FINANCE MATTERS IN THE JAPANESE REAL ESTATE MARKET

Interaction between Finance and Real Estate Ownership

by

Takayuki Kiura

Submitted to the Department of Architecture
in Partial Fulfillment of the Requirement for the Degree of
Master of Science in Real Estate Development

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ABSTRACT

Finance does not matter in perfect and efficient markets. Based on neoclassical economics, financial capital is always perfectly priced, and all investments are completely valued in frictionless markets.

In the real world, however, finance does matter, especially in the real estate market, which is relatively imperfect and inefficient.

There are several phases through which funds flow into real estate. Among others, the interaction between the financial market and real estate investors is crucial. The financial market provides funds to investors. An efficient financial market will value real estate investments perfectly, but an inefficient financial market will not. Thus, the cost and availability of capital for investors are important factors that shape the real estate market of each country. The profile of real estate investors is also important. Inefficient investors can misdirect funds, even if the financial market is relatively perfect.

The primary objective of this paper is to unveil the inefficient relationship between the financial market and real estate investors in Japan. This relationship is one of the reasons why land prices and space markets boomed and then collapsed in the late 1980's and early 1990's. Later in the paper, I will present an alternative model of the real estate market, and make several simulations under the model.

Thesis Supervisor: Timothy J. Riddiough
Title: Associate Professor of Real Estate Finance

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1 Introduction

1.1 Purpose

Japan has opened its closed door to the entire world three times in the last 200 years of history. The first was in the late nineteenth century, when Japan was forced to sign treaties with Western powers. These treaties endowed the Westerners one-sided economic advantages in Japan. The second was after the loss of World War II, when Japan was incorporated into the system of the capitalist economic world. The last was after the bubble economy, when Japan was again forced to open its markets to the world, which had been described as closed by the United States and other Western countries.

After World War II, Japan made tremendous efforts to catch up to other developed nations, and actually reached its goals. Specifically, in the twenty years following World War II, GNP increased by approximately 10% per year, more than twice the rate of increase of American and Western European economies. However, since the bubble economy burst, the Japanese economy has been in turmoil.

We cannot predict how many more times Japan will be forced to open its door in the future, but the issue is that the Japanese markets have not been transparent. This tends to produce and accumulate inefficiency in the economic system, which always requires great pain and effort to adjust.

Emerging Trends in Real Estate 1999[1] made several statements regarding the Japanese markets. "Japan has a terrifically inefficient market. It's hard for outsiders to really know what's going on." It continued, "Japan has the second-largest world economy and a third-world banking system."

Inefficiency in the financial and real estate markets seems to have triggered the bubble

[1] Lend Lease Real Estate Investments and PricewaterhouseCoopers, 1998.

economy and its collapse. In order to avoid huge fluctuations in the economy in the future, and to avoid great pain and effort to adjust the markets, we need to understand where inefficiency exists, what it is, and how much we are paying for it. Some "inefficiency" costs may be necessary within an economic and social framework of a nation. Nonetheless, we may need to recognize how much we actually pay for these. Therefore, the primary purpose of this thesis is to understand inefficiency and its costs to the Japanese financial and real estate markets by examining the relationship between the financial market and real estate investors in Japan.

1.2 Organization of Document

I attempt to organize the thesis into two parts. The first part will be devoted to understanding the actual behavior and operation of financial and real estate systems. In a sense, I will take a positive approach in the first part of the thesis. In chapter two, I will present the history of real estate ownership and show how certain underlying notions have influenced the Japanese real estate market. Chapter three will be devoted to uncovering the financial and credit systems, and to examining the close relationship between the financial and real estate markets.

In the later part of the thesis, I will try to evaluate the outcomes of the both markets, and propose alternative models. Therefore, I will take a normative approach in the later part. Chapter four will be devoted to addressing several factors necessary to establishing more efficient markets. In chapter five, I will make three simulations under the alternative models.

2 Historical Understanding of Real Estate Ownership in Japan

Each country throughout the world has its own real estate ownership model. The real estate ownership model has influenced real estate property markets, asset markets, and, in the end, the entire economy of the country.

Japan's real estate ownership model is completely different from that of other countries. The real estate ownership model has established a social and economic framework. To understand how this came about, it is important to review the history of the real estate ownership model in Japan.

2.1 History of Real Estate Ownership

2.1.1 The Meiji Era

Japan did not emerge from feudalism and establish a land ownership model until 1868, during the so-called *Meiji* Reform[1]. Like other subjugated Asian nations, Meiji Japan was forced to sign treaties with Western powers that left Japan at a disadvantage. These treaties granted the Westerners one-sided economic and legal advantages in Japan. In order to regain independence from the Europeans and Americans, and to establish itself as a respected nation in the world, Meiji Japan was determined to close the gap between itself and Western powers economically and militarily. Drastic reforms were carried out in practically all areas. For

[1] The Shogunate surrendered its power to the Emperor and the Emperor subsequently restored orders by appointing a government mainly run by mid to low level bureaucrats in the warrior class. Land ownership prior to the Meiji era (i.e. the *Edo* era) is not clearly observed. There was a form of state ownership, nobility ownership, peasant ownership, and communal ownership. While one person owned a parcel of land, a peasant (tenant) would most likely occupy and cultivate the land. Peasants were tied to the land they were cultivating, and, as is the case in most feudal societies, owning the land was one thing, and occupying and cultivating land was another. See Masayuki Tagai, Unlocking Japan's Potential GDP, 2000, MIT Sloan Thesis.

instance, the new government aimed to make Japan a democratic state with equality among all people. The boundaries between each social class of the Edo era were gradually broken down[2]. In order to stabilize the new government, former lords had to return all their fiefdoms to the emperor. Nevertheless, most of those lords became the new nobility and continued to be allowed to hold large private real estate in their former fiefdoms and metropolitan areas. To transform the agricultural economy of the Edo era into a developed industrial one, the government directly supported the prospering of businesses and industries, especially the large and powerful family businesses called *zaibatsu*[3]. As a consequence, large land ownership by a few landlords (chiefly the nobility and large merchants) was promoted during this period.

This concentrated land ownership was well recognized, specifically in metropolitan areas. In the Tokyo metropolitan area at the beginning of the twentieth century, the number of landowners who owned more than 10,000 *tsubo*[4] (approximately 8.2 acres) was 108, 0.5% of the total landowners at that time. However, this owned land accounted for almost 25% of the total area. Of these 108, 39 were former lords in the Edo era (Tokugawa, Abe, Asano, Sakai, etc.), 40 were wealthy merchants from the Edo era (Mineshima, Watanabe, etc.) and political merchants, the "zaibatsu". In particular, the Mitsubishi owned 231,792 tsubo (approximately 190 acres), and the Mitsui owned 170,258 tsubo (approximately 140 acres), ranked first and second in terms of owned areas[5].

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[2] There were mainly four social classes: warrior, farmer, craft worker, and merchant. Their activities and positions were strictly regulated during the Edo era.

[3] *Zaibatsu* were family-owned holding companies which played a major role in the Japanese economy from the late 1800s through World War II. These conglomerates expanded into almost all sectors, both industrial and financial, with the four largest being Mitsubishi, Mitsui, Sumitomo, and Yasuda.

[4] Japanese measurement of area. 1 tsubo equal to approximately 37 square feet.

[5] Source: Shigetaka Kobayashi, Land Development and Urban Planning, 1981, Tokyo University Press.

In 1912, the number of landowners who owned more than 10,000 tsubo was 162, and they owned approximately 30 percent of the total area in the old Tokyo city, indicating that ownership concentration had been further promoted during this period. Merchants, particularly, increased their ownership. This was due to the fact that those merchants also acted as quasi-bankers at the same time, acquiring collateralized land from borrowers[6].

It is important to note that the concentrated real estate ownership by a small ruling class had been the case throughout Japanese history. Other social classes, i.e. the peasant, small merchant, and worker classes, were not permitted to own real estate, always renting tiny parcels of real estate owned by a few large landlords. This situation gave rise to the excessive value of land, which deviated from the land utilization value. Eventually, land became the most valuable resource for people. The lending process, in which a pledge of land was required to obtain financing, was also recognized from the Meiji era. These facts shaped the concept of real estate and how banks lent money after this period.

2.1.2 After World War II

When the occupation forces arrived after the Second World War, one of their main tasks was to rewrite the Japanese Constitution. History tells us that an initial draft proposed by the Japanese government was rejected by the Supreme Commander for the Allied Powers (SCAP), headed by General MacArthur, because it made few changes in human rights, the power of the emperor, or feudal ownership structures. In order to address these issues, SCAP redrafted another version of the Constitution. The Japanese government under the occupation accepted most of this draft except for Clause 29. The original clause stated that all land and national

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[6] Source: Ibid.

resources would become national property. This was a reflection of the SCAP's belief that feudalism had been the cause of Japan's military aggression. The Japanese government reacted by making a counter proposal that would leave the issue of land ownership open for gradual transitional land reform. As a result, the land continued to remain in the hands of a small ruling class, especially in urban areas[7].

Furthermore, the dissolution of the zaibatsu groups did not completely eliminate large land ownership by large merchants. Although the SCAP divided each zaibatsu group into several companies depending on the nature of their businesses, almost all real estate the zaibatsu groups had owned was transferred to the real estate companies of the groups. For instance, real estate the Mitsubishi had owned was divided and transferred to two different real estate firms, Kanto and Yowa; however, when Kanto and Yowa merged, the assets returned to the Mitsubishi Estate Co., Ltd.

On the other hand, large land ownership by the former lords and the nobility was basically eliminated because of huge property taxes, which forced sell-offs. Ironically, this further encouraged concentrated real estate ownership in the hands of large firms, since the nobility's assets were primarily located in metropolitan areas, too expensive for individuals or small firms to acquire.

2.1.3 From the High Economic Growth Period[8] to Present

Land utilization during this period is characterized by heavy industrialization, urbanization, and, consequently, the concentration of production and business facilities in a few

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[7] Masayuki Tagai, Unlocking Japan's Potential GDP, 2000, MIT Sloan Thesis.

[8] The period after World War II to the first oil crisis (around 1973). As will be discussed later, Japan recorded tremendous economic growth during this period.

large metropolitan areas. This further encouraged land ownership by large corporations.

Matsubara (1988) explained this increase by categorizing corporations into four groups[9]. The first group included real estate developers (Mitsubishi Estate, Tokyu Land), construction companies (Obayashi, Kajima, Fujita), and private railroad companies (Keisei Electric Railway, Nagoya Railroad), the companies increasing land acquisition mainly for residential development purposes. The second group consisted of the automobile industry (Toyota Motor, Nissan Motor, Honda Motor), the iron and steel industry (Kobe Steel, NKK), and the machinery industry (Mitsubishi Heavy Industries, Kawasaki Heavy Industries), the industries that increased land acquisition so as to expand production facilities to meet demand for their products. The third group was composed of the companies that increased land ownership by the mid 70s, but decreased it after the first oil crisis (1973-1975). This group included the petroleum and chemical industries. The last group, represented by the textile industry, decreased land ownership throughout the 1970s.

Table 2-1 shows how each economic sector (household, government, financial institution, and private firm other than financial institution) invested in land during the high economic growth period. Figure 2-1 uses the same data, but it covers a longer period of time, from 1955 to 1998. Firms have continuously invested in land especially during the high economic growth period (table 2-1). Shortly after the first oil crisis, however, they sold off land assets for two years (figure 2-1). This trend was consistent with the argument by Matsumoto; that is, companies, especially in the petroleum and chemical industries, sold off their assets to restructure their balance sheets and smooth their profits shortly after the first oil crisis.

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[9] Source: Hiroshi Matsubara, Fudousan Shihon to Toshi Kaihatsu, 1988, Minerva Shobo.

Table 2- 1 Land Investment in Each Sector during the High Economic Growth Period

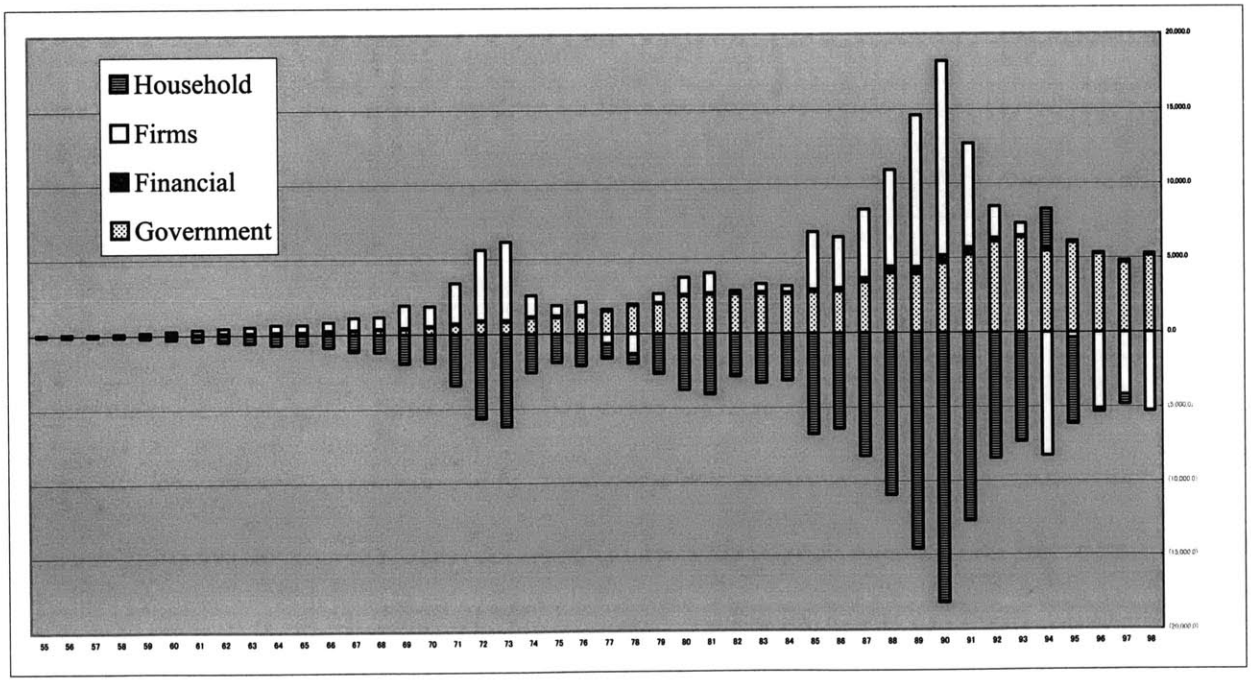
Sector / Year	1955	1956	1957	1958	1959	1960	1961	1962
Household	(62)	(96)	(90)	(118)	(183)	(274)	(363)	(450)
Firm (non-financial)	42	72	58	82	144	231	278	324
Financial Institution	4	5	6	8	13	16	15	22
Government	16	20	26	28	26	27	70	105

1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
(536)	(673)	(672)	(844)	(1137)	(1181)	(1948)	(1883)	(3417)	(5638)
398	487	486	567	827	780	1498	1316	2677	4705
37	47	64	55	54	75	106	106	92	88
101	139	122	223	256	326	344	461	647	844

Note: Thousand Million Yen. Market Value at each year. Calculated by the author.

Source: Economic Planning Agency, Annual Report on National Accounts, 2000, MOF Printing Bureau

Figure 2- 1 Land Investment in Each Sector (Long Time Series: 1955 – 1998)

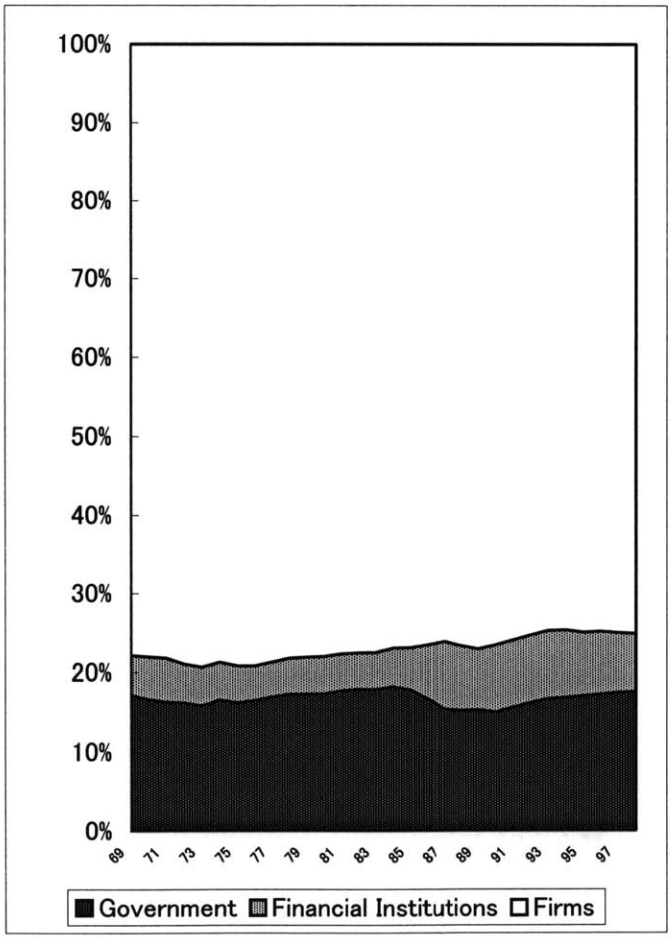


Note: Thousand Million Yen. Calculated by the author

Source: The Economic Planning Agency, Annual Report on National Accounts, 2000

Notice, however, that the Japanese government also increased land investment, specifically after the first oil crisis (figure 2-1). In order to look at these trends in more detail, figure 2-2 shows the share of land ownership from the stock viewpoint. Unlike in the previous table and figure, in this figure I have excluded the percent held by individual households in order to carefully examine those of other sectors. Please also note that data are calculated by market value in the previous table and figure, but by the book value in figure 2-2.

Figure 2- 2 Percentage of Land Holding by Sector



Note: Calculated by the author

Source: Economic Planning Agency, Annual Report on National Accounts, 2000

Unfortunately, I cannot obtain data prior to 1969, but it is realistic to assume that the percent of land owned by corporations increased until the first oil crisis. After then, however, figure 2-2 indicates that government had increased land acquisition until the bubble economy, and increased again after the burst of the bubble economy. I will discuss these phenomena in more detail in the later section.

In summary, land ownership after the Meiji reform is characterized as a history of concentrated ownership by corporations, which continued steadily from the end of the nineteenth century to the burst of the bubble economy, despite some corporate sell-offs after the first oil crisis. In contrast, the Japanese government increased its acquisition of land after the first oil crisis and the burst of the bubble economy. One might ask why this was the case. Did all firms increase their investment in land solely for pure business purposes? Why did the government increase its acquisition when firms decreased theirs? In the next section, I will look for answers to these questions.

2.2 Reasons for Direct Real Estate Investment by Private Firms

In the previous section, I discussed that corporations steadily increased their investments in land after World War II except for periods after the first oil crisis and the bust of the bubble economy. In contrast, the Japanese government increased land acquisition after the first oil crisis and the burst of the bubble economy. The primary objective of this section is to examine the reasons why corporations needed to increase their land assets. I will discuss the function of the government's investment in another chapter.

2.2.1 Needs for Production and Service Facilities by Private Firms

Table 2-2 shows how major heavy industrial companies directly own business and production facilities. I selected six companies that represent Japanese heavy industrial firms: Mitsubishi Heavy Industries, Hitachi, Toyota Motor, Nissan Motor, Matsushita Electric Industrial (Panasonic), and Toshiba.

Table 2- 2 Percentage of Owned Real Estate

Company Name	Facility Category	Owned Area	Rented Area	Percentage
Mitsubishi Heavy Industries	Production Facilities	10,141	1,113	90.1%
	Fringe Benefit Facilities	1,315	27	98.0%
	Offices	224	46	83.0%
	Other	1,330	14	99.0%
	Total	13,010	1,200	91.6%
Hitachi	Production Facilities	3,913	-	-
	Fringe Benefit Facilities	813	-	-
	Offices	488	-	-
	Other	292	-	-
	Total	5,506	897	86.0%
Toyota Motor	Production Facilities	5,551	0	100.0%
	Fringe Benefit Facilities	172	0	100.0%
	Offices	1,068	6	99.4%
	Other	1,064	71	93.7%
	Total	7,855	77	99.0%
Nissan Motor	Production Facilities	4,818	0	100.0%
	Fringe Benefit Facilities	-	315	-
	Offices	1,478	51	96.7%
	Other	1,455	2	99.9%
	Total	7,751	368	95.5%
Matsushita	Production Facilities	1,594	0	100.0%
	Fringe Benefit Facilities	155	85	64.6%
	Offices	195	78	71.4%
	Other	531	0	100.0%
	Total	2,475	163	93.8%
Toshiba	Production Facilities	1,938	-	-
	Fringe Benefit Facilities	934	-	-
	Offices	1,423	87	94.2%
	Other	209	-	-
	Total	4,504	766	85.5%

Source: Financial Report of 1998 Fiscal Year[10] of each company.

Note: All numbers except percentages are expressed by thousand square meters.

1) Owned Area: Floor area owned by each company.
2) Rented Area: Floor area rented by each company.
3) Percentage: Owned Area / (Owned Area + Rented Area)
4) Production Facility: Factory, Warehouse, etc.
5) Fringe Benefit Facility: Employee Housing and Accommodation Facility for employee in resort areas, etc.
6) Office: Head Office and Branches
7) Other: Mostly composed of Laboratories, etc.

It is not surprising that these industrial firms own relatively large production facilities, since factories or warehouses typically require buildings specifically designed for manufacture and storage of their products. Office buildings, on the other hand, need not be as customized for each tenant. However, data tell us that these firms that continuingly invested in land assets throughout the high economic growth period acquired land not only for production expansion, but also for individual office needs and fringe benefit usage.

One may point out that Matsushita Electric Industrial rents more office floors than other firms, and that this might also be the case with other companies not listed in the table. It is true that relatively newly established companies, like Matsushita, do not own as many real estate assets as those companies originating from the zaibatsu group companies, but we should not ignore the fact that most large companies typically hold real estate subsidiaries that own and manage office buildings, and lease them to parent companies and other companies in the same group. For instance, Matsushita Kousan is a real estate subsidiary in the Matsushita group, which owns magnificent twin office buildings in the Osaka metropolitan area. One building is leased to companies outside the Matsushita group, but another is fully occupied by the Matsushita

[10] A fiscal year for most Japanese firms begins on April 1st and end on March 31st.

and its group companies.

In order to look at this trend more clearly, I will next examine financial institutions, whose business facilities require primarily office spaces. I selected four major commercial banks: Bank of Tokyo-Mitsubishi, Sumitomo Bank, Sakura Bank, and Fuji Bank.

Table 2- 3 Percentage of Owned Real Estate in the Commercial Bank Industry

Company Name	Facility Category	Owned Area	Rented Area	Percentage
Bank of Tokyo-Mitsubishi	Offices and Branches	790	299	72.5%
	Fringe Benefit Facilities	322	31	91.2%
Sumitomo Bank	Offices and Branches	508	205	71.2%
	Fringe Benefit Facilities	285	61	82.4%
Sakura Bank	Offices and Branches	672	449	59.9%
	Fringe Benefit Facilities	30	2	93.8%
Fuji Bank	Offices and Branches	564	253	69.0%
	Fringe Benefit Facilities	283	170	62.5%

Source: Financial Report of 1998 Fiscal Year of each company.

Note: All numbers are expressed by square meter except percentage.

1) Owned Area: Floor areas owned by each company.
2) Rented Area: Floor areas each company rents.
3) Percentage: Owned Area / (Owned Area + Rented Area)

In preparing this table, I referred to financial reports of these banks as of the 1998 fiscal year. Table 2-3 shows the result. As can be seen in this table, these commercial banks also own a relatively high percentage of office space. Financial institutions such as these nation-wide commercial banks need optimal locations for branches so that they can attract a variety of customers, ranging from residents to shoppers to firms near the branches. Optimal locations for financial institutions are likely to change from time to time as surrounding areas develop. Therefore, it is reasonable to assume that renting would be more advantageous to these financial institutions than owning their own office space, given that renting allows them to relocate or, in some cases, completely eliminate their branches. However, the Japanese

commercial banks listed above own not only their head offices but also their branch offices throughout Japan.

As will be discussed later, demand for goods and services was basically bullish throughout the high economic growth period. As a consequence, Japanese private firms needed to expand their operation facilities to meet the needs. This fact, together with the absence of real estate investors with enough funds, partly accounts for why these private firms acquired land directly and built business facilities on their own.

2.2.2 Tax Shelter Value of Land

As is sometimes observed throughout the world, the tax system of a country can influence the behavior of households and firms in selecting optimal asset allocations. This is certainly the case in Japan. Until recently, the Japanese tax system made real estate a favorable asset with which to accumulate wealth, especially for individuals. It has been pointed out that for individuals, land has been a very good tax shelter. Inequities in the inheritance and capital gain tax systems have often been suggested as probable culprits in the overvaluing of land. Since land is undervalued in the inheritance tax base, individuals can lessen their tax burden by holding their assets in the form of land[11], thus driving up land prices. However, this tax shelter incentive works only for individuals, not for corporations, since there is no inheritance tax for the latter.

2.2.3 Did Firms Acquire Land for Business Purposes?

What factors other than those mentioned above motivated private firms to invest directly

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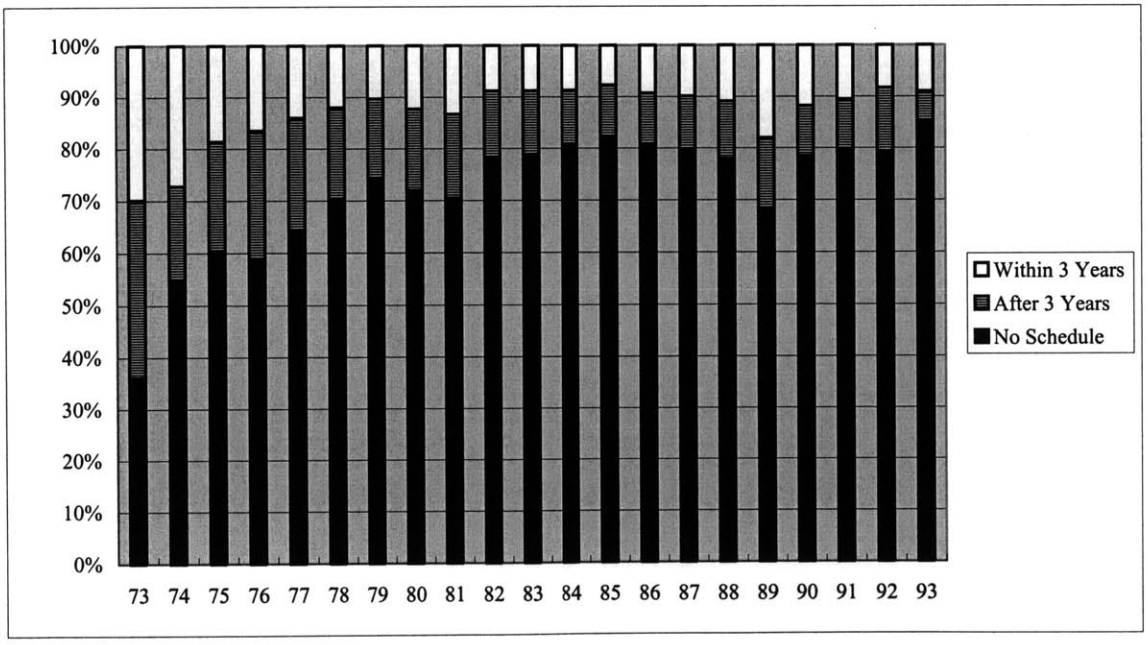
[11] Nishimura, Yamazaki, Idee, and Watanabe, "Distortionary Taxation, Excessive Price Sensitivity, and Japanese Land Prices", 1999, NBER Working Paper No. 7254.

and own real estate assets? Did they really hold land only for business/operation purposes, as discussed in the sections 2.2.1?

Figure 2-3 shows the result of research done by the National Land Agency on firms' prospective schedule to use their land. An astonishingly high percentage of the companies have no plan to utilize their land. Furthermore, apart from the period during the bubble economy, the percentage has been steadily increasing. Unfortunately, I was not able to obtain data prior to 1973. It would be safe to assume, however, that most firms acquired land for immediate business purposes throughout the high economic growth period. After the first oil crisis around 1973, however, they seem to have increased their acquisition of land without having a plan for its immediate use.

Figure 2- 3 Prospective Building Schedule of Unutilized Land



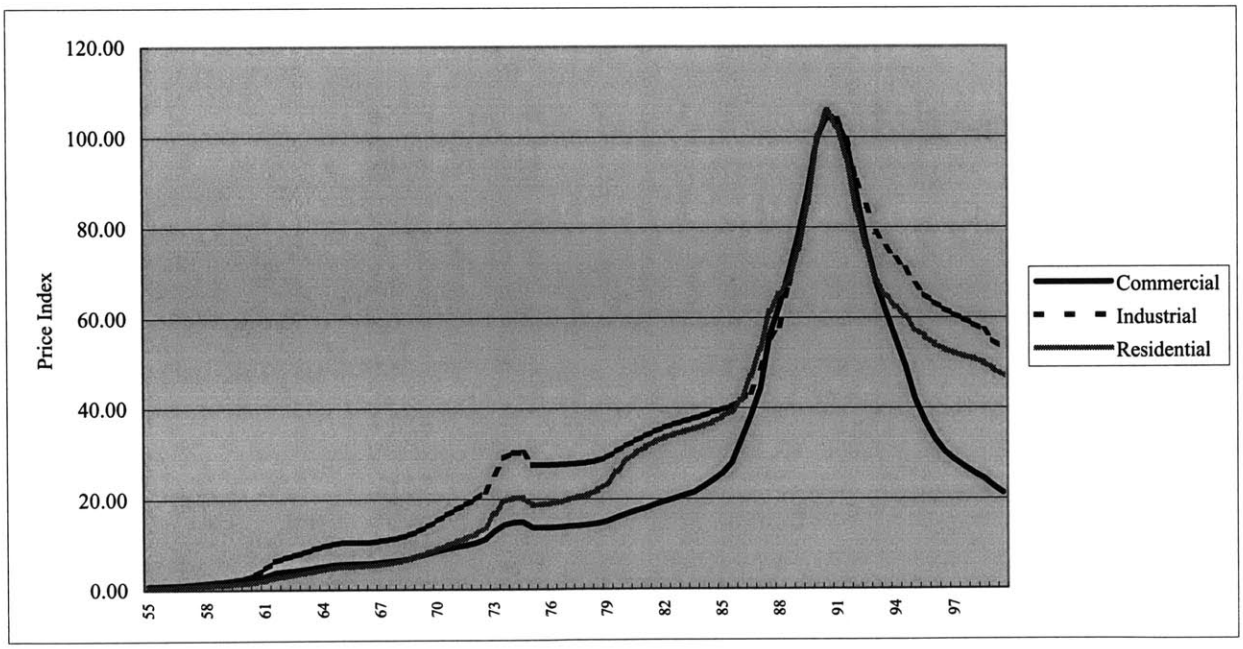
Source: National Land Agency, Tochi Hakusho, Time series are expressed by fiscal year.

Therefore, it appears that those firms invested in real estate not only for business purposes, but also for purposes other than immediate business use. We might also be able to say that land utilization is implemented when other factors, such as enough funds to finance construction, come into play.

2.2.4 The Land Myth and Price Determination

Figure 2-4 describes the movement of land price index of three zoning areas (commercial, industrial, and residential area) from 1955 to 1999 semiannually.

Figure 2- 4 The Movement of Land Price Index by Each Zoning Area



Source: Japan Real Estate Institute, each index is the average of land price indices of the six largest cities (Tokyo, Yokohama, Nagoya, Osaka, Kyoto, and Kobe). The Price of March, 1991 = 100

As depicted in Figure 2-4, Japan has experienced turbulent behavior in land prices since World War II. Between 1955 and 1990, the residential land price in metropolitan areas (six

largest cities) soared to more than two hundred times its 1955 value, whereas stock prices rose to ninety times their 1955 value. Since the consumer price index increased eight fold during the same period, the real value of land increased tremendously. Underlying this spectacular increase in the land price until 1990 was the so-called *Tochi Shinwa* (*the land myth*), i.e. the belief that land was an ultimate safe harbor, always beating any other assets with ever-increasing prices. It is remarkable to note that except for one year (1975), between 1955 and 1990 land prices did not fall. The myth was firmly entrenched in the post-war Japanese economic history. Overall, this *land myth* is the critical reason why firms tried to hold real estate on their own.

Keeping this fact in our mind, let us discuss briefly how land price is determined in Japan. In the United States, the land price determination model that we frequently encounter would be as follows:

$$P_0 = PV(R_1 + R_2 + \cdots\cdots + R_{t-1} + R_t) + PV(P_t) \qquad (1)$$

where P_n denotes the land price at a particular period n, R_n denotes the rent earned from the land at a particular period n. When we apply the growing perpetuity formula to P_t, the above formula will be modified as follows:

$$P_0 = PV(R_1 + R_2 + \cdots\cdots + R_{t-1} + R_t) + R_{t+1} / i\text{-}g \qquad (2)$$

where i denotes the capitalization rate, and g denotes the growth rate of rent after $(t+1)$ period.

In this model, we assume that cash inflow, usually represented by rent, is the basis of determining land prices. In Japan, on the other hand, we could not modify equation (1) to (2) because P_t is not derived from expected rent levels. As will be discussed later, land price is not based on rents, but rather on people's expectation for future sales price of land. Therefore, we can define our land price determination model as follows:

$$P_0 = PV(R_1 + R_2 + \cdots\cdots + R_{t-1} + R_t) + PV(P^e_t) \qquad (3)$$

where P^e_t denotes the expected land price at the time t, and it is priced basing on other factors

than the prevailing rent at the time of t.

However, equation (3) is not yet enough to explain the Japanese land price model. Nishimura et. al. (1999: see footnote 10) suggested that we should consider an augmented PV model incorporating quasi-rents (tax shelter values) mentioned in the previous section. Instead of simple PV model (3), we then get

$$P_0 = PV(R_1 + R_2 + \cdots\cdots + R_{t-1} + R_t) + PV(P^e_t) + [PVQR]_t \qquad (4)$$

where $[PVQR]_t$ denotes the present value of future quasi-rents.

2.2.5 Implication of Collateral Value

The above quasi-rents PV model can be applied to the firms' asking prices. In section 2.2.2, I discussed that the tax shelter incentive was not a decisive factor in firms holding real estate. However, as discussed earlier, land was considered as the most desirable collateral by banks. Thus, owning land made borrowing easy, even in difficult periods for corporations (Nishimura, 1996). This collateral service value should also be included in the quasi-rents.

In this chapter, I have discussed probable reasons for government and private industry to incorporate land assets in their balance sheets. Land in Japan had long been seen as the safest asset, guaranteeing ever-increasing prices. In addition, during the period of high economic growth, land acquisition was supported by firms whose primary objective was to extend their operation facilities so as to meet rising needs. The existence of quasi-rents, tax shelter value for individuals, and collateral service value for corporations also had implications for land price movements. However, these factors do not completely explain the land price movements after World War II or the building boom during the oil crisis and the bubble economy. To understand these movements better, we must consider the financial condition at the time.

3 Importance of Finance in the Real Estate Market

Finance does not matter in efficient and frictionless markets. When resources are allocated in frictionless markets and the existence of a medium of exchange is taken for granted, good investments will always be financed and bad investments will not. The cost of capital each investor can obtain is correctly priced depending on the characteristics of investment. Furthermore, based on the famous Modligliani-Miller Theorem (M&M), debt and equity do not matter to finance investment. Thus, investors need not worry about where the money comes from.

However, in the real world, finance does matter, especially in the real estate market, which is not perfect and efficient. Sometimes good investments are not financed, and other times the financial market provides investors with too low costs of capital relative to the risk. Moreover, the financial market provides funds without judging the risk-return characteristics of investments.

These imperfections suggest that finance and investment interact in important ways. In other words, neoclassical economic assumptions and hence the M&M do not hold perfectly in the real world, thus enhancing the role of finance in economic performance[1].

The primary objective of this chapter is to understand how finance has influenced the movement of the Japanese real estate market.

3.1 Finance Has Influenced the Japanese Real Estate Market

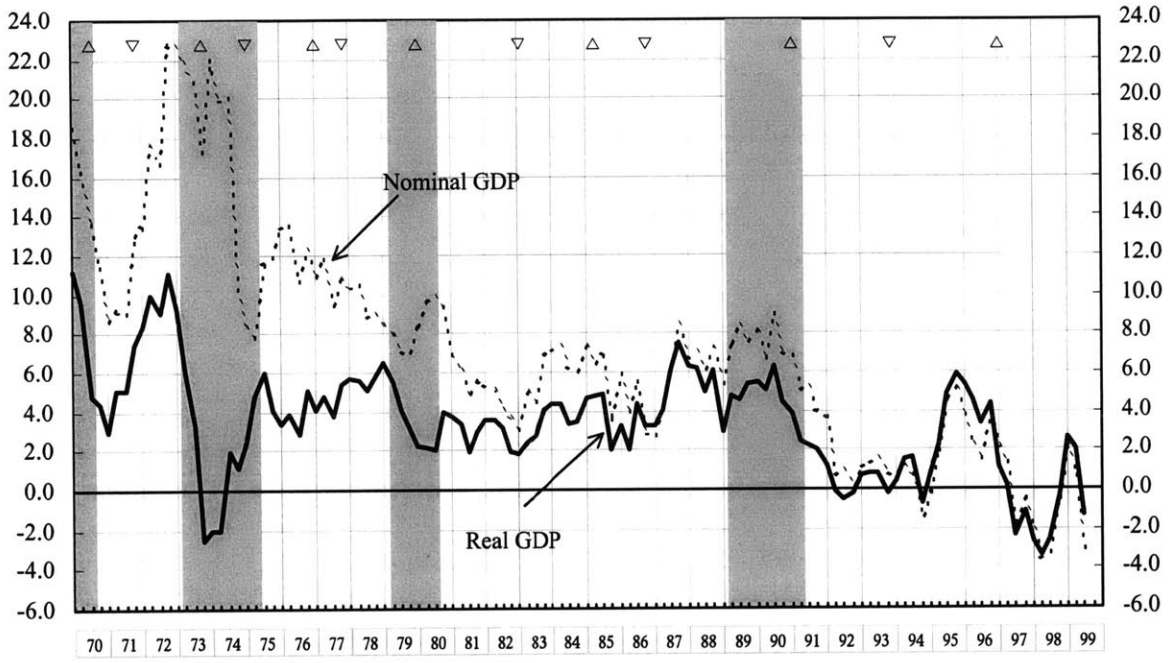
3.1.1 Overview of Japanese Economic History

Before discussing the influence of finance conditions on the real estate market, we must

[1] Timothy Riddiough, Real Estate Finance (Lecture Note), 1999, MIT.

review the history of the Japanese economy. Figure 3-1 describes the GNP rate of increase from 1970 through 1999.

Figure 3- 1 GNP Increase Rate (1970-1999), (%)



Source: Bank of Japan, Economic and Financial Data, 2000, Tokiwa Sogo Service

Note: Shaded areas indicate major economic expansions and depressions.

We called the period from World War II through 1972 the high economic growth period, during which GNP increased by approximately 10% per year, an astonishing rate of increase throughout the world at that time. However, the first oil crisis hit a Japan that was almost completely dependent on oil imports from OPEC countries. The GNP increase rate went down to less than 0% from 1973 to 1974 (shaded area).

The second oil crisis occurred in 1979 (shaded area from 1979 to 1980), and in 1985 the

Plaza Accord took place, in which the finance ministers of the Group 5 met at the Plaza Hotel in New York to mount a concerted effort to reduce the value of the U.S. dollar against other major currencies. After the Plaza Accord, the sudden appreciation of yen had a great impact on the Japanese economy, especially in those sectors that relied on export sales. We experienced a tremendous boom (the bubble economy: shaded area from 1989 to 1991), followed by its bust soon after.

What are the important factors to support a country's economic growth? First, it is frequently quoted that the magnitude of national savings and its efficient flow into capital investments is a key factor in a nation's economic growth. Many economists have pointed out that the high economic growth in Japan was due to the higher saving rate of the Japanese, and the continuing expansion of capital expenditure by private firms. In this sense, finance, or capital, is significant in making a first step of economic growth. Second, an increase in labor power is as important as that in capital. The final factor of a nation's economic growth is technological innovation[2]. Nakatani (1999) applied this model, developed by R. M. Solow, to the Japanese economy and analyzed each factor's contribution to the overall economic growth (Table 3-1)[3]. Throughout the period, the capital factor contributed most to the Japanese economic growth.

Table 3- 1 Contribution of each factor to overall economic growth

Category / Period	1965-1972	1973-1980	1981-1990
Capital	5.19%	2.73%	1.79%
Labor	0.33%	0.25%	0.66%
Technology	3.49%	0.90%	1.35%
Overall	9.01%	3.88%	3.80%

[2] R.M. Solow, A contribution to the Theory of Economic Growth, 1956, Quarterly Journal of Economics.

[3] Iwao Nakatani, Macroeconomics, 1999, Nihon Hyoron-Sha.

According to Tanaka (1997)[4], "The only binding factor for the Japanese economy soon after World War II was a *finance* constraint. Government and private industry had an ideal future model (the Western Europe and American economies) in their mind. Thus, the most important issue had been how fast they would be able to catch up with those countries." This implies a critical reason why capital contribution is essential for the growth of the Japanese economy.

Table 3-1 shows that technological growth had accounted for about 40% of the overall economic growth until the first oil crisis, but only 23% during the second period. Following Tanaka's observation that the primary objective of Japan after World War II was to catch up with other developed countries in terms of production, this decline indicates that by 1980, Japan had almost reached its goal. Therefore, I conjecture that Japanese firms lost their primary objectives and no longer had a focus for investing funds. It is important now to consider where these funds were invested.

3.1.2 Need for Stabilized Finance and Credit System

Both government and management of private industry had one goal in mind: to catch up with the economies of Western Europe and the United States. As a consequence, they established an economic infrastructure most suitable to reach their objective. First, industry set up an amicable relationship with labor unions. They came up with lifetime employment system, which promised lifetime employment in exchange for a promise not to demand a salary increase and not to strike. The government also established regulations to protect Japanese companies from outside penetration in order for firms to concentrate on their operations.

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[4] Naoki Tanaka, Japanese Economy after the Big-Bang, 1997, Nikkei Shinbun-sha.

Tanaka also argued that after World War II management felt confident that long and medium-term demand increase in all sectors would be promising. Therefore, the sole risk factor for management, as well as for government, was how to obtain financing during cyclical depressions.

Keiretsu, or the main-bank system, is one means by which large firms can overcome depressions with respect to finance. A *Keiretsu* is a network of companies, usually organized around a major bank. There are long-standing business relationships between the group companies. Most debt financing comes from the keiretsu banks or from elsewhere in the group. This system confers certain financial advantages for keiretsu group firms, especially during depressions. There is a term frequently used by economists: *asymmetric information*. It indicates that managers know more about their companies' prospects, risks, and values than do outside investors. Because of the asymmetry, investments are not always perfectly priced by the financial market. The long-standing business relationship between the keiretsu group firms and the main bank, however, mitigated this information problem, since the bank know about the group firms more than outside investors. Thus, a company with capital budgets exceeding operation cash flows can turn to the main bank or other keiretsu companies for financing. This avoids the cost or possible bad-news signal of a public sale of securities[5]. The most widely known empirical evidence is the q-based equation estimated in Hoshi, Kashyap, and Scharfstein (1991)[6]. They argue that the close bank relationship enjoyed by keiretsu group firms is likely to diminish the information problem.

In addition to the keiretsu system, however, I will discuss another system that could

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[5] Source: R. A Brealey and S. C Myers, Principles of Corporate Finance, 1996, McGraw-Hill.

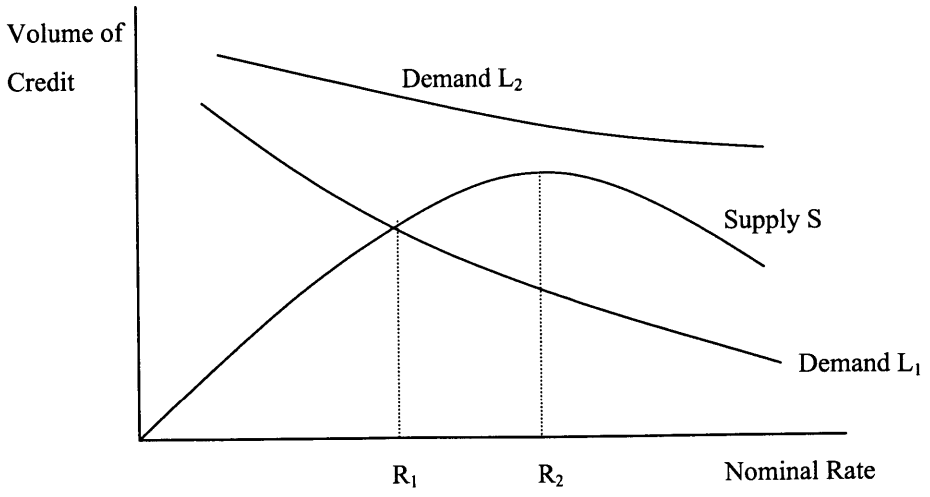
[6] Source: Hoshi, A. Kashyap, and D. Scharfstein, Corporate Structure, Liquidity, and Investment Evidence from Japanese Industrial Groups, Quarterly Journal of Economics 106.

stabilize the finance and credit system even during depressions, established by private industry in conjunction with government.

Diamond (1997) argued that as public financial market participation increases, the market becomes more efficient, and the banking sector shrinks. After World War II, maybe even now, the Japanese public financial market has been far from efficient. For instance, as will be discussed later, mutual stock sharing system by large firms prevented the stock market from being efficient. Conservative individual investors like salaried employee had not put their money into the stock market. This factor, together with the high saving rate, established the system to provide firms with huge funds from large commercial banks in which most of people's savings were deposited. This financial system had worked for long time after World War II.

Even though the savings rate was high in Japan, finance demand was strong, especially during the high economic growth period. It is reasonable to assume that credit rationing (i.e., the demand for credit exceeds supply at the prevailing interest rate) occurred even in keiretsu groups.

Figure 3- 2 Equilibrium Credit Rationing



Even if a partial equilibrium framework is adopted, the usual graphical analysis of supply and demand does not work in the context of the credit market. Figure 3-2 shows this point. If the demand schedule is L_1, a competitive equilibrium exists, and interest rate R_1 clears the market. On the other hand, when the demand is strong (L_2), the supply and demand curves do not intersect because the supply schedule is backward bending (S). When the demand is strong, banks must rank those borrowers. If banks select borrowers only by interest rates they can charge, they might lend funds only to the borrowers whose businesses are risky. Thus, ranking borrowers by interest rates can be inconsistent with their interests, and the credit supply schedule may be backward bending for high level of the interest rate. Since demand and supply curves do not intersect, a new system for ranking potential borrowers need to be devised in order to reach equilibrium[7]. Bester (1985, 1987) shows that no credit rationing will occur when collateral is used in order to select the different types of borrowers. Eventually, land collateral as a sorting device took root in the Japanese economy.

This credit system worked very well when the land price movements mentioned in the section 2.2.4 were taken into account. By the first oil crisis in 1972, the Japanese economy experienced six major fluctuations, including the "*Nabezoko*" depression from 1956 to 1957, and the "*Shouken*" depression from 1964 to 1965. Land prices, however, continued to increase even during periods of depression. As a result, private firms continued to be able to borrow, since banks based loan on land collateral.

We must now look at the role of government in finance at that time. The coalition of government and financial institutions, frequently referred to as the "*Gosou-Sendan*" system meaning a convoy of large banks led and protected by the Ministry of Finance, prevailed from the

[7] Xavier Freixas and Jean-Charles Rochet, Microeconomic of Banking, 1997, MIT Press.

end of World War II until recently. The financial industry has historically been highly regulated, and the barrier to entry into the industry is a quite large. It is my view that the governmental has been concerned not only with regulating the financial industry, but also with maintaining a credit system based on land collateral.

Figure 3-3 shows the negative correlation between land prices and government's land investments. The methodology I use in this analysis is as follows. I use the average all zoning area (commercial, industrial, and residential areas) land price index in six major cities as a source of land prices provided by the Japan Real Estate Institute. Both change rates are calculated as:

$$\textit{Change in Land Price} = (P^3_t + P^9_t) / (P^3_{t-1} + P^9_{t-1}) - 1$$

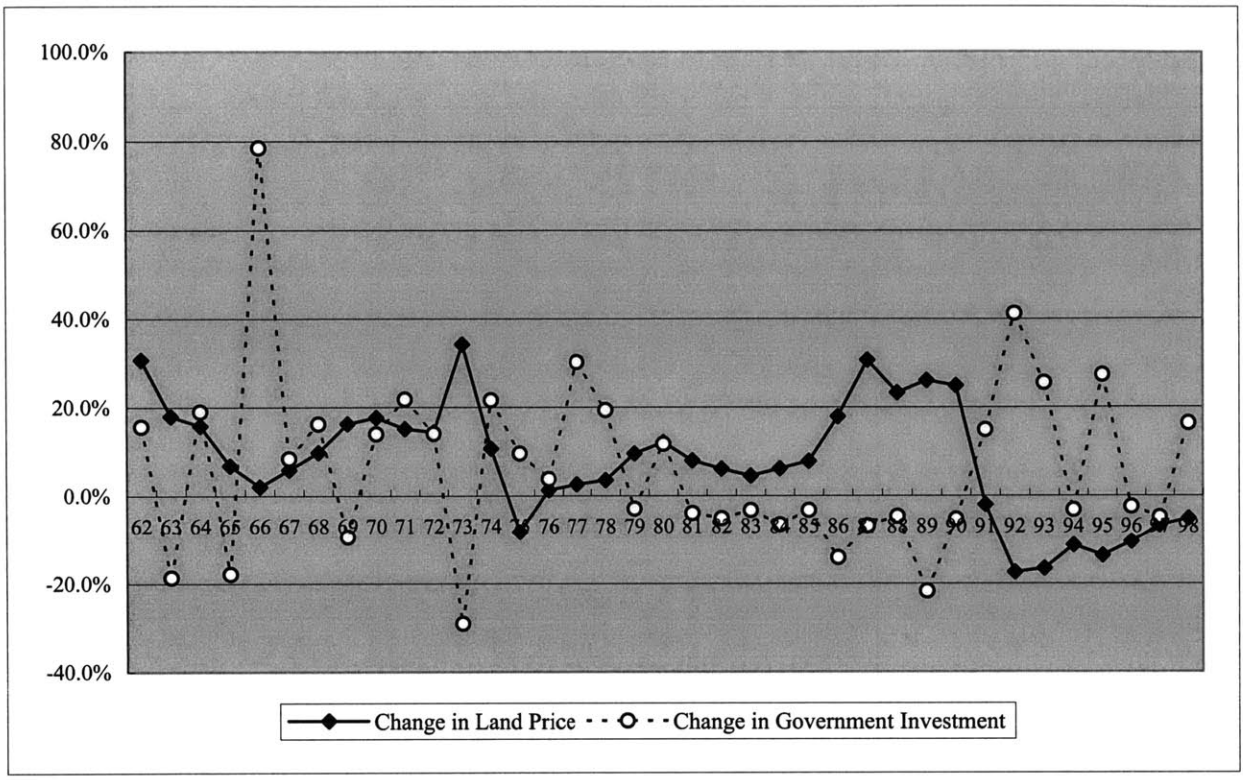
$$\textit{Change in Government Investment} = [G_t / (P^3_t + P^9_t)] / [G_{t-1} / (P^3_{t-1} + P^9_{t-1})] - 1$$

P^3_t and P^9_t denote land price on March in year t, and that on September in year t respectively (meaning that the data are tabulated semiannually). G_t denotes government investment in year t.

This figure clearly indicates that government expenditure to acquire land increased when the rate of increase of land price decreased. On the other hand, when land prices soared, government expenditure decreased.

There are several ways to interpret this trend. The first simple assumption is because government had fixed budgets each year for acquiring land, when land prices dropped, the government increased their acquisition. Nonetheless, the figure seems to imply more than this simple assumption. The second supposition is that the government increased land investments in order to help banks liquidate collaterized real estate assets for which bad loans were made.

Figure 3- 3 Negative Correlation between Land Price and Government Investments in Land



Note: Calculated by the author

Source: Japan Real Estate Institute, Land Price Index, 2000

Economic Planning Agency, Annual Report on National Accounts, 2000

This is what exactly happened after the bubble economy burst. The final assumption is that the government increased land acquisition in order to prevent further decrease in land price and to stabilize the credit system based on land collateral. The later assumption implies a more aggressive participation by government.

As I mentioned, Hoshi, Kashyap, and Scharfstein argue that the close bank relationship enjoyed by keiretsu group firms is likely to mitigate the asymmetric information problem. It is also assumed that land collateral can mitigate the asymmetric information problem in the sense that most keiretsu firms stemmed from zaibatsu groups that had owned large class-A land throughout Japan.

This finance and credit system worked well at least by the end of the high economic growth period because relatively lower costs of capital flowed into companies with the greatest growth opportunities. The continuation of the system, however, has misdirected valuable financial resources (i.e. funds flowed into firms with fewer growth opportunities but with good land collateral), resulting in speculative inflow of funds into the stock and real estate markets. In this sense, finance and investment interact in important ways, and inefficient financial market sometimes creates booms and busts in the real estate market.

3.2 Finance Matters in the Land Price Determination

3.2.1 Land Price Determination

I argued in sections 2.2.4 and 2.2.5 that a modified present value model including the expected land value and quasi-rent value would better explain the land price movements in Japan:

$$P_0 = PV(R_1 + R_2 + \cdots\cdots + R_{t-1} + R_t) + PV(P^e_t) + [PVQR]_t \qquad (1)^8$$

However, I will exclude the rent factor from the equation. As will be discussed later, the tenant's right to occupy space is highly protected by the tenancy law. Once a tenant occupies space, it is difficult for a landlord to raise rent or evict the tenant. In the extreme case, the landlord has to pay back all rents obtained from the tenant. In this sense, the present value of rent accounts for a tiny portion of the total value of land. Therefore, I will exclude the present value of rents from equation (1) so as to better capture the movement in the Japanese market.

$$P_0 = PV(P^e_t) + [PVQR]_t \qquad (2)$$

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[8] Please refer to the section 2.2.4 in detail.

In next section, I will present a land price determination model based on equation (2) and following assumptions. First, as discussed earlier, private firms played a crucial role in the real estate market. Thus, I will assume that at any given time corporate investors determine land prices. Second, since measuring investors' expectation of future prices is a difficult task, I will also assume that the movements of GDP decide the direction of investors' expectation, and that the amount of funds available to investors decide the magnitude of investor's expectation. In other word, I will assume that at any given time investors' expectation of future prices always exceeds the amount of funds available to corporate investors. In this sense, the total amount of funds currently available to private firms is an important determinant of land prices. I will construct a land price determination model based on the assumptions, and try to prove the validity of the model.

3.2.2 Land Price Regression Analysis

(1) Model Specification

I will specify my model to describe how land prices were determined. As discussed earlier, the model is such that the total amount of funds currently available to private firms is an important determinant of land price. Therefore, I will include independent variables that represent financial conditions, as well as a demand factor for land:

$$Pt = f(C, V, L, I, D) \qquad \text{(a)}$$

where Pt is land price at time t, C is excess cash amount available to firms, V is aggregate firms' value, L is average debt to equity ratio, I is interest rate, and D is demand for land.

I assume that the first four variables stand for financial conditions for the private firms. Excess cash amount means the amount of funds that private firms have in the form of cash, short-term bank deposits, and other short-term marketable securities. I assume that the amount

of debt available for a private firm is determined by a function of the firm's value and its debt-to-equity ratio. In theory, the firm tries to maintain its optimal capital structure determined by its business risk and economic environment surrounding the firm. Thus, the function of the current firm value (market stock price) and its debt-to-equity ratio (capital structure given the market stock price and the level of debt financing) can represent the amount of debt that the firm can employ at a particular time. I also include the interest rate as one of the financial variables. Lastly, we should decide what kind of variables characterizes the demand for land.

In the land market, demand comes from the buyers, firms or households. For firms, demand for land will be decided by a function of their output levels and relative price of land. For households, demand for land will depend on income and relative land prices. For a given level of the supply of land, land prices will increase when firms' output levels and household incomes increase. Thus, it is safe to assume that demand for land will increase and decrease as the economy expands and contracts. This economic change will be approximated by nominal GDP. Then, the model is specified as follows:

$$P_t = \alpha_0+\alpha_1 C+\alpha_2 V+\alpha_3 L+\alpha_4 I+\alpha_5 D+\varepsilon \qquad \text{(b)}$$

Following predictions as to the signs of coefficients can be made. First, land prices will be positively correlated to excess cash amount in the sense that firms can increase real estate investments when the amount of cash increases. Second, land prices will be also positively correlated to a firm's value, since an increase in the firm's value will increase the firm's ability to employ more debt. On the other hand, land prices will be negatively correlated to debt-to-equity ratio. The financial market will be reluctant to provide funds to the firm when its debt-to-equity ratio exceeds the optimal capital structure. It is difficult to predict the sign of the coefficient of the interest rate. In the United States, it would be assumed that asset prices are negatively correlated to the level of interest rates. However, this might not be the case in the Japanese

markets. Basically, asset prices estimated by the discount cash flow method are considered to be more sensitive to interest rate fluctuations, but Japanese firms had not used the discount cash flow method until the burst of the bubble economy[9]. Moreover, before the burst of the bubble economy investors believed that land prices could increase at a higher rate than interest rates. Lastly, there might be no doubt that land prices will be positively correlated to the demand variable.

(2) Data Description

Although land prices in general are heterogeneous and behave differently, an aggregate land price index will be used to keep the macroeconomic analysis as simple as possible. The model examines prices on a quarterly basis, from 1971/1st to 1999/1st. Data used for each variable are as follows.

Land Price (P)

I use the average urban land price index (including commercial, residential, and industrial zones) of the six major metropolitan areas (Tokyo, Yokohama, Osaka, Nagoya, Kyoto, and Kobe), tabulated semi-annually (March and September), issued by the Japan Real Estate Institute. I apply a linear adjustment so that semi-annual data can be converted into quarterly data. I define the data in March and September of a year as land prices of the first and third quarters of the year, respectively. The land price of the second quarter is the average price of the first and third quarter. The price of the fourth quarter is the average price of the third quarter of the year and the first quarter of the next year.

Excess Cash for Firms (C)

As a variable of excess cash for private firms, I use the all industry liquidity ratio index,

[9] The Pay Back Period method had been popular in doing pro forma analysis in Japan. After the bubble economy burst, the discount cash flow method began to be used. This change in pro forma analysis might have affected the asset price determination after the burst of the bubble economy.

tabulated quarterly (March, June, September, and December), provided by the Bank of Japan. The index is calculated as follows:

Total Balance of Cash, Deposits, and Marketable Securities / Total Sales of Preceding Year

This index appears in the Ratio Related to Corporate Finance section of Short-Term Economic Survey of Principal Enterprises.

Firm Value (V)

The TOPIX, the value-weighted index of the first section of the Tokyo Stock Exchange, will be used as a variable representing aggregate market values of private firms. The observations are taken from the last trading days of March, June, September, and December in order to match the frequency of other variables.

Debt to Equity Ratio (D)

I calculate the debt-to-equity ratio based on the closing balance-sheet account of non-financial incorporated enterprises appearing on the Annual Report on National Accounts by the Economic Planning Agency. Since the data is the end-of-calendar year data, I extrapolate linearly so that quarterly data can be obtained. The square power of the debt-to-equity ratio at each quarter will be used in the model.

Interest Rate (I)

I use as a risk-free interest rate a 10-year government bond yearly yield with the longest remaining maturity, tabulated quarterly. The data appears in the Economic and Financial Data issued by the Bank of Japan.

Demand for Land (D)

As an index of demand for land, I use nominal GDP obtained from the Annual Report on National Accounts provided by the Economic Planning Agency.

(3) Re-specification of the Model

The land price index is computed based on appraisal. Appraisers typically refer to historical trends in determining current land prices, which tends to create lags behind actual market prices. Therefore, I include not only current values but also lagged values of all independent variables.

I continue to include lagged values until the last addition improves the adjusted-R^2, with the maximum lag of a year (four quarters). Once the highest adjusted-R^2 is reached, each variable is examined whether it improves the adjusted-R^2. A variable is removed if the removal improves the adjusted-R^2. As a result, the final model can be specified as follows:

$$P_t = \alpha_0 + \alpha_1 \Sigma C + \alpha_2 \Sigma V + \alpha_3 \Sigma L + \alpha_4 \Sigma I + \alpha_5 \Sigma D + \varepsilon \qquad \text{(c)}$$

where Σ denotes the sum of the current and lagged values explained above.

(4) Results

Table 3-2 shows the result of the regression analysis. I start by examining α_1, excess cash amount for private firms.

As I predicted earlier, the sign of the estimated parameter is positive, and the result is statistically significant. Thus, investment by private firms is more or less triggered by the cash and cash equivalent on hand.

The sign of the estimated parameter of firm value is positive as predicted. This result shows us that when a firm's value increases, the firm is more likely to borrow money and invest in land. There is a constraint, however, as to the maximum amount of debt the firm can employ. Debt financing exceeding the optimal capital structure of the firm can be difficult. The result tells us that the sign of debt-to-equity ratio is negative, and the result is statistically significant.

Table 3- 2 Estimates of the Land Price Model

	Predicted Signs of Variables	Estimated Parameter	T-Stat
α_0 (Constant)	-------	22.22	2.44
α_1 (C: Excess Cash)	+	17.27	6.92
α_2 (V: Firm Value)	+	0.02	8.18
α_3 (L: Debt to Equity Ratio)	-	-57.86	-7.86
α_4 (I: Interest Rate)	+/-	-0.53	-0.91
α_5 (D: Demand for Land)	+	0.0001	3.21
R-square		0.97	
Adjusted R-square		0.97	
Standard Error of Regression		4.74	

Nevertheless, it is important to note that this model cannot completely explain the causality between land prices and debt-to-equity ratio. It can be argued that land prices will increase because private firms can borrow funds and invest more in land because of a low debt-to-equity ratio. We can also argue, however, that an increase in land price lowers the level of debt-to-equity ratio. Finalizing the issue requires a more sophisticated causality analysis.

I mentioned earlier that the sign of the coefficient of interest rate might be positive in Japan. The result shows that the sign is negative, but it is not statistically significant. It is basically reasonable to assume that real estate prices are negatively correlated to interest rate levels according to the neoclassical investment theory. The recent trend, however, shows a positive relationship between the two variables. During the bubble economy, government continued to increase interest rates in order to cool off the overheated stock and real estate prices. After the burst of the bubble economy, the official discount rate had decreased to almost zero percent, but land prices also continued to decrease. This recent trend seems to create a positive

correlation between two variables, and to make the result statistically insignificant in the model. Land prices are positively correlated to the demand for land, but the result is not statistically significant. Therefore, the excess cash and the amount of debt available to private firms seem to have a strong impact on land price movements. The total amount of funds currently available for real estate investment can be an important determinant of land prices.

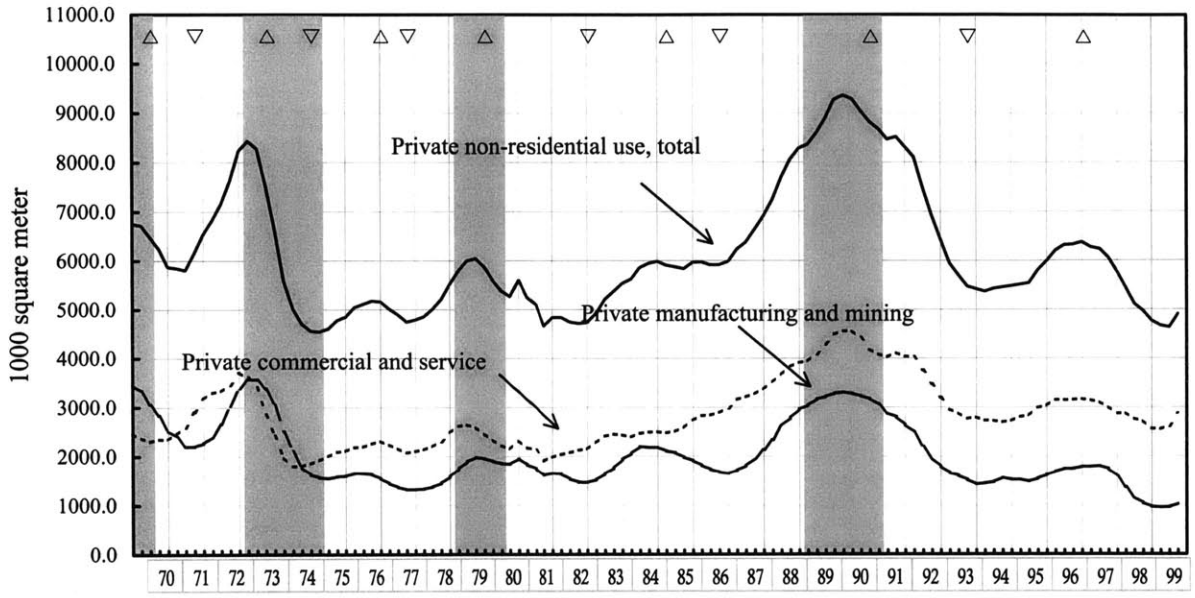
3.3 Finance Matters in the Space Market

We learned in the previous section that the relationship between finance and land prices is strong. The introduced model is simple, but because of the simplicity, the result tells us the importance of finance in the real estate market.

In this section, I will continue the same approach as to the amount of construction. Thus, the notation to be applied here is that the total amount of funds currently available for real estate investments is an important determinant of how much new property is built. Before examining the functionality between finance and construction, I will briefly explain the history of the supply of buildings.

Figure 3-4 shows that there are two peaks of construction, in 1973 and in 1990. The overall trend of the supply of commercial buildings is relatively level. On the other hand, the supply of manufacturing and mining facilities is slightly downward sloping throughout the period.

Figure 3- 4 Private non-residential-use: Construction Floor Area Started



Source: Bank of Japan, Economic and Financial Data on CD-ROM, 2000, thousand square meter

Note: Shaded areas express major economic expansions and depressions.

Although we cannot tell from the figure, data prior to the period shows that the supply of manufacturing and mining facilities outweighs the supply of commercial buildings. The low level of construction in the manufacturing and mining sectors after the first oil crisis is consistent with my argument that Japanese industrial firms lost their primary objectives (to catch up with the Western Europe and American economies in terms of production) and no longer had a focus for investing funds. Since it can be assumed that these funds were used to build commercial buildings, the analysis will focus on the supply of commercial buildings in order to clearly observe the importance of finance in the space market.

3.3.1 Construction Regression Analysis

(1) Model Specification

The model introduced in this analysis is basically the same as used in the land price regression model. The basic equation is as follows:

$$St = f(P, C, L, I, D) \qquad \text{(a)}$$

where St is the amount of commercial building construction (categorized by the Ministry of Construction as "commercial and service" facility), P denotes land prices that we examined earlier (land price index), C is excess cash in firms (liquidity ratio), L is debt-to-equity ratio of firms, I is risk-free interest rate, and D denotes demand for commercial space (GDP). I exclude the values of private firms (market stock prices), and instead include land price in this model. Basically, financial institutions lend funds based on land collateral values. Therefore, this model will help us clearly observe the influence of land collateral values on the amount of construction. Then, the model is specified as follows:

$$S_t = \beta_0+\beta_1 P+\beta_2 C+\beta_3 L+\beta_4 I+\beta_5 D+\varepsilon \qquad \text{(b)}$$

(2) Data Description

Time series used in this model are from 1971/3rd to 1999/1st quarter.

Supply of Space: Construction (S_t)

As a measure of the amount of constructions, I use the commercial and service construction floor areas started, measured by thousand square meters, tabulated quarterly by the Ministry of Construction. The actual data is obtained from the Economic and Financial Data on CD-ROM issued by the Research and Statistics Department of the Bank of Japan.

Land Price (P)

The land price index divided by GDP deflator will be used in this analysis.

Excess Cash for Firms (C)

I use the same data used in the previous model as the variable.

Debt to Equity Ratio (L)

I use the same data used in the previous model as the variable.

Interest Rate (I)

I use the same data used in the previous model as the variable.

Demand for Commercial Space (D)

Unlike in the previous model, I use real GDP as the variable.

(3) Re-specification of the Model

I adjust the model in the same way that I did in the land price regression model. I include not only current values but also lagged values of all the independent variables in the final model because there are usually time lags between the change in exogenous factors that influence the amount of construction and the actual start date of construction (mainly due to design work, application for construction permit to local governments, and so forth).

The method to include and remove variables is completely the same. The two variables that represent interest rate and demand for commercial space are completely eliminated from the model, since the exclusion of these variables improves adjusted-R^2. As a result of the re-specification of the model, the final model can be specified as follows:

$$S_t = \beta_0 + \beta_1 \Sigma P + \beta_2 \Sigma C + \beta_3 \Sigma L + \varepsilon \qquad \text{(c)}$$

where Σ denotes the current and lagged values as explained above.

(4) Results

Table 3-3 shows the result of this model. We will first notice that the amount of construction is positively correlated to land price movements, and the result is statistically significant.

Table 3- 3 Estimates of the Commercial Space Supply Model

	Predicted Signs of Variables	Estimated Parameter	T-Stat
β_0 (Constant)	-------	441.33	2.20
β_1 (P: Land Price)	+	12,657.55	13.97
β_2 (C: Excess Cash)	+	79.58	2.71
β_3 (L: Debt to Equity Ratio)	-	107.63	3.52
R-square		0.90	
Adjusted R-square		0.90	
Standard Error of Regression		224.22	

An increase in land prices implies an increased land collateral value. For a given level of the amount of debt in a firm, increased collateral values will likely allow the firm to employ more debt, resulting in the supply of commercial buildings.

The amount of construction is also positively correlated to excess cash available to private firms, the same consequence as we saw in the previous analysis. On the other hand, the effect of debt-to-equity ratio is puzzling. The sign of coefficient of debt-to-equity ratio is positive, whereas it was negative in the previous model. A couple of suppositions can be made regarding this issue. First, the high level of aggregate debt-to-equity ratio implies that economic fundamentals are good at that time. This in turn indicates the strong demand for office space, a good time for real estate investors to build commercial buildings. Next, in theory, the high level of aggregate debt-to-equity ratio signals that a cost of capital is relatively cheap. This can motivate real estate investors to employ debt and construct buildings.

In any case, the relationship of the amount of construction with financial environment can be relatively strong, especially with land prices that are significantly affected by financial factors. The result would show us that the total amount of funds currently available for real

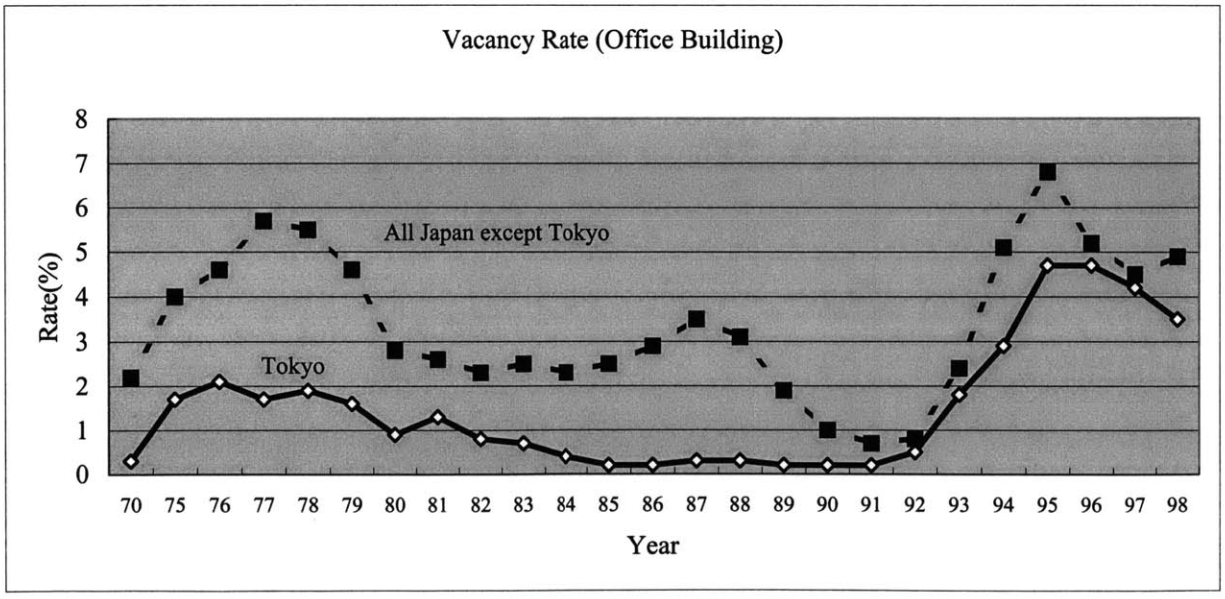
estate investment affected the amount of construction.

3.4 Discussion

We have just examined that finance conditions have influenced land prices and the amount of construction. However, the amount of cash reserves in private firms, represented by liquidity ratio in the model, and the amount of debt available to private firms tended to fluctuate from time to time. Consequently, an oscillation of land prices and construction occurred.

Figure 3-5 shows the movements of vacancy rates of office buildings in the Tokyo metropolitan area, and the rates throughout Japan except in the Tokyo metropolitan area. The research was done by the Japan Building Association.

Figure 3- 5 The Movements of Vacancy Rate (Office Building)



Source: Japan Building Association, Biru Jittai Chousa

Notice that there are two peaks after the high economic growth period, one in 1977 and the other in 1995. Notice also Figure 3-4, which describes the Construction Floor Areas Started. Obviously, this comparison shows that the increase in vacancy rates around 1977 was due to the huge increase of construction started around 1973. Similarly, the huge increase in vacancy rates around 1995 was brought about by skyrocketing construction around 1990. The level of vacancy rates can be the measure of floor areas necessary for the economy. Therefore, the data tells us that the amount of construction of commercial space was not perfectly related to the strength of economy in general during these periods. According to the previous model, these additional supplies were more or less triggered by finance conditions at any given time.

We can also find excessive construction in the form of office buildings built by firms whose primary businesses were basically unrelated to real estate. As mentioned earlier, the desire of private firms to build their own office buildings is potentially strong. This type of construction will likely be made when these firms obtain additional funds. However, this construction significantly affected the property market.

Generally, these firms will terminate their lease contracts and move their operations into their newly-built office buildings. The spaces they vacate will increase the supply of a rentable officer space. Furthermore, additional supply may arise from their new buildings, since these firms might not occupy entire buildings themselves.

Exhibit 2 summarizes the profile of office building projects started during the bubble economy period (from 1989 to 1991), and started after 1999, respectively. These tables were created by the author based primarily on news reports appearing on such newspapers as the Nihon Keizai, Nikkei Sangyou, and Kensetsu Kougyou Shinbun.

I categorize building owners by their primary businesses. "Real Estate" includes office building companies and real estate developers. Trading companies are also included in this

category because they have often functioned as real estate developers throughout history (Matsubara 1988). I distinguish "Construction" and "Life Insurance" companies from others, since they are considered to be institutional investors in the Japanese real estate market. "Other" refers to private industries such as food, telecommunications, broadcasting, and advertising, not included in the previous categories.

During the bubble economy, office buildings built by "Other" industries accounted for approximately 62%, but recently their shares went down to approximately 40% of the total floor area. This may imply that these non-professional investors build office buildings only when they have excess funds. Thus, it is assumed that this supply of available space was created by the lower costs of capital resulting from the inefficient financial and credit system. I will discuss this issue in the next chapter.

4 Alternative Model of the Real Estate Market

In the previous chapter, I argued that finance matters in the real estate market. In particular, I discussed that government and private industry established a credit and financial system based on land collateral. In the two regression analyses, the close relationship between real estate investments and finance conditions were observed. I then proposed that the financial system based on land collateral provided relatively lower costs of capital to private firms, and that these funds flowed into the real estate market, resulting in the booms and busts after the high economic growth period.

Relative cost and the amount of capital are decisive factors of the real estate market. In order to avoid the misdirection of funds, I will now propose several factors for establishing an alternative model of the real estate market.

4.1 Financial and Credit System

The emerging internet business sector, which is least likely to own good collateral land, and the penetration by the American and European banks into the Japanese financial market are forcing Japanese banks to change their inefficient credit system. For instance, they have began to offer non-recourse loans. In case of default, the lender has no recourse to assets that are not related to the objects of the loans. Thus, overall land collateral values of borrowers are irrelevant to whether loans are made or not.

Some changes have been made in the public market, too. The Tokyo Stock Exchange (TSE) launched "Mothers" (Market of the high-growth and emerging stocks) in May 2000. Mothers is the new stock market introduced to provide easier funding for emerging companies with high growth potential, and to offer a wider choice of investment instruments for investors. The Osaka Stock Exchange (OSE) also established the Nasdaq Japan Market as one of its

sections in June 2000. The foundation of these markets is aimed at generating more opportunities for the growth and the success of emerging Japanese companies, especially high-tech, growth-oriented companies, by creating an efficient market that links investors and entrepreneurs directly and easily, just like Nasdaq in the United States, or Neuer Markt in Germany.

Although financing options for Japanese firms, especially for venture companies, has widened in recent times, the dependency upon real assets in evaluating companies has continued to be dominant. For example, the loan balance secured by land collateral accounted for 25.7% (125.8 trillion yen) of the total loan balance of the Japanese financial institutions in the 1989 fiscal year. Although the percentage went down slightly to 23.5% in the 1997 fiscal year, the balance had increased by approximately 2.1 trillion yen during the period[1]. The supply of funds based on real assets was one of the largest culprits in the misdirection of funds. This system provided private firms with lower costs of capital relative to the investment risk. Therefore, the establishment of an efficient financial market will be a critical first step toward building an appropriate model of the real estate market.

4.2 Tenancy Law and the Interaction of Asset Market and Property Market

The tenancy law that regulates the relationship between landlords and tenants has long a considerable influence on the space market.

The so-called tenancy law (*Shakuchi Shakuya Hou*) was initially established in 1941 as a part of wartime emergency legislation. Its provisions do not allow a landlord to evict a tenant

[1] Bank of Japan, Keizai Toukei Nenpou, 1998

unless the landlord has a legitimate reason, such as when the landlord moves into the property for residence, and when, at the same time, the property in dispute is the only place in which the landlord can live. Furthermore, the law gives the tenant the right to renegotiate rents and to terminate the tenancy during the lease period. The law was designed to protect the socially weaker class (i.e. tenants) during wartime, but it was continued after the war since the SCAP[2] believed the landlord-tenant (semi-feudal) system was the social root that had led Japan to militarism[3]. Following an immediate housing shortage after the war, the application of the law was strengthened, and, what is more, the scope of the law was extended to covering business tenancy[4]. As a consequence, we could find two different rents: the "market rent" and the "existing rent".

The market rent is the rent that a new tenant pays to occupy the space initially. It is determined mainly by supply and demand, as we would see in any other place throughout the world. Therefore, the new tenant might have to pay a much higher rent than existing tenants of the building.

The existing rent is the rent an existing tenant pays when renewing the lease contract. It is determined mainly by a tenant-owner negotiation, where the tenancy law comes into play. As we saw above, the tenant's right to occupy the office space is strongly protected: the owner cannot raise rent discretionally, nor replace the tenant with a tenant willing to pay a higher market rent. Usually existing rent will increase so as to cover an increase in expenses. In this sense, existing rent is not perfectly affected by supply-demand conditions in the space market.

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[2] See section 2.1.2.

[3] As I mentioned earlier, this semi-feudal system is also considered to be the root of the idea that land is the most valuable asset.

[4] Masayuki Tagai, Unlocking Japan's Potential GDP, 2000, MIT Sloan Thesis

This market imperfection creates inefficiency. First, the supply of buildings is limited due to the tenancy law. For instance, once a landowner builds an office building and tenants occupy the space, prospective cash flows will be locked, since the landowner will be unable to raise rents or evict tenants. Thus, one may say that there is a value of "option to wait" for landowners to capture the greatest upside potential[5]. People often argue that this supply limitation due to the tenancy law pushes up overall rent levels in Japan[6].

It seems that this imperfect space market has also given rise to the misallocation of space and distorted the formation of urban areas. For instance, a tenant occupying a class-A building from decades ago pays a rent far below the prevailing market rent. Since the landlord of the building cannot evict the tenant, she/he cannot lease it to a candidate who is willing and able to pay market rent. If the candidate is the one who can most benefit from the location, and if the existing tenant is not, a misallocation of the space can occur. Thus, the current market system will likely sustain these old-fashioned firms with fewer growth opportunities, and prevent growing firms from occupying the most suitable locations.

It is also reasonable to assume that this issue has influenced the formation of urban areas. If a high degree of legal protection did not exist, the existing tenant in the previous example would be forced to move to another location, where a rent would be sustainable for the firm. Eventually, the decentralizing of firms would take place, which would change the formation of urban areas[7]. Moreover, the supply of the class-A buildings would increase because of the decentralizing of these firms. As a result, rent levels of class-A space would be lowered. Thus,

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[5] See Jiro Yoshida, Effect of Uncertainty on the Investment Decision, 1999, MIT MSRED Thesis, although the interpretation of the option is different from that mentioned in this paper.

[6] The tenancy law also prevents the supply of land, resulting in extreme prices of land.

[7] As a reference of firm's decentralizing, see D. DiPasquale and W. C Wheaton, Urban Economics and Real Estate Markets, 1996, Prentice-Hall, Inc.

the imperfect market shaped by the high degree of legal tenant protection might be one reason why rents and corresponding land prices are so high in midtown Tokyo[8].

4.3 Real Estate Investors

As discussed earlier, real estate ownership has significantly affected not only the real estate market, but also the entire economy. To explore an alternative model of the real estate market, we need to consider who should be real estate investors in the twenty-first century. It is important to notice that there are several problems with the current real estate ownership. Also note that I will discuss the overview of real estate investors in APPENDIX 3.

4.3.1 Agency Problems

There are agency problems for current institutional real estate investors. Downs (1991) argued[9], "As long as real estate developers can finance out of individual deals – that is borrow, or raise as equity funds, more money than their projects cost, and have none of their own capital at risk – they will continue to construct more space, regardless of whether the market really needs it". This was what exactly happened in Japan during the bubble economy, and this can occur not only with developers, but also with any private firms with good land collateral.

Another agency problem includes a "herd" problem. Downs also addressed, "the group-think occurs partly because institutional investors are primarily driven by short-run goals,

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[8] Although the new tenancy law was introduced in 1992, I did not mention the effect, since the influence of the new law to the market has been minor.

[9] Anthony Downs, What have we learned from the 1980s experience?, Real Estate Investment, 1991, Solomon Brothers.

such as quarterly performance reports, rather than longer-term considerations. Because each is judged with a small group of his or her peers, no one wants to behave much differently from those peers". Such mentality is likely to exist in a homogeneous country like Japan.

These agency problems tend to encourage market oscillations. Thus, an alternative model needs to be one in which investors have heterogeneous views toward future and interact efficiently in the markets. REITs are one of the investment vehicles that allow small investors as well as overseas investors to participate in the markets.

4.3.2 Diversification Fallacy and Specialization Advantage

Some may argue that there must be asset diversification benefits for firms to incorporate real estate into their portfolios. In fact, Japanese firms have sometimes realized profits (land price appreciation) by selling assets when their business experienced downturns[10]. One may also say that firms owning rental office buildings can stabilize their incomes regardless of the performance of their main businesses. The argument that real estate works to hedge against inflation might also be made. Most real estate managers in private firms will emphasize these arguments.

These arguments are made in the belief that investors will benefit from a firm's policy of asset diversification, since investors are by nature risk averse. Diversifying asset allocation gives these firms a better opportunity to increase their value than those firms which concentrate their investments in one area. The question arises, however, as to what is a real benefit for investors. According to the M&M theory, the incremental value that firms can produce from a

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[10] On the balance sheets of Japanese corporations, in accordance with Japanese accounting principles, market-related assets, such as stocks and real estate, are evaluated not at their current market prices but at their purchase prices. The government is planning to revise these principles.

policy of diversification is limited to the portion that investors cannot implement on their own. Thus, if investors can include real estate assets in their portfolios, no incremental value will be provided to investors. There might have been some incremental values for investors in the sense that investors were not able to include the real estate assets like class-A office buildings in midtown Tokyo. Nevertheless, emerging J-REITs will allow investors to have these opportunities in the near future, when firms' real estate investment may lose the validity. This argument also implies that there might exist specialization advantage for private firms.

One of the largest professional real estate investors in the Japanese market are real estate developers. Unlike their counterparts in the United State, Japanese developers typically own office buildings, shopping centers, retail malls, hotels, and resort facilities after their developments. If there is a specialization advantage for private firms, these developers should focus their businesses only on developments, and dispose of their assets in more efficient investment vehicles such as REITs.

In fact, recent empirical work seems to suggest that diversification at the firm level destroys the firm's value. Morck, Shleifer, and Vishny (1990) show that firms experience negative returns when they announce acquisitions that are unrelated to their primary business. Lang and Stulz (1994), and Berger and Ofek (1995) find that the stocks of diversified firms are traded at a discount of at least 13 to 15 percent relative to the stocks of stand-alone firms in the same industries.

4.3.3 Asset-Liability Matching Argument and Pension Fund

Among institutional investors, pension funds are best suited to invest in real estate because of the characteristics of their liability obligations. Pension funds have much longer-term liabilities than insurance companies and other institutional investors. And real

estate properties need a longer-term investment horizon corresponding to their relatively long economic lives. In theory, pension funds can be the most logical source for future real estate equity.

However, Japanese pension funds have not been key players. Although regulatory issues can explain most of the reasons for this, it is not as clear as it may seem. Indeed, there was a regulation that imposed an optimal portfolio on pension funds, but it did not ban pensions from investing in real estate. Generally speaking, allocation must follow these rules: at least 50% of a fund should be invested in basically riskless Japanese corporate and government bonds; no more than 30% can be in equities or overseas investments; and a maximum of 20% may be placed in real estate. Nevertheless, their actual real estate investments have been quite minor.

However, the prospective influence of pension funds on the future real estate market can be enormous. First, deregulation regarding asset allocation has continued since the bubble economy burst. Fund managers of pension funds can use more discretion in putting their money into various types of assets. Second, the Japanese pensions market is reaching a crucial junction. Fund performance has plummeted due to Japan's lingering recession and slumping stock prices. To pursue higher returns, pension funds will shift assets to financial products with more risk, where real estate investments can serve as investment products with relative returns and risks.

The size of the pension funds will reach 100 trillion yen in the future, which would put Japan close behind the United States and other countries where pension plans are more pervasive. As we can see from history, the background and the government's intervention of the Japanese pension system, large amounts of direct real estate investments will not occur immediately, but indirect investment through securitized products such as J-REITs can be a reasonably assumed. If 10% of pension fund assets are allocated in J-REIT, it will be close to a total market

capitalization of $136 billion of the US REIT market[11]. More detailed information as to pensions will appear in APPENDIX 3.

4.3.4 Direct Investment or Indirect Investment

Most real estate investments have been directly made by corporate investors. Although there have been indirect investments through quasi-securitized products[12], they almost died out after the bubble economy burst[13]. This is partly because the primary objective of these products was to reduce inheritance tax during the bubble economy (also refer to the section 2.2.2 "Tax consideration in owning land"[14]), and also because secondary markets for these products were not established.

I discussed in section 4.3.2 that there is no diversification premium at the firm level as long as investors can replicate the same portfolio by themselves. At the investor level, on the other hand, portfolio theory tells that there is a benefit by diversifying their asset allocation. With a large number of asset allocations, investors would ultimately be able to reduce investment risks down to a systematic risk. Thus, they have a rational motivation to include real estate in their portfolios.

Portfolio theory, however, assumes that investors can rebalance their asset allocation with minimum costs when macroeconomic factors change. Nevertheless, because each piece of real estate is unique, and the amount of money needed to invest in real estate is typically large,

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[11] PricewaterhouseCoopers and Lend Lease Real Estate Investments, Emerging Trends in Real Estate 2000, 1999.

[12] The so-called "One-Room Mansion Investment". Reference: Hitoshi Mikuni, Fudousan no Shoukenka to Houhou, 1997, Touyou Keizai.

[13] There are also some investment schemes using securtization. However, these schemes are basically limited to professional intuitional investors.

[14] Tax saving effects for investors is a little different from those mentioned in the section 2.2.2. Ibid.

direct investors will find it difficult to change their portfolios. This inefficiency can be avoided when there is a market in which a number of different investors can trade their assets. Indirect investment through investment vehicles will allow investors to put their money in an efficient way, as will be discussed in the following section.

4.3.5 Functions of REITs

(1) REIT as an Intermediary

Convenience of denomination is usually seen as one of the main justifications of financial intermediation[15]. It means that the bank chooses the unit size (denomination) of its products (deposits and loans) in a way that is convenient for its clients. A typical example is that of small depositors facing large investors who are willing to borrow indivisible amounts. If the M&M theory holds, the denomination function of financial intermediation will have no value, and the bank will not obtain any rewards. The actual financial market is not perfectly efficient, and neither is the real estate market. REITs are assumed to provide convenience of denomination to investors, since real estate assets are also indivisible. We should note that this function of REITs makes the real estate market closer to the M&M theory.

(2) REIT as a Dealer

In the United States, a number of commercial real estate investors needed to desperately recapitalize their investments by the early 1990's. However, no private or institutional capital existed in the market during that period. There were some foreign investors, like Japanese corporate investors, but the necessary amount of money exceeded the funds they had available. As a result, investors came up with approaching the public capital market.

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[15] Xavier Freixas and Jean-Charles Rochet, Microeconomics of Banking, 1997, The MIT Press.

Today, exactly the same thing is happening in the Japanese real estate market. Many investors who put huge amounts of money into real estate during the bubble economy are desperately trying to restructure their portfolios. However, since almost all firms' balance sheets suffered, no private capital is waiting to retire their burdens. Although foreign investors are looking for investment opportunities, a fundamental system to provide funds to the market needs to be established, i.e. the emergence of J-REITs.

We must now look at the reasons why REITs in the United States helped reactivate the market, and why the Japanese government and private industry expect the same effects to be created by J-REITs.

Financial market microstructure analyzes how specific trading mechanisms affect the price formation process. These mechanisms involve a specific intermediary such as a dealer, and employ a certain location of trading such as an exchange. The financial market typically involves dealers at centralized markets. On the other hand, there is no centralized market place as to real estate. Thus, dealers do not exist in the direct real estate market. Market microstructure theory argues that the services of these dealers characterize price formation in each market.

An inventory-based approach is one of the basic ways to conceptualize these dealer services. Dealers take short-term positions (holding assets for a while) by buying and selling assets. In this sense, they provide liquidity and immediacy in markets. Their short-term positions, however, involve the risk arising from the imbalances of buy-sell orders because the imbalances create an inventory holding problems for dealers. Consequently, dealers set bid and ask spreads enough to compensate this inventory risk.

When real estate markets crash, sell orders will increase, whereas buy orders will decrease. The market will lose liquidity and immediacy due to the absence of dealers. It can

be assumed that REITs functioned as dealers around the 1990s in the illiquid United States real estate market.

In the Japanese real estate market, the imbalances of order flows are severe, and a huge bid and ask spread seems to exist. If J-REITs provide the dealer service to the market, they will work at least until the liquidity and immediacy are regained, and bid and ask spread is cleared in the market[16].

4.3.6 J-REIT

The current ban on REITs is expected to be lifted once the investment-trust law is revised during the current Diet session (as of 4/28/2000). In anticipation, the Tokyo Stock Exchange plans to create a market for the instruments by the end of the year. It will set up a market for corporate-type investment trusts centering on J-REITs. Listing criteria could demand a minimum investor figure of 800 and a minimum trading unit of 4,000 lots.

In the United States, REITs are popular investment tools for institutional investors as well as for individuals. As of June 30, 1999, REITs had a total market capitalization of approximately $136 billion[17]. In Japan, investments from pensions are also expected, as mentioned in the previous section. Furthermore, a significant amount in postal savings time deposits is due to mature in the coming months. Some 106 trillion yen (approximately $1,000 billion) in postal "teigaku," or fixed-amount, savings accounts will mature by the end of fiscal 2001. If we succeed in establishing a system and environment that give small investors

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[16] Timothy Riddiough, Real Estate Capital Markets (Lecture Note), 2000, MIT.

[17] Ibid.

opportunities to participate in the real estate market, the prospective feature of real estate ownership in Japan will completely change.

5 Simulation under an Alternative Model of the Real Estate Market

As discussed in the previous chapter, the Japanese financial and real estate markets are experiencing many inefficiency problems. The inefficiency is considered to have created the bubble economy and its burst. I also mentioned key factors to establish an alternative market model, particularly in three aspects: the financial market, the asset and property markets, and the investors' profile. In this chapter, I will simulate what the market would have been like, assuming that the alternative model had been introduced before the first oil crisis.

5.1 First Simulation

5.1.1 Methodology

The primary objective of this simulation is to estimate asset prices under the alternative market model, and to compare the estimated prices with actual asset prices. In the simulation, I will assume that the main factors discussed in the previous chapter are satisfied before the examined period.

First, I will assume that the financial market is efficient. Thus, financial mix (debt or equity) is irrelevant, and financial capitals are always perfectly priced. In a sense, real estate investors can obtain costs of capital that are perfectly priced at an efficient financial market.

Second, I will assume that the interaction of the asset market and the property market is efficient. This means that landlords adjust rents perfectly to prevailing market rent at any time.

Lastly, I will assume that investors are generic and have the same investment policy. For instance, I will assume that the risk premium that each investor demands is the same, and the forecast of future rent growth is also the same among all investors. They use the same discount cash flow model to price investments.

5.1.2 Model Specification

The present value model in its simplest form assumes that the real estate asset market can be approximated in frictionless entire asset markets. Then, further assuming that all investors agree on the same risk premium for real estate investment throughout the period, we have the familiar no-arbitrage condition:

$$P_t = R_{t+1}/(1+i_{t+1}+\pi) + R_{t+2}/(1+i_{t+2}+\pi)^2 + R_{t+3}/(1+i_{t+3}+\pi)^3 + \cdots\cdots$$

where P_t denotes real estate asset price at the year t, R_t is rent at the year t, i_t denotes risk-free interest rate at the year t, and π is the risk premium on which all investors agree.

In principle, there can be a different interest rate for each future period. For simplicity, however, I will avoid complications by assuming that the term structure of interest rates is flat; in other words, the interest rate is the same regardless of the time of the cash flow. Thus, I replace the series of interest rates $i_{t+1}, i_{t+2}, i_{t+3}$, etc., with a single rate i_t. Now I can write the formula as:

$$P_t = R_{t+1}/(1+i_t+\pi) + R_{t+2}/(1+i_t+\pi)^2 + R_{t+3}/(1+i_t+\pi)^3 + \cdots\cdots$$

I will also make assumptions as to rent growth rate in order to realize an efficient market and to keep the simulation as simple as possible. All investors agree on the rent growth rate from the year t to the year $t+10$, and the rate is calculated based on the past rent growth rates available at the year t. Furthermore, they also agree on the growth rate after the year $t+11$. The rate is computed based on past inflation rates observed at the year t. Therefore, the model will become as follows:

$$P_t = R_t*(1+g_{\alpha t})/(1+i_t+\pi) + R_t*(1+g_{\alpha t})^2/(1+i_t+\pi)^2 + \cdots\cdots + R_t*(1+g_{\alpha t})^{10}/(1+i_t+\pi)^{10}$$
$$+ R_t*(1+g_{\alpha t})^{10}*(1+g_{\beta t})/(1+i_t+\pi)^{11} + R_t*(1+g_{\alpha t})^{10}*(1+g_{\beta t})^2/(1+i_t+\pi)^{12} \cdots\cdots$$

where $g_{\alpha t}$ denotes the rent growth rate estimated at the year t. The same rate is applied from the year t to $t+10$. $g_{\beta t}$ denotes the rent growth rate estimated at the year t, and is used after the year $t+11$. Then, for simplicity, I introduce cap rate and modify the above equation as follows:

$$P_t=R_t*(1+g_{\alpha})/(i_t+\pi-g_{\alpha})-R_t*(1+g_{\alpha})^{11}/(i_t+\pi-g_{\alpha})/(1+i_t+\pi)^{10}+R_t*(1+g_{\alpha})^{10}*(1+g_{\beta})/(i_t+\pi-g_{\beta})/(1+i_t+\pi)^{10}$$

5.1.3 Data Specification

Rent (R)

I compute market office rents at each year from the MTB-IKOMA Real Estate Investment Index issued by the Mitsubishi Trust and Banking Corporation and the Ikoma Data Service System Co., Ltd., published in 1998. This index is the best performance index of office building investment currently available in Japan. It computed three types of investment return indicators. The way to compute each return indicator is as follows.

1) Income Return (%) = Rent during one year / Asset Price at the beginning of the year
2) Capital Appreciation Return (%) = (Asset Price at the end of the year – Asset Price at the beginning of the year) / Asset Price at the beginning of the year
3) Total Return (%) = Income Return + Capital Appreciation Return

The asset prices at each year is the sum of both land prices published every year by the National Land Agency, and building costs assuming that a full-FAR[1] new office building is built each year at prevailing construction costs.

I use the aggregate three major metropolitan areas (Tokyo, Osaka, and Nagoya) data from 1970 to 1998 in order to calculate rents, although the actual time series to be examined in the simulation will be from 1974 to 1997 due to the limited availability of other variables. First, I set the asset price at the end of 1969 (the beginning of 1970) as 100. The asset price at the end of each year (1970 – 1997) is computed as follows:

- Price in1970 = Price 1969 (=100) * (1 + Capital Appreciation Return in 1970)

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[1] Floor-Area-Ratio is the arithmetic relationship of the total square feet of a building to the square footage of the land area.

- Price in1971 = Price 1970 * (1 + Capital Appreciation Return in 1971)

and so forth. In the end, I can obtain asset prices of all years from 1970 to 1997. The asset prices will also be used as actual asset prices when I compare them with estimated asset prices calculated under the alternative model assumption. Finally, rent revenues during each year are computed by multiplying a beginning asset price of a year by income return (%) at the same year.

The rent calculated above is market rent prevailing in each year. Although I assume that landlords can adjust their rents to market rent, they cannot completely change rents every year partly because of the lease term (the typical length of lease term is two year in Japan). Therefore, I smooth rent fluctuations by taking the average of the market rents at the year t and at the year t-1.

Rent Growth Rate 1 (g_α: from time t to t+10)

I assume that all investors at the year t estimate prospective rent growth rates from time t to t+10 based on the historical movement of rents. This is computed by taking the average of three rent growth rates of past and current years: $g_{\alpha t} = \{(R_{t-2}/R_{t-3}-1) + (R_{t-1}/R_{t-2}-1) + (R_t/R_{t-1}-1)\}/3$

Rent Growth Rate 2 (g_β: after time t+11)

I will also assume that all investors at the year t forecast prospective rent growth rates after time t+11 based on past GDP deflators. It is computed by taking the average of GDP deflators from 1955 to the year t:

$$g_{\beta t} = (D_{1955} + D_{1956} + \cdots\cdots + D_{t-1} + D_t)/(t-1955+1)$$

where Dt denotes GDP deflator at the year t. GDP deflators are obtained from the Annual Report on National Accounts provided by the Economic Planning Agency.

Risk-free Rate (i)

As a risk-free interest rate at each year, I use a 10-year government bond yearly yield

with the longest remaining maturity obtained from the Economic and Financial Data issued by the Bank of Japan.

Risk Premium for Real Estate Investment (π)

The Japan Real Estate Institute published the Survey on Japanese Real Estate Investors in April 1999. According to the survey, the average risk premium that Japanese institutional investors applied to real estate investments was 3.50%. Thus, I use this rate as the risk premium throughout the period.

5.1.4 Limitation of the Simulation

Unfortunately, there are several limitations in the simulation. First, the market rent (R) in the model is computed based on actual market rents that were influenced by a high degree of legal protection for tenants. As discussed earlier, the tenancy law has prevented landlords from providing office space to the market. If the law had not existed, the market rent level could have been lower and less volatile than the actual rent[2], but it is too difficult to include this effect in the simulation. Second, I take the supply of office as given. The actual movement of asset prices had an impact on the supply of office space, which in turn affected market rent. Thus, if assets had been priced under the alternative model, the amount of construction and resulting market rent would have been different from the actual movements. This effect is not included in the model either.

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[2] It is important to note the different definitions of market rent and existing rent. The market rent in the model is the rent that a new tenant pays when it begins occupancy. This rent is determined by the market condition. The existing rent is determined by a negotiation between the landlord and the existing tenant at the renewal of lease contract. The existing rent levels have been lowered and less volatile by the tenancy law. On the other hand, the tenancy law is considered to raise market rent level and increase its volatility. Please refer to section 4.2.

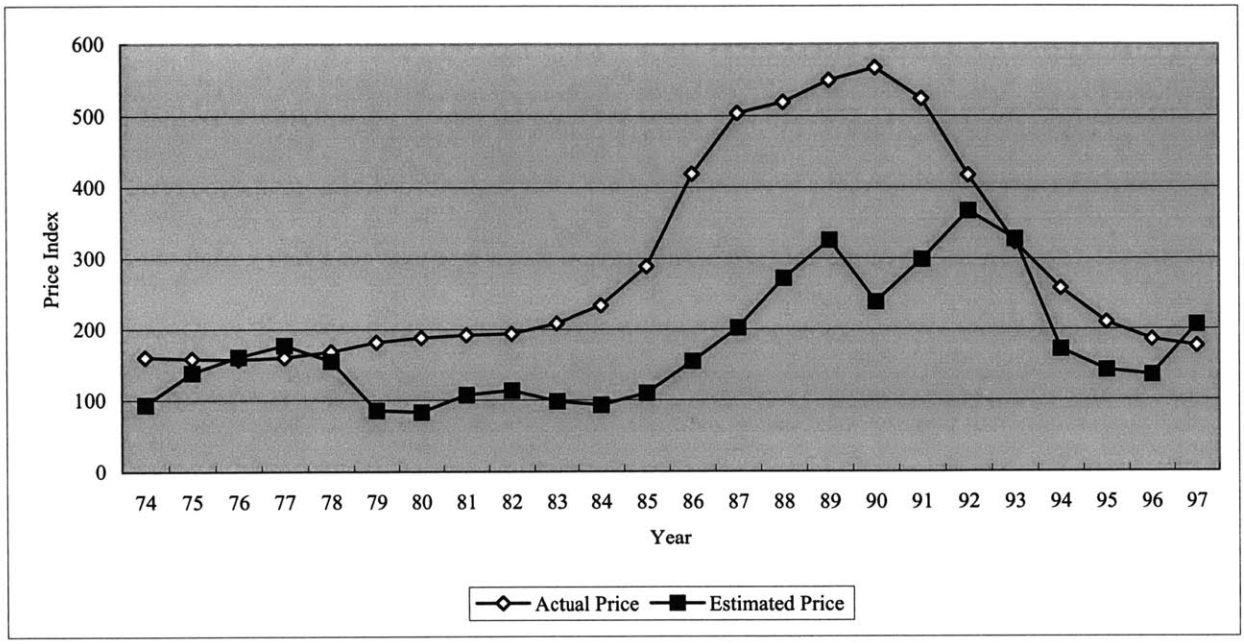
5.1.5 Result and Discussion

Figure 5-1 shows the result of this simulation. I will begin the discussion from an overall comparison between two asset price movements. Actual asset prices seem to follow the land price movement of the major metropolitan areas. This trend matches the fact that the cost of land accounts for a large portion of the total costs of office building investments, especially in the metropolitan areas. Short-term fluctuations are more observed in the estimated price movement than in the actual price movement. I assume that the markets are so efficient that investments are always perfectly valued. Therefore, asset prices in an efficient markets will more likely fluctuate in the short run in response to changes in economic factors such as interest rate, rent growth forecast, and so forth. This short-term fluctuation, in turn, might be able to control a larger long-term oscillation, although this effect is not incorporated in the simulation, as discussed earlier.

In the longer-run, on the other hand, the volatility of asset prices is larger in the actual prices than in the estimated prices. The underlying issue is that the inefficient market can dull the ability of market participants to respond immediately to the signs of exogenous changes. For instance, the financial market has continued to provide lower costs of capital even when more risks have been predicted. Institutional investors tend to have agency problems such as trend chasing and herding behavior that create below average risk-adjusted returns.

In examining the result in more detail, I will begin with the period soon after the first oil crisis (1974-1975). The estimated asset prices exceed the actual prices in 1976 and 1977.

Figure 5- 1 Comparison between Actual Asset Price and Estimated Price (Basic Simulation)



It may seem strange that in the simulation the estimated asset prices continue to increase during the depression soon after the oil crisis. One possible reason is that the Japanese economy experienced very high inflation around this period. Thus, the market rent continued to rise even during the depression. Indeed, the rent growth rate reached a high of 26% in 1974, and 22% in 1975. Furthermore, as inflation rates gradually went down, interest rates began to decrease from the end of 1976. In fact, the government lowered the official discount rate from 9% to 6.5% during the year 1975. These two mixed effects seem to increase the estimated asset price in mid 1970s.

As mentioned in chapter three, the Japanese economy before the first oil crisis was booming, and much construction began between 1972 and 1974. This oversupply of office buildings, together with the shakeout of inflation, decreased market rent after 1977. Although actual prices continued to increase after the oil crisis, the estimated prices in the simulation go down in response to negative rent growth forecast.

After several years of equilibrium, the Japanese economy plunged into the bubble economy around 1985. Both prices move differently during the bubble economy period. Unlike the actual prices, which went up and down fairly linearly with a peak in 1990, the estimated prices reach high levels in 1989, goes down slightly in 1990, and then reaches their highest levels in 1992 in the simulation. A couple of reasons can be proposed. First, the government raised the official discount rate from 2.5% in the first quarter of 1989 to 6.0% in the fourth quarter of 1990. This huge increase in interest rate is immediately reflected in the discount rate that lowers the estimated prices in 1990. Next, the market rent continued to increase, hitting its highest level in 1992. At the same time, the government lowered the official discount rate from 6.0% in 1991 to 3.25% in 1992. These combined effects would make the estimated prices reach their highest levels in 1992 in the simulation.

On the other hand, the actual prices continued to increase until 1990, and then continued to decrease after 1990. This is partly because Japanese firms did not use the discount cash flow method by which asset prices are priced more sensitively to the fluctuation of interest rate. Other possible reasons, as mentioned earlier, include agency problems such as trend chasing and herding behavior, and an inefficient financial market. As discussed in chapter three, the amount of debt provided by financial institutions largely depended on the land collateral value of borrowers. It may be assumed that in an inefficient market, when asset prices increase, private firms can employ more debt and invest in real estate assets, which further drives up asset prices. However, the opposite mechanism may work when asset prices are decreasing. When collateral value of the firm decreases below the face value of debt, financial institutions basically demand a margin call or other collateral enough to satisfy the face value of debt. This requires borrowers to sell off real estate assets, sometime at fire sale prices, which further drives asset prices down. It is often pointed out that this spiral mechanism was observed throughout the course of the

bubble economy and its burst.

Interestingly, in the simulation the estimated prices exceed the actual prices in 1997. Nevertheless, the truth is that real estate asset prices continued to decrease, and have not yet touched bottom. The simulation tells us some implications related to this issue. First, this continuous decline in actual real estate prices might be inconsistent with economic fundamentals surrounding the real estate market. As mentioned earlier, it can be assumed that the opposite mechanism of what occurred during the bubble economy is happening today, i.e. the lower the land collateral, the higher the cost of capital.

Next, it is also assumed that the market has lost liquidity, and the trading of real estate has been paralyzed. In this situation, the true underlying asset prices are not obvious to market participants, which can further decrease asset prices. As discussed in the previous chapter, J-REITs can provide the market with immediacy and liquidity. If J-REITs work as a dealer in the asset market, the simulation indicates that asset prices will go up in the future in that dealers inform the market true underlying asset prices.

5.2 Second Simulation: Investors with Perfect Foresight

Efficiently priced capital will choke off over-development tendencies. Unlike direct investment by institutional investors with various agency problems, investments through the public capital market are relatively efficient. REIT investors are much more likely to notice the prospective change in exogenous factors, and tend to react relatively sooner than institutional investors. When they notice an oversupply of office space, they will raise costs of capital for REITs. This capital market discipline will discourage further development and help keep space market in equilibrium. I will take the foresight of the capital market investors into account by

adding another variable onto the previous simulation.

5.2.1 Methodology and Model Specification

Basically, the methodology, model, and data used in the simulation are the same as used in the previous simulation. The only difference is that I will assume that all investors have perfect 1-year foresight as to vacancy rate and change discount rates depending on the prospective vacancy. This assumption is achieved as follows:

$$\mu_t = i_t + \pi - g_{(\alpha,\beta)t} + \nu_{t+1}$$

where μ_t is the discount rate at the year t, and i_t, π, $g_{(\alpha,\beta)t}$ are the same as mentioned in the previous simulation. I add ν_{t+1} that denotes the difference between the actual vacancy rate at the year $t+1$ (forecasted vacancy rate at time t) and the average rate of vacancy from 1975 to 1998.

$$\nu_{t+1} = \textit{(actual vacancy rate at time t+1)} - \textit{(average rate of vacancy)}$$

I assume that the average vacancy rate represents a state of equilibrium of office markets. For instance, if investors forecast that a vacancy rate a year from today is above the average rate of vacancy, they will increase their discount rate by adding the difference onto an original discount rate. This adjustment will have the effect of decreasing today's asset prices.

The intuition of this adjustment is as follows. As seen in chapter three, construction of office buildings was affected by the amount of funds available to private firms. Thus, this inefficient system observed in chapter three assumed that construction is driven regardless of current and future conditions of office markets. On the other hand, investments through the capital market are considered to be more efficient and forward-looking. When investors think that prospective vacancy rates are relatively high, they will likely raise the cost of capital. Thus, I substitute the level of vacancy rate for this increase in the cost of capital in this model.

Another argument can also be made from the irrational behavior of institutional

investors responding to changes in economic factors. Suppose that rents suddenly increase due to a change in economic fundamentals. Irrational or inefficient institutional investors may expect that the rents will remain at the present level elevated by the economic change, and that the rents will not decrease with a future supply of office buildings. Eventually, asset prices will continue to increase, and much construction will be started. After some periods, however, this construction will be completed and supplied in office markets. In the end, we will likely have an oversupply of buildings, followed by a decrease in rents. On the other hand, if we assume that investors are more rational and efficient, they will predict that construction can take place, and that prospective rents may decrease in the future. Thus, the volume of construction will be much smaller than that under the previous irrational expectation[3].

5.2.2 Data Specification

Variables other than vacancy rates are completely the same. Thus, I will mention the data of vacancy rates.

Vacancy Rate (v)

I use the vacancy rate of the Tokyo metropolitan area from 1975 to 1998 provided by the Japan Building Association[4]. Since I will assume that all investors can completely forecast vacancy rate a year hence, the time series will match other variables.

I compute the average of vacancy rates between 1975 and 1998, and assume that the average vacancy rate (1.54%) stands for a state of equilibrium of the office market. For instance, the actual vacancy rate in 1975 is 1.70%. Investors forecast this vacancy rate in 1974, and add the difference (0.16% = 1.70% - 1.54%) onto their discount rates when computing the asset

[3] Denise DiPasquale and William C. Wheaton, Urban Economics and Real Estate Markets, 1996, Prentice-Hall.

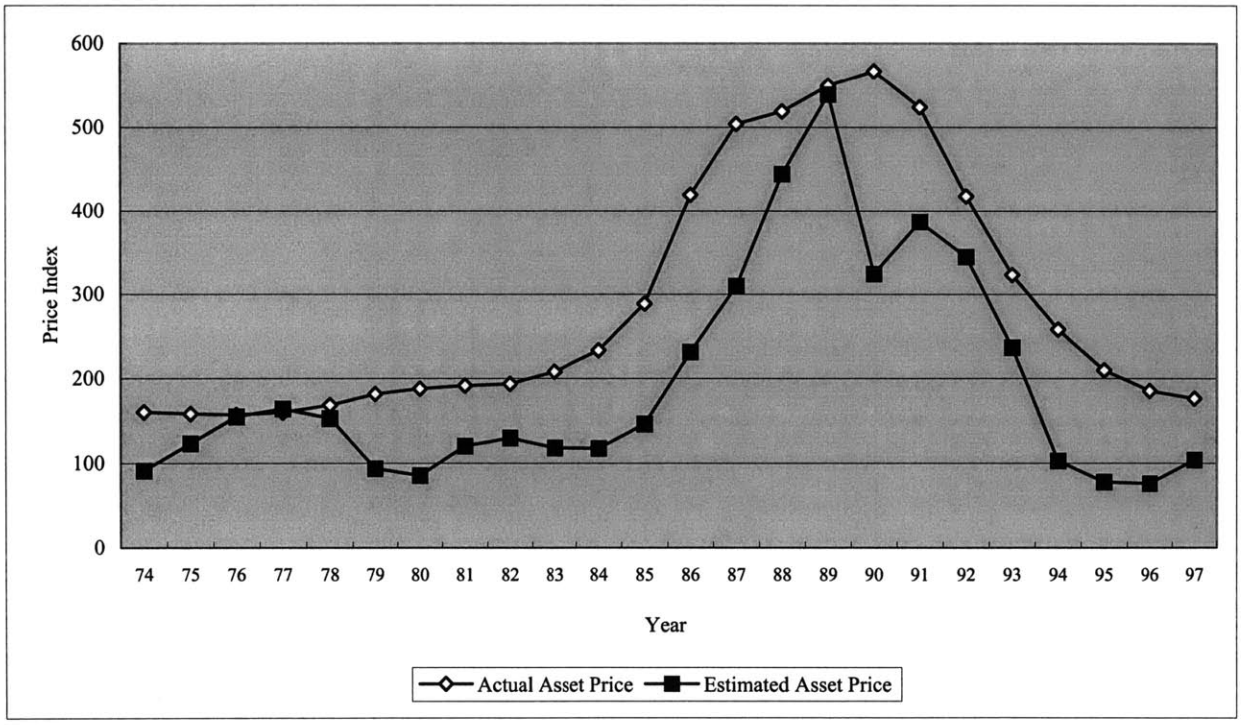
[4] The trend of the vacancy rates can be seen in the figure 3-5.

prices in the year 1974.

5.2.3 Result and Discussion

Figure 5-2 shows the result of the simulation. As a whole, the trend is almost the same as seen in the previous simulation, but the magnitude of changes is different.

Figure 5- 2 Comparison between Actual Asset Price and Estimated Price (1-Year Foresight)

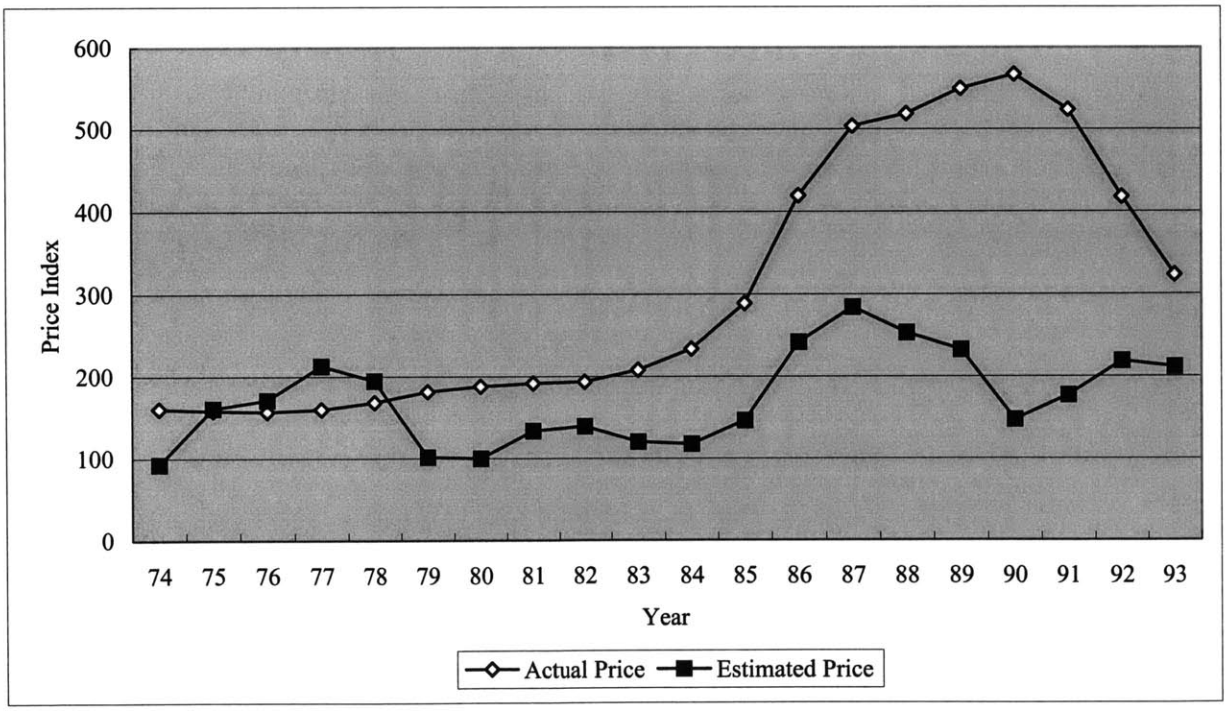


In the simulation the increase in estimated asset prices after the first oil crisis is controlled to some extent because of an increase in vacancy rates around 1976. On the other hand, the oscillation of prices during the bubble economy is promoted. This is due to the remarkably low rates of vacancy (0.2 %) beginning from the mid 1980s. Unlike in the previous simulation, the estimated prices hit their highest levels in 1989, not in 1992. The possible

reason is that low vacancy trend had continued until 1990, and then vacancy rates increased, especially in 1993 (1.8%). This huge increase in vacancy rates is forecasted and incorporated in 1992, resulting in lower prices. The estimated prices around the late 1990s are much lower than that in the previous simulation. The vacancy rates around the period are almost 5%, which adds risk premium onto discount rates.

The result implies that the recent actual asset prices might be higher than the estimated prices, which is valued more based on economic fundamentals. If this is true, the introduction of J-REITs will inform the market as to true underlying asset prices, which can further lower real estate asset prices.

Figure 5- 3 Comparison between Actual Asset Price and Estimated Price (5-year Foresight)



For additional information of this model, I will briefly introduce another simulation in which investors have a much longer foresight, 5-year foresight as to future vacancy rates.

Figure 5-3 shows the result. Note that time series are shortened because of the longer forecast of vacancy rates.

The result clearly indicates that long-term oscillation of asset prices is controlled to a great extent. It is reasonable to suppose that asset price movement will be further leveled when the supply factor, affected by estimated asset price movement, is taken into account.

5.3 Third Simulation: Different Views on Risk Premium "J-REITs"

So far in this chapter, I have assumed that all investors agree on the risk premium of real estate investment, and the rate of premium is stable throughout the period. The risk premium in the previous two simulations is 3.5%, the average rate of risk premium that institutional investors applied to their pro forma analysis in recent times.

Theoretically, however, risk premiums can be different from time to time, and the rate of premium demanded by the capital market investors may also be different from that of institutional investors. Therefore, I will make another simulation in which the risk premium of J-REIT investors is approximated based on beta (β) of publicly traded real estate firms' stocks. In fact, empirical evidence shows us that the performance of equity REITs is much more correlated to the performance of the stock market than to that of direct real estate investment in the United States. For instance, the correlation of quarterly returns (1978 – 1994) between S&P 500 and equity REITs is 0.6912, whereas the correlation between NCREIF[5] and equity REITs is

[5] National Council of Real Estate Investment Fiduciaries collects historical data on various institutional-grade property types, sorted by geographic areas. Index, called Russell-NCREIF Real Estate Performance Report, is often cited as the benchmark for institutional real estate performance.

0.0423[6]. Furthermore, Quan and Titman (1999) show that the contemporaneous relation between yearly real estate price changes and stock return is quite high (0.84) and statistically significant in Japan[7]. Thus, it might be reasonable to assume that the profile of prospective J-REIT investors is close to that of real estate stock investors.

5.3.1 Methodology, Model Specification, and Data Description

The basic methodology, model, and data used in the simulation are the same as those of the second simulation. The only difference is that I will assume that J-REIT equity investors value all real estate investments in the market. Investors will change the risk premium from time to time, depending on actual past performances of their investments. Therefore, the variable to be changed is only "π" in the previous model specification. In order to calculate the risk premium of J-REIT investors, I will start with the CAPM formula to compute β of real estate stock investments at each year:

$$R_j - R_f = a + \beta_j(R_m - R_f) + \varepsilon_j \qquad (1)$$

where R_j denotes return on asset j, R_f is risk-free rate, a is constant, R_m denotes market portfolio return, and ε_j is the idiosyncratic risk. In order to avoid the confusion of the symbols in the previous sections, and to clarify the model, the above equation is refined such that:

$$S_n - i_n = a + \beta_n(M_n - i_n) + \varepsilon_n \qquad (2)$$

where S_n denotes the monthly return on the stocks of real estate firms at the month n, M_n denotes the monthly return on the market portfolio at the month n, and i_n denotes the monthly risk-free rate at the month n.

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[6] William B. Brueggeman and Jeffrey D. Fisher, Real Estate Finance and Investments, 1997, Irwin/McGraw-Hill.

[7] Daniel C. Quan and Sheridan Titman, Do Real Estate Prices and Stock Prices Move Together? An International Analysis, 1999, Real Estate Economics.

I use actual monthly data and run a regression based on equation (2) to estimate β_t (beta at the year t). For instance, to calculate the β_{1980} (beta in 1980), I use monthly data on market portfolio returns, real estate stock returns, and risk-free interest rates from 2/1968 to 12/1980 (155 months time series). To compute β_{1990} (beta in 1990), I run a regression based on monthly data from 2/1968 to 12/1990.

I calculate market portfolio monthly returns from the monthly price change of TOPIX. I use the monthly price change of real estate stock index to estimate monthly real estate stock returns. Both indices[8] are provided by the Tokyo Stock Exchange, with data beginning from 1/4/1968. As a risk-free rate at each month, I use a 10-year government bond yield with the longest remaining maturity. Since the data are tabulated monthly but expressed by a yearly yield, I approximate the monthly risk-free rate by taking the twelfth root of the yearly yield at each month. After calculating β_t by running the regressions, I compute the risk premium at each year based on a following equation:

(Risk Premium at the year t: π^*_t) = 0.62 * β_t * {(Average Market Portfolio Returns from 1968 to the year t) – (Average Risk-free Rates from 1968 to the year t)}

I estimated the β_t from the actual past data on stock prices of publicly traded real estate firms. Since these firms typically employed debt in their capital structure, the estimated β_t is considered to reflect both financial risks (debt risk) and investment risks. In order to assume hereafter that J-REITs are 100% equity financed, and to eliminate particular financial risks of these firms, I multiply the β_t by the market equity ratio of 0.62, the ratio of market value of equity to the total market value of firm (i.e. I "unlever" their equity β_t to estimate asset β_t)[9]. The same

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[8] Unfortunately, both indices do not include dividend yield.

[9] To estimate asset beta, the following equation may usually be used: [$\beta_A = \beta_D$ *D/(D+E) + β_E *E/(D+E)], where β_A, β_D, and β_E denote asset beta, debt beta, and equity beta, respectively. D denotes market value of debt, and E is

ratio is used throughout the period. The data and method to estimate the ratio are explained in APPENDIX 4.

I compute the average market portfolio returns by taking the average of past yearly returns from 1968 to the year t. I calculate the average risk-free rates by taking the average of 10-year government bond yields with the longest remaining maturity, tabulated quarterly, from the first quarter of 1968 to the fourth quarter of the year t. Both rates are expressed as yearly yields. Therefore, the discount rate is finalized as follows:

$$\mu_t = i_t + \pi^*_t - g_{(\alpha,\beta)t} + v_{t+1}$$

where μ_t is the final discount rate at the year t, i_t is prevailing (not past average) risk-free interest rate at the year t, π^*_t is the risk premium calculated at the year t, $g_{(\alpha,\beta)t}$ is the rent growth rates as mentioned in the previous sections, and v_{t+1} is the differences of a forecasted vacancy rate and its average rate. It is not obvious, however, whether the capital market has already incorporated future vacancy risks into their risk premiums. Hence, I will assume hereafter that the capital market originally did not include prospective vacancy risk in their risk premiums. Please also note that I approximate the risk premiums of commercial real estate investments with the β of the real estate stock index. However, these real estate firms are not completely pure commercial real estate players[10]. Thus, the estimated β may be affected by other real estate businesses such as condominium developments[11].

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market value of equity. If I assume that these firms employ low enough levels of leverage, β_D can be seen as almost zero. Thus, I use the following approximation to estimate asset beta: $[\beta_A = \beta_E * E/(D+E)]$.

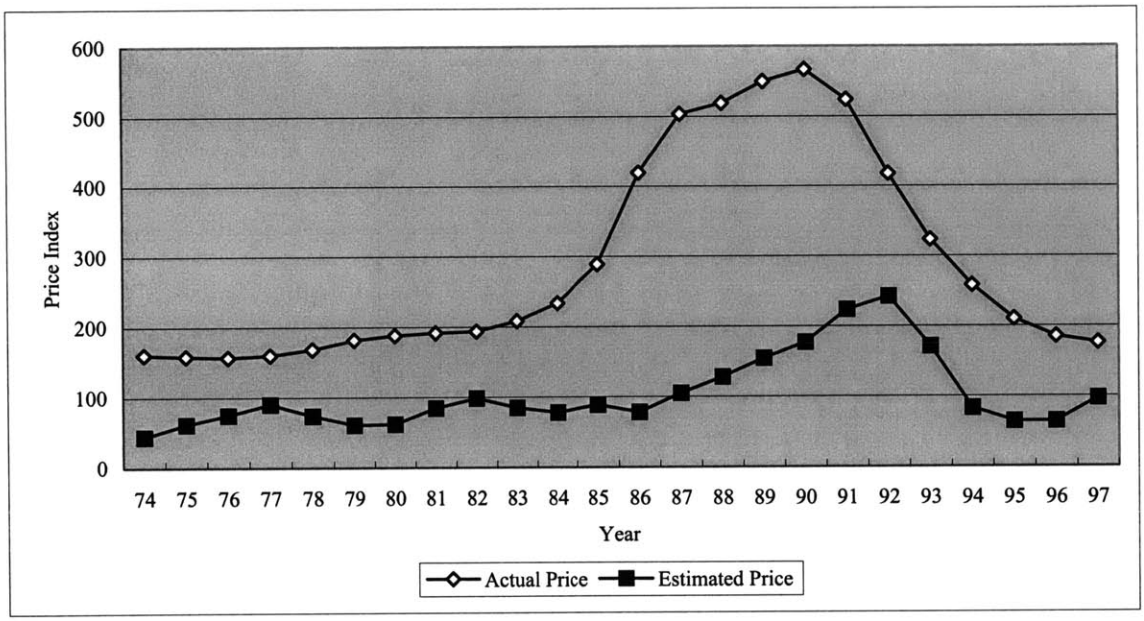
[10] Their revenues mainly come from both commercial real estate rents and residential unit sales. Refer to APPENDIX 3.

[11] Refer to APPENDIX 5.

5.3.2 Result and Discussion

Figure 5-4 shows the result of the simulation. Due to the high risk-premium based on the past β analyses of real estate stock investments, the estimated prices are lowered during the entire period.

Figure 5- 4 Comparison between Actual Asset Price and Estimated Price (β)



The β of real estate stock investments stayed at quite a high level during the period (approximately from 1.05 to 1.23)[12] as compared to that of the REITs in the United States (around the 0.5 range[13]). A question arises as to why the β of real estate stock is so high in Japan. If we assume that the correlation between stock yield and real estate price changes is strong (Quan and Titman: 1999), and that almost the entire assets of real estate firms are

[12] Approximately from 0.65 to 0.76 under the assumption of all equity finance.

[13] Under the assumption of all equity finance.

composed of real estate, real estate stock prices are more likely related to real estate asset prices. Thus, one may question the high β because the Japanese believed that real estate was an ultimate safe harbor, always beating any other assets with ever-increasing prices. It is my view that the capital market evaluated real estate stocks based on specific asset allocations of these real estate firms. The capital market would also incorporate the cyclical risks peculiar to the real estate industry. Since detailed arguments about the issue are not the primary objectives of the thesis, I will introduce several analyses in APPENDIX 5.

I will further examine the β of real estate stock investments in recent years. As of the end of the year 1999, the risk premium is 4.56% (β=1.18). To eliminate the effect of historical data, I also examine the risk premium based on data from a shorter period (1/1997 to 12/1999). The β goes down from the historical β of 1.18 to 0.90, but the difference between market portfolio returns and risk-free interest rates increases. As a result, the risk premium becomes 4.70%, slightly higher than that calculated by using a longer period of data. In any case, estimated risk premiums are more than the premium that institutional investors has been applying to their pro forma analysis (3.5%).

It is not obvious, as mentioned, whether the estimated risk premiums have already incorporated future vacancy risks. If we assume that the capital market has not yet included prospective vacancy risks, we need to forecast these vacancy rates.

The Ikoma Data Service System published in 1999 the forecast of future vacancy rates by the year 2003. A chart describing the trend of vacancy rates appears on the report[14], but real numbers are not available. Therefore, the vacancy rates I will mention hereafter are my estimation from the chart. The forecast shows that the vacancy rates of three major

[14] Ikoma Data Service System, IDSS Fudousan Hakusho '99.

metropolitan areas (Tokyo, Osaka, and Nagoya) will record the historical highest in the early 2000s. For instance, the vacancy rate of the Osaka area will reach 10% in 2001, and that of the Tokyo area will reach 7% in 2002. The report argues that the reason will be partly due to the economic depression. In today's economic environment, private firms are trying to reduce occupied space or eliminate branches in order to cut down their overheads. The report also argues that a huge supply of office buildings can be predicted around 2002, and this will further push up future vacancy rates.

If we add these forecasted vacancy rates onto estimated risk premiums, and if we take into account the fact that government is planning to increase the official discount rate, it is clear that we would have significantly low real estate asset prices today.

Overall results would imply that the financial and capital market has continued to provide low costs of capital to real estate firms relative to the risks. This may also indicate that the capital market discipline has not worked for real estate stock investments.

The question is whether the capital market will continue this behavior with J-REITs, or if it will provide high costs of capital and push down asset prices as observed in the simulation. This issue may be determined by who will be prospective investors of J-REITs. If the profile of J-REIT investors is different from those of real estate stock investors, the capital market may raise costs of capital for J-REITs. To work out the issue, I will briefly introduce my assumptions as to possible differences between J-REIT and real estate stock investors.

In theory, when a firm uses lower discount rates than the stock market expects, the market can punish the firm by lowering its stock prices and increasing costs of capital for the firm. This increase in costs of capital will in turn decrease asset prices. However, the result of our model seems to indicate that the market has not punished real estate firms. Examining the true reasons must require great amounts of analyses, but a stock sharing system peculiar to Japan, the

so-called *mochiai*, may be one of the reasons.

Taniguchi (1990)[15] argues that the mochiai continued to support high Japanese stock prices relative to firms' earnings. The mochiai is a mutual stock sharing system between firms and their main banks[16]. This block shareholding system allows the firm to control the amount of floating stock. Using empirical data from 1979 to 1988, Taniguchi analyzes how stock prices were artificially maintained by this mochiai mechanism. The analysis shows that overall P/E ratio (price earning ratio: price of a stock divided by its earnings per share) of the Japanese stocks would go down by approximately 5-10%, when the effect derived from the mochiai is eliminated[17]. Thus, it is possible that the mochiai is one of the reasons why the capital market was not able to punish real estate firms by lowering their stock prices[18].

Under the above assumption, we may be able to think that prospective J-REIT investors may be different from current and past real estate stock investors. Since the legislation of J-REITs is underway, we do not yet know what the regulations will be. Nonetheless, as is the

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[15] Tomohiko Taniguchi, Japan's Banks and the "Bubble Economy" of the Late 1980s, 1993, Center of International Studies, Program on U.S.-Japan Relations, Princeton University.

[16] This system can be well observed in keiretsu groups. Please refer to section 3.1.2.

[17] Several assumptions about the financial and real estate markets during the bubble economy can also be made from this mochiai system standpoint. During the bubble economy, large firms made most of the bullish stock markets. They could obtain cheap cost of capital by issuing new stocks. Theoretically, the announcement of a new stock issue will likely decrease the stock price of a firm due to the information asymmetry. However, new stock issues did not decrease stock prices in Japan partly due to the mochiai system, in which the information asymmetry is mitigated. These low costs of capital are considered to have flowed into the stock and real estate markets, pushing up both asset prices. Owing to both increased asset prices, firms could also employ more debt, since land and stock collateral financing was popular in the Japanese credit system. These debts again flowed into the stock and real estate markets, further pushing up these asset prices.

[18] Another possible assumption is that the financial market continued to provide the real estate firms with low costs of debt capital.

case in the United States, the limitation of large block shareholdings is forecasted[19]. Income distribution requirements of J-REITs (at least 90% of taxable income must be distributed to shareholders as a dividend) will keep investors from expecting a high growth opportunity in J-REITs. As a consequence, investors will price J-REITs mainly based on their regular dividends. Under this mechanism, the capital market discipline might work.

5.3.3 Conclusions

The third simulation has many implications. First, it seems that the inefficient financial market has continued to provide low costs of debt capital to direct real estate investors. If financial institutions had noticed the actual risk profile of direct real estate investments, the cost of capital would have been increased, which in turn would have lowered asset prices. Second, the same argument can also be made with the capital market. The lower discount rates that the real estate firms have used, or are currently using, might indicate that the capital market also has continued to provide low costs of equity capital to real estate firms. These stances of the financial and capital markets have continued to contribute to the discrepancy between real estate asset prices and the economic fundamentals, followed by cyclical oversupply of office buildings. In this sense, the huge supply of office buildings forecasted for 2002 may be due to low discount rates that institutional investors have recently been using. We have already looked at the possible result of this effect in the form of increasing vacancy rates which appears on Ikoma's report.

I also argued that the emergence of J-REITs might lower real estate asset prices. Under the assumption that J-REIT investors are more efficient than are real estate stock investors, risk

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[19] Nihon Fudousan Counselor Kai, Fudousan Shoukenka no Jitsumu, 1999, Seibun-sha.

premiums of J-REIT investors can be much higher than that of past and current stock investors[20]. Moreover, if J-REIT investors include increasing vacancy rates as an additional risk premium, the asset prices can be further depressed.

Basically, the arguments in this section were based solely on short-term forecasts of equity capital costs. From this point of view, we found several factors that may increase the rates used to discount commercial real estate cash flows. However, from other points of view, or from a much longer perspective, there will be several aspects that may decrease discount rates, or increase real estate prices. First, J-REITs will be tax-exempt investment vehicles. Theoretically, asset prices must be pushed up by the present value of the tax shield effects. This effect can exceed, or at least mitigate, the negative impacts of the increase in equity capital costs. Second, I assumed that J-REITs are 100% equity financed. However, cheap debt capitals may continue to flow into J-REITs, as it actually has into private firms. Third, the efficient capital market will choke off over-development tendencies. As seen in the second simulation, efficient investors are much more likely to notice the prospective change in economic factors, and tend to adjust the relative cost of capital. This capital market discipline can help keep space markets in equilibrium. Thus, in the longer-run, risk premium for over-development might be reduced by the emergence of J-REITs.

In the end, what we really need to know is that past and current costs of capital for real estate investments have not reflected the real risk. J-REITs are expected to help change this mind-set of the financial and real estate markets. The successful introduction of J-REITs may control the over-development tendency and improve social welfare.

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[20] I am assuming that J-REITs are all equity financed.

6 Summary

In chapter two, I began the discussion with the history of real estate ownership. Private firms continued to acquire land after World War II. They also invested in land even when they did not have any plan for utilizing it. In the later part of the chapter, I presented several reasons why firms increased land acquisition. The primary reason is that private firms needed to build business facilities to meet the strong demand for goods and services during the high economic growth period. I also proposed other rationales including the quasi-rent value of collateral service for private firms. However, these reasons cannot completely explain why land prices and the supply of commercial space were volatile, and why the firms continued to acquire land without plans for immediate business use.

In chapter three, I argued that finance matters in the real estate market. Government and private industry established a credit and financial system in order to catch up with the economies of other developed countries. To obtain debt financing during cyclical depressions, they devised a credit system that based on land collateral. It may also be assumed that government was to some extent concerned with supporting this credit system by participating in the asset market.

Later in chapter three, the land price determination model and construction determination model were proposed and examined. The result of these regression models showed the close relationship between finance conditions and the real estate market. This implied that the amount of funds available to private firms could be one of the most important determinants of real estate investment. Then, I proposed that the credit system based on land collateral provided private firms with lower costs of capital relative to the risk, and that these funds flowed into the stock and real estate markets, creating booms and busts in the asset markets, especially in the late 1980s and throughout the 1990s.

In chapter four, I presented key factors to establish an alternative model of the real estate market. The credit system based on land collateral needs to be changed to establish an efficient financial market. An inefficient interaction between the asset market and the property market due to the high degree of legal protection for tenant generated many problems in the entire economy. The tenancy law might misdirect space allocation, and may be one of the reasons why rents are high in the metropolitan areas.

Several issues related to real estate investors were also argued in the chapter. Private firms with good land collateral are the dominant real estate investors. However, they are likely to have agency problems such as trend chasing and herding behavior. Asset diversification policy at the firm level may reduce the values of firms. We also learned that pension funds are the most suitable investors from the asset-liability point of view. Later in the chapter, I suggested prospective functions of J-REITs.

In chapter five, I made three simulations under the alternative model of the financial and real estate markets. Estimated asset prices in these three scenarios move differently from actual price movements. Several forecasts and related problems were also proposed at the end of the chapter. Among others, the financial and capital markets seem to continue to provide institutional investors with lower costs of capital relative to the risk. If this behavior continues, it may take time for the Japanese real estate market to regain a state of equilibrium.

As discussed throughout the thesis, the relationship between the financial market and the real estate market is strong and important. It would not be an exaggeration to say that the amount and the relative cost of capital have a great impact on a nation's real estate market.

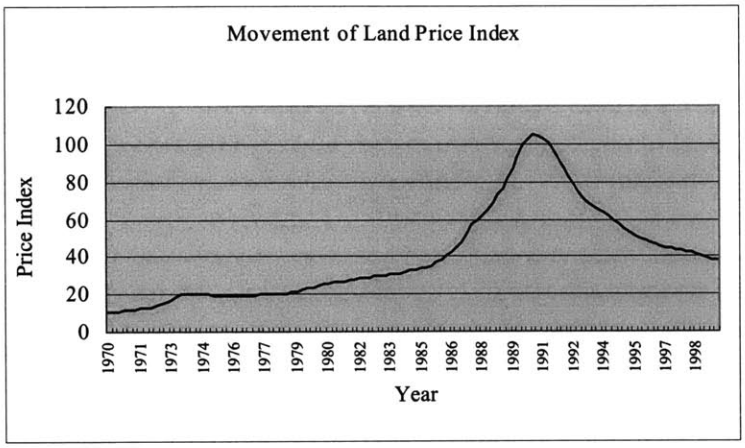
This "cost of capital" argument will also be applied to the world economy framework. Japanese firms acquired relatively lower costs of capital from the late 1980s to the early 1990s mainly due to the inflated stock and land collateral values, and the sudden appreciation of yen.

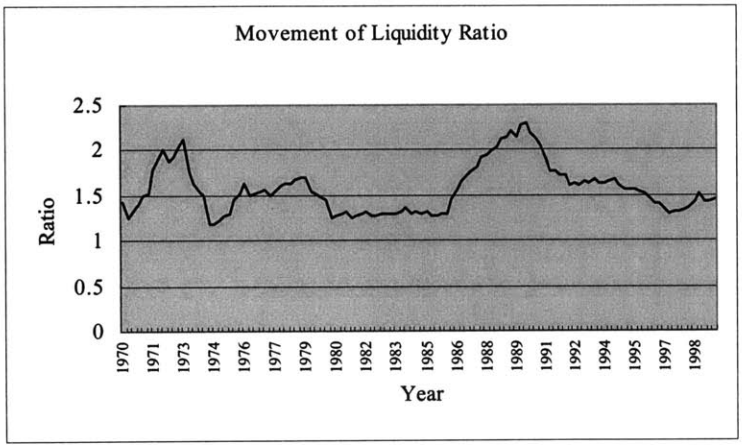
These funds flowed not only into their own markets, but also into foreign markets, especially into the real estate market in the United States. The idea of buying out assets in distressed markets with lower costs of capital seems to make sense. Japanese private firms, however, had not yet become accustomed to overseas investments. Foreign markets operate much differently than their own markets. Local players have distinct advantages in terms of market information, the legal system, and so forth.

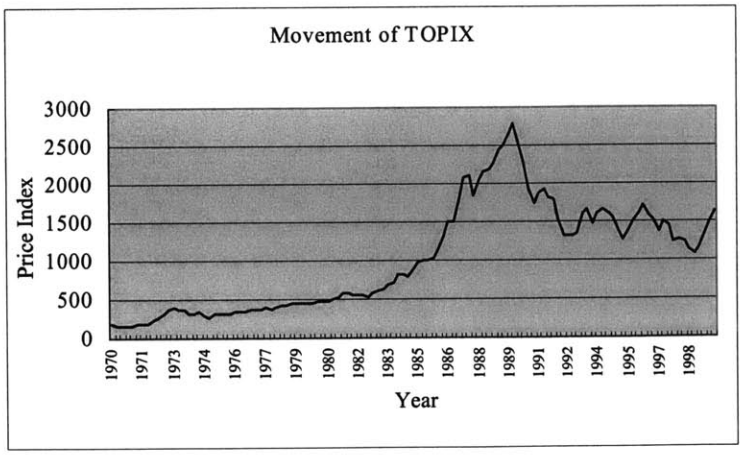
In today's world economy, Japan is providing some countries with capital at an extremely low cost. These countries might be taking advantage of the low costs for their own economies. In this sense, the world economy might be the most inefficient market. In order to improve efficiency in the world economy, to avoid the misdirection of funds, and to help these countries avoid relying on continuous fund inflows from other countries, we need to start making our own markets as transparent as possible. The transparency will help make the nation's markets efficient, which eventually will improve efficiency in all the markets of the world.

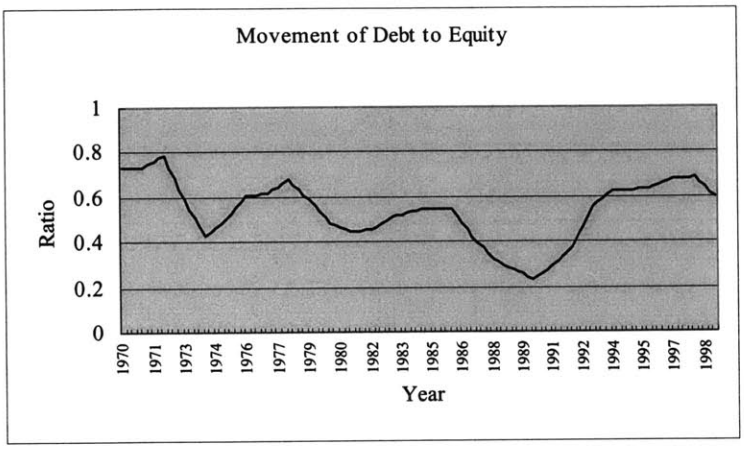
We learned that finance does matter in the real estate market, since the markets is not perfect and efficient. Thus, the neoclassical economics model does not work in the real world context. Nevertheless, it is a good idea to start from the model. The intuitions of the Modigliani & Miller Theorem will help us understand where market inefficiencies exist, what they are, and how much we are paying for them. After answering these questions, we will be able to decide which costs should be eliminated, although it can be argued some of these costs may be inevitable or necessary in the real world, especially to build another "Tower of Babel."

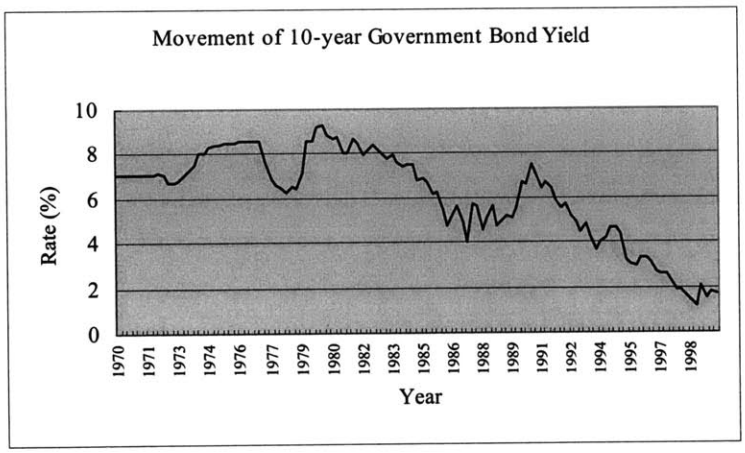
APPENDIX 1: Movement of Each Variable in the Regression Analysis (Ch. 3)

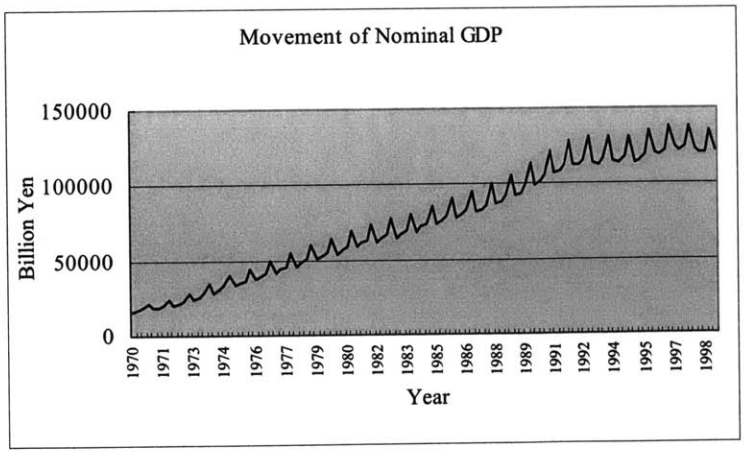


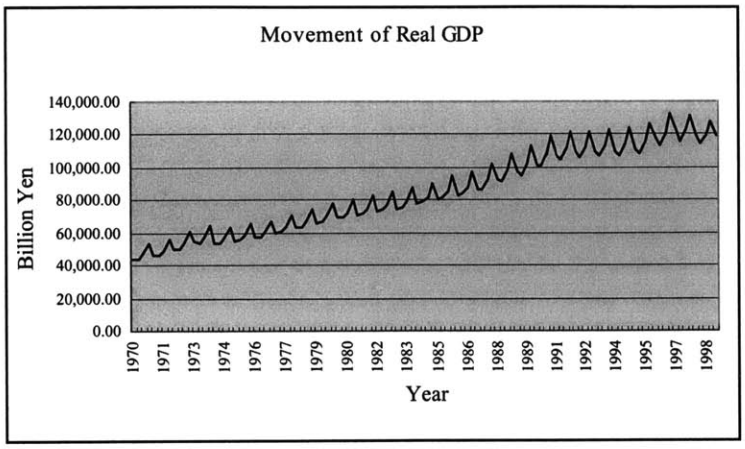


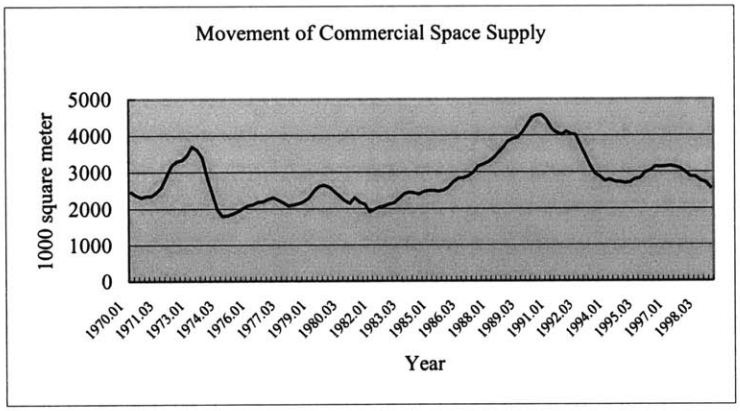



Movement of Debt to Equity
Ratio
1
0.8
0.6
0.4
0.2
0
1970 1971 1973 1974 1976 1977 1979 1980 1982 1983 1985 1986 1988 1989 1991 1992 1994 1995 1997 1998
Year


Movement of 10-year Government Bond Yield
Rate (%)
10
8
6
4
2
0
1970 1971 1973 1974 1976 1977 1979 1980 1982 1983 1985 1986 1988 1989 1991 1992 1994 1995 1997 1998
Year


Movement of Nominal GDP
Billion Yen
150000
100000
50000
0
1970 1971 1973 1974 1976 1977 1979 1980 1982 1983 1985 1986 1988 1989 1991 1992 1994 1995 1997 1998
Year


Movement of Real GDP
Billion Yen
140,000.00
120,000.00
100,000.00
80,000.00
60,000.00
40,000.00
20,000.00
0.00
1970
1971
1973
1974
1976
1977
1979
1980
1982
1983
1985
1986
1988
1989
1991
1992
1994
1995
1997
1998
Year


Movement of Commercial Space Supply
1000 square meter
5000
4000
3000
2000
1000
0
1970.01
1971.03
1973.01
1974.03
1976.01
1977.03
1979.01
1980.03
1982.01
1983.03
1985.01
1986.03
1988.01
1989.03
1991.01
1992.03
1994.01
1995.03
1997.01
1998.03
Year

APPENDIX 2: Project Lists

(1) During the Bubble Economy

#	Ward	Construction		Owner Category	Story	Floor Area
		Start	Completion			(sq.-meter)
1	Sumida	Jun-91	Jul-94	Construction	33	68,680
2	Minato	Oct-91	Jun-93	Construction	10	11,939
3	Shinagawa	May-90	Apr-93	Real Estate	28	44,045
4	Chuo	Nov-90	Feb-93	Real Estate	12	14,020
5	Shibuya	Dec-90	Mar-93	Real Estate	9	11,348
6	Minato	Dec-90	Oct-93	Real Estate	20	46,680
7	Minato	Jan-91	Apr-93	Real Estate	20	40,734
8	Shibuya	Jan-91	Jun-93	Real Estate	14	15,788
9	Shibuya	Mar-91	Apr-93	Real Estate	9	24,111
10	Toshima	May-91	May-93	Real Estate	14	16,926
11	Shinjuku	Jun-91	Jun-94	Real Estate	10	9,563
12	Shinjuku	Jun-91	Mar-97	Real Estate	10	9,563
13	Shibuya	Jul-91	Dec-93	Real Estate	18	12,594
14	Chuo	Sep-91	Mar-93	Real Estate	13	15,548
15	Chuo	Sep-91	Mar-93	Real Estate	11	11,319
16	Setagaya	Oct-91	Nov-93	Real Estate	29	69,000
17	Taitou	Nov-91	Oct-93	Real Estate	11	10,127
18	Shinjuku	Nov-91	Jan-95	Real Estate	44	241,323
19	Chiyoda	Mar-91	Feb-94	Life Insurance	27	60,316
20	Shinjuku	Nov-91	Oct-94	Life Insurance	31	44,787
21	Bunkyo	May-89	Mar-94	Others	6	11,816
22	Chuo	Dec-89	May-94	Others	51	100,700
23	Shinagawa	Mar-90	Jan-93	Others	11	38,610
24	Minato	Aug-90	Feb-93	Others	11	20,966
25	Shinjuku	Sep-90	Apr-94	Others	52	264,128
26	Shibuya	Nov-90	Feb-93	Others	18	28,746
27	Shinjuku	Nov-90	May-95	Others	8	29,650
28	Chuo	Dec-90	Jul-95	Others	11	22,607
29	Sumida	Jan-91	Mar-93	Others	8	23,006
30	Shibuya	Jan-91	Sep-93	Others	6	12,206
31	Minato	Feb-91	Feb-93	Others	14	20,555
32	Koutou	Feb-91	Feb-93	Others	12	16,693
33	Chuo	Feb-91	Mar-93	Others	18	43,214
34	Minato	Feb-91	Sep-93	Others	24	66,818
35	Kita	Feb-91	Sep-93	Others	19	27,934
36	Chuo	Feb-91	Feb-94	Others	20	55,085
37	Shinjuku	Mar-91	May-93	Others	11	10,706
38	Chiyoda	Apr-91	Sep-93	Others	20	32,575
39	Minato	May-91	Mar-94	Others	20	113,157
40	Shinagawa	Jun-91	Mar-93	Others	6	10,457
41	Shinagawa	Jun-91	Mar-94	Others	27	46,622
42	Minato	Jul-91	May-93	Others	13	10,073
43	Ota	Jul-91	May-93	Others	7	10,239
44	Kita	Jul-91	May-94	Others	10	11,439
45	Shibuya	Aug-91	Feb-93	Others	9	17,193
46	Shinjuku	Aug-91	Apr-93	Others	17	83,693
47	Taitou	Aug-91	Aug-94	Others	11	11,884
48	Koutou	Sep-91	Nov-93	Others	12	36,170
49	Minato	Sep-91	Jan-94	Others	20	26,529
50	Edogawa	Oct-91	Mar-93	Others	7	29,567

51	Nerima	Nov-91	Mar-93	Others	7	10,429
52	Koutou	Nov-91	Jun-93	Others	7	10,170
				Total Floor Area		2,032,048
				"Others" Sub-Total		1,253,637
				Share of "Others"		61.69%

(2) After 1999

#	Ward	Construction		Owner Category	Story	Floor Area
		Start	Completion			(square-m)
1	Shibuya	Feb-99	Dec-00	Real Estate	18	20,548
2	Sumida	Mar-99	Dec-00	Real Estate	16	19,517
3	Minato	Apr-99	Jul-01	Real Estate	41	86,600
4	Chiyoda	Apr-99	Aug-02	Real Estate	37	100,000
5	Chiyoda	Aug-99	Nov-01	Real Estate	32	57,000
6	Minato	Aug-99	Nov-00	Real Estate	10	25,380
7	Minato	Sep-99	May-01	Real Estate	15	30,710
8	Chiyoda	Dec-99	Jan-01	Real Estate	11	13,737
9	Shinjuku	Feb-00	Nov-02	Real Estate	38	96,500
10	Shinjuku	Feb-00	Nov-02	Real Estate	23	32,400
11	Minato	Mar-00	Apr-02	Real Estate	17	61,172
12	Minato	Mar-00	Jan-03	Real Estate	43	187,745
13	Minato	Apr-00	Feb-02	Real Estate	12	7,536
14	Minato	Apr-00	May-03	Real Estate	54	380,105
15	Minato	Apr-00	May-03	Real Estate	6	6,855
16	Chiyoda	Apr-99	Jun-02	Life Insurance	38	76,634
17	Shinagawa	Feb-99	Jun-01	Others	-	20,619
18	Chuo	Feb-99	Feb-99	Others	7	8,181
19	Minato	Mar-99	Jan-01	Others	6	15,991
20	Minato	Jun-99	Dec-00	Others	13	20,800
21	Koutou	Sep-99	Aug-01	Others	14	20,016
22	Minato	Sep-99	Nov-02	Others	48	232,000
23	Meguro	Oct-99	Jan-01	Others	7	19,190
24	Shinagawa	Dec-99	Mar-06	Others	23	294,734
25	Shinagawa	Dec-99	Mar-06	Others	28	83,800
26	Minato	Mar-00	Feb-03	Others	29	74,296
				Total Floor Area		1,992,066
				Others Sub-Total		789,627
				Share of Others		39.64%

APPENDIX 3: Overview of Real Estate Investors

1. Developer

One of the largest professional real estate investors in the Japanese market have been real estate developers. Unlike their counterparts in the United States, Japanese developers typically own office buildings, shopping centers, retail malls, and hotels after finishing developments. Since they did not dispose and recapitalize their assets, their capacities to develop were limited due to finance constraints. It is assumed that this is one of the reasons why private firms had to acquire land and build business facilities on their own during the high economic growth period. On the other hand, this developers' structure promoted excessive investments during the bubble economy because they were the largest real estate investors with class-A collateral land. In this sense, real estate developers may not be efficient real estate investment vehicles in that they increased and decreased developments regardless of the demand for space.

In order to look at the characteristics of developers, I examine how much they depend their revenues on rent incomes from commercial real estate. I divide the total sales amount of major three developers by business categories: commercial real estate (rent revenues), residential sales revenues, and other in table 1. This table shows that Japanese developers earn a large portion of their revenues from rent incomes from commercial real estate.

Table 1 Breakdown of the Three Major Developers' Sales

(million yen)

	Mitsui		Mitsubishi		Sumitomo	
Commercial	243,737	42.5%	239,988	66.0%	128,686	45.2%
Residential	296,681	51.7%	86,994	23.9%	135,998	47.7%
Other	33,602	5.9%	36,750	10.1%	20,325	7.1%
Total Sales	574,020	100.0%	363,732	100.0%	285,009	100.0%

Source: 1998 Fiscal Year Financial Reports

If the specialization advantage exists as discussed in chapter four, and if the emergence of more efficient investment vehicles like J-REITs is taken for granted, the revenue structure of Japanese developers may need to change in the future.

2. Life Insurance Company

Life insurance companies are major office building owners in the current Japanese real estate market. While real estate developers struggled with obtaining enough funds to finance office-building projects, life insurance companies had increased office-building investments since 1970s until the burst of the bubble economy. Asset-liability matching issue seems to accelerate their direct investments in office buildings. A life insurance company's decision to allocate most of its funds to long-term investments is a result of the nature of its liabilities. As most contracts written by life insurance companies are based on some contractually fixed interest that will be paid to a policyholder after an extended number of years, long-term investment is a natural consequence for an insurance company to use to hedge its commitment.

Historically, life insurers enjoyed good performance in managing their funds due to a vast, perennial supply of unrealized profits from their long-held portfolios of stocks and real estate. The paper profits of life insurers have been substantially eroded by low interest rates, however, as well as the scourge of non-performing assets and lackluster stock and real estate markets. Under these conditions, life insurers are recently trying to recapitalize their real estate assets[1], but little progress has been made because of the lack of private equity capital in the market.

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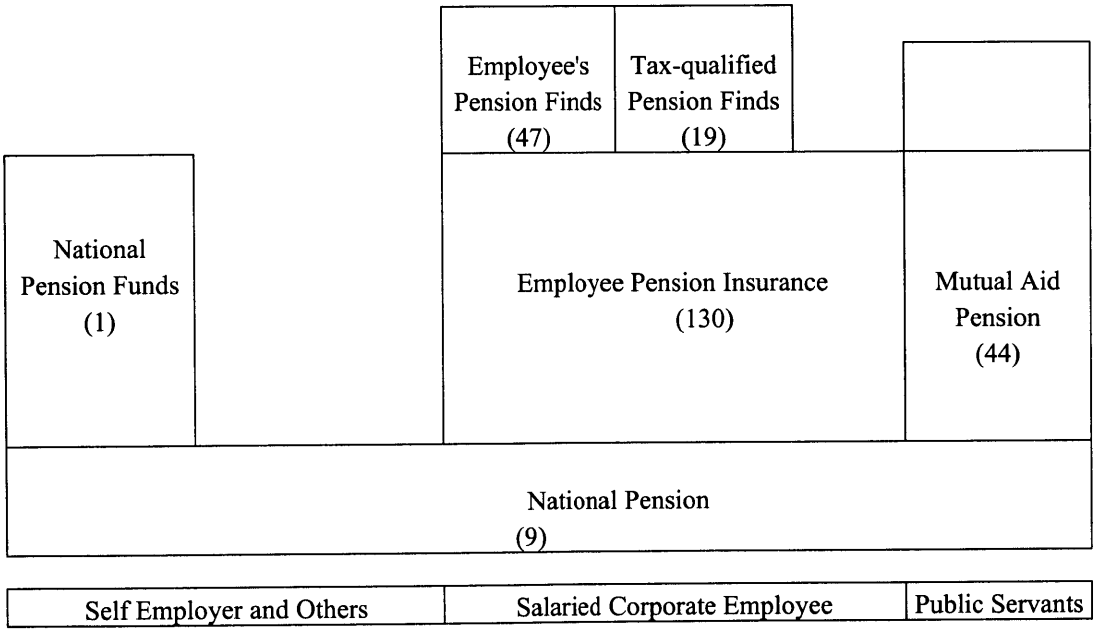
[1] For instance, Touhou Life Insurance sold its head office building to overseas investors to restructure its portfolio. Nihon Keizai Shinbun, March, 11, 1999.

3. Pension Fund[2]

(1) Structure and Scale

Pensions in Japan basically fall into one of two categories: public pensions and corporate pensions. A market for private pension plans exists, but is not large enough to examine its influence on the real estate market in this thesis. Public pension schemes are broadly classified into three: the Mutual Aid Pension, Employee Pension Insurance, and the National Pension (Figure 1). The Mutual Aid Pension scheme, with assets of 44 trillion yen, covers public servants. Employee Pension Insurance, with assets of 130 trillion yen, covers salaried corporate employees. The National Pension plan, a basic program with assets of 9 trillion yen, is mandatory for all Japanese citizens over 20 years of age.

Figure 1 Japanese Pension Fund Scheme (scale: trillion yen)



Source: Nenkin Hakusho, 1999, Shakai Hoken Kenkyu-jo

[2] Source: Nikkei Net Interactive (www.nni.nikkei.co.jp/).

Employee Pension Insurance's fund initially came fully under control of the Ministry of Finance, which delegated asset-management duties to its Trust Fund Bureau. In 1988, however, the Trust Fund Bureau began consigning fund assets to the Pension Welfare Service Public Corp., which in turn assigned management of those assets to the private sector, namely trust banks, life insurance companies and investment-advisory firms. As of March 31, 1998, assets under management totaled more than 24 trillion yen, but the effective returns have been pitiful. The reason for this is the high guaranteed interest rate paid by the Pension Welfare Service Public Corp. to the Trust Fund Bureau. In fact, the government had put the Employee Pension program in the position of borrowing money at high interest rate to invest in stocks and bonds, presupposing a rising market that would yield a profit on the interest rate spread. Instead, when portfolio returns evaporated after the burst of the bubble economy, a huge negative spread appeared. Investment losses amounted to 1.4 trillion yen as of the end of fiscal 1997; they are scheduled to be amortized by fiscal 2000.

The Ministry of Health and Welfare, meanwhile, plans to establish a new "pension asset-management organization" that will continue to invest some Employee Pension assets in the financial markets. The real estate sector is paying attention to this fund.

(2) Corporate Pension Schemes

Employees' pension funds (kousei nenkin kikin) and tax-qualified pension funds (zeisei tekikaku nenkin) – Japan's two main corporate pension schemes -- are another targets of the real estate sector. Under the employees' pension fund system, companies place into a corporate pension reserve additional contributions beyond their mandatory payments into government-managed Employee Pension Insurance, and manage those assets to meet or surpass an assumed rate of return calculated to cover projected benefit obligations. Because these funds

are closely linked to the public pension system, the Ministry of Health and Welfare monitors accounting, investment and related systems. Companies, which set up tax-qualified pension plans, manage fund assets independently from public pension schemes. These funds fall under the watchful eye of the National Tax Administration Agency. Differences in asset-management systems highlight the operation of these two corporate pension schemes. A key difference is that assets in employees' pension funds have, since the end of fiscal 1997, been assessed at market value, whereas assets in tax-qualified pension plans are assessed at book value.

i) Employees' Pension Funds

There were 1,850 separate employees' pension funds as of April 1, 1999, with assets amounting to 46.7 trillion yen as of March 31. These figures represent the total number of funds established by parent-only or group businesses as well as collective funds established by groups of small companies or other organizations operating within a single industry. Typical examples are the employees' pension fund of Hitachi Ltd., and the Zenkoku (All Japan) Credit Union employees' pension fund

ii) Tax-Qualified Pension Plans

Tax-qualified pension plans are not funds per se. A company can establish a pension program and assign management of the assets to a trust bank or life insurance company for investment purposes to generate source funds for lump-sum severance payments to employees upon resignation or for annuities.

From a taxation viewpoint, tax-qualified pension plans have several disadvantages compared with employees' pension funds, and are thus favored more by small and midsize businesses than by large companies. However, regulations governing plan formation are less rigorous for tax-qualified pension plans, a factor that has encouraged companies like IBM Japan Ltd. to adopt this scheme. Total asset scale reached an estimated 18.5 trillion yen, about half

that of employees' pension funds, as of March-end 1998.

iii) Pension Fund Association

The Pension Fund Association is a special organization that manages the pension assets of individuals who have withdrawn from employees' pension programs (typically due to a job change) before retirement age. With assets of more than 3.2 trillion yen, the PFA is in effect the largest pension fund in Japan. It makes use of the services of as many as 21 investment-advisory firms and is Japan's most aggressive participant in the execution of in-house as well as consultancy-oriented portfolio management activity.

APPENDIX 4: Data and Methodology to Estimate Market Equity Ratio

I estimate the market equity ratio (0.62) based on following method and data.

First, from the real estate firms whose stock prices are reflected in the real estate stock index, I select eight real estate firms[1] whose main businesses are considered to be commercial real estate[2].

Next, I calculate each firm's market values of both equity and debt. The market value of equity is computed by multiplying the number of shares by the highest market stock price from January 4 to June 30, 2000. The market value of debt is obtained from the company financial information of the Yahoo Japan[3]. I use the total amount of "interest-bearing debt" of each firm as the market value of debt of the firm. The market equity ratio of each firm is computed based on the following equation.

Market Equity Ratio = Market Equity Value / (Market Equity Value + Market Debt Value)

I take the average of the market equity ratios of these firms. Thus, the final ratio used in the third simulation in chapter five is 0.62[4].

---

[1] The firms include Airport Facilities (74%), Daibiru (93%), Heiwa Real Estate (56%), Mitsubishi Estate (65%), Sankei Building (91%), TOC (73%), Toho Real Estate (54%), and Tokyo Rakutenchi (69%). The parentheses indicate the percentages of rent revenues from commercial real estate to the total revenues of these firms.

[2] I select these firms whose revenues from commercial real estate exceed 50% of the total revenues of the firms.

[3] http://profile.yahoo.co.jp/

[4] Since the market equity ratio changed every year, it must be better to change the ratio based on historical financial information of these firms. Unfortunately, I was not able to obtain these data mainly due to time constraint.

APPENDIX 5: Risk Premium of Real Estate Stock Investments

I will try to understand why the β of Japanese real estate stock exceeds 1.0. I will mainly focus on comparing relative risks between market portfolio investment and real estate investment, assuming that aggregate stock price indices (i.e. TOPIX and Nomura-Russell Stock Performance Index) represent the performance of the market portfolio investment. Note, however, that perfectly analyzing relative risks of both investments is not straightforward mainly because of data constraints.

I begin from calculating standard deviations of semiannual price changes of both aggregate stock price (TOPIX) and land prices[1] (Land Price Index used in chapter three) from 1980 to 1998. The standard deviation of stock price change is 0.142, whereas that of land price change is 0.075. Only from this result, it seems that land is a safer asset than the market portfolio. Although this result is consistent with the belief of the Japanese that land is the safest asset class in Japan, it can be misleading mainly because of following two reasons.

First, both data do not include income return, i.e. dividend yield for stocks and rent yield for land. Including income returns may change risk-return characteristics of both assets. Second, the TOPIX is a value-weighted index of the first section of the Tokyo Stock Exchange, and it is calculated based on actual market stock prices. On the other hand, land price index is computed based on appraisal. Appraisers typically refer to past trends in determining current land prices, which tends to create lags behind actual market prices. Thus, it is reasonable to consider that land price fluctuations are more or less smoothed out, which is likely to lower the standard deviation.

---

[1] The land price index is computed based on average land prices of six major urban cities, and includes residential, commercial, and industrial zoning areas.

Therefore, I will try to include income returns of both investments in the next analysis[2]. I use the Nomura-Russell Stock Performance Index as an index of the market portfolio. The data include dividend yields. As an index of real estate investment performance, I use the MTB-IKOMA Real Estate Investment Index. I use the total return index that includes return from office rents.

The result is shown in the below table.

	Nomura-Russell Stock Index	MTB-IKOMA Aoyama	MTB-IKOMA Tokyo-Metropolitan	MTB-IKOMA All Japan
Standard Deviation	0.21	0.22	0.18	0.16
Mean Return	7.71%	5.53%	4.00%	3.97%

I categorize MTB-IKOMA index by area sizes, small, medium, and large. Aoyama is one of the business districts in the Tokyo metropolitan area. Tokyo-Metropolitan includes such prefectures as Tokyo, Kanagawa, Chiba, and Saitama. As easily predicted from the portfolio theory point of view, the standard deviation and mean return decrease as real estate asset pools are diversified.

The standard deviations of market portfolio, represented by the Nomura-Russell, and real estate investments become much higher than these we saw in the simple price change analysis. In particular, the standard deviation of the "Aoyama" exceeds that of the Nomura-Russell. However, the overall risk of the market portfolio seems higher than the overall risk of real estate investments (MTB-IKOMA All Japan). Thus, the result cannot yet answer to our question as to why the β of Japanese real estate stock exceeds 1.0.

---

[2] Unfortunately, all real estate performance indices depend on appraisal in computing asset prices. Therefore, I cannot eliminate this factor in the thesis.

From these two simple analyses, I will propose several points with regard to this issue. First, the capital market seems to have priced real estate stocks based on particular asset allocations of real estate firms. In the above table, we found that only the standard deviation of the "MTB-IKOMA Aoyama" exceeds that of Nomura-Russell Index. Japanese real estate firms in the first section of the Tokyo Stock Exchange tend to hold real estate assets after developments, and these assets are concentrated in some particular large cities. This implies that their investment performances are much closer to the "MTB-IKOMA Aoyama" than to "MTB-IKOMA All Japan".

Second, it may also be assumed that real estate stock price indicates more accurately the true underlying prices of assets held by these real estate firms. As will be mentioned later, the MTB-IKOMA Index is computed based on appraisal. Thus, the movements of the index may be smoothed out. On the other hand, the capital market is more likely to concern about the market values of real estate assets of these companies, not the appraisal values.

From this point of view, it is important to note that the real estate stock index may not completely measure the market values of a particular real estate asset type, i.e. commercial, residential, industrial, etc. For instance, typically real estate firms earn sales and profits mainly from both commercial real estate rents and sales of residential (condominium) units. The stock prices of these firms seem to be affected by the performances of these two businesses[3].

Figure 1, 2, and 3 show the movements of the real estate stock index, the condominium sales rate, and commercial real estate return from 1992 to 1998, respectively.

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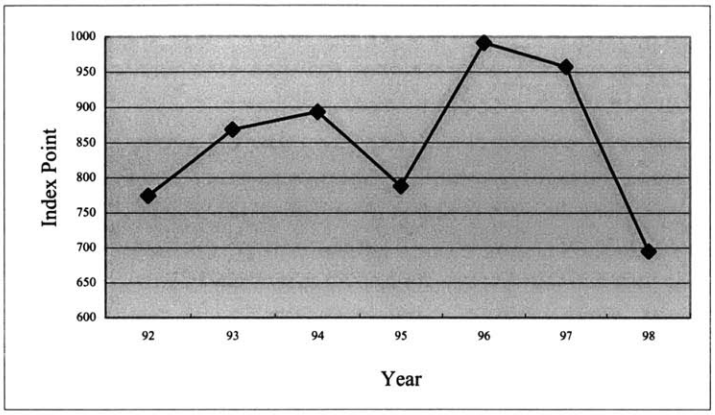
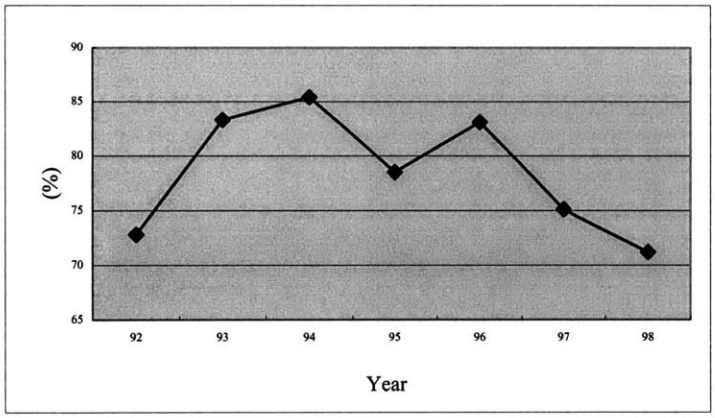
[3] Refer to the APPENDIX 3 (1. Developer).

Figure 1: Real Estate Stock Index



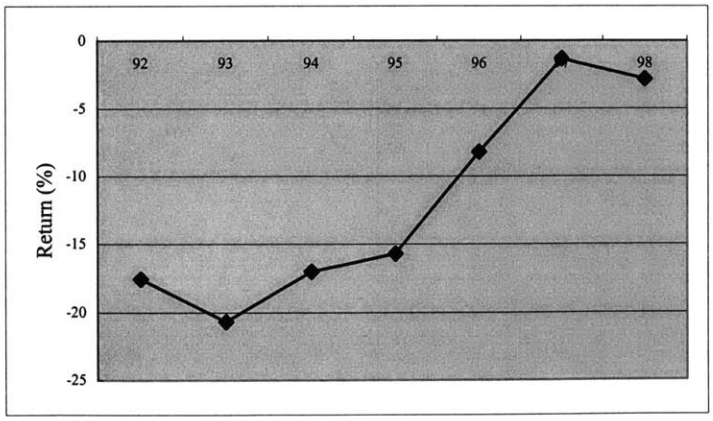
Source: Tokyo Stock Exchange [yearly average]

Figure 2: Condominium Sales Rate in the Tokyo area



Source: Fudousan Keizai Kenkyujo [yearly average: the number of units sold / the number of units supplied]

Figure 3: Office Building Return in the Tokyo area



Source: MTB-IKOMA Real Estate Investment Index

These figures clearly show that stock prices of real estate firms are not determined by either residential sales performances or office building performances. Rather, it seems that combined factors had an impact on the real estate stock prices. Therefore, to approximate the price of a specific type of real estate assets with the real estate stock prices may be misleading.

Lastly, among others, to exactly compare the overall risk of both investments is not an easy task due to the data constraint. The price index of the TOPIX covers longest time series (from 1949), but the total return index that includes dividend yield started from 1990. Although the Nikkei Stock Index is another well-known stock index, it does not include dividend yield. As to real estate index, there are several investment performance indices. Most famous real estate investment indices would be MTB-IKOMA and STIX (Sumitomo Trust Property Index). However, like other indices, both calculate asset prices based on appraisal. Moreover, rent incomes are computed based on market rents. As I already mentioned, the existing rents can be different from the prevailing market rents. Thus, rent incomes of these indices do not reflect the real rent inflows from office building investments. In addition, like the STIX, some indices cover data of smaller area sizes. These indices are considered to be inappropriate for the apple-to-apple comparison of overall performances[4].

[4] Relatively high level of debt the real estate firms typically employ can be one of the reasons why the beta of real estate stock exceeded 1.0.

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