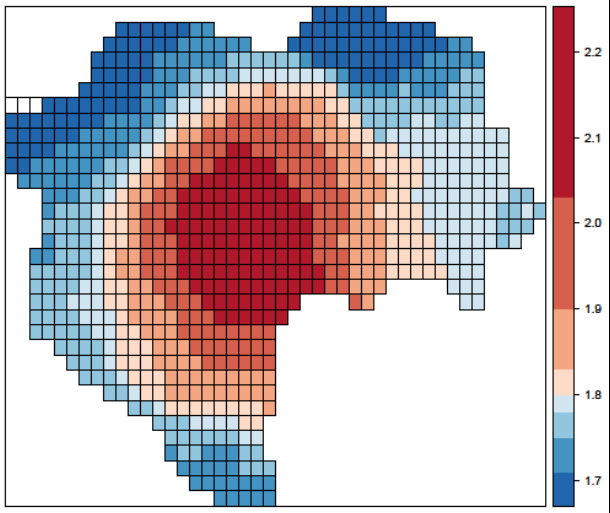
Spatially Varying Median Appreciation Rates



1986 – 1990

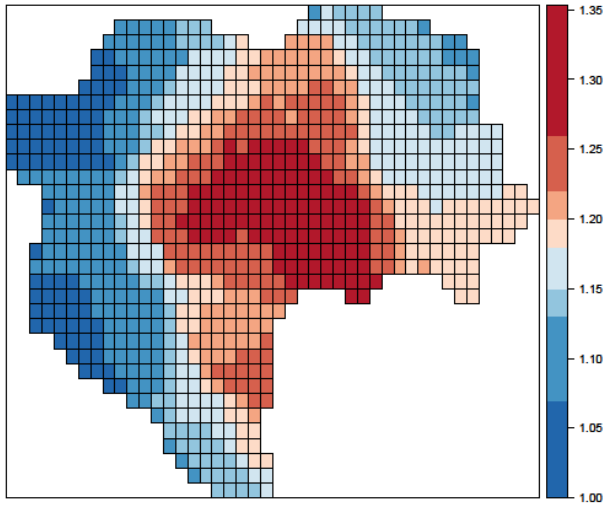


1991 – 1995

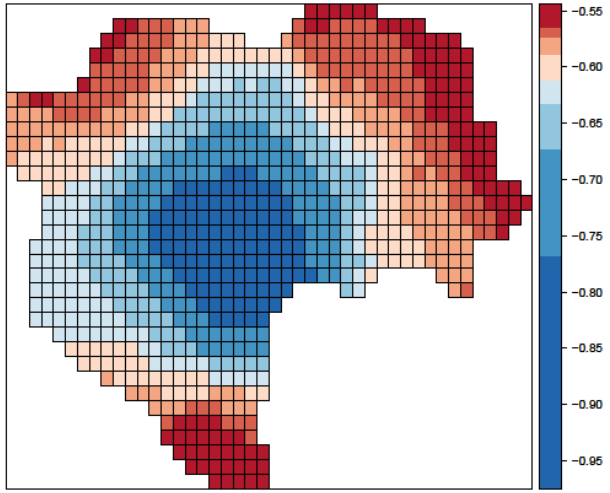


Difference, 1986-90 – 1991-95

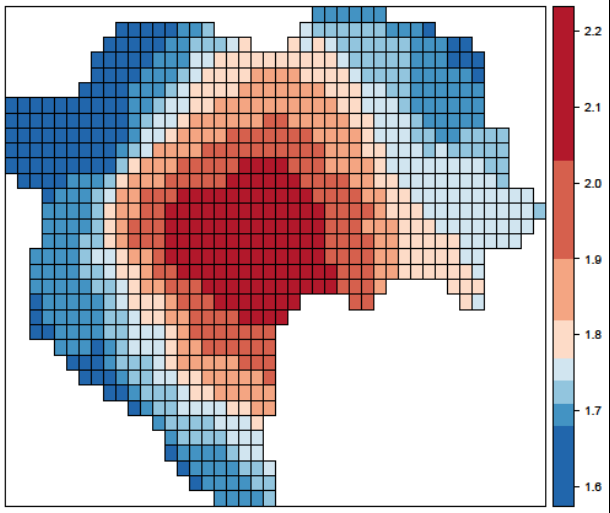
Spatially Varying 10% Appreciation Rates



1986 – 1990

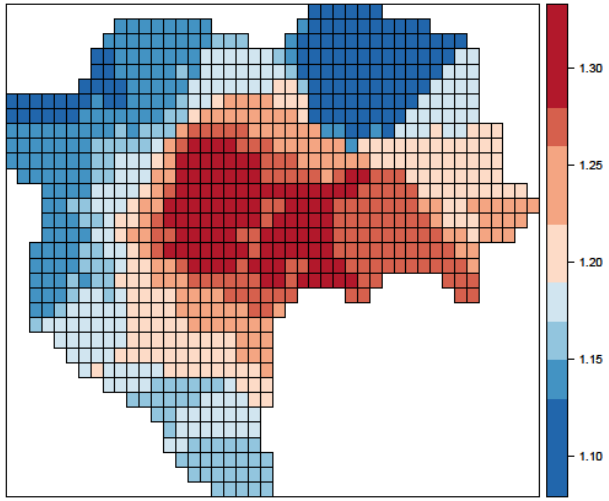


1991 – 1995

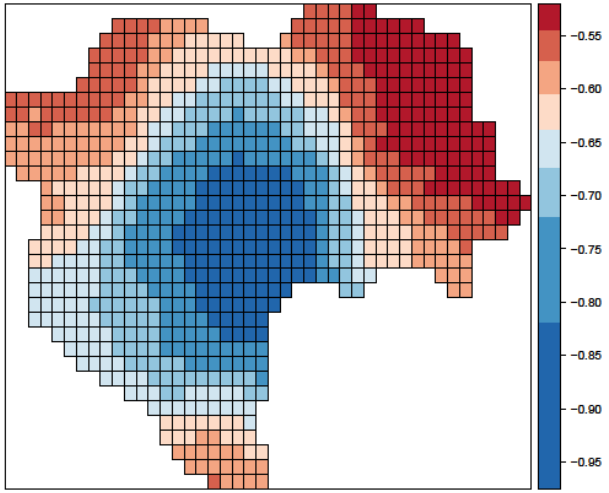


Difference, 1986-90 – 1991-95

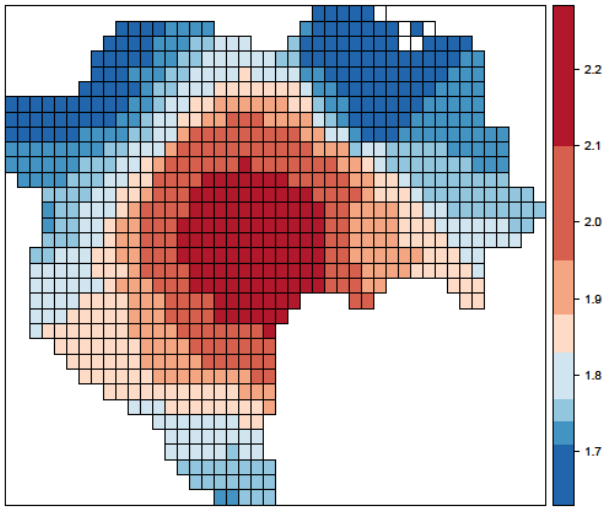
Spatially Varying 90% Appreciation Rates



1986 – 1990



1991 – 1995



Difference, 1986-90 – 1991-95

Journal of Property Research, 2015
Vol. 32, No. 3, 217–239, http://dx.doi.org/10.1080/09599916.2015.1059875
Routledge
Taylor & Francis Group

Estimating quality adjusted commercial property price indexes using Japanese REIT data

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(*Received 26 February 2015; accepted 2 June 2015*)

We propose a new method to estimate quality adjusted commercial property price indexes using real estate investment trust (REIT) data. Our method is based on the present value approach, but the way the denominator (i.e. the discount rate) and the numerator (i.e. cash flows from properties) are estimated differs from the traditional method. We run a hedonic regression to estimate the quality adjusted discount rate based on the share prices of REITs, which can be regarded as the stock market's valuation of the set of properties owned by the REITs. As for the numerator, we use rental prices associated with all existing contracts, as well as rental prices associated with new rental contracts, which may contain more information on future cash flows from properties. Using a data-set with prices and cash flows for about 400 commercial properties included in Japanese REITs for the period 2001–2013, we find that our price index signals turning points much earlier than an appraisal-based price index; specifically, our index peaks in the second quarter of 2007, while the appraisal-based price index exhibits a turnaround only in the third quarter of 2008. Our results suggest that the share prices of REITs provide useful information in constructing commercial property price indexes.

Keywords: REIT; quality adjusted price index; hedonic regression; Tobin's *q*; risk premium

JEL Classifications: E3; G19

Daily Property Price Index

Session 7: Methodological Innovations — Integrating Real Estate Indices into CPI and SNA

- **Chair:** Yusuf Kenan BAĞIR – Central Bank of the Republic of Türkiye

- *Land Price Index and Land–Structure Decomposition*
  Presenter: Stefan Hofbauer / Statistics Austria
- *Empirical Analysis of the Impact of Age-Related Property Depreciation on Office Rents*
- Presenter: Sahoko Furuta (with Kimiaki Shinozaki / Bank of Japan)
- *Spatial Heterogeneity in Price-to-Rent Ratios in Tokyo, 1986–2025*
- Presenter: Xiangyu Guo / Tsinghua University (with Jiro Yoshida / Pennsylvania State University, Takatoshi Ito / Columbia University and Chihiro Shimizu / Hitotsubashi University)

Session 8: Emerging Challenges in Property Price Measurement

- **Chair:** Franz Fuerst – University of Cambridge
- *Reading the News to Read the Housing Market*
- Presenter: Annabelle Mourougane / OECD
- *Disseminating Globally Comparable Property Price Statistics*
- Presenter: Bianca Ligani / BIS
- *Residentially Zoned Land Prices in Ireland*
- Presenter: Kieran Healy / Central Statistics Office Ireland

Session 9: Property Price Index Compilation — Practical Implementation and Lessons Learned

- **Chair:** Kelvin Wong – University of Hong Kong
- *Automating Web Data Collection for Kenya's RPPI*
  Presenter: Lucas Robi Sagire / Kenya National Bureau of Statistics
- *Development of the Bank of Thailand's RPPI*
  Presenter: Kiattikhun Samritpiam (with Poontharik Chongprasoplarp / Bank of Thailand)
- *Constructing Limited-Revisable and Stable CPPIs for Small Domains*
  Presenter: Farley Ishaak / Statistics Netherlands (CBS)

Session 10: Wrap-up Panel — IMF · BIS · OECD · Eurostat · BOJ

- **Chair: Paul Schreyer – EsCoE and Hitotsubashi University**

- **Panelists:**
- **Barra Casey** – International Monetary Fund
- **Bruno Tissot** – Bank for International Settlements, Irving Fisher Committee (IFC)
- **Annabelle Mourougane** – OECD
- **Rui Evangelista** – Eurostat
- **Ichiro Muto** – Bank of Japan, Irving Fisher Committee (IFC)

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- 3.6/8,2023, United Nations Economic Commission, Meeting of the Group of Experts on Consumer Price Indices,2023(Geneva, Switzerland), Presentation Title: Quality Adjustment Methods in CPI for Digital appliances.
- 4.6/9, 2022, The Ottawa Group on Price Indices (United Nations Statistical Division)2022(Italian National Institute of Statistics). Presentation Title: Measuring the Services of Durables and Owner-Occupied Housing.
- 5.8/19, 2019, The 62nd ISI World Statistics Congress, invitation session by IMF & BIS (Kuala Lumpur, Malaysia), Presentation Title: Compilation of the Commercial Property Price Index (CPPI) and Its Use in Japan.
- 6.8/17, 2019, Society for Economic Measurement, organized session (European Central Bank & Goethe University, Frankfurt, Germany), Presentation Title: Rigidity of Housing Rent in CPI -Unit-level long-run dynamics of housing rents-
- 7.2/21, 2019, International Conference on Real Estate Statistics 20 – 22 February 2019, European Convention Center, Luxembourg, European Commission, Presentation Title: Residential property price index in Japan: discussion in methodology and data sources.
- 8.5/7,2018, Workshop on Commercial Property Price Indices (BIS), Turkey (Central Bank of Republic Turkey), Presentation Title: Biases in Commercial Property Price Indexes and Session 1 Chair.
- 9.5/2, 2018, 69th FIABCI World Real Estate Congress, Dubai, UAE (Dubai Government, Dubai Land Department), Presentation Title: Measurement for Happiness: Residential Property Price Indices in Superstar Cities.
- 10.5/10,2017, The Ottawa Group on Price Indices (United Nations Statistical Division)2017(Bundesbank, Frankfurt). Presentation Title: An evaluation of the hedonic methods used by European National Statistical Institutes to compute their official House Price Indices.
- 11.5/4, 2016, United Nations Economic Commission, Meeting of the Group of Experts on Consumer Price Indices,2016(Geneva, Switzerland): Documents. Presentation Title: Hedonic Regression Models for Tokyo Condominium Sales.
- 12.11/18, 2014, Second IMF Statistical Forum: Statistics for Policymaking—Identifying Macroeconomic and Financial Vulnerabilities (IMF, Washington. D.C, USA), Presentation Title: Real Estate Prices—Availability, Importance, and New Developments (Discussant with Prof. Robert Shiller, Yale University).

- 13.5/28, 2014, United Nations Economic Commission, Meeting of the Group of Experts on Consumer Price Indices,2014(Geneva, Switzerland), Presentation Title: Alternative approaches to CPPIs for Tokyo.
- 14.9/30, 2014, International Conference on Commercial Property Price Indicators (Eurostat, ECB, IMF and BIS, OECD)2014(European Central Bank, Frankfurt, Germany), Presentation Title: Decomposing a CPPI into Land and Structure Components. (with Erwin Diewert).
- 15.9/29, 2014, International Conference on Commercial Property Price Indicators (Eurostat, ECB, IMF and BIS, OECD)2014(European Central Bank, Frankfurt, Germany), Presentation Title: What is Commercial Property? (with David Geltner).
- 16.3/2, 2014, OECD Workshop on House Price Statistics 2014 (OECD, Paris, France), Presentation Title: Residential Property Price Indexes in Japan.
- 17.5/1,2013, The Ottawa Group on Price Indices(United Nations Statistical Division)2013, (Copenhagen, Denmark). Presentation title: Commercial Property Price Indexes in Tokyo, Presentation title: Residential Property Price Indexes in Tokyo.
- 18.5/10-11,2012, International Conference on Commercial Property Price Indicators(Eurostat, ECB, IMF and BIS, OECD)2012(Frankfurt, Germany) Presentation title: Biases in commercial Property Price Indexes.
- 19.5/4-6, 2011, The Ottawa Group on Price Indices (United Nations Statistical Division)2011(Wellington, New Zealand) Presentation title: House Prices at Different Stages in Buying/Selling Process.
- 20.2/10-11,2011, Workshop on Residential Property Price Indices, Statistics Netherlands, The Hague, Netherlands. Presentation title: House Prices from Magazines, Realtors, and the Land Registry.
- 21.5/10–12,2010, United Nations Economic Commission for Europe (UNECE), International Labour Office (ILO),Meeting of Experts on Consumer Price Indices(Geneva, Switzerland) Presentation title: Detecting Real Estate Bubbles: A New Approach Based on the Cross Sectional Dispersion of Property Prices.
- 22.11/11,2009, Eurostat-IAOS-IFC Conference on Residential Property Price Indices Basel (Basel, Switzerland) Presentation title: On the Evolution of the House Price Distribution.
- 23.05/27,2009, The Ottawa Group on Price Indices (United Nations Statistical Division)2009 (Neuchâtel, Switzerland) Presentation title: House Prices and Rents in Tokyo- A Comparison of Repeat-sales and Hedonic measures-.

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