

# Research Methodology 06

## -Writing Report-

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# 0. Outline of Today's Lecture

1. Writing Report.
2. Project

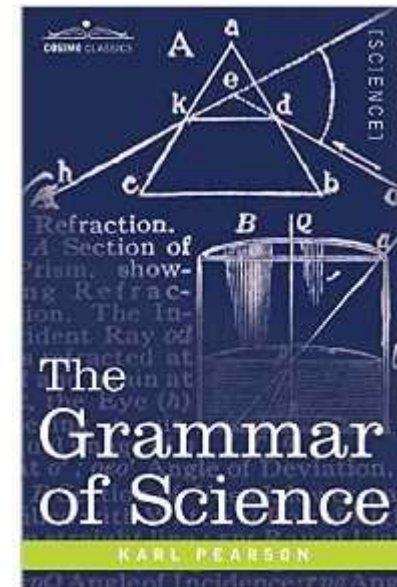
**Today's Stat: Additional Topics in Regression Analysis**

**Today's Case:**

**“Housing Rent and Japanese CPI: Nominal Rigidity of Rents,”**

# 1. Writing Report

- How to structure a research report?
  - How to find your own writing style?
  - How to develop your skills in academic writing?
  - How to write to different audiences?
- 
- The question of research writing has been discussed by many researchers during the past decades.
  - Although there is *no single answer* to the question of how we should represent and write research, there are some common issues that we find relevant.



## Scientific writing.

- A central issue for many researchers is that writing differs from what we call scientific writing, which is closely related to the positivist research tradition.
- ***Statistics is “The Grammar of Science” Karl Pearson .***
- Whereas scientific writing aims to be objective by using impersonal pronouns and the passive voice, writers allow themselves to be present in their writing.
- It is also common in research that the authors reflect on their writing process and choice of style in their research report.
- 
- **In addition, writers rely on vivid description, storytelling, and metaphorical language to carry meaning and hold their readers’ attention.**

## Think like a novelist.

- One way to understand the specific nature of scientific writing is to start *thinking like a novelist*, that is, someone who creates a setting in which to place the characters and events that produce a plot (Ellis, 2004; Marvasti, 2011).
- You can think about your research process *as a story*: it started in some place;
- the data were collected at some locality and with some people; and
- the research text started with some context.

## Choose your intended audience.

- The success of your writing depends on how well your writing mode and style speaks to the readers.
- This is why good writing is rarely produced without attention to the audience (Richardson, 1990).
- There are at least two types of audience in any kind of research: real and intended.
- →The real audience is anyone who reads your research texts, and the intended audience is the target group that you have in mind when planning your writing.
- **Who? the other students; instructors, supervisors and examiners; business practitioners; and the business media.**

## The structure of the research report.

- Many researchers begin to write a research report with **crafting an outline**, including a table of contents. When writing these, it is necessary to make some decisions about the **structure of the research report**.
- It is common to make a distinction between ***the macro-and micro-structure*** of a research report.
- The macro-structure refers to how the **main sections or chapters** are organized in the report, and the micro-structure indicates what the **more detailed structural choices** are.

## Good research report.

- In the same way as any good research report, scientific writing deals with the following tasks:
  - a) introducing the purpose of the research,
  - b) critically reviewing and referring to the literature;
  - c) describing the methods used, analyses made, and
  - d) discoveries achieved, as well as providing discussion and
  - e) conclusions about the topic studied (Marvasti, 2011).



## Titling work.

- In titling work, researchers often use imagination and creativity.
- It is quite typical to combine a vivid phrase or a question followed by a more descriptive sub-title.
- Try to select a title for your work that will *encourage the readers to want to read it* and let them know in advance what it is about.

## (1) Introduction

- The introduction is where you give your intended audience reasons to read your research text.
- Therefore, you should be able to convince the reader that your research is important and relevant to them.

## (2) Literature Review

- When introducing your research, you usually position your research within the prior research done by other researchers on the same topic, and within a specific theoretical approach (see Lecture 2).
- Wolcott (2009) argues, however, that the conventional organization of the literature in *one separate section* in the beginning of your research report is unhelpful to most qualitative researchers.

### (3) Describing methodology and methods

- A description of your methodology and methods should give a detailed account of the research process:
  - a) what was done;
  - b) how and why.
- This is most often done in a separate section outlining the methodological approach and the specific methods used, the collection of empirical materials and their analysis, and the problems or issues that were raised during the study.
- Method : Hypothesis and Theory →Lecture 2
- Data collecting→Lecture 3

## (4) Presenting analysis

- One central issue concerning the structure of your research report is to decide *how you want to present your empirical analysis and your findings*.
- While there is no one answer to this, **you need to consider which way of presenting is suitable to your research design and research questions**, and which way of presenting would appeal to your audience.
- Analyzing data→Lecture 4
- Interpretation and Validation→Lecture 5

## (5) Conclusions

- A conclusions section can be as short as a few paragraphs or as long as several pages; the length will depend on the complexity of your focus and results.
- The conclusion often includes a discussion of any new insights the research can contribute to the broader literature.
- Additionally, any limitations of your research should be stated, as well as the suggestions;
- Suggestions that you would have for *future research*.

## 2. Project

- Project1: A report on “Aging and Housing Prices”.
- Project2: Literature Review.
- Deadline: March 20, 2016 5:00pm.
- File Name: Student Matric No+Name.docx
- Exp: 149076ChihiroShimizu.docx
- IVLE folder.

## Project1: A report on “Aging and Housing Prices”.

- **1. Motivation as Introduction**
- **2. Literature Review (at least 10 papers)**
- **3. Data collection**
  - Pick up 10 countries from database. (Please pick up your favorite 10 countries)
  - **Data: T02\_PanelData.csv**
  - 
  - If you need to add several variables to this data, please find new variables and revise your data.(Not necessarily)
  - Ex. interest rate, housing starts, etc



- **4. Empirical Model**
- Make figures, Summary stat, run OLS model based;
- $Pit = \alpha i + \beta 1i \text{ GDPPC}it + \beta 2i \text{ OLDDEP}it + \beta 3i \text{ TPOP}it + eit$
- $Pit$ : land prices,
- $\text{GDPPC}it$  : per capita GDP
- $\text{OLDDEP}it$ : old age dependency ratio
- $\text{TPOP}it$ : total population,
- **Interpretation and validation your empirical results.**
- **5. Conclusion**
- **References**

## Project2: Literature Review

- 1. Find your research topic.
- Write your motivation.
- 2. Identify 5 keywords.
- 3. Find 10 papers.
- 4. Make “References”.
- 5. Literature Review.

## W01. Title Page

- Title: Aging and House Prices
- See. P.15
- (N A M E)
- (Student Matric No.)
- Key words: 5 Key words

## W02. Introduction-Motivation-

- Motivation to study or importance of study for “Aging and Housing Market”.

### Lec02: What is a research problem?

- All progress is born of inquiry. Doubt is any day better than over confidence. *Doubt leads to inquiry and inquiry leads to invention.*
- Thus invention is the out come of research. Research may be motivated by *the desire to know* for the sake of knowing or by *the desire to solve* the practical problems.
- In research process, the first and foremost step is *selecting and defining a research problem.*

- **Conditions:**
- 1. It must be worth studying. In other words it must have viability or potentiality to stand as a research problem.
- 2. The study of the problems must be socially useful. It must be able to catch the attention of the experts, policy makers, academicians etc. who are familiar with the subject.
- 3. There must be a felt need for research over the problem. It should be a problem untouched by other researchers or even if touched must be in need of further research possibility.
- 4. A research problem should come out with pragmatic solutions to the issue.
- 5. As far as possible the research problem should not be stale. It should be up to date and relevant to the current social happenings.

## W03: Literature Survey

- **Lec02 : Literature Survey & Tutorial 1.**
- **Positioning the study through literature**
- Find and read other's work throughout your research process  
→ The idea is to clarify and sharpen your research questions during the research process.
- Theories, theoretical concepts, and research findings that you read about will assist you with *positioning your study in relation to prior knowledge*.  
→ This positioning takes place with the help of prior research and through the development of your own research questions.

## W04: Hypothesis & Theory

- **Lec02 : Hypothesis and Theory**
- Although real estate studies emphasizes practical business problems, you must incorporate into the study some *theoretical ideas and concepts*.
- →In theory-driven research you pay a lot of attention to theoretical concepts right at the beginning of the study.
- In *data-driven research* you build the relationship between theoretical concepts and your data at later stages of the project. It is often helpful to make a distinction between theory (theoretical ideas and concepts) and prior research (studies dealing with empirical data).

## Example: Project

- Model.
- $\Delta P_{it} = \alpha_1 + \beta_1 \Delta Y_{1it} + \beta_2 \Delta OLDDEP_{1it} + \beta_3 \Delta TPOP_{it} + \delta_i$
- $i = 1, \dots, I \quad t = 1, \dots, T$
- $P_{it}$ : residential land price (real value)
- $Y_{it}$ : income per capita for the population aged 20–64 (real value)
- $OLDDEP_{it}$ : old-age dependency ratio (= population aged 65+/population aged 20–64)
- $TPOP_{it}$ : total population
- $\alpha_1, \beta_1, \beta_2, \beta_3$ , parameters to be estimated
- $\delta_i$ : error term



## W05: Data

- **Lec03 : Data Collection**
- **Lec04 : Research Question and Data**
- How to collect Data? Data source.
- Primary data or secondary data.
- **Primary data**: The data which are collected from the field under the control and supervision of an investigator is known.
- **Secondary data**: If data are collected from journals, magazines, government publications, annual reports of companies, etc.
- The reliability of managerial decisions depends on **the quality of data**.

## Example: Project

- We made a multinational-level panel data. Our multinational panel data covers **10 developed/developing** countries between 1981 and 2013 in annual frequency ( $N = 10$ ,  $T = 33$ ,  $N \times T = 330$ ). The countries covered are; \* Asian countries, \* Oceania countries, \* North American countries, \* Africa country, and \* European countries.
- Nominal residential price index is gathered from “Residential Property Price Statistics” conducted by the Bank for International Settlements (BIS). Nominal residential price is deflated by CPI. For Real GDP, CPI and Population by age groups we gathered from the World Bank database ([data.worldbank.org](http://data.worldbank.org)).

## W06. Analyzing Data

- **Lec04 : Research Question and Data**
  - **Lec04 : Overview of multivariable analysis**
  - **Lec05 : Machine Learning and Big Data**
  - **& Tutorial 2.**
- 
- Multivariate analysis methods will increasingly influence not only the analytical aspects of research but also the design and approach to data collection for decision making and problem solving.
  - Although multivariate techniques share many characteristics with their univariate and bivariate counterparts, several key differences arise in the transition to a multivariate analysis.

## W07. Interpretation and Validation

- **Lec05 : Interpretation and Simulation.**
- Interpretation, the meanings and implications of the study become clear. Analysis is not complete without interpretation and interpretation cannot proceed without analysis. Both are thus interdependent. *Interpretation can be conceived of as a part of analysis.*
- Analysis and interpretation occupy *the last stage of the research*, conceptually or in terms of thought, they occupy the first stage, since the necessary theoretical and practical knowledge of the future shape of the result is acquired much before the actual work is undertaken.

## Example: Project

	No. of observa tions	Adj. R2	GDP per capita			Old dependency ratio			Total population			EC term		
Japan	1,645	0.629	0.2188	0.0000		-1.3167	0.0000		0.9177	0.00		-0.1033	0.00	
Standard error/t value			0.058	/	3.76	0.186	/	-7.06	0.290	/	3.17	0.009	/	-11.33
U.S.	1,836	0.439	0.4515	0.0000		-0.9067	0.0000		0.7514	0.00		-0.1272	0.00	
Standard error/t value			0.042	/	10.66	0.116	/	-7.79	0.116	/	6.46	0.010	/	-12.29

**The coefficient on per capita GDP :**

**Japan 0.2188, US 0.4515, Takáts:0.8842.**

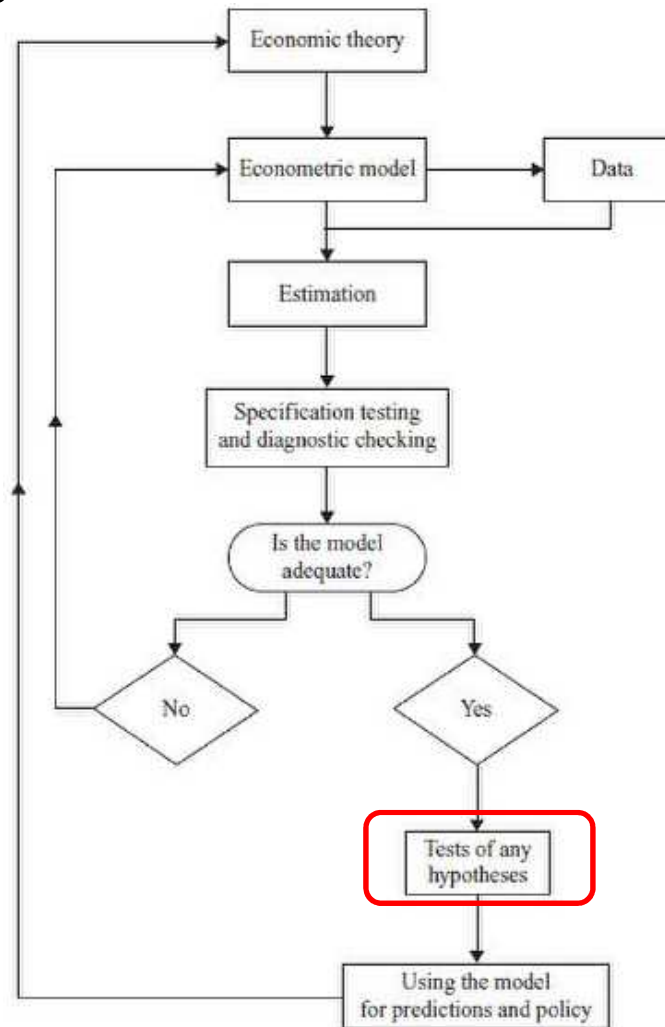
**Old age dependency ratio:**

**Japan -1.3167, US -0.9067, Takáts:-0.6818.**

**Total population:**

**Japan 0.9177 , U.S. 0.7514, Takáts: 1.0547.**

A revised schematic description of the steps involved in an econometric analysis of economic models.



G.S.Maddara and K. Lahiri (2009), "Introduction to Econometrics" 4th edition.

# Robustness Check Japan

Model	No. of observations	Adj. R2	GDP per capita	Old age dependency ratio	Total population	Time fixed effect	Local fixed effect
<b>Japan</b>							
Base model: BM	1,645	0.629	<b>0.2188</b> ***	<b>-1.3167</b> ***	<b>0.9177</b> ***	Yes	None
without time fixed effect	1,645	0.159	<b>0.4401</b> ***	<b>-1.9702</b> ***	<b>2.5376</b> ***	None	None
with local fixed effect	1,645	0.621	<b>0.2302</b> ***	<b>-1.7280</b> ***	<b>2.0220</b> ***	Yes	Yes
with local fixed effect and without time fixed effect	1,645	0.182	<b>0.3891</b> ***	<b>-2.2071</b> ***	<b>4.0806</b> ***	None	Yes
without EC term	1,645	0.602	<b>0.1468</b> **	<b>-1.0790</b> ***	<b>0.8333</b> ***	Yes	None
BM+ Interest rate	1,598	0.629	<b>0.1433</b> **	<b>-1.4071</b> ***	<b>1.0508</b> ***	Yes	None
BM + New housing supply	1,645	0.627	<b>0.2297</b> ***	<b>-1.2701</b> ***	<b>1.1372</b> ***	Yes	None
BM + interest rate + new housing supply	1,598	0.629	<b>0.1664</b> ***	<b>-1.3675</b> ***	<b>1.2517</b> ***	Yes	None
BM + interest rate + new housing supply ( 1 period lag)	1,598	0.628	<b>0.0890</b>	<b>-1.3569</b> ***	<b>1.1941</b> ***	Yes	None

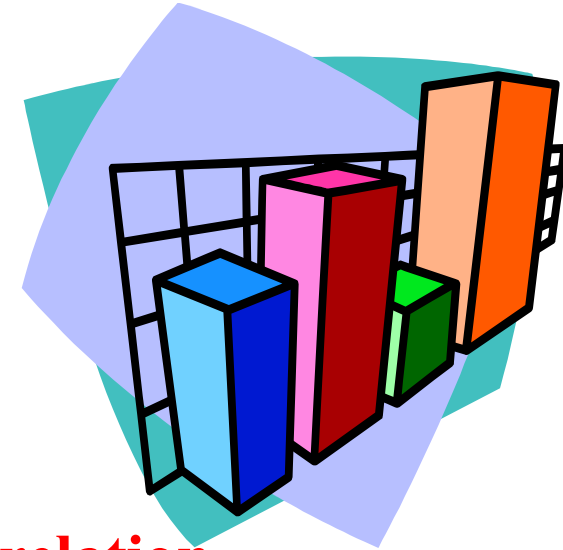
## W08. Conclusion

- **Lec06 : Writing Report.**
- A conclusions section can be as short as a few paragraphs or as long as several pages; the length will depend on the complexity of your focus and results.
- The conclusion often includes a discussion of any new insights the research can contribute to the broader literature.
- Additionally, any limitations of your research should be stated, as well as the suggestions;
- Suggestions that you would have for *future research*.



# Introduction to Statistics04

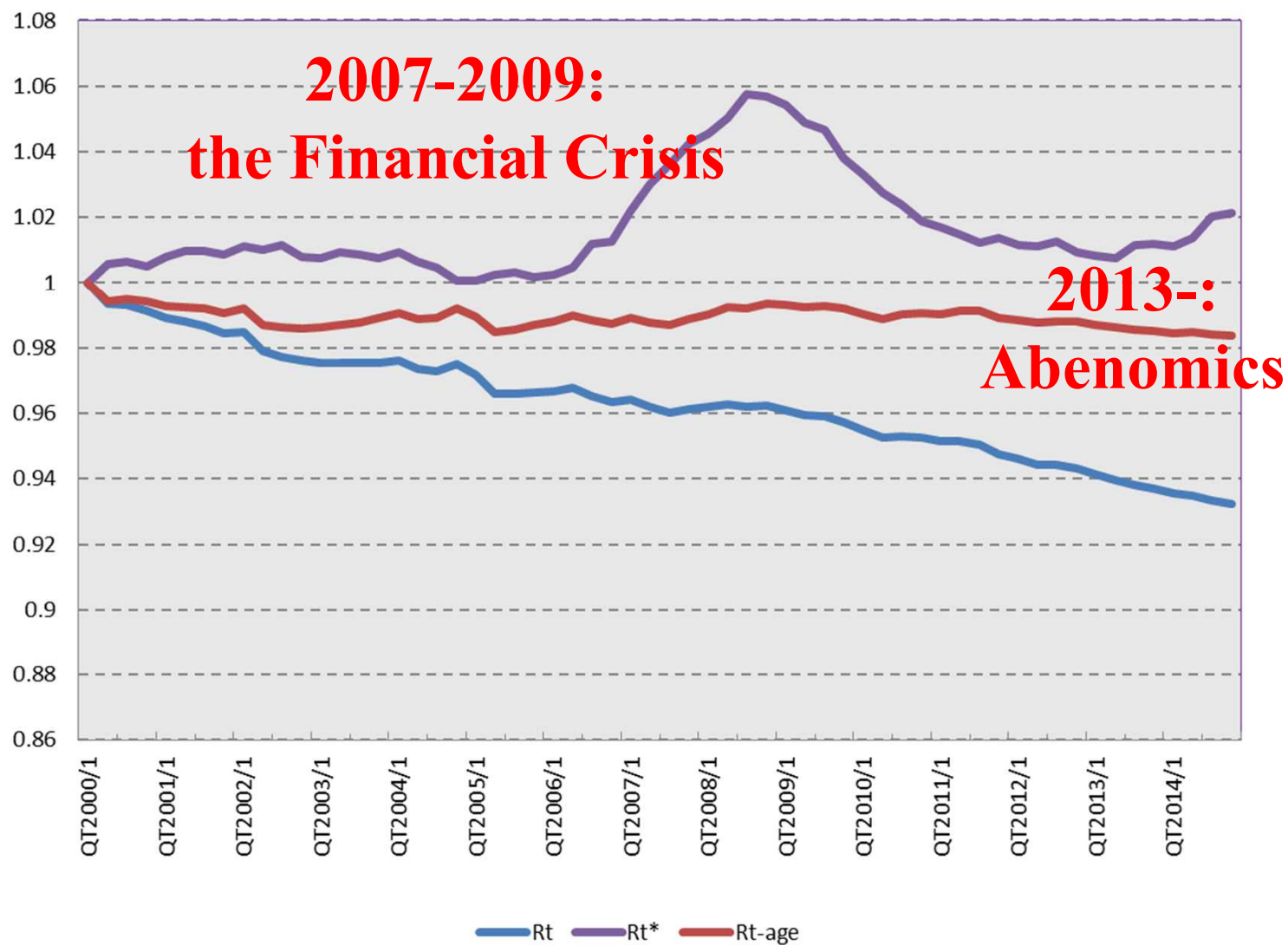
- **Regression model-building methodology**
- **Dummy variables for categorical**
- **Lagged values of the dependent variable**
- **Residuals for heteroscedasticity and autocorrelation**



**P. Newbold, W.L. Carlson, B. M. Thorne (2010),  
“Statistics for Business and Economics”7<sup>th</sup> edition.  
Chapter 13: Additional Topics in Regression Analysis**

## Today's Case:

- Shimizu, C., K. G. Nishimura and T. Watanabe (2010), “Residential Rents and Price Rigidity: Micro Structure and Macro Consequences,” *Journal of Japanese and International Economy*, 24, 282-299.
- Shimizu, C., W. E. Diewert and S. Imai (2015), “Housing Rent and Japanese CPI: Nominal Rigidity of Rents ”, IRES Working Paper(National University of Singapore), 2015-009.



**Figure 6: Hedonic estimate  $R_t^*$ , R-age and Actual CPI**

# 1. Introduction

## Outline or Questions

- **Why are housing rents sticky?**
  - Real estate prices and goods & services prices is linked through housing rents. But housing rents did not rise much, and consequently CPI inflation was stable even during the bubble period. This caused delay in monetary tightening
  - How much and why are housing rents sticky?
- **How should we estimate CPI more linked to asset price developments?**
  - Defining as the opportunity cost of homeowners, we can estimate rent index measuring the newly contracted rent instead of paying rent
  - The user cost method that many countries started to develop in these days

## Background papers.

- **Rigidity of Housing Rent.**

- Shimizu, C., K. G. Nishimura and T. Watanabe (2010), “Residential Rents and Price Rigidity: Micro Structure and Macro Consequences,” Journal of Japanese and International Economy, Vol.24, 282-299.

- **Comparison of Residential Property Price Indexes.**

- Shimizu, C., K. G. Nishimura and T. Watanabe (2010), “House Prices in Tokyo - A Comparison of Repeat-sales and Hedonic Measures-,” Journal of Economics and Statistics, Vol. 230 (6), 792-813.
- → Shimizu, C, and K.Karato (2014). “Estimation of Residential Property Price Indexes in Tokyo-,” Conference Paper for Hitotsubashi-RIETI International Workshop on Real Estate Markets and the Macro Economy.

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## W08. Conclusion

- **Lec05 : Interpretation and Simulation.**
- Interpretation, the meanings and implications of the study become clear. Analysis is not complete without interpretation and interpretation cannot proceed without analysis. Both are thus interdependent. *Interpretation can be conceived of as a part of analysis.*
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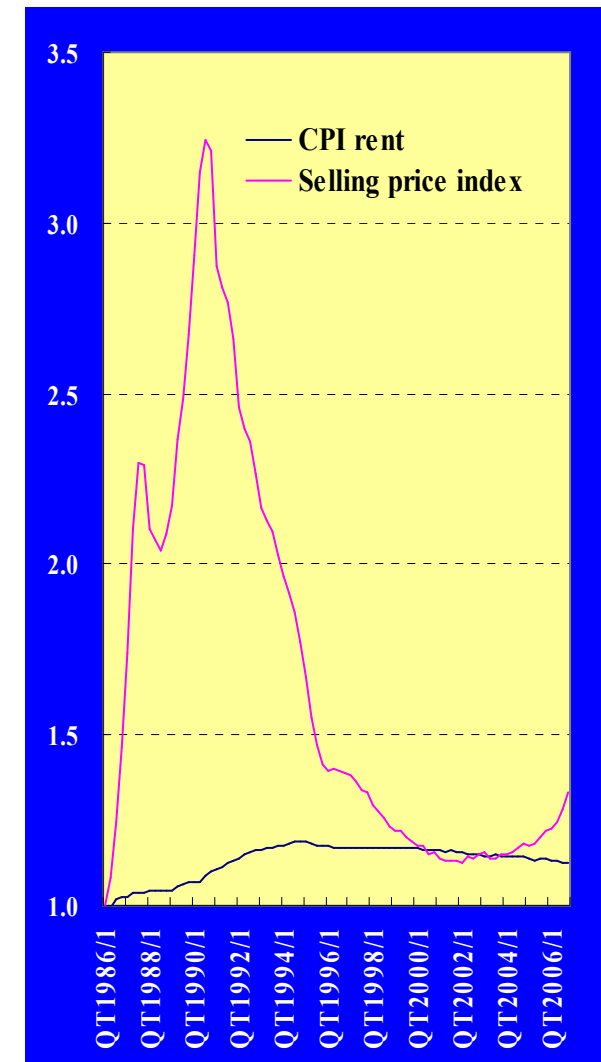
# Macroeconomic Policy and Housing Market.

## Expenditures for housing services: 26.4%

Housing rents:	4.9%
Imputed rents from owner occupied housing:	19.4%
Housing maintenance and others:	2.3%

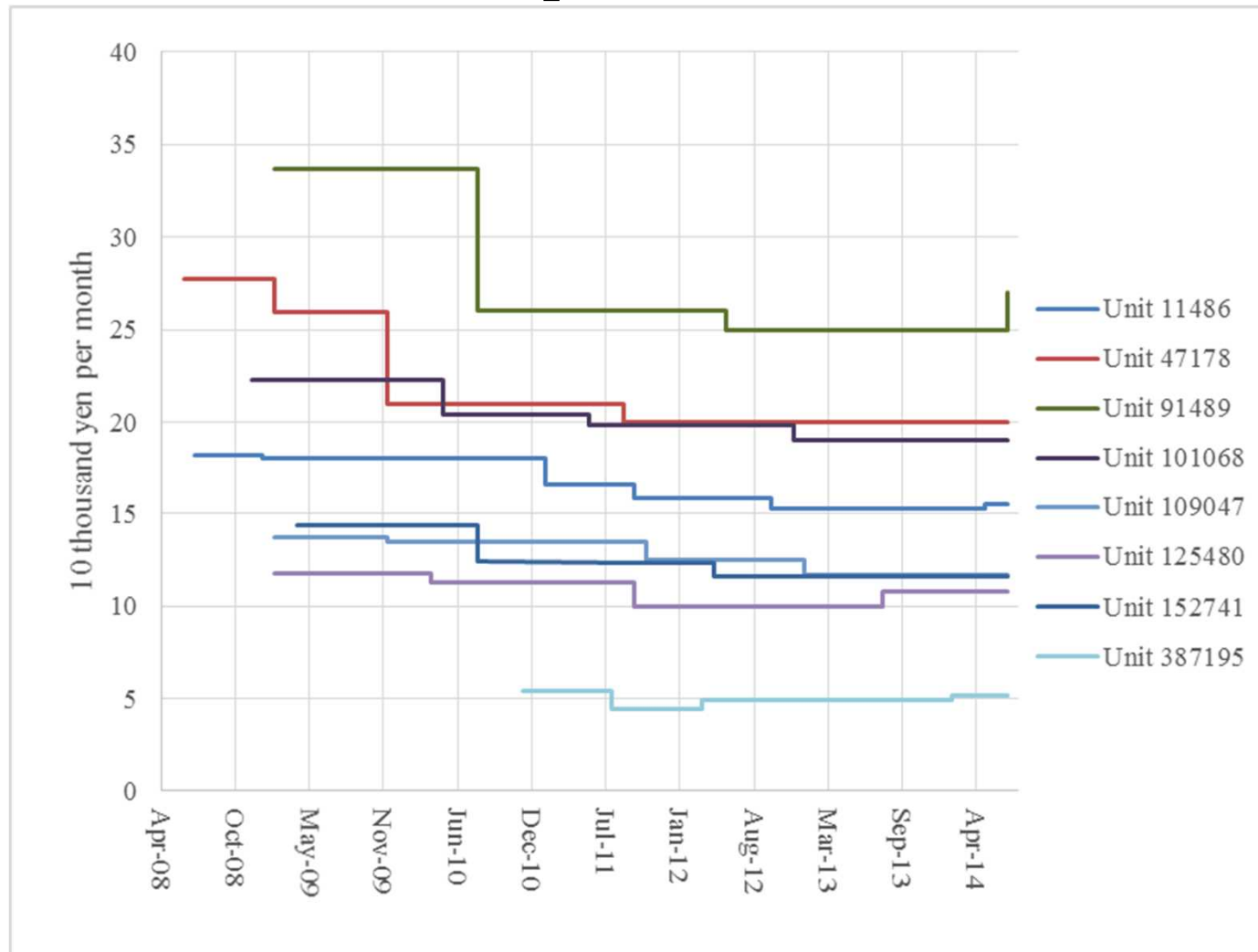
“Consumer Price Index (CPI) in Tokyo, 2010”

- The most important link between *asset prices* and *goods & services prices* is the one through **housing rents** (Goodhart 2001)
- Housing rents account for more than **one fourth** of personal spending



## 2. Macro-Analysis of Housing Rent

### Panel data of rental prices





# Summary Statistics of Housing Rent

<b>Sample period</b>	<b>January 2010 - July 2014</b>					
<b>Frequency</b>	<b>Monthly</b>					
<b>Area</b>	<b>Tokyo's wards</b>					
<b>Type of data</b>	<b>Paid rent</b>					
<b>Coverage</b>	<b>New and rollover contracts</b>					
<b>Provided by</b>	<b>Recruit</b>					
<b>Number of units</b>	<b>52,524</b>					
<b>Number of samples</b>	<b>All samples</b>		<b>New contracts</b>		<b>Rollover contracts</b>	
	<b>1,529,485</b>		<b>36,832</b>		<b>41,117</b>	
	<b>mean</b>	<b>s.d.</b>	<b>mean</b>	<b>s.d.</b>	<b>mean</b>	<b>s.d.</b>
<b>Monthly rent</b>	<b>101,721.2</b>	<b>46,209.7</b>	<b>100,423.7</b>	<b>45,271.9</b>	<b>102,094.6</b>	<b>46,480.0</b>
<b>Floor space (m<sup>2</sup>)</b>	<b>32.4</b>	<b>15.6</b>	<b>32.2</b>	<b>15.6</b>	<b>32.5</b>	<b>15.7</b>
<b>Price per m<sup>2</sup></b>	<b>3,293.3</b>	<b>788.3</b>	<b>3,271.9</b>	<b>756.8</b>	<b>3,292.8</b>	<b>798.1</b>
<b>Age of unit (years)</b>	<b>13.0</b>	<b>9.9</b>	<b>12.3</b>	<b>10.1</b>	<b>13.4</b>	<b>9.8</b>
<b>Time to nearest station (min)</b>	<b>5.1</b>	<b>3.8</b>	<b>5.0</b>	<b>3.7</b>	<b>5.2</b>	<b>3.9</b>
<b>Time to central business district (min)</b>	<b>12.4</b>	<b>6.4</b>	<b>12.1</b>	<b>6.3</b>	<b>12.5</b>	<b>6.4</b>

## Hedonic estimation for housing rent

- We have the price and property-characteristics data of houses, pooled for all periods  $t=1,2,\dots,T$ , and that the number of data samples in period  $t$  is  $n_t$ .
- A standard hedonic price index is produced from the following house-price estimation model:

$$\ln R_{it} = \beta_t x_{it} + \varepsilon_{it} \quad (1)$$

where  $R_{it}$  is the rent of house  $i$  in period  $t$ ,

$\beta_t$  is a vector of parameters associated with residential property characteristics,

$x_{it}$  is a vector of property characteristic for house  $i$  in period  $t$ ,

and  $\varepsilon_{it}$  is an error term

## Hedonic estimation for housing rent

- we run rolling regression using new housing rent with  $T = 12$ .
- Table 2 indicates the estimation results of rolling hedonic models.

Estimation Window	Floor space	Age of building	Time to nearest station	Commuting time to CBD	Adjusted $R^2$	Number of observations
201001 - 201012	0.0188	<b>-0.0109</b>	-0.0087	-0.0058	0.917	17,697
201002 - 201101	0.0188	<b>-0.0109</b>	-0.0088	-0.0058	0.916	16,707
201003 - 201102	0.0188	<b>-0.0109</b>	-0.0089	-0.0059	0.917	15,670
201004 - 201103	0.0188	<b>-0.0110</b>	-0.0090	-0.0059	0.917	14,504
201005 - 201104	0.0188	<b>-0.0110</b>	-0.0092	-0.0058	0.916	13,303
201006 - 201105	0.0189	<b>-0.0111</b>	-0.0094	-0.0058	0.915	11,684
201007 - 201106	0.0189	<b>-0.0112</b>	-0.0096	-0.0060	0.914	10,667
201008 - 201107	0.0190	<b>-0.0114</b>	-0.0097	-0.0062	0.916	9,942
201009 - 201108	0.0189	<b>-0.0115</b>	-0.0095	-0.0065	0.918	9,099
201010 - 201109	0.0190	<b>-0.0114</b>	-0.0099	-0.0065	0.919	8,346
201011 - 201110	0.0191	<b>-0.0113</b>	-0.0104	-0.0067	0.922	7,571
201012 - 201111	0.0191	<b>-0.0113</b>	-0.0105	-0.0066	0.924	6,698
201101 - 201112	0.0191	<b>-0.0114</b>	-0.0104	-0.0067	0.924	6,490

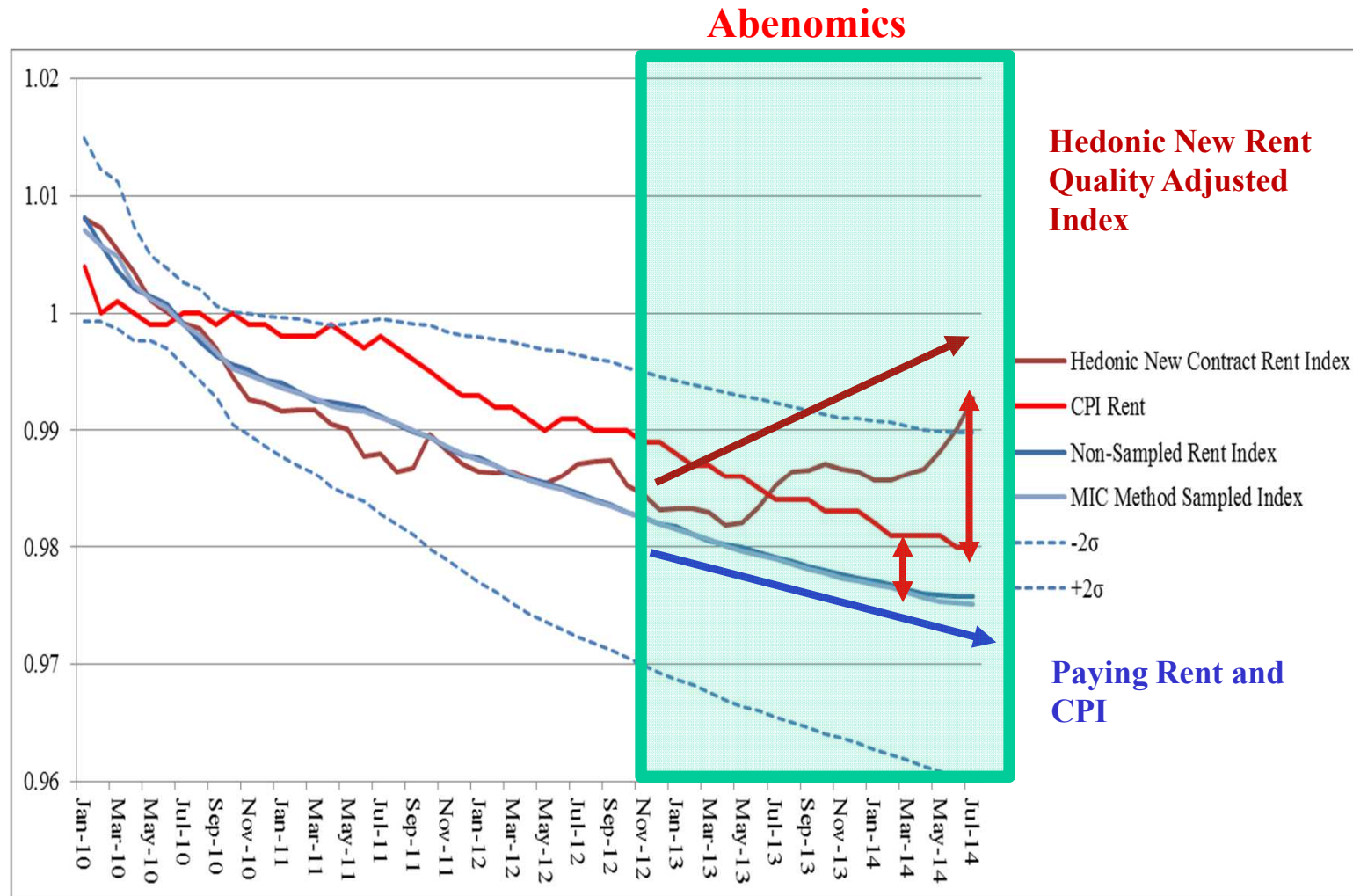
# Hedonic estimation for housing rent

201102 - 201201	0.0192	<b>-0.0114</b>	-0.0104	-0.0067	0.927	6,446
201103 - 201202	0.0192	<b>-0.0113</b>	-0.0101	-0.0065	0.927	6,485
201104 - 201203	0.0192	<b>-0.0113</b>	-0.0102	-0.0067	0.927	6,564
201105 - 201204	0.0194	<b>-0.0113</b>	-0.0099	-0.0071	0.928	6,664
201106 - 201205	0.0194	<b>-0.0112</b>	-0.0096	-0.0075	0.929	6,782
201107 - 201206	0.0194	<b>-0.0110</b>	-0.0095	-0.0074	0.927	6,788
201108 - 201207	0.0193	<b>-0.0110</b>	-0.0096	-0.0071	0.925	6,880
201109 - 201208	0.0193	<b>-0.0109</b>	-0.0098	-0.0068	0.923	6,887
201110 - 201209	0.0191	<b>-0.0109</b>	-0.0096	-0.0071	0.922	6,913
201111 - 201210	0.0191	<b>-0.0110</b>	-0.0096	-0.0072	0.922	6,920
201112 - 201211	0.0192	<b>-0.0110</b>	-0.0094	-0.0074	0.922	6,988
201201 - 201212	0.0191	<b>-0.0109</b>	-0.0091	-0.0075	0.922	6,963
201202 - 201301	0.0189	<b>-0.0109</b>	-0.0091	-0.0072	0.918	6,968
201203 - 201302	0.0188	<b>-0.0109</b>	-0.0091	-0.0076	0.918	7,000
201204 - 201303	0.0188	<b>-0.0108</b>	-0.0093	-0.0076	0.918	7,012
201205 - 201304	0.0187	<b>-0.0109</b>	-0.0097	-0.0073	0.917	6,939
201206 - 201305	0.0186	<b>-0.0109</b>	-0.0098	-0.0071	0.916	6,785
201207 - 201306	0.0186	<b>-0.0110</b>	-0.0098	-0.0071	0.917	6,725
201208 - 201307	0.0186	<b>-0.0110</b>	-0.0098	-0.0073	0.918	6,526
201209 - 201308	0.0186	<b>-0.0110</b>	-0.0097	-0.0075	0.918	6,409
201210 - 201309	0.0187	<b>-0.0110</b>	-0.0097	-0.0074	0.918	6,260
201211 - 201310	0.0186	<b>-0.0110</b>	-0.0098	-0.0073	0.916	6,179
201212 - 201311	0.0186	<b>-0.0110</b>	-0.0099	-0.0073	0.916	6,028
201301 - 201312	0.0187	<b>-0.0110</b>	-0.0105	-0.0075	0.915	5,869
201302 - 201401	0.0189	<b>-0.0109</b>	-0.0107	-0.0078	0.918	5,718
201303 - 201402	0.0191	<b>-0.0108</b>	-0.0110	-0.0077	0.918	5,530
201304 - 201403	0.0190	<b>-0.0108</b>	-0.0109	-0.0075	0.919	5,389
201305 - 201404	0.0191	<b>-0.0107</b>	-0.0109	-0.0075	0.918	5,288
201306 - 201405	0.0192	<b>-0.0106</b>	-0.0112	-0.0077	0.918	5,273
201307 - 201406	0.0191	<b>-0.0105</b>	-0.0114	-0.0077	0.916	5,206
201308 - 201407	0.0192	<b>-0.0104</b>	-0.0113	-0.0079	0.915	5,225
<b>Average</b>	<b>0.0190</b>	<b>-0.0110</b>	<b>-0.0099</b>	<b>-0.0070</b>	<b>0.9196</b>	<b>7,863</b>
<b>Estimation Window</b>	<b>Floor space</b>	<b>Age of building</b>	<b>Time to nearest station</b>	<b>Commuting time to CBD</b>	<b>Adjusted R<sup>2</sup></b>	<b>Number of observations</b>

## Official Residential Rent Index or CPI Rent

- CPI rent survey districts are selected from enumeration districts of the Population Census by probability sampling. The number of house rent survey districts is **1,221**.
- Statistics Bureau of Japan says that about **28,000 households** are surveyed (see Annual report on the Retail Price Survey 2013).
- The survey districts are allocated according to scale of sample cities, the Tokyo metropolitan area is allocated **54** districts.
- The survey districts are grouped to three groups and one group is surveyed **every 3 months**.
- Rent index is calculated separately by 4 classification.-  
**Wooden small house, wooden medium house, non-wooden small house and non-wooden medium house.**

# Figure 1: Comparison of Tokyo Ward Area Rent Indices



### 3. Micro-Analysis of Rent

#### Frequency of Rent Adjustments

Price Change

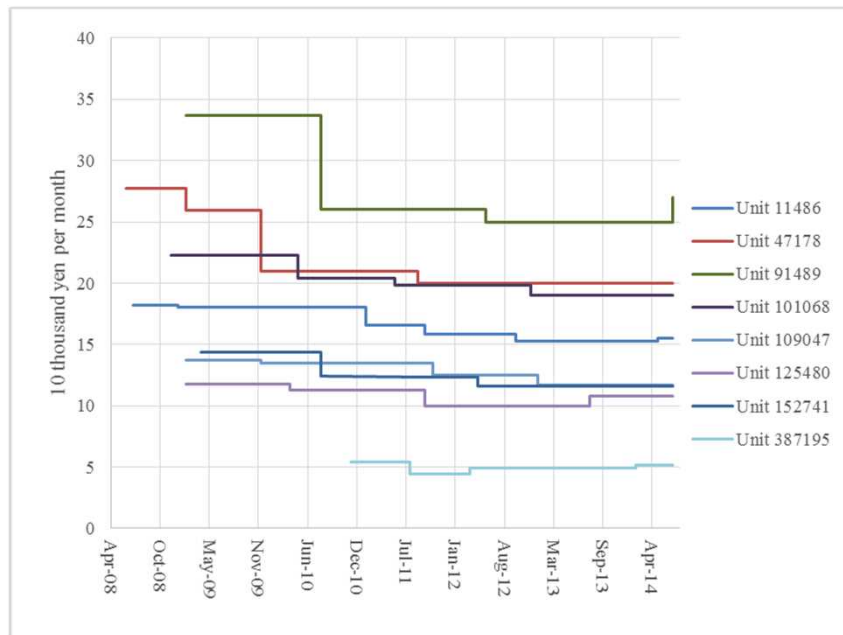
$$\Delta R_{it} \equiv R_{it} - R_{it-1}$$

Probability of event on *New Contract* ( $I^N$ )  
and *Renewed Contract* ( $I^R$ )

$$\Pr(\Delta R_{it} = 0) = \left[ 1 - \Pr(I_{it}^N = 1) - \Pr(I_{it}^R = 1) \right]$$

$$+ \Pr(\Delta R_{it} = 0 \mid I_{it}^N = 1) \Pr(I_{it}^N = 1)$$

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



**Table 4: Nominal Rigidity of Rent**

	Rent decreased	Rent unchanged	Rent increased	Total	(Rent change)
<b>Changes accompanying new contracts</b>	<b>4,181</b> (0.114)	<b>31,737</b> (0.862)	<b>914</b> (0.025)	<b>36,832</b> (0.224)	<b>5,095</b> (0.138)
<b>Changes accompanying rollover contracts</b>	<b>641</b> (0.016)	<b>40,284</b> (0.980)	<b>192</b> (0.005)	<b>41,117</b> (0.250)	<b>833</b> (0.020)
<b>Total contract changes</b>	<b>4,822</b> (0.029)	<b>72,021</b> (0.438)	<b>1,106</b> (0.007)	<b>164,356</b> (1.000)	<b>5,928</b> (0.036)

**Fraction of housing units without no rent change per year****US****29%**

Estimated by Genesove (2003)

**Germany****78%**

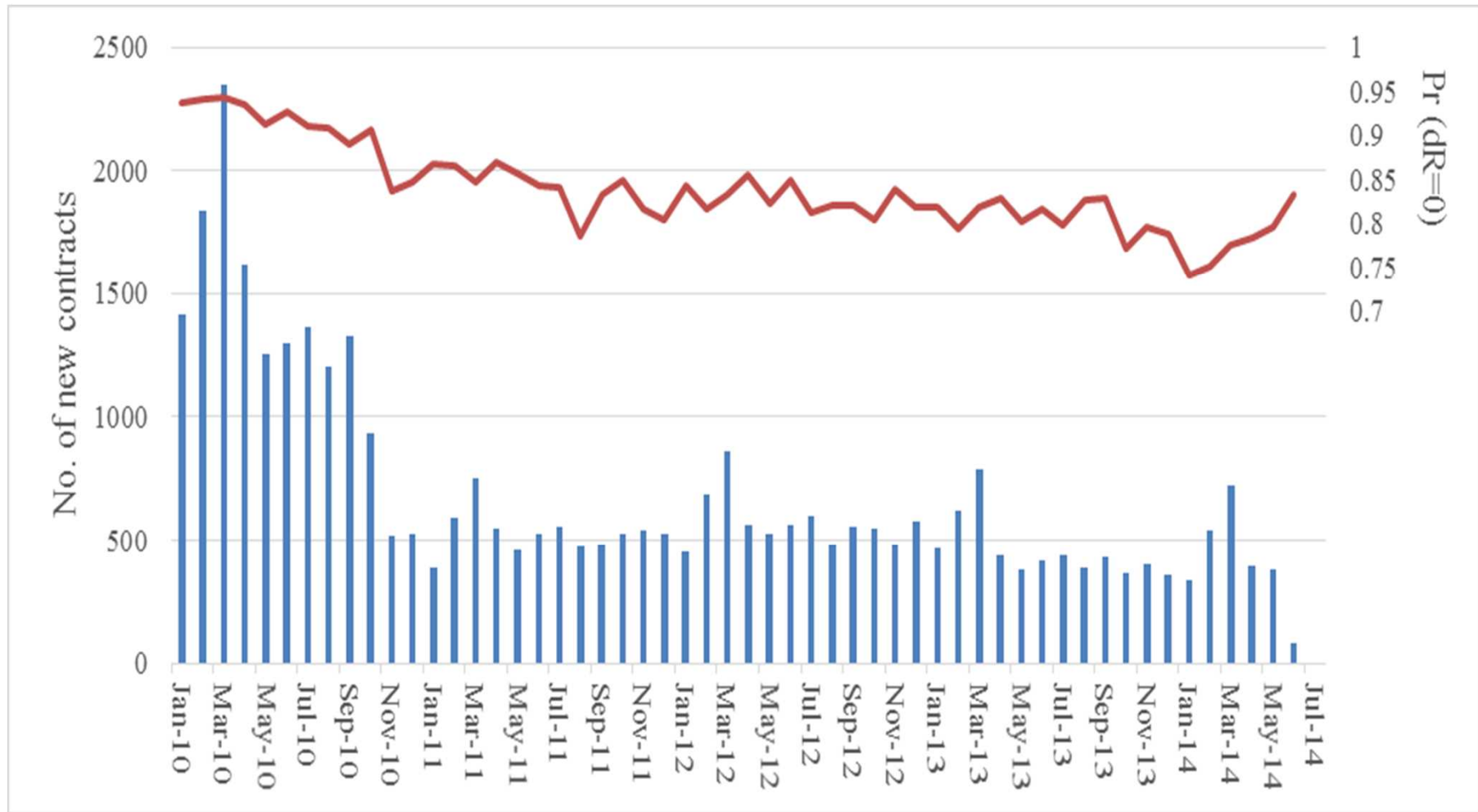
Estimated by Kurz-Kim (2006)

**Japan****90%**

Estimated by this research

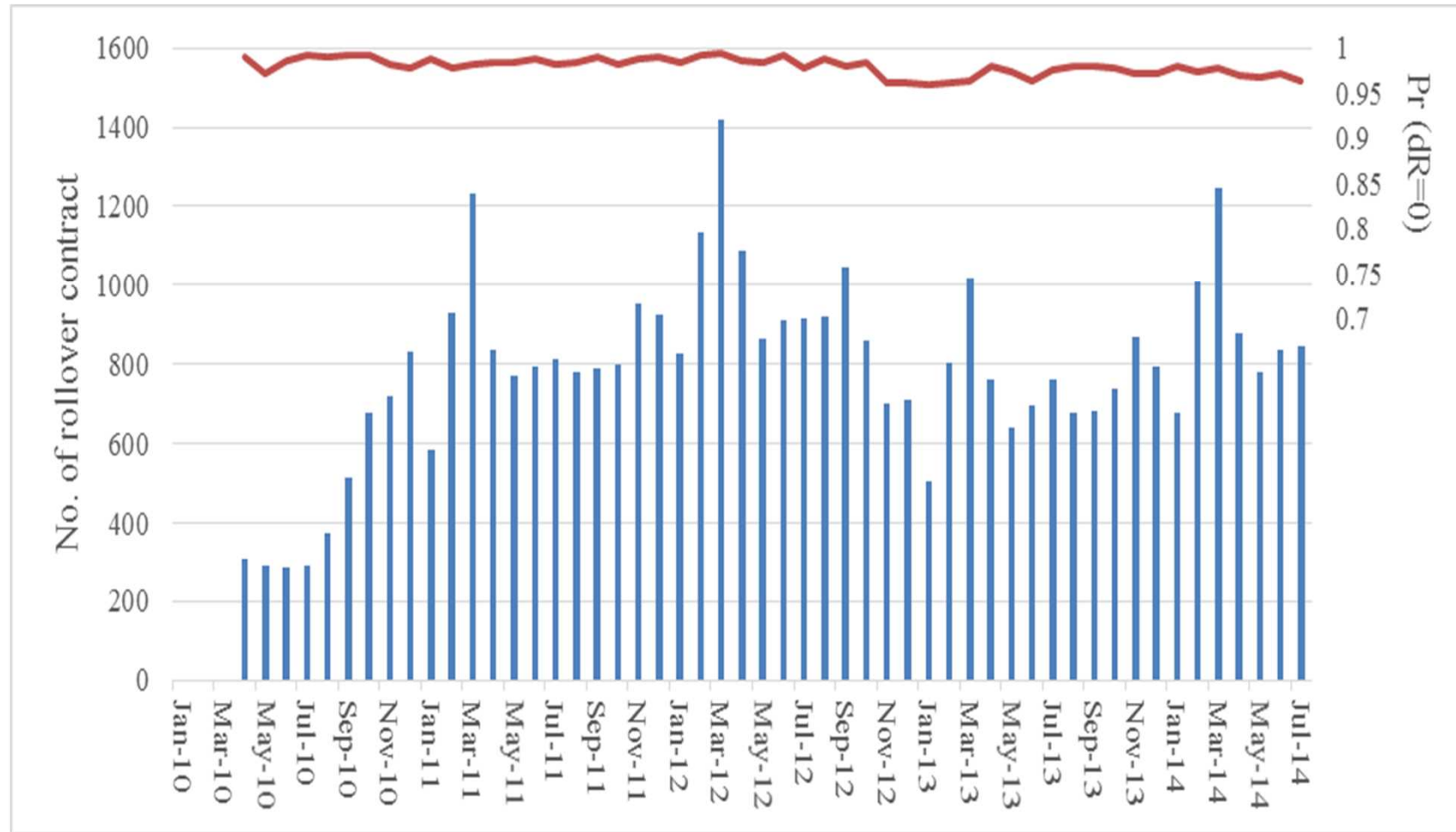


# Probability of No Rent Adjustments in New Contracts : 2010-2014



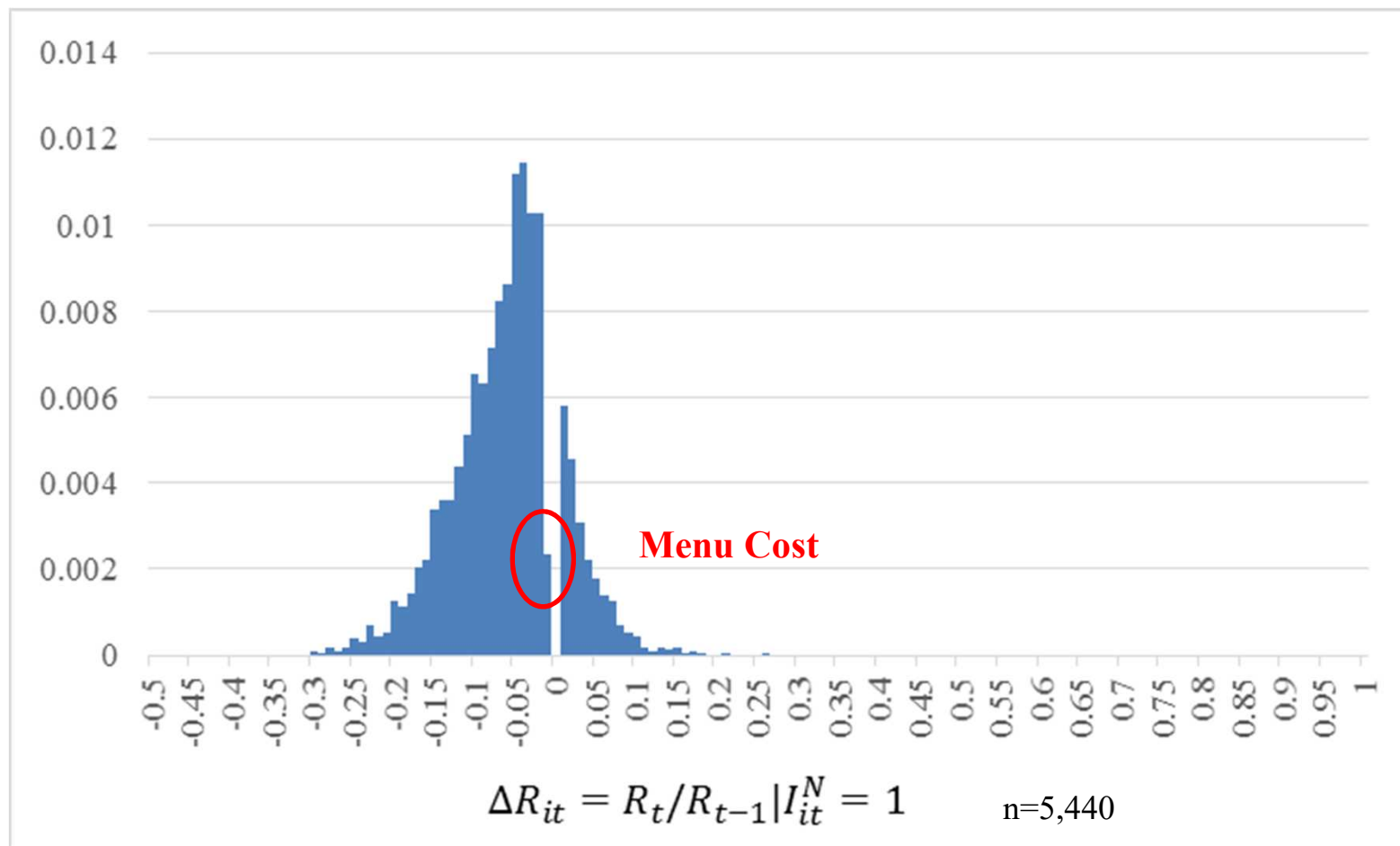
**Figure 2: Monthly Changes in Nominal Rigidity of Rent**

# Probability of No Rent Adjustments in Rollover Contracts : 2010-2014



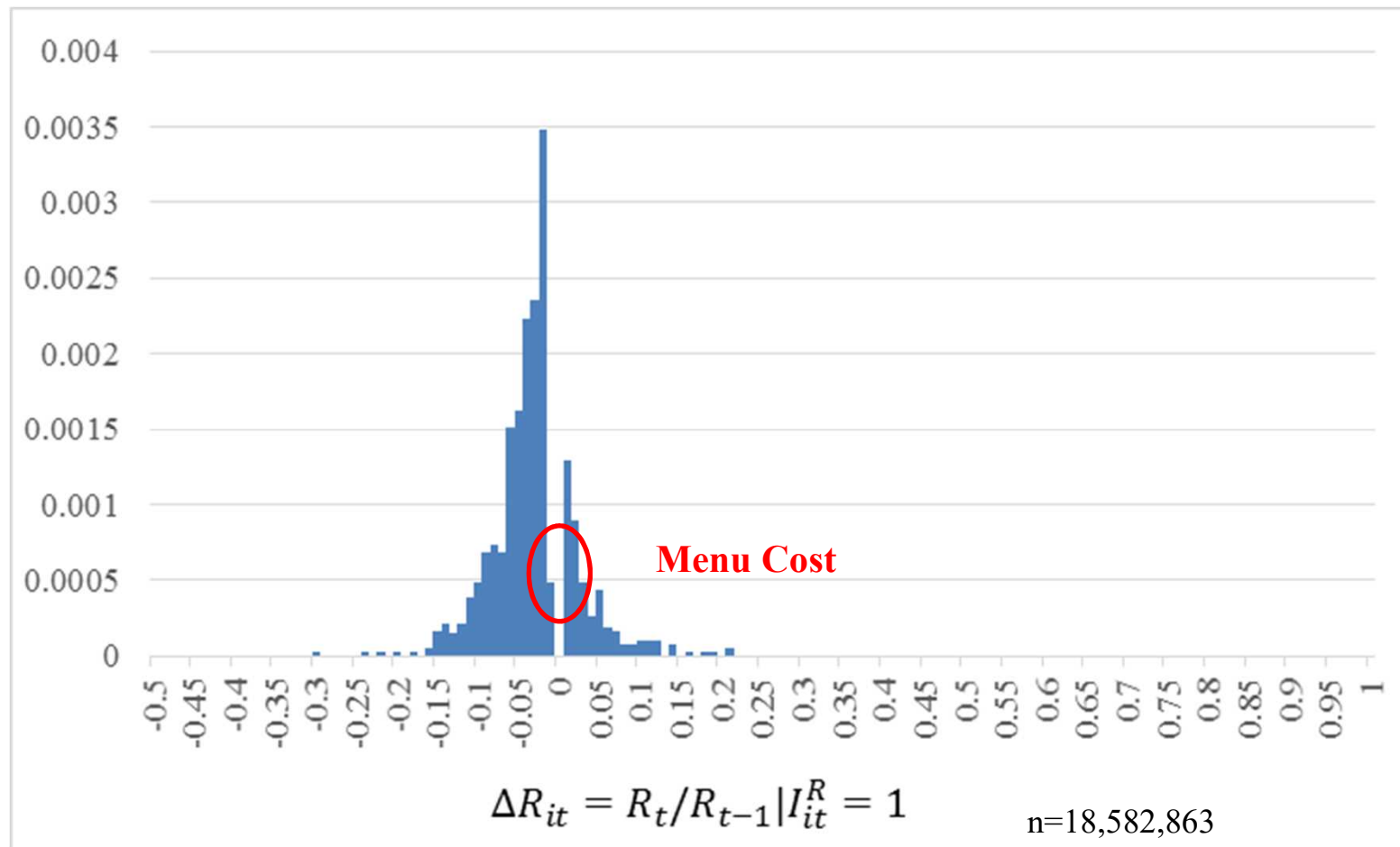
**Figure 2: Monthly Changes in Nominal Rigidity of Rent**

# Monthly rent change distribution in Turnover Contracts



**Figure 3: Rent Revision Range Density Distribution**

# Monthly rent change distribution in Rollover Contracts



**Figure 3: Rent Revision Range Density Distribution**

# State-Dependent or Time-Dependent Pricing: Caballero-Engel's definition of price flexibility

Target Rent Level

Price Gap

Probability of rent  
adjustments

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

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

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

Caballero-Engel(1993)

**:Adjustment Hazard  
Function**

$$\lim_{\Delta \xi_t \rightarrow 0} \frac{\Delta \log R_t}{\Delta \xi_t}$$

=

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

+

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

Caballero-Engel's  
measure of price flexibility

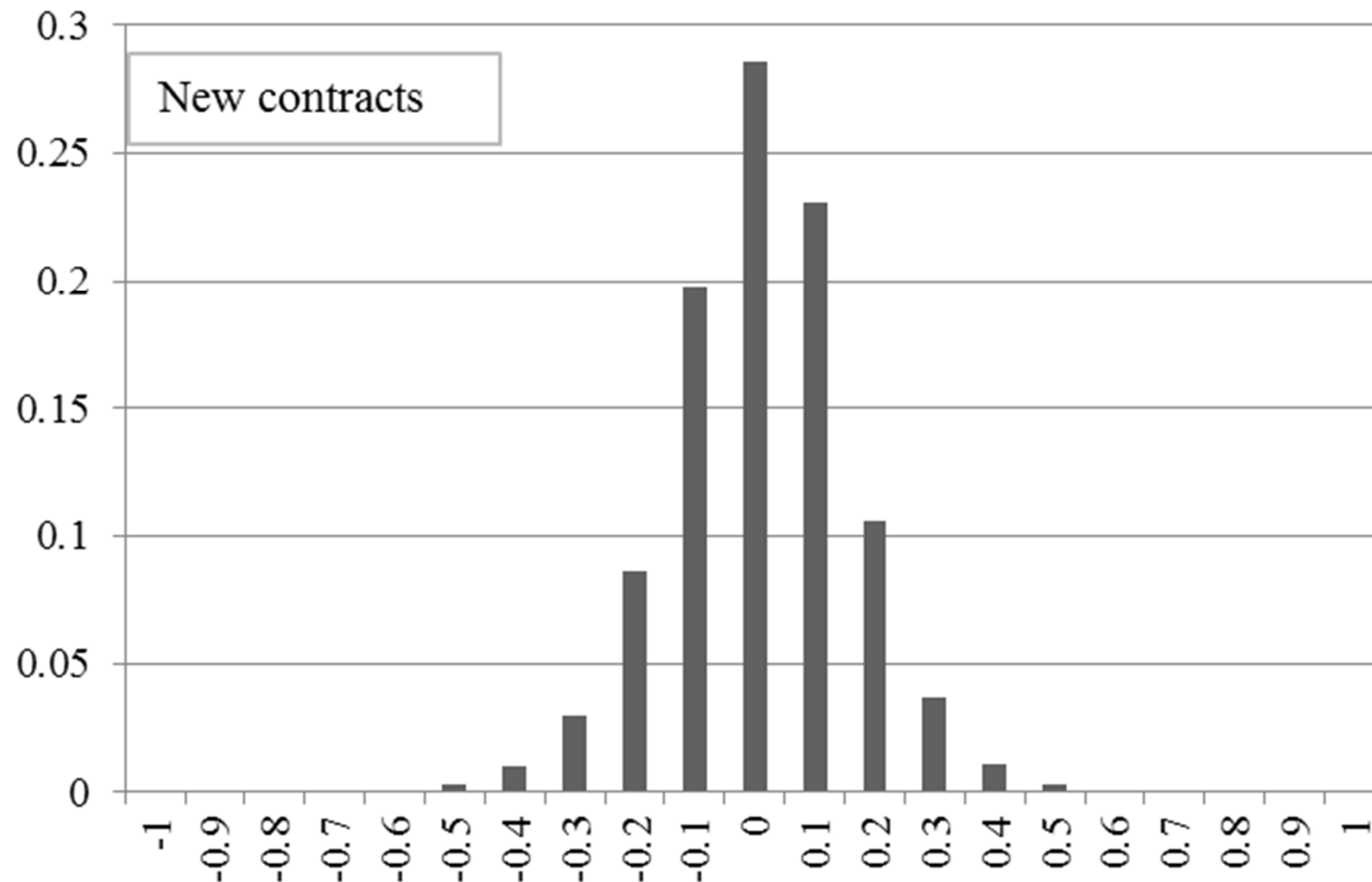
Intensive margin

Extensive margin

Caballero-Engel(2007)

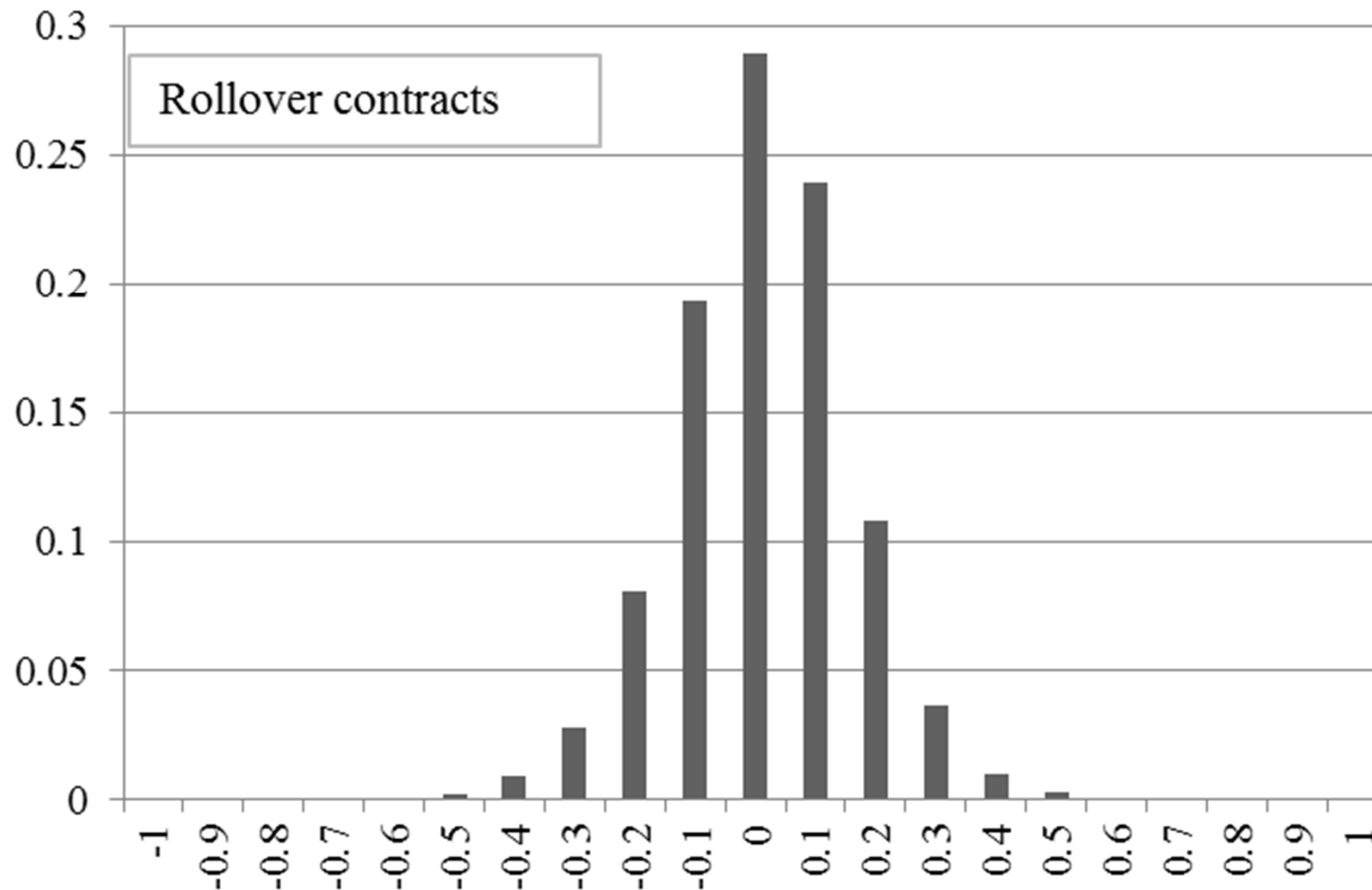
$$\begin{aligned} \Lambda(x) = & \Pr(\Delta R_{it} \neq 0 \mid I_{it}^N = 1, X_{it} = x) \Pr(I_{it}^N = 1 \mid X_{it} = x) \\ & + \Pr(\Delta R_{it} \neq 0 \mid I_{it}^R = 1, X_{it} = x) \Pr(I_{it}^R = 1 \mid X_{it} = x) \end{aligned}$$

## Distribution of Price Gap in New Contract



**Figure 4: Price Gap Distribution**

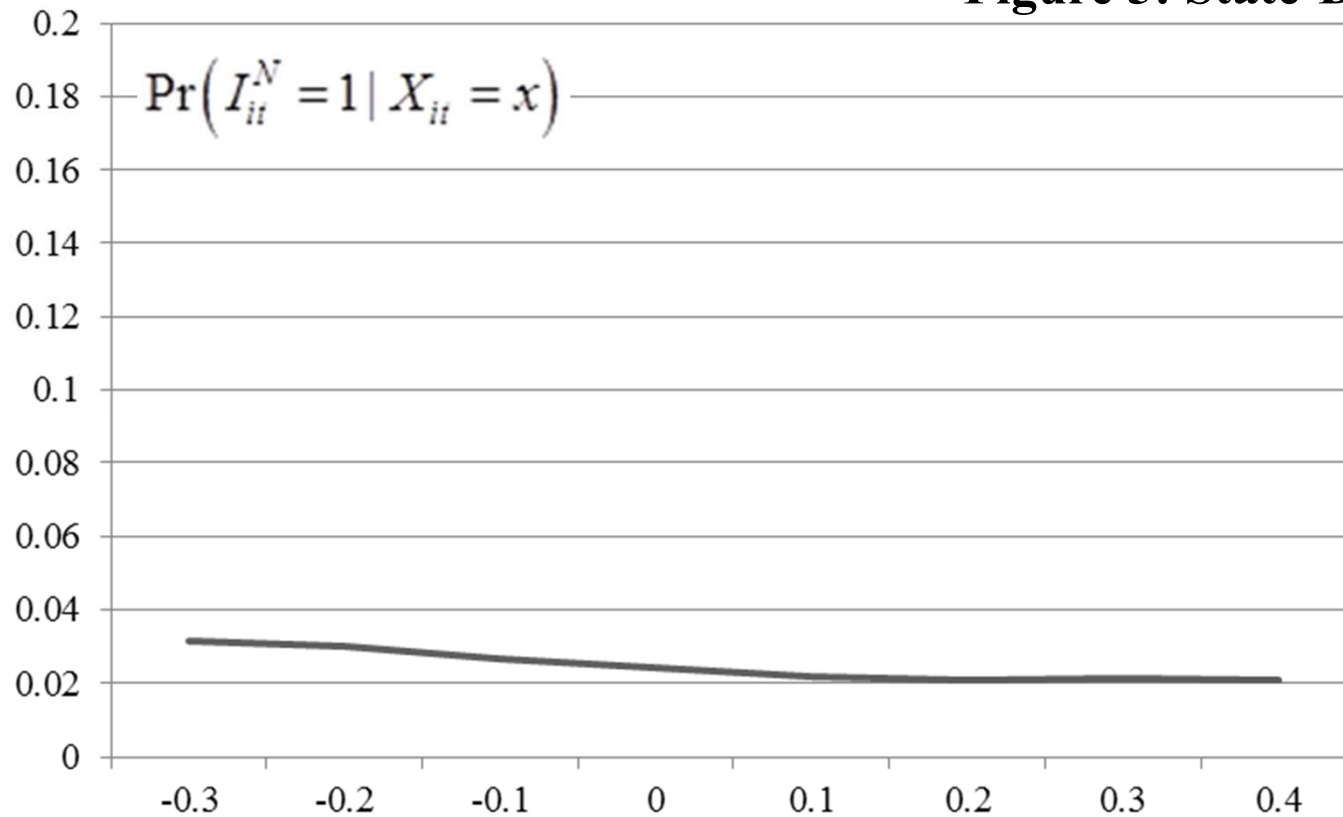
## Distribution of Price Gap in Renewed Contract



**Figure 4: Price Gap Distribution**

# Adjustment Hazard Function for *Turnover Units*: Probability of Unit Turnover

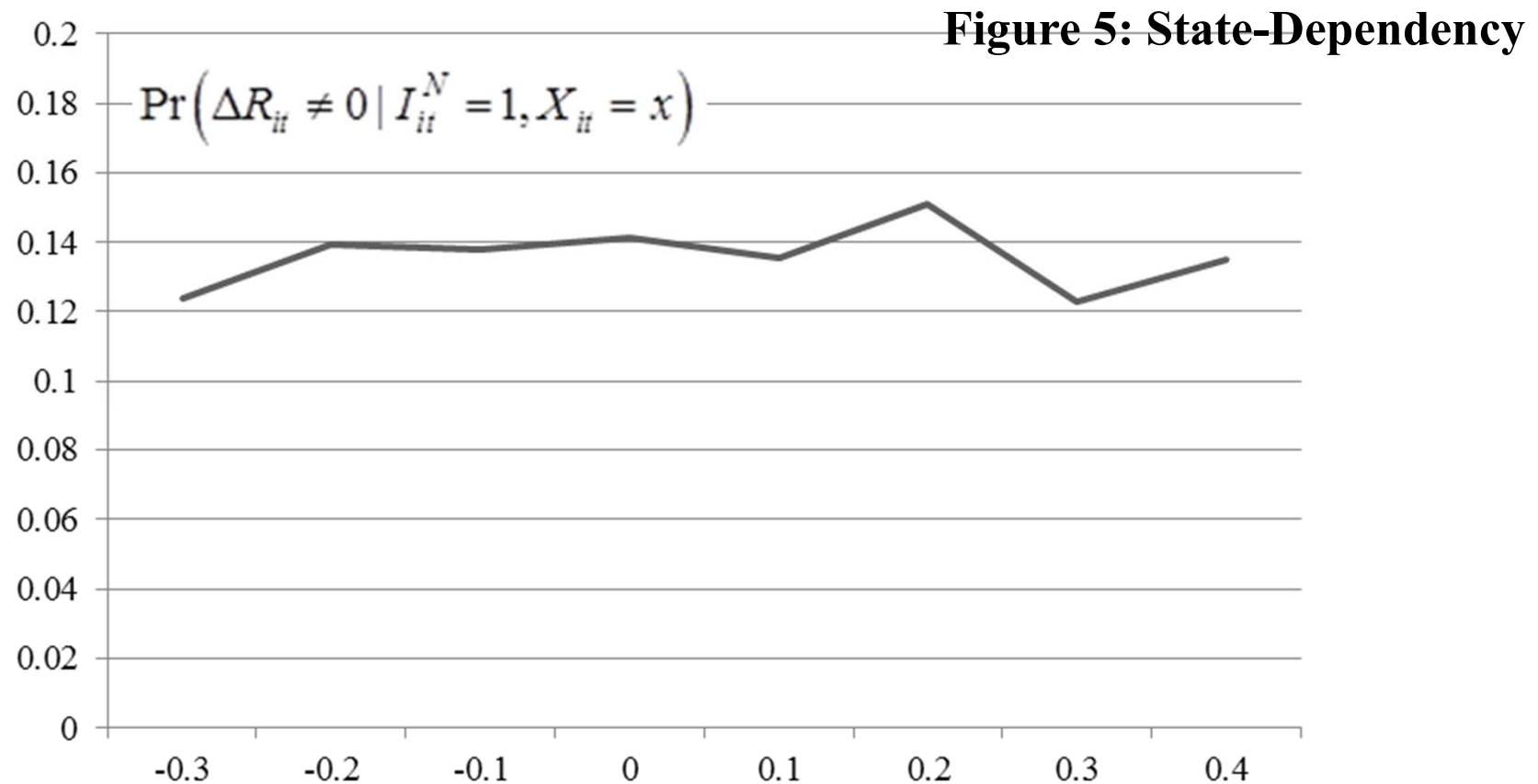
Figure 5: State-Dependency



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

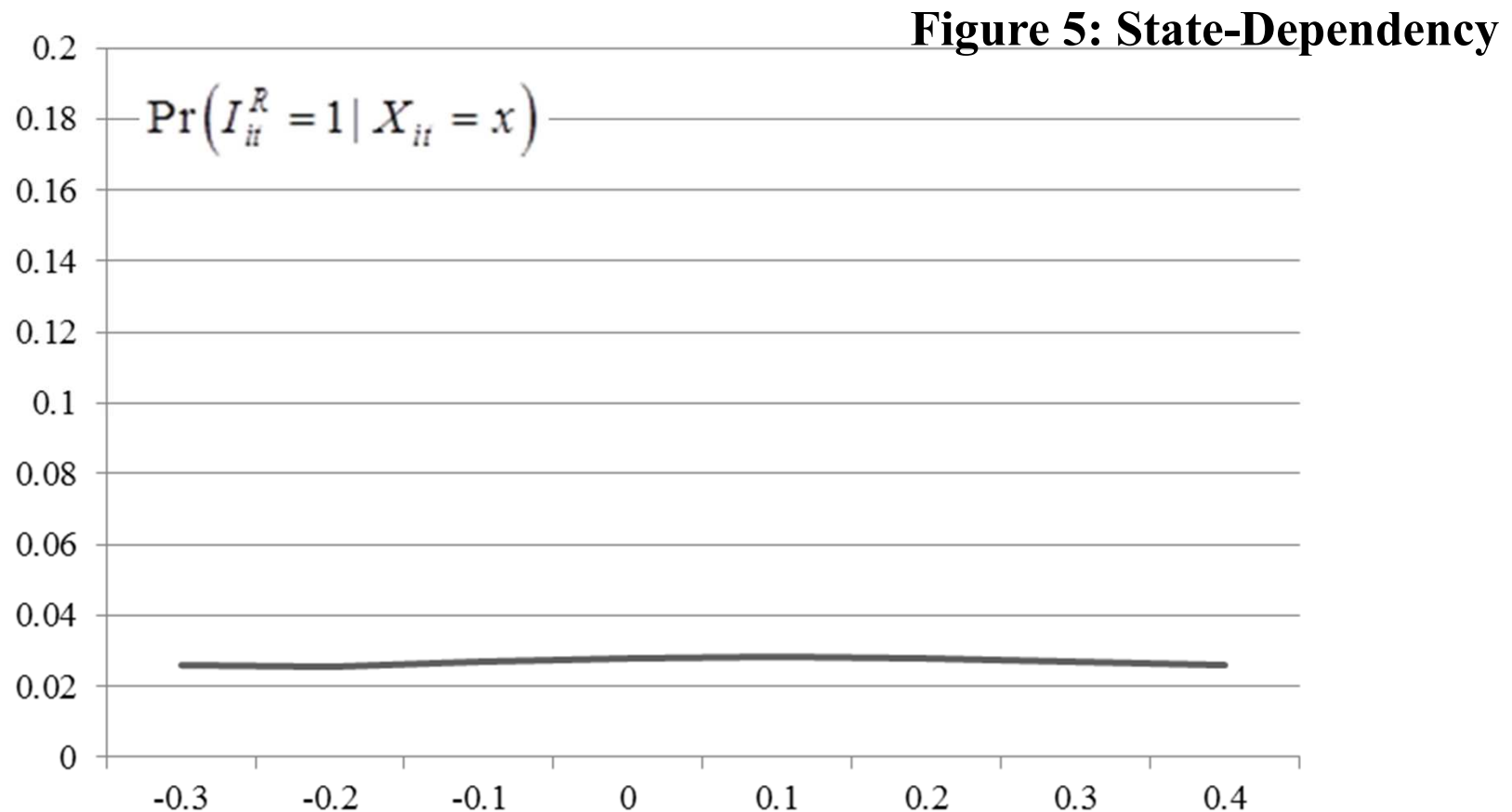


# Adjustment Hazard Function for *Turnover Units*



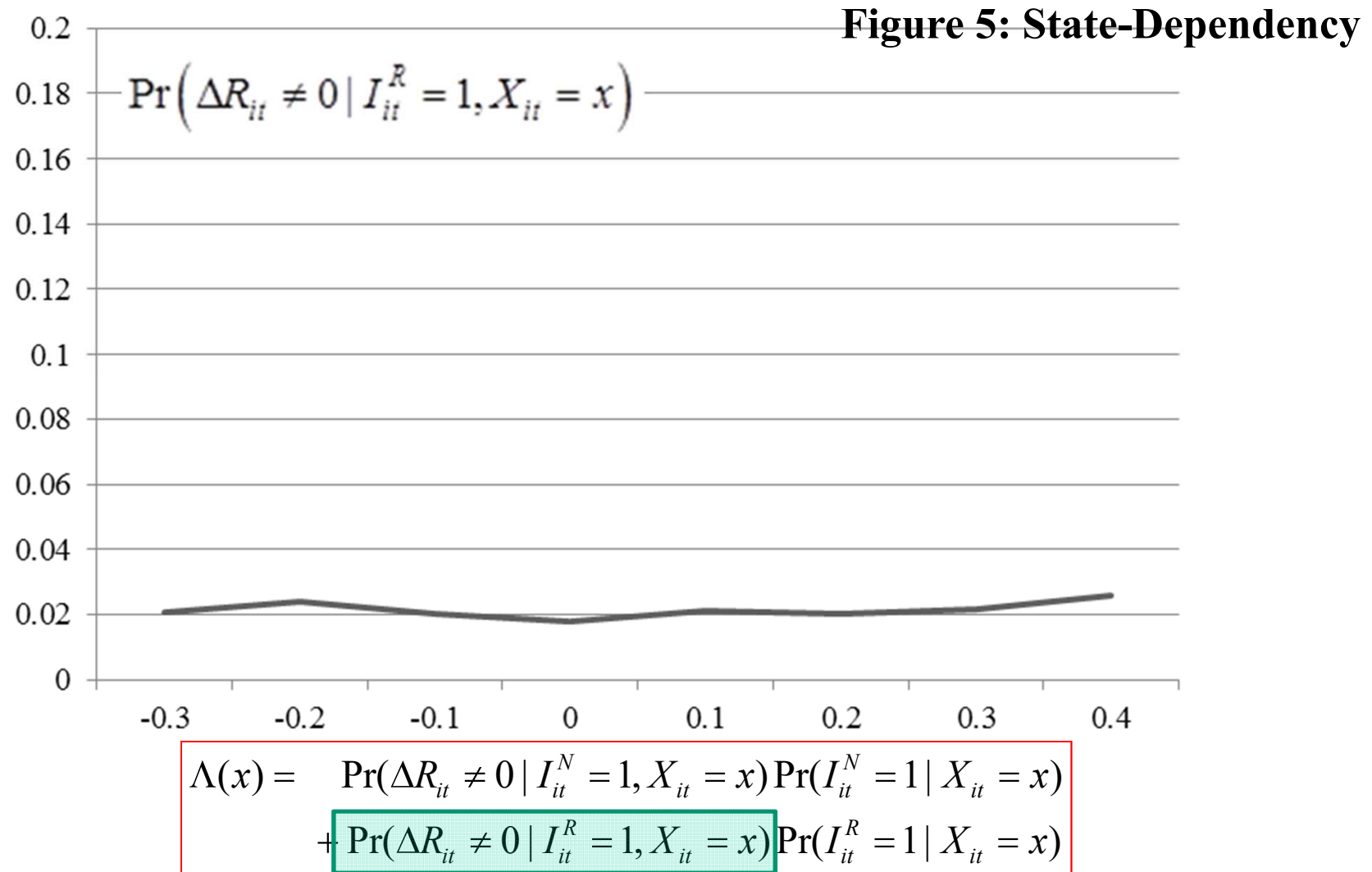
$$\Lambda(x) = \Pr(\Delta R_{it} \neq 0 | I_{it}^N = 1, X_{it} = x) \Pr(I_{it}^N = 1 | X_{it} = x) + \Pr(\Delta R_{it} \neq 0 | I_{it}^R = 1, X_{it} = x) \Pr(I_{it}^R = 1 | X_{it} = x)$$

# Adjustment Hazard Function for *Rollover Units*



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

# Adjustment Hazard Function for *Rollover Units*



# Adjustment Hazard Functions

**Table 5: Summary of Estimation Results**

	$x \in [-0.4, -0.2)$	$x \in [-0.2, 0.0)$	$x \in [0.0, 0.2)$	$x \in [0.2, 0.4)$
$\Pr(I_{it}^N = 1   X_{it} = x)$	<b>0.035</b>	<b>0.029</b>	<b>0.023</b>	<b>0.021</b>
$\Pr(I_{it}^R = 1   X_{it} = x)$	<b>0.006</b>	<b>0.026</b>	<b>0.028</b>	<b>0.027</b>
$\Pr(\Delta R_{it} \neq 0   I_{it}^N = 1, X_{it} = x)$	<b>0.131</b>	<b>0.134</b>	<b>0.138</b>	<b>0.137</b>
$\Pr(\Delta R_{it} \neq 0   I_{it}^R = 1, X_{it} = x)$	<b>0.015</b>	<b>0.022</b>	<b>0.020</b>	<b>0.021</b>
$\Lambda(x)$	<b>0.005</b>	<b>0.004</b>	<b>0.004</b>	<b>0.003</b>
$h(x)$	<b>0.039</b>	<b>0.569</b>	<b>0.337</b>	<b>0.047</b>

**Intensive margin:**

$$\int \Lambda(x) h(x) dx = \boxed{0.050}$$

**Extensive margin:**

$$\int x \Lambda'(x) h(x) dx = \boxed{0.0081}$$



**Caballero-Engel's measure  
of price flexibility**

$$\lim_{\Delta \xi_t \rightarrow 0} \frac{\Delta \log R_t}{\Delta \xi_t} = \boxed{0.0581}$$

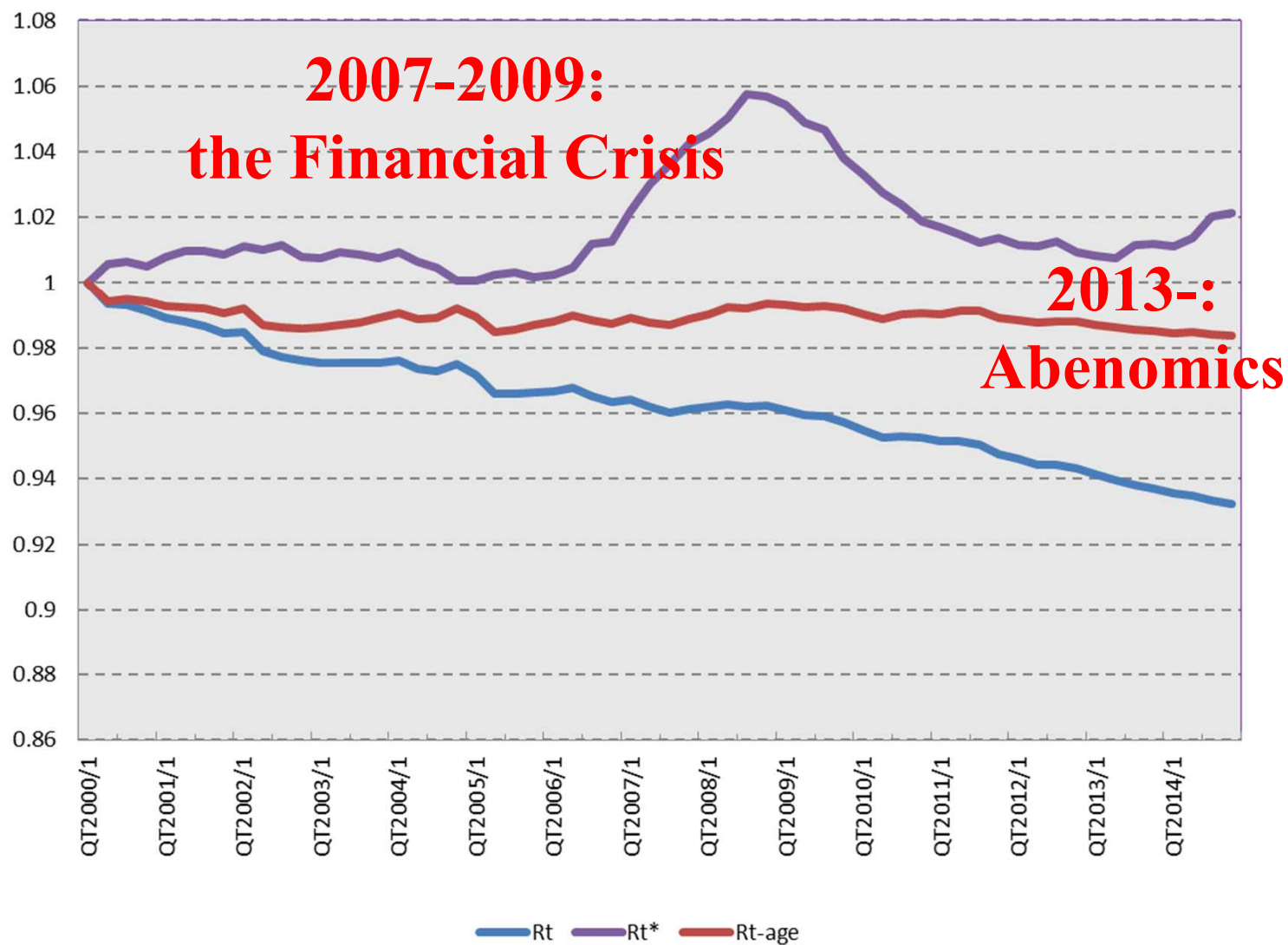
## Summary in “Sticky Housing Rent”

1. About ninety percent 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 US.
2. 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.
3. These two results indicate that both intensive and extensive margins of rent adjustments are small, resulting in a slow response of the CPI rent to aggregate shocks.

## 4. Re-estimation of CPI

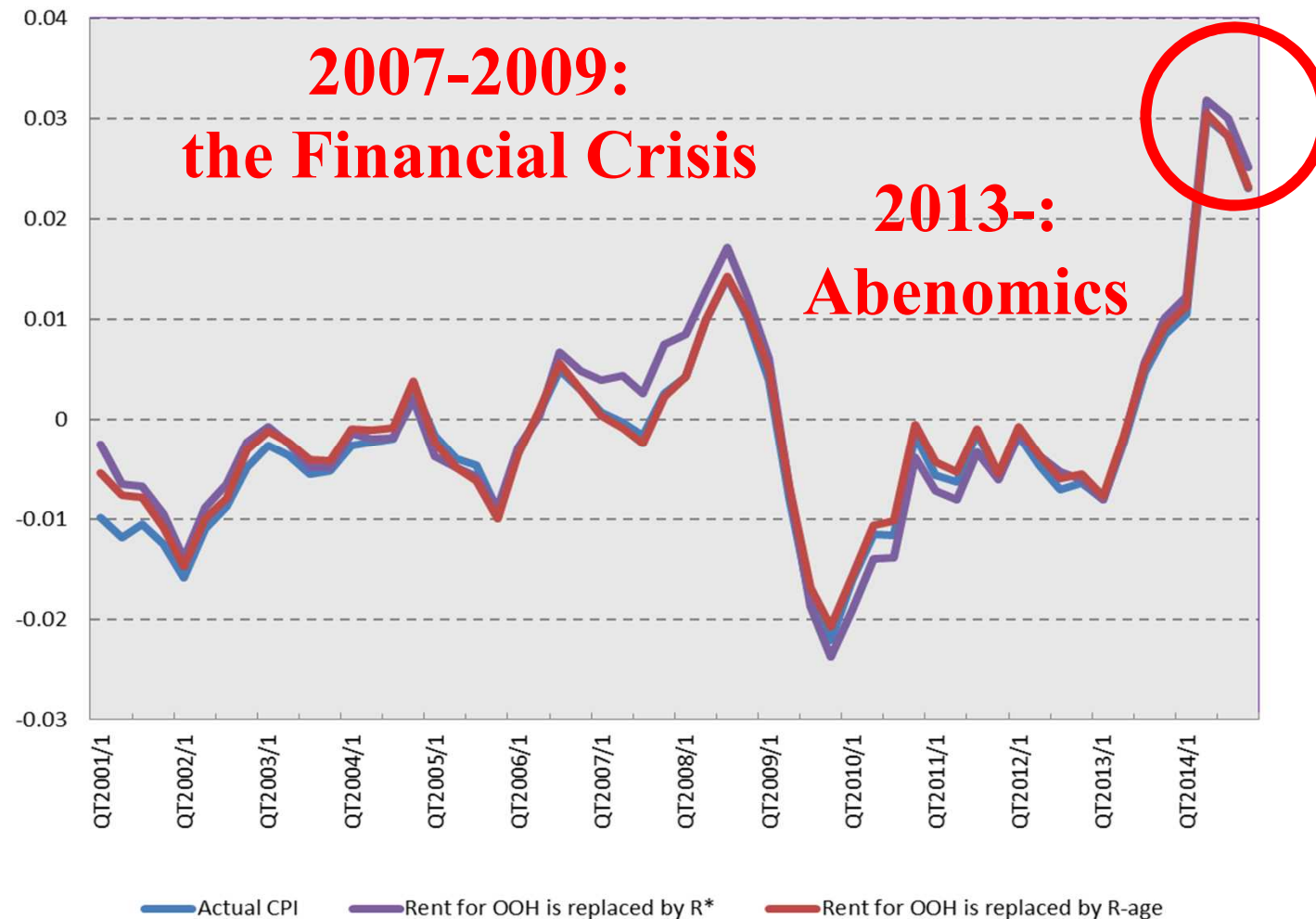
### How should we estimate CPI more linked to asset price developments?

- We have seen in the previous sections that the probability of individual rent adjustments is very low and that it depends little on price imbalances.
- These two facts imply that price flexibility in terms of the impulse response function is low, thus causing the CPI for rent to respond only slowly to aggregate shocks.
- We simplify the model.
- We replace the imputed rent for owner-occupied housing in the CPI by our estimate of the market rent  $R^*$ .
- We also replace the imputed rent for OOH by our estimate of the depreciation adjusted rent  $R\text{-age}$ .



**Figure 6: Hedonic estimate  $R_t^*$ , R-age and Actual CPI**

# Figure 7: Reestimates of CPI inflation under Rent for OOH replaced by $R_t^*$ and $R\text{-age}$





### 3. Conclusions:

- Goods and services prices, as represented by consumer price indexes and the like, have not changed all that much in response to fluctuations in asset prices.
- This lack of correlation means that management via fiscal policy and such is difficult.
- Focusing on rents,  
The obtained results showed that while rents based on new contracts change in an elastic manner, actual paid rents change only gradually, even when market shocks occur.
- In other words, average market rents, which are representative of consumer prices, have a strong tendency to change in a random manner, independently of changes in rents determined freely by the market.

### 3. Conclusions:

- Also, the rent index of actual CPI is pointed out the problems that aging depreciation is not adjusted properly. In other words, the actual CPI holds a strong downward bias due to mis-adjustment of this aging depreciation.
- However, we found that the effect of paying rent stickiness is much larger than the effect of aging depreciation.
- It is clear that the magnitude of the effect from paying rent stickiness enhances the stickiness of price index.

### 3. Conclusions:

To address with this problem, we have the following options.

- First, we can consider the price index excluding the owner-occupied housing rent for policy target. However, this way ignores the important factor of expenditure; the housing has the share from 25% to 30% in expenditure.
- Second, defining as **the opportunity cost** of homeowners, we can estimate rent index measuring the newly contracted rent instead of paying rent.
- Third one is the **user cost method** that many countries started to develop in these days.

### 3. Conclusions:

- the United Nations, IMF, OECD, BIS, and ILO have jointly put together international handbook on residential property price indices.
- Many countries in Europe finished this kind of indices and from March 2015,
- It also has been published through the test operation of three years in Japan.
- By using this index, we can estimate owner-occupied housing rent as the user cost base index.

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