Strategic Management in the Age of

'Liquid' Real Assets

by

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Introduction

How will asset market trends, in conjunction with the rapid growth of Real Estate Investment Trust (REIT), affect corporate strategies? After a long interval since the creation of REITs in the U.S. in 1960, Japan joined the global REIT market in 2001; later, other major countries without publicly traded real estate investments joined, and have, by now (2013), set REIT legislation in place. The spread of listed property markets in particular is likely to change the scope of assets that could be seen as financial assets; through the use of their assets as collateral, companies can transform any property into cash flows or financial assets. Thus to understand the modern corporate strategies, the implications of evolving securitization markets must be understood.

This dissertation has two parts. The first part adds enhancements to traditional corporate strategies: a) the use of sale-leaseback schemes for effective property management; b) macroeconomic forecasts under the assumption of perfect real estate liquidity. Furthermore, the second part develops the study on cartels, which highlights successful product differentiation as a fundamental source of competitive advantage.

The following is a summary of these two parts. The first part consists of two research papers, i.e., Ashiya (2013a) “Determinants of Potential Seller/Lessee Benefits in Sale-Leaseback Transactions” (Forthcoming in *The International Real Estate Review*), and Ashiya (2013b) “Perfect Real Estate Liquidity and Adjustment Paths to Long-run Equilibrium” (*Journal of International Economic Studies*). The second part consists of one research paper, which we present as a comparison between modern and traditional

corporate management styles, i.e., Ashiya (2004) "Robustness of Cartels Facilitated by Anti-dumping Regulations" (*Australian Economic Papers*).

The first research paper of Ashiya (2013a) has two purposes. Firstly, 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 the buyer/lessor has 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 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 regarding SLB actions; those findings reveal an institutional environment that is unique to Japan.

The purpose of the second research paper of Ashiya (2013b) is to formulate an example of the international macroeconomic climate with 'perfect' real estate liquidity and identify the crucial implications brought about by such extreme degrees of real estate liquidity, or 'financial' real estate. For this, it extends the traditional Keynesian international macroeconomic model, revisited and modified in the study of Branson and Buiter (1983), and constructs a simple analytical framework with reference to the recent economic climate with extreme degrees of real estate liquidity. It is shown that, after the

increase in the foreign interest rate, real estate liquidity may help reduce the fluctuations of home output along an adjustment path between one equilibrium position and another. This finding suggests that real estate liquidity may serve as a buffer against influences from foreign countries, although within the setting of a theoretical perfect market.

The purpose of the third research paper of Ashiya (2004) is to formulate Prusa's (1992) theory that anti-dumping regulations facilitate the formation of cartels between an exporter and import-competing firms and identify the main factors that may determine the robustness of the cartels. It demonstrates that interest rates and product differentiation are two key factors that may determine the robustness of the cartels. It builds a Bertrand duopoly model with differentiated products that explains how anti-dumping regulations might encourage the creation of cartels. To highlight the circumstances under which an import-competing firm is seriously hurt by dumped exports, the paper adopts the following setting. First, both the exporter and the import-competing firms sell only in the home market. Second, if the exporter's product is sold at a cheaper price than the product of an import-competing firm in the home market, this is a sufficient condition to initiate an anti-dumping petition. Although the setting might also provide the circumstances under which the anti-dumping authority could be over-protecting the import-competing firm, it makes it possible to view the

exporter as a predator. Since the setting enables the exporter to be free from the need to make profits in its own market, it sets a lower price for its product only if it decides to undertake predatory activities against an import-competing firm.

I. Enhancements to Traditional Corporate Strategies

1 Determinants of Potential Seller/Lessee Benefits in Sale-Leaseback Transactions

1.1 Introduction

In modern real estate finance literature, it is accepted as fact that the current development of international accounting standards is leading toward a situation in which the use of off-balance-sheet finance through financial leases is becoming more difficult. Observing this, Louko (2004) points out that obtaining off-balance-sheet finance cannot be the main reason for the 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 benefits of SLBs that come from factors other than the leasing component or the sales component of the transaction (see, 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 regarding 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. Firstly, it formulates a model to explore alternative criteria for making decisions regarding SLBs, using this model to identify a primary factor that may determine the potential seller/lessee benefits. Secondly, it quantifies this

factor. It also tests whether the applied quantification method can be considered valid or not.

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, e.g., Lewis and Schallheim, 1992; Benjamin et al., 1998; Richard, 2003). 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 regarding 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 taxes, income taxes, 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 taxes 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 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, 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 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” (Sirmans and Slade, 2010, p. 239).

1.2 Literature Review

In a PRE setting, we examine the tax-exempt seller/lessee, namely Japanese local government authorities (LGAs). By 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), 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. Notice 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) added the analysis of market efficiency to support their findings. For further evidence on market efficiency, see, e.g., Clayton (1998). For the corresponding study of the price premium, see, e.g., Attebery and Rutherford (1993) and Hardin and Wolverton (1999). Related analysis uses the hedonic approach: see, e.g., Saderion et al. (1994), Des Rosiers and Theriault (1996), and Berry et al. (2003). Wells and Whitby (2012) provide evidence that suggests that 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), Alvayay 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, SLB 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 corporation's real estate strategy.

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 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, to exploit economies of scale, and to 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 seller/lessee's cash flow situation. 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 seller/lessee's poor cash flow situation; 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.

1.3 Theory for Alternative SLB Criteria

1.3.1 The User Cost Model

In the simplest case – in 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, 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 costs, are included in the "all other costs" component. Those 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, to exploit economies of scale, and to specialize in the valuation, maintenance, and disposal of commercial property (see, e.g., Benjamin et al., 1998) can decrease these parts of 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.

1.3.2 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 ($\boldsymbol{KNOWLEDGE_{seller}}$):

$$\boldsymbol{USERCOST_{before\text{SLB}}} = \boldsymbol{g} * \boldsymbol{PRICE} - \Delta\boldsymbol{PRICE} + (\boldsymbol{d} * \boldsymbol{PRICE} + \boldsymbol{KNOWLEDGE_{seller}} * \boldsymbol{PRICE}) \quad (1)$$

where:

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

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

$\boldsymbol{PRICE}$ = price per unit of the property;

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

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

$\Delta\boldsymbol{PRICE}$ = 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 $\boldsymbol{KNOWLEDGE_{seller}}$ represents how knowledgeable the original owner is. If the owner can operate the property more cheaply, then the value of $\boldsymbol{KNOWLEDGE_{seller}}$ becomes smaller; it 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 ($\boldsymbol{KNOWLEDGE_{seller}}$) times the value of the property ($\boldsymbol{PRICE}$), i.e., $\boldsymbol{KNOWLEDGE_{seller} * PRICE}$.

The first term ($\boldsymbol{g * PRICE}$) represents the opportunity cost of owning the property worth the $\boldsymbol{PRICE}$ 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 $\boldsymbol{g}$ $\boldsymbol{(\times 100)}$ % of the principal ($\boldsymbol{PRICE}$), i.e., $\boldsymbol{g * PRICE}$.

The second term ($\Delta \boldsymbol{PRICE}$) represents the unrealized capital gains in the property 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 ($\boldsymbol{\delta} * \boldsymbol{PRICE}$), is one of the biggest costs that the property owner faces. From the buyer/lessor's perspective too, depreciation is a major consideration. A change to less favorable depreciation rules works against their benefit. The second component ($\boldsymbol{KNOWLEDGE_{seller}} * \boldsymbol{PRICE}$) is supposed to be the total of the operational costs for the property one holds. Of course, $\boldsymbol{PRICE}$ affects both of the two costs, i.e., $\boldsymbol{\delta} * \boldsymbol{PRICE}$ and $\boldsymbol{KNOWLEDGE_{seller}} * \boldsymbol{PRICE}$.

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 is exempt from property taxes, capital gains taxes, and income taxes.

1.3.3 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 ($\boldsymbol{RETAIN}$) is one which mirrors the characteristics of an SLB. Unlike the situation in general sales, here the seller/lessee can retain, we suppose, $\boldsymbol{RETAIN}$ $(\times 100)$ % of the ownership. Therefore, we modify equation (1) by including the portion of the retained ownership of the property sold and leased as:

$$\boldsymbol{USERCOST_{after\text{SLB}}} = \left[\boldsymbol{g} * \boldsymbol{PRICE} + \boldsymbol{d} * \boldsymbol{PRICE} + \boldsymbol{KNOWLEDGE_{buyer}} * \boldsymbol{PRICE}\right] - [\boldsymbol{RETAIN} * \Delta \boldsymbol{PRICE} + (\boldsymbol{1} - \boldsymbol{RETAIN}) * \Delta \boldsymbol{PRICE}] \quad (2)$$

where:

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

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

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

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 ($\boldsymbol{g * PRICE}$) is the net rent, which equals the opportunity cost, which the owner perceives as the cost of ownership; the second component ($\boldsymbol{d * PRICE}$) is the depreciation cost; and the third component ($\boldsymbol{KNOWLEDGE_{buyer} * PRICE}$) 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 nonsale and sale of the property. A nonsale generates unrealized capital gains, i.e., $\boldsymbol{RETAIN * \Delta PRICE}$; a sale generates realized capital gains, i.e., $\boldsymbol{(1 - RETAIN) * \Delta PRICE}$.

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 capital gains and the realized capital gains cancel each other out; therefore, they have no effect on the user cost of the property.

1.3.4 The 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 ($\boldsymbol{USERCOST}_{\boldsymbol{before}\mathbf{SLB}}$) from the user cost that the same seller/lessee pays after it enters into an SLB ($\boldsymbol{USERCOST}_{\boldsymbol{after}\mathbf{SLB}}$):

$$\Delta(\boldsymbol{USERCOST}) = \left(\boldsymbol{KNOWLEDGE}_{\boldsymbol{buyer}} - \boldsymbol{KNOWLEDGE}_{\boldsymbol{seller}}\right) * \boldsymbol{PRICE} \quad (3)$$

where:

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

Recall that the smaller the value of $\boldsymbol{KNOWLEDGE}$, the lower the total operating costs ($\boldsymbol{KNOWLEDGE} * \boldsymbol{PRICE}$); i.e., in the model, the owner with more expertise has a smaller value of the $\boldsymbol{KNOWLEDGE}$ 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 $(\boldsymbol{KNOWLEDGE_{buyer} - KNOWLEDGE_{seller}})$ represents the difference in knowledge between the buyer/lessor and the seller/lessee. Generally speaking, the seller, not being a real estate professional, is less able to lower the value of $\boldsymbol{KNOWLEDGE_{seller}}$. If a real estate professional can create such differences, then the condition $(\boldsymbol{KNOWLEDGE_{buyer} - KNOWLEDGE_{seller}}) < 0$ 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.

Counterintuitively, depreciation does not affect the benefits of the 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 the 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.

Notice that, if the seller/lessee is a private entity, the 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, 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, 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.

1.4 Possible Application of SLB Decision Criteria to the Japanese PRE Market

1.4.1 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.

(Figure 1)

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 the NOI. We suppose that this cost cut can be achieved with the use of knowledge. Panel A shows the current cost, which includes $\boldsymbol{PROPCOST}_{\boldsymbol{before}\mathbf{SLB}}$, which we use as a basis for the measurement.

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

$$\boldsymbol{KNOWLEDGE}\ (\%) = \frac{\boldsymbol{ADDTAX}}{\boldsymbol{PROPCOST}_{\boldsymbol{beforeSLB}}} \times 100 \qquad (4)$$

where:

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

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

$\boldsymbol{PROPCOST}_{\boldsymbol{before}\mathbf{SLB}}$ = the before-SLB total property cost (the total cost of property management before the seller/lessee enters into an SLB).

In equation (4), on the right-hand side, the data of $\boldsymbol{PROPCOST}_{\boldsymbol{before}\mathbf{SLB}}$ are publicly available; this cost, in other words, represents the current cost, which we use as a basis for the measurement. We can calculate $\boldsymbol{ADDTAX}$ by using the income and expenditure account, shown in Figure 1. For this, we first estimate $\boldsymbol{NOI}$; Appendix 1 explains the estimation method. Then we adjust the said costs to obtain Additional Tax Required for SLB, or $\boldsymbol{ADDTAX}$ 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.[1] Simply put, equation (4) represents the government's fiscal constraint; it 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. The assumption we make is that the government adopts the SLB only if it does not involve an extra expense. Unlike the case in an open 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 or not.

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."

1.4.2 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.[2] Among the 11 cities in Japan with a population of over 100 million, Saitama City discloses the most detailed information on its PRE portfolio, from which we can expect to obtain meaningful evidence. In addition, everyone can access this information freely 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 City, Fujisawa City, Musashino City, Narashino City, and

Tachikawa City, 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 data set that included approximately 700 buildings of 28 types, of which complete information was available for 405. The original data set 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 the 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 data set.

The data set comprises tax-exempt properties. As explained earlier, every LGA in Japan is exempt from capital gains taxes, income taxes, 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. It adopts the U.S. units of measurement to allow easy comparison with corresponding studies (e.g., the 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). It has also converted yen into U.S. dollars at ¥1 = $0.0125 ($1 = ¥80); ¥80 per dollar is near the record-high level of ¥75.32 per dollar in Tokyo on 31th October 2011. Thus, we should note that the prices in the sample could be seen as the highest prices possible from the viewpoint of a foreign investor.[3]

(Table 1)

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 partnership, are approximately equivalent to the current property costs, which represent the property costs under the City's direct management. We can simplify the analysis by using Net Operating Income instead of Additional Tax Required for SLB.

In Table 1, Sale Prices range from $143,963 to $153,000,000. Those prices are the estimates based on book values and the rule of depreciation that the 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 capital losses, which means losses to the citizens. In other words, the city's only motivation to enter an SLB is 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.

1.4.3 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** $\boldsymbol{KNOWLEDGE}$ (%). The log transformation helps to make $\boldsymbol{KNOWLEDGE}$ (%) more normally distributed.

(Insert Figure 2 around here)

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, "Best Suited for SLB"; 36 buildings (about 7.53%) as Group 1, "Possibly Suited for SLB"; and the remaining 435 buildings as Group 2, "Not Suited for SLB."

(Table 2)

1.4.4 Validity of the 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 building's age, we can make decisions regarding SLBs.

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

(Table 3)

Comparing 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 Table 3, Panel A (Physical Characteristics of Each Building), 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 in the mean 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, and that of Total Income from Tax is 0.0000 (<0.05), and that of Additional Tax Required for SLB is 0.0264 (<0.05).

The results of 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 is 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 Group 0 (Best Suited for SLB) and Group 1 (Possibly Suited for SLB), or between Group 0 and Group 2 (Not Suited for SLB); in Panel B, we see that 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.

Conversely, between Group 1 (Possibly Suited for SLB) and Group 2 (Not Suited for SLB), 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 highlightings in Panel C, the

p-value for the Floor Area between Group 1 and Group 2 (p=0.020), i.e., the gray highlighting 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 ANOVA tests.

(Table 4)

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.

This is why the applied knowledge quantification method is considered to be valid. We need only add the information on the building's age, 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 using a building's age, instead of the amount of additional tax required for the SLB. Given the above, we re-define knowledge as equation (5) below.

$$\boldsymbol{KNOWLEDGE}\ (\%) = \frac{\boldsymbol{NOI}}{\boldsymbol{PROPCOST}_{\boldsymbol{beforeSLB}}} \times 100 \qquad (5)$$

Note that those 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.

1.5 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. 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 PRE buildings are suited for SLBs. Given the results of ANOVA tests, the buildings can be considered similar across most physical characteristics. By 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 Appendix 1 explains, 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 only on the building's age 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 regarding SLB – 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 infrastructure 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.

Footnotes

[1] 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 we present equals the cost before the adjustment, and Additional Tax Required for SLB equals the cost after the adjustment.

[2] We thank Saitama City for their generous assistance with the data. For details on the City's PRE management, see the Web site of Saitama City at http://www.city.saitama.jp; the City is ready for property disposals, but only if such disposals are expected to improve the state of PRE management.

[3] Note that, from August 2010 to December 2012 the monthly average U.S. dollar value of the yen moved between ¥75 per dollar and ¥84 per dollar. From October 2010 to November 2012, the mean exchange rate was approximately ¥80 per dollar.

Appendix 1 Capitalization Rates and NOI for Public Properties

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

$$\boldsymbol{CAP} = \frac{\mathbf{1}}{\boldsymbol{YP}} = \frac{\mathbf{1}}{\boldsymbol{LIFE - AGE}} \tag{A1}$$

$$\boldsymbol{PRICE} = \boldsymbol{DEP} \times (\boldsymbol{LIFE} - \boldsymbol{AGE}) \tag{A2}$$

$$\boldsymbol{NOI} = \boldsymbol{CAP} \times \boldsymbol{PRICE} \tag{A3}$$

where:

$\boldsymbol{CAP}$ = capitalization rate;

$\boldsymbol{YP}$ = year's purchase in perpetuity;

$\boldsymbol{LIFE}$ = useful life in years;

$\boldsymbol{AGE}$ = building age in years;

$\boldsymbol{PRICE}$ = sale price;

$\boldsymbol{DEP}$ = annual depreciation expense;

$\boldsymbol{NOI}$ = 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 it holds. Note that our assumption concerning the leaseback period will overstate the case, but it 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 building's age in years ($\boldsymbol{AGE}$). For the building's useful life in years ($\boldsymbol{LIFE}$), 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 $\boldsymbol{LIFE}$ of the property, i.e., $\boldsymbol{CAP} = \frac{\mathbf{1}}{\mathbf{60}-\boldsymbol{AGE}}$.

Equation (A2) is the formula for the sale price ($\boldsymbol{PRICE}$). 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 ($\boldsymbol{PRICE}$), we multiply the annual depreciation expense ($\boldsymbol{DEP}$) by the remaining useful life ($\mathbf{60} - \boldsymbol{AGE}$). 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; we substitute this value into equation (A2) to estimate the sale price.

Equation (A3) is the formula for NOI. We multiply the capitalization rate ($\boldsymbol{CAP}$), estimated by equation (A1), by the sale price ($\boldsymbol{PRICE}$), estimated by equation (A2), to obtain NOI ($\boldsymbol{NOI}$). Note that both the capitalization rate ($\boldsymbol{CAP}$) and the sale price

($\boldsymbol{PRICE}$) are estimates, not observations; this does not contradict Sirmans and Slade (2010). To estimate these two, we use age ($\boldsymbol{AGE}$), life ($\boldsymbol{LIFE}$), and depreciation ($\boldsymbol{DEP}$), which are publicly available. Recall that the City sets $\boldsymbol{LIFE}$ at 60 years, therefore we only need to have cost information, or $\boldsymbol{DEP}$, and the $\boldsymbol{AGE}$ to estimate $\boldsymbol{NOI}$.

Table 1 Descriptive Statistics for the 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

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

Notes: 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.

Table 3 Results of ANOVA for Japanese PRE Portfolio

Panel A: Physical Characteristics of Each Building

	Mean			F-value	Prob>F
Variable	Group 0 Best Suited for SLB	Group 1 Possibly Suited for SLB	Group 2 Not Suited for SLB	Difference Between Groups	
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

	Mean			F-value	Prob>F
Variable	Group 0 Best Suited for SLB	Group 1 Possibly Suited for SLB	Group 2 Not Suited for SLB	Difference Between Groups	
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 highlighting means the *p*-value is less than 0.05.

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

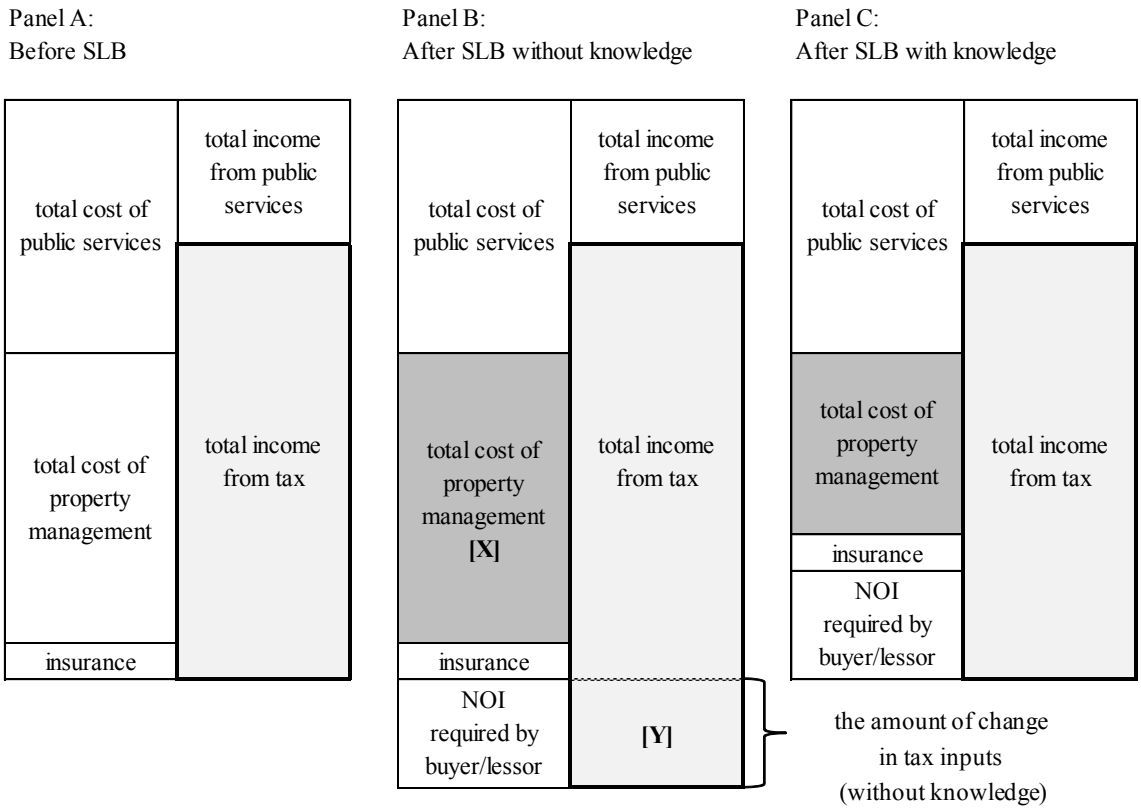
Row Mean – Col Mean	Group 0	Group 1
Group 1	-3444303 0.025	
Group 2	-4772707 0.000	-1328404 0.128

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

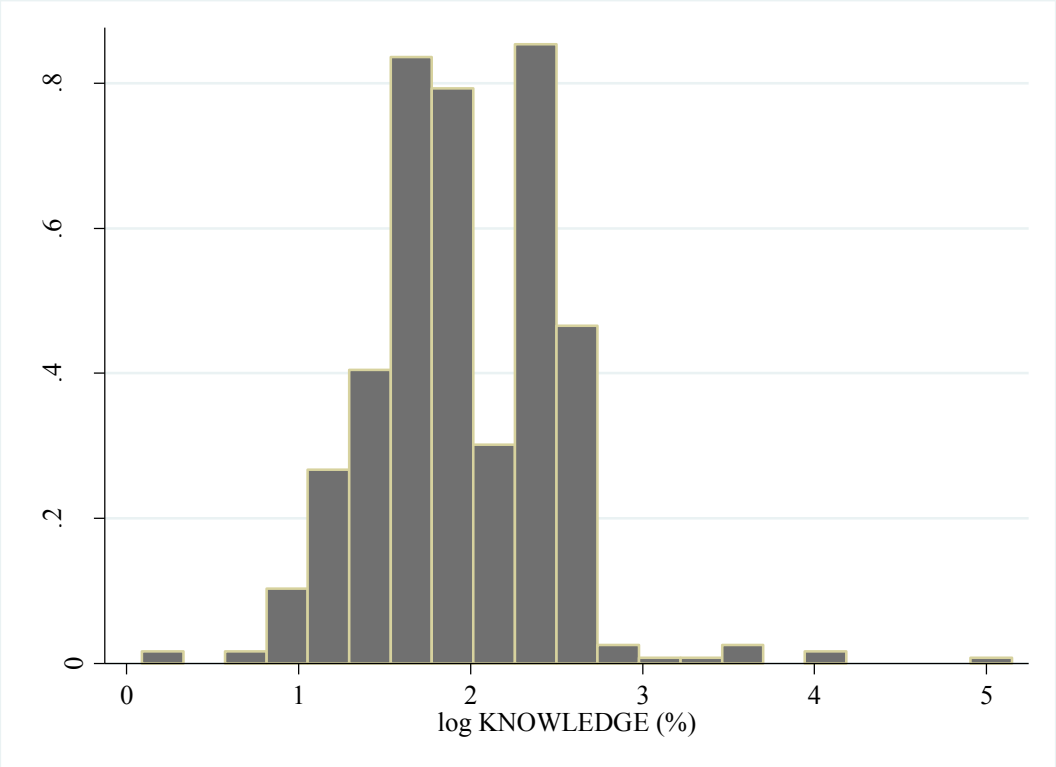
Note: The gray highlighting means the *p*-value is less than 0.05.

Figure 1 Income and Expense Account of the Representative City



Notes: 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., knowledge =[Y]/[X](∗100%).

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



Notes: The vertical axis shows probability density; the horizontal axis shows log $\boldsymbol{KNOWLEDGE}$(%).

2 Perfect Real Estate Liquidity and Adjustment Paths to Long-run Equilibrium

2.1 Introduction

Real estate is still a real asset, but its characteristics are becoming closer to those of financial assets. Evidence of this trend is the increased volume of securitization activities,[1] which have been stimulated by both technological progress and special law frameworks; tranquil market conditions have made securitization products seem profitable and safe,[2] attracting a wider range of investors.[3] Although the global securitization markets led to a collapse after the onset of the U.S. subprime mortgage crisis, and have not yet recovered to pre-crisis levels, this has not prevented the characteristics of real estate from changing in the direction of financial assets;[4] this change has crucial implications for the asset market and the overall economy. Rosengren (2010) pointed out that securitization, *i.e.*, financial real estate in the context of this paper, would interact with the real economy. However, such an interaction, *i.e.*, the theoretical and practical implications of financial real estate, has not yet been examined in a rigorous economic framework.[5]

The purpose of this paper is to formulate an example of the recent international macroeconomic climate with 'perfect' real estate liquidity[6] and identify the crucial implications brought by such extreme degrees of real estate liquidity, or 'financial' real estate. For this, we will extend the traditional Keynesian international macroeconomic model, revisited and modified in the study of

Branson and Buiter (1983),[7] and construct a simple analytical framework with reference to the recent economic climate, which has shown extreme degrees of real estate liquidity. Firstly, we will include financial real estate, *i.e.*, liquidized real estate, in the traditional Keynesian framework and secondly, suppose an increase in the foreign interest rate, which is usually considered to be a typical influence from foreign countries.[8] We will use the model to examine the effects of this foreign interest rate hike on the levels of home output both in the short-run and long-run equilibriums. We will also examine the link between these two effects, *i.e.*, foreign interest rate effects in the short-run and long-run equilibriums, by drawing figures which reveal the relationships between the directions, *i.e.*, indicators, of each effect and the money-market environment.[9]

It will be shown that, after the increase in the foreign interest rate, real estate liquidity may help reduce the fluctuations of home output along an adjustment path between one equilibrium position and another.[10] The model with the liquidized real estate indicates the positive effect on home output both in the short-run and in the long-run, which may suggest that, after the foreign interest rate hike, the home output will adjust smoothly towards the new position in the long-run equilibrium. Note that such a smooth transition will be dependent on the role of liquidized real estate; if we remove the effects brought about by the real estate liquidity, the same model will indicate the same positive effect only in the short-run. Simply put, without the real estate liquidity, we could expect an increase in home output in the short-run but not in the long-run, where the adjustment path will turn towards

an unstable growth path.

This finding suggests that real estate liquidity may serve as a buffer against influences from foreign countries, although within the setting of a theoretical perfect market. Moreover, such a buffering effect may reverse the long-run negative effect; which is in line with the well-known situation brought by diversified investments, where a well mixed portfolio will enhance long-term performance.[11] In contrast, many recent studies have focused on the rather pessimistic idea that securitization products, with highly levered structures, were the critical factor in the magnifying effects of the crisis.[12] But if we remove leverages from the same analytical framework and analyze the same situation, we could also expect to see some positive implications of real estate liquidity.

The remainder of the paper is set out as follows. Section 2.2 formulates an example of the international macroeconomic climate with 'perfect' real estate liquidity; further explanation will be presented in Appendix 1. Section 2.3 examines the effects of a foreign interest rate hike on the levels of home output both in the short-run and long-run equilibriums. Section 2.4 examines a link between these two effects by drawing figures which reveal and highlight the relationships between the direction of each effect and a benchmark of the money-market environment. The assumptions underlying the figures will be presented in Appendix 2. Lastly, Section 2.5 states the main results and gives some concluding remarks.

2.2 Global Economy with 'Perfect' Real Estate Liquidity

With perfect real estate liquidity, it is appropriate to classify real estate as a financial asset, not as a real asset. In this section, we will include such a 'financial' real asset, *i.e.*, liquidized or securitized real estate, in the standard neo-Keynesian open-economy model[13] in the simplest possible way. We will try to present an example of a recent global economy with perfect real estate liquidity, which coincides with expanded securitization markets in the real world. Further notes will be presented on this model building in Appendix 1.

2.2.1 Assumption of Perfect Real Estate Liquidity

Firstly, we will explain the assumption of perfect real estate liquidity. We note that this assumption, *i.e.*, the assumption of perfect real estate liquidity, is not far from the truth in the advanced financial centers of the U.S., U.K., Germany and Japan, and also in the emerging financial centers of Australia, Singapore, and Hong Kong. These may be taken as examples where companies and investors have enjoyed the benefits associated with listed Real Estate Investment Trust (REIT) markets such as access to new investors or new capital, tax transparency, access to property for minimal outlay, portfolio diversification, liquidity, and so on. These open markets have not faded but rather expanded despite the occurrence of the subprime mortgage crisis in 2007.[14] It would be plausible to suppose extreme degrees of real estate liquidity, *i.e.*, perfect real estate liquidity, and highlight an economy in

which more companies, investors, and citizens have commonly accepted this liquid characteristic of real estate.[15] It can also be said that the assumption of perfect real estate liquidity will overstate the case, but the assumption makes it possible to formulate the simplest example of the recent international macroeconomic climate with expanded securitization markets.

Following traditional literature, we will assume perfection also in capital mobility.[16] As Mundell (1963) explained, the assumption of perfect capital mobility can be taken to mean that all securities in the system are perfect substitutes. This implies that existing exchange rates are expected to persist indefinitely. We note that Flemming (1962) also introduced capital mobility as an important aspect of exchange determination.[17] Papers by Mundell and Fleming introduced capital mobility as an important aspect of exchange determination and presented a first formulation of the assets market view.[18]

2.2.2 Liquidized Real Estate in the Asset Menu

Secondly, we will include liquidized real estate, *i.e.*, financial real estate, in the traditional Keynesian framework. Under the assumption of perfect real estate liquidity, and in light of the standard Keynesian open-macro model, real estate, which exists as a financial asset, *i.e.*, liquidized real estate denoted by ***LRE***, would be included in the asset menu as follows:

$$W = M + B + eF + LRE \tag{1}$$

where, on the left-hand side of equation (1), ***W*** denotes private financial wealth, *i.e.*, a financial asset portfolio with a menu of financial assets measured in home currency. On the right-hand side, four elements, *i.e.*, ***M***, nominal stock of domestic money, ***B***, nominal stock of domestic-currency-dominated bonds, ***F***, stock of net private sector claims on the rest of the world denominated in foreign currency, and ***LRE***, liquidized real estate, construct the asset menu.[19]

In equation (1), we have simply added ***LRE*** to the traditional asset menu. We will follow the traditional literature also in assuming that domestic and foreign bonds are perfect substitutes in private portfolios.

Note that we use ***e***, foreign exchange rate, *i.e.*, the number of units of home currency per unit of foreign currency, to convert the unit of ***F*** into domestic currency. Definitions of symbols are given in the list in Table 1.

(Table 1)

We will also note that equation (1), *i.e.*, the formula which expresses the way we include ***LRE*** in the asset menu, affects investors' asset holdings and also affects the transmission paths of the foreign influences across the market, which has been emphasized in the models in previous studies (e.g., Kyle and Xiong, 2001; Kodres and Pritsker, 2002; Yuan, 2005).

As for the relationship between the value of ***LRE*** and the domestic nominal interest rate ***i***, we will suppose that, as ***i*** increases, ***LRE*** may be reduced. Simply put, we will define ***LRE*** as a decreasing function of ***i***:

$$LRE'(i) < 0 \tag{2}$$

where an increase in ***i*** decreases ***LRE***. Note that equation (2) is consistent with the cash-flow-based valuation, which, in general, has been used in the process of assessing real estate for asset securitizations.

2.2.3 Definitions of Equilibriums

Our definitions of equilibriums, *i.e.*, definitions of short-run/instantaneous flow equilibrium and long-run stock equilibrium, are essentially the same as those in Branson and Buiter (1983). We will also use the same setting on the domestic general/CPI price, denoted by ***p***; we will suppose that ***p*** is a decreasing function of the foreign exchange rate ***e*** and express one as $p = p(e)$ and assume that $p(e)' > 0$. In line with the traditional literature, we will assume perfect substitutability and the arbitrage condition with risk-neutral speculation as:

$$i = i^* + \frac{\dot{e}}{e} \tag{3}$$

where ***i**** denotes the foreign nominal interest rate and ***e*** denotes the foreign exchange rate. Equation (3) may reflect the situation in which the domestic nominal interest rate, *i.e.*, an index of the domestic economic climate, would be directly affected by interest rate movements in foreign countries or the rest of the world.[20]

2.2.4 Conditions for Short-run Flow Equilibrium

Short-run flow equilibrium is defined by the ***IS-LM*** equilibrium conditions.[21] If liquidized real estate ***LRE*** was included in the asset menu ***W***, as expressed in equation (1), the short-run equilibrium conditions determining the values of ***e*** and ***q*** are:

$$\frac{M}{p} = L(i^* + \frac{\dot{e}}{e}, \frac{Vq}{p}, \frac{M + B + eF + LRE}{p}) \tag{4}$$

$$a(i^* + \frac{\dot{e}}{e} - \frac{\dot{p}}{p}, \frac{V}{p}(q-g) + \frac{i^* eF}{p}, \frac{M+B+eF+LRE}{p}) + \frac{V}{p}g + x(i^* + \frac{\dot{e}}{e} - \frac{\dot{p}}{p}, \frac{V}{p}(q-g) + \frac{i^* eF}{p}, \frac{M+B+eF+LRE}{p}, \frac{e}{p}) = \frac{V}{p}q \tag{5}$$

Here, equation (4) is an ***LM*** curve describing money-market equilibrium, and equation (5) is an ***IS*** curve describing goods market equilibrium; ***q*** is domestic output, ***a*** is private absorption, ***g*** is government purchases, and ***x*** is net exports. At the same time, the following conditions are assumed: $L_1 < 0$, $L_2 > 0$ and $L_3 > 0$ for real money demand in equation (4); $a_1 < 0$, $a_2 > 0$ and $a_3 > 0$ for private absorption in equation (5), and $x_1 > 0$, $x_2 < 0$ and $x_3 < 0$ for net exports in equation (5).

In this simultaneous system of equation (4) and equation (5), real tax revenue, denoted by ***T***, has been canceled out by use of the open-economy government budget constraint:

$$\frac{\dot{M}}{p}+\frac{\dot{B}}{p}+\frac{ei^{*}R}{p}+T=\frac{V}{p}g+\frac{iB}{p}+\frac{e\dot{R}}{p} \tag{6}$$

As we follow Branson and Buiter (1983) and examine the case in which the conditions $\dot{B}=0$, $B>0$, $\dot{R}=R=0$ and $\dot{M}=0$ hold, the open-economy government budget constraint, expressed in equation (6) above, has also been transformed into:

$$T=\frac{V}{p}g+\frac{iB}{p} \tag{7}$$

Here $\dot{B}=0$ means that the government does not engage in flow open market operation and does not sterilize balance of payments deficits or surpluses; $B>0$ shows that there is a pre-existing stock of government debt; $\dot{R}=R=0$ holds under a floating exchange rate; and $\dot{M}=0$ means there are no continuous open market operations.

2.2.5 Conditions for a Long-run Stock Equilibrium

A long-run stock equilibrium is defined by the ***IS-LM*** equilibrium plus current account balance.[22] As the condition $\dot{e}=\dot{V}=\dot{F}=\dot{p}=0$ holds in a steady state, the long-run equilibrium conditions determining the steady-state values of ***e***, ***q*** and ***F*** are:

$$\frac{M}{p} = L(i^*, \frac{Vq}{p}, \frac{M+B+eF+LRE}{p}) \tag{8}$$

$$a(i^*, \frac{V}{p}(q-g)+\frac{i^*eF}{p}, \frac{M+B+eF+LRE}{p}) + \frac{V}{p}g + x(i^*, \frac{V}{p}(q-g)+\frac{i^*eF}{p}, \frac{M+B+eF+LRE}{p}, \frac{e}{p}) = \frac{V}{p}q \tag{9}$$

$$-i^*eF = px(i^*, \frac{V}{p}(q-g)+\frac{i^*eF}{p}, \frac{M+B+eF+LRE}{p}, \frac{e}{p}) \tag{10}$$

Here equation (8) is an ***LM*** curve, equation (9) is an ***IS*** curve, and Equation (10) is a ***BP*** curve describing current account balance. In the short-run equilibrium, the condition $\dot{F} = 0$ does not hold[23] and so the ***BP*** curve is expressed as equation (11) below:

$$e\dot{F} - i^*eF = px(i^* + \frac{\dot{e}}{e} - \frac{\dot{p}}{p}, \frac{V}{p}(q-g)+\frac{i^*eF}{p}, \frac{M+B+eF+LRE}{p}, \frac{e}{p}) \tag{11}$$

where the left-hand side expresses net factor income, *i.e.*, primary income account, and the right-hand side expresses the overall trade balance, *i.e.*, goods and services account. In line with the traditional literature, we do not consider transfer payments, *i.e.*, secondary income account, in our basic analytical framework.

2.3 Effects of the Foreign Interest Rate Hike

In this section we will use the model presented in the previous section and try to identify the crucial

implications of the increased liquidity of real estate. Specifically, we will suppose an increase in the foreign interest rate and will examine its effect on the levels of home output both in the short-run and long-run equilibriums. As an increase in the foreign interest rate can be considered as one of the many typical influences from foreign countries, any reactions to that interest rate change would also reflect the role of real estate liquidity. As shown by Ammer et al. (2010) and Devereux and Yetman (2010), for example,[24] this section can also reveal a transmission channel which may affect the patterns of fluctuations of home output along an adjustment path between one equilibrium position and another.

2.3.1 Short-run Effects

In order to derive the short-run effects of the foreign interest rate hike, we firstly transform the short-run equilibrium condition of equation (4) and (5).

If the demand for money, private absorption, and net exports are homogeneous of degree 1 in real income and wealth, then the short-run equilibrium conditions, *i.e.*, the simultaneous system in ***e*** and ***q***, expressed above by equation (4) and equation (5), can be rewritten as:

$$\frac{M}{V} = L(i^* + \frac{\dot{e}}{e}, q, \frac{M + B + eF + LRE}{V}) \tag{12}$$

$$a(i^*+\frac{\dot{e}}{e}-\frac{\dot{p}}{p},q-g+\frac{i^*eF}{V},\frac{M+B+eF+LRE}{V})+g+x(i^*+\frac{\dot{e}}{e}-\frac{\dot{p}}{p},q-g+\frac{i^*eF}{V},\frac{M+B+eF+LRE}{V},\frac{e}{V})=q \tag{13}$$

Then take the total differential of equation (12) and equation (13) to obtain

$$\begin{matrix} & A & & & B \end{matrix}$$

$$\begin{bmatrix} L_2 & L_3\frac{F}{V} & L_3\frac{e}{V} \\ a_2+x_2-1 & a_2\frac{i^*F}{V}+a_3\frac{F}{V}+x_2\frac{i^*F}{V}+x_3\frac{F}{V}+x_4\frac{1}{V} & a_2\frac{i^*e}{V}+a_3\frac{e}{V}+x_2\frac{i^*e}{V}+x_3\frac{e}{V} \end{bmatrix}\begin{bmatrix} dq \\ de \\ dF \end{bmatrix}=-\begin{bmatrix} L_1+L_3\frac{1}{V}\frac{\partial LRE}{\partial i^*} \\ a_1+a_2\frac{eF}{V}+a_3\frac{1}{V}\frac{\partial LRE}{\partial i^*}+x_1+x_2\frac{eF}{V}+x_3\frac{1}{V}\frac{\partial LRE}{\partial i^*} \end{bmatrix}di^* \tag{14}$$

Here the determinant of coefficient matrix $Det(A)<0$. The solution for a change in ***i**** is given by

$$\frac{dq}{di^*}=\frac{1}{Det(A)}\left[\left\{((a_2+x_2)i^*+(a_3+x_3))\frac{F}{V}+\frac{x_4}{V}\right\}L_1-\left\{(a_1+x_1)+(a_2+x_2)\frac{eF}{V}-((a_2+x_2)i^*-\frac{x_4}{F})\frac{1}{v}\frac{\partial LRE}{\partial i^*}\right\}\frac{F}{V}L_3\right] \tag{15}$$

where the indicators of $\frac{dq}{di^*}$ determine the short-run effect of a foreign interest rate hike on the domestic GDP. If this indicator in equation (15) is positive, *i.e.*, $\frac{dq}{di^*}>0$ holds, an increase in the foreign interest rate improves domestic output; if negative, *i.e.*, $\frac{dq}{di^*}<0$ holds, the same increase eliminates domestic output.

Firstly, we suppose $\frac{dq}{di^*}>0$ in Equation (15) above and transform one with respect to $\frac{L_3}{L_1}$ [25] to

obtain

$$\frac{L_3}{L_1} < \frac{\{(a_2+x_2)i^*+(a_3+x_3)\}\frac{F}{V}+\frac{x_4}{V}}{\left[\left\{(a_1+x_1)+(a_2+x_2)\frac{eF}{V}\right\}-\left\{(a_2+x_2)i^*-\frac{x_4}{F}\right\}\frac{1}{V}\frac{\partial LR\bar{E}}{\partial i^*}\right]\frac{F}{v}} \tag{16}$$

Here, the right-hand side of equation (16) expresses the boundary value, which determines the indicators of the foreign interest rate hike results. As long as $\frac{L_3}{L_1}$ is smaller than this value, an increase in i^* raises domestic output q. If we expect a positive short-run effect after the foreign interest rate hike, the wealth effect divided by interest rate effect ratio should take a value below a certain level.

2.3.2 Long-run Effects

For the long-run effects, similarly, we firstly transform the long-run equilibrium condition of equation (8) - (10).

If the demand for money, private absorption, and net exports are homogeneous of degree 1 in real income and wealth, then the long-run equilibrium conditions given by equation (8) - (10) can be rewritten as:

$$a\left(i^*, q-g+\frac{i^*eF}{V}, \frac{M+B+eF+LRE}{V}\right)+g+x\left(i^*, q-g+\frac{i^*eF}{V}, \frac{M+B+eF+LRE}{V}, \frac{e}{V}\right)=q \tag{17}$$

$$\frac{M}{V} = L(i^*, q, \frac{M + B + eF + LRE}{V}) \tag{18}$$

$$x(i^*, q - g + \frac{i^* eF}{V}, \frac{M + B + eF + LRE}{V}, \frac{e}{V}) + \frac{i^* eF}{V} = 0 \tag{19}$$

Then take the total differential of equations (17) - (19) to obtain

$$\alpha \qquad\qquad\qquad\qquad \beta$$

$$\begin{bmatrix} L_2 & L_3\frac{F}{V} & L_3\frac{e}{V} \\ a_2 + x_2 - 1 & a_2\frac{i^*F}{V} + a_3\frac{F}{V} + x_2\frac{i^*F}{V} + x_3\frac{F}{V} + x_4\frac{1}{V} & a_2\frac{i^*e}{V} + a_3\frac{e}{V} + x_2\frac{i^*e}{V} + x_3\frac{e}{V} \\ x_2 & x_2\frac{i^*F}{V} + x_3\frac{F}{V} + x_4\frac{1}{V} + \frac{i^*F}{V} & x_2\frac{i^*e}{V} + x_3\frac{e}{V} + \frac{i^*e}{V} \end{bmatrix} \begin{bmatrix} dq \\ de \\ dF \end{bmatrix} = - \begin{bmatrix} L_1 + L_3\frac{1}{V}\frac{\partial LRE}{\partial i^*} \\ a_1 + a_2\frac{eF}{V} + a_3\frac{1}{V}\frac{\partial LRE}{\partial i^*} + x_1 + x_2\frac{eF}{V} + x_3\frac{1}{V}\frac{\partial LRE}{\partial i^*} \\ x_1 + x_2\frac{eF}{V} + x_3\frac{1}{V}\frac{\partial LRE}{\partial i^*} + \frac{eF}{V} \end{bmatrix} di^* \tag{20}$$

Here the determinant of coefficient matrix $Det(\alpha) < 0$. The solution for a change in ***i**** is given by

$$\frac{dq}{di^*} = \frac{1}{Det(\alpha)} \frac{X_4 e}{V^2} \left[-\{(x_2 - 1)i^* + x_3\} L_1 + \left[a_1 + (a_2 - 1)\frac{eF}{V} - \{(x_2 - 1)i^* + x_3\} \frac{1}{v}\frac{\partial LRE}{\partial i^*}) \right] L_3 \right] \tag{21}$$

where the indicators of $\frac{dq}{di^*}$ determine the long-run effect of a foreign interest rate hike on domestic GDP. If this indicator in equation (21) is positive, *i.e.*, $\frac{dq}{di^*} > 0$ holds, an increase in the foreign interest rate improves domestic output; if negative, *i.e.*, $\frac{dq}{di^*} < 0$ holds, the same increase eliminates domestic output.

Firstly we suppose $\frac{dq}{di^*} > 0$ in equation (21) above and transform one with respect to $\frac{L_3}{L_1}$ to obtain

$$\frac{L_3}{L_1} < \frac{(x_2 - 1)i^* + x_3}{a_1 + (a_2 - 1)\dfrac{eF}{V} - \{(x_2 - 1)i^* + x_3\}\dfrac{1}{v}\dfrac{\partial LRE}{\partial i^*}} \tag{22}$$

Here, similarly, the right-hand side of equation (22) expresses the boundary value, which determines the indicators of the foreign interest rate hike results. As is similar to the case for the short-run effects, as long as $\frac{L_3}{L_1}$ is smaller than this value, an increase in ***i**** raises domestic output ***q***. If we expect a positive long-run effect after the foreign interest rate hike, the wealth effect divided by the interest rate effect ratio should take a value below a certain level.

2.4 Link between Short-run and Long-run Effects

In this section, we will examine the link between the short-run and long-run effects, *i.e.*, the effects of the foreign interest rate hike in short-run and long-run equilibriums. Based on the analysis in the preceding section, we attempt to reveal the patterns of fluctuations in home output along an adjustment path between one equilibrium position, *i.e.*, the equilibrium position before the foreign interest rate hike, and another, *i.e.*, the equilibrium position after the foreign interest rate hike. Note that, on the adjustment path to the long-run equilibrium, the home economy will firstly reach the position in short-run equilibrium, where the ***IS-LM*** equilibrium conditions hold.

2.4.1 Visualized Link

Figure 1 reveals the link between each of these directions, *i.e.*, indicators, of the short-run and long-run effects and $\frac{L_3}{L_1}$, *i.e.*, the wealth effect divided by the interest rate effect ratio, used as a benchmark of the money-market environment. The assumptions underlying this figure will be explained in the Appendix 2.

(Figure 1)

Figure 1 marks each of the boundary values of equations (16) and (22). The mark on the right, expressed by $\boldsymbol{B_s}$, corresponds to the term on the right-hand side of equation (16). In the case in which $\frac{L_3}{L_1}$ is smaller than this marked value $\boldsymbol{B_s}$, domestic output $\boldsymbol{q}$ will be increased towards short-run equilibrium after the foreign interest rate hike. In contrast, the mark on the left, expressed by $\boldsymbol{B_L}$, corresponds to the term on the right-hand side of equation (22). In the case in which $\frac{L_3}{L_1}$ is smaller than this marked value $\boldsymbol{B_L}$, domestic output $\boldsymbol{q}$ will be increased towards the long-run equilibrium after the foreign interest rate hike.

The crucial point is that both $\boldsymbol{B_s}$ and $\boldsymbol{B_L}$ are expected to be larger than zero, *i.e.*, both the boundary values which determine the short-run and long-run effects would lie in the range $0 < \frac{L_3}{L_1}$; this result contradicts the domain of $\frac{L_3}{L_1}$, *i.e.*, the shaded area in Figure 1 where $\frac{L_3}{L_1} \leq 0$ holds.[26] As Figure 1 shows, if we use the model with perfect real estate liquidity and analyze the directions/indicators of

the short-run and long-run effects, both the short-run and long-run effects would be found to be positive. This finding suggests the possibility that, with perfect real estate liquidity, the foreign interest rate hike will bring a smooth adjustment path to a long-run equilibrium, *i.e.*, from the long-run perspective, the pattern of fluctuations of the home output along an adjustment path towards long-run equilibrium is shown to be stable.

2.4.2 The Role of Liquidized Real Estate

In this subsection, we will proceed to the analysis of the role of liquidized real estate ***LRE***. For this, we simply remove the effects associated with ***LRE*** from the previous framework, presented above, and re-draw the figure as follows:

(Figure 2)

Figure 2 similarly marks each of the boundary values of equations (16) and (22), but these values in contrast do not include the effects associated with ***LRE***. The assumptions underlying Figure 2 are the same as those for Figure 1, explained in Appendix 2. The shaded area in Figure 2 also shows the domain within which $\frac{L_3}{L_1} \leq 0$ holds.

In Figure 2, the mark on the right, expressed by $\boldsymbol{b_s}$, corresponds to the term on the right-hand side of equation (16) under the assumption of $\frac{\partial LRE}{\partial i^*} = 0$. Similarly, in the case in which $\frac{L_3}{L_1}$ is smaller

than the new marked value $\boldsymbol{b_s}$, domestic output $\boldsymbol{q}$ will be increased towards the short-run equilibrium after the foreign interest rate hike. Note that, this new boundary value $\boldsymbol{b_s}$ is also expected to be larger than zero, and thus the short-run effect becomes positive. On the other hand, the mark on the left, expressed by $\boldsymbol{b_L}$, corresponds to the term on the right-hand side of equation (22) under the assumption of $\frac{\partial LRE}{\partial i^*} = 0$.

The crucial point is that $\boldsymbol{b_s}$ is expected to be larger than zero, but $\boldsymbol{b_L}$ is expected to be smaller than zero, *i.e.*, the boundary values which determine the short-run and long-run effects would lie in the different ranges across zero.[27] This finding suggests that, if $\frac{L_3}{L_1}$ takes values within the shaded area between $\boldsymbol{b_L}$ and zero, *i.e.*, the area within which $b_L < \frac{L_3}{L_1} \leq 0$ holds, domestic output $\boldsymbol{q}$ will be increased in the short-run but decreased in the long-run.[28]

This finding suggests the possibility that, without real estate liquidity, the positive foreign interest rate effect will be reversed in the long-run. It could also be said that the pattern of fluctuations in home output along an adjustment path towards long-run equilibrium would be unstable. As Figure 2 shows, if we use the model without real estate liquidity and analyze the directions/indicators of the short-run and long-run effects, the short-run effect would be found to be positive, but the long-run effects to be negative.

2.4.3 Adjustment Paths to a Long-run Equilibrium

In the final subsection, we will summarize the derived "adjustment paths" or "patterns of home output fluctuations" towards a long-run equilibrium. Table 2 presents those findings. Note also that they are all based on the assumptions explained in Appendix 2.

(Table 2)

It should be noted that the findings presented in Table 2 are consistent with countries with sufficiently matured markets and industries. As is explained in Appendix 2, the relative degree of the marginal propensity to consume, as opposed to the marginal propensity to import, *i.e.* a national taste which favors local products over imports, and the stock of net private sector claims on the rest of the world have played key roles in our analysis. Thus our findings are, for now, applicable to the sufficiently industrialized countries with a wide range of manufacturing. It should also be noted that all the assumptions or settings are consistent with each other; thus the generality of our findings can be maintained.

2.5 Conclusion

We have demonstrated that real estate liquidity may serve as a buffer against influences from foreign countries, although within the setting of a theoretical perfect market. In the position of a short-run

equilibrium, the foreign interest rate hike has a positive effect on home output under real estate non-liquidity, while, in the position of a long-run equilibrium, the same interest rate hike has a negative effect. On the other hand, under 'perfect' real estate liquidity, both in the positions of short-run and long-run equilibriums, the foreign interest rate hike has a positive effect.

Simply put, without real estate liquidity, the positive foreign interest rate effect in the short-run would be reversed in the long-run. It could also be said that the patterns of fluctuations in home output along an adjustment path towards long-run equilibrium would be stable under perfect real estate liquidity while unstable under real estate non-liquidity.

Note that, our findings contradict previous studies which focused on the fact that those structured products, *i.e.*, securitization products in our context, had been a critical factor in magnifying the effects of the financial crisis. However, if we remove their settings such as informational asymmetry, lack of investors' confidence, leverages, sensitivity to portfolio adjustment, and so on, and formulate an example of a theoretical perfect market, we would expect findings which suggest the essential role of real estate liquidity.

Our findings are consistent with reports by various international institutions. IMF (2009), Blommestein et al. (2011), in the OECD Journal, and Jobst (2008), an IMF economist, have suggested that the revival of securitization markets would be a key to global economic recovery,

which reflects their view on the need for securitization markets and also supports our view on changing real estate characteristics.

If my assumption about real estate liquidity were valid in Europe, it would mean that liquidized real estate would serve as a buffer against influences from countries outside the region. After the interest rate hike in the areas outside the EU, *i.e.*, outside the monetary union in more specific terms, the aggregate income of the countries within the EU would firstly be deterred from the current growth path and then switch to an adjustment path towards long-run equilibrium. This adjustment path would be stable under extreme degrees of real estate liquidity while, under the zero degree of real estate liquidity, *i.e.*, real estate non-liquidity, the an adjustment path would turn out to be unstable .

Naturally, the assumption of perfect real estate liquidity, as well as the assumption of perfect capital mobility, is not literally valid. As was pointed out by Mundell (1963), my conclusions are also black and white rather than showing shades of gray. It should also be noted that Mundell put forward the theory of optimum currency areas (Mundell 1961, 1973); such areas, *i.e.*, OCAs, may not only satisfy perfect capital mobility, but can also be extended in a framework with perfect real estate liquidity.

Footnotes

[1] See, e.g., Jobst (2008) for back-to-basics discussions of securitization activities. As any type of asset with a stable cash flow could in principle be securitized, real estate can be seen as a potential asset for securitization. Since the volume of securitization activities could also be considered a reflection of real estate liquidity, in a state where that volume is being increased, the degree of real estate liquidity would be increased and move closer to the 'perfect' level.

[2] While the term "securitization products" in this paper describes financial products derived from loans, *i.e.*, cash flows from real estate, it generally includes those products derived from student loans, credit card receivables, etc., as well. By adopting a limited definition of securitization products, we try to pose a stereotype towards which recent asset markets seem to be heading.

[3] See, e.g., IMF (2009) and Blommestein et al. (2011) for the rise and fall of the global securitization markets. IMF (2009) reported that the peak of the global private-label securitization gross issuance was at most $5 trillion in 2006, the volumes of which dropped off sharply the following year; Blommestein et al. (2011) focused on the comparison of securitization markets between the U.S. and Europe.

[4] Reports by various institutions worldwide, including IMF (2009), Blommestein et al. (2011), in the OECD Journal, and Jobst (2008), an IMF economist, have suggested that the revival of securitization

markets would be a key to global economic recovery, which reflects their view on the need for securitization markets and also supports our view on changing real estate characteristics.

[5] Rosengren (2010) also pointed out that those financial links to the real economy were only crudely incorporated into most macroeconomic modeling. He called for better understanding of the links between financial intermediaries, *i.e.*, securitizers in the context of this paper, financial markets, *i.e.*, securitization markets, and the real economy, *i.e.*, GDP. IMF (2009) tracked the rise and fall of securitization markets, and evaluated the various initiatives aimed at restarting those securitization markets on a sounder footing. The IMF analysis attempted to discern how securitization, *i.e.*, increased liquidity of real estate in the context of this paper, could positively contribute to sustainable economic growth.

[6] The assumption of perfect real estate liquidity can be taken to mean that all real estate in the system is perfectly securitized and thereby exists as a securitization product in a financial asset portfolio. Note that this definition of liquidity is different from market liquidity; see, e.g., Pagano and Volpin (2008). It might also be argued that the assumption of perfect real estate liquidity is not far from the truth, as will be presented in the body of this paper.

[7] Branson and Buiter (1983) revisited the Mundel-Dornbusch model, the flexible-rate version of the Mundell-Flemming model dynamized by Dornbusch (1976). They found that Mundell's (1963)

flexible-rate fiscal policy result, *i.e.*, that fiscal policy has no effect on output and employment under a flexible exchange rate, is a special case, dependent on the assumption of insensitivity of price level to movement in the exchange rate. For a discussion of the origins of the Mundell-Flemming model, see, e.g., Boughton (2003).

[8] This supposition of an increase in the foreign interest rate is in line with previous studies. See, e.g., Ehrmann and Frazcher (2009) and Wongswan (2009); they have documented that U.S. monetary policy is a global influence, which dissipates through various channels.

[9] We will take the wealth effect divided by the interest rate effect ratio as a benchmark of the money-market environment. For details, see the analysis in Section 3 and Section 4.

[10] Generally, an increase in the foreign interest rate is considered to be a typical example of the changes in key exogenous variables. It would be expected, as a result, that the patterns of increase and/or decrease in home output would also be altered.

[11] As a newly added option in private asset portfolios, liquidized real estate, *i.e.*, securitization products, will be shown to disperse the influences from foreign countries. For details, see the analysis in Section 3 and Section 4.

[12] See, e.g., Devereux and Yetman (2010). As asset values declined, highly levered financial

institutions found their net worth sharply eroded; they were forced to shed assets to avoid unacceptable risks of insolvency.

[13] The setting of the neo-Keynesian open-economy model is that (1) the country is assumed to be small regarding the market for its imports and the world capital market, but (2) is assumed to be large regarding the market for its exportables.

[14] IMF (2009) pointed out that, in light of the current constraints on lending capacity, restarting securitization could help get credit growth moving again. This IMF suggestion was based on the study by Sabry and Okongwu (2009), which demonstrated that, in the U.S. context, securitization had had positive impacts in the past on increasing the availability and lowering the cost of credit.

[15] This fact is consistent with the assumption of perfect real estate liquidity.

[16] The assumption of perfect capital mobility would possibly be a contradiction to the recent stance of the IMF, which, although within limited economic circumstances, has admitted the merit of the use of capital controls. See, e.g., Ostry et al. (2011) and Moghadam (2011), papers released by the IMF. The recent economic crisis has shattered the economic orthodoxy behind the fund's previous policies.

[17] For details, see, e.g., Boughton (2003).

[18] For details, see, e.g., Dornbusch and Fisher (1980).

[19] Case, Quigley and Shiller (2005) pointed out that wealth may take many forms and consumption may be variously affected according to the form in which wealth is held. Equation (1) stipulates the form of wealth, which includes liquidized real estate ***LRE***, *i.e.*, securitization products, by merely adding ***LRE*** to the other traditional assets such as ***M***, ***B*** and ***F***. Note that, under the assumption of perfect real estate liquidity, the amount of ***LRE*** equals the total amount of real estate.

[20] As Branson and Buiter (1983) explained, this setting would also permit us to focus on the importance of exclusion of the exchange rate from the money-market equilibrium condition. Kim (2001) found that the interest rate reaction in other countries was the most important channel of transmission. Also, Hausman and Wongswan (2011) and Canova (2005) showed that U.S. monetary policy also affects foreign short-term interest rates. Ammer, Vega and Wongswan (2010) added that foreign firms tend to be more sensitive to U.S. monetary policy if they are based in countries with exchange rates pegged to the U.S. dollar.

[21] As will be apparent in Equation (5), an ***IS*** curve shown below, the real exchange rate, ***e/p***, adjusts to provide offsetting valuation in ***x*** to movements in ***g***. This implies that in monetary equilibrium the current account balance is, in general, non-zero. This is why an instantaneous short-run equilibrium does not require any current account balance other than the ***IS-LM*** equilibrium conditions. For

details, see also Branson and Buiter (1983).

[22] Constraints of long-run portfolio balance would require balance on the current account in the long-run equilibrium. This point contradicts the movements of the Mundell- Dornbusch model [See, Mundell (1961), (1963) and (1968); Dornbusch (1976) and (1980)], and the lack of this point from their traditional settings has been noted earlier by Branson (1972) and Buiter (1978).

[23] The ***IS*** and ***LM*** schedules will not settle to a full equilibrium as long as net foreign investment is above zero; *i.e.*, in the long-run equilibrium, the current account balance must be zero. In contrast, as Branson (1972) and Buiter (1978) noted earlier, the Mundell-Dornbusch model permits current account imbalance indefinitely.

[24] Ammer et al. (2010) specified the four channels of monetary policy transmission, *i.e.*, the demand channel, the credit channel, the portfolio channel, and the foreign interest rate channel; the analysis in this section will be associated with the portfolio channel and the foreign interest rate channel. Devereux and Yetman (2010) compared how macro-influences are transmitted under different financial market structures, focusing on leverage constraints. They developed a two-country model in which investors borrow from savers and invest in fixed assets.

[25] $\frac{L_3}{L_1}$ is the ratio of the two partial differential coefficients, L_3, which represents the direction of the wealth effect for real money demand, and L_1, which represents the effect of an increase in the

foreign interest rate on the demand for real money. Simply put, it expresses the wealth effect, L_3, divided by the interest rate effect, L_1, ratio.

[26] As we suppose $L_1 < 0$ and $L_3 > 0$, $\frac{L_3}{L_1}$ always takes values smaller than zero, *i.e.*, $0 \leq \frac{L_3}{L_1}$ holds.

[27] The boundary value which determines the long-run effect would lie within the shaded area in Figure 2, where $\frac{L_3}{L_1} \leq 0$ holds. However, that of the short-run effect would not lie within the same area.

[28] More concretely, Figure 2 shows the possibility that domestic output will be pushed up by the positive power in the short-run, but will be pushed down by the negative power in the long-run.

Appendix 1 A Further Note on Model Building

Appendix 1 will present a further note on the model building. In this paper, we modified the model analyzed in Branson and Buiter (1983), who commented that, when the scale elasticity of money demand was unity, their model was essentially the same as that analyzed in Dornbush and Fisher (1980), except for the inclusion of domestic government bonds in the asset menu and of fiscal variables.

Stating that, with respect to the scale elasticity of money demand, our model can be considered as a Branson-and-Buiter type Keynesian framework, which has the unit scale elasticity of money demand. This produces as simple a model as possible and highlights the role of liquidized real estate, expressed by ***LRE***, in the open-macroeconomic framework.

Note that Fujita (1998) maintained a Branson-and-Buiter type setting of the scale elasticity of money demand; a degree of that elasticity was one of the main focuses of his study. He revisited their conclusions on the link between that elasticity and the effectiveness of fiscal policy under a floating exchange rate and perfect capital mobility and found differences in fiscal policy effectiveness between the short-run and long-run. We followed Fujita (1998) in assuming that real financial wealth affects real money

demand, which was the same as the approach adopted in the Mundell-Fleming model, and also affects net exports, which was a modification of that adopted in Branson-Buiter model.

Appendix 2 Assumptions Underlying Figure 1 and 2

Appendix 2 will explain the assumptions that underlie Figure 1 and 2, presented in Section 4. Specifically, those assumptions are:

$$a_2 + x_2 > 0 \tag{A1}$$

$$a_3 + x_3 > 0 \tag{A2}$$

$$F \geq 0 \tag{A3}$$

Here, assumption (A1) corresponds to the relative size of the marginal propensity to consume, *i.e.*, ***MPC***, to the marginal propensity to import, *i.e.*, ***MPM***. Specifically, (A1) can also be expressed as:

$$|a_2| > |x_2| \tag{A1'}$$

Where $|a_2|$ expresses the amounts of marginal increase in domestic absorption due to

the increase in disposable income, given the setting of $a_2 > 0$; $|x_2|$, the amounts of marginal increase in net exports due to the increase in disposable income, given the setting of $x_2 < 0$. This relation stipulates a national taste which favors local products over imports. Thus the economy with the assumption of (A1) or (A1') can also be taken as an industrialized economy, which may be well able to satisfy a wide range of domestic demands.

Similarly, assumption (A2) corresponds to the relative size of the marginal wealth effect on consumption to the marginal wealth effect on imports, which also is expressed as:

$$|a_3| > |x_3| \qquad \text{(A2')}$$

Where $|a_3|$ expresses the amounts of marginal increase in domestic absorption due to the increase in real private financial wealth, given the setting of $a_3 > 0$; and $|x_3|$ the amounts of marginal increase in net exports due to the increase in real private financial wealth, given the setting of $x_3 < 0$. This relation also stipulates a national taste which favors local products over imports. Thereby the assumption of (A2), or (A2'), can be taken to support the economic situation stipulated by (A1), or (A1'), presented above.

Note that assumption (A3) is consistent with these assumptions. If the economy is

sufficiently industrialized and has a wide range of manufacturing, which is stipulated by (A1) and (A2), it is natural for the economy to have a stock of net private sector claims on the rest of the world, *i.e.*, $F \geq 0$ holds. We should also note that if the economy has a negative stock of such private sector claims, *i.e.*, $F < 0$ holds, these two assumptions, (A1) and (A2), would possibly be invalid.

Table 1 List of Symbols

M	nominal stock of domestic currency
B	nominal stock of domestic-currency-denominated bonds
F	stock of net private sector claims on the rest of the world, denominated in foreign currency
R	stock of official foreign exchange reserves, denominated in foreign currency
q	domestic GDP in GDP units
W	private financial wealth measured in domestic currency
a	private absorption in GDP units
x	net exports in GDP units
T	real taxes
g	public spending in GDP units
i	domestic nominal interest rate
i^*	foreign nominal interest rate
p	domestic general price (domestic CPI price)
V	domestic GDP price (GDP deflator)
e	foreign exchange rate (number of units of domestic currency per unit of foreign currency)
LRE	value of liquidized real estate asset under perfect real asset liquidity (private real estate holdings measured in domestic currency)

Table 2 "Adjustment Paths" or "Patterns of Home Output Fluctuations" to Long-run Equilibrium

(ⅰ) Case with Perfect Real Estate Liquidity

	boundary value	indicator of boundary value	effect of foreign interest rate hike on home output	adjustment path to long-run equilibrium
short-run equilibrium	B_S	+	+	**stable**
long-run equilibrium	B_L	+	+	

(ⅱ) Case *without* Perfect Real Estate Liquidity

	boundary value	indicator of boundary value	effect of foreign interest rate hike on home output	adjustment path to long-run equilibrium
short-run equilibrium	b_S	+	+	**stable**
long-run equilibrium	b_L	−	+ (if $L_3/L_1 < b_L$)	**stable**
			− (if $b_L < L_3/L_1 \leqq 0$)	**unstable**

Figure 1 Case with Perfect Real Estate Liquidity

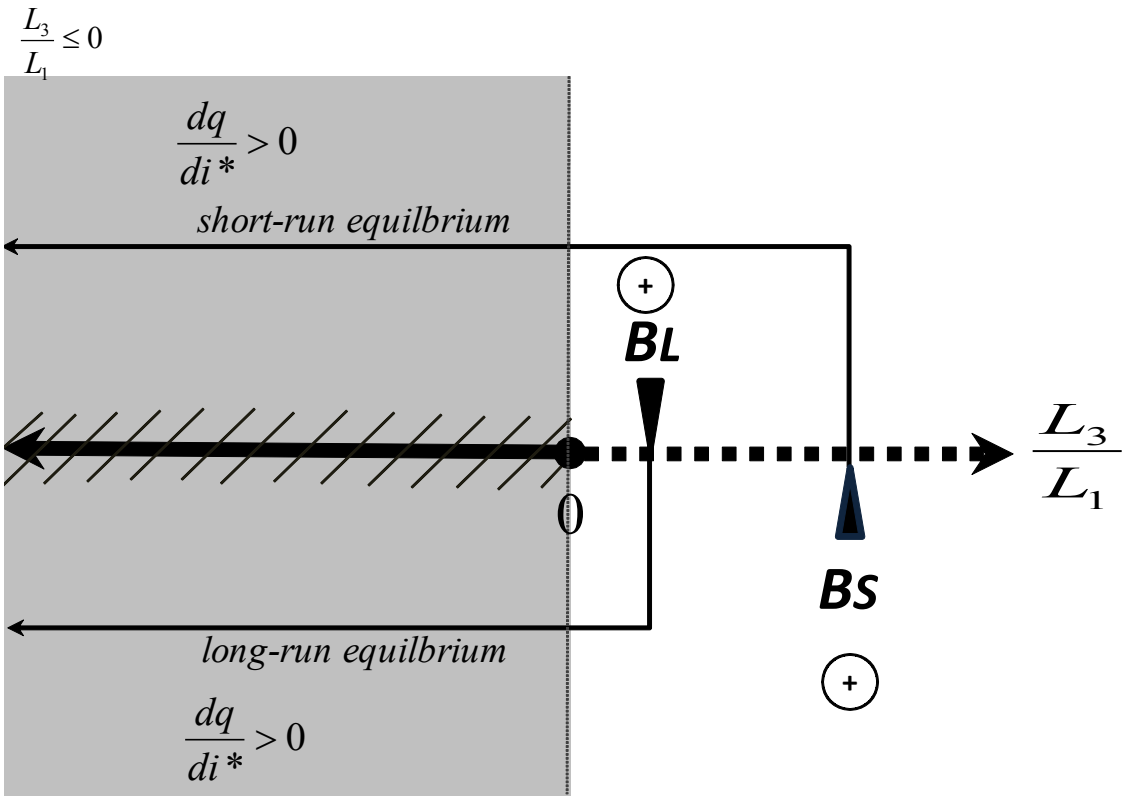
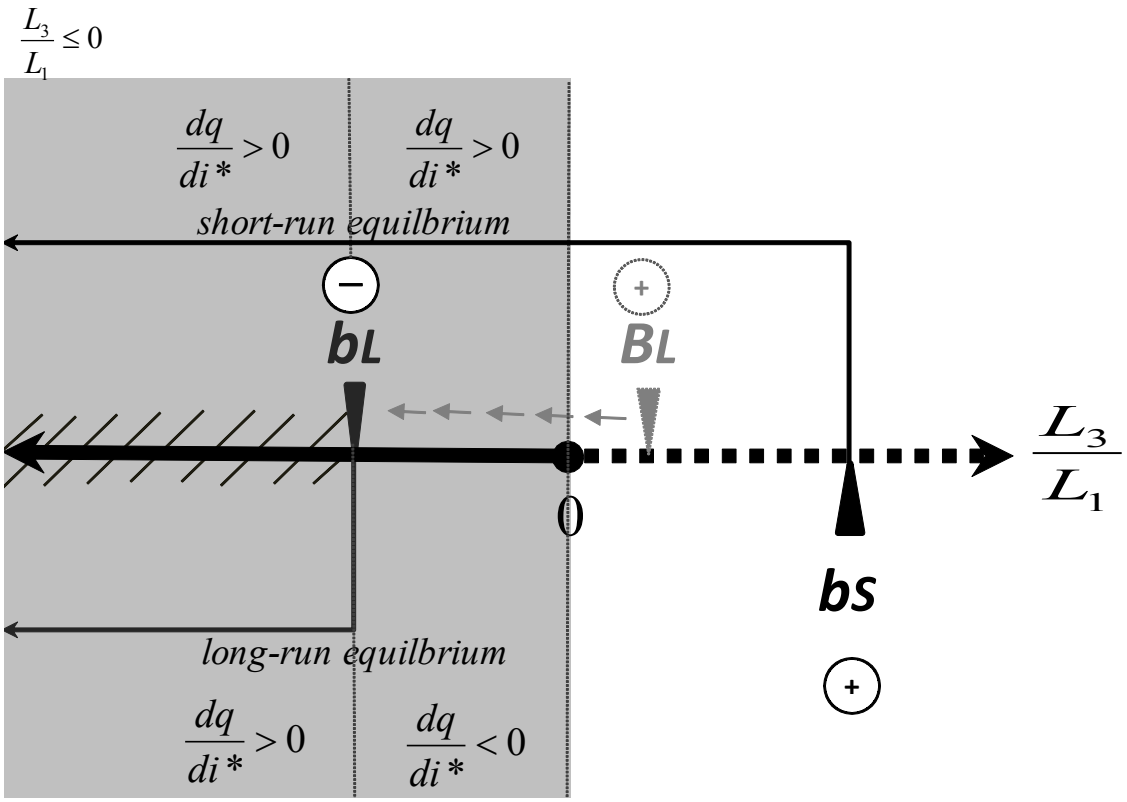


Figure 2 Case without Real Estate Liquidity



II. Successful Product Differentiation as a Fundamental Source of Competitive Advantage

1 Robustness of Cartels Facilitated by Anti-dumping Regulations

1.1 Introduction

In the modern literature on international economics, it is accepted as fact that trade flows and prices are restricted after the initiation of anti-dumping investigations.[1] Observing this, Prusa (1992) points out that cartels[2] between the defendants and plaintiffs of anti-dumping cases, i.e., between exporters and import-competing firms, are formed as a result of out-of-court settlements between these parties.[3] However, the conditions under which the cartels are maintained over time have not yet been examined in a rigorous economic framework.[4] The purpose of this paper is to formulate Prusa's theory and identify the main factors that may determine the robustness of the cartels.

In so doing, this paper intends to fill the gap between the literature and recent trade talks. Since unfair rules on anti-dumping regulations have been amended through trade talks in the World Trade Organization (WTO), it should be increasingly difficult for an authority to arbitrarily calculate dumping margins. However, in the relevant literature, it is often

argued that an anti-dumping authority could base its calculations of dumping margins on highly subjective decisions. On the basis of this fact, this paper presents the simplest analytical framework that can capture the properties of the circumstance under which a lower price for an exporter's product would reflect the exporter's incentive to undertake predatory activities against an import-competing firm. In addition, the framework provides the simplest method of calculating the anti-dumping duties, which makes the analysis tractable.

In contrast with Prusa (1992), this paper assumes that whether anti-dumping duties are imposed or not is dependent on the strategies of the firms. Prusa assumes that the imposition of duties depends on the political expediency of doing so for the anti-dumping authority, and he defines the ex-ante probability of the imposition of anti-dumping duties. As it should be increasingly difficult for an anti-dumping authority to exercise political expediency in imposing anti-dumping duties, as described above, the setting of the present paper excludes such political expediency.

On the basis of Prusa's (1992) theory, the present paper assumes the following settings. First, the anti-dumping authority proposes to the foreign firm that it create a cartel with the home firm, under conditions that are more favourable to the home firm, but are

sufficiently attractive for the foreign firm to accept.[5] This setting reflects the fact that even under when the procedures of an anti-dumping regulation are fairly conducted, a loophole in the anti-dumping law enables the anti-dumping authority to use the regulation as a protective policy instrument. Second, the products are differentiated, reflecting the fact that most tradables are differentiated in reality.

A referee points out that if the products are different they might have different prices, i.e., the difference in prices might be based upon the nature of the demand for the products. On the basis of that suggestion, this paper depicts conditions with respect to the ratio of the demand for the home firm's products to the demand for the foreign firm's products. The product differentiation makes it possible to abstract the cartel bargaining process and highlight the key factors that might affect the robustness of the cartel. In addition, it makes it possible to examine the robustness of the cartel in a framework similar to that in Prusa's (1992) paper.

The literature on cartel formation facilitated by anti-dumping regulations was initiated by Prusa (1992), who extends the traditional model by incorporating the ability of the home firm to extract a settlement from the foreign firm. Zanardi (2000) extends Prusa's (1992) model by incorporating the possibility that anti-dumping petitions could be withdrawn.

He precisely examines the bargaining process and concludes that whether the petitions are withdrawn or not depends on the bargaining process of the home and foreign firms. In contrast with those studies, the present paper focuses on the main factors that may affect the robustness of the cartels. It extends Prusa's (1992) model by incorporating the possibility that anti-dumping petitions are initiated, suspended, and withdrawn.

It is demonstrated that product differentiation and interest rates are two key factors that may maintain cartels over time. The conditions under which cartels are formed and maintained over time are depicted in Figures 3 and 5, corresponding to the ratio of the demand for the products of the home and foreign firms. In addition, these two factors are shown to determine the timing of events that correspond to the strategies of the home and foreign firms.

The remainder of the paper is set out as follows. Section 1.2 introduces the model. Section 1.3 derives a condition under which the foreign firm dumps in a home market. Section 1.4 derives a condition under which a cartel-like state between the home and foreign firms exists under free trade. It also derives a condition under which a home firm initiates an anti-dumping petition. Section 1.5 derives a condition under which a cartel is facilitated by anti-dumping regulations, and Section 1.6 derives a condition under which a cartel is

maintained over time. Lastly, Section 1.7 states the main results and makes some concluding remarks.

1.2 The Model

This paper adopts a setting similar to that of Prusa's (1992) model. It builds a simple Bertrand model of one home firm (the import-competing firm) and one foreign firm (the exporter) with differentiated products. It assumes that the home and foreign firms sell only in the home market. Under the setting described above, a comparison can be made between the prices that the home and foreign firms charge in the home market.[6] This paper assumes that a sufficient condition for the home firm to initiate an anti-dumping petition is that a product of the foreign firm is sold more cheaply than a competing product of the home firm in the home market.

As a referee points out, dumping refers to the fact that a foreign firm sells a product in the home market at a price that is lower than the price (called the normal price) that the same firm charges when it sells the same product in the world market or in its own market. The setting of this paper for a price comparison might imply naïve behaviour on the part of the anti-dumping authority, but this paper attempts to weaken such an implication. As examined in the next few paragraphs, the analytical framework as a whole reflects the

circumstances under which the foreign firm would behave like a predator against the home firm. Therefore, if adopted for the whole analytical framework of this paper, the method of price comparison would not imply excessively naïve behaviour on the part of the anti-dumping authority. The setting makes the analysis tractable and highlights the key factors clearly.

Generally speaking, a foreign firm with disloyal competence perceives the home and foreign markets not only as a whole, but also as being segmented. In other words, the foreign firm determines its export price without considering its profitability in its own market, i.e., it exports at a lower price not only when it cannot gain from the total supplied to the home and foreign markets, but also when it cannot gain from the foreign market. This is why the present paper abstracts other markets from the model. In addition, because the abstraction makes the analytical framework as simple as possible, key factors that might affect the rivalry between the firms under anti-dumping regulation are highlighted in the main findings of the paper. Note that, even with the abstraction, the firms are characterized by whether they are charged duties, i.e., only the foreign firm would be charged duties.

The method of calculating anti-dumping duties can be simplified along with this

analytical framework, i.e., the rate of anti-dumping duties is assumed to be equivalent to the difference between the prices charged by the home and foreign firms in the home market. Note that this setting makes it possible to exclude the possibility that the anti-dumping authority would arbitrarily calculate higher levels of anti-dumping duties in the simplest form.

The Chamberlinian demand functions for the differentiated products, X and Y, are as follows:

$$x = a - bp + cq \tag{1}$$

$$y = a^* - b^* q + c^* p \tag{2}$$

where p and q are the prices charged by the home and foreign firms, respectively, and x and y are the resulting outputs that they sell. In order to highlight the key factors that might determine the strategies of the firms, this paper assumes that $b = b^*$ and $c = c^*$ in the demand functions, and makes a model that is as simple as possible. Note that the demand functions necessarily require that $c \leq b$.[7]

This paper assumes that both firms have zero costs. Therefore, the profit function for the home firm, π, is written $\pi = p(a - bp + cq)$, and that for the foreign firm, π^*, is written

$\pi^* = q(a^* - bq + cp)$.

Based on the discussions in the introduction and in the first part of this section, this paper adopts the following settings. (i) It assumes that dumping refers to the fact that the foreign firm sells product Y in the home market at a price q that is lower than the price p charged by the home firm for product X. (ii) It assumes that the anti-dumping authority is protectionist. The process of the anti-dumping regulation incorporates the ability of the anti-dumping authority to extract a settlement from the foreign firm in favour of the home firm. In the present model, a cartel price leads to certain price levels that maximize and expand the profit of the home firm. The timing of events and possible alternative strategies are illustrated in Figure 1.

(Figure 1)

1.3 The Dumping Condition

In this section, we will derive a condition under which the foreign firm exports at dumped prices under free trade. The condition, which we call the Dumping Condition, only proves the legality of the anti-dumping petition initiated by the home firm.[8]

By the use of the first-order condition for the profit maximization of each firm, the Nash

equilibrium prices for the home and foreign firms, p_N and q_N, are determined as:

$$(p_N, q_N) = \left(\frac{2ab + a^* c}{4b^2 - c^2}, \frac{2a^* b + ac}{4b^2 - c^2} \right) \tag{3}$$

Since this paper assumes that, if q_N is lower than p_N, then the anti-dumping authority determines that the exports are dumped in the home country, and the Dumping Condition would be obtained as follows:

Theorem 1 (The Dumping Condition):

$$a > a^* \tag{4}$$

Proof: Since the difference between p_N and q_N, shown in (3), equals:

$$\frac{a - a^*}{2b + c} \tag{5}$$

then a positive sign in (5) implies that exports are dumped in the home country. For the sign in (5) to be positive, both the denominator and the numerator would have the same sign. Since the denominator, $2b + c$, is positive, the numerator, $a - a^*$, should be positive. Consequently, Theorem 1 is proved. Q.E.D.

Theorem 1 implies that an advantage in demand for the home firm is a key determinant

that might induce dumped exports.

1.4 The Anti-dumping Petition Condition

In this section, we will derive the conditions under which the home firm initiates an anti-dumping petition, which we call the Anti-dumping Petition Condition. The home firm is legally permitted to initiate an anti-dumping petition against the foreign firm when exports are dumped in the home country. However, it is not obvious whether it has an incentive to initiate the petition because it also has an incentive to remain in the current state.

To begin with, we intend to find out the key factors that may induce the home firm to stay in the initial Nash equilibrium. We consider the following two circumstances: (i) the circumstance under which exports are dumped in the home market; and (ii) the circumstance under which the total profit of the home and foreign firms is maximized in a Nash equilibrium, without the intervention of the anti-dumping authority.[9] Since circumstance (i) occurs if the Dumping Condition in Theorem 1 holds, I will consider circumstance (ii) in this section.

The total profit of the home and foreign firms, Π, is obtained as follows:

$$\Pi = \pi + \pi^* = p(a - bp + cq) + q(a^* - bq + cp) \tag{6}$$

The first-order conditions for the total profit maximization are:

$$\frac{\partial \Pi}{\partial p} = 0 \qquad \text{and} \qquad \frac{\partial \Pi}{\partial q} = 0 \tag{7}$$

which give p_C as the cartel price charged by the home firm, and q_C as the cartel price charged by the foreign firm:

$$(p_C, q_C) = \left(\frac{ab + a^* c}{2(b^2 - c^2)}, \frac{a^* b + ac}{2(b^2 - c^2)} \right) \tag{8}$$

and the total profit of the cartel, Π_C, as,

$$\Pi_C = \frac{b(a^2 + a^{*2}) + 2aa^* c}{4b^2 - 4c^2} \tag{9}$$

Consider the case in which the cartel prices, shown in (8), are equal to the prices in a Nash equilibrium state, shown in (3). In such a case, the total profits of the home and foreign firms in a Nash equilibrium, $\Pi_N = \pi_N + \pi_N^*$, are equivalent to those in the cartel, $\Pi_C = \pi_C + \pi_C^*$, shown in (9). Since the total profit is maximized, the home firm has no incentive to initiate an anti-dumping petition, i.e., the anti-dumping authority could not intervene and the foreign firm enjoys maximized total profit. I call such a cartel-like state

the Naturally-generated Cartel.

We denote the prices charged in the Naturally-generated Cartel by $(p_{N(nc)}, q_{N(nc)})$. Under the assumptions of $a > 0$, $a^* > 0$, $b = 1$, and $c \leq 1$, a condition under which the Naturally-generated Cartel exists under free trade is obtained as follows.

Theorem 2 (The Naturally-generated Cartel Condition):

$$c = 0 \tag{10}$$

Proof: The difference in prices between the Nash equilibrium state and the total profit maximization state is obtained as follows for each firm:

$$p_C - p_N = 2a^* b^2 c + 3abc^2 + a^* c^3 \tag{11}$$

$$q_C - q_N = 2ab^2 c + 3a^* bc^2 + ac^3 \tag{12}$$

When the Naturally-generated Cartel exists in a Nash equilibrium state, the values shown in (11) and (12) should be zero. Since the conditions $a > 0$, $a^* > 0$, $b = 1$, and $c \leq 1$ hold, as described above, the condition $c = 0$ should hold. Q.E.D.

Theorem 2 implies that when products X and Y are heterogeneous or highly

differentiated, a Naturally-generated Cartel is likely to exist under free trade. As described below, the Naturally-generated Cartel would be robust over time.

Note that when both Theorem 1 and Theorem 2 hold, the price of product Y is lower than that of product X. However, since the maximized total profit obtained with different cartel prices, $p_{N(nc)} > q_{N(nc)}$, exceeds the total profit obtained with the same cartel price, $p_C = q_C$, the home firm no longer has an incentive to initiate an anti-dumping petition. On the other hand, when Theorem 1 does not hold, the Nash equilibrium price of product Y is higher than the Nash equilibrium price of product X. In this case, the home firm cannot initiate an anti-dumping petition. Consequently, for the home firm to initiate an anti-dumping petition, Theorem 3 should hold.

Theorem 3 (The Anti-dumping Petition Condition):

$$a > a^* \qquad \text{and} \qquad c > 0 \tag{13}$$

Theorem 3 provides a possible explanation of why few anti-dumping petitions are initiated in markets with highly differentiated products. This finding implies that the homogeneity of products would be a cause of an anti-dumping petition.

1.5 The Cartel Formation Condition

In this section, we will derive a condition, which we call the Cartel Formation Condition, under which the cartel of the home and foreign firms is facilitated by the anti-dumping regulations.

a) Cartel prices

In order to formulate a system that determines a cartel price, we will consider the following situation. First, the home firm should have an incentive to initiate an anti-dumping petition, i.e., the Anti-dumping Petition Condition in Theorem 3 should hold. Second, the cartel should be the outcome of an out-of-court settlement of the anti-dumping petition, i.e., the material injury caused by the dumped exports should be removed by an increase in the export price after the formation of the cartel.[10] Third, the anti-dumping authority intends to protect the home firm by the use of the anti-dumping regulation, i.e.: (i) the anti-dumping authority intervenes in the formation process of the cartel and assigns a cartel price to the foreign firm, the level of which is the best reaction price for the home firm;[11] and (ii) the profit of the home firm should not be reduced after the formation of the cartel.

The system that determines the cartel price is obtained as follows:

$$a > a^* \tag{14}$$

$$c > 0 \tag{15}$$

$$\hat{p_C} \leq \hat{q_C} \tag{16}$$

$$\frac{\partial \hat{\pi_C}}{\partial \hat{p_C}} = 0 \tag{17}$$

$$\pi_N \leq \hat{\pi_C} \tag{18}$$

Note that condition (16) is considered to represent the degree of protection. When the anti-dumping authority weakly regulates the export price, this would lead the foreign firm to raise the export price as high as the price charged by the home firm, which corresponds to the case where $\hat{p_C} = \hat{q_C}$. On the other hand, when the anti-dumping authority strictly regulates the export price, this would lead the foreign firm to raise the export price above the price charged by the home firm, which corresponds to the case where $\hat{p_C} < \hat{q_C}$.[12]

In the following, this paper assumes that $\hat{p_C} = \hat{q_C}$ to simplify the analysis. The essential trade-restricting effects of the anti-dumping regulation are still reflected in our model

with this simplification. That is, even in the case where $\hat{p}_C = \hat{q}_C$, as well as in the case where $\hat{p}_C < \hat{q}_C$, the foreign firm would lose its profit after the formation of the cartel. In a broad sense, the analysis for the case where $\hat{p}_C < \hat{q}_C$ would be covered by the analysis for the case where $\hat{p}_C = \hat{q}_C$. In addition, by introducing the assumption that $\hat{p}_C = \hat{q}_C$, not only is the method of analysis simplified, but the implications of our findings are clearer intuitively.

Figure 2 illustrates the iso-profit curves for the home firm that correspond to the prices p_N and $\hat{p}_C$. It shows that the profit of the home firm in a Nash equilibrium, π_N, is smaller than that in the cartel, $\hat{\pi}_C$.

(Figure 2)

By considering all the points described above, the system that formulates the cartel formation condition, shown in (14)–(18), is rewritten as follows:

$$a > a^* \tag{19}$$

$$c > 0 \tag{20}$$

$$\hat{p}_C = \hat{q}_C \tag{21}$$

$$\frac{\partial \hat{\pi}_C}{\partial \hat{p}_C} = 0 \tag{22}$$

By solving the system shown in (19)–(22), the cartel prices, $\hat{p}_C$ and $\hat{q}_C$, are obtained as follows:

$$\hat{p}_C = \hat{q}_C = \frac{a}{2b - c} \tag{23}$$

b) Anti-dumping duties

In order to reflect the nature of anti-dumping regulations in our model, we should make clear the nature of their penalties. The penalties take the form of anti-dumping duties that are imposed on the products of a foreign firm to make up for the price differential between the home and foreign firms.

Note that this paper considers the purpose of an anti-dumping duty to be the removal of the injury caused by exports being sold at a cheaper price than that charged by a home firm. Moreover, following Prusa (1992), this paper considers that even if an anti-dumping regulation is implemented in the home country, a foreign firm has the chance to avoid the imposition of this anti-dumping duty by increasing its dumped price to the cartel price. Thus, the anti-dumping authority will impose an anti-dumping duty when a foreign firm

does not agree to set a cartel price. The anti-dumping duty $\hat{t}_1$ equals $(p_N - q_N)$; it makes up for the price differential between the products of home and foreign firms in a Nash equilibrium.

The imposition of an anti-dumping duty occurs within the period in which a foreign firm does not agree to set the cartel price and still charges a Nash equilibrium price. The foreign firm knows the amount and the timing of the imposition.

c) The Cartel Formation Condition

In order to derive a condition, which we call the Cartel Formation Condition, under which a cartel is formed between the home and foreign firms under the anti-dumping regulation, we only need to focus on the incentive of the foreign firm. As described in part a) of this section, the home firm is protected by the anti-dumping regulation. Since the home firm always gains from the cartel, it always agrees to set the cartel price $\hat{p}_C$ shown in (23). For these reasons, we examine only the incentive of the foreign firm in the following analysis.

First, consider the case in which the foreign firm agrees to set a cartel price of $\hat{q}_C$, shown in (23), and avoids the imposition of an anti-dumping duty. The cartel profit of the foreign firm, $\hat{\pi}_C^*$, is obtained as follows:

$$\hat{\pi_C}^* = \frac{a}{(2b-c)^2}\left\{(2b-c)a^* - (b-c)a\right\} \tag{24}$$

Second, consider the case in which the foreign firm does not agree to set a cartel price of $\hat{q_C}$. In this case, the foreign firm still charges a Nash equilibrium price, q_N, shown in (3), and, subsequently, pays an anti-dumping duty. Note that the rate of the anti-dumping duty, $\hat{t_1}$, equals the price differential between the firms in a Nash equilibrium, $(p_N - q_N)$.[13] The total amount of the anti-dumping duty, $\hat{T_1}$, equals the product of the rate of the anti-dumping duty, $\hat{t_1}$, and the output of the foreign firm in a Nash equilibrium, y_N. The profit of the foreign firm after it pays the anti-dumping duty, $\hat{\pi_{N(D)}}^*$, which equals the Nash equilibrium profit, π_N^*, minus the total of the anti-dumping duties imposed, $\hat{T_1}$, is obtained as follows:

$$\hat{\pi_{N(D)}}^* = \frac{2a^*b^2 + abc}{\left(4b^2 - c^2\right)^2}\left\{2a^*b + ac - (2b-c)(a-a^*)\right\} \tag{25}$$

Note that $\hat{t_1}$ would always be positive under Theorem 1 and Theorem 3. For the purpose of analysis, this section has a setting similar to the former sections and assumes that $b = 1$ and $0 < c \leq 1$ holds. The setting makes it possible to highlight the key factors that facilitate the formation of the cartel.

In order to derive a condition under which a cartel of home and foreign firms is facilitated

by anti-dumping regulations, recall Theorem 3 and compare the values $\hat{\pi}_C^*$ and $\hat{\pi}_{N(D)}^*$, shown in (24) and (25). Then, the Cartel Formation Condition is obtained as follows:

Theorem 4 (The Cartel Formation Condition):

$$\left\{-(1-c)(4+2c+c^2)\right\}\theta^2+\left\{(2-c)(6+3c+c^2)-4c^2\right\}\theta-8+2c>0 \qquad (26)$$

where $\theta>1$ and $c>0$. The symbol θ denotes $\frac{a}{a^*}$, or the ratio of the demand for the products of the home and foreign firms.

Given the cartel price of the foreign firm, $\hat{q}_C$, which the anti-dumping authority assigns to the foreign firm, the home firm maximizes its own profit by charging the cartel price, $\hat{p}_C$, whereas it is possible that the foreign firm, which is assigned the cartel price, $\hat{q}_C$, may unfairly incur losses. However, if Theorem 4 holds, the foreign firm agrees to set the cartel price and form a cartel with the home firm under the anti-dumping regulation. Theorem 4 shows that the degree of the product differentiation, c, and the demand advantage of the home firm, θ, should have certain values and relations.

d) The locus of the Cartel Formation Condition

In order to depict the locus of the Cartel Formation Condition in Theorem 4, we first

substitute the sign of the inequality (26) into the equality. The quadratic function with respect to θ, $f(\theta)$, the roots of which are α and β, $\alpha \leq \beta$, is obtained as follows:

$$\{-(1-c)(4+2c+c^2)\}\theta^2 + \{(2-c)(6+3c+c^2)-4c^2\}\theta - 8 + 2c = 0 \qquad (27)$$

Second, taking into consideration that $0 < c \leq 1$, we use the examples of $c = 0.5$ and $c = 0.8$. With the restrictions that $\theta > 1$ and $0 < c \leq 1$, the values of θ that satisfy (27) exist in the shaded region of Figure 3, in the space of θ and $f(\theta)$.

(Figure 3)

Figure 3 shows that, as c gets larger, or the products become more homogeneous, the vertex of the parabola that depicts the quadratic equation $f(\theta)$ moves to the upper right. At the same time, the intercepts of the parabola along the first axis, or the real roots of the quadratic equation $f(\theta)$, denoted by α and β, $\alpha \leq \beta$, shift to the right, with the difference in the roots, or $\beta - \alpha$, $0 < \alpha \leq \beta$, becoming larger. Since α is not more than unity, or since $\alpha \leq 1$ holds, in the examples, the range in which the cartel is facilitated by the anti-dumping regulations is obtained as $1 < \theta < \beta$.

It is found that when the products sold in the home market are slightly differentiated, a cartel is likely to be formed under an anti-dumping regulation. However, that is not the

case before the initiation of an anti-dumping petition. As shown in Theorem 2, the cartel-like state, the Naturally-generated Cartel, is likely to exist when the products are heterogeneous. This finding implies that the role of product differentiation in the co-operation between the home and foreign firms would change after the initiation of an anti-dumping petition.

1.6 The Robust Cartel Condition

In this section, we will derive a condition under which a cartel is maintained over time, which we call a Robust Cartel Condition. In order to analyse the effects of anti-dumping regulations over time, we extend the setting in Section 1.3 to an infinite time horizon. For the reasons described in Section 1.3, it is again sufficient to consider the incentives of the foreign firm only.

a) Anti-dumping duties

The anti-dumping authority will impose an anti-dumping duty when the foreign firm deviates from the cartel price and instead charges $\hat{q}_d$, referred to as the deviation price. Note that a foreign firm that charges the deviation price is aware of the following facts. First, the home firm still charges the cartel price, $\hat{p}_C$, and the anti-dumping authority

imposes the anti-dumping duty $\hat{t}_2$, or $(\hat{p}_C - \hat{q}_d)$, within the period in which the foreign firm deviates from the cartel. Second, the rivalry between the home and foreign firms will be a Bertrand competition from the next period onwards. Thus, the home and foreign firms will charge a price set of (p_N, q_N), and the anti-dumping authority will impose the anti-dumping duty $\hat{t}_1$, or $(p_N - q_N)$, from the next period onwards.[14]

b) Deviation prices

The deviation price, $\hat{q}_d$, is obtained by solving the following maximizing problem:

$$\underset{\hat{q}_d}{Max}\ \hat{\pi}_{d(D)}^{*} = \hat{q}_d(a^* - b\hat{q}_d + cp_C) - (\hat{p}_C - \hat{q}_d)(a^* - b\hat{q}_d + cp_C) \tag{28}$$

$$subject\ to\ \hat{p}_C - \hat{q}_d > 0 \tag{29}$$

where $\hat{\pi}_{d(D)}^{*}$ represents the profit of the foreign firm in the period in which it deviates from the cartel. Note that the foreign firm gains from the deviation, but that it has to pay the anti-dumping duty $\hat{t}_2$ within the same period. The restriction, shown in (29), implies that the foreign firm would never have a negative duty, or compensation.[15]

The first-order condition for the profit maximization is obtained as follows:

$$\frac{\partial \hat{\pi}^{*}_{d(D)}}{\partial \hat{q}_d} = 2a^{*} - 4b\hat{q}_d + (2c+b)\hat{p}_C = 0 \tag{30}$$

By transforming (30), the anti-dumping duty $\hat{t}_2$, which is equal to the price differential between $\hat{p}_C$ and $\hat{q}_d$, is obtained as follows:

$$\hat{t}_2 = \frac{1}{4b(2b-c)}\left\{(3b-2c)a - (4b-2c)a^{*}\right\} \tag{31}$$

where $\hat{t}_2 = \hat{p}_C - \hat{q}_d$, $\hat{p}_C = \frac{a}{2b-c}$, and $\hat{q}_d = \frac{1}{4b}\left(2a^{*} + \frac{b+2c}{2b-c}a\right)$. [16] Since the anti-dumping duty $\hat{t}_2$ should be positive, as described above, the following condition should hold:

$$\frac{4b-2c}{3b-2c} < \theta \tag{32}$$

where θ denotes $\frac{a}{a^{*}}$, as described above.

For the purpose of the analysis, (31) can be transformed in line with the assumptions, adopted above, that $b=1$ and $0<c\leq 1$, to obtain the following condition:

$$\frac{4-2c}{3-2c} < \theta \tag{33}$$

Since the left hand side of the inequality (33) is no less than $\frac{4}{3}$, the condition is consistent with the Dumping Condition in Theorem 1.

c) Credibility of threat

The anti-dumping duty $\hat{t}_2$ would be negative even when dumping actually occurs in the home country. In such a case, the anti-dumping duty, the penalty of the cartel, is no longer a threat to the foreign firm. Such a circumstance occurs under the following condition:

$$1 < \theta \leq \frac{4-2c}{3-2c}. \tag{34}$$

The negative duty implies that the foreign firm can always expand its profit through deviation from the cartel. Therefore, if condition (34) holds, the foreign firm is most likely to deviate from the cartel, and thus the cartel will not be maintained over time. Figure 4 depicts the region in which condition (34) holds in the space of c and θ. The shaded area is excluded from the region in which the cartel is maintained over time.

(Figure 4)

d) The Robust Cartel Condition

In order to derive what we call the Robust Cartel Condition, or the condition under which the cartel is maintained over time, we will consider the total of the discounted values of the profit levels of the foreign firm when it deviates from the cartel and when it maintains

the cartel.

First, we will calculate the total of the discounted values of the profit of the foreign firm from this period onwards, when it deviates from the cartel in this period. If the foreign firm charges a deviation price $\hat{q}_d$ and deviates from the cartel in this period, its profit in this period, $\hat{\pi}_{d(D)}^{*}$, would be its gains from the deviation before the imposition of duties, $\hat{\pi}_d^{*}$, minus the total payments of the anti-dumping duty, $\hat{T}_2$, or $\hat{t}_2 \hat{y}_d$. The anti-dumping duty $\hat{t}_2$ would equal $\hat{p}_C - \hat{q}_d$ since the home firm still maintains a cartel price $\hat{p}_C$ in the period. Therefore, the profit of the foreign firm in this period, $\hat{\pi}_{d(D)}^{*}$, would be obtained by:

$$\hat{\pi}_{d(D)}^{*} = \hat{\pi}_d^{*} - \hat{T}_2 = \frac{1}{8b}\left(2a^{*} - \frac{b-2c}{2b-c}a\right)^2 \tag{35}$$

From the next period onwards, the foreign firm obtains $\hat{\pi}_{N(NR)}^{*}$ in each period. Its profit equals that obtained in a Nash equilibrium in one period, π_N^{*}, minus the total payments of the anti-dumping duty in one period, $\hat{T}_1$, or $\hat{t}_1 y_N$. Therefore, the profit of the foreign firm in one period of the total period following the deviation, $\hat{\pi}_{N(NR)}^{*}$, would be obtained by:

$$\hat{\pi}_{N(NR)}^{*} = \pi_{N}^{*} - \hat{T}_1 = \frac{2a^{*}b^2 + abc}{\left(4b^2 - c^2\right)^2}\left\{2a^{*}b + ac - (2b-c)(a-a^{*})\right\} \tag{36}$$

Note that $\hat{\pi}_{N(NR)}^{*}$ shown in (36) equals $\hat{\pi}_{N(D)}^{*}$ shown in (25).

Second, we calculate the total of the discounted values of the profit of the foreign firm when it maintains the cartel from this period onwards. If the foreign firm continues to charge a cartel price $\hat{q}_C$, from this period onwards, its profit in one period, $\hat{\pi}_C^{*}$, would be obtained by $\frac{a}{(2b-c)^2}\left\{(2b-c)a^{*} - (b-c)a\right\}$, as calculated in Section 3.1.5 and shown in (24).

Third, we calculate and compare the sums of the profit streams of the foreign firm in each case considered above. In order to calculate each profit, we use a rate of return in each period, r,[17] which we assume is constant over time.

The cartel is maintained over time under the following condition:

$$\hat{\pi}_{d(D)}^{*} + \frac{\hat{\pi}_{N(NR)}^{*}}{r-1} < \frac{r}{r-1}\hat{\pi}_C^{*} \tag{37}$$

Substituting (24), (35), and (36) into (37), and considering the Anti-dumping Petition Condition in Theorem 3, the Robust Cartel Condition is obtained as follows:

Theorem 5 (The Robust Cartel Condition):

$$\frac{1}{8}\{(2c-1)(c+2)\theta+2(2-c)(2+c)\}^2+\frac{1}{r-1}\{2+c\theta-(2-c)(\theta-1)\}(2+c\theta)$$
$$-\frac{r}{r-1}\{-(2+c)^2(1-c)\theta^2+(2+c)^2(2-c)\theta\}<0 \tag{38}$$

where $\theta>1$ and $c>0$.

Theorem 5 implies that for the cartel to be maintained over time, the rate of return, r, the degree of product differentiation, c, and the advantage in demand for the home firm, θ, should take certain values and relations.

e) The locus of the Robust Cartel Condition

In order to depict the locus of the Robust Cartel Condition, we transform condition (38) in Theorem 5 into the function with respect to θ. First, we substitute the sign of inequality in (38) into the equality. The quadratic function with respect to θ, the roots of which are α^* and β^*, where $\alpha^*\le\beta^*$, is obtained as follows:

$$\frac{1}{8}\{(2c-1)(c+2)\theta+2(2-c)(2+c)\}^2+\frac{1}{r-1}\{2+c\theta-(2-c)(\theta-1)\}(2+c\theta)$$
$$-\frac{r}{r-1}\{-(2+c)^2(1-c)\theta^2+(2+c)^2(2-c)\theta\}=0 \tag{39}$$

Second, we use the same examples of $c=0.5$ and $c=0.8$ illustrated in Section 3.1.5.

With the restrictions that $\theta > 1$ and $c > 0$, the values of θ that satisfy (39) are shown in the shaded region of Figure 5. Figure 5 also depicts the locus of the Cartel Formation Condition in the space of θ and $g(\theta)$, which correspond to each case. Figure 5 shows that, as c gets larger, i.e., as the products sold in the home market become more homogeneous, the co-ordinate of the first axis becomes larger, and that of the second axis becomes smaller, or becomes larger in a negative direction, i.e., the vertex of the quadrant $g(\theta)$ shifts to the lower right. At the same time, the intercepts of the parabola along the first axis, or the real roots of the quadratic equation $g(\theta)$, denoted by α^* and β^*, where $\alpha^* \leq \beta^*$, shift to the right, with the difference in the roots, or with $\beta^* - \alpha^*$, $0 < \alpha^* \leq \beta^*$, becoming larger.

In addition, as the rate of return r becomes larger, the co-ordinate of the first axis becomes smaller, and that of the second axis becomes larger, or smaller in a negative direction, i.e., the vertex of the quadrant $g(\theta)$ shifts to the upper left. At the same time, α^* shifts to the right and β^* shifts to the left, with the difference in the roots becoming smaller.

This finding implies that, when products sold in the home market are slightly differentiated, a cartel is more likely to be maintained when facilitated by an

anti-dumping regulation. It also implies that the interest rate serves as a key factor in maintaining a cartel. The smaller is the value of the interest rate, the more robust is the cartel.

(Figure 5)

1.7 Conclusion

This paper has formulated Prusa's (1992) theory that anti-dumping regulations might encourage the creation of cartels between home and foreign firms. It demonstrates that interest rates and product differentiation are two key factors that can determine the robustness of cartels. We characterize the effects of anti-dumping regulations on the robustness of cartels over time by building a simple Bertrand model with one home firm and one foreign firm that sell differentiated products only in the home market, and by extending the model in an infinite time horizon. Although we adopt a specific method of calculating anti-dumping duties, the setting makes it possible to highlight predatory behaviour by a foreign firm against a home industry. In addition, it makes it possible to reflect on the role of an anti-dumping authority as a protectionist entity.

Our main findings are first, that product differentiation can possibly induce a cartel-like

state in a Nash equilibrium under free trade, which is not prosecuted by either anti-trust or anti-dumping regulations. Second, product differentiation causes few anti-dumping petitions to be suspended or withdrawn, i.e., few cartels are formed or maintained as a result of out-of-court settlements in anti-dumping cases. Finally, we demonstrate that cartels, which are facilitated by anti-dumping regulations, are made robust by low interest rates.

The first result reflects the fact that, in markets with homogeneous products, firms cannot maximize total profit or seek adequate profits without undertaking collusive agreements. Note that even slight product differentiation threatens firms with price cuts. Therefore, in markets with homogeneous or slightly differentiated products, the firms have an incentive to reach some kind of agreement that would enable them to avoid a price war. In markets with heterogeneous or highly differentiated products, firms would possibly maximize total profit even in a Nash equilibrium and thus, in such a case, they have an incentive to maintain prices over time. In addition, the most famous cartels, such as the Organization of Petroleum Exporting Countries (OPEC), DeBeers, and so on, have successfully controlled the prices of homogeneous products only. Hence, it can be said that, without product differentiability, there is no room for a naturally generated cartel to be maintained over time.

The second result reflects the fact that price wars often take place in a market with slightly differentiated or homogeneous products. If a price war takes place, it continues until each firm charges the lowest possible price, resulting in each firm making less profit. Therefore, the firms have an incentive to trust each other and observe a cartel agreement. This incentive becomes larger as the degree of product differentiability becomes lower and the threat of a price war becomes larger. This is why the larger is the value of c, the more likely it is that a cartel will be formed or maintained over time.

This result, shown in (ii), also provides a possible explanation of why the issue of anti-dumping practices is at the heart of recent political debate. As many studies point out, an anti-dumping authority intends to use regulations as a policy tool to protect home industries. However, the anti-dumping regulations could possibly worsen the rivalry between the home and foreign firms at the expense of a consumer surplus. This is because, as the result shows, the anti-dumping regulations aid the creation of a cartel, which causes a large distortion in trade flows over time, especially in markets with homogeneous products. Since the number of anti-dumping petitions initiated against Japanese steel makers has increased dramatically in recent years, much attention should be paid to the implementation of anti-dumping regulations.

The final result relates to the interest rate. Stability of collusion is normally sustained for small values of the interest rate. The reason is that, as a referee pointed out, if one plus the interest rate, $1+i$, or the rate of return, r, is small, the non-loyal member of a collusion is very concerned about future punishment, or Nash reversion. The result shown in this paper is consistent with this familiar result.

It would be of interest to extend the present model in a more general setting. One possible extension is the inclusion of the capital market, as the present paper considers only the product market. Another possible direction is to examine the case in which firms charge different prices in a cartel, or the case where $\hat{p_C} < \hat{q_C}$. In the present paper, we refer only to the relation between the cases where $\hat{p_C} = \hat{q_C}$ and where $\hat{p_C} < \hat{q_C}$. The implications of the analysis for the case where $\hat{p_C} = \hat{q_C}$ are considered to be extended in the analysis for the case where $\hat{p_C} < \hat{q_C}$. This extension would be useful in a discussion of whether the protective use of anti-dumping regulations would harm an entire economy. In other words, it would be an analysis of the desirable degree of protection through anti-dumping regulations. We could also extend the present paper by characterizing the cause of dumping in the light of other trade restrictions, for example, VERs.

Footnotes

[1] We present this research paper, published in 2004, as a comparison between modern and traditional corporate management styles. But, in the context of the recent global trend towards regional free trade, it still can be considered as raising modern issues. Shiozawa (2013)'s new edition also features more in-depth information on globalization, free trade agreement (FTA), economic partnership (EPA), and Trans Pacific Partnership (TPP).

[2] Note that "cartels" refers to price undertakings throughout the present study. The setting reflects Article 8 of the Anti-dumping Agreement, which contains rules on price undertakings in lieu of the imposition of anti-dumping duties.

[3] Yano (1989) provides a possible explanation of why anticipated trade restrictions in the future may induce dumping in the present in the context of VERs implemented in the home country. The implication of Yano's (1989) study contrasts with that of Prusa's (1992) theory because Yano demonstrates that in the present, export prices in the home country would be reduced in the face of anticipated trade restrictions in the future. By contrast, Prusa's (1992) theory implies that export prices in the home country would be increased in the present in the face of anticipated trade restrictions in the future, because of the facilitation of cartels.

[4] Fujita (1995) derives a condition under which exporters and import-competing firms voluntarily restrict total supply to the home country under the anti-dumping regulations. In contrast with Prusa's (1992) study, Fujita (1995) adopts a Cournot model with

homogeneous goods.

[5] Prusa (1992) adopts the following setting: (i) the anti-dumping authority assigns the foreign firm's price after the imposition of anti-dumping duties; and (ii) the home firm then sets its price knowing that duties have been levied.

[6] In the context of a general trading economy model, Ohyama (1972) notes: "It is important to understand the relationships between the four different price vectors pertaining to the economy under trade with the rest of the world. Needless to say, this difference arises in the presence of the governmental intervention in the private transactions via taxes and subsidies (Ohyama, 1972, p. 40-41)."

[7] As pointed out by a referee, this condition is crucial to our main findings.

[8] Note that the home firm would not necessarily initiate an anti-dumping petition under the Dumping Condition. Whether the home firm would initiate a petition or not is examined in Section 3.1.4.

[9] As pointed out by a referee, if total profit is maximized in the case where $q_N < p_N$, the anti-dumping authority could intervene, but the home firm would never initiate an anti-dumping petition against its own cartel partner. Based on this suggestion, we consider the case in which the total profit is maximized in the Nash equilibrium under free trade. we call such a cartel-like state a Naturally-generated Cartel and examine it in subsequent analysis.

[10] The cartel price of the foreign firm, $\hat{q}_C$, should be above certain levels and should be no less than the cartel price charged by the home firm, $\hat{p}_C$.

[11] This setting is based on Prusa (1992), as described in the introduction.

[12] Based on a referee's suggestion, we consider the case in which the home and foreign firms charge different cartel prices, i.e., the case where condition $\hat{p}_C < \hat{q}_C$ holds.

[13] As a referee points out, if the foreign firm does not agree to form a cartel, both firms will play Nash reversion. Therefore, $\hat{t}_1$ must be the difference in prices when both firms are playing Nash reversion.

[14] Based on the suggestion of a referee, we changed the rules of the imposition of anti-dumping duties in the Nash reversion.

[15] Based on the suggestion of a referee, we formulate the maximization problem that would ensure the foreign firm has the incentive to deviate from the cartel. The foreign firm would never have a negative duty (compensation) if its price is larger than the one charged by the home firm.

[16] As a referee points out, the foreign firm would pay anti-dumping duties of $\hat{t}_2$ times $\hat{q}_d$ in the deviation period.

[17] As a referee points out, the rate of return equals one plus the interest rate, or $1+i$.

Figure 1 The sequence of events

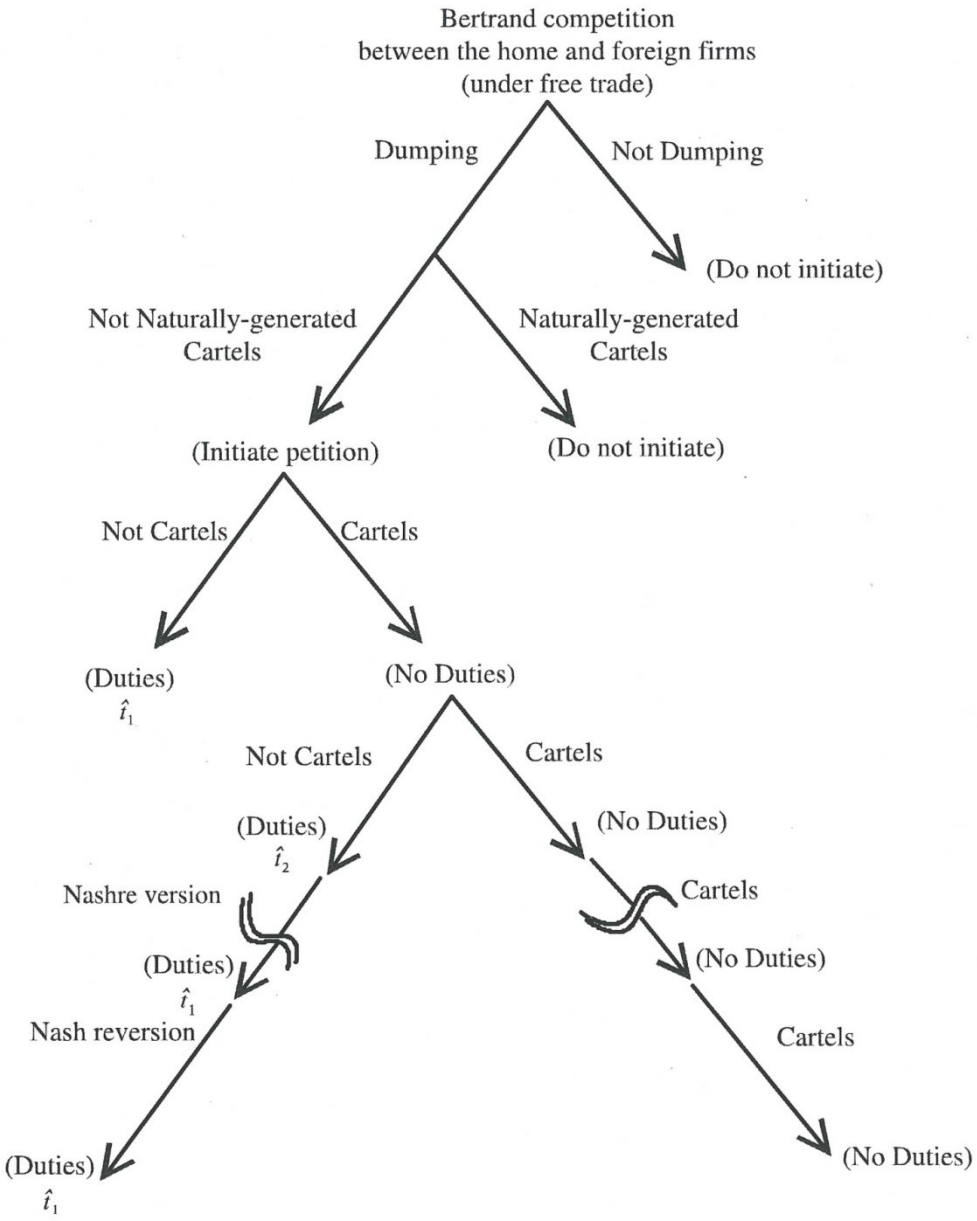


Figure 2 The Bertrand–Nash equilibrium in price space

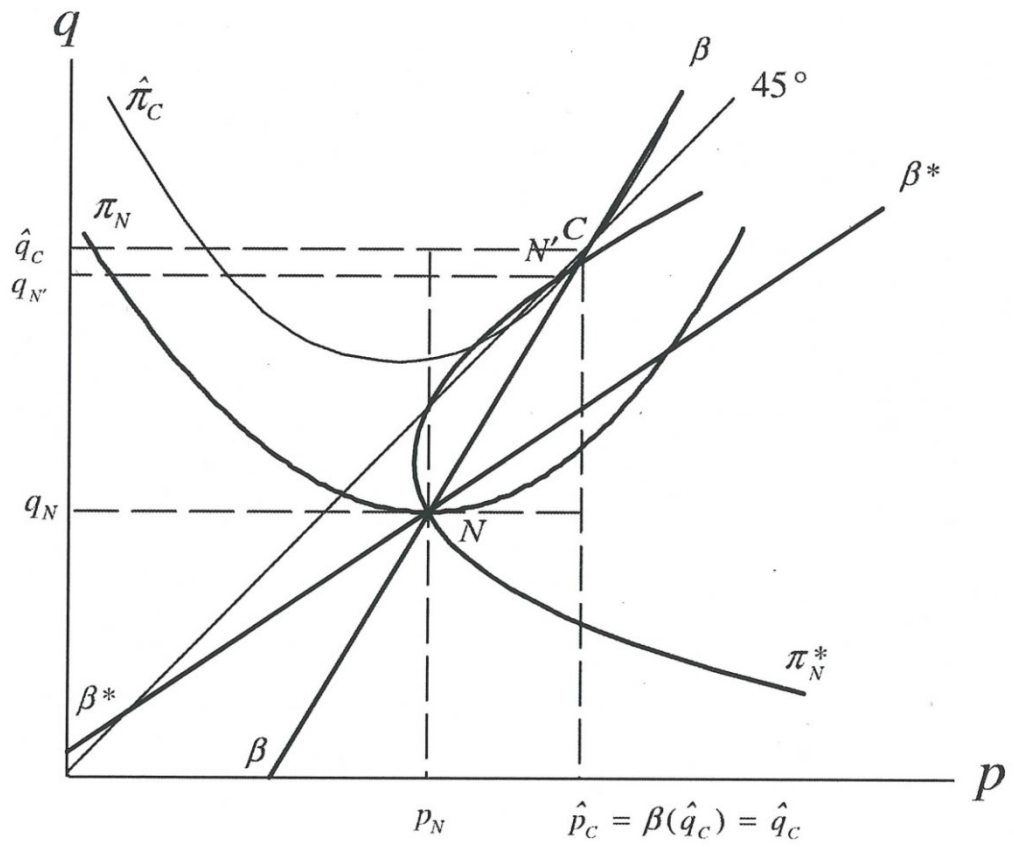


Figure 3 The locus of the Cartel Formation Condition

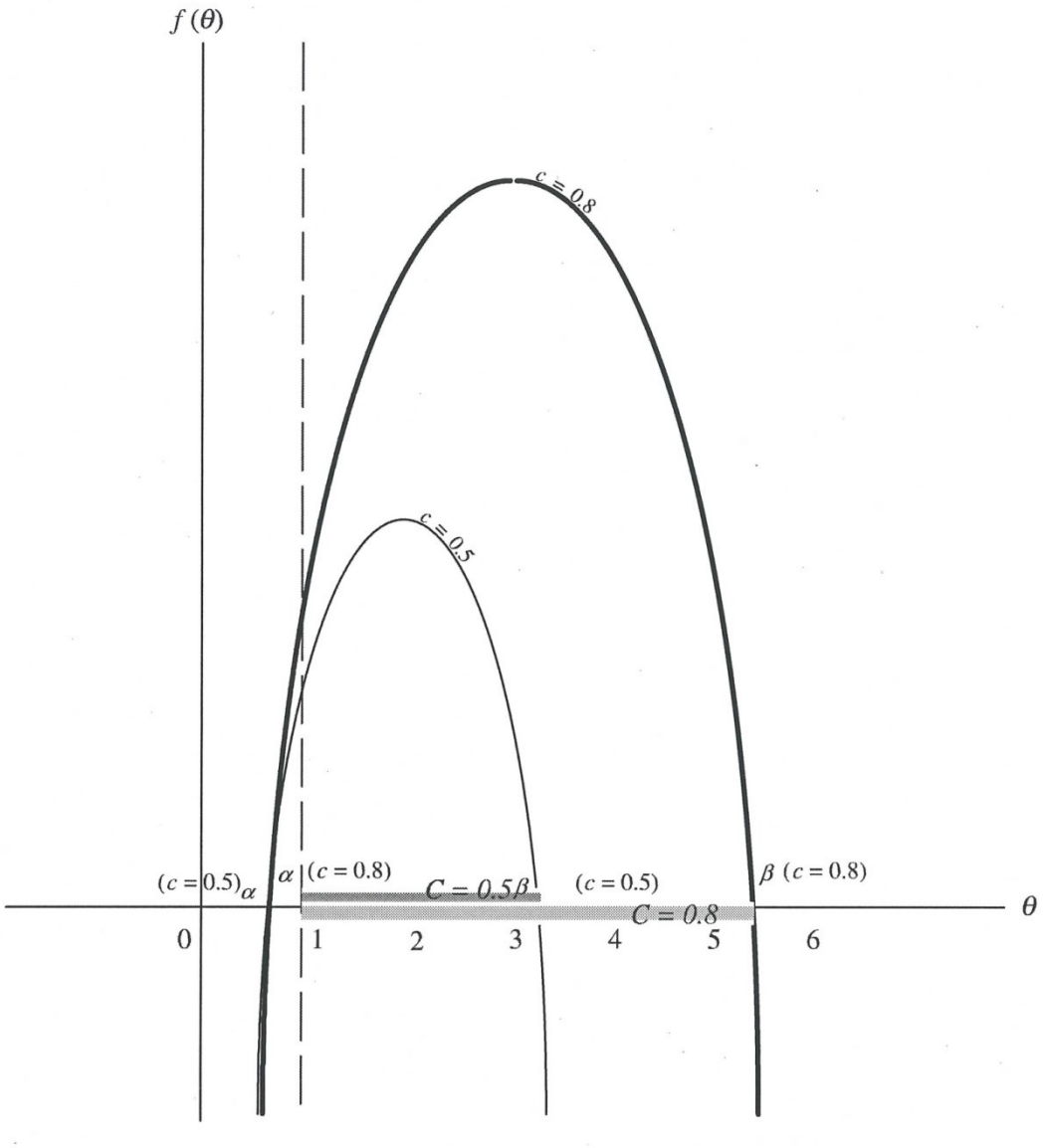


Figure 4 The region of negative anti-dumping duties

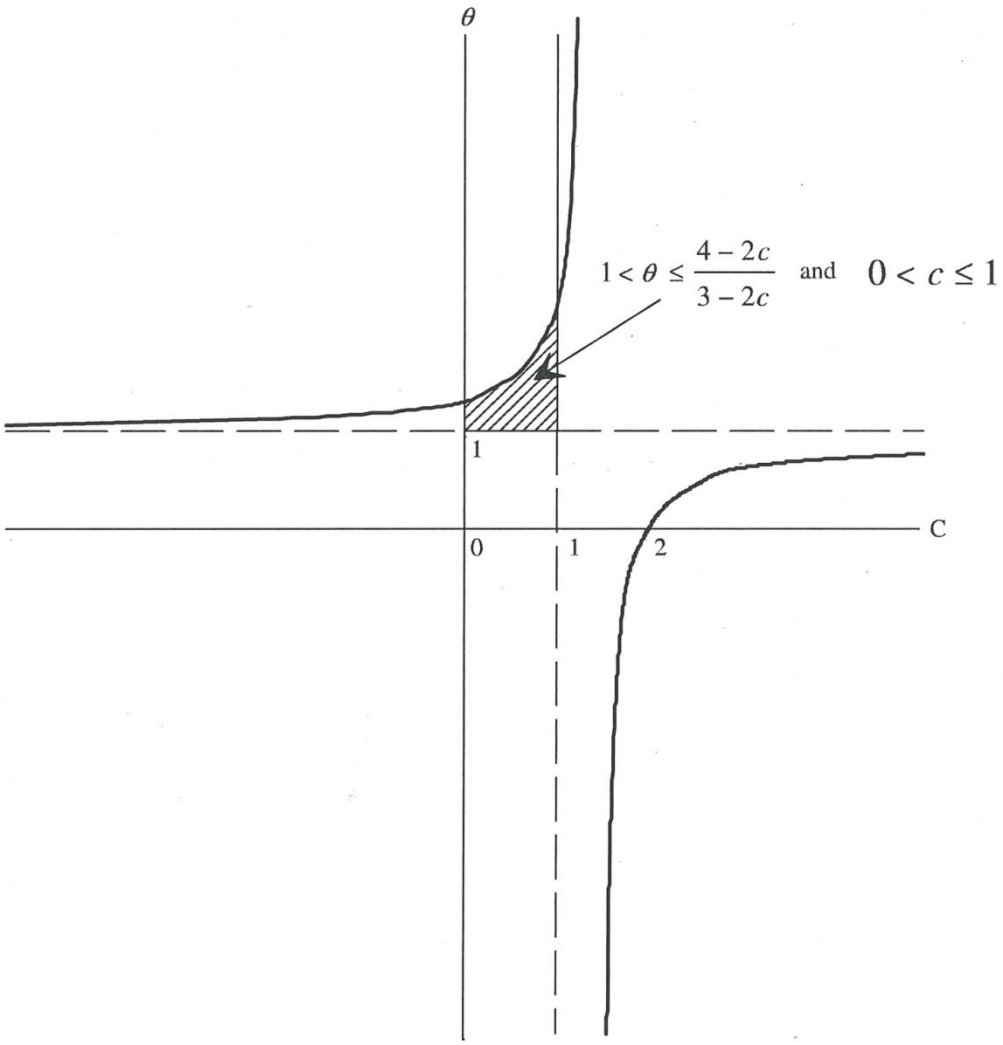
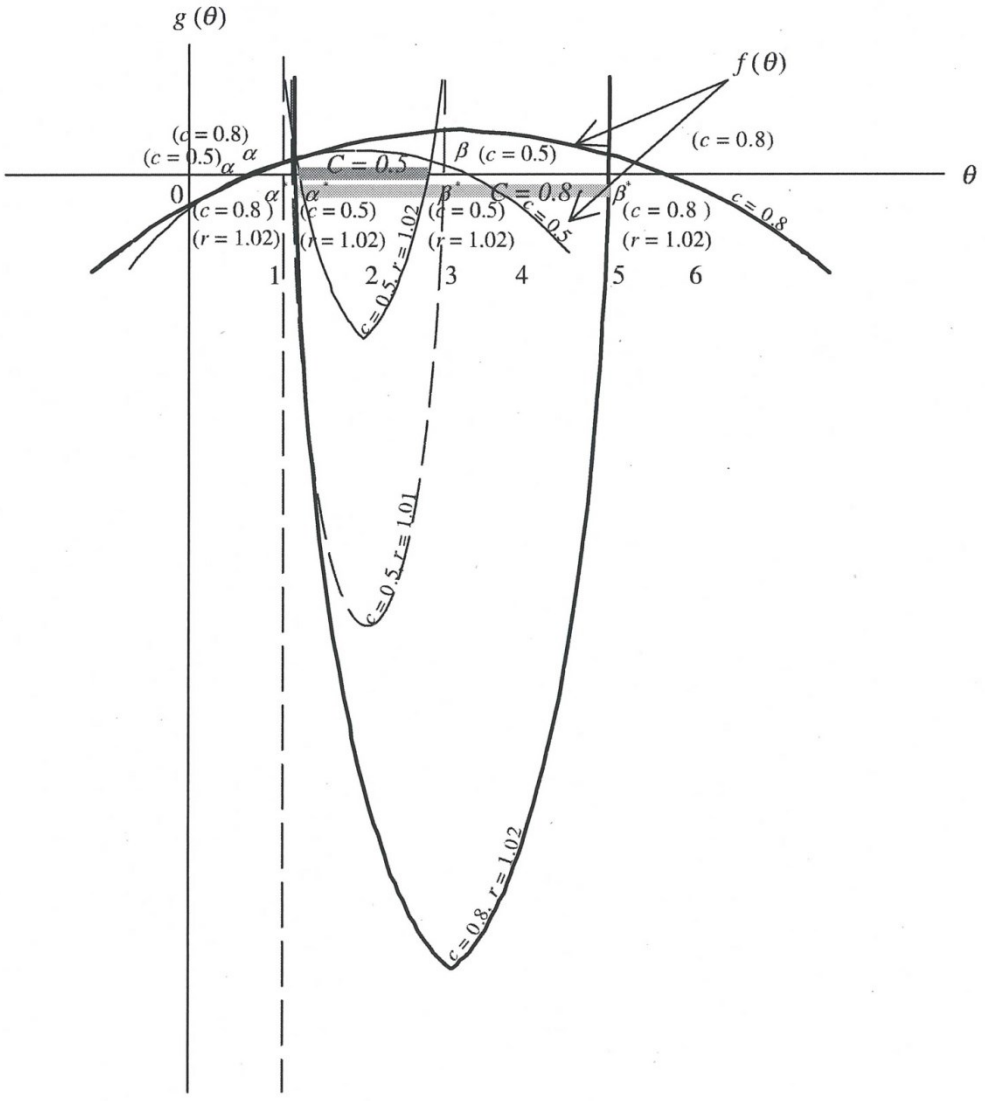


Figure 5 The locus of the Robust Cartel Condition



Conclusion

We are still developing study methods to understand modern corporate strategies, and doubtlessly, both micro- and macroeconomic assumptions used for the three research papers above will change in the future. Nonetheless, these models reveal several practical implications of evolving securitization markets.

From a firm's point of view, sale-leaseback transactions, which in some ways are the simplest form of securitization, provide an opportunity to raise funds. Furthermore, local government authorities (LGAs) with substantial real estate holdings may also prefer the sale-leasebacks; they can effectively transfer the obsolescence risk of their property to the real estate professionals. Our theoretical findings suggest that the success of a sale-leaseback lies in the knowledge, or the expertise, of the buyer/lessor, to eliminate free-rider problems, to exploit economies of scale, and to specialize in valuation, maintenance and disposal of properties, which is in line with previous studies. The empirical findings add enhancements to traditional corporate strategies; i.e., the data from a tax-exempt Japanese PRE portfolio reveal the simple criteria for making decisions regarding sale-leasebacks, which can be an alternative to off-sheet financing. The results 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 regarding sale-leaseback actions for Japanese PRE portfolios.

Even post-Lehman, characteristics of real estate (real assets) have continued to change in the direction of financial assets; this trend, associated with the increased volume of securitization activities, has led to an increase in the quantity of financial assets. Our theoretical findings suggest that such a quantitative change in private financial wealth would stimulate private absorption largely enough to offset its negative effects we posit on the net exports; i.e., it is shown that, after the increase in the foreign interest rate, real estate liquidity may help reduce the fluctuations of home output along an adjustment path between one equilibrium position and another.

As Mundell noted in 1963, the theoretical findings are also black and white rather than showing shades of gray. However, also in the process of setting prices or basic corporate strategies, companies need to consider how securitization would transform their business environment or the macroeconomic environment. Our theoretical findings link the companies using trigger strategies with anti-dumping regulations, which may also determine their external macroeconomic environment.

We are still at early stages of exploring the implications of evolving securitization

markets. Evidence-based studies are sure to add further enhancements. As we did in the first research paper, applications of various property management schemes to the LGAs provide useful insights into the current policy issues. Many Japanese LGAs are now disclosing, or are preparing to disclose, a variety of data, which are publicly available.

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