On the Regional Variation of Consumer Price Levels and House Rents

by Tatsuya Ishikawa
Economic Research Group
ishikawa@nli-research.co.jp

1. Introduction

The broadest measure for measuring the standard of living is real income. When making international comparisons, we must also take into account domestic and foreign price levels. Surprisingly, however, domestic comparisons within Japan tend to overlook price level variation by region.

The greatest variation in regional prices occurs in rent for rental housing. But despite the economic importance of house rent and the rental housing market, this fact has been so obvious for so long that few people bother to check whether the variation is growing or shrinking, or what the causes are.

In this paper, we examine the price level variation by prefecture from 1980, focusing on house rent. We investigate whether the regional variation is expanding or contracting, and analyze whether variations in income and productivity play a role. Finally, we consider the implications of regional variation in house rent.

2. Consumer Price Level Variation by Prefecture

According to the *Fiscal 2002 National Survey of Prices* (Ministry of Internal Affairs and Communications), conducted every five years and containing detailed price data for goods and services by region and retail outlet, the largest price variation by prefecture occurs in the category of dwellings. If the national average is indexed to 100, the highest house rent level is 137.5 for Tokyo, and the lowest is 71.5 for Okinawa, for a multiple of 1.92 times (Figure 1). Within the category of dwelling expenses, for house rent excluding repair expense, the variation widens to 178.3 (Tokyo) and 59.1 (Okinawa), for a multiple of 3.02 times. By comparison, for overall consumer prices, the variation narrows to 108.7(Tokyo) and 92.3 (Okinawa); excluding house rent, the variation shrinks even more to 105.9 (Tokyo) and 94.8 (Miyazaki; Figure 2).

Figure 1　Prefectures with Highest and Lowest Consumer Price Levels (2002; nation = 100)

	① Highest pref.		② Lowest pref.		③=①÷②	Standard deviation
Food	Tokyo	106.0	Kumamoto	91.9	1.15	3.0
Dwelling	Tokyo	137.5	Okinawa	71.5	1.92	11.3
Utilities	Yamagata	113.2	Yamanashi	92.7	1.22	5.0
Furniture, home goods	Tokyo	106.5	Oita	93.9	1.13	2.7
Apparel	Tokyo	117.1	Shimane	83.3	1.41	6.6
Healthcare	Shimane	101.8	Fukui, Wakayama	98.2	1.04	0.9
Transport. & com.	Tokyo	111.3	Okinawa	93.3	1.19	3.3
Education	Osaka	119.0	Iwate	83.6	1.42	7.8
Culture & recreation	Kanagawa	105.3	Miyazaki	93.0	1.13	3.2
Miscellaneous	Tokushima	107.2	Aomori	89.1	1.20	4.5

Note: Standard deviation is calculated from indexed values.
Source: Ministry of Internal Affairs and Communications, *Fiscal 2002 National Survey of Prices*.

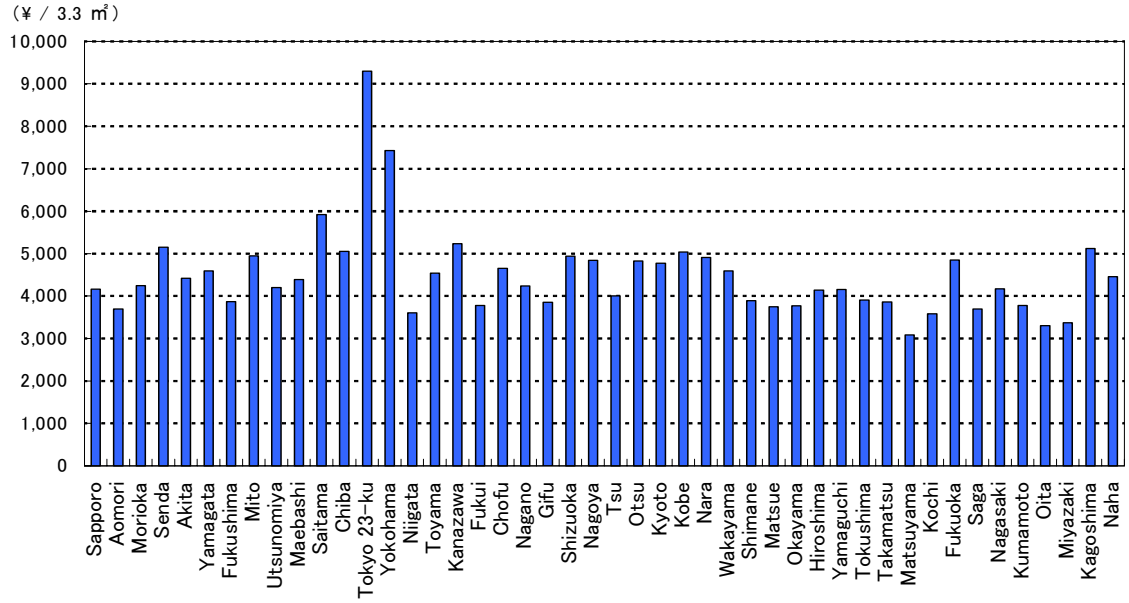
Figure 2　Variation of House Rent and Prices Excluding Rent

	① Highest pref.		② Lowest pref.		③=①÷②	Standard deviation
Overall consumer prices	Tokyo	108.7	Okinawa	92.3	1.18	2.8
Excluding rent	Tokyo	105.9	Miyazaki	94.8	1.12	2.2
Rent	Tokyo	178.3	Okinawa	59.1	3.02	21.3

Note: Standard deviation is calculated from index values.
Source: MIC, *Fiscal 2002 National Survey of Prices*.

In addition to the national survey, a separate monthly survey exists called the *Retail Price Survey,* with coverage limited to the capital city areas of each prefecture. Due in part to differences in the degree of concentration of urban functions such as government, business, culture and transportation, results differ slightly from the prefecture-wide results of the national survey. Still, the same pattern emerges—monthly house rent in the private sector ranges from a low of ¥3,037 per 3.3 square meters in Matsuyama City, to a high of ¥9,294 in the Tokyo 23-ku area, or a multiple of 3.02 times (Figure 3). The coefficient of variation is 23.1% (C.V., or standard deviation divided by mean, is used to compare variations of two or more series), which is roughly the same as in the national survey.

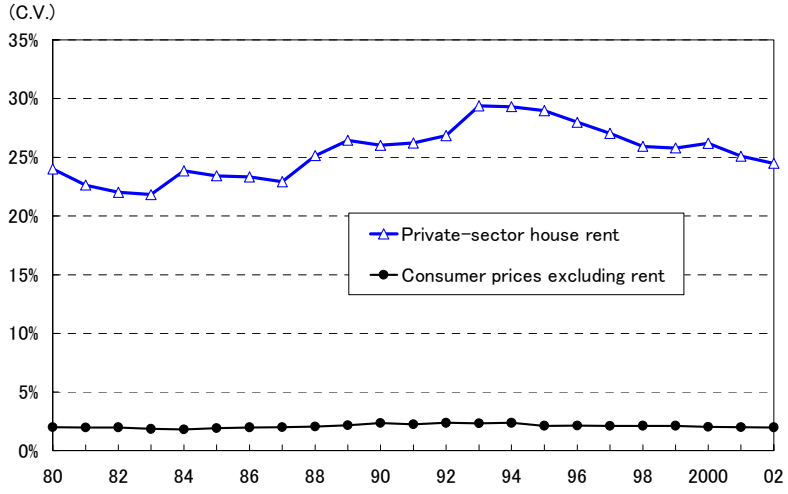
Figure 3　Private-Sector House Rent in Prefecture Capital Cities (2003)



Source: MIC, *Retail Price Survey*.

We next address the question of whether the variation in regional price levels has been growing or shrinking. Focusing on prefecture capital cities, we tracked the coefficient of variation for private-sector house rent and for price level excluding house rent from 1980 (Figure 4).

Figure 4　Coefficient of Variation of Private-Sector House Rent and Prices Excluding Rent in Prefecture Capital Cities



Source: MIC, *Retail Price Survey*.

With the recent growth of e-commerce, which empowers consumers to purchase practically any product directly from anywhere by paying modest shipping fees, we would expect to see the price variation shrink. Surprisingly, however, the variation of prices excluding house rent has consistently been near zero throughout the period covered. This is because whenever price

disparities arise, businesses seek profits from arbitrage, causing prices to converge and equalize nationwide.

In contrast, the variation in private-sector house rent has been persistently large. It started growing even larger in 1988, and surged in 1993 before gradually returning to the 1980 level by 2002.

3. Relationship Between Variations in House Rent and Land Price

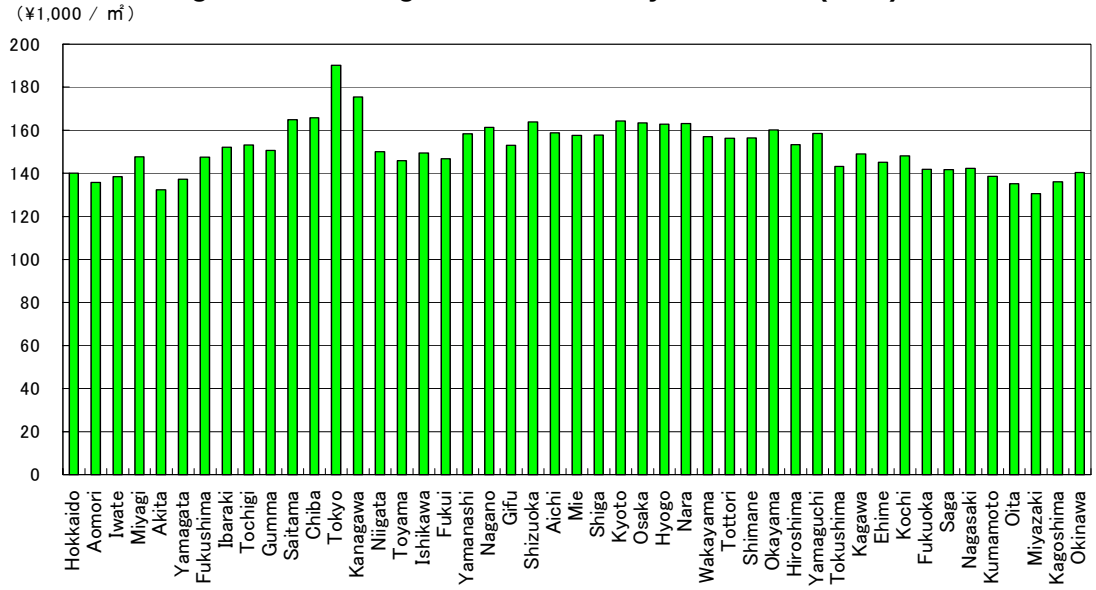
The large variation in house rent by prefecture has long been taken for granted. Moreover, its expansion from the late 1980s and subsequent contraction immediately suggests a correlation with the movement of land prices. But while variations in house rent and land price share certain characteristics, the causes are not necessarily the same.

Of course, since house rent can be defined as the price of housing services generated from housing structure and land, these prices are actually reflected in the process of supplying the services. At the same time, housing (structure and land) price reflects the future income stream generated from house rent, or from imputed rent in the case of owner-occupied homes, and land price reflects the future income stream from land rent.[1] In addition, house rent also depends on the demand for housing services in the local market.

Below we compare housing structure and land prices by prefecture. For housing structure, while climate differences affect the choice of construction materials and methods and equipment features, the variation in construction cost per square meter of floor space is small (Figure 5).

[1] This "land rent" includes not only rent from land leases, but also imputed land rent, namely, the fair value of the portion attributable to land in housing services generated by owner-occupied homes.

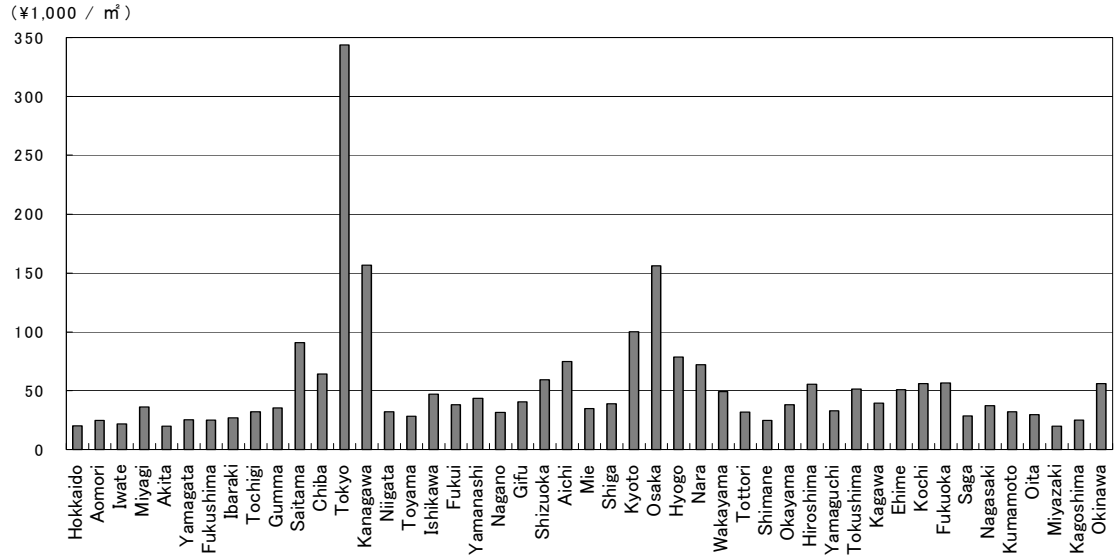
Figure 5　Housing Structure Price by Prefecture (2002)



Note: Housing price per square meter = Scheduled construction cost of housing structure ÷ floor space.
Source: Ministry of Land, Infrastructure and Transportation, *Annual of Construction Statistics*.

Obviously, then, the cause of the large variation in house rent can be attributed almost entirely to land price. At the end of 2002, Tokyo had the highest residential land price of ¥344,000 per square meter, more than double that of the next highest prefectures of Kanagawa (¥157,000) and Osaka (¥156,000).

Figure 6　Residential Land Price by Prefecture (2002)

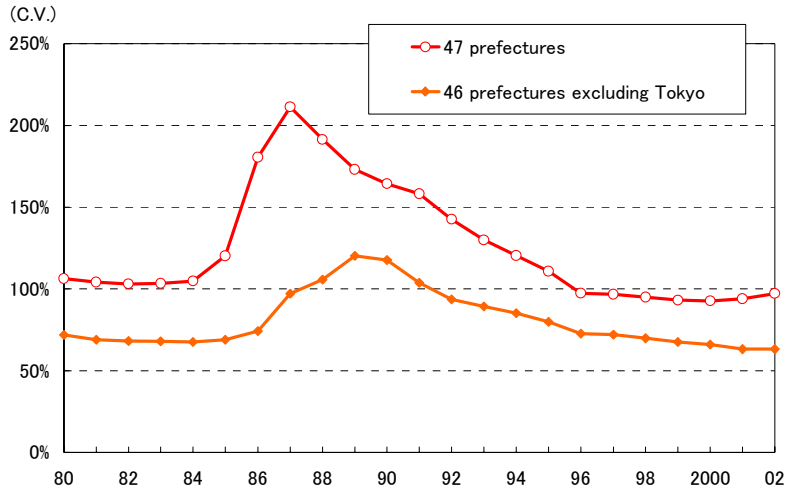


Note: Residential land price per sq. meter = Total value of residential land ÷ land area. Includes commercial land.
Sources: Cabinet Office, *Annual Report on National Accounts*; MIC, *Summary and Record of Tangible Asset Prices (for Land, by Prefecture)*.

For the 47 prefectures, the average price of residential land is ¥53,500 per square meter, the standard deviation is ¥52,000, and the coefficient of variation is 97.1%.

We next examine how the variation in land prices by prefecture changed during the land price surge from the late 1980s and persistent decline from the 1990s. In Tokyo, the land price was high from the start of the period, and not only accelerated upward ahead of other prefectures, but also plunged first. To eliminate the effect of Tokyo as an outlier, we plotted the coefficient of variation as a time series for all 47 prefectures, and also for 46 prefectures excluding Tokyo.

Figure 7　Variation of Residential Land Price by Prefecture (per square meter)



Sources: Same as Figure 6.

For all 47 prefectures, the variation starts to expand in 1985 and peaks out in 1987. It then contracts visibly until 1996, levels off from 1997 to 2000, and begins to edge up in 2001 and 2002.

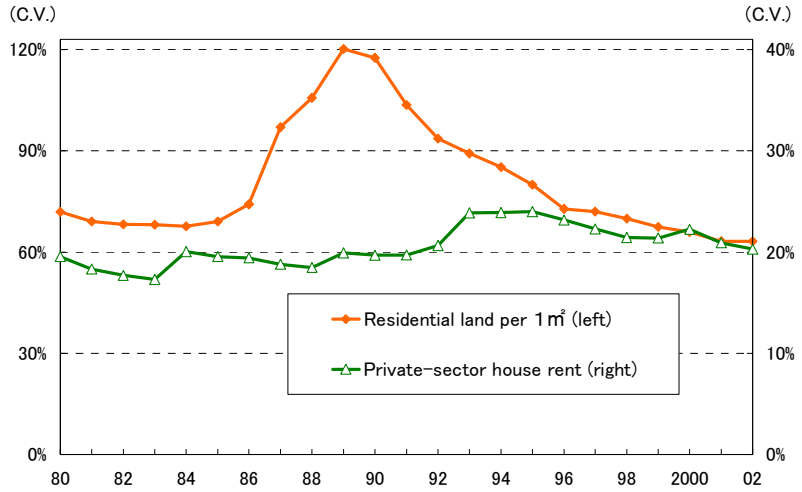
But for the 46 prefectures excluding Tokyo, the variation starts to expand at an accelerating pace in 1986, and peaks out in 1989. A visible contraction starts in 1991, which abates from 1997 but continues at a modest pace to 2002.

If land prices in all prefectures rose and fell at exactly the same rate every year, the coefficient of variation would not change over time. Interestingly, the land price variation pattern for 46 prefectures excluding Tokyo closely resembles the widely recognized pattern of land price movements during this period. Recently, the 47-prefecture variation has deviated again from this land price pattern because the pace of decline in Tokyo-to has slowed in recent years.[2]

We compared regional variation trends in private-sector house rent against land price for the 46 prefectures excluding Tokyo (Figure 8).

[2] In land price data for 2004, land prices have turned upward not only in Tokyo but at the city block level in some municipalities. In the past, the direction of regional land price movements was assumed to conform to national trends, and changes in regional land price variation were attributed to disparities in the speed of adjustment. However, a new pattern of regional variation is now emerging.

Figure 8　Variation of House Rent and Land Price by Prefecture (excluding Tokyo)



Sources: Same as Figure 6.

Clearly, even when we exclude Tokyo as an outlier, private-sector house rent and land price show divergent patterns. Whereas house rent represents the current market price of housing services, land price is derived from the discounted present value of the future income stream from land rent and the corresponding portion of house rent. Thus a fair land price based on fundamentals represents the expected future income from house rent and land rent. However, the regional variation in private-sector house rent continued to expand in the mid 1990s after the economy was already entrenched in recession. This could not have been correctly anticipated by the expanding land price variation of the late 1980s and early 1990s. Of course, the land price surge in the late 1980s and subsequent decline can be interpreted as a deviation from fundamentals during the rise and collapse of the "bubble." But we must also consider the possibility that special factors affected private-sector house rent.

4.　Explaining House Rent Variation with Variation in Income and Productivity

Whether for goods and services or house rent, prices are determined by demand and supply conditions in the market. For the 46 prefectures excluding Tokyo, the variation in private-sector house rent remained stable from 1984 to 1992, but actually expanded from 1993 to 1995, and then contracted but at a modest pace. This pattern could reflect demand side movements in each prefecture's rental housing market, and the annual trend in income variation by prefecture.

One possible cause is that unlike the price comparison goods and services, which have the same quality nationwide, the comparison of house rent overlooks differences in the quality of housing services by prefecture.

Even in the same neighborhood, the quality of otherwise identical rental housing can vary depending on characteristics such as distance to the nearest train station, noisiness, amount of sunshine, and type of frontage. And even if all of these factors could somehow be standardized, house rent levels would still differ by city and prefecture.[3] Different cities and prefectures offer different urban amenities, business opportunities, job opportunities, natural environment, and climate and weather conditions. Thus house rent represents a current overall evaluation of the dwelling and these location-specific features.

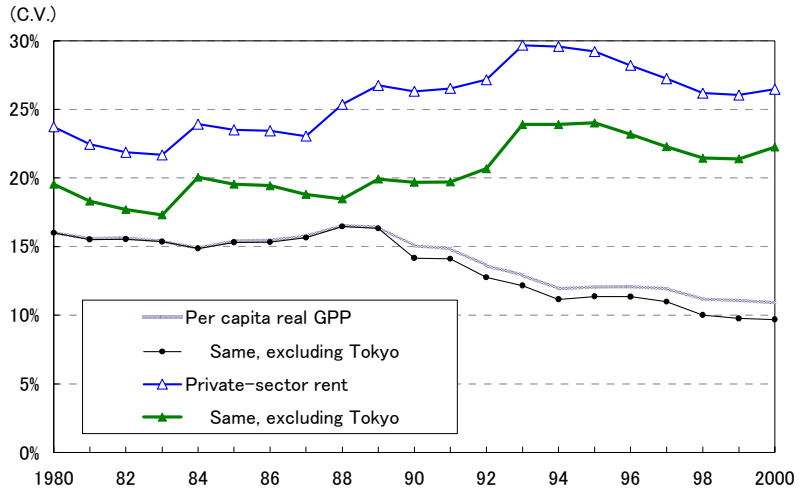
To take another example, consider beverage prices for coffee, juice, beer or wine. These beverages differ in quality, and people's preferences for them vary as well. Nonetheless, the market makes an overall evaluation that reduces this diversity into unit prices. The same applies to house rent. Of course, a comparison of house rent per unit floor area, if limited to a particular locale and adjusted for quality, might be as meaningful as a price comparison of similar goods. However, differences in the quality of housing services by prefecture cannot be captured simply by calculating house rent per unit area.

Moreover, qualitative differences by prefecture are by no means fixed. For example, Tokyo emerged as an international financial center and productivity expectations grew in the mid 1980s. In other regions, differences often widen owing to the development of urban infrastructure and quality of life infrastructure. Thus relative relationships can change in the quality of living, level of urban amenities, and overall productivity growth or deterioration.

A key indicator of both real income and overall productivity is per capita real gross prefectural product (GPP). We calculated the coefficient of variation in per capita real GPP for each year, and plotted this against the coefficient of variation of private-sector house rent (Figure 9).

[3] Naturally, this discussion also applies to land price.

Figure 9　Variation of Productivity and House Rent by Prefecture

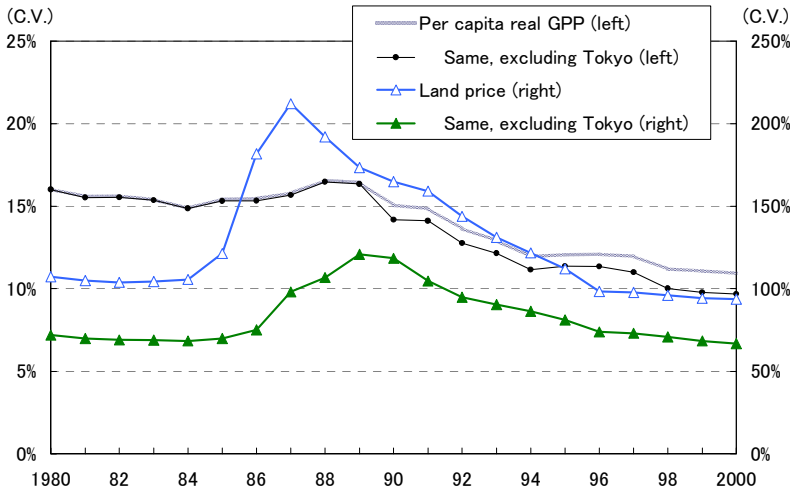


Note: To calculate coefficient of variation, productivity is derived as follows: real GPP (at 1990 prices to fiscal 1989, and at 1995 prices from fiscal 1990) is divided by number of employed persons in the prefecture.
Source: Cabinet Office, *Annual Report on Prefectural Income*.

As the graph clearly shows, the pattern of per capita real GPP variation differs from that of private-sector house rent.

Empirical studies in the U.S. and Japan indicate that over the long term, income clearly tends to converge. However, Japan during the 1980s was an exception—variation in income and productivity actually expanded in a period when urban productivity improved or was expected to improve due to concentration. However, no correlation is seen with private-sector house rent variation even during this exceptional period.

Figure 10　Variation of Productivity and Land Price by Prefecture



Source: Same as Figure 6.

In fact, productivity variation actually has more in common with the pattern of land price variation (excluding Tokyo; Figure 10).

Having eliminated the obvious possibilities, what remains is the possibility that factors peculiar to the rental housing market are causing the variation in private-sector house rent.

5. Conclusion

Using data from 1980 forward, we confirmed that the variation of consumer price level by prefecture is almost nonexistent, except for one important category— house rent. The variation in house rent reflects qualitative differences by prefecture in factors such as urban amenities, business opportunities, and job opportunities. However, house rent variation shares few similarities with variations in land price or productivity, although the latter two also reflect these qualitative differences.

The persistence of house rent variation by prefecture does not appear to be caused by the absence of penetration of market mechanisms, since we can see movements in local house rent levels as well as in the variation itself. Other factors that may play an intricate role include the favorable tax treatment for owner-occupied homes, which increases the user cost of investment in rental housing, and disparities in local vacancy rates for rental housing.

However, the speed at which house rent levels adjust does seem slow compared to the prices of goods and other services, which are determined in the goods market, and to land prices, which reflect expected future income streams from land and are determined in the asset market. Even land price movements and their regional variation—which many casually attribute to the rise and collapse of the “bubble”—are more closely correlated to the performance of the real economy. We believe there are particular factors that can explain the level and movement of regional house rent variation. Further research is needed to clarify this relationship.

Today, 40% of all households are renters, while current homeowners are also potential renters should their circumstances change in the future. Companies that once boasted generous employee benefit programs are also scaling down company housing in the process of business restructuring. And with many people seeking better housing to meet changing needs, a large latent demand exists for rental housing in the same commuting area, or in another prefecture in case of a job change or retirement.

For all these reasons, it is imperative that we carefully analyze the trend in house rent variation by prefecture, and examine the implications therein.