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# **Determinants of Potential Seller/Lessee Benefits in Sale–Leaseback Transactions**

**Noriko Ashiya**

Faculty of Real Estate, Meikai University, 1, Akemi, Urayasu-shi, Chiba-ken 279-8550, JAPAN, Phone: (81) 47-355-5120, FAX: (81) 47-350-5504, E-mail: nashiya@meikai.ac.jp

The purpose of this paper is twofold. First, it formulates a model to explore the criteria for making decisions on sale–leaseback (SLB) actions, which can be an alternative to off-balance-sheet financing. The theoretical findings show that the knowledge of the buyer/lessor of low-cost property management is a primary factor in favor of SLB, which is in line with previous studies. Secondly, it quantifies this factor to explore the possible application of SLB schemes to Japanese public real estate (PRE) markets. The validity of this quantification method is also shown by using data from a tax-exempt Japanese PRE portfolio. The empirical findings of ANOVA and multiple comparison tests suggest that if we only have cost information and know the age of the buildings on the property, we can make decisions with regard to SLB actions; these findings reveal an institutional environment that is unique to Japan.

### **Keywords**

Sale–Leaseback; Public Real Estate; Accounting Change; User Cost; Public–private Partnership

## 1. Introduction

In modern real estate finance literature, it is accepted as fact that the current development of international accounting standards is leaning toward a situation in which the use of off-balance-sheet finance through financial leases is becoming more difficult. In observing this, Louko (2004) points out that obtaining off-balance-sheet finance cannot be the main reason for real estate sell-offs; i.e., in the context of sale-leaseback (SLB) transactions, proposed financial restrictions on the use of leasing would require the seller/lessee to reexamine SLB benefits to offset possible impacts on off-sheet financing (see the practitioner literature, e.g., Mattson-Teig, 2011; Thomas, 2011). Furthermore, academic contributions find evidence of SLB benefits that come from factors other than the leasing or the sales component of the transaction (see for e.g., Grönlund et al., 2008; Sirmans and Slade, 2010; Wells and Whitby, 2012); the literature also provides theoretical explanations of the difference between direct leases and SLBs, or the lease that occurs subsequent to the sale of the same property (see Grenadier, 2005). However, the criteria for making decisions with regard to SLBs, which can be an alternative to off-sheet financing, have not yet been examined within a rigorous economic framework.

The purpose of this paper is twofold. First, it formulates a model to explore alternative criteria for making decisions with regard to SLBs by using this model to identify a primary factor that may determine the potential seller/lessee benefits. Secondly, it quantifies this factor. The paper also tests whether the applied quantification method can be considered valid.

Our theoretical findings show that buyer/lessor knowledge of low-cost property management is a primary factor in favor of SLBs. This is in line with previous studies (see for e.g., Lewis and Schallheim, 1992; Benjamin et al., 1998; Richard, 2003). By using a data set for a representative city in the National Capital Region, this paper estimates the value of this knowledge for each public property. The data show that about 10% of the buildings in the public real estate (PRE) portfolio are suited for SLBs. Furthermore, the results of analysis of variance (ANOVA) tests reveal an institutional environment that is unique to Japan. Specifically, if we only have cost information plus the age of the building on the property, we can make decisions with regard to SLBs for Japanese PRE portfolios. The results of multiple comparison tests also support the findings.

Note that the data set comprises tax-exempt properties. In Japan, this means exemption from capital gains, income and property taxes. By national law, a local government or the owner of the PRE does not need to pay those taxes (see Corporation Tax Act 2-1-5 for capital gains and income taxes; see Local Tax Act 348-1 for property taxes). Our model omits these tax factors. However, if there were taxes, continued ownership would shield the owner

from capital gains taxes. An increase in capital gains taxes would work against the potential seller/lessee in entering into an SLB.

Our paper also focuses on SLB user costs, whereas a more traditional approach considers wealth effects, which, of course, would be the present value of said user costs. The merit of our approach comes from the nature, or the definition, of user costs. That is, the user cost is the implicit rent, which is defined as the expected real cost of using a unit of property; this term (user cost) defines the cost of using a unit of property, regardless of ownership. More precisely, whether the property is owned (on-sheet) or sold/leased (off-sheet) does not influence the magnitude of this cost. Recall that the current development of international accounting standards may involve such an on-sheet/off-sheet issue. The new accounting rules would require that a net-lease transaction be treated as a sale and subsequent lease only if the risk and benefits of ownership actually transfer to the purchaser; otherwise, the lease is ignored, and the transaction is treated as a loan (see, for e.g., Mattson-Teig, 2011). Accordingly, we formulate the benefits of SLBs for the user cost, which is not influenced by this issue.

Another issue is how we calculate costs, income, net operating income (NOI), and capitalization rates for public properties that do not generally generate rental income, such as community centers, libraries, museums, schools, welfare facilities, fire stations, and government office buildings. For costs and income, we can use the publicly available data: the sample city records cost and income data for almost every property, as well as the building-by-building physical characteristics of the PRE portfolio. For NOI and capitalization rates, we use the estimates detailed in Appendix 1. As Sirmans and Slade (2010) note: “By definition, SLB properties are owner-occupied prior to the sale; therefore the net income is forecast rather than historical” (p. 239).

## 2. Literature Review

In a PRE setting, we examine the tax-exempt seller/lessee, namely, Japanese local government authorities (LGAs). In contrast, Elayan et al. (2006) examine the tax-exempt seller/lessee in the context of real estate investment trusts; their purpose is to explore leasing motives other than those based on tax benefits. Grönlund et al. (2008), by using a pan-European data set, suggest that the release of hidden values, or the sale element of SLBs, brings about an increase in the share price. On the role of the sales component, Brennan (1990) has reached similar conclusions. A recent study by Sirmans and Slade (2010) extends the previous findings on valuation effects; they find evidence of the increase in the sale price of SLB-structured commercial property transactions. Note that their theoretical base is provided by Grenadier (2005), who notes that the SLB transaction has two components: the setting of a sale price and the setting of lease terms.

Sirmans and Slade (2010) add an analysis on market efficiency to support their findings. For further evidence on market efficiency, see, for e.g., Clayton (1998). For a corresponding study of the price premium, see, for e.g., Attebery and Rutherford (1993) and Hardin and Wolverton (1999). Related analyses use the hedonic approach: see, for e.g., Saderion et al. (1994), Des Rosiers and Theriault (1996), and Berry et al. (2003). Wells and Whitby (2012) provide evidence that suggests liquidity needs and capital constraints are SLB motivators. Furthermore, Whitby (2013) examines the cumulative abnormal returns around the announcements of SLBs; he also offers an overview of previous studies of the market responses to SLB transactions.

As for tax effects, Slovin et al. (1990), Alvaay et al. (1995), and Ezzell and Vora (2001) quantify the tax advantages of SLBs; they explore the trend of the seller/lessee's share value. Fisher (2004) presents evidence that taxation by itself does not favor the seller/lessee; he shows that in a case in which a sale is combined with a shorter period of leaseback, SLBs as a whole may offset the possible negative impacts of the taxation change.

Before the lease-accounting change became an issue, Redman and Tanner (1991) conducted a survey to determine how executives finance real estate, and the criteria used to make lease and purchase decisions. Their surveys of corporate real estate executives include research into the use and evaluation of SLB arrangements. Nourse and Roulac (1993) suggest that we can achieve effective real estate decisions only if we make the link between a specific real estate transaction and the real estate strategy of a corporation.

Further note that practitioners suggest that an SLB transaction allows an LGA to use the capital that would otherwise remain locked up in the property that it holds, without additional bond issues or tax burdens. Pollina (2010) points out that SLBs have proven effective in plugging budget gaps and increasing bond ratings and capacity. Scanlon (2009) points out that public companies are more likely to use SLBs; he highlights not only advantages, but also disadvantages to the business and the investor.

Our present study concludes that the knowledge of the buyer/lessor, or benefits from the property outsourcing professional, work as a primary factor in favor of SLBs. Richard (2003) pays attention to buyer/lessor expertise in professionally operating its real estate holdings; this would be expected to lower the corporate risk and the corresponding cost of debt. Lewis and Schallheim (1992), too, suggest the importance of this kind of ability to lower the risk and interest rate. Benjamin et al. (1998) examine the abilities of property owners and property managers to eliminate free-rider problems, exploit economies of scale, and specialize in valuation, maintenance and disposal of commercial property as a key rationale for real estate leasing. However, Rutherford (1990) suggests that the buyer/lessor would suffer an insignificant loss by entering into an SLB.

The user costs that we focus on also relate to cash flows. Previous studies have focused on the relation between SLBs and the cash flow situation of the seller/lessee. Adams and Clarke (1996) find negative market reactions to SLBs in the UK and conclude that the stock market treats SLBs as an indication of the poor cash flow situation of the seller/lessee. Liow (1997) presents a converse relation between SLBs and the value of the firm. Allen et al. (1993) suggest that the positive valuation effects of SLBs are consistent with increased cash flows.

### 3. Theory for Alternative SLB Criteria

#### 3.1 User Cost Model

In the simplest case –a world with no taxes and perfect markets –the cost of using a unit of real estate for a specified period has three components: interest, capital gains, and all other cost components (see, for e.g., Gillingham, 1983). That is, the user cost is defined as the opportunity cost of holding and using the property (interest costs plus all other costs) less the increase in its value (capital gains).

All other costs in general include the depreciation cost of using the property. Even in the case in which the owner does not sell the property, the owner still suffers a loss equivalent to this cost. The book value of the property will decrease year by year.

To examine the effects of SLBs on the user cost, we suppose that operating costs, such as fuel and maintenance, are included in the “all other costs” component. These costs as a whole can be increased or decreased in accordance with the knowledge of the owner. An owner who knows how to eliminate free-rider problems, exploit economies of scale, and specialize in the valuation, maintenance, and disposal of commercial property (see, for e.g., Benjamin et al., 1998) can decrease these parts of the user cost. Simply put, if the knowledge of the buyer/lessor differs from the knowledge of the seller/lessee, then the user cost during the leaseback period must be different from the cost before one enters into an SLB. This idea is examined below by formulating a user cost model.

#### 3.2 Before-SLB User Cost

Equation (1) is the formula for the user cost in the current state (Before-SLB User Cost). To obtain this, we modify the simplest formula, which has the said three components, to highlight the knowledge of the seller/lessee ( $KNOWLEDGE_{seller}$ ):

$$USERCOST_{beforeSLB} = g * PRICE - \Delta PRICE + (d * PRICE + KNOWLEDGE_{seller} * PRICE) \quad (1)$$

where:

$USERCOST_{beforeSLB}$  = before-SLB user cost (the cost of using a unit of real estate per year before the seller/lessee enters into an SLB);

$g$  = market interest rate (the value of  $g$  lies in the range  $0 \leq g \leq 1$ );

$PRICE$  = price per unit of the property;

$d$  = depreciation rate (the value of  $d$  lies in the range  $0 \leq d \leq 1$ );

$KNOWLEDGE_{seller}$  = knowledge of the seller/lessee (an indicator that measures the abilities of the seller/lessee to enhance cost efficiency in property management – the smaller the indicator, the more efficient the seller/lessee);

$\Delta PRICE$  = capital gains per unit of property.

Note that the knowledge variable is specified as an indicator that measures the abilities of the seller/lessee to enhance cost efficiency in property management. In other words, the value of  $KNOWLEDGE_{seller}$  represents the amount of knowledge of the original owner. If the owner can operate the property more cheaply, then the value of  $KNOWLEDGE_{seller}$  becomes smaller; the value varies according to whether the owner decreases, increases, or maintains that part of the user cost. We suppose that this part of the user cost equals the knowledge variable ( $KNOWLEDGE_{seller}$ ) times the value of the property ( $PRICE$ ), i.e.,  $KNOWLEDGE_{seller} * PRICE$ .

The first term ( $g * PRICE$ ) represents whether the opportunity cost of owning the property is worth the  $PRICE$  value. If the same money was put into a different investment, the owner could have earned at least the interest. The owner is giving up the opportunity to earn  $g (\times 100)$  % of the principal ( $PRICE$ ), i.e.,  $g * PRICE$ .

The second term ( $\Delta PRICE$ ) represents the unrealized capital gains in the property that one holds. To obtain the user cost of the property, we should subtract the increase in its value.

The third term (set of round brackets) represents all the other cost components. In the brackets, the first term, i.e., depreciation ( $\delta * PRICE$ ), is one of the greatest costs that the property owner faces. From the perspective of the buyer/lessor, depreciation is also a major consideration. A change to less favorable depreciation rules works against their benefit. The second component ( $KNOWLEDGE_{seller} * PRICE$ ) is supposed to be the total of the operational costs for the property that one holds. Of course,  $PRICE$  affects both costs, i.e.,  $\delta * PRICE$  and  $KNOWLEDGE_{seller} * PRICE$ .

Recall that in a Japanese PRE setting, we can ignore the role of taxes in the SLB decision; the owner (the government) is a tax-exempt entity and therefore exempt from property, capital gains and income taxes.

### 3.3 After-SLB User Cost

After the SLB occurs, the seller/lessee pays a new user cost (After-SLB User Cost). Equation (2) is the formula for this new cost. The new variable (*RETAIN*) is one which mirrors the characteristics of an SLB. Unlike the situation in general sales, here the seller/lessee can retain, we suppose, *RETAIN*( $\times 100$ ) % of the ownership. Therefore, we modify Equation (1) by including the portion of the retained ownership of the property sold and leased as:

$$USERCOST_{afterSLB} = [g * PRICE + d * PRICE + KNOWLEDGE_{buyer} * PRICE] - [RETAIN * \Delta PRICE + (1 - RETAIN) * \Delta PRICE] \quad (2)$$

where:

$USERCOST_{afterSLB}$  = after-SLB user cost (the new cost of using a unit of real estate per year after the seller/lessee enters into an SLB);

$KNOWLEDGE_{buyer}$  = knowledge of the buyer/lessor (an indicator that measures the abilities of the buyer/lessor to enhance cost efficiency in property management; the smaller the indicator, the more efficient the buyer/lessor);

*RETAIN* = portion of property sold and leased for which ownership is retained (the value of *RETAIN* lies in the range  $0 \leq RETAIN \leq 1$ ).

The first term on the right-hand side in Equation (2) (first set of square brackets) represents the leaseback fee per unit of the property. If the SLB is structured with a triple-net lease, then the seller/lessee pays all expenses associated with the property. The first component ( $g * PRICE$ ) is the net rent, which equals the opportunity cost, which the owner perceives as the cost of ownership. The second component ( $d * PRICE$ ) is the depreciation cost. The third component ( $KNOWLEDGE_{buyer} * PRICE$ ) is the operating cost, which is dependent on the knowledge of the new property owner.

The second term (second set of square brackets) represents the capital gains by type. The seller/lessee can benefit from both the non-sale and sale of the property. A non-sale generates unrealized capital gains, i.e.,  $RETAIN * \Delta PRICE$ ; a sale generates realized capital gains, i.e.,  $(1 - RETAIN) * \Delta PRICE$ .

Equation (2) shows that whether the property is owned or sold-and-leased neither increases nor decreases the cost of using a unit of the property. In other words, whether the property is on-sheet or off-sheet does not affect the user cost. The unrealized and realized capital gains cancel each other out; therefore, they have no effect on the user cost of the property.

### 3.4 Seller/Lessee Benefits

Equation (3) shows the benefits of the SLB transaction for the user cost of the property; the benefits come from the difference between the Before-SLB User Cost and the After-SLB User Cost. Thus, we subtract the user cost that the potential seller/lessee pays before it enters into an SLB ( $USERCOST_{beforeSLB}$ ) from the user cost that the same seller/lessee pays after it enters into an SLB ( $USERCOST_{afterSLB}$ ):

$$\Delta(USERCOST) = (KNOWLEDGE_{buyer} - KNOWLEDGE_{seller}) * PRICE \quad (3)$$

where:

$\Delta USERCOST$  = SLB effects on the user cost (if effective, the SLB decreases the user cost and  $\Delta USERCOST < 0$  holds).

Recall that a smaller value of  $KNOWLEDGE$  means slower total operating costs ( $KNOWLEDGE * PRICE$ ); i.e., in the model, the owner with more expertise has a smaller value of the  $KNOWLEDGE$  variable. Then, Equation (3) shows that the seller/lessee benefits depend on the additional knowledge of the buyer/lessor.

On the right-hand side in Equation (3), the first set of round brackets ( $KNOWLEDGE_{buyer} - KNOWLEDGE_{seller}$ ) represents the difference in knowledge between the buyer/lessor and the seller/lessee. Generally speaking, the seller, who is not a real estate professional, is less able to lower the value of  $KNOWLEDGE_{seller}$ . If a real estate professional can create such differences, then the condition ( $KNOWLEDGE_{buyer} - KNOWLEDGE_{seller} < 0$ ) holds in Equation (3).

This suggests that the seller/lessee can benefit from the SLB if the buyer/lessor is able to lower the cost of utilizing the property. In terms of user costs, our theory suggests that the SLB decision depends in large measure on the knowledge of the buyer/lessor.

Counter intuitively, depreciation does not affect the benefits of an SLB, or the SLB effects on user cost. This finding rests on the fact that the model is structured with triple-net leases. A triple-net lease allows the buyer/lessor to pass on the depreciation costs (and all other costs associated with the property) to the seller/lessee. The model thus neutralizes the effects of possible changes in the depreciation rules that may otherwise work for or against the seller/lessee or the buyer/lessor.

Note that if the seller/lessee is a private entity, tax law changes matter with regard to the SLB decision. All lease payments are counted as tax deductible, but if the lessee owns the same property, only the interest portion of the debt



payment is counted as such (see, for e.g., Henderson, 2011). Capital gains taxes are more relevant. Equity that is tied up in the appreciated property motivates the owners to enter into an SLB (see, for e.g., Hunsaker, 2012; Mueller, 2012; Smith, 2012); an increase in the capital gains tax would work against the sale. In the case in which the private owner enters into the SLB, it can use the capital trapped in the underperforming property, and use the amount equal to the tax saving.

## 4. Possible Application of SLB Decision Criteria to Japanese PRE Market

### 4.1 Methodology to Quantify Knowledge

To use the obtained criteria for practical decisions on SLB actions, we need to measure the knowledge of the buyer/lessor. The method of this quantification must be consistent with the attitude of the seller, which in general is sensitive to the increase in the fiscal budget. A plausible assumption for this is that this knowledge depends on the abilities of the buyer/lessor to reduce her or his property costs.

The seller should also explain his or her reason for adopting the SLB scheme. For this, we set another assumption: that the government adopts the SLB only if it does not involve an extra expense. Note that, in this case, the SLB does not impose additional taxes on citizens; instead, it caps the benefit to the buyer/lessor, as Figure 1 shows.

In Figure 1, Panel B shows that NOI, or the benefit to the buyer/lessor, would increase the size of the government's budget. Panel C shows that, other things being equal, the buyer/lessor should cut the costs of property management so that it can ensure NOI. We suppose that this cost cut can be achieved with the use of knowledge. Panel A shows the current cost, which includes  $PROPCOST_{beforeSLB}$ , which we use as the basis for the measurement.

Given the above, we define knowledge as Equation (4) below.

$$KNOWLEDGE (\%) = \frac{ADDTAX}{PROPCOST_{beforeSLB}} \times 100 \quad (4)$$

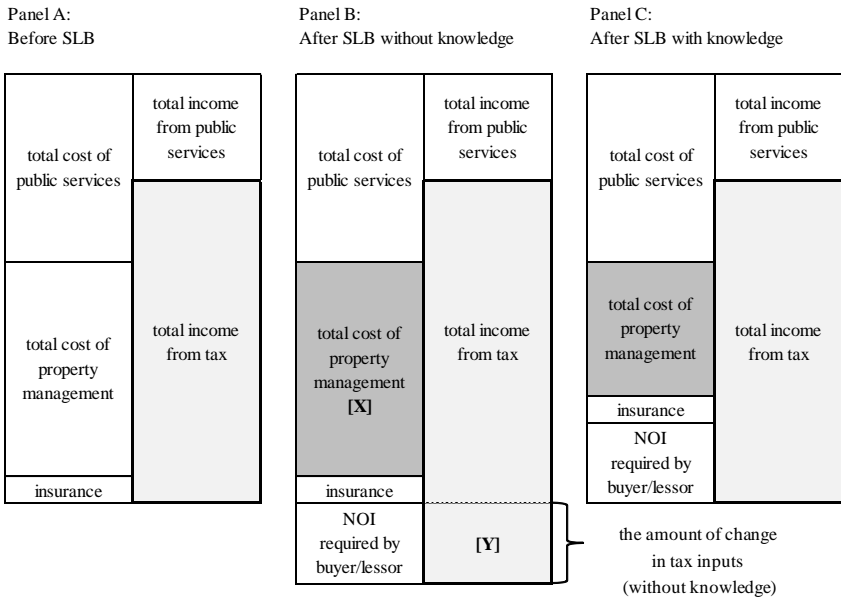
where:

$KNOWLEDGE (\%)$  = the percentage of the property cost reduction required for the buyer/lessor to motivate the seller/lessee to proceed with the SLB;

$ADDTAX$  = the possible amount of additional tax that an SLB imposes on the government's citizens;

$PROPCOST_{beforeSLB}$  = the before-SLB total property cost (the total cost of property management before the seller/lessee enters into an SLB).

**Figure 1** Income and Expense Account of Representative City



**Note:** Method of quantifying knowledge: the change in tax inputs (without knowledge), or NOI, divided by the total cost of property management prior to SLB, i.e.,  $\text{knowledge} = [Y]/[X](\ast 100\%)$ .

On the right-hand side of Equation (4), the data of  $PROPCOST_{beforeSLB}$  are publicly available. This cost, in other words, represents the current cost, which we use as the basis for the measurement. We can calculate  $ADDTAX$  by using the income and expenditure account, shown in Figure 1. For this, we first estimate  $NOI$ ; Appendix 1 explains the estimation method. Then, we adjust the said costs to obtain Additional Tax Required for the SLB, or  $ADDTAX$  in Equation (4). That is, in the case in which the property is operated by the private entity under a public-private partnership, the city pays the commission fees instead of the cost of operating the property. However, the fees are not exactly the same as the total cost of the same property; therefore, we adjust for this difference.<sup>1</sup> Simply put, Equation (4) represents the government’s fiscal constraint and clarifies the rate of cost reduction required to ensure that the SLB does not increase the property cost of each building. Equation (4) quantifies the knowledge that the seller/lessee, or the government, requires for each building. We make the assumption that the government only adopts the SLB if it does not involve an extra expense. Unlike the case in an open

<sup>1</sup>If the commission fee is greater than the total property cost, we use the commission fee instead of the property cost. Specifically, the Net Operating Income that we present equals the cost before the adjustment, and Additional Tax Required for SLB equals the cost after the adjustment.

market, in a PRE case, we first need to clarify the value of knowledge for each property. Subsequently, in light of the abilities of the buyer/lessor, we can determine whether the building is suited for an SLB.

The value or the degree of knowledge varies from building to building. We divide buildings into three groups, depending on whether the buyer/lessor can decrease the total property cost by 0% to 10% (Group 0), 10% to 20% (Group 1), or more than 20% (Group 2). Group 0 buildings are “Best Suited for SLB”. Group 1 buildings are “Possibly Suited for SLB”, while Group 2 buildings are “Not Suited for SLB”.

## 4.2 Data

To explore the distribution of knowledge, we use PRE data for 482 community centers, libraries, museums, theaters, gymnasiums, recreation facilities, schools, welfare facilities, city hall and government office buildings, fire stations, cleaning centers, and health care centers in Saitama City, a representative Japanese city, at the end of fiscal year 2010, on 31 March 2011.<sup>2</sup> Among the 11 cities in Japan with a population of over 100 million, Saitama City discloses the most detailed information in its PRE portfolio, from which we can expect to obtain meaningful evidence. In addition, everyone can freely access this information via the Internet. The area of Saitama City is over 53 thousand acres, and it is located about 15 miles north of central Tokyo. In the same region, some other cities, including Fuchu, Fujisawa, Musashino, Narashino, and Tachikawa, are now disclosing or preparing to disclose their PRE data, but their data are not currently as available as those for the sample city. Demographic characteristics are similar across all these cities, and resemble those of our sample city.

The data used in this paper are a subset of a larger dataset that included approximately 700 buildings of 28 types, of which complete information was available for 405. The original dataset included 77 buildings for which information on land area was lacking; however, we have included them in our data set, as the land area itself does not have a direct influence on the estimated level of knowledge. Five buildings for which Saitama City has already adopted some kind of complex, but strategically effective management scheme, are excluded from the data set. For technical reasons, the buildings located at cemeteries and used for funeral-related activities, and a planetarium building, are excluded from the original dataset.

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<sup>2</sup> We thank Saitama City for their generous assistance with the data. For details on the PRE management by this city, see the Saitama City website at <http://www.city.saitama.jp>. Saitama City is ready for property disposals, but only if such disposals are expected to improve the state of PRE management.

The data set comprises tax-exempt properties. As explained earlier, every LGA in Japan is exempt from capital gains, income and property taxes. Note that an SLB transfers the ownership of the property from the tax-exempt government to a private company, which should pay taxes. If the SLB is structured with triple-net leases, it requires the seller/lessee to pay an amount equivalent to the property taxes. The seller, or the government, thus seems to lose its tax-exempt status if it enters into the triple-net lease. However, in a practical sense, the seller government is still exempt from property taxes. Simply put, property tax is a local tax under Japanese legislation, and therefore the seller (government) itself will collect the property taxes once it has paid for the leased property, thus neutralizing this cost.

Table 1 provides descriptive statistics of the data for the total sample. U.S. units of measurement are adopted to allow for easy comparison with corresponding studies (e.g., a study on private real estate SLBs in seven southwest U.S. cities by Sirmans and Slade (2010)). The original sample used the metric system of measurement. This paper has applied the following conversions: 1 square meter = 10.752 square feet (1 square foot = 0.093 square meters), and 1 square meter = 0.000247 acres (1 acre = 4,047 square meters). Yen is also converted into U.S. dollars at  $\text{¥}1 = \$0.0125$  ( $\$1 = \text{¥}80$ );  $\text{¥}80$  per dollar is near the record-high level of  $\text{¥}75.32$  per dollar in Tokyo on 31st October 2011. Thus, we should point out that the prices in the sample could be seen as the highest prices possible from the viewpoint of a foreign investor.<sup>3</sup>

In Table 1, Panel A shows the physical characteristics (floor area, building age, land area, and floor area ratio) for the total sample. Panel B shows the cost descriptions (total cost of property management, total cost of public services, total income from public services, total income from tax, and additional tax income required for the SLB) for the total sample. Note that Net Operating Income in Panel A and Additional Tax Required for SLB in Panel B are quite similar. This suggests that the commission fees, which represent the property costs under public-private partnerships, are approximately equivalent to the current property costs, which represent the property costs under the direct management of Saitama City. We can simplify the analysis by using Net Operating Income instead of Additional Tax Required for SLB.

In Table 1, Sale Price ranges from \$143,963 to \$153,000,000. These prices are estimates based on book values and the rule of depreciation that Saitama City adopts; they can be different from the current market values of the same properties. Sirmans and Slade (2010) show that an SLB transaction occurs at about a 13.86% premium compared with non-SLB transactions. If we consider fiscal accountability and transparency, sale prices must be equal to or higher than book values; if the sale price is below the book value, it generates

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<sup>3</sup>Note that from August 2010 to December 2012, the monthly average U.S. dollar value of the yen moved between  $\text{¥}75$  and  $\text{¥}84$  per dollar. From October 2010 to November 2012, the mean exchange rate was approximately  $\text{¥}80$  per dollar.

**Table 1 Descriptive Statistics for PRE Portfolio**

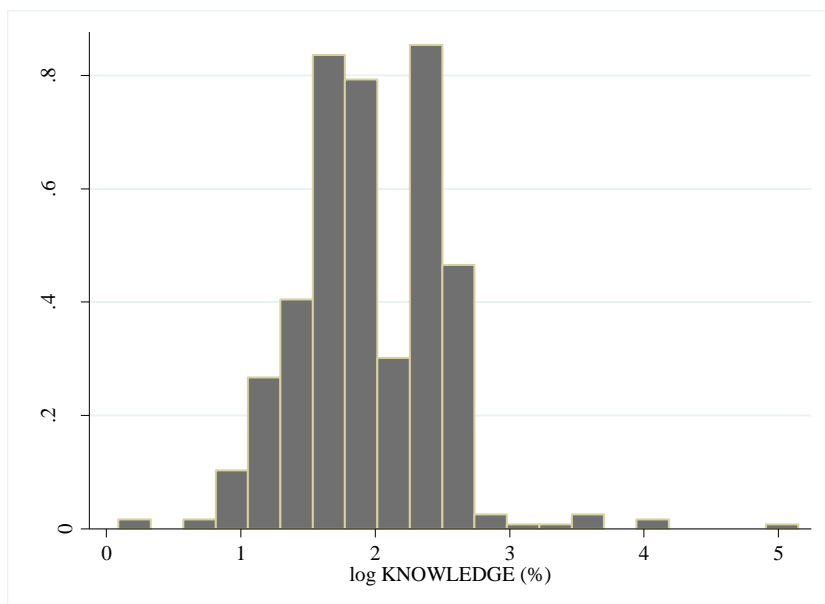
Panel A: Physical Characteristics of Each Public Building					
Variable	Obs.	Mean	Std. Dev.	Minimum	Maximum
Sale Price	482	\$8,279,783	\$13,100,000	\$143,963	\$153,000,000
Price Per Square Feet	482	\$321	\$1,336	\$28	\$28,735
Net Operating Income	482	\$301,475	\$423,259	\$4,640	\$5,903,238
Capitalization Rate (%)	482	3.97%	2.73%	1.67%	25.00%
NOI Per Square Feet	482	\$9.53	\$33.29	\$1.78	\$718.38
Floor Area (Sq. Feet)	482	41,635	46,638	376	341,591
Building Age (Years)	482	28	13	0	56
Land Area (Acres)	405	2.85	5.14	0.02	84.28
Floor Area Ratio	405	0.64	0.77	0.01	8.69
Panel B: Cost Descriptions of Each Public Building					
Variable	Obs.	Mean	Std. Dev.	Minimum	Maximum
Total Cost of Property	482	\$480,231	\$1,955,223	\$30	\$27,700,000
Total Cost of Public Services	482	\$1,380,365	\$3,068,263	\$10,343	\$39,000,000
Total Income from Public Services	482	\$154,515	\$835,902	\$0	\$14,000,000
Total Income from Tax	482	\$1,711,010	\$3,836,155	\$11,968	\$45,300,000
Additional Tax Required for SLB	482	\$302,599	\$423,064	\$4,640	\$5,903,238

capital losses, which means losses to the citizens. In other words, the only motivation of a city to enter into an SLB is for the capital gains. Where the book value of the SLB property is higher than its market value, the seller/lessee will have to accept this premium to ensure that the SLB occurs. Thus, our data, based on book values, reflect the terms and conditions that the buyer/lessor will have to accept.

### 4.3 Distribution of Knowledge

The distribution of knowledge at the end of fiscal year 2010 is illustrated in Figure 2. This is a density function of  $\log KNOWLEDGE$  (%). The log transformation helps to make  $KNOWLEDGE$  (%) more normally distributed.

**Figure 2** Distribution of Knowledge at End of Fiscal Year 2010



*Note:* The vertical axis shows probability density; the horizontal axis shows  $\log KNOWLEDGE$  (%).

As Table 2 shows, among the 482 buildings in our final sample, 11 buildings (about 2.3% of the total) are classified as Group 0 or “Best Suited for SLB”; 36 buildings (about 7.53%) as Group 1 or “Possibly Suited for SLB”; and the remaining 435 buildings as Group 2 or “Not Suited for SLB”.

**Table 2** Descriptive Statistics for Knowledge (%)

	Knowledge (%)	Obs.	Mean	Std. Dev.	Minimum	Maximum
Group 0	0%–10%	11	6.54	2.93	1.23	9.36
Group 1	10%–20%	36	14.13	2.62	10.06	19.66
Group 2	knowledge > 20%	435	572.81	6,798.48	20.27	140,578.00
Total		482	518.16	6,459.93	1.23	140,578.00

*Note:* The full sample comprises 482 observations. Group 0 (knowledge 0%–10%, Best Suited for SLB) has 11 observations. Group 1 (knowledge 10%–20%, Possibly Suited for SLB) has 36 observations. Group 2 (knowledge >20%, Not Suited for SLB) has 435 observations.

#### 4.4 Validity of Applied Quantification Method

To check the validity of the applied knowledge quantification method, which is based only on the building-by-building cost description plus the age of the property, we use ANOVA and multiple comparison tests. The evidence shows that physical characteristics are not crucial criteria for making decisions on SLBs. As far as Japanese PRE portfolios are concerned, if we only have cost information plus the age of the building, we can make decisions about SLBs.

Table 3 shows the results of the ANOVA tests. In general, the sample buildings are very similar across most physical characteristics.

A comparison of the three groups yields interesting similarities in Sale Price, Price Per Square Feet, Capitalization Rate, NOI Per Square Feet, Building Age, Land Area, and Floor Area Ratio. In Panel A (Physical Characteristics of Each Building) of Table 3, only two items, i.e., Net Operating Income and Floor Area, have different means. We can see that the significance level of Net Operating Income is 0.0279 ( $<0.05$ ) and that of Floor Area (Sq. Feet) is 0.0037 ( $<0.05$ ). There are significant differences in the mean Net Operating Income and Floor Area. Note that these two items influence after-SLB property cost; thus, we can suggest that, even though the differences between these two items are statistically significant, it does not mean that the samples are, in fact, physically different.

Simply put, a difference in the Total Cost of Property, shown in Panel B, mirrors the differences in Net Operating Income and Floor Area, shown in Panel A. Panel B also shows the differences in Total Income from Tax and Additional Tax Required for the SLB. In general, the samples are very different across the cost items. We can see that the significance level of Total Cost of Property is 0.0000 ( $p=0.000$ ), which is below 0.05, Total Income from Tax is 0.0000 ( $<0.05$ ), and Additional Tax Required for SLB is 0.0264 ( $<0.05$ ).

The results of the multiple comparison tests, shown in Table 4, support the findings above. In Panel A, we cannot find statistically significant differences in Net Operating Income. We see that all the significance levels for Net Operating Income between the three pairs of groups are above 0.05. In Panel E, we see that all the significance levels for Additional Tax Required for SLB are above 0.05; nor are there any significant differences in the mean additional tax. Even for Floor Area, we cannot find any difference between Groups 0 and 1, or between Groups 0 and 2. In Panel B, we see that the significance levels for Floor Area (Sq. Feet) are 1.000 ( $>0.05$ ) and 0.120 ( $>0.05$ ), respectively. In contrast, Total Cost of Property differs between the same two pairs of groups. In Panel C, we see that the significance levels for Total Cost of Property for the two pairs are both 0.000 ( $<0.05$ ). In Panel D, we see similar trends in Total Income from Tax.



**Table 3 Results of ANOVA for Japanese PRE Portfolio**

Panel A: Physical Characteristics of Each Building						
Variable	Mean			F-value	Prob>F	
	Group 0	Group 1	Group 2	Difference Between Groups		
	Best Suited for SLB	Possibly Suited for SLB	Not Suited for SLB			
Sale Price	\$4,479,585	\$6,321,663	\$8,537,932	0.95	0.3863	
Price Per Square Feet	\$261.84	\$230.66	\$330.17	0.10	0.9022	
Net Operating Income	\$100,829	\$160,720	\$318,197	3.60	0.0279	
Capitalization Rate (%)	2.81%	3.23%	4.06%	2.55	0.0793	
NOI Per Square Feet	\$7.03	\$6.78	\$9.82	0.17	0.8435	
Floor Area (Sq. Feet)	14,808.00	21,926.00	43,944.00	5.68	0.0037	
Building Age (Years)	23	26	29	2.33	0.0988	
Land Area (Acres)	8.29	3.08	2.76	2.90	0.0562	
Floor Area Ratio	0.74	0.68	0.64	0.08	0.9268	
Panel B: Cost Descriptions of Each Building						
Variable	Mean			F-value	Prob>F	
	Group 0	Group 1	Group 2	Difference Between Groups		
	Best Suited for SLB	Possibly Suited for SLB	Not Suited for SLB			
Total Cost of Property	\$3,740,021	\$1,107,011	\$345,928	19.57	0.0000	
Total Cost of Public Services	\$2,623,158	\$2,167,464	\$1,283,798	2.31	0.0999	
Total Income from Public Services	\$85,457	\$441,056	\$132,548	2.32	0.0998	
Total Income from Tax	\$6,277,722	\$2,833,420	\$1,502,641	10.37	0.0000	
Additional Tax Required for SLB	\$100,829	\$160,720	\$319,443	3.66	0.0264	

*Note:* The gray highlighted areas mean that the  $p$ -value is less than 0.05.

Conversely, between Groups 1 and 2, we find statistically significant differences in Floor Area ( $p=0.020$ ); the  $p$ -value is below 0.05. However, compared to the  $p$ -values that indicate the differences in the Total Cost of Property ( $p=0.000$ ), i.e., two of the gray highlighted areas in Panel C, the  $p$ -value for the Floor Area between Groups 1 and 2 ( $p=0.020$ ), i.e., the gray highlighted area in Panel B, is much larger; the samples are thus expected to be similar across the mean Floor Area. Given this, we conclude that the results of multiple comparison tests support those of the ANOVA tests.

Note that Table 4 shows the results of the multiple comparison tests with the Bonferroni correction. We can easily find that multiple comparison tests with other types of adjustments, e.g., Scheffe and Sidak corrections, produce similar results.

**Table 4 Results of Multiple Comparison Tests (Bonferroni) for Japanese PRE Portfolio**

Panel A: Comparison of Net Operating Income by Knowledge Group		
Row Mean – Col Mean	Group 0	Group 1
Group 1	59,892 1.000	
Group 2	216,384 0.279	156,492 0.098
Panel B: Comparison of Floor Area (Sq. Feet) by Knowledge		
Row Mean – Col Mean	Group 0	Group 1
Group 1	7,118 1.000	
Group 2	28,996 0.120	21,877 0.020
Panel C: Comparison of Total Cost of Property by Knowledge		
Row Mean – Col Mean	Group 0	Group 1
Group 1	-2633010 0.000	
Group 2	-3393650 0.000	-760,640 0.061
Panel D: Comparison of Total Income from Tax by Knowledge		
Row Mean – Col Mean	Group 0	Group 1
Group 1	-3444303 0.025	
Group 2	-4772707 0.000	-1328404 0.128
Panel E: Comparison of Additional Tax Required for SLB by Knowledge		
Row Mean – Col Mean	Group 0	Group 1
Group 1	59,892 1.000	
Group 2	217,632 0.273	157,741 0.093

**Note:** The gray highlighted areas mean that the  $p$ -value is less than 0.05.

This is why the applied knowledge quantification method is considered to be valid. We only need to add the information on the age of the building, and then we can complete the cost descriptions needed for this quantification method. Net Operating Income and Additional Tax Required for SLB are confirmed to be similar. We can therefore use Net Operating Income, which we can easily estimate by using the age of a building, instead of the amount of additional tax required for the SLB. Given the above, we re-define knowledge as Equation (5) below.

$$KNOWLEDGE (\%) = \frac{NOI}{PROPCOST_{beforeSLB}} \times 100(5)$$

Note that the similarities in the total cost of public services and total income from public services are consistent with Figure 1 (Income and Expenditure Account of the Representative City). Figure 1 illustrates the case in which the total cost of public services is greater than the total income from public services; this pattern in income and expense structure would be expected for all the buildings in the sample PRE portfolio.

## 5. Conclusion

While the literature suggests the need for alternative SLB decision criteria, they have not yet been examined in a rigorous economic framework. Our paper formulates a model of the benefits of SLBs for reducing the user cost of real estate, and uses the model to show that the knowledge of the buyer/lessor is a primary factor in favor of SLBs; this finding is in line with previous studies. By using a data set of a Japanese PRE portfolio, which is exempt from tax by national law, our paper quantifies knowledge. The data show that about 10% of the PRE buildings are suited for SLBs. Given the results of the ANOVA tests, the buildings can be considered similar across most physical characteristics. In contrast, the same results also suggest that the buildings differ across most cost descriptions. Net Operating Income and the Amount of Additional Tax Required for SLBs are confirmed to be quite similar. This suggests that we can simplify the knowledge calculation formula, or Equation (4), by substituting Net Operating Income for the Amount of Additional Tax Required for SLBs; the new formula is Equation (5). As explained in Appendix 1, in the case in which the seller/lessee can completely transfer the obsolescence risk of the property to the buyer/lessor, we can estimate NOI based on only the age of the building and the annual depreciation expense.

Simply put, the findings of this paper reveal an institutional environment that is unique to Japan. Specifically, if we only have cost information plus the age of the building, we can make decisions about SLBs – as far as Japanese PRE portfolios are concerned. The results of multiple comparison tests also support this conclusion.

We suggest that our method of analysis will apply to any similar city in Japan. The Japanese postwar policy framework of the Comprehensive National Development Plan defines the directions for constructing infrastructures, such as housing, cities, roads, airports, and so forth, throughout Japan. The findings from our representative city data set can therefore be extended to the whole nation.

The Japan-specific institutions will limit the application of our findings, but our method, specifically, the creation of our data set, has the merit of creating a stereotype of Japanese PRE portfolios scattered nationwide. Another merit of our method is easy access to the original PRE data for even overseas real estate professionals, which allows easier use of our knowledge quantification method. This also allows every buyer/lessor easier entry to Japanese PRE markets.

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## Appendix 1                      Capitalization Rates and NOI for Public Properties

We estimate capitalization rates and NOI with Equations (A1)–(A3) below:

$$CAP = \frac{1}{YP} = \frac{1}{LIFE - AGE} \quad (A1)$$

$$PRICE = DEP \times (LIFE - AGE) \quad (A2)$$

$$NOI = CAP \times PRICE \quad (A3)$$

where:

*CAP* = capitalization rate;

*YP* = year's purchase in perpetuity;

*LIFE* = useful life in years;

*AGE* = building age in years;

*PRICE* = sale price;

*DEP* = annual depreciation expense; and

*NOI* = net operating income.

Equation (A1) is the formula for the capitalization rate. The denominator on the right-hand side represents the remaining useful life of the building. We assume this life to be equal to or no longer than the leaseback period. In this case, the seller/lessee, or the government, can completely transfer the obsolescence risk of the SLB property to the buyer/lessor. The seller/lessee can also benefit from the SLB, which works as an effective tool for managing risks on the asset that it holds. Note that our assumption about the leaseback period will overstate the case, but has the merit of characterizing governments as risk averse. This assumption is also consistent with the constraint on the change in expenses for the property.

The sample city records the age of the building in years (*AGE*). For the useful life of the building in years (*LIFE*), the city publicly reports that they set the useful life for each building at 60 years. Thus, we can simplify Equation (A1) by substituting 60 for the *LIFE* of the property, i.e.,  $CAP = \frac{1}{60 - AGE}$ .

Equation (A2) is the formula for the sale price (*PRICE*). The formula is based on the straight-line depreciation method; the sample city reports that it adopts this depreciation method. To obtain the value of the sale price (*PRICE*), we multiply the annual depreciation expense (*DEP*) by the remaining useful life ( $60 - AGE$ ). Note that the sample city records the depreciation expenses for its property portfolio as a whole, not for individual buildings. However, the city estimates the depreciation expenses for each property, so we substitute this value into Equation (A2) to estimate the sale price.

Equation (A3) is the formula for the NOI. We multiply the capitalization rate (*CAP*), estimated by Equation (A1), by the sale price (*PRICE*), estimated by

Equation (A2), to obtain the NOI (*NOI*). Note that both the capitalization rate (*CAP*) and the sale price (*PRICE*) are estimates, not observations; this does not contradict Sirmans and Slade (2010). To estimate these two, we use age (*AGE*), life (*LIFE*), and depreciation (*DEP*), which are publicly available. Recall that Saitama City sets *LIFE* at 60 years, therefore we only need to have cost information or *DEP*, and the *AGE* to estimate *NOI*.