May 23, 2014

NEWS & RELEASE

For further inquiry please contact:
Xymax Real Estate Institute
Phone: +81 3-5544-6640 FAX: +81 3-5544-6641
info-rei@xymax.co.jp

Good Earthquake-Resistant Buildings Generate Higher Income: Statistical Study Explains

Based on the analysis of correlation between environmental performance and income

The real estate market is increasingly focusing on the environmental performance of properties. Various recently-started environmental certification programs also show such trends. However, how environmental performances influence the income had remained unclear. The income from the property is generally estimated based on factors such as location, size and building age.

Xymax Real Estate Institute therefore collaborated with the laboratory of Dr. Naoki Katoh, Professor at Graduate School of Engineering, Kyoto University, to analyze the correlation between the environmental performance and income of office buildings based on the statistical method. We used the data of tenant-occupied office buildings in Tokyo and its income obtained from Xymax Group's real estate services.

Key Points

1) This study aims to examine the correlation between each environmental factor and income. The environmental analysis is based on the scores derived from the CASBEE for Market Promotion.
2) In order to reflect the actual real estate market conditions in our analysis to the extent possible, we have included not only large-size buildings but also small- and medium-size buildings.
3) Two types of data are applied as indicator of the income: "Rent of New Lease" and "Rental Income"

Key Findings

- Earthquake Resistance (one of the environmental performance factors) has a Positive Influence to the Income.
- Before/after comparison proved that Correlation between Earthquake Resistance and Income became more evident after Great East Japan Earthquake.

This report is prepared by Xymax Real Estate Institute based on "Analysis of Correlation between Environmental Performance and Income of Office Buildings in Tokyo" by the laboratory of Dr. Naoki Katoh, Professor at Graduate School of Engineering, Kyoto University.

Evaluation of Environmental Performance

We used CASBEE for Market Promotion as our tool to evaluate the environmental performance of properties. CASBEE, which stands for Comprehensive Assessment System for Built Environment Efficiency, is an evaluation system co-developed by an industry-government-academia collaboration group headed by the Ministry of Land, Infrastructure, Transport and Tourism. CASBEE for Market Promotion is a tool based on CASBEE and was developed in 2012 to promote the use of the system by real estate market participants. For this study, we have scored each of the environmental factors based on this tool and used the scores in the analysis.

The list of evaluation items is provided at the end of this report.

Method of Analysis

A combination of various factors including location, size and age of the building is considered to influence the income generated from tenant-occupied properties. To make clear the relation between such factors and income, we have developed a statistical model by using the multi-regression analysis, generalized linear model and structure equation model.

Please refer to Figure 1 for the details of subject properties and data used in the analysis.

Figure 1: Outline of Analysis

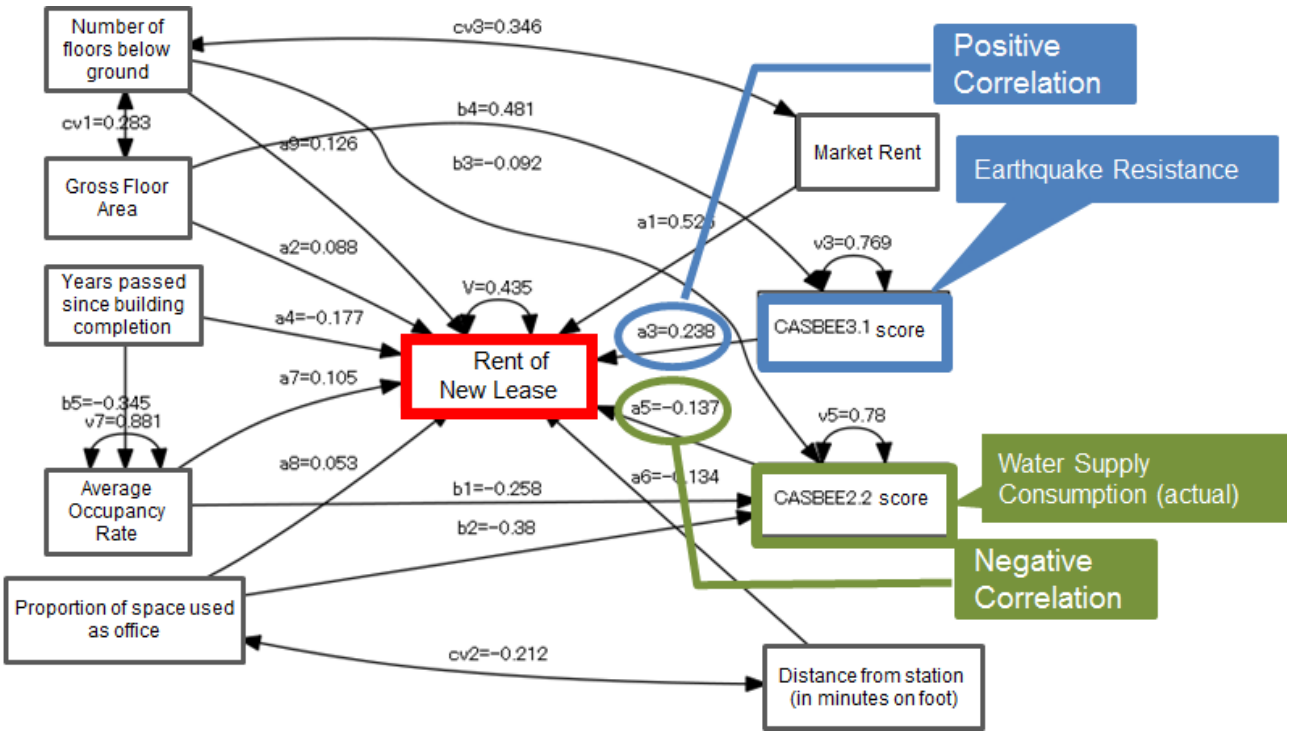
Subject Property
176 buildings with valid data from typical tenant-occupied office buildings in Tokyo under management by Xymax Group Location: Tokyo Average Gross Floor Area: 2,422 tsubo (approx. 8,000 sqm) (1 tsubo = approx. 3.3 sqm) Average Building Age: 22.5 years
Subject Data
Income Data Rent of New Lease (Jan. 2009 – May 2013) Estimated by dividing the rent by the floor area of newly-agreed contract. Rental Income (Jan. 2009 – Aug. 2013) Estimated by dividing the rental income (incl. CAM charge, excl. storage/parking area) by the net rentable area. Occupancy Rate & Occupied Floor Area in Tsubo (Jan. 2009 – Dec. 2012) Average Market Rent (Jan. 2009 – Mar. 2013) Market Vacancy Rate (Jan. 2009 – Mar. 2013) Building Data Number of Floors (above/below ground, total), Ceiling Height, Gross Floor Area, Typical Floor Area, Years Passed Since Building Completion, Electrical Power Capacity, with or without Optical Cable, with or without Raised Floor, conducted or not conducted Overall Renovation, Air Conditioning System (central/individual/floor-by-floor), Number of Parking Lots, Size of Elevator Car, Distance from Station (in minutes on foot) Environmental Performance Data Scores derived from CASBEE for Market Promotion, Primary Energy Consumption (basic unit), Water Supply Consumption (basic unit) Identity of Tenants Type of Business of the tenant based on industry classification in Japan, Type of Use (as office or other purpose), Number of Office Workers per tsubo.
Analysis Method
Multi-regression Analysis, Generalized Linear Model, Structure Equation Model

Analysis Results

The model we obtained from the analysis methods shows relations between income and several other data including environmental performance. Figure 2 is one of the typical models obtained in our analysis.

Of the environmental factors, a positive correlation between income and scores related to earthquake resistance of the building and a negative correlation between income and scores related to water supply consumption were observed.

Figure 2: New Lease Rent Estimation Model



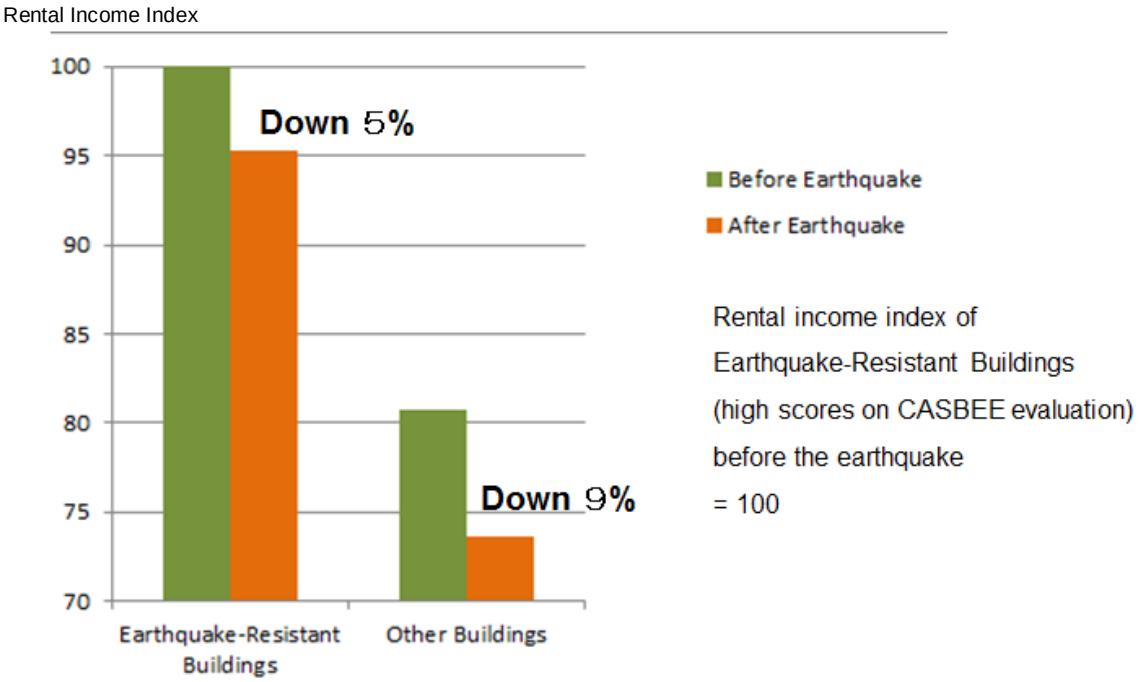
The CASBEE evaluation gives high marks to buildings with seismic mitigation system or seismic isolation system or to buildings that satisfy the above-standard seismic capacity (estimated by multiplying the level stated in the Building Standards Acts by the relevant rate). Our analysis made it clear that the buildings with high marks on earthquake resistance achieved higher rent than the buildings with low marks. This correlation has also been observed in Rental Income Estimation Model, but New Lease Rent Estimation Model shows a stronger correlation between income and earthquake resistance.

The CASBEE evaluation of water supply consumption tends to give relatively low marks to buildings with a high occupancy level because actual water supply consumption increases along with the volume of activities operated in the building. However, we have included the occupancy rate in our model shown in Figure 2, and differences in the occupancy rate are considered. Nevertheless, the model still shows a negative correlation, indicating there are apparently some other factor, which is not covered in our analysis, influencing the correlation.

In order to obtain an accurate model, we have excluded some factors that are considered not necessary for the purpose of our study.

Furthermore, we compared the average rental income of good earthquake-resistance buildings and other buildings before and after the Great East Japan Earthquake and found a distinct difference as shown in Figure 3. During the analysis period (2009-2012), the overall real estate market suffered falling income affected by the uncertainty after the fund bubble, but good earthquake-resistance buildings experienced only a small decline.

Figure 3: Rental Income Before & After Great East Japan Earthquake



Our research report “Office Disaster Prevention Survey 2013” released last year based on the tenant survey conducted by Xymax Real Estate Institute also shows over 90 percent of office tenants think seismic capability of the building is important when choosing office space.

Office Disaster Prevention Survey 2013
http://www.xymax.co.jp/english/research/release/131011.html

Conclusion

Our analysis based on quantitative data confirmed the correlation between income generated from tenant-occupied office buildings and one of the environmental performances, earthquake resistance. This correlation turned stronger after the Great East Japan Earthquake, reflecting the change of mind of office occupiers. In contrast, not much correlation between income and other environmental performances was observed so far from this study. The impact of environmental performances of buildings on income may become more apparent as more evaluation systems are introduced and occupiers gain more interests in environmental aspects of the building they use.

Xymax Real Estate Institute will continue to study and analyze a wide range of factors influencing the income generated from tenant-occupied properties.

Reference: List of CASBEE for Market Promotion Evaluation

Category 1: Energy and greenhouse gases	
Required item	Compliance with the energy-saving standards, target setting, monitoring, management/operation system
1.1. Estimated consumption/emission (basic unit)	Comparison with the estimated annual primary energy consumption for a typical building
1.2. Actual consumption/emission (basic unit)	Level of actual annual primary energy consumption for a typical building
1.3. Natural energy	Ratio of use of green energy
Category 2: Water	
Required item	Target setting, monitoring
2.1. Estimated water consumption	Level of estimated amount based on water volume capacity of the water supply equipment
2.2. Actual water consumption	Level of annual actual water supply consumption (basic unit)
Category 3: Use of resources and safety	
Required item	Building constructed under new seismic standards, or, buildings after reinforcement to achieve IS 0.6+ (current seismic capacity), or buildings with reinforced columns to achieve below IF 1.0 (risk of building collapse).
3.1. Earthquake resistance, etc.	Percentage of addition to the requirements stated by Building Standards Act With or without seismic mitigation/isolation system
3.2. Ratio of use of recycled materials	Use of recycled materials in the building structure and other construction materials
3.3. Useful life of building structure materials	Durability of building structure materials
3.4. Replacement cycle of main equipment, increase self-sufficiency, equipment management and maintenance	Replacement cycle of main equipment, number of projects to improve self-sufficiency (electric power, etc.), number of projects related to environment in management and maintenance of equipment
Category 4: Biodiversity and land	
Required item	Specified foreign species, undetermined foreign species and suspicious foreign species shall not be used in the building.
4.1. Improve biodiversity	Number of effective projects to improve biodiversity.
4.2. Soil environment Redevelopment of brownfield	Dealing with the soil contamination countermeasure law
4.3. Proximity to public transportation	Distance from public transportation (train station or bus stop) in minutes on foot.
4.4. Measures to prevent risk of natural disaster	Number of risk of natural disasters based on hazard map. Countermeasures.
Category 5: Indoor environment	
Required item	Building environmental and sanitary management standards
5.1. Use of daylight	Size of windows/entrance to let in natural light Installment of daylight devices
5.2. Natural ventilation system	Openable/closable windows for natural ventilation
5.3. View	Ceiling height, with/without windows that can provide enough information from outside.

Source: Prepared by Xymax Real Estate Institute based on “CASBEE for Market Promotion: Point of View and Guideline” (Institute for Building Environment and Energy Conservation)