APPLICATION OF VALUATION-BY-COMPONENTS TO RISK MEASUREMENT AND FOREIGN EXCHANGE EXPOSURES IN INTERNATIONAL PROJECTS

by

Yoshitaka Inoue

B.S., Architectural Engineering
Tokyo University, Japan
(1979)

Submitted to the Department of
Civil Engineering in Partial Fulfillment of
the Requirements for the
Degree of

MASTER OF SCIENCE
in Civil Engineering

at the

Massachusetts Institute of Technology

January, 1990

Signature of Author _____
Department of Civil Engineering
January, 1990

Certified by _____
Professor James L. Paddock
Thesis Supervisor

Accepted by _____
Ole S. Madsen
Chairman, Department Committee on Graduate Students

APPLICATION OF VALUATION-BY-COMPONENTS TO RISK MEASUREMENT AND FOREIGN EXCHANGE EXPOSURES IN INTERNATIONAL PROJECTS

by
Yoshitaka Inoue

Submitted to the Department of Civil Engineering
in January, 1990 in partial fulfillment of the requirements
for the Degree of Master of Science in Civil Engineering

ABSTRACT

Increasing demand for appropriate evaluation methodologies for international investments is currently recognized in order to vitalize world economies by mobilizing capital across borders. However, the demand has not necessarily been met by conventional or widely-used evaluation methodologies due to complicated structures of and risks inherent to international investments.

The purpose of this thesis is to discuss and examine the practical applicability of " Valuation-by-Components " with underlying theories and concepts to evaluation of international investments, in the context of the construction and real estate industries.

A main research issue is to test practical applicability of two international asset pricing models, Zero-Beta Capital Asset Pricing Model and Consumption Capital Asset Pricing Model, to measurement of operational risks in international setting of the construction and real estate industries.

At first, a result of the research indicates that ZCAPM is more applicable to pricing international assets than CCAPM, given theoretical and data-related issues on CCAPM. The result also supports international diversification effects of international investments which reduce systematic risks for foreign investors as contrasted with those for domestic investors. However, secondly, systematic and portions of unsystematic foreign exchange risks inherent to international investments should be hedged by using optimal mix of operational and financial hedging instruments at firm's level whereas firms and investors can diversify away unsystematic foreign exchange risks to some extent. Finally, the " Valuation-by-Components " is found to be the best evaluation methodology among others due to its theoretical correctness, transparency, flexibility, and outstanding capability of analyzing and allocating relevant risks in intelligible manners.

Thesis Supervisor: Dr. James L. Paddock
Title: Senior Lecturer in Civil Engineering

ACKNOWLEDGEMENTS

I am deeply indebted to Professor James L. Paddock, my thesis advisor, for his guidance and encouragement with patience and intelligence. He opened my mind to a new methodology of investment analysis and fundamental finance theory through his lectures and discussions. He also motivated me to proceed with my thesis.

My gratitude also goes to Professor Fred Moavenzadeh, director of Center for Research and Education, and Research Associate Charles H. Helliwell, Jr., deputy director of Center for Research and Education, who coordinated excellent course programs and made my study at MIT fruitful.I also thank Professor Shyam Sunder, my academic advisor, for his kind and valuable advice on my study at MIT.

I would like to thank President of Taisei Corporation, Yasuo Satomi, Vice-President of Taisei, Toshiharu Yokouchi, General Manager of Taisei, Koji Okumura and other many people in Taisei for financially and mentally supporting me to study at MIT. I also would like to thank President of North America Taisei Corporation, Yoshiya Kumazawa, and Vice-President of North America Taisei Corporation, Toshimitsu Iimura, and other people in North America Taisei for giving me kind supports and advices.

Throughout my stay at MIT, many friends stimulated me and made my stay at MIT fruitful and comfortable. Among them are Fumio Sugimoto, Koji Ikkatai, Masahiro Iwano, and Takaharu Yamamura who gave me valuable insights on the construction industry.

I thank my parents in Japan for their moral support. Last but not least, I especially thank my wife, Yuki Inoue, who has always encouraged and supported me during my stay in the United States.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: INTRODUCTION

1. PURPOSE OF THESIS AND RESEARCH ISSUE

1.1. PURPOSE OF THESIS

International investments take important roles in the development of the world economy in the following positive senses:

1) the increasing mobility of capital across countries through the international investments vitalizes the world economy by providing the capital to those who can not utilize their other own idle resources due to the shortages of the capital or the technological immaturities;
2) the ownerships of the international investments provide opportunities of the economic and cultural interchanges between the countries, which, in turn, develop the world capital market and international investment opportunities; and
3) the investors also can benefit from the international investments which substantially contribute to the international diversifications of their portfolios.

However, in spite of the apparent benefits described above, the international investments are not easy to be evaluated because of the complicated structures of the ownerships, financings, sourcing inputs, and competitions, and because of the risks inherent to the international

investments, such as foreign exchange risks, political risks, and so forth. Therefore, it is necessary to overcome those impediments by appropriately analyzing the complicated structures and allocating the risks in proper manners. Hence, the increasing necessity for appropriate evaluation methodologies for the international investments is currently recognized.

The motivation to study the " Valuation-by-Components " methodology is 1) due to the strong demand for evaluation models for international investments, which are recognized to be currently increasing and to be certain to continue to grow in the future as long as the framework of the open economy is maintained and promoted in the world, and 2) because of its outstanding capabilities of evaluating international projects, given the current economic systems and the level of the development of the international capital markets.

The purpose of this thesis is to discuss and examine the practical applicability of " Valuation-by-Components " to evaluation of international investments, in the context of the construction and real estate industries.

1.2. RESEARCH ISSUE

In examining the practical applicability of the " Valuation-by-Components ", the central issue boils down to

the applicabilities of the international asset pricing models which the " Valuation-by-Components" employs, given various restrictions, such as the data availabilities which may not satisfy the theoretical requirements.

In the thesis, two international assets pricing models, Zero-Beta Capital Asset Pricing Model (ZCAPM) and Consumption Capital Asset Pricing Model (CCAPM), will be tested by using the best data currently available in the context of the construction and real estate industries. The numerical results of the test will be compared to the theories of the ZCAPM and CCAPM.

Although the general test of the ZCAPM and CCAPM should be conducted by using the data of all the industries in order to eliminate any bias which may exist in particular industries, the test, conducted here in the context of the construction and real estate industries, provides, at least, industry-specific results, and might give a clue to further thorough investigations of the ZCAPM and CCAPM.

2. STRUCTURE OF THESIS

The thesis consists of six chapters, including this introductory chapter which discusses the purpose of the thesis, the research issue, and the structure of the thesis. The second chapter gives an overview of the evaluation methodologies, including the " Valuation-by-Components ", and discusses the methodological advantages and disadvantages. Then, the third and fourth chapters discuss the technical issues in applying the " Valuation-by-Components ", first, the international asset pricing models in the third chapter, and second, the foreign exchange exposures and hedgings in the fourth chapter. By using the results of the chapter three and four, the fifth chapter analyzes the real project and compares the V.C. analysis with the original assessment report. Finally, the sixth chapter concludes the thesis and discusses implications for the international investments. The outline of the thesis from the second chapter through the sixth chapter is as follows.

The second chapter discusses and compares the evaluation methodologies currently available in the context of the international investment analyses from methodological viewpoints. The evaluation methodologies discussed here are Internal Rate of Return, Net Present Value and Adjusted Net Present Value both with Weighted Average Costs of Capital,

Valuation-by-Components, and Real Option Approach. Finally, this chapter discusses the technical issues in the Valuation-by-Components.

The third chapter, at first, discusses and tests two international asset pricing models, those are, the ZCAPM and CCAPM by using the stock data of U.S. and Japan's construction and real estate industries and the consumption data of both countries for the past three years (from 1986 through 1988). The regression results of the ZCAPM and CCAPM are compared with the empirical results obtained by the precursors based on the data for the longer periods of time, then the practical applicabilities and relevant issues are discussed. After calculating betas and real discount rates as measurements of the business risks inherent to the industries based on the asset pricing models, the betas and real discount rates are interpreted from the domestic and foreign investors' perspectives, in the long-term and short-term. Finally, a sample project is analyzed by using the betas and real discount rates in order to present the effects of the international investments.

The fourth chapter reviews the effects of the foreign exchange exposures in the international investments on the contractual and non-contractual cash flows in nominal terms and real terms. Then, the operational hedgings and the financial hedgings are briefly reviewed in relation to the foreign exchange exposures. Finally, the general formula of the Valuation-by-Components is proposed, which conceptually

incorporates the costs of hedging the foreign exchange exposures by using matrices.

The fifth chapter analyzes a real case of an international real estate redevelopment project in U.S. by using the Valuation-by-Components. First of all, the original assessment report is re-examined from the methodological viewpoints. Secondly, in order to evaluate the case project in more adequate and correct manners, the case project is analyzed in terms of the risk-return trade-offs among the project's participants by examining the V.C. structures, and then, sensitivity analyses are implemented for those factors seriously affecting the project value. Consequently, the V.C. analysis discloses the crucial points which could not be recognized by the original assessment report.

Finally, the sixth chapter concludes the entire discussions by focusing on the following subjects; 1) the practical applicabilities of the ZCAPM and CCAPM, and related data and theoretical issues, 2) the implications of the ZCAPM and CCAPM betas and real discount rates in the context of U.S. and Japan's construction and real estate industries, both in short-term and in long-term, 3) the effects of the foreign exchange exposures and hedgings in evaluation of international investments, 4) the international financing and diversification, and 5) the advantages of the Valuation-by-Components.

CHAPTER 2

EVALUATION METHODOLOGIES OF INTERNATIONAL CONSTRUCTION PROJECTS

1. INTRODUCTION

This chapter discusses evaluation methodologies for investment analysis in the context of international dimensions. Some of these methodologies are broadly-applied while others are more recently developed from modern finance theory. In the discussion, these methodologies are compared with each other in terms of methodological adequacy and theoretical correctness of evaluating international projects. However, the discussion is not necessarily limited to international projects, but it can be applied to domestic projects which have similar features in their structures of participants, financing, and cash flows with those of international projects.

Evaluation methodologies analyzed in this chapter are 1) IRR (Internal Rate of Return), 2) NPV (Net Present Value) and ANPV (Adjusted Net Present Value), both with WACC (Weighted Average Costs of Capital), 3) VC (Valuation by Components), and 4) Real Option Approach. Some evaluation methodologies such as Payback Period and Average Return on Book Value are excluded from the discussion although these are often used methodologies[1]. This is because these methodologies may miss theoretically certain needed criteria, for example, evaluation of cash flows in terms of time, that is, time

---

[1]See Brealey and Myers[1988] and Weston and Copeland[1986] for discussions on Payback Periods and Average Return on Book Value.

value of money, which is one of the most important concepts in finance theory[1]. For this reason, I explicitly excluded them from the following discussion.

1.1. IRR (INTERNAL RATE OF RETURN)

IRR is a profitability measure by which expected cash flows at each period are discounted such that a summation of the discounted cash flows equals zero. The calculations are done by different numerical methods to satisfy the following equation[2].

$$\sum_{t=0}^{k} \frac{C_t}{(1 + IRR)^t} = 0: \qquad (1)$$

where C_t denotes an expected cash flow at period t;
IRR denotes an internal rate of return; and
k denotes a last period of series of cash flows.

In other words, IRR is a rate which makes Net Present Value to equal zero. In this connection, IRR is exactly the same evaluation methodology with NPV under some specific conditions, which will be discussed later.

Investment decision by IRR is to accept a project if IRR is higher than an opportunity cost of capital, and vice versa. Opportunity costs of capital are expected rates of

---

[1]See Brealey and Myers[1988] and Weston and Copeland[1986] for discussions on time value of money.
[2]See Brealey and Myers[1988].

return for projects with equivalent risks and determined in the capital market. Thus, calculating IRR and making investment decision with IRR is simple.

However, major defects in IRR methodology are generally recognized so that IRR must be used carefully so as to avoid falling into pitfalls of the defects[1]. Some of the defects are as follows:

1) increases in denominators in the equation (1) is not necessarily accompanied by decreases in Net Present Value of a left side of the equation (1);
2) multiple positive real IRRs can exist if plus or minus signs of cash flows at each period change more than once; and
3) projects are assumed mutually exclusive when plural IRRs are compared and ranked;
4) IRR implicitly assumes flat term structures where short-term and long-term interest rates are not distinguished;
5) IRR assumes that cash flows generated by the project can be reinvested at the Internal Rate of Return. But, the correct reinvestment rate should be the opportunity cost of capital for projects of equivalent risk.

---

[1]See Brealey and Myers[1988].

In addition to the above defects, some crucial defects in evaluating international projects by using IRR rule are pointed out as follows[1];

1) Due to complexities of international projects in various sources of financing, various currencies of cash flows, different taxation systems and tax treaties in host and home countries, project's organizations, multiple contracts and so forth, cash flows in international projects generally comprise multiple cash flow components which bear different risks. Especially in international projects, risks borne by different cash flow components can vary in a wide range. However, in spite of the wide variances of risks of the cash flow components, IRR methodology discounts aggregated cash flows with a single discount rate. Therefore, investment decisions by IRR bring ambiguous results when applied to international projects or equivalently complex projects.
2) Because of the complicated structures of international projects, it is generally difficult to find an opportunity cost of capital for the risk-equivalent projects in the capital markets. In case it is not observed in the capital markets, an opportunity cost of capital needs to be estimated or an opportunity cost of capital for the most

---

[1]See Paddock[1989].

risk-equivalent projects needs to substitute for it. In the process of estimation or approximation of an opportunity cost of capital, a real opportunity cost of capital which is a sole criterion for investment decision by IRR can be easily distorted, so investment decisions by IRR are also distorted.

3) Discount rates in international projects can fluctuate over periods of the projects more widely than those in domestic projects because of uncertainties in political and economic conditions of the host countries, imperfections in the capital markets and so forth. IRR cannot accommodate the fluctuation of discount rates over time.

4) IRR cannot directly accommodate cash flows in various foreign currencies, so that they should be translated into a single currency. However, IRR doesn't explicitly explain how to translate. In fact, the cash flows in multiple currencies must be translated with foreign exchange rates estimated for each time period, and in the process of translating multiple currencies into one currency, effects of foreign exchange exposures on expected cash flows should be explicitly taken into consideration by changing the expected cash flows. However, since the translation of multiple currencies and considerations on foreign exchange exposures are not explicitly built in IRR methodology, and since only aggregated

cash flows in a single currency are visible in the formula(1), it is cumbersome to implement sensitivity analysis to various scenarios of foreign exchange movements.

1.2. NPV (Net Present Value) and ANPV (Adjusted Net Present Value), both with WACC (Weighted Average Cost of Capital)

NPV and ANPV are absolute values of a project expressed in certain currency of certain time (generally, time of evaluation), and obtained by summing up discounted expected cash flows whereas IRR is a profitability measured based on expected cash flows. NPV is calculated by the following formula[1]:

$$NPV = \sum_{t=0}^{k} \frac{C_t}{(1 + DR)^t} : \qquad (2)$$

where C_t denotes an expected cash flow at time t;
DR denotes a discount rate; and
k denotes the last period of series of cash flows.

Expected cash flows are after-tax basis, and projected as if projects are financed solely with equity, which is based on the original Modigliani and Miller's proposition that, in a perfect capital market, capital structure does not affect

---

[1]See Brealey and Myers[1988].

values of firms or projects. Thus, NPV methodology is based on the assumption that there is no imperfection in the markets and that investment decisions are perfectly independent from financing decisions.

However, because of existences of imperfections in the market such as taxations, NPV is modified to ANPV in order to explicitly accommodate side effects of financing on project values such as tax shields on debt interest payment. There are two ways of calculating ANPV. One way is to add Net Present Value of side effects of financing decisions (tax shields on debt interest) to Net Present Value of the all equity-financed project calculated according to the formula (2) as follows:

$$ANPV = \sum_{t=0}^{k} \frac{C_t}{(1 + DR_1)^t} + \sum_{t=0}^{m} \frac{r * D * T}{(1 + r)^t} \qquad (3)$$

where C_t denotes an expected cash flow at time t;
r denotes a nominal rate of interest for debt;
D denotes an amount of debt;
T denotes a corporate tax rate;
DR_1 denotes a discount rate for project cash flows;
k denotes the last period of series of cash flows; and
m denotes a maturity of debt.

The other way is to discount cash flows with risk-adjusted discount rates such as WACC (Weighted Average Cost of Capital) instead of discount rates which are expected rates

of return observed in the capital markets for risk-equivalent projects. ANPV and WACC are computed as follows[1]:

$$ANPV = \sum_{t=0}^{k} \frac{C_t}{(1 + ADR)^t} : \qquad (3a)$$

where C_t denotes a cash flow at time t;
ADR denotes a risk-adjusted discount rate such as WACC; and
k denotes the last period of series of cash flows.

$$WACC = r_d * (1-Tc) * (D/V) + r_e * (E/V): \qquad (4)$$

where r_d denotes a firm's current borrowing rate;
Tc denotes a firm's marginal income tax rate;
r_e denotes an expected rate of return on the firm's stocks;
D denotes market value of firm's debt;
E denotes market value of firm's equity;
V denotes market value of firm's debt plus equity.

Although there are a couple other ways of calculating risk-adjusted discount rates incorporating side effects of financing such as MM formula and Miles-Ezzell formula, WACC is the most widely used and can represent fundamental characteristics of most of risk-adjusted discount rates.

Investment decisions are to accept a project if NPV or ANPV is positive, and vice versa. And, a project with the largest positive NPV or ANPV should be undertaken at first among other projects with positive NPV or ANPV if there is a budget constraint.

---

[1]See Brealey and Myers[1988].

NPV or ANPV with WACC eliminates most of the defects mentioned on IRR in the last section. However, WACC is used with some limitations and assumptions such as follows:

1) a risk of a project under consideration should be the same as that of the firm because WACC is a discount rate for cash flows generated by the firm as a whole;
2) debt is assumed to be issued in perpetuity;
3) debt capacity of the firm is assumed constant over the project's duration; and
4) marginal income tax rate is assumed constant over the project's duration.

Thus, applying ANPV methodology to projects bearing risks different from the firm's average risk may result in an incorrect investment decision. Moreover, the assumptions 2) is unrealistic to individual standalone projects, and the assumption 3) & 4) are questionable for long-term projects.

In addition to these limitations and assumptions, the following defects of ANPV when applied to evaluating international projects should not be overlooked[1]:

1) different risk classes associated with multiple cash flow components in international projects are inconsistent with firm's average risk expressed in WACC. Therefore, results of ANPV with WACC are ambiguous because it discounts aggregated cash flows with a risk-adjusted discount rate corresponding to

---

[1]See Paddock[1989].

firm's average risk;

2) WACC incorporates side effects of tax shields only, although in international projects, other side effects generated by financing decisions such as concessionary financing and tax credit unique to the projects are often considerable portions of side effects of the financing; and
3) different taxation systems in host and home countries cannot be incorporated in WACC.

1.3. VC (VALUATION BY COMPONENTS)[1]

Valuation by Components, like NPV and ANPV, is an absolute value of projects expressed in certain currency of certain time. In this sense, VC is a derivative of NPV or ANPV approach. The major differences of VC from NPV or ANPV are 1) that individual components of cash flows bearing individual risk classes are separately discounted with different discount rates adequate to the risk classes of the corresponding cash flow components and summed up according to the value additivity principle, and 2) that different discount rates are estimated based on the market-determined rates of return by using Capital Asset Pricing Model[2].

---

[1]See Lessard, Flood, and Paddock[1986] for detailed explanation of VC framework.
[2]See Sharpe[1985] for a review of Capital Asset Pricing Model.

There is no unique formula for VC because grouping various cash flow components into those bearing the same risks changes project-by-project. As a general form, a formula proposed by D.Lessard is extracted as follows[1]:

Valuation by Components (5)

=

Capital Outlay $\sum_{i=1}^{N} S_0^i \sum_{t=o}^{T} I_t^i / (1+\pi_1)^t$ (5a)

+

Remittable After-Tax Operating Cash Flows $\sum_{i=1}^{N} S_0^i \sum_{t=1}^{T} CF_t^i(1-\Omega) / (1+\pi_2)^t$ (5b)

+

Contractual Operating Flows $\sum_{i=1}^{N} S_0^i \sum_{t=1}^{T} CONT_t^i (1-\Omega)/ (1+\pi_3)^t$ (5c)

+

Depreciation Tax Shields $\sum_{i=1}^{N} S_0^i \sum_{t=1}^{T} DEP_t^i (\Omega)/ (1+\pi_4)^t$ (5d)

+

Tax Shields Due to Normal Borrowing $\sum_{i=1}^{N} S_0^i \sum_{t=1}^{T} INT_t^i (\Omega)/ (1+\pi_5)^t$ (5e)

+

Financial Subsidies or Penalties $\sum_{i=1}^{N} S_0^i \sum_{t=1}^{T} \Delta INT_t^i / (1+\pi_6)^t$ (5f)

+

---

[1]See Lessard[1979] for more precise discussion on the VC formula.

$$\text{Tax Reduction or Deferral via Interaffiliate Transfers} \quad \sum_{i=1}^{N} S_0^i \sum_{t=1}^{T} TR_t^i / (1+\pi_7)^t \qquad (5g)$$

+

$$\text{Additional Remittance via Interaffiliate Transfers} \quad \sum_{i=1}^{N} S_0^i \sum_{t=1}^{T} REM_t^i / (1+\pi_8)^t \qquad (5h)$$

where N denotes a number of currencies;
T denotes the last period of series of cash flows;
S_0^i denotes a spot exchange rate for currency i;
superscript "i" denotes currency i;
subscript "t" denotes time period;
Ω denotes a effective income tax rate;
π_1 to π_8 denote discount rates corresponding to risks of grouped cash flows.

Furthermore, Lessard aggregates these eight cash flow groups into three categories based on how the risks of the cash flows are determined as follows:

1) non-contractual cash flows, comprising of capital outlay and remittable after-tax operating cash flows whose risks are determined by economic and competitive environments surrounding the operations[1];
2) contractual flows, comprising of contractual operating flows, depreciation tax shields, tax shields due to normal borrowing, and financial subsidies or penalties whose risks are determined in nominal terms by contracts or quasi-contracts; and
3) operating flows deliberately manipulated by the firm

---

[1]See Lessard , Flood, and Paddock[1986] for definitions of contractual and non-contractual cash flows, and discussions on risks associated with each type of cash flows.

to maximize the firm's total value, comprising of tax reduction, tax deferral, and additional remittance via interaffiliate transfers whose risks are determined by firm's and project's overall tax and cash positions.

The discount rates for non-contractual cash flows which are generally a major portion of the total cash flows are estimated by using the market-determined expected rates of return with Capital Asset Pricing Model whereas those of the contractual cash flows and operating flows manipulated by firms are estimated by using the market-determined nominal rate of interest plus the corresponding risk premium with Capital Asset Pricing Model[1].

The following formula is to compute a discount rate for non-contractual cash flows (remittable after-tax operating cash flows) expressed in nominal terms:

$$\text{Discount Rate} = (1+R_r)*(1+i)*(1+\beta_{AE}*RP): \qquad (6)$$

where R_r denotes a real interest rate;
i denotes an inflation rate;
β_{AE} denotes an all equity-financed beta of the operation against investors' relevant portfolio; and
RP denotes a general risk premium for investors.

---

[1]See Lessard[1979] for more detailed discussion on determinations of discount rates for contractual and non-contractual cash flows.

Investment decision by VC is to accept a project if VC is positive, and vice versa. And, a project with the largest positive VC should be undertaken at first among other projects with positive VC if there is any budget constraint.

Although considered a derivative of NPV or ANPV, VC is successful in overcoming the limitations and assumptions required for NPV or ANPV which are discussed in the last section[1]. These are:

1) VC can be applied to any type of project bearing any sort of risks because VC estimates multiple discount rates to match risks of individual cash flow groups;
2) VC can fully evaluate debt specifically issued for the project with the specific debt terms, and is independent from the firm's overall capital structure because VC separates financial cash flows from operational cash flows and discounts them with individual discount rates free from the firm's overall capital structure; and
3) VC can accommodate expected changes in tax deductible marginal tax rates by adjusting cash flows affected by the tax rates whereas a single WACC assumes the tax rate constant.

All in all, VC is theoretically the most accurate evaluation methodology among IRR, NPV, ANPV, and VC. In addition to the theoretical accuracy, VC methodology has the

---

[1]See Lessrad and Paddock[1986] for comparison of VC methodology with ANPV with WACC.

following advantages when applied to evaluation of international projects:

1) VC can simultaneously deal with real and nominal cash flows either by discounting real and nominal cash flows with real and nominal discount rates or by converting real or nominal cash flows into either of them;
2) VC is so flexible to accommodate any complexity of cash flow components in international projects by separating different risk-bearing cash flow components and by adding them back according to the value additivity principle. Major elements of complexity of cash flow components in international projects are multiple currencies, multiple interest rates, multiple inflation rates, multiple exchange rates, multiple tax systems, and so on can be explicitly accommodated;
3) VC's transparency allows to grasp values of individual cash flow components respectively, to understand strength and weakness of the project under consideration in terms of cash flow components, and to clarify financing cash flows; and
4) VC allows to implement sensitivity analysis with ease because of independent evaluation of the cash flow components.

In spite of the theoretical accuracy and substantial advantages of VC methodology, VC has not yet been known as

widely as IRR, NPV, and ANPV. One of major reasons is that VC methodology is relatively newly introduced by D.Lessard , James Paddock and et al. The other major reason is probably because VC methodology is technically more complicated than IRR, NPV and ANPV in the following points:

1) VC requires that users appropriately group various cash flows into those bearing the same risk classes. Therefore, the users must examine riskiness of each cash flow whereas IRR, NPV, and ANPV require aggregated cash flows at each period only; and
2) the users must appropriately estimate multiple discount rates corresponding to the riskiness of the grouped cash flows, which can be a major challenge for the users. Estimating appropriate discount rates in international setting sometimes requires that the users fully understand the fundamental finance theories and up-dated asset pricing models underlying VC methodology. On the other hand, IRR, NPV and ANPV require to estimate only one discount rate.

However, it should be noted that this technical complication substantially contributes to the theoretical accuracy and transparency of VC methodology, which, in fact, decision-makers want in investment analysis. Rather, the technical complication should be conquered by the users and decision-makers so as to make appropriate decisions in investment, especially in international projects whose complication may not be thoroughly examined by the other methods.

Therefore, technical understanding of VC methodology is essential for VC to be implemented in a correct manner.

1.4. REAL OPTION APPROACH[1]

An evaluation methodology discussed last is a real option approach which is derived from a different form of the same theoretical basis as IRR, NPV, ANPV, and VC. The real option approach is an application of option pricing model developed lately in finance theory in order primarily to evaluate financial options traded in the option markets such as stock options, foreign exchange options, commodity options, and so forth. In this connection, the real option approach is applied to those real assets which have operating options, option-like characteristics, or growth opportunities[2]. Therefore, to draw option-like analogies between financial options and real assets under consideration is a key for the real option approach.

Instead of showing various derivative real option approaches[3], the following "Black and Scholes Formula" to calculate present value of call options for multiple periods tells general procedures of computing option values[4]:

---

[1]See Cox and Rubinstein[1989] for an overview of financial option markets.
[2]For applications of option pricing model to managerial fields, see Trigeorgis and Mason[1987]
[3] For applications of option pricing model to valuation of real assets, see Paddock,Seigel, and Smith[1987 and 1988], Geltner[1986], and Bar-Or[1984].
[4]See Brealey and Myers[1988].

$$\text{Present Value of Call Option} = PN(d_1) - EXe^{-rt}N(d_2) \qquad (7)$$

where

$$d_1 = \frac{\log(P/EX) + r*t + V*t/2}{SQR(V*t)} ; \qquad (7a)$$

$$d_2 = \frac{\log(P/EX) + r*t - V*t/2}{SQR(V*t)} ; \qquad (7b)$$

N(d) = cumulative normal probability density function;
EX = exercise price of option;
t = time to exercise date;
P = price of stock now;
V = variance per period of rate of return on the stock; and
r = risk-free interest rate.

As indicated above, calculating option values with the formula(7) is simpler than that of IRR, NPV or ANPV, and much simpler than that of VC because expected cash flows are not needed to be forecast, nor discount rates. As only five parameters are necessary to compute the option values, the real option approaches require very small number of parameters to calculate the real option values although some modifications of the formula are required. As an example of the application of the real option model, J.Paddock, D.Seigel, and J.Smith[1988] drew analogies between stock call options and undeveloped petroleum reserves as indicated below and simulated the real option values.

Comparison of Variables for Pricing Models of Stock Call Options and Undeveloped Petroleum Reserves

Stock Call Option	Undeveloped Reserves
Current Stock Price	Current Value of Developed Reserve
Variance of Rate of Return on the stock	Variance of Rate of Change of the Value of a Developed Reserve
Exercise Price	Development Cost
Time to Expiration	Relinquishment Requirement
Riskless Rate of Interest	Riskless Rate of Interest
Dividend	Net Production Reserve less Depletion

The real option model is also applicable to investment projects because most of them have operating options and option-like natures. Although the applications of option pricing model to various real assets, such as oil reserve tracts, real estate investment, research & development investment and etc., have been tried only for the past 10 years, and is still at development stages, the real option approach has indicated outstanding features compared to other evaluation methodologies such as:

1) the real option approach does not require to forecast either future cash flows or risk-adjusted discount rates whereas IRR, NPV, ANPV and VC requires either or both of them;
2) the real option approach fully reflects market valuations where assets are traded liquidly so that it eliminates artificial errors generated in the process of forecast or estimation;
3) the real option model implicitly incorporates values

of operating options, option-like characteristics, or growth opportunities whereas the other methodologies cannot include them unless they are explicitly added; and

4) the real option approach requires substantially small number of parameters.

The most important message that the real option models gives to those users of the other evaluation methodologies such as IRR, NPV, ANPV, and VC is that the other evaluation methodologies cannot implicitly evaluate operating options, option-like characteristics, and growth opportunities whereas the real option approach can. The message is a warning that option values should be reflected in evaluation, if any[1]. Fortunately, it is possible to add the values of the options to the other methodologies although adding the values further complicates the calculations of the other methodologies.

However, there are some conditions that restrict applications of the real option approaches to real assets such as:

1) real assets should be traded in liquid markets so that the market valuations, which the real option approach relies on, reflect all information available on the real assets;

2) variance of the changes in market values of the real

---

[1]See Myers[1984] for discussions on importance of option values to bridge between finance theory and strategic planning.

assets should be estimated by observing the markets; and

3) time lag of exercising financial options and real options should be taken into considerations.

In addition to these conditions which limit applications of the real option approach, the real option approach is difficult to be applied to international projects. Major reasons are:

1) complexity of international projects disturbs establishing option-structures which explicitly or implicitly exists in the projects;
2) some types of international projects, such as international construction projects, are not traded in such a liquid market as stocks or commodities are traded;
3) most of international projects are individually unique so that it is difficult to observe or estimate the market values and the variances of the specific international projects under consideration; and
4) multiple currencies, interest rates, inflations and etc. cannot be explicitly incorporated.

In conclusion, the real option approach is attractive due to its simplicity and implicit inclusion of option values, but is not easy to be applied to evaluation of international projects.

1.5. COMPARISON OF METHODOLOGIES

As was discussed in the last sections, Valuation by Components has methodologically superior characteristics to the other generic methodologies such as IRR, NPV, and ANPV in almost of all aspects except for that VC is more complicated than the others. Although simplicities of the other methodologies are attractive, they are not crucial enough to deny the superiority of VC. VC is the most adequate methodology for evaluation of international projects among IRR, NPV, ANPV, and VC.

When compared with VC methodology, the real option approach is superior to VC 1) in that the real option approach implicitly evaluates option values of the projects, and 2) in that less artificial errors are made by the real option approach than VC because the real option approach almost fully relies on the market valuations of the real assets. However, this is not necessarily true with regard to evaluating international projects. Two reasons are identified:

1) no efficient and integrated international market, where international projects or the similar assets are traded with reasonable liquidity, exists at present. Thus, no satisfying market and market valuation, which the real option approach is based on, exists; and
2) there are a few international projects whose multiple

elements such as currencies, tax systems and etc. are fully reflected in the current market valuations. In short, the current degree of integration of international market is too premature to apply the real option approach to evaluation of international projects[1]. On the other hand, VC can deal with the above issues by explicitly estimating risk-adjusted discount rates for project cash flows against investors' relevant market portfolio, which will be discussed in the next section.

In conclusion, VC is the best evaluation methodology among those currently available. In next section, I will discuss the fundamental theories underlying VC methodology in more details and identify the most challenging technical issues of VC methodology.

---

[1]For discussions on a degree of integration of international capital market, see Krugman and Obstfeld[1987].

2. THEORETICAL BASIS FOR VALUATION BY COMPONENTS

As was previously indicated in the discussion on VC, correctly understanding fundamental theories which underlie VC methodology is a prerequisite for correct application of VC methodology. Major theories supporting VC methodology are:

1) investors' portfolio selection and systematic risks;
2) CAPM (Capital Asset Pricing Model);
3) PPP (Purchasing Power Parity) and IFE (International Fisher Effect).

This section discusses above-mentioned three theories and basic VC model, including distinctions between contractual and non- contractual cash flows.

2.1. INVESTORS' PORTFOLIO SELECTIONS AND SYSTEMATIC RISKS[1]

A theory that investors' portfolio selections are irrelevant to firms' activities (firms' portfolio selections) tells us "from which perspective and what kind of risks of projects should be appraised." The answer is that systematic risks of the projects should be appraised from investors' viewpoints.

---

[1]See Brealey and Myers[1988] for more detailed discussions on relations between investors, capital market, and corporate activities in terms of investor's consumption pattern.

The theory behind this is that, according to capital market theory, investors who own firms are assumed to diversify away almost of all unique risks of their assets by holding assets comprising the risk-free assets and the market portfolio. Therefore, for investors, only systematic risks matter whereas, for firms, maximizing firms' values,that is, investors' equities, is a final objective as investors' agents.

Based on the theory, systematic risks of project cash flows are measured, and discount rates are estimated by CAPM.

2.2. ESTIMATE OF RISK PREMIUM BY CAPITAL ASSET PRICING MODEL

Capital Asset Pricing Model is a theory that relates systematic risks of assets to expected rates of return on the assets in efficient market. The relation is expressed in the following equation:

$$E(r) = R_f + ß * RP_m : \quad (8)$$

where E(r) denotes an expected rate of return on the asset;
R_f denotes a risk-free interest rate;
ß denotes a relative measurement of systematic risk of the asset against the market portfolio;
RP_m denotes a risk premium of the market portfolio over the risk-free asset.

In the formula(8), ß(beta) is called an observed beta in the market, and it is financially leveraged. The observed beta is calculated as follows:

$$ß = \frac{COV[r_i, r_m]}{VAR[r_m]} : \qquad (9)$$

where COV denotes a covariance;
VAR denotes a variance;
r_i denotes a rate of return on the asset;
r_m denotes a rate of return on the market portfolio.

The observed betas of stocks can be obtained in published beta books.

However, betas of the formula(9) is financially leveraged whereas all equity-financed betas are necessary to compute risk premiums for estimation of discount rates. The relationship of leveraged betas (observed betas) and all equity-financed betas can be obtained from MM proposition. The Modigliani and Miller's proposition that the expected rates of return on firms' stocks increase in proportion to the increases of the debt-equity ratios of firms can be translated into the relationship of leveraged betas (observed betas) and all equity-financed betas in the following formula[1]:

---

[1]See Brealey and Myers[1988] for the translation of the MM proposition to the formula(10).

$$\beta_E = \beta_A + (D/E) * (\beta_A - \beta_D): \qquad (10)$$

where β_E denotes a leveraged equity beta;
β_A denotes an all equity-financed beta;
β_D denotes an beta of debt;
D denotes a market value of debt;
E denotes a market value of equity.

By incorporating effects of tax shields on interest payment and assuming that the debt is almost risk-free (beta of debt = 0), the formula(10) is rewritten as follows:

After-tax market value of debt

=(market value of debt) -

(PV of tax shield on debt interest)

$$= D - \sum_{t=1}^{k} \frac{D * r * T}{(1 + r)^t}$$

$$= D - \frac{D*r*T}{r} * \left[1 - \frac{1}{(1 + r)^t} \right]$$

where T denotes an effective tax rate;
r denotes a nominal rate of interest on debt; and
k denotes a maturity of debt.

I assume that firms continue to operate as long as possible so that I assume maturity of debt(k) approximates to infinite time. Under the assumption, the term $1/(1+r)^t$ converges to zero. Therefore,

After-tax market value of debt

$$= D - D * T$$

$$= D * (1-T): \qquad (10a)$$

Also, I assume the debt is almost risk-free, thus

$$\beta_D = 0: \qquad (10b)$$

Substituting D of(10a) and β_D of (10b) for those of (10),

$$\beta_E = \beta_A + (D*(1-T)/E) * (\beta_A - 0)$$

$$= \beta_A + (D/E) * (1 - T) * \beta_A: \qquad (10c)$$

Therefore, rearranging (10c),

$$\beta_A = \beta_E / (1 + (1 - T) * (D/E)): \qquad (11)$$

Finally, the risk premiums for all equity-financed betas are obtained by the following formula:

$$RP = \beta_A * RP_m$$

$$= \beta_E / (1 + (1 - T) * D/E) * RP_m$$

$$= \frac{COV[r_i, r_m]}{VAR[r_m]} * \frac{1}{1 + (1 - T) * D/E} * RP_m : \qquad (12)$$

However, when VC is applied to international projects, there exist major difficulties in calculating the risk premiums according to the formula(12), because investors'

relevant market portfolios and consumption patterns are not homogeneous all over the world. This technical difficulties will be discussed in next section 3 TECHNICAL ISSUES IN USING VALUATION BY COMPONENTS.

2.3. ESTIMATE OF DISCOUNT RATES OF CONTRACTUAL AND NON-CONTRACTUAL CASH FLOWS

As was discussed in the section 1.3. VALUATION BY COMPONENTS, cash flow components are grouped according to how risks of cash flow components are determined. Although D. Lessard's general formula (5) groups various cash flows into three categories in order to explicitly separate cash flows at the disposal of the firm to take advantage of imperfections in tax systems from others, the basic categories of cash flow components are contractual and non-contractual cash flows.

Contractual cash flows are denominated in nominal terms of certain currency. Those cash flows are such as contracted capital expenditures, contracted operating cash flows, tax shields on depreciation/amortization, tax shields on interest expenses, concessionary borrowings and so forth.

These cash flows are divided into two types of contractual cash flows. The first type is a cash outflow according to an obligation to pay to the third party under the contract. The second type is a cash inflow according to a claim to be paid by the third party under the contract.

However, regardless of cash inflows or outflows, risks of contractual cash flows are theoretically the same under the existence of the complete capital market because firms can create the same series of cash flows by lending or borrowing in the complete capital market with the same interest rate. For instance, when a firm borrows $100 million under a balloon-payment borrowing contract which matures 10-years later with an annual interest rate of 10%, the firm is obliged to pay $10 million from the first year through 9th year, and $110 million in the 10th year. At the same time when the firm borrows $100 million, the firm can lend the $100 million to the third party under a lending contract whose terms are exactly the same as those of the borrowing contract the firm agreed with the lender, because the capital market is complete. Therefore, the firm has a claim to the same series of cash flows as those of the firm's obligation. Consequently, the firm's cash flows of simultaneous lending and borrowing at each period and NPVs ends up with zero. This simple sample indicates that risk of contractual cash flows, regardless of claims or obligations, is identical with each other under the existence of the complete capital market.

Therefore, as an approximation, discount rates for contractual cash flows are assumed the same as the firm's borrowing and lending rate. However, the firm's borrowing rate is generally higher than the risk-free lending rate because the borrowing rate reflects not only expectations of

real rate of interest and inflation but also expectations of the firm's default risk and covariance risk with the economy where the firm operates. Since the contractual cash flows have the same risk structure, the firm's borrowing rate of certain currency, which denominates the contracted amount, is used as a discount rate.

In addition to the firm's borrowing rate, some sort of risk premiums may be necessary to be added to the borrowing rate, depending on the nature of the contractual cash flows.

The second type of cash flow, non-contractual cash flows, is affected by the economic and competitive environments around them. The non-contractual cash flows are such as non-contracted capital expenditures, non-contracted operational cash flows, and so on.

Risks of non-contractual cash flows are divided into two types,these are, 1) systematic risks , and 2) unique risks. As was discussed in the section 2.1. INVESTORS' PORTFOLIO SELECTION AND SYSTEMATIC RISKS, only systematic risks do matter for investors. Therefore, only systematic risks of non-contractual cash flows should be taken into account.

In the last section 2.2. ESTIMATE OF RISK PREMIUMS BY CAPITAL ASSET PRICING MODEL, risk premiums for systematic risks of assets were shown. By using the formula(12) of the last section, the discount rate for non-contractual cash flows is calculated as follows:

Discount Rate

$$= (1+R_f) * (1+I) * (1 + RP) \qquad (13)$$

$$= (1+R_f)*(1+I)*\left(1+ \frac{COV[r_i, r_m]}{VAR[r_m]} * \frac{1}{1 + (1 - T) * D/E} * RP_m\right):$$

where R_f denotes a risk-free real interest rate of home country; and
I denotes an inflation rate in home country.

However, the formula(13) is based on the important assumption that there must exist a risk-free interest rate, which, in fact, cannot be observed in real world[1]. This issue will be discussed in next section 3 TECHNICAL ISSUES IN USING VALUATION BY COMPONENTS.

2.4. FOREIGN CURRENCY TRANSLATION UNDER PURCHASING POWER PARITY AND INTERNATIONAL FISHER EFFECT

Foreign currency translation is not a fundamental part of the theories supporting VC methodologies. Rather, it is considered a part of the process of projecting incremental future cash flows. However, under certain conditions, VC methodology can explicitly incorporate foreign exchange translations in its general formula in a simple manner. In

---

[1]See Fama and MacBeth[1983] for empirical tests of Sharpe-Lintner CAPM.

fact, the VC formula(5) proposed by D.Lessard implicitly assume the conditions, these are, Purchasing Power Parity (PPP) and International Fisher Effect (IFE).

PPP means that aggregated real price levels among different countries should be the same, namely, that foreign exchange rates should be adjusted according to the differentials of the inflation rates among the countries so that the aggregated real price levels are kept at the same level. This notation for one period is expressed in the following formula:

$$S_t = S_0 * \frac{P_t / P_0}{P_t^* / P_0^*} = S_0 * \frac{1 + I_t}{1 + I_t^*} \qquad (14)$$

where S_0 denotes a spot exchange rate of home currency against foreign currency at time = 0;
S_t denotes a spot exchange rate of home currency against foreign currency at time = t;
P_0 denotes price level of home country at time = 0;
P_t denotes price level of home country at time = t;
P_0^* denotes price level of foreign country at time = 0;
P_t^* denotes price level of foreign country at time = t;
I_t denotes an inflation rate of home country from time = 0 to time = t; and
I_t^* denotes an inflation rate of foreign country from time = o to time = t.

The formula(14) is generalized for multiple periods as follows:

$$S_t = S_0 * \frac{(1 + I_1) * (1 + I_2) * \text{--------} * (1 + I_t)}{(1 + I_1^*) * (1 + I_2^*) * \text{-------} * (1 + I_t^*)} \qquad (14a)$$

Unfortunately, PPP is generally recognized not to always hold, but to hold on average or in the long-run.

IFE means that foreign exchange rates should be adjusted according to the differentials of the nominal interest rates among countries (which are theoretically exactly the same as the differentials of the inflation rates among the countries). This notation for one period is expressed as follows:

$$S_t = S_0 * \frac{1 + r_t}{1 + r_t^*}: \qquad (15)$$

where r_t denotes a nominal interest rate of home country at time = t; and
r_t^* denotes a nominal interest rate of foreign country at time = t.

The formula(15) is generalized for multiple periods as follows:

$$S_t = S_0 * \frac{(1 + r_1) * (1 + r_2) * \text{--------} * (1 + r_t)}{(1 + r_1^*) * (1 + r_2^*) * \text{-------} * (1 + r_t^*)} \qquad (15a)$$

IEF is recognized to have a strong tendency to hold in the long-run. However, in the short-run, the effectiveness of IFE is not clear, because the nominal interest rates may be affected not only by the differentials of the inflation rates among countries but also by the fluctuations of the real interest rates. This is because some literatures test IFE in terms of the historical exchange rates as opposed to the expected exchange rates which IFE originally meant[1].

However, as was discussed in this section, because PPP and IEF don't strictly hold, translating foreign currencies into home currencies is not easy task. This issue will be discussed in next section 3 TECHNICAL ISSUES IN USING VALUATION BY COMPONENTS.

2.5. BASIC EVALUATION MODEL

In this section, two basic VC evaluation models 1) a model for contractual cash flow components discounted with the corresponding discount rates, and 2) a model for non-contractual cash flow components discounted with the corresponding discount rates are discussed under the theoretical basis described in the previous four sections with explicit assumptions.

---

[1]For discussions on the empirical evidence for IFE, see Shapiro[1989], Solnik[1988], and Eiteman and Stonehill[1989].

Contractual cash flows are generally fixed and denominated in nominal terms of certain currency and discounted with the firm's nominal borrowing rate when the contracts are agreed upon. Although all of the contracts are not necessarily signed when the project starts, the assumption (1) that all contracts are agreed at time = 0 is made. Therefore, the constant borrowing rates at time = 0 are used as discount rates. Strictly speaking, the borrowing rates should be adjusted by the risk premiums, depending on the risks borne by the cash flows. Here, the assumption (2) that the risk premiums for contractual cash flows are constant over time is made. Thus, a general formula of discount rates for contractual cash flows is expressed as follows:

$$\text{Discount Rate} = (1 + r_0^i) * (1 + RP^i) : \qquad (16)$$

where r_0^i denotes the firm's nominal borrowing rate in currency i at time = 0; and
RP^i denotes a risk premium for corresponding cash flows.

Translation of contractual cash flows in terms of a foreign currency into the home currency is made by using the exchange rate when the contract is agreed upon. According to the assumption (1) above and the assumption that PPP holds, the translation exchange rate for the contractual cash flows is the spot exchange rate at time = 0.

Therefore, a general formula to calculate VC values of contractual cash flows expressed in terms of home currency is as follows:

$$\sum_{i=1}^{N} \sum_{t=0}^{T} \frac{CF_t^{\,i}(n) * S_0^{\,i}}{[(1 + r_o^{\,i}) * (1 + RP^{i})]^t} =$$

$$\sum_{i=1}^{N} S_0^{\,i} \sum_{t=0}^{T} \frac{CF_t^{\,i}(n)}{[(1 + r_o^{\,i}) * (1 + RP^{i})]^t} \quad : \qquad (17)$$

where N denotes a number of currencies;
T denotes a number of periods of cash flows;
$S_0^{\,i}$ denotes a spot exchange rate of home currency against foreign currency i at time = 0; and
$CF_t^{\,i}(n)$ denotes nominal cash flows in currency i at time = t.

Non-contractual cash flows are affected by economic and competitive conditions and generally affected by inflation rates. The discount rates for the non-contractual cash flows are discussed in detail in the section 2.3. ESTIMATE OF DISCOUNT RATES OF CONTRACTUAL AND NON-CONTRACTUAL CASH FLOWS. The formula to calculate the discount rate is (13):

Discount Rate

$$= (1+R_f) * (1+I) * (1 + RP) \qquad (13)$$

In the formula(13), the risk-free real interest rate, R_f, is generally recognized to vary over time. However, the assumption(3) that the risk-free real interest rate is constant over time, and the assumption(4) that the risk premiums for non-contractual cash flows are constant are made.

Therefore, a general formula to calculate VC values of non-contractual cash flows expressed in terms of home currency is as follows by using PPP formula(14a):

$$\sum_{i=1}^{N}\sum_{t=0}^{T}\frac{CF_t^{\,i}(n)\ *\ S_t^{\,i}}{(1+R_f)^t*(1+I_1)\ *\ \text{----}*\ (1+I_t)*(1+RP)^t} =$$

$$\sum_{i=1}^{N}\sum_{t=0}^{T}\frac{CF_t^{\,i}(r)*(1+I_1^{\,i})\ *\ \text{----}*\ (1+I_t^{\,i})}{(1+R_f)^t*(1+I_1)\ *\ \text{----}*\ (1+I_t)*(1+RP)^t}*$$

$$S_0^{\,i}\ *\ \frac{(1+I_1)\ *\ (1+I_2)\ *\ \text{-------}\ *\ (1+I_t)}{(1+I_1^{\,i})\ *\ (1+I_2^{\,i})*\ \text{-------}*\ (1+I_t^{\,i})} =$$

$$\sum_{i=1}^{N} S_0^{\,i}\sum_{t=0}^{T}\frac{CF_t^{\,i}(r)}{[(1+R_f)\ *\ (1+RP)]^t}\ : \qquad (18)$$

where N denotes a number of currencies;
T denotes a number of periods of cash flows;
$S_t^{\,i}$ denotes a spot exchange rate of home currency against foreign currency i at time = t;
$CF_t^{\,i}(n)$ denotes nominal cash flows in

currency i at time = t;
$CF_t^i(r)$ denotes real cash flows in currency i at time = t;
I_t denotes an inflation rate of home country from time = t-1 to time = t;
I_t^i denotes an inflation rate of foreign country ,whose currency is i, from time = t-1 to time = t;
R_f denotes a risk-free real interest rate of home country;
RP denotes a risk premium of cash flows, which is calculated with the formula(12).

These two models on contractual and non-contractual models are applied to different risk-bearing cash flows to formulate a general formula of VC. The total VC is obtained simply by adding the discounted multiple components. One example is the formula(5) by D.Lessard.

However, as was noted in the previous sections, since there exist theoretical and technical issues in the underlying theories, these models cannot be used without restrictions inherent to the supporting theories, especially the PPP theory. Therefore, these models will be modified in order to explicitly add foreign exchange exposure terms as independent components in Chapter 4: FOREIGN EXCHANGE EXPOSURE.

3. TECHNICAL ISSUES IN USING VALUATION BY COMPONENTS

This section discusses technical issues in VALUATION BY COMPONENTS which were pointed out in the last sections. Two major technical difficulties are recognized in using VC methodology : 1) how to measure risks of non-contractual cash flows with CAPM, and 2) how to evaluate effects of foreign exchange exposures.

3.1. MEASUREMENT OF RISKS OF NON-CONTRACTUAL CASH FLOWS BY USING CAPITAL ASSET PRICING MODEL IN INTERNATIONAL SETTING

Risks of non-contractual cash flows were discussed in the section 2.2. ESTIMATE OF RISK PREMIUM BY CAPITAL ASSET PRICING MODEL. According to the formula(12), all equity-financed beta, $ß_A$, is measured by the following formula:

$$ß_A = \frac{COV[r_i, r_m]}{VAR[r_m]} * \frac{1}{1 + (1 - T) * D/E} : \qquad (19)$$

In order to compute with the formula(19), at first, a covariance of rates of return of similar projects and investors' relevant market portfolio must be calculated; secondly, a variance of rate of return of investors' relevant market portfolio must be calculated. Calculating the

covariance and variance is technically very difficult because:

1) investors' relevant market portfolio is hardly determined because some diversify their portfolio internationally, others diversify their portfolio domestically, and the others are somewhere between the two extremes. Therefore, investor's portfolio is assumed to be a combination of domestic and foreign market portfolios. However, the weight of each market portfolio of the entire portfolio is unknown;
2) investor's holding portfolio is related to the PPP risks to an extent which the investor hedges the PPP risks. Therefore, the influences of the PPP risks on the investor's portfolio selection must be taken into account;
3) investor's consumption pattern also must be taken into account because the consumption pattern affects the investor's portfolio selection[1]; and
4) a rate of return of similar projects in a host country is very hard to find, therefore, a covariance of rates of return of similar projects and investors' relevant market portfolio is hard to calculate.

In next Chapter 3. MEASUREMENT OF RISKS OF NON-CONTRACTUAL CASH FLOWS, two extensions of Sharpe-Lintner CAPM, these are, 1) Zero-Beta CAPM and 2) Consumption-CAPM, are briefly

---

[1]See Breeden[1979] for discussions on consumption-based asset pricing model.

discussed in connection with the above issues, and all-equity betas are calculated statistically by using the concepts of the two derivative CAPMs.

3.2. TRANSLATION OF MULTIPLE FOREIGN CURRENCIES

Although PPP and IFE are assumed to hold in order to formulate basic VC models, there is historical evidence that they don't hold in their strict senses[1]. Therefore, expected cash flows are exposed to the deviations from PPP and IFE. It does not necessarily mean that all foreign currency cash flows are exposed to FX risks ,but that unmatched amounts of each foreign currency cash flows at each time are exposed to FX exposures. Therefore, calculating the unmatched amounts is essential to estimate effects of FX exposures. This process complicates VC or any other methodologies to a great extent.

These foreign exchange exposures can be hedged either by operational or by financial instruments. The operational hedging is more certain that the financial hedging because the financial hedging relies on the capital market which is not necessarily predictable with certainty. Thus, costs of hedging by the financial instruments are ambiguous.

If FX exposures cannot be hedged or intentionally are not hedged, effects of FX exposures should be included in VC

---

[1]See Shapiro[1989] and Solnik[1988] for discussions on empirical evidence for PPP and IFE.

evaluation. However, since foreign exchange rates behave like a random-walker, it is very hard to generalize evaluation of FX exposures. Rather, it should be evaluated project-by-project by estimating exposed amount of foreign currencies. In Chapter 4: FOREIGN EXCHANGE EXPOSURE --- US$ VS YEN, a simple model of foreign exchange exposures will be presented and this component will be explicitly incorporated into the general formula of VC analysis proposed by Lessard.

CHAPTER 3

MEASUREMENT OF RISKS OF NON-CONTRACTUAL CASH FLOWS

0. INTRODUCTION

As was discussed in the last chapter, measuring risks of non-contractual cash flows by using Capital Asset Pricing Models in international setting is challenging mainly due to the difficulties 1) in identifying the investor's relevant portfolio; 2) in discovering a degree and effects of the integration of the world market; and 3) in examining effects of the PPP risks and the consumption patterns on the investor's portfolio selection.

This chapter is devoted to pragmatically measure risks of non-contractual cash flows generated by the US and Japanese construction and real estate industries in international setting. The chapter, at first, briefly reviews two extensions of the Sharpe-Lintner CAPM, these are, 1) Zero-Beta CAPM (ZCAPM), and 2) Consumption-Based CAPM (CCAPM) respectively, in relation to the validity or invalidity of the Purchasing Power Parity. Secondly, ways of using ZCAPM and CCAPM are discussed in order to pragmatically calculate all equity-financed betas in international setting. Then, after estimating discount rates, a sample project is evaluated by using the obtained discount rates. Finally, the results of the sample project and the adequacy of the pragmatic usage of the ZCAPM and CCAPM are discussed.

1. THEORY OF CAPITAL ASSET PRICING MODEL IN INTERNATIONAL SETTING

Many studies on international asset pricing models have been done mainly from two different views: 1) based on the segmented country market and 2) based on the integrated world market[1].

In this section, Zero-Beta CAPM and Consumption-Based CAPM are briefly discussed among several international asset pricing models because these two models can theoretically accommodate the validity or invalidity of the PPP and because they are relatively easy to be handled for pragmatic application to estimating expected rates of returns in international setting, in addition to their theoretical clarity and superiority[2].

Then, in next section, both ZCAPM and CCAPM are used for their pragmatic application.

1.1. ZERO-BETA CAPITAL ASSET PRICING MODEL UNDER VALIDITY OF PURCHASING POWER PARITY

---

[1]For a brief review of developments on international asset pricing models, see Copeland and Weston[1979]. For more detailed discussions on international asset pricing model, see Black[1974], Grauer,Litzenberger, and Stehle[1976], Solnik[1974], Stehle[1977], and Stulz[1984].

[2]See Lessard, Flood , and Paddock[1986] for rationalization of Zero-Beta CAPM and Consumption-Based CAPM in international setting.

The Sharpe-Lintner CAPM [formula(8) and (9)] estimates nominal expected rates of return with a crucial assumption that a risk-free borrowing and lending rate is available without limitation. For example, the Treasury Bill, which is considered almost default-free, is not totally risk-free because the nominal interest rate of the Treasury Bill does not necessarily exactly cover the fluctuations of the inflation rates over time, though it comes very close over short periods.

The Zero-Beta CAPM was introduced by Black in 1972 so as to eliminate the restriction imposed on the Sharpe-Lintner CAPM that a risk-free lending and borrowing rate must exist[1]. By mixing a minimum-variance zero-beta portfolio with the market portfolio with adequate ratios, the Zero-Beta CAPM claims that expected rates of return on risky assets have proportional relations with the standard deviations of the rates of return on the risky assets, which is exactly the same claim which the Sharpe-Lintner CAPM made, except that the risk-free rate of interest is replaced by the rate of return on a minimum variance zero-beta portfolio . The Zero-Beta CAPM is expressed by the following formula[2]:

$$E(R_i) = E(R_z) + [E(R_m) - E(R_z)] * \beta_i: \qquad (20)$$

where $E(R_i)$ denotes an expected real rate of return on a risky asset i;
$E(R_z)$ denotes an expected real rate of return on a minimum variance zero-beta

---

[1]See Black[1972].
[2]See Copeland and Weston[1979].

portfolio;
$E(R_m)$ denotes an expected real rate of return on the market portfolio; and
$ß_i$ denotes a beta of the risky asset i over the market portfolio, and given by the following formula:

$$ß_i = COV[R_i,R_m] / VAR[R_m] \qquad (20a)$$

An important finding of the Zero-Beta CAPM is that the Security Market Line would be flatter than defined by the Sharpe-Lintner CAPM, therefore, risky assets whose betas are less than 1(one) require higher expected rates of return than the Sharpe-Lintner CAPM estimates and risky assets whose betas are more than 1(one) require lower expected rates of return than the Sharpe-Lintner CAPM estimates. This finding is known to correspond to the empirical tests[1], which is shown in Figure 1: Comparison of Original CAPM and ZCAPM. As the figure indicates, the empirical rate of return on the zero-beta portfolio is substantially higher than those on the treasury bills, and the SML is flatter than that of the Sharpe-Lintner CAPM. This is because the Zero-Beta CAPM assumes investors to hold minimum variance zero-beta portfolios whose rates of return are higher than those of almost risk-free assets.

Thus, when the PPP holds, Zero-Beta CAPM is used for international asset pricing with the following assumptions:

1) the Purchasing Power Parity holds;

2) the world capital market is perfect,complete, and

---

[1]See Fama and MacBeth[1973] for the results of empirical tests.

integrated;

3) investors are risk-averse, and no satiation;

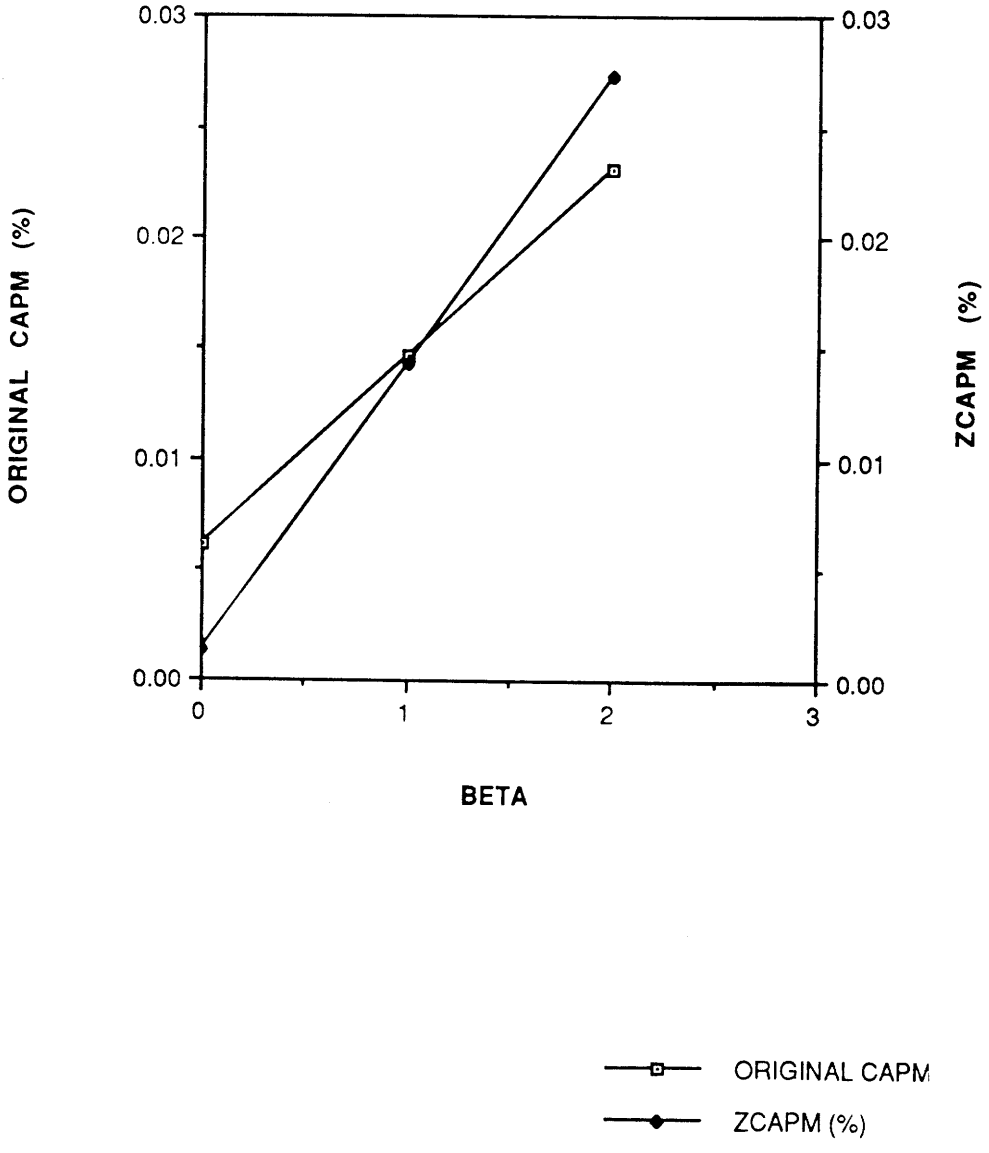
4) no asymmetry of information;

5) all investors' consumption baskets of goods are identical all over the world; and

6) real prices of the consumption basket are the same all over the world due to the validity of the PPP.

As a result, the Zero-Beta CAPM in the international setting claims that discount rates in real terms are the same all over the world.

Therefore, investors in different countries are indifferent to the same international project because the value of the project is unchanged from any investor's viewpoint.



Source : Fama and Macbeth [1973]

Figure 1: Comparison of Original CAPM and ZCAPM

However, since the above assumptions 1), 2), 5), and 6) are not generally recognized to be realistic, applying the ZCAPM to calculating discount rates is sometimes unrealistic. Besides the restrictive assumptions, there is a fundamental difficulty in pragmatically applying the ZCAPM in the international setting. That is, how to obtain the world market portfolio which everyone in the world is assumed to hold. Although we can obtain an index close to the world market portfolio, such as those issued by the Morgan Stanley Capital International Perspective, the index may not be appropriate because the index is always affected by the fluctuations of the foreign exchange rates and different inflation rates among the countries. Consequently, the index is dependent on which currency is used as a base currency unit.

There is the other way to apply the ZCAPM, which is not based on the above mentioned assumptions, but based on the assumptions which replace the previous assumption 2) with the following new assumption 2):

2) the segmented capital market is perfect and complete, whereas the world capital market is not necessarily so.

Advantages of the modified assumptions is 1) that data of the segmented market portfolio is easy to be obtained and free from the effects of the foreign exchange conversions and different inflation rates conversions, and 2) that an assumption that those in each segmented market hold the

market portfolio in the corresponding segmented market is likely to reflect more reality than the assumption that that everyone in the world holds the identical world market portfolio, given the current degree of the integration of the world market. On the other hand, it is generally recognized that this new assumption tends to underestimate risks of international assets, because it is true that the investors currently, more or less, diversify their portfolios internationally so that their asset holdings are not limited to those in the corresponding segmented markets.

In this thesis, I will apply the ZCAPM under the modified assumptions because of the advantages mentioned above, recognizing that it may overestimate the risks of the international assets.

In later section, a way of pragmatically using the Zero Beta CAPM will be discussed.

1.2. CONSUMPTION-BASED CAPITAL ASSET PRICING MODEL UNDER INVALIDITY OF PURCHASING POWER PARITY

When the PPP does not hold, investors in different countries are exposed to risks of different inflations and fluctuating foreign exchange rates. Since risk-averse investors try to hedge against those risks by holding country-specific hedge portfolios in order to stabilize their consumptions, real rates of return on risky international

assets from different countries' investors' perspectives are also country-specific.

Under the framework of the Consumption-Based CAPM, investors in a country hold portfolios comprising three different portfolios. These are[1]:

1) safety portfolios which are uncorrelated with investors' real consumptions;
2) well-diversified portfolios which are "the tangency portfolios on the efficient frontiers for each country; and
3) hedge portfolios which offset unexpected changes in investors' costs of living.

The general formula of the Consumption-Based CAPM is given by the following[2]:

$$E(R_i) = E(R_{zc}) + [E(R_p) - E(R_{zc})] * ß_{ic}: \qquad (21)$$

where $E(R_i)$ denotes an expected real rate of return on a risky asset i;
$E(R_{zc})$ denotes an expected real rate of return on a portfolio uncorrelated with real consumption;
$E(R_p)$ denotes an expected real rate of return on an arbitrary portfolio; and
$ß_{ic}$ denotes a beta of the risky asset i determined by investor's real consumption and reference portfolio, and given by the following formula:

$$ß_{ic} = COV[R_i, C_1] / COV[R_p, C_1] \qquad (21a)$$

---

[1]See Stulz[1984] and Lessard,Flood, and Paddock[1986] for more detailed discussions on the component portfolios of the entire portfolio under the framework of the Consumption-Based CAPM.

[2]See Breeden[1979] and Stulz[1984] for the derivation of the formula.

where C_1 denotes a real consumption of a representative domestic investor.

Thus, when the PPP does not hold, the Consumption-Based CAPM is used with the following assumptions:

1) the Purchasing Power Parity does not hold;
2) the segmented capital market is perfect and complete, whereas the world capital market is not necessarily so;
3) investors are risk-averse, and no satiation;
4) no asymmetry of information;
5) investors' consumption baskets are identical within each country, but different from country to country; and
6) real prices of the consumption baskets are different from country to country due to the invalidity of the PPP.

As a result, the Consumption-Based CAPM claims that discount rates in real terms vary country-by-country. Therefore, the value of the identical international project varies, depending on where the investors live. Although the above-mentioned assumptions are required for the use of the Consumption-Based CAPM, the Consumption-Based CAPM can theoretically accommodate the issues discussed in section 3.1. of Chapter 2, within its framework.

However, it should be noted that there are two different ways of calculating the CCAPM betas proposed by two

respectable precursors, D.Breeden [1979] and R.Stulz [1984]. Breeden, who originally proposed the CCAPM, claims that CCAPM betas are calculated as a ratio of covariance of return on risky assets with changes in consumption to covariance of return on arbitrary safety portfolio with changes in consumption, whereas Stulz claims that CCAPM betas are calculated as a ratio of covariance of return on risky assets with level of consumption to covariance of return on arbitrary safety portfolio with level of consumption.

In this thesis, I will apply both calculation methods by Breeden and Stulz because it is worthwhile to apply both methods. This is simply because the second article(Stulz) does not clarify why he uses the level of consumption rather than the changes as Breeden originally used. Thus, there are these two methods of calculating the CCAPM betas and because theoretical models like the CAPM must be statistically tested so that the conformity and applicability of the model with the reality should be verified.

In next section, a way of pragmatically using the Consumption-Based CAPM will be discussed.

2. PRAGMATIC APPLICATION OF ZERO BETA CAPM AND CONSUMPTION-BASED CÀPM

In this section, how to apply the Zero Beta CAPM and Consumption-Based CAPM for the purpose of calculating betas and estimating the respective Security Market Line is discussed. Appropriate approximation and additional assumptions are required to pragmatically use the ZCAPM and CCAPM due to limitations on real data available and difficulties in identifying the theoretical variables of the ZCAPM and CCAPM in real world.

First, how to calculate betas is discussed, and second, how to estimate the Security Market Line with Ordinary Least Square Regression is discussed.

2.1. CALCULATING ZCAPM & CCAPM BETAS WITH APPROXIMATING REAL DATA TO THEORETICAL VARIABLES

Betas of the Zero Beta CAPM and Consumption-Based CAPM are calculated with the formula (20a) and (21a), respectively:

$$\text{ZCAPM: } \beta_i = COV[R_i, R_m] \,/\, VAR[R_m] \qquad (20a)$$

$$\text{CCAPM: } \beta_{ic} = COV[R_i, C_1] \,/\, COV[R_p, C_1] \qquad (21a)$$

Each variable on the right side of the formula is discussed below.

First o all, 10(ten) U.S. construction and engineering firms, 8(eight) U.S. real estate investment companies, 11(eleven) Japanese construction and engineering firms, and 4(four) Japanese real estate companies are selected as representatives of U.S. and Japan's construction and real estate industries so that the monthly rates of return on the stocks of the selected firms for three years (1986-1988) are assumed to be rates of return on risky assets in order to calculate betas of the selected firms. The selected firms are as follows with the stock markets where the stocks of the selected firms are traded in the parenthesis:

1) U.S. construction and engineering firms:
   - CBI Industries (NYSE)
   - Centex General (NYSE)
   - CRSS (NYSE)
   - Flour Daniel (NYSE)
   - Foster Wheeler (NYSE)
   - Jacobs Engineering (ASE)
   - Morrison Knudsen (NYSE)
   - Perini (ASE)
   - Stone & Webster (NYSE)
   - Turner (ASE)

2) U.S. real estate trust companies:
   - California REIT (NYSE)
   - Cenvill (NYSE)
   - Federal Realty (NYSE)
   - First Union (NYSE)
   - Hotel Investment (NYSE)
   - HRE Properties (NYSE)
   - IRT Properties (NYSE)
   - Saul B.F.RL.Inv. (NYSE)

3) Japanese construction and engineering firms:
   - Aoki Construction (TSE)
   - Fujita Corp (TSE)
   - Haseko (TSE)
   - Hazama-gumi (TSE)
   - Kajima (TSE)
   - Kumagai-gumi (TSE)
   - Maeda Corp (TSE)

Ohbayashi Corp (TSE)
Penta Ocean Construction (TSE)
Shimizu Construction (TSE)
Taisei Corp (TSE)

4) Japanese real estate development companies:
Daikyo (TSE)
Mitsubishi Estate (TSE)
Mitsui Real Estate (TSE)
Sumitomo Realty and Development (TSE)

The formula of calculating pre-tax monthly real rates of return on the stocks of the selected firms and the sources of the data are as follows[1]:

$$R_{i,t}=[((P_{i,t}-P_{i,t-1}+D_{i,t})/P_{i,t-1})/(1+I_t/100)-1]*100: \quad (22)$$

where $R_{i,t}$ denotes the pre-tax monthly real rate of return on the stock of the selected firm i for month=t;
$P_{i,t}$ denotes the adjusted market price of the stock of the selected firm i at the end of month=t (effects of changes in capital and face values, stock splits, and mergers on stock prices are adjusted);
$D_{i,t}$ denotes the dividend paid by the selected firm i during month=t (dividend payment is leveled for all the corresponding months.); and
I_t denotes the U.S. or Japan's monthly inflation rate from month=t-1 to month=t.

Sources of the data:
$P_{i,t}$: Daily Stock Price Record: New York Stock Exchange, 1986-89;
Daily Stock Price Record: Over-The-Counter, 1986-89; and
Morgan Stanley, 1986-1989.
$D_{i,t}$: Moody's Handbook of Common Stock, 1986-89; and
Moody's Annual Dividend Handbook, 1986-89.
I_k: International Monetary Fund, 1986-1989

---

[1]Strictly speaking, the after-tax real rates of return must be calculated.

Secondly, since C_1 denotes either changes in or level of real consumption of a representative domestic investor, data of real consumption per capita which are published by the Government or its agents can be used as good approximations although the data have the following problems in addition to the general errors inherent to the statistical methods employed by the issuers :

1) the inflation rate to adjust the nominal consumption per capita of a representative domestic investor to the real consumption per capita is difficult to identify. Hence, the Consumer Price Index (CPI) is used to adjust the nominal consumption per capita as an approximation;
2) the monthly data of the domestic population are generally based on the estimation, thus, the real or nominal monthly consumption per capita may be different from the actual number;
3) the real consumption in the Consumption-Based CAPM excludes the consumption of durable goods whereas some data on the consumption do not clearly separate the consumption of durable goods from that of non-durable goods and services;[1] and
4) the consumption data of Japan's investors are not seasonally adjusted, whereas those of U.S. investors are seasonally adjusted.

---

[1]See Breeden[1979] and Stulz[1984] for discussions on reasons of excluding the consumption of durable goods.

In order to calculate discount rates from U.S. and Japan's investors' perspectives with minimum effects of the above problems, the following two formulas and data are used to obtain the level of the real consumption per capita, excluding the durable goods consumption, of U.S. and Japan's investors. Therefore, the real level of consumption per capita calculated with the following formulas (23) and (24) are applicable to Stulz-CCAPM.

$$C_{us,t} = C_{1t} / P_{1t}: \quad (23)$$

where $C_{us,t}$ denotes the monthly real consumption per capita of U.S. investors for month=t;
C_{1t} denotes the total monthly real personal consumption of non-durable goods and services for month=t; and
P_{1t} denotes the total resident population in U.S. for month=t.

Sources of the data:
C_{1t}: U.S.Department of Commerce, Bureau of Economic Analysis, 1989
P_{1t}: U.S.Department of Commerce, Bureau of the Census, 1989

$$C_{j,t} = A*(C_{2t}-C_{3t}-C_{4t})/[\, P_{2t} * \prod_{k=1}^{k=t} (1 + I_k(J)/100)]: \quad (23a)$$

where $C_{j,t}$ denotes the real monthly consumption per capita of Japan's investors for month=t;
A denotes a monthly seasonality adjustment factor based on those used in 1984. For each month, from January through December, the following numbers are used as the adjustment factors:
1.0512, 1.1507, 0.9292, 0.9989,
1.0592, 1.0464, 0.9635, 0.9921,
1.1071, 1.0475, 1.0749, and 0.7255;
C_{2t} denotes the total nominal monthly household expenditure for month=t;

C_{3t} denotes the nominal monthly expenditure in fuel, light, and water charges for month=t;
C_{4t} denotes the nominal monthly expenditure in clothing and footwear for month=t;
P_{2t} denotes the persons per household for month=t; and
$I_k(J)$ denotes the Japan's monthly inflation rates from month=k-1 to month=k.

Sources of the Data:
C_{2t}, C_{3t}, C_{4t}, and P_{2t}: The Bank of Japan, 1986-1988
$I_k(J)$: International Monetary Fund, 1986-1989

On the other hand, monthly changes in real consumption per capita for Breeden-CCAPM are calculated with the following formulas (23b) and (23c) by using the data obtained by the formulas (23) and (23a).

$$CC_{us,t} = (C_{us,t} - C_{us,t-1}) / C_{us,t-1}: \quad (23b)$$

where $CC_{us,t}$ denotes the monthly changes in real consumption per capita of U.S. investors for month=t; and
$C_{us,t}$ denotes the monthly real consumption per capita of U.S. investors for month=t.

$$CC_{j,t} = (C_{j,t} - C_{j,t-1}) / C_{j,t-1}: \quad (23c)$$

where $CC_{j,t}$ denotes changes in real monthly consumption per capita of Japan's investors for month=t; and
C_{jt} denotes the real monthly consumption per capita of Japan's investors for month=t.

Secondly, a market portfolio, (Rm), and a real rate of return on an arbitrary portfolio, (Rp), is approximated to the pre-tax real rate of return on the domestic market

portfolio with the assumption that all domestic investors hold the domestic market portfolio[1]. This approximation enables the Zero-Beta CAPM later to check estimated discount rates by the CCAPM in some specific conditions. The following formulas and data are used to calculate monthly real rates of return on the U.S. and Japan's domestic market portfolios:

$$M_{us,t} = [(1+M_t(U)/100)/(1+I_t(U)/100)-1] * 100: \qquad (24)$$

where $M_{us,t}$ denotes the real monthly rate of return on the U.S. domestic market portfolio for month=t;
$M_t(U)$ denotes the nominal monthly rate of return on the U.S. domestic market portfolio for month=t;
$I_t(U)$ denotes the U.S. monthly inflation rate from month=t-1 to month=t.

Sources of the data:
$M_t(U)$: Ibbotson Associates, 1989
$I_k(U)$: International Monetary Fund, 1986-1989

$$M_{j,t} = [(1+M_t(J)/100)/(1+I_t(J)/100)-1] * 100: \qquad (24a)$$

where $M_{j,t}$ denotes the real monthly rate of return on the Japan's domestic market portfolio for month=t;
$M_t(J)$ denotes the nominal monthly rate of return on the Japan's domestic market portfolio for month=t;
$I_t(J)$ denotes the Japan's monthly inflations

---

[1]Strictly speaking, the after-tax real rates of return must be calculated. However, since covariance of the pre-tax real rates of return on the risky assets with the real consumption is divided by the covariance of the pre-tax real rates of return on the domestic market portfolio with the real consumption, effects of tax on calculating betas is assumed to be minor.

rate from month=t-1 to month=t.
Sources of the data:
$M_t(J)$: Ministry of Finance,Japan , 1986-1989
$I_k(J)$: International Monetary Fund, 1986-1989

Thus, the betas of the selected firms are calculated by using the formulas (20a) and (21a) with the results obtained above. However, obtained betas, which are financially leveraged, must be unleveraged in order to be all equity-financed betas for the use of VC methodology. The method of unleveraging is the same as was discussed in section 2.2. of Chapter 1 (ESTIMATE OF RISK PREMIUM BY CAPITAL ASSET PRICING MODEL). The formula(11) of unleveraging betas is cited from the section as follows:

$$ß_A = ß_E \; / \; (1 + (1-T) * D/E): \qquad (11)$$

Here, 1) the tax rates for U.S. and Japanese firms are assumed to be 34% and 42%, respectively[1]; and 2) the market value of the debt of the selected firm is assumed to be total outstanding amount of long-term debt for 1986 or 1987 whichever the data are available. The sources of the data on the debt are Moody's Industrial Manual, Moody's International Manual, and Moody's Bank and Financial Manual. Finally, 3) the market value of the equity of the selected firms are calculated by multiplying the number of outstanding shares of the selected firm during the same period as the period, when

---

[1]See Gomi[1984] for Japanese Tax Systems.

the data of the outstanding long-term debt are obtained, with the market price of the stock of the selected firms. The sources of the data are the same as those for the debt.

Finally, the all equity-financed betas are obtained in order to estimate the discount rates.

2.2. ESTIMATING ZCAPM & CCAPM SECURITY MARKET LINE WITH ORDINARY LEAST SQUARES REGRESSION

In the previous sub-section, ways of calculating the leveraged and unleveraged ZCAPM and CCAPM betas of the selected U.S. and Japan's firms are presented.

In this sub-section, ways and issues of estimating the Security Market Lines of the ZCAPM and CCAPM by using the obtained results in the previous sub-section are briefly discussed with the Ordinary Least Squares Regression method. However, since this thesis does not intend to explain the OLS Regression method, readers may need to consult statistics textbooks, such as Dhrymes[1970], Hoel[1954] and etc, which explain the OLS Regression method.

The equations of the Security Market Lines (SML) of the ZCAPM and CCAPM were already presented in the beginning of this chapter. The following formula (20) and (21), respectively, express the SML of the ZCAPM and CCAPM.

$$E(R_i) = E(R_z) + [E(R_m) - E(R_z)] * ß_i: \quad (20)$$

$$E(R_i) = E(R_{zc}) + [E(R_p) - E(R_{zc})] * ß_{ic}: \quad (21)$$

As the above formulas show, the SML expresses a linear relationship between the betas of risky assets and expected rates of return on the risky assets. By assuming the SML is applicable to the betas obtained in the previous sub-section and the realized rates of return on the selected firms for the time period from 1986 through 1988, the SML's of the ZCAPM and CCAPM are estimated by using the OLS Regression method.

The results of the OLS Regression should be examined in terms of what the results imply because the OLS Regression itself is a pure statistical method and does not explain causes and effects of the results. The following are points necessary to be examined.

1) The SML obtained by the OLSR must go through a point which represents the domestic market portfolio, whose realized real rate of return is calculated according to the data used to calculate the betas, and whose beta must be one(1) by the definition and assumptions. The realized monthly rates of return on the U.S. and Japan's domestic market portfolios are 0.7333% and 2.2274%, respectively.[1] Any statistically significant deviation from the point implies that the obtained SML is not appropriate.

2) The slope of the SML is assumed to be positive

---

[1]See Tokyo Stock Exchange Market[1989] for another calculation of the realized monthly rate of return on Japan's market portfolio. They also show very high rates of return on the market portfolio.

because the expected rates of return are assumed to increase as the betas (or, equivalently, riskiness or variance of assets) increases. However, it is recognized that, in some periods, the SML for the historical data could be negative according to the empirical tests of the CAPM. If the slope is negative, the obtained SML is not applicable to estimate expected (future) rates of return on risky assets because the negatively-sloped SML represents historical outcomes.

3) The intercept of the SML with the vertical axis (or, equivalently, rates of return on risk-free assets) should be compared to the rates of return on those "risk-free" financial assets such as T-Bill. Too high risk-free rates of return may overestimate or underestimate risky assets under consideration.
4) The squared correlation coefficients must be large enough to support the statistical reliability of the OLS Regression.

By keeping the points above mentioned, the OLS Regression are applied to the obtained betas and the realized real rates of return so as to obtain the ZCAPM SML's for U.S. and Japan's investors, respectively, and the Breeden-CCAPM and Stulz-CCAPM for U.S. and Japan's investors, respectively, in total six(6) SML's. The main data and results will be presented and discussed in next section.

3. RESULTS OF REGRESSION OF ZCAPM AND CCAPM

This section presents the data and results of the OLS Regression and discusses the obtained SML's, comparing with those of the ZCAPM obtained by others or each other. After checking the obtained SML's with the points mentioned in the previous section, the SML's are refined in order to be reasonable enough to be used to estimate discount rates.

3.1. COMPARISON OF OBTAINED ZCAPM WITH ZCAPM BY FAMA, MACBETH, AND SAKAKIBARA

The leveraged ZCAPM betas and the realized real rates of returns of the selected U.S. and Japan's firms, which were calculated according to the procedures earlier discussed are shown in the Table below.

Then, the data are used for the OLS Regressions so as to obtain the SML equations. Simultaneously, the rates of return on the Zero-beta portfolios are statistically obtained, but are not confirmed by creating the Zero-beta portfolios with the observable risky assets. In the OLS Regressions, the SMLs are examined with regard to the points discussed in section 2.2 of this chapter.

TABLE 1: Leveraged ZCAPM Betas and Realized Real Return of the Selected US & Japan's Firms

	Leveraged Betas	Monthly Return(%)
-----U.S.-----		
CBI Industries	0.79	0.97
Centex General	0.95	0.95
CRSS	1.08	3.78
Flour Daniel	1.25	1.68
Foster Wheeler	1.73	1.19
Jacobs Engineering	0.58	3.75
Morrison Knudsen	1.25	0.46
Perini	0.91	0.83
Stone & Webster	1.12	1.62
Turner	0.85	-0.62
California REIT	0.14	-0.95
Cenvill	0.35	0.72
Federal Realty	0.62	0.90
First Union	0.64	-0.52
Hotel Investment	0.66	-1.36
HRE Properties	0.13	0.07
IRT Properties	0.80	1.62
Saul B.F.RL.Inv.	0.56	1.99
----Japan--------		
Aoki Construction	0.68	1.63
Fujita Corp	1.18	2.75
Haseko	1.48	3.49
Hazama-gumi	0.40	3.05
Kajima	1.64	4.90
Kumagai-gumi	0.39	1.50
Maeda Corp	0.95	2.51
Ohbayashi Corp	1.37	4.19
Penta Ocean Const.	1.04	3.33
Shimizu Construction	1.24	4.73
Taisei Corp	1.32	4.77
Daikyo	0.42	0.26
Mitsubishi Estate	1.60	3.53
Mitsui Real Estate	1.31	3.85
Sumitomo R & D	1.05	0.87

The results of the OLS Regression with the OLS equations are shown in the Figure 2: ZCAPM for U.S., and Figure 3: ZCAPM for Japan. Because, in the Figure 2, some of the plotted data are found to be out of a group of the other

majority of the data, the OLS Regression was implemented for those data excluding the extraordinary ones. The result of the

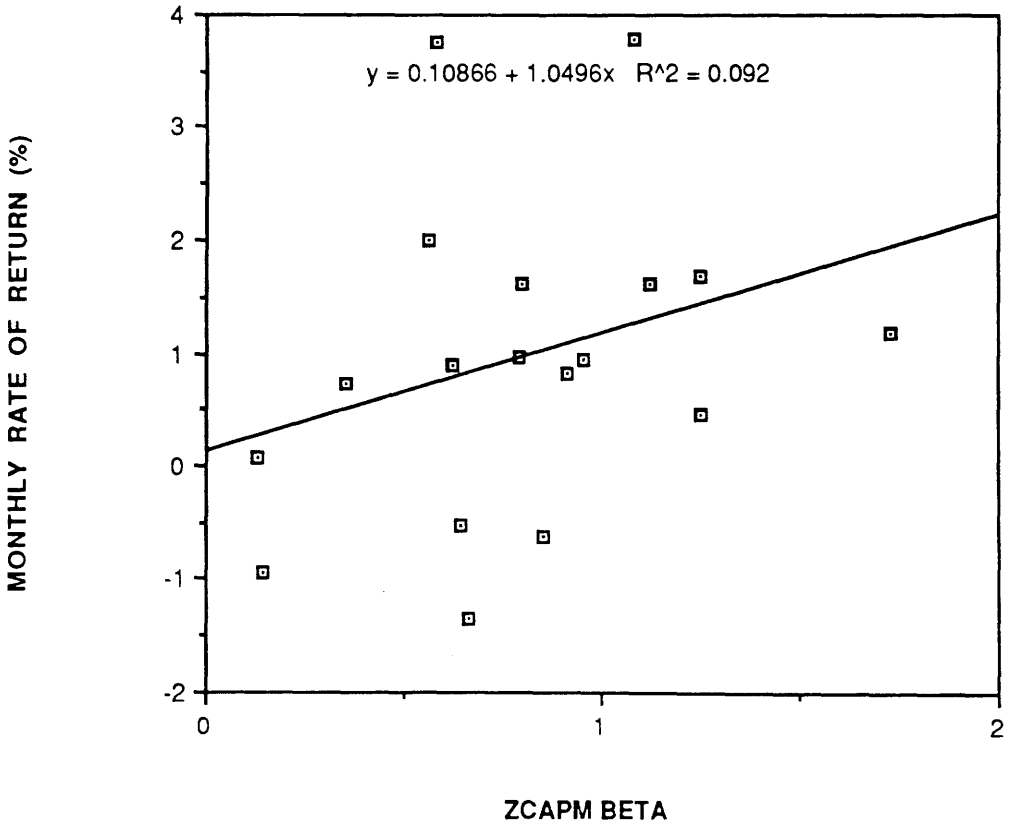


Figure 2: ZCAPM for U.S.

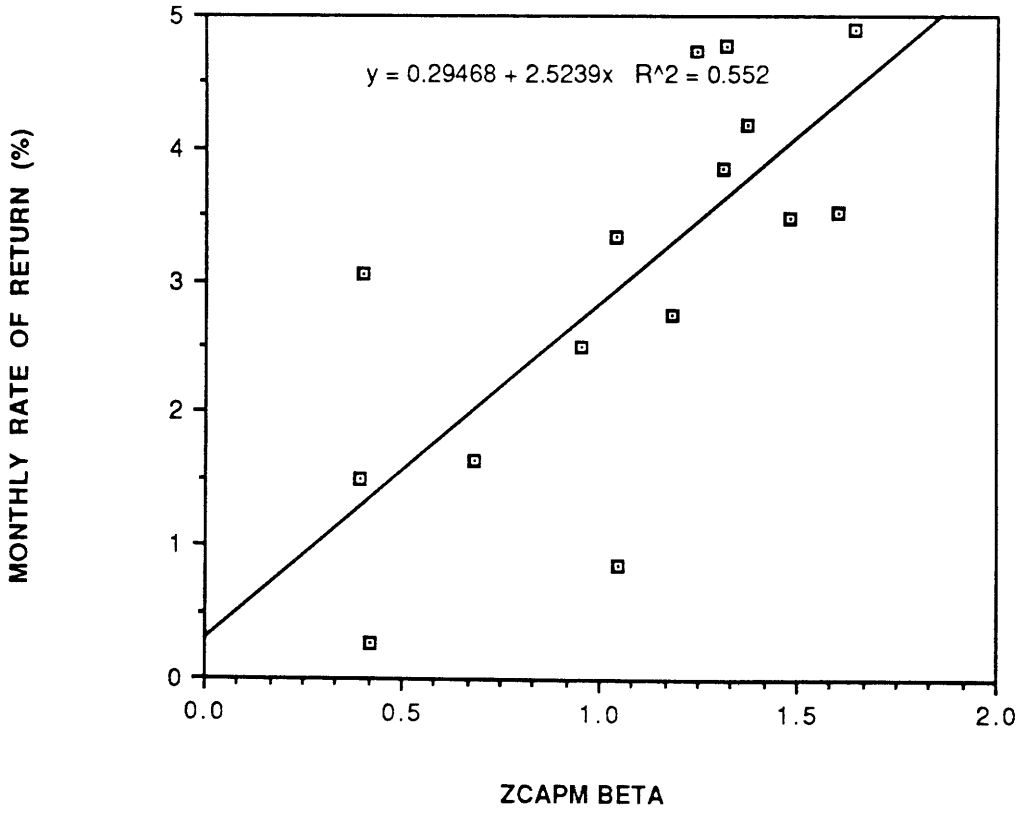


Figure 3: ZCAPM for Japan

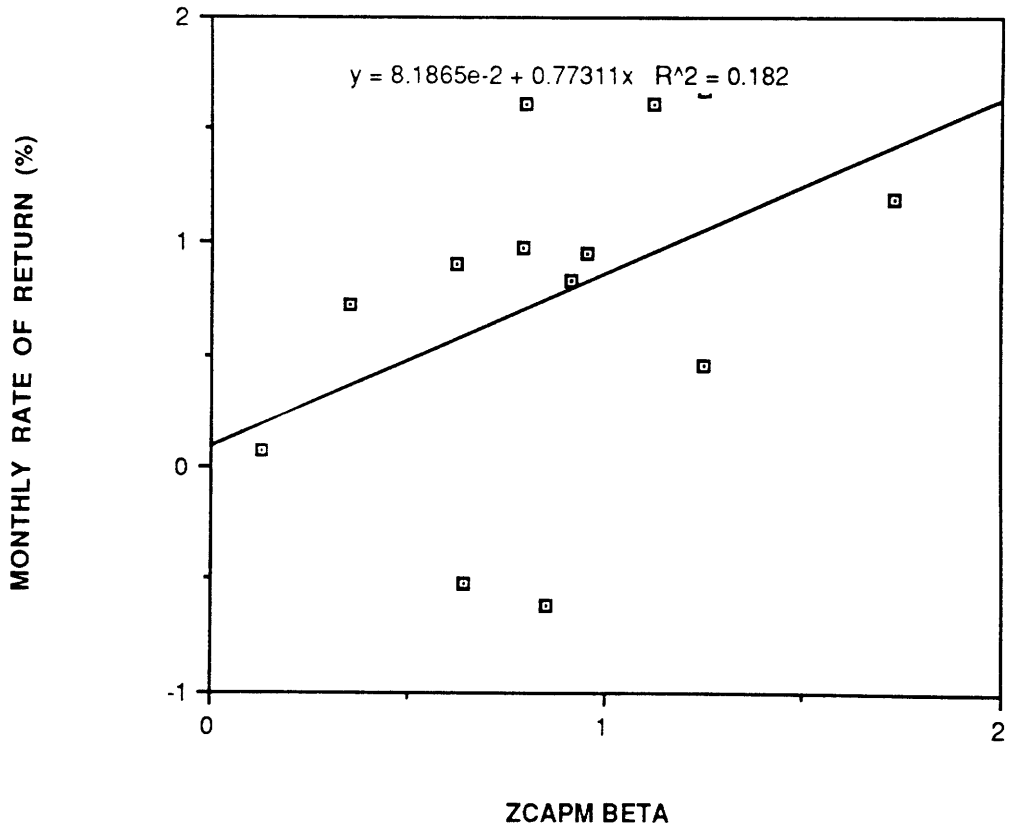


Figure 2a: Adjusted ZCAPM for U.S.

OLS Regression is shown in the Figure 2a: Adjusted ZCAPM for U.S.. Consequently, the SML equations in terms of monthly rates of return for the period from 1986 through 1988 are expressed as follows:

ZCAPM for U.S.: $E(R_i) = 0.0819 + 0.7731 * ß_i$:

$E(R_m) = 0.8550$ %

$E(R_z) = 0.0819$ %

R^2 = 0.182

ZCAPM for Japan: $E(R_i) = 0.2947 + 2.5239 * ß_i$:

$E(R_m) = 2.8186$ %

$E(R_z) = 0.2947$ %

R^2 = 0.552

These SML equations for 1986 to 1988 are compared with those obtained by Fama,Macbeth[1973], and Sakakibara et. al.[1988] in the following Table 2: Comparison of ZCAPM's.

Table 2: Comparison of ZCAPM's

period	monthly rates(%)		annualized rates(%)	
	R_z	R_m	R_z	R_m
--ZCAPM for U.S.				
1935-40	0.17	1.26	2.04	15.12
1941-45	0.12	2.40	1.44	28.80
1946-50	-0.06	0.22	-0.72	2.64
1951-55	1.11	1.35	13.32	16.20
1956-60	1.30	1.89	15.60	22.68
1961-6/68	-0.17	1.25	-2.04	15.00
1935-6/68	0.36	1.21	4.32	14.52
1986-88	0.08	0.86	0.98	10.26
--ZCAPM for Japan				
1957-59	0.14	1.40	1.68	16.80
1960-64	1.48	0.91	17.76	10.92
1965-69	0.32	1.20	3.84	14.40
1970-74	2.62	1.44	31.44	17.28
1975-79	0.44	0.87	5.28	10.44
1980-84	0.87	-0.54	10.44	-6.48
1957-84	0.45	0.85	5.40	10.20
1986-88	0.29	2.82	3.54	33.82

Sources: Data of U.S. ZCAPM for 1935-6/68 are cited from Fama and Macbeth[1973] and adjusted into the real terms.
Data of Japan's ZCAPM for 1957-59 are cited from Sakakibara et. al.[1988].
Other data are calculated in this thesis.

By comparing the SML obtained for the period of 1986-1988 with those by Fama, Macbeth, and Sakakibara for the past three decades, it is observed that the SMLs obtained for 1986-89 are substantially different from those for the past three decades with regard to the rates of return on the Zero-beta portfolios and the rates of return on each market portfolio.

First of all, the SMLs in U.S. seem to have general tendency that the slopes of the SMLs are positively steeper when U.S. economy expanded, such periods as of 1941-1945 and 1961-1968, than when U.S.economy was stagnant, such periods as of 1946-1950. For instance, the risk premiums (differentials of rates of return on the market portfolio and Zero-beta portfolio) for 1941-1945 and 1946-1950 are 27.36% and 3.36%, respectively. Over the three decades, the average risk premium is 10.20%, which is close to the current risk premium for 1986 to 1988. The current risk premium of 9.28% is likely to correspond to the current stable expansion of U.S. economy. However, the rate of return on the Zero-beta portfolio for 1986-1988, that is, 0.98%, is quite lower than that on average of 4.32%. One possible explanation might be that the average rate of return on Zero-beta portfolio is inflated by two extremely high rates of return on Zero-beta portfolios for 1951-1955 and 1956-1960, these are, 13.32% and 15.6%, respectively.

Secondly, the SML in Japan does not seem to have such a general tendency as was observed for the SML in U.S.. Both before 1970 when Japan's economy expended with roughly 10% growth rates, and after 1970 when Japan's economy moderately expanded with roughly 5% growth rates, positively-sloped and negatively-sloped SMLs are observed for the five-year sub-periods. Incidentally, the positive and negative slopes of the SMLs for each sub-period in Table 2 appears mutually. The current SML for 1986-1988 indicates extremely high rate

of return on the market portfolio (roughly 30%), reflecting the current extraordinary economic expansions which are compatible to those in 1960's.

As the SML's by Fama, Macbeth, and Sakakibara indicate, the SML equations the above Table, the following points are recognized for various periods considerably fluctuate, not only in terms of realized real rates of return, but also in terms of relationships between the betas (risks of assets) and realized return. Especially, in periods, such as 1960-64, 1970-74, and 1980-84, the realized return on Japan's Zero-Beta portfolios are higher than the realized return on the domestic market portfolios. Moreover, the realized return on the Zero-Beta portfolios in both countries vary substantially over time. For the periods of 1935-88, the realized return on the Zero-Beta portfolios in U.S. vary between -2.04 % to 15.60 %, and for the periods of 1957-88, the realized return on the Zero-Beta portfolios in Japan vary between 1.68 % to 31.44 %. This large fluctuation of the return on the Zero-Beta portfolios seems to be inconsistent with the concept of the Zero-Beta portfolio because the Zero-Beta portfolio is supposed to replace the almost risk-free assets, such as T-Bill's or Government Bonds whose real rates of interest are quite stable, compared to those of the Zero-Beta portfolio.

The above argument might indicate that the ZCAPM SML are more dynamic over time than expected. Since this thesis is not intended to pursue the dynamics of the ZCAPM in a pure finance field, and since this issue is beyond the scope of

this thesis, this is an obvious research issue for financial experts to examine in the future.

The importance of this issue to the project evaluation is what is the appropriate expected rate of return on the Zero-Beta portfolio and on the domestic market portfolio so as to estimate the appropriate discount rates, given such fluctuations.

The most adequate way of estimating discount rates might be to forecast states of economies for the project's periods so that the expected rates of return on the Zero-Beta and domestic portfolios are estimated for the project's periods. However, it is quite judgmental rather than objective and not easy to forecast.

In this thesis, the discount rates of the selected U.S. and Japan's C&E and real estates firms will be calculated by using the SML's by Fama,Macbeth, and Sakakibara for long-life projects whose durations are equal to or more than average business cycles of the home country's economy, and by using the SML's obtained for 1986-88 for short-life projects whose durations are less than average business cycles of the home country's economy.(The average business cycles in U.S. and Japan are about 50 to 60 months.) These SML equations are as follows:

ZCAPM for U.S.(long term):

$$E(R_i) = 4.32 + 10.20 * ß_i \quad (25)$$

ZCAPM for U.S.(short term):

$$E(R_i) = 0.98 + 9.28 * \beta_i : (26)$$

ZCAPM for Japan(long term):

$$E(R_i) = 5.40 + 4.80 * \beta_i : (27)$$

ZCAPM for Japan(short term):

$$E(R_i) = 3.54 + 30.28 * \beta_i : (28)$$

3.2. COMPARISON OF OBTAINED TWO CCAPM's: BREEDEN-CCAPM AND STULZ-CCAPM

The leveraged Breeden- and Stulz-CCAPM betas and the realized real rates of returns of the selected U.S. and Japan's firms, which were calculated according to the procedures earlier discussed are shown in the Tables below.

TABLE 3: Leveraged Breeden-CCAPM Betas and Realized Real Return of the Selected Firms

	Leveraged Betas	Monthly Return(%)
-----U.S.-----		
CBI Industries	-1.42	0.97
Centex General	-1.73	0.95
CRSS	-11.64	3.78
Flour Daniel	1.54	1.68
Foster Wheeler	5.04	1.19
Jacobs Engineering	7.06	3.75
Morrison Knudsen	-4.17	0.46
Perini	5.29	0.83
Stone & Webster	1.64	1.62
Turner	3.34	-0.62
California REIT	1.92	-0.95
Cenvill	3.17	0.72
Federal Realty	-0.86	0.90
First Union	-3.18	-0.52
Hotel Investment	4.11	-1.36
HRE Properties	6.03	0.07
IRT Properties	0.42	1.62
Saul B.F.RL.Inv.	-1.16	1.99
----Japan--------		
Aoki Construction	-0.10	1.63
Fujita Corp	-1.71	2.75
Haseko	4.17	3.49
Hazama-gumi	0.16	3.05
Kajima	1.29	4.90
Kumagai-gumi	0.78	1.50
Maeda Corp	5.66	2.51
Ohbayashi Corp	-0.31	4.19
Penta Ocean Const.	0.72	3.33
Shimizu Construction	2.84	4.73
Taisei Corp	2.18	4.77
Daikyo	0.60	0.26
Mitsubishi Estate	-0.53	3.53
Mitsui Real Estate	4.45	3.85
Sumitomo R & D	-0.06	0.87

TABLE 4: Leveraged Stulz-CCAPM Betas and
Realized Real Return of the Selected Firms

	Leveraged Betas	Monthly Return(%)
-----U.S.-----		
CBI Industries	2.78	0.97
Centex General	1.26	0.95
CRSS	-2.43	3.78
Flour Daniel	-3.01	1.68
Foster Wheeler	0.79	1.19
Jacobs Engineering	-1.58	3.75
Morrison Knudsen	1.62	0.46
Perini	-0.64	0.83
Stone & Webster	1.04	1.62
Turner	-0.50	-0.62
California REIT	-1.91	-0.95
Cenvill	2.94	0.72
Federal Realty	1.64	0.90
First Union	1.67	-0.52
Hotel Investment	4.21	-1.36
HRE Properties	0.22	0.07
IRT Properties	1.53	1.62
Saul B.F.RL.Inv.	6.03	1.99
----Japan--------		
Aoki Construction	0.25	1.63
Fujita Corp	1.48	2.75
Haseko	2.75	3.49
Hazama-gumi	0.29	3.05
Kajima	2.17	4.90
Kumagai-gumi	0.01	1.50
Maeda Corp	0.47	2.51
Ohbayashi Corp	2.36	4.19
Penta Ocean Const.	1.27	3.33
Shimizu Construction	1.28	4.73
Taisei Corp	1.31	4.77
Daikyo	0.78	0.26
Mitsubishi Estate	3.30	3.53
Mitsui Real Estate	1.73	3.85
Sumitomo R & D	1.04	0.87

The results of the OLS Regression are shown in the Figure 4: Breeden-CCAPM for U.S., Figure 5: Breeden-CCAPM for Japan, Figure 6: Stulz-CCAPM for U.S., and Figure 7: Stulz-

CCAPM for Japan. Because, in the Figure 4 and 6, some of the plotted data are found to be out

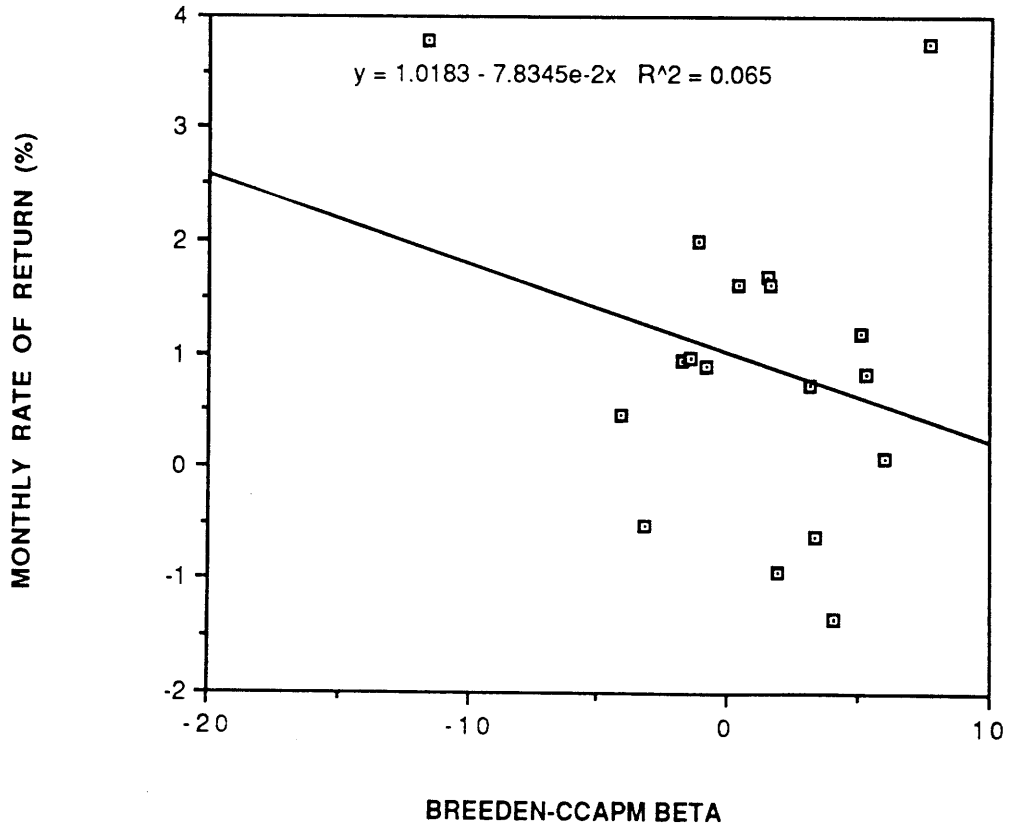


Figure 4: Breeden-CCAPM for U.S.

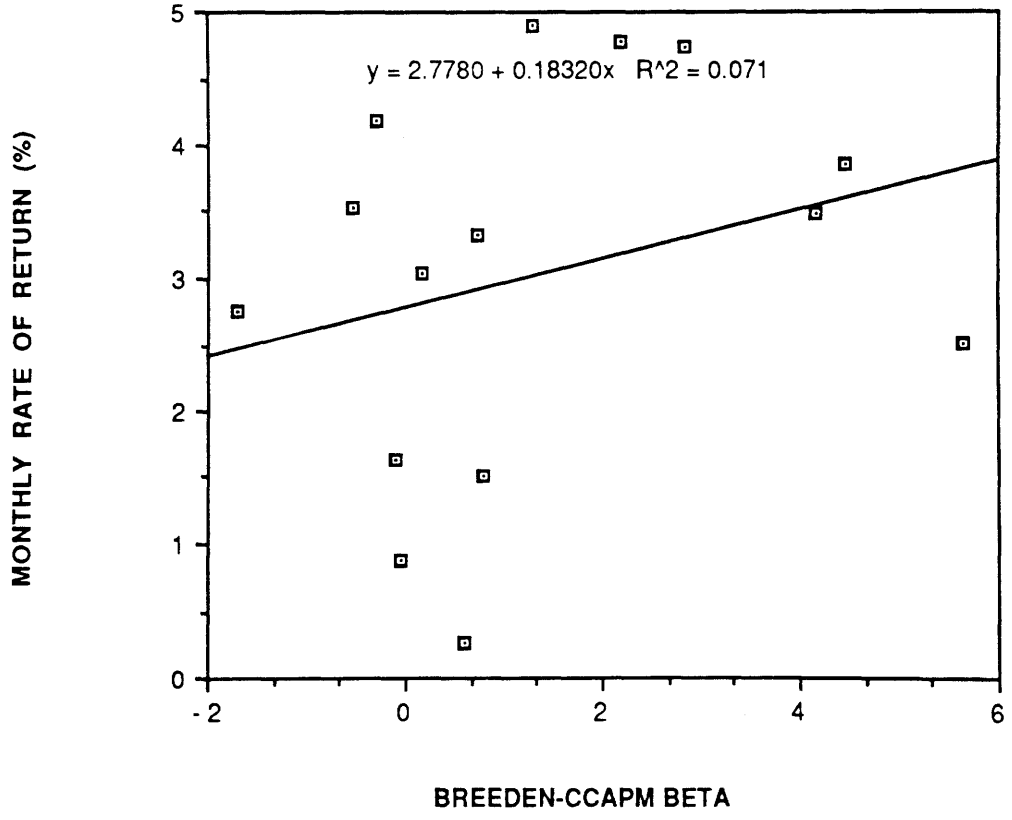


Figure 5: Breeden-CCAPM for Japan

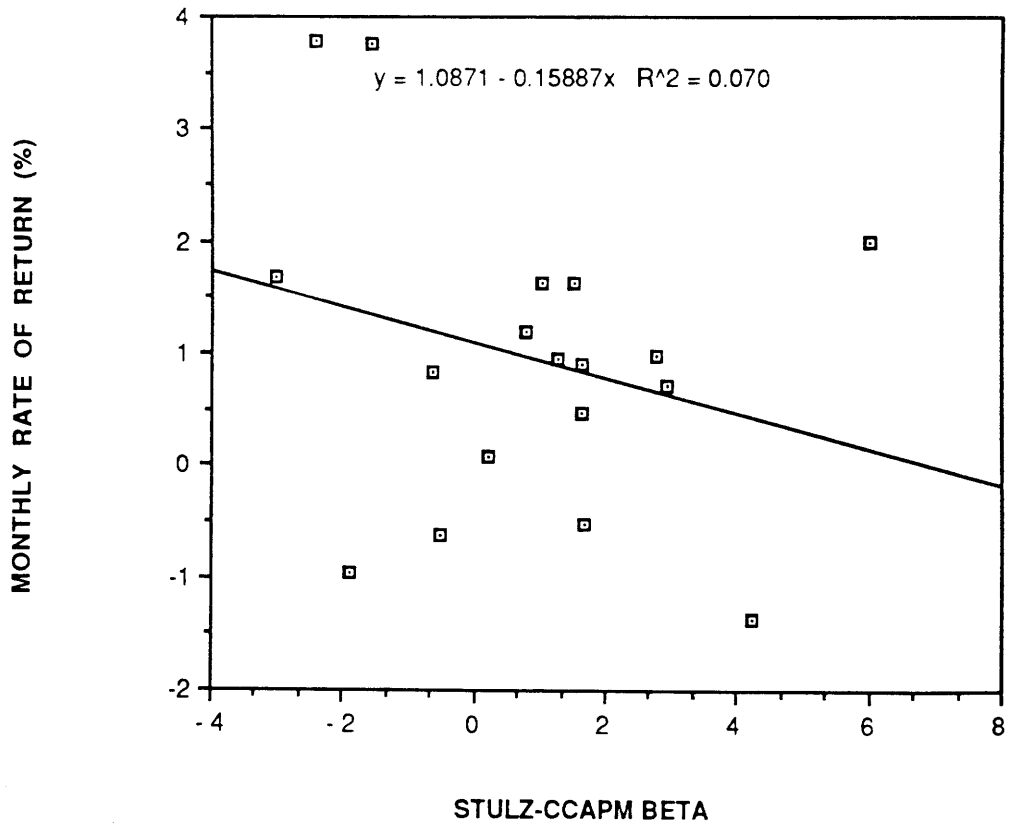


Figure 6: Stulz-CCAPM for U.S.

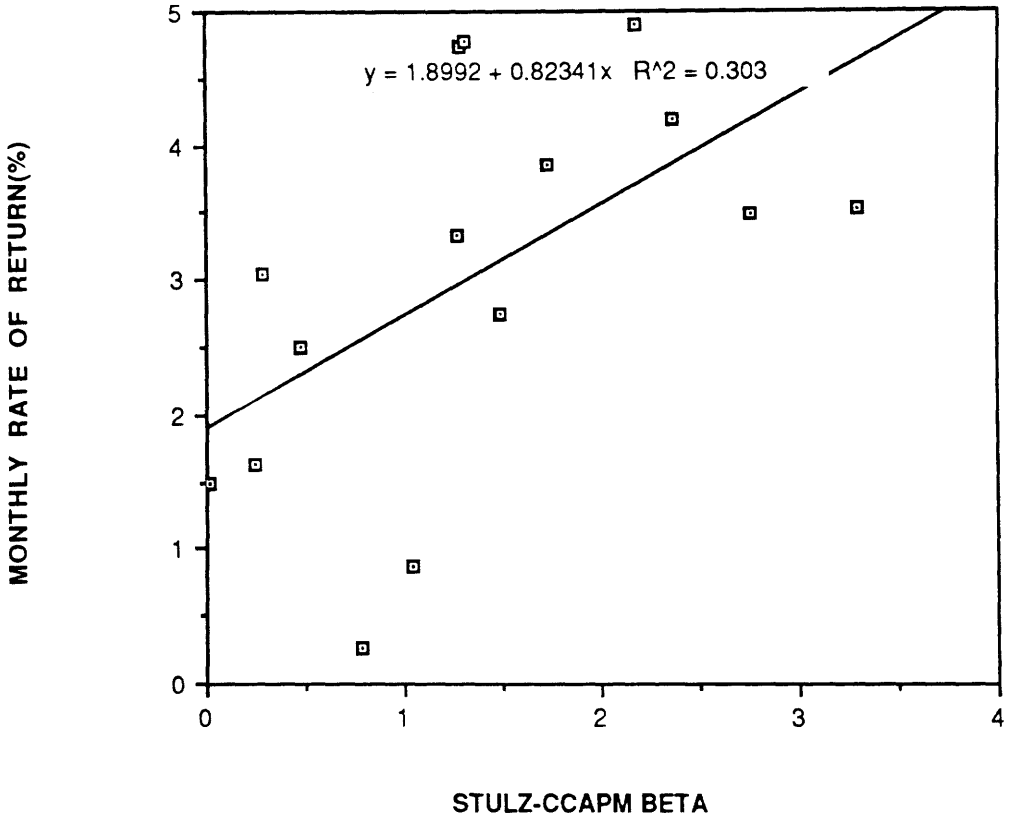


Figure 7: Stulz-CCAPM for Japan

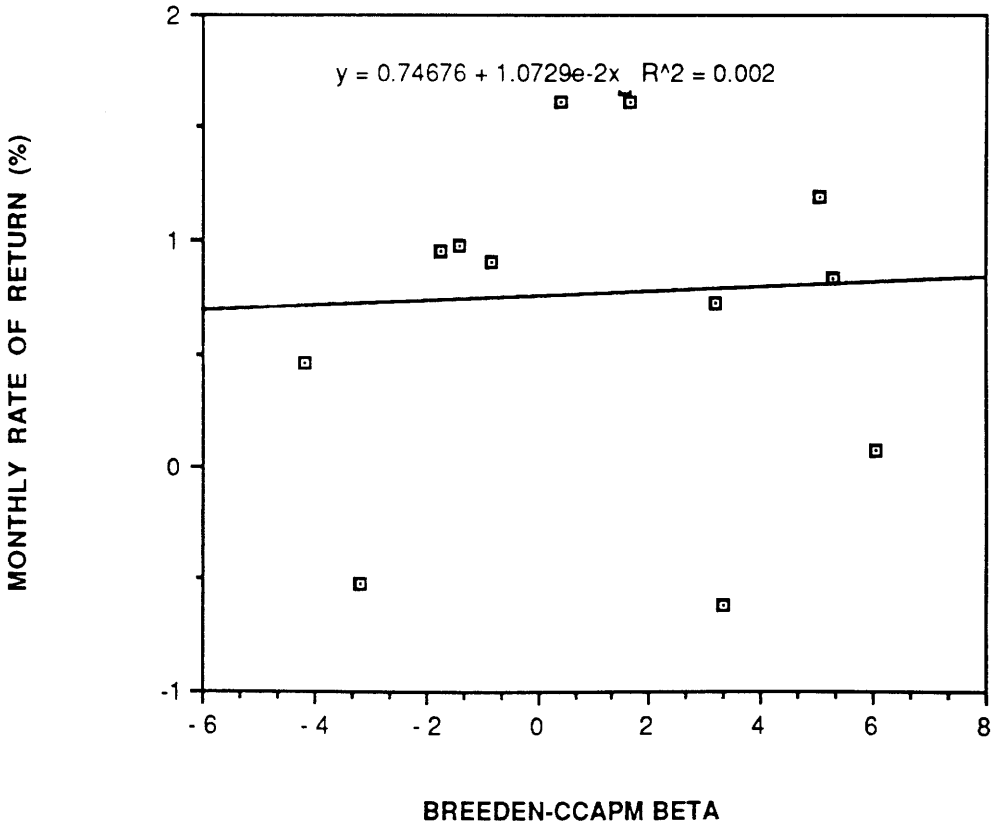


Figure 4a: Adjusted Breeden-CCAPM for U.S.

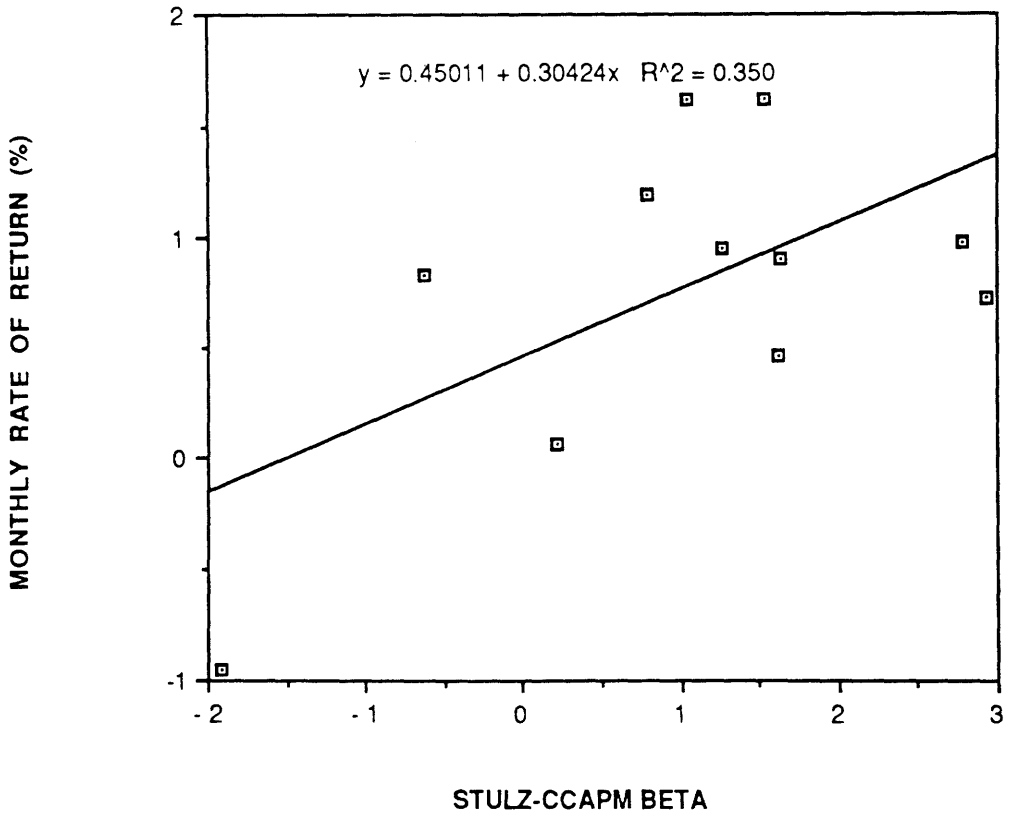


Figure 6a: Adjusted Stulz-CCAPM for U.S.

of a group of the other majority of the data, the OLS Regressions were implemented for those data excluding the extraordinary ones. The results of the OLS Regressions are shown in the Figure 4a: Adjusted Breeden-CCAPM for U.S., and in the Figure 6a: Adjusted Stulz-CCAPM for U.S..

The results of the Breeden-CCAPM shown in the Figure 4a and 6 indicates that the obtained SML's are almost non-sensitive to the betas. (The annualized risk premiums of the U.S. and Japan's domestic market portfolios are marginally 0.13 % and 2.20 %, respectively, and the squared correlation coefficients of the SML's are 0.002 and 0.071, respectively.) This results do not necessarily result in the invalidity of the Breeden-CCAPM because the most reliable consumption data currently available are not considered as accurate as those data of the capital markets, and moreover, there is a fundamental question of which categories of the consumptions are relevant to the individual's utilities and of how these categories of the consumptions affect the individual's utilities. Although Breeden and Stulz recommend to exclude durable goods from the relevant consumptions, it may not be precise enough to distinguish those relevant to the individual's utilities from those irrelevant. Because some of the non-durable goods and services, such as food indispensable for lives, do not seem to affect the individual's utilities. According to my various regressions by combining various categories of the consumptions, the results were heavily affected by the combination of the

consumption categories. Unless these questions are answered, the Breeden CCAPM may not be correctly applied. Because of these questions, at least in this thesis, the Breeden-CCAPM may not be adequate to apply so as to estimate the discount rates for the project evaluation.

On the other hand, the results of the Stulz-CCAPM shown in the Figure 6a and 7 show much more reasonable relationships between the realized rates of return and the betas. It is not clear why the Stulz-CCAPM shows the reasonable relationships between the returns and betas than the Breeden-CCAPM. One of several possible reasons for this result might be that the changes in the consumptions are too sensitive measures, compared to the changes in the returns on the assets so that the relationships are clouded out by the excess sensitivities.

In this thesis, the Stulz-CCAPM will be used to estimate discount rates for the project evaluation because the squared correlation coefficients of the Stulz-CCAPM are statistically more significant that those of the Breeden CCAPM. (The squared correlation coefficients of the Stulz-CCAPM are 0.35 and 0.303 as opposed to 0.002 and 0.071 of the Breeden-CCAPM.) The Stulz-CCAPM SML equations expressed in terms of annualized real rates are as follows:

CCAPM for U.S. : $E(R_i) = 5.40 + 3.65 * ß_i$: (29)

CCAPM for Japan: $E(R_i) = 22.79 + 9.88 * ß_i$: (30)

However, as was discussed for the ZCAPM, the above SML equations are applicable only for short-term projects which terminate within the business cycle of the home country's economy. Since the tests of CCAPM for the long time horizon is not currently available, a precise test of the CCAPM is expected in the future.

4. MEASUREMENT OF UNLEVERED BETAS OF CONSTRUCTION INDUSTRY AND REAL ESTATE INDUSTRY OF THE UNITED STATES AND JAPAN

This section presents the results of the calculations of unleveraged betas of the selected firms which are engaged in the construction and real estate industries in the U.S. and Japan. Also discussed are the obtained unleveraged betas in terms of the sensitivities to the market movements and the real consumption. However, it is not easy to discuss the unleveraged betas in relation to the real consumptions, because 1) the real consumption data used in the calculations are, although considered to be the most reliable data currently available, likely to be, more or less, in error in the senses discussed in the previous section, and 2) the restrictive assumptions made for the calculations don't completely reflect the real world so that the obtained unleveraged betas might be, more or less, biased.

In order to clearly discuss the sensitivities of the obtained betas to the real consumption, 1) the unleveraged betas calculated according to the Breeden-CCAPM will be presented only for reference because the non-sensitivities of the betas, and 2) the unleveraged betas calculated according to the Stulz-CCAPM will be compared with those calculated according to the ZCAPM by using the identical data. This comparison can make it possible to understand how different, in international setting, the asset pricing based on the consumption maximization (Consumption-Based CAPM) is from

that based on the wealth maximization (Zero-Beta CAPM), though, in economic theory, both ZCAPM and CCAPM are identical.

In addition, in order to clarify the differences of the two asset pricings in international setting, the selected construction and engineering firms in the U.S. and Japan are respectively separated into two groups, these are, foreign-oriented firms which undertake substantial foreign contracts and domestic-oriented firms which undertake insignificant foreign contracts. The selected real estate firms are assumed to operate primarily in the domestic markets. The groupings of the C&E firms are as follows:

1) foreign-oriented firms:

U.S.------- Flour Daniel, Foster Wheeler, Stone & Webster, CBI Industries, and Perini (the weighted average ratio of the foreign contracts to the entire contracts is 29%.);
Japan------ Aoki Construction, Hazama-gumi, Kumagai-gumi, and Ohbayashi Corp. (the weighted average ratio of the foreign contracts to the entire contracts is 11%.);

2) domestic-oriented firms:

U.S.------- CRSS, Morrison Knudsen, Centex General, Turner, and Jacobs Engineering (the weighted average ratio of the foreign contracts to the entire contracts is 2%.); and
Japan------ Fujita Corp., Haseko, Kajima, Maeda Corp., Penta Ocean Const., Shimizu Construction, and Taisei Corp. (the weighted average ratio of the foreign contracts to the entire contracts is 3%.).

At first, the unleveraged betas of the U.S. construction and real estate firms are presented and discussed from the U.S.(domestic) and Japan's(foreign) investors' viewpoints, and secondly, the unleveraged betas of the Japan's construction and real estate firms are presented and discussed from the U.S.(foreign) and Japan's(domestic) investors' viewpoints.

4.1. UNLEVERED BETAS OF U.S. CONSTRUCTION AND REAL ESTATE INDUSTRY FROM U.S. AND JAPAN'S INVESTORS' VIEWPOINTS

The following Table-5 shows the obtained unleveraged betas of the U.S. construction and engineering firms according to the Zero-Beta CAPM and Consumption CAPM.

Table-5: Unleveraged Betas of U.S. C&E Firms

CAPM	firms' orientation (foreign/domestic)	investors' consumption base U.S.	Japan
ZCAPM	foreign	0.95	0.37
	domestic	0.82	0.09
	average	0.89	0.24
Stulz-CCAPM	foreign	0.18	0.90
	domestic	-0.30	0.46
	average	-0.06	0.68
Breeden-CCAPM	foreign	1.94	-1.83
	domestic	-1.48	0.29
	average	0.23	-0.77

The following points are observed in the above table:

1) the sensitivities of stocks of the selected U.S. C&E firms to the stock market movements and the real consumptions are substantially different with each other. The betas calculated with the ZCAPM are higher for the U.S. investors, whereas the betas with the Stulz-CCAPM are higher for Japan's investors;
2) the Stulz-CCAPM tells that, for the U.S. investors, the U.S. E&C firms are almost risk-free whereas the ZCAPM tells that the U.S. E&C firms are almost as risky as the domestic market portfolio;
3) the Stulz-CCAPM shows that, for Japan's investors, the U.S. E&C firms are riskier than the ZCAPM; and
4) the Breeden-CCAPM indicates that, for Japan's investors, the U.S. E&C firms are negatively risky as opposed to the Stulz-CCAPM.

However, it should be noted that since the unleveraged betas are relative sensitivity measures of the riskiness of the assets under consideration to the market movements (ZCAPM) or the real consumption (CCAPM), the betas alone cannot determine discount rates used for project evaluations. This is because the ZCAPM and CCAPM have different expected rates of return on the zero-beta portfolio or safety portfolio uncorrelated with the real consumptions as was discussed in section 3. of this chapter. (This issue will be discussed in next section.)

The next Table-6 shows the obtained unleveraged betas of the U.S. real estate firms according to the ZCAPM and CCAPM.

Table-6: Unleveraged Betas of U.S. Real Estate Firms

CAPM	firms' orientation (foreign/domestic)	investors' consumption base	
		U.S.	Japan
ZCAPM	-------	0.34	0.14
Stulz-CAPM	-------	1.15	0.57
Breeden-CAPM	-------	1.27	0.09

The following results are obtained from the above table:

1) the sensitivities of stocks of the selected U.S. real estate firms to the stock market movements and the real consumptions are different with each other. A general tendency is observed that the CCAPM betas are larger than the ZCAPM betas, except for the Breeden-CCAPM betas from Japan's investors' perspectives; and
2) the betas calculated from the U.S. (domestic) investors' viewpoints are larger than those from the Japan's (foreign) investors' viewpoints.

By combining the observations obtained from the unleveraged betas of the U.S. construction and engineering firms with those of the U.S. real estate industry, the following might be argued:

1) the U.S. C&E and real estate firms which are relatively purely engaged in the domestic activities

are less risky to the Japan's (foreign) investors than to the U.S. (domestic) investors in terms of the sensitivities both to the investors' relevant market movements and to the investors' real consumptions. Therefore, "international naive diversification effects" might be effectively achieved in case that the Japan's investors invest on the U.S. assets related to the U.S. construction and real estate industries; and

2) the U.S. real estate industries are more sensitive to the real consumptions of both the U.S. (domestic) investors and the Japan's (foreign) investors rather than to the U.S. and Japan's market movements. This might suggest that the U.S. real estate industry be riskier than it is evaluated with the ZCAPM.

However, it should be also noted that the above arguments should not be generalized, but rather, they should be interpreted as such that represent the current(1986-88) relationships between the risk and return of the U.S. and Japan's assets from each other's perspectives. An important issue of how the relationship might change is beyond the scope of this thesis.

4.2. UNLEVERED BETAS OF JAPAN'S CONSTRUCTION AND REAL ESTATE INDUSTRY FROM U.S. AND JAPAN'S INVESTOR'S VIEWPOINTS

The following Table-7 shows the obtained unleveraged betas of the Japan's construction and engineering firms according to the ZCAPM and CCAPM.

Table-7: Unleveraged Betas of Japan's C&E Firms

CAPM	firms' orientation (foreign/domestic)	investors' consumption base: U.S.	investors' consumption base: Japan
ZCAPM	foreign	0.05	0.63
	domestic	0.29	1.12
	average	0.20	0.94
Stulz-CCAPM	foreign	2.78	0.67
	domestic	4.99	1.34
	average	4.19	1.10
Breeden-CCAPM	foreign	-2.63	0.11
	domestic	1.30	1.98
	average	-0.13	1.30

The following are observed in the above table:

1) the sensitivities of stocks of the selected Japan's C&E firms to the stock market movements and the real consumptions are substantially different to the U.S. investors (the Stulz-CCAPM betas are considerably larger than the ZCAPM betas for U.S. investors), whereas the ZCAPM and Stulz-CCAPM betas the stock are almost unchanged to Japan's investors;
2) the ZCAPM betas calculated from the U.S. (foreign) investors' viewpoints are smaller than those from the

Japan's (domestic) investors' viewpoints whereas the Stulz-CCAPM betas from the U.S. (foreign) investors' viewpoints are larger than those from the Japan's (domestic) investors' viewpoints. Therefore, in relation to the U.S. consumptions, the Japan's construction industry would be quite riskier to the U.S.(foreign) investors than the ZCAPM predicts; and

3) a general tendency is observed that the betas of the foreign-oriented Japan's C&E firms are smaller than those of the domestic-oriented firms, whereas the opposite tendency was observed for the U.S. E&C firms.

The following Table-8 shows the obtained unleveraged betas of the Japan's real estate firms according to the ZCAPM and CCAPM.

Table-8: Unleveraged Betas of Japan's Real Estate Firms

CAPM	firms' orientation (foreign/domestic)	investors' consumption base: U.S.	investors' consumption base: Japan
ZCAPM	-------	0.36	0.94
Stulz-CCAPM	-------	3.20	1.47
Breeden-CCAPM	-------	6.64	0.85

The following are observed in the above table:

1) as is the case with the Japan's construction

industry, the sensitivities of stocks of the selected Japan's real estate firms to the U.S. (foreign) real consumption is substantially larger (10 time) than to the U.S. markets; and

2) the ZCAPM betas calculated from the U.S. (foreign) investors' viewpoints are smaller than those from the Japan's (domestic) investors' viewpoints whereas the Stulz-CCAPM betas from the U.S. (foreign) investors' viewpoints are larger than those from the Japan's (domestic) investors' viewpoints. In this sense, the Stulz-CCAPM indicate the Japan's real estate industry is riskier than the ZCAPM might indicate.

By combining the observations obtained from the unleveraged betas of the Japan's construction and engineering firms with those of the Japan's real estate industry, the following might be argued:

1) the Japan's C&E and real estate firms might be riskier in relation to the real consumptions of the U.S. (foreign) investors than in relation to the U.S. market movements. However, the ZCAPM indicates that, for U.S. investors, the Japan's C&E and real estate firms are not risky in relation to the U.S. market movements. If the Stulz-CCAPM prevails, the "international diversification effects" might be marginal, but still be achievable to some extent in case that the U.S. investors invest in Japan's

assets related to the Japan's construction and real estate industries; and

2) the Japan's construction and real estate industries are more sensitive to the real consumptions of the U.S. (foreign) investors and rather than those of the Japan's investors. For the Japan's investors, the ZCAPM and Stulz-CCAPM do make little difference. This might suggest that the Japan's construction and real estate industries covary well with the U.S. real consumptions, or that the Japan's real consumption pattern covary well with the Japan's market movements.

However, it should be also noted that the above arguments should not be generalized, but rather, they should be interpreted as those representing the current states of the industries, given the restrictive conditions mentioned in the previous section.

5. ESTIMATE OF DISCOUNT RATES FOR CASH FLOWS GENERATED BY CONSTRUCTION AND REAL ESTATE INDUSTRY OF U.S. AND JAPAN

This section presents the discount rates estimated by using the obtained unleveraged betas for cash flows generated by the construction and real estate industries of the U.S. and Japan, and discusses the effects of the discount rates on the international projects evaluations.

As is similar to the previous section, the discount rates by the Stulz- and Breeden-CCAPM are compared with those by the ZCAPM. Before presenting the estimated discount rates, six(6) SML equations which were derived in section 3 of this chapter are cited below.

ZCAPM for U.S.(long term):

$$E(R_i) = 4.32 + 10.20 * \beta_i \quad (25)$$

ZCAPM for U.S.(short term):

$$E(R_i) = 0.98 + 9.28 * \beta_i \quad (26)$$

ZCAPM for Japan(long term):

$$E(R_i) = 5.40 + 4.80 * \beta_i \quad (27)$$

ZCAPM for Japan(short term):

$$E(R_i) = 3.54 + 30.28 * \beta_i \quad (28)$$

CCAPM for U.S.(short term) :

$$E(R_i) = 5.40 + 3.65 * \beta_i \quad (29)$$

CCAPM for Japan(short term):

$$E(R_i) = 22.79 + 9.88 * \beta_i \quad (30)$$

The following points had better be noted here again in order to quickly review the above six SML equations:

1) the ZCAPM formulas (25) and (27) were derived from the empirical tests by Fama, Macbeth, and Sakakibara for about 30 years time frame. Thus, these equations are used for the long-lived projects;
2) the ZCAPM formulas (26) and (28) were derived from the empirical tests by myself for recent three(3) years time frame (1986-1988). Thus, these equations are used for the short-lived projects currently under consideration;
3) the Stulz-CCAPM formulas (29) and (30) were also derived from the empirical tests by myself for recent three(3) years time frame (1986-1988). Thus, these equations are used for the short-lived projects currently under consideration;
4) the Stulz-CCAPM formulas for the long-lived projects are not presented here because this requires substantial number of data and time which is beyond this thesis; and
5) the Breeden-CCAPM are excluded due to the non-sensitivities of the betas earlier discussed.

In the following two sections, real discount rates of the U.S. and Japan's construction and real estate industries, which are calculated by using the above six SML equations and the unleveraged betas presented in the previous sections, are

presented from the U.S. and Japan's investors' viewpoints, and the effects of the discount rates on project evaluations are discussed.

5.1. DISCOUNT RATES OF U.S. CONSTRUCTION AND REAL ESTATE INDUSTRY FROM U.S. AND JAPAN'S INVESTOR'S VIEWPOINTS

The following Table-9 shows the real discount rates of the U.S. construction and engineering firms according to the ZCAPM and CCAPM SML equations (25) through (30).

Table-9: Real Discount Rates of U.S. C&E Firms (%)

CAPM	firms' orientation (foreign/domestic)	investors' consumption base: U.S.	Japan
ZCAPM (long-term)	foreign	14.01	7.18
	domestic	12.68	5.83
	average	13.35	6.55
ZCAPM (short-term)	foreign	9.80	11.29
	domestic	8.59	6.27
	average	9.24	10.81
Stulz-CCAPM (short-term)	foreign	6.06	31.68
	domestic	4.31	27.33
	average	5.18	29.51

The following points are observed in the above table:

1) a general tendency in the Table 9 through 12 is observed that the ZCAPM, regardless of short-term or long-term, estimates lower discount rates for the

foreign investors, whereas the Stulz-CCAPM (short-term) consistently estimates higher discount rates for Japan's investors. This is due to the extremely high expected rate of return on the safety portfolio uncorrelated with the real consumptions for Japan's investors. (The high rates of return on the safety portfolios were observed in both U.S. and Japan in the past. See section 3 of this chapter.) Thus, the short-term Stulz-CCAPM heavily reflect the current state of Japan's economy by increasing the required returns, whereas the ZCAPM discount rates do not;

2) in the long-run, Japan's (foreign) investors can expect substantially high values if they invest in the U.S. assets related to the construction industries due to lower discount rates for Japanese than those for U.S. investors, whereas, in short-run, no significant advantage to Japan's investors are not recognized; and
3) whether the U.S. C&E firms are foreign-oriented or domestic-oriented does make little differences in the real discount rates of the foreign-oriented and domestic-oriented C&E firms, regardless of the ZCAPM and CCAPM whereas the unleveraged betas are heavily affected by the business orientations of the U.S. C&E firms.

The next Table-10 shows the real discount rates of the U.S. real estate firms according to the ZCAPM and Stulz-CCAPM.

Table-10: Real Discount Rates of U.S. Real Estate Firms (%)

CAPM	firms' orientation (domestic only)	investors' consumption base: U.S.	Japan
ZCAPM	(long-term)	7.79	6.07
ZCAPM	(short-term)	4.14	7.78
Stulz-CCAPM	(short-term)	9.60	28.42

The following are observed in the above table:

1) no significant difference between discount rates by the long-term and short-term discount rates is observed for U.S. and Japan's investors, though, the long-term investment in the U.S. real estate industries is more valuable to Japan's investors than the short-term investment as is the same with the U.S C&E firms; and
2) the discount rates calculated by the Stulz-CCAPM from Japan's investors' viewpoints are substantially large, reflecting the current state of Japan's economy, as is the case with the U.S. C&E firms.

By combining the observations obtained from the real discount rates of the U.S. construction and engineering firms

with those of the U.S. real estate industry, the following might be argued:

1) as the long-term investment, the U.S. C&E and real estate firms, regardless of whether or not domestic-oriented, are more valuable to the Japan's (foreign) investors than to the U.S. (domestic) investors. Therefore, "international diversification effects" would be achieved in case that the Japan's investors invest on the U.S. assets related to the U.S. construction and real estate industries if unique risks are well diversified away; and
2) as the short-term investment, the U.S. construction and real estate industries do not provide any significant advantage to either U.S. or Japan's investors; and
3) the short-term Stulz-CCAPM heavily reflects the current state of Japan's economy, increasing the required rates of return for Japan's investors.

5.2. DISCOUNT RATES OF JAPAN'S CONSTRUCTION AND REAL ESTATE INDUSTRY FROM U.S. AND JAPAN'S INVESTORS' VIEWPOINT

The following Table-11 shows the real discount rates of the Japan's construction and engineering firms according to the ZCAPM and Stulz-CCAPM.

Table-11: Real Discount Rates of Japan's C&E Firms (%)

CAPM	firms' orientation (foreign/domestic)	investors' consumption base: U.S.	Japan
ZCAPM (long-term)	foreign	4.83	8.42
	domestic	7.28	10.78
	average	6.36	9.91
ZCAPM (short-term)	foreign	1.44	22.62
	domestic	3.67	37.45
	average	2.84	32.00
Stulz-CCAPM (short-term)	foreign	15.55	29.41
	domestic	23.61	36.03
	average	20.69	33.66

The following points are observed in the above table:

1) for U.S. investors, investing in the Japan's C&E firms would generate substantial values, regardless of the long-term or the short-term;
2) the short-term ZCAPM and Stulz-CCAPM estimate the real discount rates of Japan's E&C firms to be very high for Japan's investors, reflecting the current state of Japan's economy; and
3) the short-term Stulz-CCAPM estimates very high discount rates not only for Japan's investors but also for U.S. investors.

The next Table-12 shows the real discount rates of the Japan's real estate firms according to the ZCAPM and CCAPM.

Table-12:Real Discount Rates of Japan's Real Estate Firms (%)

CAPM	firms' orientation (domestic only)	investors' consumption base: U.S.	investors' consumption base: Japan
ZCAPM	(long-term)	7.99	9.91
Stulz-CCAPM	(short-term)	4.32	32.00
Breeden-CCAPM	(short-term)	17.08	37.31

The following points are observed in the above table:

1) for U.S. investors, investing in the Japan's real estate firms would generate substantial values, regardless of the long-term or the short-term, similarly to investing in Japan's C&E firms;
2) the short-term ZCAPM and Stulz-CCAPM estimate the real discount rates of Japan's real estate firms to be very high for Japan's investors, reflecting the current state of Japan's economy; and
3) the short-term Stulz-CCAPM estimates very high discount rates not only for Japan's investors but also for U.S. investors.

By combining the observations obtained from the real discount rates of the Japan's construction and engineering firms with those of the Japan's real estate industry, the following might be argued:

1) for U.S. investors, like Japan's investors' investing in the U.S. C&E and real estate firms, investing in Japan's C&E and real estate firms are more valuable

than for Japan's investors, regardless of short-term or long-term. Therefore, "international diversification effects" would be effectively achieved in case that the U.S. investors invest on the Japan's assets related to the Japan's construction and real estate industries; and

2) the short-term Stulz-CCAPM reflects the current states of economies strongly so that the estimated discount rates are generally high. Especially for U.S. investors, the short-term ZCAPM and Stulz-CCAPM estimate totally different level of discount rates.

6. EVALUATION OF SAMPLE PROJECT BY USING OBTAINED DISCOUNT RATES

In this section, a simple imaginary project is evaluated by using the real discount rates calculated in the previous sections. A main purpose of this section is to present effects of the discount rates for the U.S. and Japan's investors on the values of the project. Therefore, the project setting is quite simplifying rather than realistic.

The U.S.-based IBN Corporation and Japan-based SOMY Corporation now face opportunities of investing on identical real estate projects both in the U.S. and in Japan.

The real estate project in the U.S. requires $100 million for the initial capital expenditure, and from one year later on to the 20th year, the project generates net cash flows of $12 million in each year in real terms. On the other hand, the real estate project in Japan requires ¥20 billion($100 million at the real exchange rate of ¥200/$) for the initial capital expenditure, and from one year later on to the 20th year, the project generates net cash flows of ¥2.4 billion($12 million at the real exchange rate of ¥200/$) in each year in real terms.

Therefore, if the real exchange rate is unchanged over the project period, the cash flows of both projects are identical. In addition to the assumption, if the real discount rates for the U.S. and Japan's investors are the

same, the values of both projects would be exactly the same to the IBN and SOMY Corporation.

However, the following assumptions are made for the evaluation: 1) the real exchange rate changes from ¥200/$ at the time of the capital expenditures to ¥150/$ at the end of the projects with a constant rate (certainty of the foreign exchange) ; and 2)the real discount rates are those calculated in the previous section by the long-term & short-term ZCAPM and Stulz-CCAPM. The implications of these assumptions are 1) the U.S. dollar depreciates against the Japanese Yen in real terms so that the U.S. investors have opportunities of benefiting from the investment in Japan, but Japan's investors might loose by investing in U.S. assets simply due to the real depreciation of Yen ; 2) the value of both projects would be different, depending on who would invest and on which discount rates to use, the ZCAPM or Stulz-CCAPM.

Table-13: V.C. of Real Estate Projects (in U.S. Dollar)

CAPM	project location	investors' consumption base: IBN(U.S.) (million $)	investors' consumption base: SOMY(Japan) (million $)
ZCAPM (long-term)	U.S.	19.68	21.25
	Japan	36.91	2.80
ZCAPM (short-term)	U.S.	61.08	6.85
	Japan	81.57	-62.25
Stulz-CCAPM (short-term)	U.S.	5.02	-60.60
	Japan	-26.50	-67.90

The following could be concluded in the above table:

1) the long-term V.C. of the identical real estate projects in U.S. and Japan are positive for both U.S. and Japan's investors, but the values of the projects are larger to the foreign investors than to the domestic investors. In spite of the assumption that U.S. dollar depreciates against Japanese Yen over the project periods, Japan's investors would benefit more from investing in the U.S. real estate project;
2) the short-term ZCAPM V.C. of the identical real estate projects in U.S. and Japan are positive for U.S. investors, but for Japan's investors, only the project in U.S. has a positive value. However, the values of both projects in U.S. and Japan are much higher to U.S. investors than to Japan's investors. Therefore, if Japan's investors now buy U.S. real estate, and sell it soon, at latest before Japan's current economic expansion declines, expected payoffs to the investors would be smaller than those in case the investors buy and sell Japan's real estate in short periods.
3) the short-term Stulz-CCAPM V.C. of the identical real estate projects in U.S. and Japan are negative for Japan's investors, but for U.S. investors, only the project in U.S. has a positive value. However, the values of both projects in U.S. and Japan are much lower to Japan's investors than to U.S. investors.

This result implies that the short-term Stulz-CCAPM responses to the current states of both economies in very sensitive manners.

As is shown in this sample project evaluation, the international long-term investments are generally beneficial to foreign investors, whereas the short-term international investments depend on the current states of economies.

6. CONCLUSIONS

According to the results of the previous sections in this chapter, the following general conclusions might be argued:

1) the values of the international projects are not identical to those who participate in the projects across borders even if there exists no foreign exchange risks. This is because the underlying segmented economies where the investors live create unique circumstances determining the risks of the projects and because the real consumption patterns of the investors are regional and segmented. Therefore, it would be very dangerous to evaluate the international projects from one country's investors' viewpoint, but rather, the international projects should be assessed by using the asset pricing models corresponding to the investors' relevant risk-determinant environments;
2) in this thesis, the long-term CCAPM cannot be presented due to the limitations on data and difficulties inherent to searching for the long-term CCAPM. However, since the real consumption patterns affect the valuations of the international projects, the long-term CCAPM should be also established as the international asset pricing model. In doing so, the

real consumption data should be examined very carefully to avoid misleading factors and artificial erroneous estimations in the data;

3) "international diversification effect" had better be considered as a long-term basis, but not as a short-term basis, because the short-term international investment is largely affected by the current states of economies measured with such as real growth rates of GNP or industrial sectors, although diversification effects can be expected. Therefore, careful examinations of the underlying conditions affecting the project evaluation should be implemented, especially in case of the short-term international investment:

4) a domestic project which is believed to have substantially negative V.C. for the domestic investors might turn out to be positive if it is financed, fully or partially, by foreign investors. In this sense, internationally financing domestic projects might benefits not only the investors but also those who live domestically by vitalizing the domestic economy. In coordinating the international financing, the V.C. with the CAPM or other appropriate international asset pricing models would help all participants in the project fairly assess their benefits.

In next chapter, the other critical issue --- the foreign exchange exposures --- is discussed and the effects of the FX risks on the project evaluations are tried to be measured.

CHAPTER 4

EVALUATING FOREIGN EXCHANGE EXPOSURE

0. INTRODUCTION

This chapter discusses Foreign Exchange(FX) exposures and effects of the FX exposures on values of international projects and, finally, conceptually incorporates the FX risks into the V.C. methodology. The purpose of conceptually incorporating the FX risks into V.C. formula is to provide an analytical and easy-to-use general formula of cash flow components or risk premiums associated with the FX risks so that users of the V.C. methodology can independently evaluate the effects of the FX risk components according to assumptions and forecasts made on the nominal and real foreign exchange rates. However, as was discussed in Chapter 2, since there is no universal V.C. formula applicable to any type of project in a sense that cash flow components and risks differ project-by-project, users are assumed to modify the general V.C. formula to match the project cash flow components.

Before getting into the discussion, some clarifications of the FX exposures examined in this chapter is necessary. These are as follows:

1) this chapter discusses only the economic FX exposures as opposed to the accounting FX exposures because only the economic FX exposures are relevant to values

of projects;[1]

2) this chapter is based on the assumption that corporations' hedging the FX exposures is rational because of imperfections in the international financial markets which impact such aspects as corporate bond ratings, costs of capital and so forth. (However, the finance theory based on the perfect capital market does not justify the corporations' FX risk hedging because investors can diversify away the FX risks with less cost than corporations.)[2] ; and

3) this chapter assumes that the corporation's FX risk hedge is determined by mean-variance trade-off of an entire portfolio which the corporation currently holds plus a new project under consideration. In this sense, the FX risk management cannot be discussed without looking into the corporation's entire portfolio, although this chapter does not discuss the entire portfolio.

In this chapter, first of all, the foreign exchange exposures in international projects are briefly reviewed in

---

[1]See Choi and Mueller[1984], Eiteman and Stonehill[1989], and Shapiro[1989] for detailed discussions on the accounting FX exposures.

[2]See Dufey and Srinivasulu[1984] for a discussion on the corporation's FX risk management.

terms of contractual and non-contractual cash flows. Secondly, hedging strategies -- operational and financial -- are briefly reviewed. And finally, a modified V.C. formula is proposed to conceptually incorporate the FX risks.

1. REVIEW FOR FOREIGN EXCHANGE EXPOSURE

This section reviews the FX exposures on contractual and non-contractual cash flows, respectively. This is because 1) the FX exposures on these two types of cash flows are quite different in nature and 2) distinguishing the FX risks on the two types of cash flows is necessary to evaluate the effects of the FX risks on these cash flows in different ways appropriate to the nature of the FX risks.

1.1. FOREIGN EXCHANGE EXPOSURE ON CONTRACTUAL CASH FLOWS

The FX exposures on contractual cash flows, which are fixed by contract and denominated in foreign currencies, are sensitive to expected or unexpected changes in nominal exchange rates rather than directly to real exchange rates. Therefore, the FX exposures on the contractual cash flows are grouped into two risks; these are, the FX risks associated with the expected changes in the nominal exchange rates and those associated with the unexpected changes in the nominal exchange rates. (Inflation risks are excluded from the two groups because 1) the inflation risks are not necessarily inherent to the cash flows denominated in foreign currencies, 2) the inflation risks are assumed to be minor due to offsetting effects of the inflations of various countries if the differentials of the inflation rates among relevant countries are close, and 3) the real exchange rate analysis

to follow takes direct account of inflation differentials. However, long or short positions in soft currencies are very sensitive to the inflation risks so that the inflation risks must be carefully treated when soft currencies are involved.[1])

The expected changes in the nominal exchange rates are defined as those homogeneously expected by all investors participating in the perfect capital market. Hence, I assume that the expected changes in the nominal exchange rates are reflected directly in forward exchange rates for short periods, and indirectly in the term structures of long-term government bonds or Eurocurrency interest rates which can be converted into expected changes in the nominal exchange rates by using the IFE formula(15).[2]

On the other hand, the unexpected changes in the nominal exchange rates are defined as those which are not anticipated by the market. However, since the unexpected changes in the nominal exchange rates are likely to be unique or unsystematic rather than systematic, the unexpected changes in the nominal exchange rates should be diversified away by the investors' holding the well-diversified portfolios in terms of the multiple foreign currencies, because the project evaluation is for the investors, but not directly for the

---

[1]See Shapiro[1989] for a discussion on the inflation risks.

[2]See Dufey and Giddy[1978] and Shapiro[1989] for a detailed discussion on the uses of the market-based forecasts.

firm. Therefore, the FX risks associated with the unexpected changes in the nominal exchange rates are irrelevant to the project evaluation from the investors' perspectives.

However, from the firm's perspective, the unsystematic FX risks are very important because, if the firm cannot hold their own well-diversified portfolios in terms of the multiple foreign currencies due to difficulties in diversifying the firm's real assets, the firm is exposed to the serious FX risks associated with the unexpected changes in the nominal exchange rates, whereas investors are less or almost not affected by the unique FX risks. Because, at the beginning of the chapter, the reducing the FX risks from the firm's perspective is justified due to the imperfections, the firm's position of being exposed to the FX risks attributable to the unexpected changes in the nominal exchange rates would be serious, causing negative impacts on the firm's value. In this connection, even though the unexpected changes in the nominal exchange rates are irrelevant to the project evaluation, the effects of the FX risks associated with the unexpected changes in the nominal exchange rates will be discussed.

In addition to the distinction between expected and unexpected changes in the nominal exchange rates, the contractual cash flows exposed to the FX risks are grouped into three categories, these are, 1) financial contractual cash flows, 2) operational contractual cash flows, and 3) other contractual cash flows. The financial contractual cash

flows exposed to the FX risks are those cash flows explicitly or implicitly bearing fixed interest rates such as borrowing and lending in the international money markets, futures, and forwards. The operational contractual cash flows exposed to the FX risks are, for example, outstanding and future sales or purchase contracts, account receivables, account payables, acquisitions of foreign assets incurring liabilities in foreign currencies and so on. Finally, the other contractual cash flows exposed to the FX risks are those which cannot be grouped in the former two categories, such as tax shields on depreciation. The FX exposures associated with the expected and unexpected changes in the nominal exchange rates are reviewed for the three types of contractual cash flows, respectively.

First of all, the financial contractual cash flows explicitly or implicitly bearing the interest rates are not affected by the expected changes in the nominal exchange rates because I assume that the interest rates already reflect the expected changes. However, the financial contractual cash flows are subject to the effects of the unexpected changes in the nominal exchange rates, which are deviations from the expected equilibrium nominal exchange rates based on the IFE. And, if the FX risks caused by these deviations are not diversified away, the financial contractual cash flows should be discounted with additional risk premiums appropriate for the FX risks.

Secondly, the operational contractual cash flows are affected by both the expected and unexpected changes. However, some operational contractual cash flows are not affected by the expected changes. Those are contracts which are settled in a relatively short period and priced in a forward exchange rate of the settlement date (if the forward rate is available), reflecting expected changes in the nominal exchange rates. However, because of the price rigidity in short-term and competitive business environments, pricing products and services in forward rates might not be possible unless the products and services are fully differentiated from others. Moreover, the long-term contracts are hard to be priced in the market-expected long-term exchange rates. These risks had better be grouped as the FX risks on the non-contractual cash flows, and these are sensitive to the changes in the real exchange rates rather than those in the nominal exchange rates. This will be discussed in next section. On the other hand, the unexpected changes in the nominal exchange rates fully affects the operational contractual cash flows in the same manners as the financial contractual cash flows are affected by the unexpected changes in the nominal exchange rates. Thus, the risk premiums might be necessary to evaluate the operational cash flows if those FX risks are not diversified away.

Finally, the other contractual cash flows are affected by both the expected and unexpected changes in the nominal exchange rates. For instance, the tax shields on

depreciation is affected by both expected and unexpected changes because these cash flows are fixed completely irrelevant to the foreign exchange rates and because the FX risks are not generally hedged in these cases partly due to uncertainty in applicability of tax shields.

In conclusion,

1) the FX risks on the contractual cash flows are those associated with the expected changes in the nominal exchange rates only because the FX risks associated with the unexpected changes in the nominal exchange rates are irrelevant to the project evaluation from investors' perspective and because the FX risks attributable to the changes in the real exchange rates have minor effects on the contractual cash flows; and
2) the FX risks, associated with the expected changes in the nominal exchange rates, on the contractual cash flows are chiefly caused by the unmatched cash flows denominated in multiple currencies with regard to the foreign currency transactions.

The following TABLE-14 summarizes the FX exposures of the contractual cash flows relevant to the project evaluation.

TABLE-14: FX Exposures of Contractual Cash Flows

types of cash flows	expected changes in nominal exchange rates
financial contractual	NO
operational contractual	YES
other contractual	YES

1.2. FOREIGN EXCHANGE EXPOSURE ON NON-CONTRACTUAL CASH FLOWS

The FX exposures on non-contractual cash flows are sensitive to the real exchange rates and to the nominal exchange rates. Differences of the effects of the real and nominal exchange rates on the non-contractual cash flows are that the changes in the real exchange rates fully affect expected cash flows in foreign currencies by affecting the competitive environments and the project's cash flow structures, whereas the nominal exchange rates affect the non-contractual cash flows primarily in terms of the foreign exchange transactions. Therefore, it is generally recognized that the real exchange rates are main factors affecting the non-contractual cash flows.

In this section, like the contractual cash flows, non-contractual cash flows are grouped into the same three groups as those of the contractual cash flows. The financial non-contractual cash flows are those which are not fixed in nominal terms, but claims and liabilities are determined by

contracts in variable terms, such as borrowing & lending with floating interest rates. The operational non-contractual cash flows are those associated with the primary operations, such as purchases of input sources and sales of products and services without any contractual commitment. The other non-contractual cash flows are those irrelevant to the financial and operational non-contractual cash flows, such as intra-company cash flow transfers. The FX risks associated with the real nominal exchange rates are discussed in terms of three different types of non-contractual cash flows.

First of all, the financial non-contractual cash flows, such as floating rate borrowings and lendings, are affected if the outstanding interest rates, which are tied to certain interest rates in the market, are not offset by the realized changes in the nominal exchange rates. An actual effect is that, with the floating interest rates, the risks of interest rates fluctuations are shifted from lenders to borrowers. Therefore, from the standpoint of the borrowers, the floating exchange rate borrowing and lending are affected by the deviations of the realized nominal exchange rates from the equilibrium nominal exchange rates determined by the IFE. That is the unexpected changes in the real exchange rates rather than the changes in the nominal exchange rates. In this sense, the financial non-contractual cash flows are affected only by the unexpected changes in the real exchange rates, which are irrelevant to the project evaluation.

Secondly, the operational non-contractual cash flows are affected by the changes in the nominal exchange rates and by the changes in the real exchange rates. The effects of the expected and unexpected changes in the nominal exchange rates on the operational non-contractual cash flows are similar to those on the operational contractual cash flows in terms of the foreign exchange transactions because, even in the non-contractual transactions, the timings of the cash inflows and outflows for the non-contractual purchases and sales generally have time-lags. In this sense, the FX risks, associated with the changes in the nominal exchange rates, on the non-contractual operational cash flows are of the same nature as that for the contractual operational cash flows. In addition to the FX risks associated with the changes in the nominal exchange rates, the changes in the real exchange rates more seriously affect the operational non-contractual cash flows in a sense that they affect the expected cash flows denominated in foreign currencies. This is because the changes in the real exchange rates imply the changes in the relative prices among countries or even within a country, which cause the "competitive effects" on the operational non-contractual cash flows by changing the firm's competitive position, and sources and costs of inputs.[1] The determinants of this FX risks are the market structure where the firms

---

[1]See Shapiro[1984] for a discussion on the linkage between currency risks, represented by inflation risk and exchange rate changes, and relative price risk.

compete and the market structure where the firms source the inputs.[1]

Finally, the other non-contractual cash flows are primarily affected by the changes in the nominal exchange rates in terms of foreign exchange transactions, and secondly the changes in the real exchange rates because the amounts of the other non-contractual cash flows, such as intra-company cash transfers, are determined by over-all regulations and cash flows positions of the firm.

In conclusion,

1) the FX risks on the non-contractual cash flows are those associated with 1) the expected changes in the real exchange rates and 2) the expected changes in the nominal exchange rates; and
2) the FX risks, associated with the expected changes in the real exchange rates, on the non-contractual cash flows are chiefly caused by the relative price changes among the countries; and
3) the FX risks, associated with the expected changes in the nominal exchange rates, on the non-contractual cash flows are caused by the unmatched cash flows denominated in multiple currencies with regard to the foreign currency transactions.

---

[1]For more detailed discussions on the determinants of the "competitive effects", see Flood and Lessard[1986]. Also, similar discussions are made by Shapiro[1989].

The following TABLE-15 summarizes the FX exposures of the non-contractual cash flows relevant to the project evaluation.

TABLE-15: FX Exposures of Non-Contractual Cash Flows

types	expected changes in nominal exchange rates	expected changes in real exchange rates
financial	NO	NO
operational	YES	YES
other	YES	YES

2. REVIEW FOR HEDGING FOREIGN EXCHANGE EXPOSURES

This section reviews concepts of the FX exposure management based on the reviews on the FX exposures in the last section. This review is essential to conceptually incorporate the FX exposures into investment analysis so as to obtain the FX exposure-adjusted values of projects. This enables analyst and decision-makers 1) to compare individual projects on the same basis of risk-return trade-off and 2) to identify the FX risks of projects under consideration and the sensitivities of the projects to the nominal and real exchange rate volatility.

Before getting into the reviews, it would be necessary to consider the difference of the FX risk diversification and the FX risk hedging in order to clarify the implications of the FX hedgings. The FX risk diversification is to diversify away the unsystematic risks of the FX risks, fully depending on the negative or not-perfect correlations between the currencies denominating the asset and liabilities. Due to the FX risk diversification, investors could be indifferent to the unsystematic FX risks, in theory. On the other hand, the FX hedging is to reduce unmatched amounts of foreign currencies or to generate offsetting cash flows so as to minimize uncertainty of the net cash flow positions. Thus, since the FX hedging is not fully relying on the correlations, it is a more positive measure to reduce both the systematic and unsystematic FX risks simultaneously.

Therefore, it is sometimes difficult to distinguish the hedgings of the unsystematic FX risks from the hedgings of the systematic FX risks. Discussed in this section is the FX hedging.

This section tries to discuss, but not decisively describe how to estimate costs of hedging or reducing the FX exposures, though it is one of the most difficult tasks in the FX exposure management once the FX risks are identified and the ways of hedging or reducing the FX risks are determined, subject to the costs of hedging. Because estimating costs of hedging or reducing the FX exposures depends on the project-specific factors, only the conceptual FX risks management methods are reviewed.

First, concepts of operational hedgings, and second, concepts of financial hedgings are reviewed.

2.1. OPERATIONAL HEDGING[1]

The operational hedging is chiefly 1) to hedge the long-term FX risks caused by the relative price changes among countries, which are generally considered to be most serious FX risks for international projects, and 2) to hedge the FX risks caused by the unmatched foreign currency cash flows. Therefore, it corresponds to the FX risks, associated with the changes in the real exchange rates, on the operational

---

[1]The contents of this section is cited mainly from Cornell and Shapiro[1983] and Shapiro[1989].

non-contractual cash flows, and to the FX risks,associated with changes in the nominal exchange rates in terms of the foreign currency transactions. Therefore, at first, the concepts of the operational hedging are reviewed based on the determinants of the FX risks on the operational non-contractual cash flows discussed before, and secondly, based on the foreign currency transactions.

At first, the determinants of the FX risks caused by the changes in the real exchange rates are 1) the market structure to compete in and 2) the market structure to source in. Consequently, these determinants correspond to 1) marketing and strategic management and 2) production and operation management, respectively. The marketing and strategic management of the FX exposures is quoted from Cornell and Shapiro[1983] and Shapiro[1989] as follows.

1) Market Selection and Market Segmentation

   By adjusting the market mix to compete in, both in country-by-country and in segment-by-segment basis, firms mitigate the impacts of changes in real exchange rates on revenues so as to stabilize or maximize long-term profits.

2) Pricing Strategy

   By adjusting prices of products and services, firms keep themselves in equilibrium points where marginal revenues equal marginal costs in order to maximize profits. However, degrees and frequencies of the adjustment of the prices are subject to the trade-

offs between profit margins and market shares, likelihoods of persistence of the changes in the real exchange rates, consumers' price sensitivities and etc.

3) Promotional Strategy

By allocating promotional activities among the markets to compete in, subject to the promotional budget constraints, firms maximize profit margins.

4) Product Strategy

By adjusting timings of introductions of new products or deletions of obsolete products, firms mitigate negative impacts of changes in relative prices on the introduction or deletions of the products.

Secondly, the production and operation management of the FX exposures is quoted from Cornell and Shapiro[1983] and Shapiro[1989] as follows.

1) Input Mix

By substituting domestic(imported) inputs for imported(domestic) products, depending on the relative prices and degrees of substitution possibilities, firms achieve minimum input cost structures so as to mitigate or exploit impacts of changes in relative prices.

2) Shifting Production among Plants and Plant Location

By shifting production among countries or reallocating plants worldwide, firms achieve minimum cost structures.

These operational hedging methods are important and effective in competitive and changing market environments, and these are, in practice, more dynamic processes, due to changing environments in the sourcing and sales markets, than the financial hedging which can achieve almost perfect hedging once locked in. Therefore, the hedging the FX risks, associated with the changes in the real exchange rates, of the operational non-contractual cash flows is a very difficult task.

The second chief objective of the operational hedging is to minimize or eliminate the FX risks caused by unmatched amount of the cash flows in the multiple foreign currencies at each point of time. Since this objective is directly affected by the first objective of the operational hedging, that is, hedging the long-term FX risks attributable to the relative price changes among countries, the operational hedging becomes a more complicated task of trying to optimize the input and output structure of the project, in the long-run and in the short-run.

The conceptual procedure of minimizing or eliminating the unmatched amount of the cash flows in the multiple foreign currencies at each point of time is explained with a matrix of the cash flows in the multiple currencies as follows:

MATRIX OF MULTIPLE CASH FLOWS at time=t

$= [\ C_{t,i,j}\ ]$

$$= \begin{pmatrix} C_{t,1,1} & C_{t,1,2} & \cdots & C_{t,1,n} \\ C_{t,2,1} & C_{t,2,2} & \cdots & C_{t,2,n} \\ C_{t,3,1} & C_{t,3,2} & \cdots & C_{t,3,n} \\ \vdots & \vdots & \cdots & \vdots \\ C_{t,m,1} & C_{t,m,2} & \cdots & C_{t,m,n} \end{pmatrix}$$

"m" = number of relevant multiple currencies

"n"= number of cash flow categories of the same risk class

where $C_{t,i,j}$ denotes a cash flow at time=t of cash flow risk class "i"th denominated in "j"th currency;
m denotes a number of relevant multiple currencies; and
n denotes a number of cash flow categories of the same risk class.

The column of the above matrix represents a series of the multiple currency cash flows of the same risk class at time=t, and the row represents a series of the multiple risk-class cash flows in one currency at time=t. The process of operational hedging to eliminate or minimize the unmatched cash flows in the multiple currencies is identical to reducing or nullifying wide dispersion of the multiple currency cash flows in various risk classes in the cash flow matrix. For instance, if the project has a large amount of liabilities due to the purchase of the input sources in the "i"th currency and claims due to the sales of the products in the "j"th currency, both liabilities and claims are exposed

to the FX risks. Simply, by purchasing the input sources in the "j"th currency or by selling the products and services in the "i"th currency, for instance, the amount exposed to the FX risks could be reduced, assuming that 1) such operational arrangements are possible, and 2) the liabilities and claims belong to the same risk class.

However, between the different risk classes, the trade-offs of the liabilities and claims could be arranged, requiring more complex evaluation of the risks involved in such arrangements. For instance, accumulated account receivables could be sold so as to minimize debt principles, although the risk classes of both cash flows are different. This sort of arrangement requires risk-return trade-offs between the parties concerned.

In conclusion, the operational hedging is a dynamic and project-specific process of hedging the FX risks associated with the relative price changes among the countries, and the unmatched amount of cash flows at each point of time.

2.2. FINANCIAL HEDGING

The financial hedging is primarily to hedge the short-term FX risks associated with the expected changes in the nominal exchange rates. The long-term FX risks associated with the expected changes in the nominal exchange rates could be hedged by the financial instruments, but they tend to

require more costly arrangements than the short-term financial instruments.

Whereas the operational hedging of the FX risks associated with the expected changes in the nominal exchange rates are efforts of reducing or eliminating the unmatched amount of the multiple-currency cash flows, the financial hedgings of the FX risks generates a set of financial cash flows or swap the cash flows to offset the unmatched foreign currency cash flows with the financial arrangements, leaving the unmatched amount of the multiple-currency as they are. Therefore, the financial hedging generally requires funds at hand or in future due dates to fulfill the financial contracts. Therefore, the financial hedgings for the non-contractual cash flows tend to be for the short-term because the cash flows exposed to the long-term FX risks are less certain than those exposed to the short-term FX risks. Of course, the financial hedgings for the contractual cash flows can be either for long-term or for short-term, depending on the durations of the contracts.

The major financial hedging widely used or recently innovated are such as future exchanges, forward exchanges, foreign exchange options, currency swaps, back-to-back/parallel loans, credit swaps and so forth.[1] The three financial hedging instruments -- futures, forwards, and options -- are briefly reviewed below.

---

[1]See Eiteman and Stonehill[1989] for an overview of the financial hedging.

The futures are obligations to buy or sell the foreign currency for the future price at the designated future date. Because 1) the futures are traded in standardized amounts on the organized exchanges, and 2) the futures are marked-to-market (Gains or losses in each period due to the difference between the future prices in different periods of time generates cash flows during the contracted periods.), costs of hedging the FX risks with the futures tend to be expensive and sometimes the futures do not satisfy project-specific requirements for hedgings, such as amounts and timing to be hedged.

On the other hand, the forward exchange contracts are obligations to buy or sell foreign currency for the forward price at the designated future date, but can be tailor-made with regard to the amounts, the forward price, and the timing of the hedging. Since, on the delivery date only, the contracts are settled, the forwards can perfectly lock in a certain net cash flow position, whereas the futures cannot due to the transactions during the contract periods. However, since the forwards are obligations, the amount required to fulfill the contracts must be prepared on the delivery dates. Otherwise, the forwards create uncovered short positions.

Different from the futures and forwards, the foreign exchange options are contingent claims whose payoffs are dependent on the future values of the underlying assets. In this sense, the options cannot perfectly lock in a certain

net cash position, but, the options adequate to hedge the exposed positions can generate the more valuable cash positions by keeping the losses at the designated minimum levels. In other words, the options can transfer the variabilities of the foreign exchanges to other participants in the option markets, resulting in changes in the probability distributions of the future payoffs. Moreover, since the options are not obligations, but the right to buy or sell foreign currencies, short positions incurred in case of the futures and forwards would not occur in theory.

However, there are some limitations on practical uses of the financial hedging instruments. First, since these financial hedging instruments are accompanied by hedging costs, such as transaction costs, brokers' fees, costs of options and etc, these instruments are not generally used for daily and small foreign currency transactions, but rather used for large amount of unmatched cash flows whose FX risks are expected to significantly affect the project values. Secondly, since the foreign exchanges and even the expected cash flows in multiple currencies are substantially volatile, the hedging strategies should be adjusted to match the hedge ratios at each time the volatilities changes. Thus, it requires continuous changes in the hedging position in order to achieve perfect hedgings. This might not be realistic. For these reasons, from the viewpoint of evaluating projects, it might be enough to incorporate the hedging costs of the crucial foreign cash flows only.

Then, a question is how to estimate the costs of the financial hedgings in order to incorporate the costs into the expected cash flows in the V.C. formula. The transaction costs of the futures and the forwards might be estimated according to the historical data on the transaction costs. However, since the futures and the forwards traded or quoted in well-organized markets provide primarily the short-term futures and forwards, estimating the future prices and forward prices in the near future could be done with small range of errors, whereas the long-term future and forward prices are almost impossible to estimate. This might be one of reasons why the long-term futures and forwards are not traded in large volumes. Therefore, the future and forwards can be used to hedge the FX risks occurring in early years of the project. These FX risks are those associated with the borrowing, the capital expenditures and other large cash flows in the beginning of the project. On the other hand, the option prices can be theoretically estimated by using the Black-Scholes formula described in chapter 2. The Black-Scholes formula calculates the present value of the European call options.[1] The present value of the European put option can be calculated by using the following option parity formula:

Value of Put = Value of Call - Value of Share

---

[1] See Brealey and Myers[1988] for sample calculation of the currency option.

+ Present Value of Exercise Price

However, similar to the futures and forwards, the long-term options are not generally traded in the option markets probably because the option values are too large to be traded since the option values substantially increase as the time to maturity of the options increase. Therefore, applying the Black Scholes formula to the long-term options might not be realistic.

The other difficulty in estimating the costs of the financial hedgings in evaluating projects is to determine when to buy the futures, forwards, and options because the purchase timing affects the future and forward prices, option prices.

Thus, incorporating the effects of the financial hedgings is, first, to identify significant unmatched amounts exposed to the FX risks, second, to think of possibilities of the operational hedgings, third, if it is impossible, to select the financial hedging instruments, and to estimate the effects of the hedging, and finally, to incorporate the effects into the forecasted cash flows.

What are theoretical implications to the operational and other cash flows if these financial hedgings are perfectly applied to them,assuming there exists no impediment in applicability? It means that the operational and other cash flows, which are hedged with the financial hedging

instruments, become equivalent to the financial cash flows in a sense that they are not affected by the expected changes in the nominal exchange rates, although costs of the financial hedging must be taken into considerations.

As a result, the FX risks associated with the expected changes in the nominal exchange rates can be almost perfectly hedged by the financial instruments, though the applicability of the financial hedging depends on the certainty of the funds to fulfill the financial arrangements.

2.3. CONCLUSION

As the following Table summarizes the discussions on the FX risks exposures and hedgings, the FX risks which should be examined in evaluating international projects consists of two FX risks: 1) the FX risks associated with the unmatched amounts of multiple currency cash flows, caused by the changes in the nominal exchange rates, and 2) the FX risks associated with the relative price changes among countries, caused by the changes in the real exchange rates. In order to hedge those FX risks, two hedging strategies should be considered and incorporated in the evaluation of international projects, these are, 1) the operational hedging which is primarily for the long-term FX risks associated with the relative price changes among countries, and secondly for the long-term FX risks attributable to the unmatched amounts of multiple-currency cash flows, and 2) the financial hedging

which is for the short-term and long-term FX risks associated with the unmatched amounts of multiple-currency cash flows.

Table 16: FX Risk Exposures and Hedgings

	FX Risk Exposures	
category of exposure	unmatched amounts of foreign cash flows	relative price changes among countries
causes of exposure	changes in nominal exchange rates	changes in real exchange rates
Operational Hedging	reduce or eliminate unmatched amounts in multiple currencies long-term, (short-term)	adjust structures of costs and sales market long-term
Financial Hedging	generate a set of cash flows or swap cash flow to offset the unmatched amounts short-term, (long-term)	

In next section, the above mentioned FX risks will be conceptually incorporated in a general formula of the V.C. methodology.

3. VC FORMULA INCORPORATING FOREIGN EXCHANGE EXPOSURE

A final objective of this section is to propose a general formula of the V.C. methodology, which conceptually incorporates the Foreign Exchange exposures and hedging. The proposed general formula is a derivative from the general formula proposed by Lessard and incorporates the FX risks cash flow components and associated risk premiums based on the reviews of the FX exposures in the previous two sections.

In the following sub-sections, first, a general formula of the V.C. methodology will be presented by using the cash flow matrix which was discussed earlier, and second, three cash flow matrices will be discussed in relation to the FX hedging.

3.1. GENERAL FORMULA OF V.C. METHODOLOGY

A general formula of the V.C. methodology, which conceptually incorporates the FX exposures and hedgings, is proposed as follows by using the cash flow matrix:

Valuation by Components

$$= \sum_{t=0}^{k} \mathbb{E}_t * \mathbb{C}_t * \mathbb{D}_t * \mathbb{T} \qquad (31)$$

where $\mathbb{E}_t$ denotes a market-expected nominal exchange rate vector for all relevant currencies at time=t;
$\mathbb{C}_t$ denotes an after-FX-hedging-adjusted expected cash flow matrix for all cash flow components

of the same risk-class in each relevant currency at time=t;

$\mathbb{D}_t$ denotes a systematic-risk discount factor matrix for all cash flow components of the same risk-class at time=t in home currency terms: and

$\mathbb{T}$ denotes a unit vector whose each element is one.

Thus, the V.C. is expressed as a summation of the products of four matrices from time=0 to time=k (ending time of the project). The product of $\mathbb{E}_t$ and $\mathbf{C}_t$ is a one by "n" vector which represents after-FX-hedging-adjusted expected cash flows in each cash flow component in each risk-class at time=t in terms of the home currency. The product of $\mathbb{E}_t$, $\mathbf{C}_t$, and $\mathbf{D}_t$ represents a one by "n" vector which represents discounted values of the after-FX-hedging-adjusted expected cash flows in each cash flow component in each risk-class at time=t in terms of the home currency. Then, the product of $\mathbb{E}_t$, $\mathbf{C}_t$, $\mathbf{D}_t$, and $\mathbf{T}$ represents a summation of the discounted values of the after-FX-hedging-adjusted expected cash flows in each cash flow component in each risk-class at time=t in terms of the home currency. Finally, the discounted values of each time are summed up. The formats of each matrix is as follows.

1) Market-Expected Nominal Exchange Rate Vector (1, m): $\mathbb{E}_t$

$$\mathbb{E}_t = [\ E_{t,i}\ ] \quad (\ i=1 \sim m\ )$$
$$= [\ E_{t,1}\ ,E_{t,2}\ \ldots\ ,E_{t,m}\ ]$$

where $E_{t,i}$ denotes a market-expected nominal exchange rate of currency "i" over the home currency at time=t; and
"m" denotes a number of relevant currencies including the home currency.

The market-expected nominal exchange rate implies the nominal exchange rate implicitly determined by the term-structure of interests of the relevant two countries according to the IFE.

2) After-FX-Hedging-Adjusted Expected Cash Flow Matrix (m, n) : $\mathbb{C}_t$

$$\mathbb{C}_t = [\ C_{t,i,j}\ ] \quad (\ i=1 \sim m\ ;\ j=1 \sim n\ )$$

$$= \begin{pmatrix} C_{t,1,1} & C_{t,1,2} & \cdots & C_{t,1,n} \\ C_{t,2,1} & C_{t,2,2} & \cdots & C_{t,2,n} \\ \vdots & \vdots & \cdots & \vdots \\ C_{t,m,1} & C_{t,m,2} & \cdots & C_{t,m,n} \end{pmatrix}$$

where $C_{t,i,j}$ denotes a after-FX-hedging-adjusted expected amount of a cash flow component "j" denominated in currency "i" at time=t ;
"m" denotes a number of relevant currencies including the home currency; and
"n" denotes a number of project cash flow components plus one which is used for the cash flows associated with the financial FX hedging.

For simplicity, the first row is allocated to the home currency cash flows, and the last column "n" is allocated for the cash flows associated with the Financial FX hedging.

3) Discount Factor Matrix (n, n) : $\mathbb{D}_t$

$$\mathbb{D}_t = [\ D_{t,i,j}\ ] \quad (\ i=1 \sim n\ ;\ j=1 \sim n\ )$$

$$= \begin{pmatrix} D_{t,1,1} & 0 & \cdots & 0 \\ 0 & D_{t,2,2} & \cdots & 0 \\ \vdots & \vdots & \cdots & \vdots \\ 0 & 0 & \cdots & D_{t,n,n} \end{pmatrix}$$

where $D_{t,i,i}$ denotes a systematic discount factor of a cash flow component "i" denominated in home currency at time=t;
$D_{t,i,j}$ ($i \neq j$) equals zero (0);
"n" denotes a number of project cash flow components plus one which is used for the cash flows associated with the financial FX hedging.

The discount factor is determined by the CAPM discussed earlier, which simply reflect the systematic business risks in the Home Currency Terms. The relationship with the discount rate in the general formula by Lessard is as follows.

$$D_{t,i,i} = 1 \Big/ \prod_{i=1}^{t}(1+\pi_i)$$

where π_i denotes a discount rate for period from time=t-1 to time=t.

4) Unit Vector (1, m) : $\mathbb{T}$

$$\mathbb{T} = [\ T_i\ ] \quad (\ i=1 \sim n\ )$$
$$= [\ 1 \quad 1 \ \ldots\ldots\ 1\ ]$$

where T_i equals one (1) for all "i"; and
"n" denotes a number of project cash flow components plus one which is used for the cash flows associated with the financial FX hedging.

The general formula above presented is exactly identical to that by Lessard. The difference will be discussed in next sub-section.

3.2. AFTER-FX-HEDGING-ADJUSTED CASH FLOW MATRIX

The after-FX-hedging-adjusted cash flow matrix comprises three sub-matrices, a cash flow sub-matrix without FX

hedging, an operational hedging cash flow sub-matrix, and a financial hedging cash flow sub-matrix. Dimensions of each sub-matrix are "m" by "n" in order to keep the additivity of the matrices.

First, the cash flow sub-matrix without FX hedging implies the multiple-currency cash flows forecasted in each cash flow components at each time without explicitly considering the FX hedging. The columns of the matrix represent categories of the cash flow components in each risk-class. Here, the cash flow category by Lessard , shown in Chapter 1 as a formula (5), is applied to each column in the matrix as follows because the category is considered to be representative in almost all cases:

1) non-contractual operating flows:
   COLUMN 1: capital outlay,
   COLUMN 2: remittable after-tax operating cash flows,
2) contractual flows:
   COLUMN 3: contractual operating flows,
   COLUMN 4: depreciation tax shield,
   COLUMN 5: tax shield due to normal borrowing,
   COLUMN 6: financial subsidies or penalties,
3) operating flows dependent on firm's overall tax and cash-flow position
   COLUMN 7: tax reduction or deferral via interaffiliate transfer,
   COLUMN 8: additional remittances via interaffiliate transfers,
4) financial hedging
   COLUMN 9: cash flows generated by the financial hedging including expected transaction costs

The column "9" is a newly added in order to represent cash flows generated by the financial hedging so as to offset the unmatched amounts of multiple-currencies as discussed

earlier. Each row is allotted for each relevant currency, setting the first row for the home currency. Thus, the cash flow matrix without FX hedging ($\mathbb{X}_t$) is as follows:

$$\mathbb{X}_t = [\ X_{t,i,j}\ ] \quad (\ i=1 \sim m\ ;\ j=1 \sim 9\ )$$

$$= \begin{bmatrix} X_{t,1,1} & X_{t,1,2} & \cdots & X_{t,1,9} \\ X_{t,2,1} & X_{t,2,2} & \cdots & X_{t,2,9} \\ \vdots & \vdots & \cdots & \vdots \\ X_{t,m,1} & X_{t,m,2} & \cdots & X_{t,m,9} \end{bmatrix} \begin{matrix} \\ \text{--> HC} \\ \text{--> FC 2} \\ \\ \text{--> FC m} \end{matrix}$$

COL(1) COL(2) ... COL(9)

cash flow components

where $X_{t,i,j}$ denotes an expected amount of a cash flow component "j" denominated in currency "i" at time=t; and
"m" denotes a number of relevant currencies including the home currency.

Therefore, the discounted value of this matrix, as is similar to the formula (31), is the discounted value of the project without FX hedging.

Discounted Value of the project without FX hedging

$$= \sum_{t=0}^{k} \mathbb{E}_t * \mathbb{X}_t * \mathbb{D}_t * \mathbb{T} \qquad (32)$$

The users would easily identify which cash flows are exposed to the FX risks associated with the unmatched amounts of

multiple-currency cash flows by summing up each cash flows in each row (currency). If any sum of each row except for the first row (home currency) is not equal to zero(0), these foreign currencies are exposed to the FX risks. In addition to identifying the FX risks associated with the unmatched amounts of multiple-currency cash flows, the FX risks associated with the relative price changes among countries should be identified. Then, the operational FX risk hedging will be implemented by generating the operational hedging cash flow matrix.

Second, the operational hedging cash flow matrix implies the changes in multiple-currency cash flows forecasted in each cash flow components at each time by explicitly considering the operational FX hedging. The format of the matrix is exactly the same as that of the cash flow without FX hedging. Thus, the operational hedging cash flow matrix ($\mathbb{Y}_t$) is as follows:

$$\mathbb{Y}_t = [\, Y_{t,i,j} \,] \quad (\, i=1 \sim m \,;\, j=1 \sim 9 \,)$$

$$= \begin{pmatrix} Y_{t,1,1} & Y_{t,1,2} & \cdots\cdots & Y_{t,1,9} \\ Y_{t,2,1} & Y_{t,2,2} & \cdots\cdots & Y_{t,2,9} \\ \vdots & \vdots & \cdots\cdots & \vdots \\ Y_{t,m,1} & Y_{t,m,2} & \cdots\cdots & Y_{t,m,9} \end{pmatrix}$$

where $Y_{t,i,j}$ denotes an expected changes in expected cash flow component "j" denominated in currency "i" at time=t by operational hedging; and "m" denotes a number of relevant currencies including the home currency.

Each cash flow element in the cash flow matrix without FX hedging would be reduced, eliminated, or generated by the operational hedgings in order to hedge the FX risks associated with the changes in the nominal and real exchange rates. The amount of the changes by the operational hedgings fill in the operational hedging matrix. Therefore, the discounted value of this matrix as indicated in the formula (31) is the discounted value of the operational FX hedging.

$$\text{Discounted Value of the operational FX hedging} = \sum_{t=0}^{k} \mathbb{E}_t * \mathbb{Y}_t * \mathbf{D}_t * \mathbf{T} \qquad (33)$$

For instance, if a firm, which is in a long position in its local currency liabilities, switches input sources from the host country to the home country in spite of relatively higher price levels in the home country in order to reduce unmatched amount of the local liabilities, the discounted values of the additional costs generated by switching the input sources are the present values of the operational hedging costs. However, in this case, the FX risks still remain unless the unmatched amount is nullified.

After identifying the FX risks and implementing the operational FX hedging, it would be almost probable that some foreign cash flows are still exposed to the FX risks. Then, the financial hedging is implemented.

Third, the financial hedging cash flow matrix implies the changes in multiple-currency cash flows forecasted in each cash flow components and the financial cash flows associated with the financial hedgings at each time by explicitly considering the financial FX hedging. The format of the matrix is exactly the same as that of the cash flow without FX hedging and the operational hedging cash flow. Thus, the financial hedging cash flow matrix ($\mathbb{Z}_t$) is as follows:

$$\mathbb{Z}_t = [\, Z_{t,i,j} \,] \quad (i=1 \sim m \; ; \; j=1 \sim 9)$$

$$= \begin{pmatrix} Z_{t,1,1} & Z_{t,1,2} & \cdots\cdots & Z_{t,1,9} \\ Z_{t,2,1} & Z_{t,2,2} & \cdots\cdots & Z_{t,2,9} \\ \vdots & \vdots & \cdots\cdots & \vdots \\ Z_{t,m,1} & Z_{t,m,2} & \cdots\cdots & Z_{t,m,9} \end{pmatrix}$$

where $Y_{t,i,j}$ denotes an expected changes in expected cash flow component "j" denominated in currency "i" at time=t by financial hedging; and "m" denotes a number of relevant currencies including the home currency.

For instance, if, after implementing the operational hedging, there still remains a cash outflow of 1000 units in currency "2", the financial hedging is implemented, such as a forward exchange contract of buying 1000 units of currency "2" in exchange for 2000 units of currency "3", which is not yet hedged, through the third major currency. This transaction affects only the financial cash flows of the financial hedging cash flow matrix, in the column (9) of the row "2"

and "3", by increasing 1000 units in currency "2" and decreasing 2000 units in currency "3", whereas the other two cash flow matrices do not change. Also, the transaction costs, in theory, should be added to the column (9) in the first row (home currency). This procedure completes the financial hedging matrix so that, in theory, all the expected cash flows can be hedged, either by the operational or by the financial instruments. Thus, the discounted value of this matrix, like the formula (31), is the discounted value of the financial FX hedging.

Discounted Value of the financial FX hedging

$$= \sum_{t=0}^{k} \mathbb{E}_t * \mathbb{Z}_t * \mathbb{D}_t * \mathbb{T} \qquad (33)$$

In conclusion, the proposed general V.C. formula is:

Valuation by Components

$$= \sum_{t=0}^{k} \mathbb{E}_t * \mathbb{C}_t * \mathbb{D}_t * \mathbb{T} \qquad (31)$$

$$= \sum_{t=0}^{k} \mathbb{E}_t * (\mathbb{X}_t + \mathbb{Y}_t + \mathbb{Z}_t) * \mathbb{D}_t * \mathbb{T} \qquad (31a)$$

where $\mathbb{E}_t$ denotes an expected exchange rate vector (1,n);
$\mathbb{C}_t$ denotes an expected cash flow matrix (m,n);
$\mathbb{X}_t$ denotes an expected cash flow matrix without FX hedging;
$\mathbb{Y}_t$ denotes an operational hedging cash flow matrix (m.n);
$\mathbb{Z}_t$ denotes a financial hedging cash flow matrix

(m,n);
$\mathbb{D}_t$ denotes a discount factor matrix (n,n): and
$\mathbb{T}$ denotes a unit vector (1,m).

The advantage of this "matrix-type" V.C. formula is:

1) it is easy to identify the FX risks because the cash flow elements are individually shown in the matrix, classified by the cash flow risk-class and the currency;
2) it is easy to implement and check the FX hedging because the changes in the cash flow elements by the operational and financial hedging are separately shown in each matrix;
3) it is easy to calculate the operational and financial hedging values (costs), by using the hedge matrix;
4) the matrix formula is easily built in any type of computer programs so that users can create their own evaluation model programs; and
5) by modelling the cash flow matrix, the sensitivity analysis is easily implemented for various factors.

In next chapter, a real case project will be examined by using the real discount rates calculated in Chapter 2 and the concepts of the FX hedging reviewed in this chapter.

CHAPTER 5: CASE STUDY ON INTERNATIONAL REAL ESTATE DEVELOPMENT PROJECT IN THE UNITED STATES

0. INTRODUCTION

This chapter analyzes a real estate redevelopment project actually undertaken in one of the major cities in California, by applying the V.C. methodology to the case project. The case project, which can be considered to be an " international project" because of the participation of the foreign capital partner and the financing from foreign sources, is analyzed 1) in terms of the risk and return trade-offs among the project participants and 2) in terms of the specific issues and sensitivities of the major factors influential to the value of the case project.

The first section of this chapter outlines the nature of the case project, especially in terms of the project organization, structure, and risk and return trade-offs among the project participants. Then, from methodological viewpoints, we re-examine an original assessment of the case project which was made by one of the leading U.S. accounting firms so as to verify whether or not the original assessment was adequate enough to lead the project participants into making correct decisions on the project acceptance.

In the second section, the V.C. methodology is applied to the case project from viewpoints of the managing and capital partners. The results of the V.C are discussed in terms of the project feasibility and risk-return trade-offs among the participants. In addition, it discusses the specific issues in the case project in details, implementing

the sensitivity analyses of the major variables which would seriously affect the project value.

Finally, conclusions for the case project are made.

1. PROJECT ORGANIZATION STRUCTURE AND ORIGINAL ASSESSMENT OF THE CASE PROJECT

This chapter discusses, first, the outline of the case project, focusing on the organizational structure of the project which determines the risk and return trade-offs among the project participants, and is a key to success of the case project. Especially, the capital partner's overall business position is discussed in relation to the project organization. Secondly, the original assessment of the case project, which is based on the Internal Rate of Return (discussed in chapter 1), is re-examined from the methodological viewpoints, and the misleading results are discussed by correcting the serious errors in the assessment.

1.1. PROJECT ORGANIZATION STRUCTURE : MANAGING PARTNER, CAPITAL PARTNER, AND LOCAL GOVERNMENT

1.1.1 BRIEF HISTORY OF CASE PROJECT

A brief history of the case project until the project was initiated is as follows. In the beginning of the 1980s , the redevelopment agency of the city in California asked, in public, competition bids for redevelopment planning of one block in the downtown in order to redevelop the waste block and to vitalize the city's stagnant economy. As the result of the competitive bids, a local developer(henceforth,

denoted Managing Partner Mr.A) with one of major financial institutions in California won the Exclusive Negotiation Agreement with the redevelopment agency. The proposed planning was a complex of a 500-room hotel and a high-rise office building, which was attractive to the agency.

During the three times modifications on the proposals, the financial institution, which initially agreed on financing the project as a capital partner, retired from the project. In the meantime, Managing Partner Mr.A made Deposit Development Agreement with the redevelopment agency, looking for a candidate as a capital partner. A subsidiary company(henceforth denoted Capital Partner B Corp.), which is fully owned by a Japan-based construction and engineering firm and was looking for investment opportunities in the United States, agreed with the partnership with the Managing Partner Mr.A in 1985.

In this brief history, a question naturally occurs with regard to why the U.S. financial institution which were originally involved in the project gave up the project. Although the Capital Partner was informed that it had been because the financial institution had been worried about their too heavy investment on real estate projects, the question still remains, because, from the beginning, they knew that this project be a real estate project. The V.C. evaluation will help find possible reasons in later section.

1.1.2. GENERAL PARTNERSHIP

Both partners formed General Partnership for the project execution by providing equities of $ 24 Million (Capital Partner B Corp.) and $ 1 Million (Managing Partner), respectively. Out of the equity of the Managing Partner, the Managing Partner's equity of $ 800 Thousand is, in fact, a sunk cost which the Managing Partner spent by the time for the project. Therefore, the Managing Partner's equity contribution relevant to the project evaluation is $ 200 Thousand. The accounting profits generated in the General Partnership are distributed to each partner with the ratio of 3 (to Capital Partner) to 1 (to Managing Partner), whereas the accounting losses are distributed to each partner with the ratio of 96 (to Capital Partner) to 4 (to Managing Partner). On the other hand, the excess cash flows generated by the project are distributed to each partner with the ratio of 3 (to Capital Partner) to 1 (to Managing Partner).

Under the structure of the General Partnership, a question occurs with regard to adequacy of risk and return trade-offs between the Managing Partner and the Capital Partner. The question is how adequate the distribution ratios of the accounting profits and losses in relation 1) to the risks each partner bears in the project and 2) to the equity contributions of each partner. One of the most important factors affecting the question is the overall

financial positions of each partner because the income tax imposed on each partner is determined not solely by the project's accounting profits and losses, but by the overall tax accounting positions of each partner. For the question, the V.C. methodology will help examine the real value of the project to each partner in later section.

The financing scheme, when the original assessment was done, was to replace a short-term construction loan with an interest rate of 9.5% for a 20-year balloon loan with an interest rate of 11% by getting a guarantee from the Capital Partner's parent firm. However, in fact, the project was financed with non-recourse project financing loan with floating interest rate by a syndicate of U.S. and Japan's leading banks. This change in financing will be discussed in later section.

1.1.3 REDEVELOPMENT AGENCY

The redevelopment agency of the city agreed to sell the redevelopment site under consideration for $ 6 Million to the General Partner, on the condition that the Capital Partner provide advances for acquisition costs of the sites to the agency up to $14.8 Million. For the advances, the redevelopment agency issues two promissory notes to the General Partner. The First Promissory Note is in an amount not to exceed the Purchase Price of $ 6 Million and bearing

interest at the rate of ten percent (10%) per annual, simple interest. The Second Promissory Note is in the amount of the Capital Partner's advance of the Acquisition Costs in excess of the Purchase Price and bearing interest at the rate of twelve percent (12%) per annual, simple interest. The principal and interest of the Second Promissory Note is payable from the Tax Increments (property tax) from the site.(TAX INCREMENTAL FINANCING)

One of the advantages of this public financing method is that, by adopting a profitable project whose appraisal value would be expected to increase, the local government can expect the real property tax to increase enough to finance the acquisition and clearance of the site. In turn, private developers can purchase sites in relatively low prices because the local government expects to retain enough financing sources. Therefore, profitabilities of projects are key players in TIF.

However, if the actual profitability were substantially lower than the expected profitability, The TIF would hurt both developers and the local government, depending on how the real property is appraised. In this case, if the real property appraisal well reflects the future value of the real property, the expected real property tax would be substantially less than the local government expected, assuming the real property tax is unchanged, while the developers would be seriously affected solely by the lower profitability. However, because the local government can

change the real property tax rate, and the real property appraisal, which the local government generally requests real property appraisers to assess, might be distorted. Thus, under the TIF, the risks associated with the profitability of projects might be transferred from local governments to developers if the realized profitability were lower than expected. Even if the realized profitability were higher than expected, local governments might exploit excess profits from developers.

Therefore, once the redevelopment agreement is fixed between the local government and developers, the local government is concerned only with the profitability of the project, whereas the developers should be concerned not only with the profitability but also with the possible risk transfers by the local government.

1.1.4 CAPITAL PARTNER'S OVERALL BUSINESS POSITION

The Capital Partner B Corp. is, as was mentioned before, a subsidiary fully owned by the Japan-based construction and engineering firm and was recently established in the United States. At the time when they decided to get involved in the case project, their business size in the United States was insignificant, compared to the other U.S. real estate firms. As are usual with start-up firms, they were operating in the deficit, and they expected to get out of the deficit at fastest 10 years later from the time of entry.

One of the motivations which drove the Japan-based construction and engineering firm to set up a subsidiary in the United States is to take advantage of the financing capabilities due to high credibility and reputation in the business, and close relationship with Japanese banking institutions. Because, in this early stage of the subsidiary, they did not have advantageous information to the other competitors, their chief advantage is assumed to be its financing capabilities only. In this sense, the case project is a pure investment for the Capital Partner, and the profitability of the project seriously affects the subsidiary's overall accounting position, though growth opportunities may be obtained by undertaking the case project.

However, since the Capital Partner was operating in the deficit, the tax position substantially affects the profitability of the project, and vice versa. Therefore, for the Capital Partner, the tax position should be one of the main concerns in evaluating the project in the circumstances surrounding the Capital Partner at the time. The V.C. methodology will effectively analyze the interactions between the Capital Partner's tax position and the profitability of the project for the Capital Partner in later section.

1.2. EXAMINING ADEQUACIES OF ORIGINAL ASSESSMENT OF CASE PROJECT

1.2.1 ORIGINAL ANALYSIS AND RESULT

In the original assessment report of the case project, a return on equity before tax, property resale , and repayment of the principal of the loan is calculated by using the Internal Rate of Return rule. In this original assessment report by the accounting firm, for an unknown reason, the interest repayments on the 20-year balloon loan are subtracted from the cash flows, but the principal repayment at the maturity date is not subtracted from the cash flows. Similarly, the tax-related cash flows are not included in the cash flows, and the resale value of the property is not added to the cash flows. Reasons for ignoring these cash flows are also unknown. The forecasted net cash flows before tax, property resale and repayment of the loan principal, and the return on equity are shown in the Table below.

Table-17: Net Cash Flow Forecast before Tax, Property Resale, and Repayment of Loan Principal after Interest and IRR

Year	Net Cash Flows (000$)	IRR
1986	-24,200	
1987	0	
1988	0	
1989	0	
1990	669	
1991	2,840	
1992	3,354	
1993	4,241	
1994	5,174	
1995	6,133	
1996	7,150	
1997	8,229	
1998	9,374	
1999	10,588	
2000	11,877	
2001	13,244	
2002	14,694	
2003	16,232	
2004	17,864	
2005	19,595	
2006	21,454	
2007	23,427	16.0 %

The assessment shown above is a halfway result because 1) the assessment does not incorporate the cash flows associated with the tax imposed and tax shields in relation to the tax positions of each partner, and 2) the assessment does not include the cash flows associated with resale of the property and the principal repayment. However, since the assessment report does not tell more than the result shown in the above Table, the assessment could mislead the decision-makers.

Some might argue that the assessment report is satisfactory 1) because the IRR of 16% is on a safer side, assuming that the resale value of the property would be

higher than the amount of the loan principal, and 2) because the tax effects would not be significant to each partner as long as the project generates a positive value, though tax-related cash flows could change the value of the project. In some particular circumstances, the argument might be valid. However, in this case, the argument is incorrect because the assessment report has methodological errors in itself. These methodological errors are discussed in next sub-section.

1.2.2 ERRORS IN GENERAL ASSUMPTION AND EVALUATION METHODOLOGY

The general errors inherent to the IRR rules were already discussed in Chapter 1. In addition to the general errors, the following errors specific to the assessment of the case project should be pointed out.

The first and important error is in their general assumption that the cost of equity is 10% whereas the long-term borrowing rate is 11%. This assumption on the cost of equity is intuitively incorrect because the cost of equity should be higher than the borrowing rate of 11%, reflecting the higher risks to the equity-holders than to the bondholders. If, in the general assumption, the equityholders shifted their project risks to the bondholders, the lower cost of equity might be possible. However, the general assumption in the assessment report is a normal long-term loan form commercial bankers. Therefore, the cost of equity should be higher than 11%.

The most serious effect of the assumption on the decision-making is that the decision-makers might accept the case project simply because the IRR of 16% is higher than the cost of equity of 10%. However, this is obviously wrong judgement. The original appraisers could have calculated the 10% as WACC so that they might have obtained the costs of equity of 10%, which is lower than the borrowing rate. But, this is also wrong. Therefore, it in necessary to estimate the correct cost of capital for the case project.

A rough estimate can be obtained from the results in the Table-6: Unleveraged Betas of U.S. Real Estate Firms of Chapter 4. An unleveraged beta of 0.34, which is calculated based on the long-term ZCAPM for the U.S. investors, is cited from the Table. However, since the unleveraged beta is for the all-equity financed projects, the unleveraged beta should be leveraged according to the debt-to-equity ratio of 4.43 (The equity is $ 24,200,000 out of the total expenditure costs of $ 131,329,000) in order to be compared with the IRR of 16%, which is leveraged. Thus, the leveraged beta of 1.76 is obtained, assuming that the debt-to-equity ratio of the case project is constant over the project's periods. Consequently, the real cost of levered equity of 22.27% in real terms is obtained by using the formula(25). If we assume annual inflation rates of 5%, which is consistent with the assumption made in the assessment report, the nominal cost of levered equity would be 28.39%. If the IRR of 16% were compared with the nominal cost of levered equity of

28.39%, the decision-maker would not have accepted the case project. This is what the IRR rule tells the decision-maker what to do. However, this is not the end of the story.

The second error closely related to the results of the first error discussed above. The general IRR method calculates a rate of return which makes the NPV of the project zero, by incorporating the all cash flows relevant to the project. However, the assessment report calculates the return on the equity, excluding a major portion of the capital expenditures, which are financed with debt. Thus, the IRR calculated in the original assessment is leveraged. If the decision-maker compares the leveraged IRR with the cost of equity of 10%, it could mislead the decision-makers.

If we exactly follow the IRR method, the cash flows have to include all the cash flows relevant to the project, including the tax-related cash flows, salvage values, and the repayment of the loan principal. Then, based on these cash flows, the IRR is calculated, and finally, the IRR is compared with the compatible hurdle rate. The net cash flow forecasts adjusted before tax-related cash flows and after tax-related cash flows, and IRRs are shown in the Table-19 below, assuming the effective tax rate to be 34%.

Table-18: Adjusted Net Cash Flow Forecasts before and after Tax-Related Cash Flows, and IRR (000$)

Year	Before Tax	After Tax
1986	-23,487	- 23,487
1987	-53,842	- 53,842
1988	-28,223	- 22,229
1989	- 3,316	1,703
1990	12,381	16,030
1991	14,588	17,225
1992	15,102	17,570
1993	15,989	16,821
1994	16,922	16,983
1995	17,881	17,569
1996	18,898	18,216
1997	19,977	18,928
1998	21,122	19,364
1999	22,336	20,166
2000	23,625	21,017
2001	24,992	21,919
2002	26,442	22,876
2003	27,980	23,891
2004	29,612	24,968
2005	31,343	26,110
2006	33,202	25,907
2007	161,595	76,375
IRR	13.40%	13.72%

The compatible hurdle rate (cost of equity) is calculated by using the unleveraged beta of 0.34 based on the formula(25). Thus, the real hurdle rate of 7.79% is obtained. Therefore, the compatible hurdle rate in nominal terms is 13.18%, incorporating annual inflation rates of 5%. Since the IRRs before and after tax of 13.40% and 13.72% are larger than the compatible hurdle rate of 13.18%, the project is acceptable according to the IRR decision rule, regardless of the tax position of the participants.

However, the above conclusion obtained by the IRR rule could be still erroneous due to the other methodological errors inherent to the IRR rule, which were discussed in

Chapter 2. Therefore, the correct value of the case project is not yet known at this point.

1.2.3 CONCLUSION

The original assessment is halfway and misleading because it has twofold errors in addition to the methodological errors inherent to the IRR method. These are, 1) it does not take into account the tax effects, salvage values, and principal repayment, and 2) the assumption on cost of equity is inappropriate and the calculated IRR is not compatible to the cost of equity due to its financial leverage.

If the correct value of the case project, calculated with more appropriate and correct methodology such as V.C., were positive, the decision-makers would be fortunate, and otherwise, they were misled by the assessment report. In fact, since the original assessment report does not either use tax-adjusted cost of capital, such as the Modigliani-Miller formula and the Miles-Ezzell formula, or try to include the tax-related cash flows, the decision-makers would not have been certain about the tax effects.

In next section, the V.C. methodology is applied to the case project in order to evaluate the case project in a correct manner, and to analyze the conditions which must be satisfied so as to keep the project value positive enough to undertake.

2. V.C. APPLICATION TO CASE PROJECT

In this section, V.C.methodology is applied to the case project, especially with regard to the issues raised in the earlier section.

First, the assumptions employed in the original assessment report and additional assumptions compensating for the original assumptions are presented in consistent manners. Second, the V.C. are calculated and examined in relation to their overall income and tax positions of the equity-holders in the following two cases: 1) the base case when a single U.S. firm imaginarily undertakes the case project, and 2) the real case when the general partners of the U.S.developer and Japan's investors undertake the case project under the conditions described in last section. Finally, the issues specific to the case project are examined in terms of the effects of each issues on the case project, each partner's position.

2.1. GENERAL ASSUMPTIONS

The general assumptions employed in the evaluation of the case projects are briefly discussed in the following order:

1) equity contribution & split, and distribution of accounting loss & profit;
2) financing;

3) foreign exchange exposure and foreign exchange rate;

4) inflation rate and property appreciation rate;

5) operation;

6) depreciation and amortization schedule;

7) income tax and capital gain tax; and

8) cash flow component and discount rate.

2.1.1 EQUITY CONTRIBUTION & SPLIT, AND DISTRIBUTION OF ACCOUNTING LOSS AND PROFIT

The equities of $ 24 million and $ 0.2 million are contributed by the capital partner and the managing partner, respectively. However, the split ratio of the project's cash flows and assets is 75% (for the capital partner) to 25% (for the managing partner). Therefore, in the V.C. analysis, the cash flows associated with the operations of the project are split to both partners with the above ratio, whereas the project's accounting profits and losses are split with the different ratio. The project's accounting profits and losses are split with a ratio of 96 (for the capital partner) to 4 (for the managing partner) when the project's accounting income is negative (loss), and with a ratio of 75 (for the capital partner) to 25 (for the managing partner) when the project's accounting income is positive (profit). Therefore, the taxes payable by both partners are determined by each partners' overall income and tax positions, including the accounting profits and losses associated with the case

project. Consequently, the total cash flows relevant to the case project for each partners consist of three cash flow components as follows:

Total Cash Flows

= Equity + Operational Cash Flows + Cash Flows Related to Taxes

Because the cash flows related to taxes are determined by each partner's overall income and tax positions, the values of the case project are partially dependent on each partner's overall income and tax positions. This is one of natures inherent to the case project.

2.1.2 FINANCING

The financing scheme employed in the assessment is to finance the case project with a short-term construction loan during the construction period. The interest rate of the short-term loan is assumed to be 9.5% annually. The construction loan is switched to the 20-year balloon loan just after the completion of the construction. The interest rate of the long-term balloon loan is assumed to be 11%, and the principal of the loan is assumed to be repaid at the maturity date.

2.1.3 FOREIGN EXCHANGE EXPOSURE AND FOREIGN EXCHANGE RATE

The foreign exchange exposures relevant to the case project are mainly those associated with the changes in the nominal exchange rates. The reasons are as follows.

1) Because 1) the expected main targets of the hotel operations of the case project are those who do business in the region, and 2) the relative changes in currencies are not expected to increase the revenues, the hotel operations are not likely to be significantly affected by the changes in the real exchange rates.
2) Because the office leasing targets those firms doing business in the region, the office revenues are not likely to be affected by the changes in the real exchange rates.
3) Because most of the inputs, such as labors, foods, utilities, and etc. are sourced in the United States, the costs of the case project are not likely to be affected by the changes in the real exchange rates, though the prices in U.S. are, more or less, affected by the changes in the real exchange rates.

Furthermore, the FX risks associated with the changes in the nominal exchange rates are chiefly for Japan's capital partner because U.S.managing partner's utility is determined mainly in terms of U.S. dollar. Therefore, henceforth, the FX risk of the case project refers to the FX risks for

Japan's capital partner associated with the changes in the nominal exchange rates.

In the case project, Japan's capital partner takes a perfectly long position in U.S. dollar because all the assets and cash flows generated by the project are denominated in U.S. dollar. Therefore, the FX risks depends on the deviation of the Yen-Dollar nominal exchange rates from IFE. Therefore, in this simple structure of input and output, the FX risk hedging would be achieved by the financial hedging rather than the operational hedging.

However, there is a difficulty in estimating how much the capital partner can remit excess cash flows in U.S. dollar at each time. If the operations are stabilized, and the degree of certainty of the estimation is substantially high enough, the capital partner could buy Japanese Yen in forward contracts with the estimated excess dollars. This is easier to be applied to the cash flows from the office leasing than those from the hotel operation, by assuming that the costs associated with the office leasing, such as utility costs, replacement costs, and etc, are predictable with small variances, though the costs are not generally contractually fixed. For instance, because the office leasing contracts are generally long-term contracts with fixed rents (However, some of them are adjusted according to the inflation rates such as CPI index.) and because of the above assumption on the costs, the capital partner could hedge the FX risks with forward contracts whereas the most of the hotel revenues and

costs are not contracted nor predictable within small variances except for some long-term renting and etc.

In the following V.C. analysis, the hedging costs of the FX risks are not incorporated in the expected cash flows 1) because the capital partner does not intend to remit any excess dollar to the parent company, but rather invest the excess dollar in U.S., though the value of the case project in terms of Japanese Yen is affected by the nominal exchange rates, and 2) because the hedging costs would not be crucial to the V.C. analysis of the case project.

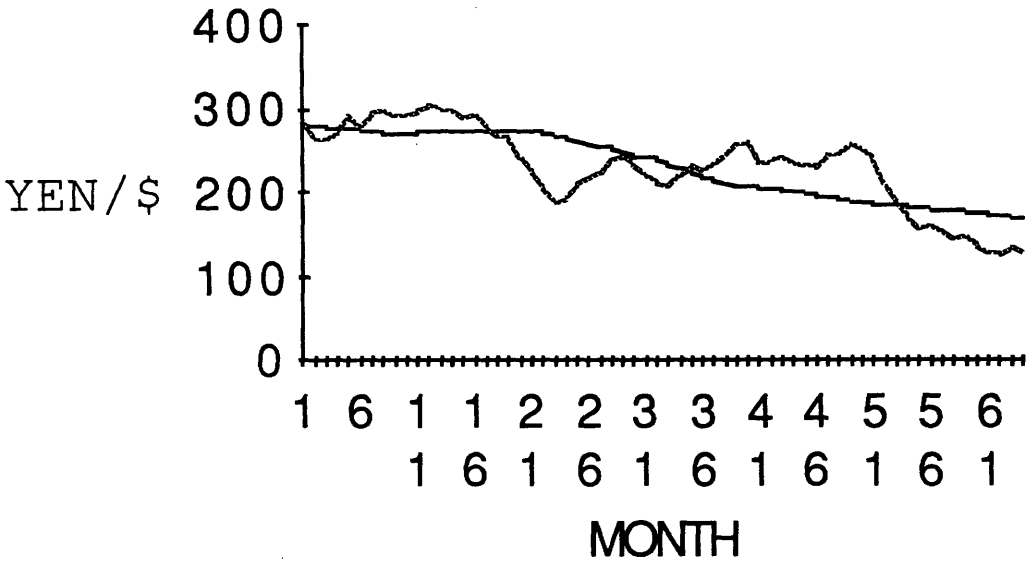
In order to convert U.S. Dollar into Japanese Yen at each time of the project's life, the exchange rate of Yen over Dollar is forecasted by the following simulation and the term structure of U.S. and Japan's Government Bond.

The simulation is to locate an estimated trend of long-term nominal exchange rates, which are calculated based on the IFE, using the differentials of short-term Treasury-Bill yields, into the historical trend of the spot exchange rates from 1973 to 1988 in a way to minimize variances between the estimated long-term nominal exchange rates and historical spot exchange rates. The purpose of the simulation is to look for the current (1985) equilibrium nominal exchange rate, which might be different from the current(1985) spot rate.

The results are shown in Figure 8: Estimating Equilibrium Nominal Exchange Rates (Yen/$) Based on IFE. The

estimated trend seems to follow the historical trend of the spot exchange rates quite well, which supports the validity of the IFE in the long-run. And, a cyclic behavior of the Yen-Dollar exchange rate along the estimated equilibrium nominal exchange rate is observed. In this simulation, in order to minimize the variances, the estimated exchange rate at the first quarter of 1973 is set 280 ¥/$ as opposed to the historical exchange rate at the same period of 287.4 ¥/$. The difference is only 7 ¥/$, which could be marginal enough.

In conclusion, the current (the fourth quarter of 1985) equilibrium exchange rate is estimated to be 185 ¥/$, based on the IFE as opposed to the current (the fourth quarter of 1985) nominal exchange rate of 207 ¥/$. The estimated exchange rates of 185 ¥/$ as opposed to the spot exchange rate of 207 ¥/$ might indicate that the market-determined exchange rates might be biased so as to overappreciate U.S. Dollar from the perspective of the historical long-term equilibrium relations embedded in the term structure of interest.



—— spot exchange rate

—— estimated exchange rate

Figure 8: Estimating Equilibrium Nominal Exchange Rates (Yen/$) Based on IFE

However, the current market-determined exchange rate of 207 ¥/$ is used as the equilibrium nominal exchange rate for forecasting the future exchange rate since the market-determined rates are considered to be generally most free from any bias. Instead, the exchange rates will be forecasted based on the current (1985) spot rate (207¥/$) and the estimated equilibrium rate (185¥/$) in the table below in order to examine the effects of the forecasted exchange rates later.

The next step is to forecast the future exchange rate, using the term structure of the interest rate, that is, the yield-to-maturity of the U.S. and Japanese government mid- and long-term bonds, some of which are chosen as the best data available, some of which are estimated based on the data available. The result of the forecasted exchange rates over the project's periods is shown in the table below.

TABLE 19: Forecast of Exchange Rate from 1986 to 2007

year	forecasted nominal exchange rate	
	base rate = 185 ¥/$	base rate = 207 ¥/$
1986	180	201
1987	175	196
1988	171	191
1989	166	186
1990	162	181
1991	157	176
1992	153	172
1993	149	167
1994	145	163
1995	141	158
1996	138	154
1997	134	150
1998	130	146
1999	127	142
2000	124	139
2001	121	135
2002	118	131
2003	114	128
2004	111	125
2005	109	121
2006	106	118
2007	103	115

The above table indicates that, as a long-term trend, U.S.dollar would continue to depreciate against Japanese Yen for the coming 20 years.

2.1.4 INFLATION RATE AND PROPERTY APPRECIATION RATE

The inflation rate in the U.S. is assumed to be annually 5% during the periods of the case project. Because the growth rates of the effective room rates and the average annual office space rents are assumed to be 6%, assuming the annual inflation rate of 5% would result in overestimating the expected cash flows. However, this inconsistency could

be adequate if the case project has some excess value added during the project. For instance, if the case project is certain to become a prime hotel or a prime office which can attract price-insensitive customers due to its good services, good locations, good reputations, luxurious images and etc, the growth rates of the effective room rates and the average annual office space rents could be higher than the average inflation rates over the project periods. However, it is also true that the higher growth rates than the inflation rates might affect the occupancy rates for price-sensitive customers. Because this is purely a matter of the marketing, this inconsistency is left as it is in the analysis in order to keep the compatibility of the original assessment and the V.C.analysis. But, later in the chapter, this inconsistency will be examined.

Consequently, the inflation rate in Japan is automatically estimated according to the expected annual inflation rate in the U.S. of 5% and the expected exchange rate of Japanese Yen over U.S. Dollar in previous section, assuming that the PPP holds during the project's period (20 years). The result of the expected inflation rate in Japan is shown in the table below.

Table 20 : Expected Inflation Rate in Japan

year	expected inflation rate (%)	
1986	2.20	
1987	2.21	
1988	2.21	
1989	2.22	
1990	2.22	
1991	2.23	
1992	2.23	
1993	2.23	
1994	2.24	
1995	2.24	
1996	2.24	
1997	2.25	
1998	2.25	
1999	2.25	
2000	2.25	
2001	2.26	
2002	2.26	
2003	2.26	
2004	2.26	
2005	2.26	
2006	2.26	
2007	2.26	average 2.25 %

For simplicity, the expected inflation rates in the above table are averaged, and the averagely expected inflation rate of 2.25% is used in the project evaluation due to the small variances of the estimated inflation rates.

The appreciation of the property (the market value of the building and land plus the value added minus the economic depreciation of the building) is assumed to be 2% real annually. Thus, the property tax is assumed to increase by 2% annually, assuming that the property tax rate would not change during the project.

2.1.5 OPERATION

The assumptions on the operations of the case project consist of those on hotel operations and office operations.

The major assumptions on the hotel operations are as follows. The number of the hotel rooms and the operation days per year are assumed to be 483 rooms and 365 days per year, respectively. The effective room rate is assumed to be $ 100 per room at the beginning of the operations and increase annually by the growth rate of 6%. On the other hand, the occupancy rate of the hotel is assumed to be 65%, 70%, 75%, 78% for 1988, 1989,1990, and 1991, and be constantly 78% thereafter.

The major assumptions on the office operations are as follows. The effective office and retail areas for leasing is 357,000 SF. The annual average rent for leasing is $26 per SF in 1988, and is assumed to increase annually by the growth rate of 6%. On the other hand, the occupancy rate of the office is assumed to be 40%, 65%, 90%, and 95% for 1988,1989,1990, and 1991, and be constantly 95% thereafter.

2.1.6 DEPRECIATION AND AMORTIZATION SCHEDULE

The depreciation schedules are 18-year and 5-year depreciations which are defined in the Accelerated Cost Recovery System (ACRS) before the Modifies Accelerated Recovery System (MACRS) in 1986. And, the amortization

schedule is 10-year straight-line amortization. The 18-year depreciation schedule is applied to the building and major equipment, whereas the 5-year schedule is applied to such as FF&E in hotel and Tenant Improvement in office building. The 10-year straight-line amortization schedule is applied to the interest costs associated with the short-term construction loan. The depreciation and amortization schedules are shown in the table below.

Table 21 : Depreciation and Amortization Schedule (ACRS)

year	18-year (%)	10-year (%)	5-year (%)
1	9	10	15
2	9	10	22
3	8	10	21
4	7	10	21
5	7	10	21
6	6	10	
7	5	10	
8	5	10	
9	5	10	
10	5	10	
11	5		
12	5		
13	4		
14	4		
15	4		
16	4		
17	4		
18	4		

However, due to the Tax Reform in 1986, the ACRS was changed to the ACRS which is currently applied to the case project. Therefore, the effects of the MACRS will be discussed later in subsection for the specific issues.

2.1.7 INCOME TAX AND CAPITAL GAIN TAX

The income taxes imposed on each general partner are the corporate income tax (for the capital partner) and the individual income tax (for the managing partner), respectively. However, because the federal corporate and individual income taxes for the general partners are assumed to be very close, 34% and 33%, respectively, the income tax of 34% is applied to both partners for simplicity. (The state income tax is ignored.)

The capital gain tax rate for the sales of the property 20 years after the operations is assumed to be the same as the income tax rate.

2.1.8 CASH FLOW COMPONENT AND DISCOUNT RATE

The grouping of the cash flows is little different from the general grouping in order to accommodate the following points specific to the case project:

1) the differences in the distribution ratios of the cash flows and accounting profits and losses, and
2) the differences in the contribution ratio and split ratio of the equity.

As a result, in the V.C. analysis of the case project, the cash flow components for the capital expenditure are replaced with the equity contributions and debt services (interest and

principal), whereas the other cash flow components are almost unchanged.

The nominal discount rates for each cash flow components are quoted from the real discount rates by the long-term ZCAPM in chapter 3 or estimated according to the market rates at the time of the evaluation as follows.

1) the nominal discount rate of the cash flows related to the operations for U.S. investors
   (per Table 10 in chapter 3)
   [(1+0.0779)*(1+0.05)-1] * 100 = 13.18 %
2) the nominal discount rate of the cash flows related to the debt and contracts for U.S.investors
   (per U.S.market rate)
   11%
3) the nominal discount rate of the cash flows related to the operations for Japan's investors
   (per Table 10 in chapter 3)
   [(1+0.0607)*(1+0.0225)-1] * 100 = 8.46 %
4) the nominal discount rate of the cash flows related to the debt and contracts for Japan's investors
   (per Japanese market rate)
   6.5%

The following tables summarize the grouping of the cash flow components and nominal discount rates in the base case and the real case.

Table 22 : Cash Flow Components and Nominal Discount Rate

cash flow components	nominal discount rate (%)	
	U.S. developer	Japan's sub.
equity contribution	13.18	8.46
gross income from operation	13.18	8.46
fixed charges	13.18	8.46
changes in working capital	13.18	8.46
debt service (interest and principal)	11.00	8.46
salvage value	13.18	8.46
tax shield on depreciation	11.00	6.50
tax shield on amortization	11.00	6.50
tax shield on interest	11.00	6.50
income and capital gain tax	13.18	8.46

The cash flow forecasts employed in the V.C. analysis are exactly identical to those in the original assessment in order to keep their compatibility. The sensitivity of the V.C. values to the ranges of the forecasts of the crucial cash flow components will be examined later in section dealing with the specific issues.

2.2. V.C. OF BASE CASE

This sub-section calculate the V.C. of the case project in case a single U.S. firm imaginarily undertakes the project without paying any advance for the site acquisition costs. The purpose of this sub-section examine the nature of the project, that is, a question of what is the crucial element affecting the profitability of the case project.

The table 23 summarizes the expected cash flows of the base case, assuming that the firm has other taxable income

enough to cover the accounting losses of the case project so as to take advantages of the tax shields on depreciations, amortizations, and interest.

Table 23-1 : Base Case
[Summary of Expected Cash Flows (000 US$)]

year	equity	gross income from operation	fixed charges	changes in working capital
1986	-10,100	0	0	0
1987	-10,100	0	0	- 9,593
1988	- 4,000	5,660	- 1,496	6,917
1989		10,493	- 1,536	2,675
1990		13,919	- 1,576	
1991		16,207	- 1,619	
1992		16,764	- 1,663	
1993		17,697	- 1,708	
1994		18,677	- 1,755	
1995		19,684	- 1,804	
1996		20,752	- 1,854	
1997		21,883	- 1,907	
1998		23,083	- 1,961	
1999		24,354	- 2,017	
2000		25,701	- 2,076	
2001		27,129	- 2,137	
2002		28,642	- 2,200	
2003		30,246	- 2,266	
2004		31,946	- 2,334	
2005		33,748	- 2,405	
2006		35,681	- 2,479	
2007		37,731	- 2,556	

Table 23-2 : Base Case
[Summary of Expected Cash Flows (000 US$)]

year	debt service	salvage value
1986	0	
1987	0	
1988	-11,081	
1989	-11,633	
1990	-11,711	
1991	-11,748	
1992	-11,748	
1993	-11,748	
1994	-11,748	
1995	-11,748	
1996	-11,748	
1997	-11,748	
1998	-11,748	
1999	-11,748	
2000	-11,748	
2001	-11,748	
2002	-11,748	
2003	-11,748	
2004	-11,748	
2005	-11,748	
2006	-11,748	
2007	-118,548	233,220

As was mentioned before, the interest on the principal is repaid at each year (from 1988 through 2007), whereas the principal is repaid at the maturity year of 2007.

Table 23-3 : Base Case
[Summary of Expected Cash Flows (000 US$)]

year	tax shield on depreciation	tax shield on amortization	interest	income & CG tax
1986	0	0	0	0
1987	0	0	0	0
1988	3,323	319	3,768	- 1,416
1989	3,791	319	3,955	- 3,046
1990	3,545	319	3,982	- 4,197
1991	3,284	319	3,994	- 4,960
1992	3,290	319	3,994	- 5,135
1993	1,955	319	3,994	- 5,436
1994	1,502	319	3,994	- 5,754
1995	1,454	319	3,994	- 6,079
1996	1,430	319	3,994	- 6,425
1997	1,430	319	3,994	- 6,792
1998	1,430		3,994	- 7,182
1999	1,430		3,994	- 7,594
2000	1,144		3,994	- 8,032
2001	1,144		3,994	- 8,497
2002	1,144		3,994	- 8,990
2003	1,144		3,994	- 9,513
2004	1,144		3,994	-10,068
2005	1,144		3,994	-10,657
2006			3,994	-11,289
2007			3,994	-89,214

The table below indicates the V.C. calculated with regard to the base case according to the forecasts of the expected cash flows and others earlier discussed. The nominal discount rates for each cash flow component is per Table 22: Cash Flow Components and Nominal Discount Rate. And, the capital expenditure cash flows are replaced with the combination of the equity contributions and debt services in order to afterwards evaluate the case project from the different equity-holders viewpoints, as was discussed earlier.

Table 24 : V.C. of Base Case
(000 U.S. Dollar at the end of 1985)

cash flow components	V.C.
equity contribution	- 22,146
gross income from operation	108,260
fixed charges	- 10,843
changes in working capital	- 1,230
debt service (interest and principal)	- 95,567
salvage value	17,322
tax shield on depreciation	16,656
tax shield on amortization	1,692
tax shield on interest	28,435
income and capital gain tax	- 38,860
total	3,719

The V.C. analysis of the base case indicates that the case project is acceptable under the assumptions. However, the V.C. analysis clarifies the nature of the case project as follows.

The first clarification is that the economic return on investment in the case project as opposed to the book return on investment in the case project is quite marginal 3.16%, which is the total V.C.value of $ 3,719 divided by the sum of the V.C. of equity contribution and the V.C. of the debt service. This marginal economic return on investment (ROI) implies that the case project is probably not profitable enough to accommodate unexpected changes or mis-forecasts of the expected cash flows.

The second clarification is that the profitability of the case project is not due to the operations, but rather due to the tax shields which the firm is supposed to take. If the firm is assumed to have accounting losses which exceed the accounting income from the case project over the

project's period, the V.C.of the case project turns out to be negative, - $ 4,204,000. Thus, the case project is not acceptable if the firm is not in a position in paying taxes or if the firm or investors can not take advantage of the tax shields by shielding other income or by deferring the tax and tax shields. This is because the total V.C. of the tax shields on depreciation, amortization, and interest, $ 46,783,000 is a real source of the profitability. The second clarification implies that the profitability of the case project is mainly dependent on the firm's tax position because the V.C. without tax payments and tax shields is a negative number, - $ 4,204,000.

In conclusion. the V.C. analysis revealed the nature of the case project, that is, 1) the marginal profitability of the case project, and 2) the project's crucial dependence on the firm's tax position. This nature of the case project is also crucial in the real case, which will be analyzed in next section.

2.3. V.C. OF REAL CASE

This sub-section calculate the V.C. of the case project in the real case when the managing and capital partner undertake the project, assuming that the capital partner does not pay any advance fore the site acquisition costs. (The effects of the advances will be discussed later.)

The table 25 and 26 summarizes the expected cash flows of the real case for the U.S.managing partner and for Japan's capital partner,respectively. The tables assume that both partners have other taxable income enough to cover the accounting losses of the case project so as to take advantages of the tax shields on depreciations, amortizations, and interest. However, later in this section, the tax-related cash flows for the Japan's capital partner are modified so as to adequately express the capital partner's tax positions.

First of all, the V.C. for U.S.managing partner is calculated and analyzed, and finally, the V.C. for Japan's capital partner is calculated and analyzed.

Table 25-1 : Real Case
[Summary of Expected Cash Flows (000 US$)
for U.S. developer]

year	equity	gross income from operation	fixed charges	changes in working capital
1986	- 200	0	0	0
1987		0	0	- 2,398
1988		1,415	- 374	1,729
1989		2,623	- 384	669
1990		3,480	- 394	
1991		4,052	- 405	
1992		4,191	- 416	
1993		4,424	- 427	
1994		4,669	- 439	
1995		4,921	- 451	
1996		5,188	- 464	
1997		5,471	- 477	
1998		5,771	- 490	
1999		6,088	- 504	
2000		6,425	- 519	
2001		6,782	- 534	
2002		7,161	- 550	
2003		7,561	- 566	
2004		7,986	- 583	
2005		8,437	- 601	
2006		8,920	- 620	
2007		9,433	- 639	

Table 25-2 : Real Case
[Summary of Expected Cash Flows (000 US$)
for U.S. developer]

year	debt service	salvage value
1986	0	
1987	0	
1988	- 2,770	
1989	- 2,908	
1990	- 2,928	
1991	- 2,937	
1992	- 2,937	
1993	- 2,937	
1994	- 2,937	
1995	- 2,937	
1996	- 2,937	
1997	- 2,937	
1998	- 2,937	
1999	- 2,937	
2000	- 2,937	
2001	- 2,937	
2002	- 2,937	
2003	- 2,937	
2004	- 2,937	
2005	- 2,937	
2006	- 2,937	
2007	-29,637	58,305

Table 25-3 : Real Case
[Summary of Expected Cash Flows (000 US$)
for U.S. developer]

year	tax shield on depreciation	tax shield on amortization	tax shield on interest	income & capital gain tax
1986	0	0	0	0
1987	0	0	0	0
1988	133	13	151	- 57
1989	152	13	158	- 122
1990	142	13	159	- 168
1991	131	13	160	- 198
1992	132	13	160	- 205
1993	78	13	160	- 217
1994	60	13	160	- 230
1995	364	80	999	-1,520
1996	358	80	999	-1,606
1997	358	80	999	-1,698
1998	358		999	-1,795
1999	358		999	-1,899
2000	286		999	-2,008
2001	286		999	-2,124
2002	286		999	-2,248
2003	286		999	-2,378
2004	286		999	-2,517
2005	286		999	-2,664
2006	0		999	-2,822
2007	0		999	-22,304

Table 26-1 : Real Case
[Summary of Expected Cash Flows (000 US$)
for Japan's subsidiary]

year	equity	gross income from operation	fixed charges	changes in working capital
1986	-24,000	0	0	0
1987		0	0	- 7,195
1988		4,245	- 1,122	5,188
1989		7,870	- 1,152	2,006
1990		10,440	- 1,182	
1991		12,155	- 1,214	
1992		12,573	- 1,247	
1993		13,273	- 1,281	
1994		14,008	- 1,316	
1995		14,763	- 1,353	
1996		15,564	- 1,391	
1997		16,412	- 1,430	
1998		17,312	- 1,471	
1999		18,265	- 1,513	
2000		19,275	- 1,557	
2001		20,347	- 1,603	
2002		21,482	- 1,650	
2003		22,684	- 1,699	
2004		23,959	- 1,750	
2005		25,311	- 1,804	
2006		26,761	- 1,859	
2007		28,298	- 1,917	

Table 26-2 : Real Case
[Summary of Expected Cash Flows (000 US$)
for Japan's subsidiary]

year	debt service	salvage value
1986	0	
1987	0	
1988	- 8,311	
1989	- 8,725	
1990	- 8,783	
1991	- 8,811	
1992	- 8,811	
1993	- 8,811	
1994	- 8,811	
1995	- 8,811	
1996	- 8,811	
1997	- 8,811	
1998	- 8,811	
1999	- 8,811	
2000	- 8,811	
2001	- 8,811	
2002	- 8,811	
2003	- 8,811	
2004	- 8,811	
2005	- 8,811	
2006	- 8,811	
2007	-88,911	174,915

Table 26-3 : Real Case
[Summary of Expected Cash Flows (000 US$)
for Japan's subsidiary]

year	tax shield on depreciation	tax shield on amortization	tax shield on interest	income & capital gain tax
1986	0	0	0	0
1987	0	0	0	0
1988	3,190	306	3,617	- 1,359
1989	3,640	306	3,797	- 2,924
1990	3,404	306	3,823	- 4,029
1991	3,153	306	3,835	- 4,762
1992	3,159	306	3,835	- 4,929
1993	1,877	306	3,835	- 5,219
1994	1,422	306	3,835	- 5,523
1995	1,091	239	2,996	- 4,559
1996	1,073	239	2,996	- 4,819
1997	1,073	239	2,996	- 5,094
1998	1,073		2,996	- 5,386
1999	1,073		2,996	- 5,696
2000	858		2,996	- 6,024
2001	858		2,996	- 6,373
2002	858		2,996	- 6,743
2003	858		2,996	- 7,135
2004	858		2,996	- 7,551
2005	858		2,996	- 7,992
2006	0		2,996	- 8,467
2007	0		2,996	-66,911

2.3.1 V.C. FOR U.S. MANAGING PARTNER

The result of the V.C. for U.S. managing partner is shown in the table below. The table also indicates the V.C. for the capital partner in case that, instead of Japan's capital partner, the U.S. capital partner imaginarily participate in the case project

Table 27 : V.C. of Real Case for U.S. Managing Partner
(000 U.S. Dollar at the end of 1985)

cash flow components	V.C.	
	managing partner	capital partner
equity contribution	- 188	- 21,958
gross income from operation	27,065	81,195
fixed charges	- 2,711	- 2,711
changes in working capital	- 308	- 923
debt service	- 23,892	- 71,675
salvage value	4,331	12,992
tax shield on depreciation	1,412	15,244
tax shield on amortization	139	1,553
tax shield on interest	3,594	24,841
income and capital gain tax	- 6,502	- 32,357
total	2,940	779

The above V.C. analysis indicates the following points with regard to the risk and return trade-off between the partners, and the cash flow structures for the managing partner.

The first point is that the conditions given to both partners of the case project is favorable to the managing partner, at least in a sense that the V.C. for the managing partner is 3.77 times larger that that for the capital partner. The advantages for the managing partner are derived mainly from 1) the marginal equity contribution, and 2) the relatively high equity split ratio compared to the equity contribution. Because it is not known how the compensation scheme between both partners were practically determined, it is speculative to judge whether or not the compensation scheme agreed between the partners are adequate, given the real situations. However, at least, the V.C. analysis can

show the compensations to both partners in explicit amounts so that it would help to determine compensation schemes between partners.

The second point is that the V.C. structure for the managing partner is improved in favor of the managing partner, compared to the V.C. structure of the base case, which is found to be marginally profitable and dependent on the tax positions of the firm. First of all, the economic ROI (the ratio of the total V.C. value to the sum of the V.C. values of the equity contribution and the debt services) for the managing partner is 12.21 %, whereas the economic ROI of the base case is 3.16 %. Secondly, even if the managing partner is not in a position of paying tax, the V.C. of the case project for the managing partner is positive, $ 4,297,000, which is obtained by adding the income & capital gain taxes of $6,502,000 to and subtracting the tax shields of $1,412,000, $139,000, and $3,594,000 from the total V.C. of $2,940,000. Thus, the managing partner is free from his tax positions. Consequently, under the given compensation scheme, the managing partner successfully modified the V.C.structure in favor of himself by sacrificing the V.C. structure of the capital partner. This is generally the case with the real estate development in U.S., and might be one of possible reasons why the U.S. capital partner, who were originally supposed to finance the case project, retired from the project.

However, the V.C. structure for the foreign capital partner could be different from that for U.S. capital partner so that the foreign capital partner might be motivated to finance the case project. This is examined in next section.

2.3.2 V.C. FOR JAPAN'S CAPITAL PARTNER

The results of the V.C. for Japan's capital partner are shown in the tables below. The Table 28 is for a case that the capital partner has other source of income enough to pay tax over the project's periods, whereas the Table 29 is for a case that the capital partner delay the tax payments exactly 10 years, resulting in the delay of the tax shields. The nominal discount rates for Japan's capital partner is per Table 22 in section 2.1.8 Cash Flow Components and Discount Rate.

Table 28 : V.C. of Real Case for Japan's Capital Partner with timely tax payment (000 Japanese Yen at the end of 1985)

cash flow components	V.C.
equity contribution	- 4,466,580
gross income from operation	19,198,337
fixed charges	- 1,882,179
changes in working capital	- 165,268
debt service	- 16,774,758
salvage value	3,654,797
tax shield on depreciation	3,344,253
tax shield on amortization	339,375
tax shield on interest	5,627,039
income and capital gain tax	- 7,801,869
total	1,073,149

Table 29 : V.C. of Real Case for Japan's Capital Partner with delayed tax payment (000 Japanese Yen at the end of 1985)

cash flow components	V.C.
equity contribution	- 4,466,580
gross income from operation	19,198,337
fixed charges	- 1,882,179
changes in working capital	- 165,268
debt service	- 16,774,758
salvage value	3,654,797
tax shield on depreciation	1,363,907
tax shield on amortization	138,344
tax shield on interest	2,302,664
income and capital gain tax	- 2,683,136
total	686,129

The results are converted into U.S. Dollar as of the ending of 1985 in order to compare the V.C. structure for the imaginary U.S. capital partner calculated previously in Table 27. The comparison table is shown below.

Table 30 : Comparison of V.C. for Capital Partner (000 U.S. Dollar at the end of 1985)

cash flow components	V.C.		
	U.S. partner	Japan's partner	
		timely tax	delayed tax
equity contribution	- 21,958	- 21,578	- 21,578
gross income from operation	81,195	92,746	92,746
fixed charges	- 2,711	- 9,093	- 9,093
changes in working capital	- 923	- 798	- 798
debt service	- 71,675	- 81,037	- 81,037
salvage value	12,992	17,656	17,656
tax shield on depreciation	15,244	16,156	6,589
tax shield on amortization	1,553	1,639	668
tax shield on interest	24,841	27,184	11,124
income and capital gain tax	- 32,357	- 37,690	- 12,962
total	779	5,184	3,315

The above table shows dramatic changes in V.C. structure for the capital partners.

The first point is that the V.C. for Japan's capital partner is substantially higher than that for U.S. capital partner. The economic ROI's (the ratio of the total V.C. to the sum of the V.C. of the equity contributions and the debt services) for the first two case are 0.83 % and 5.05 %, respectively. This is caused mainly by the increase in the differentials of the V.C. of the cash flows associated with the gross income from operations minus debt services, that is, "international financing effect" discussed in chapter 3.

" The international financing effect" discussed earlier is as follows. Because foreign investors (in the case project, Japan's investors whose portfolios consist primarily of the domestic market portfolios) live in their mostly segmented economies and consumption bases, and because the correlations of the foreign investors' market portfolios with U.S. assets are generally smaller than those of U.S. investors' market portfolios with identical U.S. assets.[1] Thus, the riskiness of the U.S. assets for the foreign investors are generally lower than that for the U.S. investors. Therefore, the identical cash flows have different values to the foreign and domestic investors because the discount rates for the foreign investors are generally smaller than those for the domestic investors if the IFE

---

[1] See Solnik[1988].

holds well. This general statement is true in the case project. (See Table 22: Cash Flow Component and Discount Rate.) Therefore, Japan's capital partner's financing the U.S. project is advantageous to them because the riskiness of the cash flows generated by the U.S. project is small enough for Japan's capital partner to undertake the case project, though the case project is not attractive for U.S. capital partner due to high correlation of the case project with their market portfolios..

The second point is that the project's dependence on the tax positions changed in a way to reduce the dependence. For the imaginary U.S. capital partner, the V.C., in case of no tax and tax shields, drops to minus $ 8,502,000 as opposed to minus $ 2,105,000 for Japan's capital partner, whereas U.S. capital partner's V.C., in case of tax and tax shields, is $ 779,000 as opposed to $5,184,000 for Japan's capital partner. This is really a better change for Japan's capital partner. Thus, "international financing effect" changed the V.C. structure in favor of foreign investors. Here is another rationale for Japan's capital partner to finance the case project.

The third case when Japan's capital partner delays the timing of paying tax is the case closest to the reality for Japan's capital partner in this case. As the V.C. analysis indicates, the case project is still acceptable, given the assumptions. However, the V.C. decreases by delaying the tax

payments because the tax shields are still main drivers of the project's profitability. Therefore, as long as the case project is concerned, delaying the tax and tax shields has negative effects on the value of the case project. Furthermore, if Japan's capital partner is not a position of paying tax over the project's period, the case project should not be acceptable even to Japan's capital partner, because the V.C. drops to minus $2,105,000.

Consequently, "international financing effect" motivates Japan's capital partner to finance the case project, but the nature of the case project, that is, the project profitability's dependence on the tax position, is not eliminated, but reduced.

2.4. SPECIFIC ISSUES

This sub-section briefly discusses the issues specific to the case project. The discussed are 1) the sensitivities of the case project to the growth rate of the hotel room rate and office rent, to the occupancy rate of the hotel and office, to the forecast of Yen-Dollar exchange rates, to the modified depreciation schedule, 2) concessionary sales price of the site and advances for the acquisition costs, 3) financing with revolving line of credits, and 4) the optimal compensation scheme.

The sensitivity analyses or simulations implemented in the following should be compared to the V.C.analysis in the

previous section for U.S. managing partner and Japan's capital partner who defers the tax payments exactly 10 years after the taxes and tax shields are incurred. The original V.C.analysis is quoted below from the previous section.

Table 31 : Original V.C. Analysis
(000 U.S. Dollar at the end of 1985)

cash flow components	V.C.	
	U.S. partner	Japan's partner delayed tax
equity contribution	- 188	- 21,578
gross income from operation	27,065	92,746
fixed charges	- 2,711	- 9,093
changes in working capital	- 308	- 798
debt service	- 23,892	- 81,037
salvage value	4,331	17,656
tax shield on depreciation	1,412	6,589
tax shield on amortization	139	668
tax shield on interest	3,594	11,124
income and capital gain tax	- 6,502	- 12,962
total	2,940	3,315
Economic ROI (%)	12.21	3.23
V.C. without tax-related components (000 $)	4,297	- 2,104

2.4.1. SENSIYIVITY TO GROWTH RATE OF HOTEL ROOM RATE AND OFFICE RENT

As was discussed in the assumptions on the expected cash flows, the growth rates were assumed to be 6%, whereas the inflation rates to be 5%. This implies that the original assessment expected the case project to achieve premium revenues of 1% over the expected inflation rate of 5%. The

sensitivity analysis to the growth rate is implemented, assuming that the case project could not achieve the premium revenues of 1%, that is, the growth rate stays at 5%. The following table shows the result when the growth rate is 5%.

Table 32 : Sensitivity of Growth Rate
(000 U.S. Dollar at the end of 1985)

cash flow components	V.C.	
	U.S. partner	Japan's partner delayed tax
equity contribution	- 188	- 21,578
gross income from operation	25,260	86,213
fixed charges	- 2,711	- 9,093
changes in working capital	- 314	- 814
debt service	- 23,892	- 81,037
salvage value	4,331	17,656
tax shield on depreciation	1,412	6,589
tax shield on amortization	139	668
tax shield on interest	3,594	11,124
income and capital gain tax	- 5,995	- 12,159
total	1,635	- 2,431
Economic ROI (%)	6.79	- 2.37
V.C. without tax-related components (000 $)	2,485	- 8,653

The result is that the capital partner's V.C. turns out negative, minus $2,431,000 whereas the managing partner's V.C. still remain positive. This implies that the capital partner is more vulnerable to the unexpected changes or mis-forecast in the growth rate whereas the managing partner successfully locked in a position of being less affected by them. Thus, the unsystematic risks born by the capital

partner is substantially larger than that of the managing partner with regard to the unexpected changes in the growth rates as long as the case project is concerned.

However, from the U.S. managing partner's viewpoint, it is quite reasonable and necessary to lock in such a position because the portfolio held by the managing partner mainly comprises U.S. regional real estates so that the portfolio is not assumed to be well diversified. Thus, by changing the probability distributions of his real estates assets returns, the managing partner changed the probability distributions of his portfolio's return in order to eliminate the unsystematic risks of his portfolio. Otherwise, the managing partner would be exposed to the strong unsystematic risks of his not-well diversified portfolio.

On the other hand, if the capital partner's portfolio is well diversified, the unsystematic risk of the case project could be diversified away. Because, when the case project was initiated, the capital partner's portfolio is not well diversified, the capital partner is exposed to the unsystematic risks of the case project to a great extent. Therefore, it is necessary for the capital partner to examine and hedge against the unexpected changes in the growth rates, subject to the conflicts of the risk-return trade-offs with the managing partner. A way of hedging the unsystematic risks of the case project will be discussed later.

2.4.2. SENSITIVITY TO OCCUPANCY RATE OF HOTEL AND OFFICE

One of major difficulties in the marketing of the case project is to predict the occupancy rates over the project's periods, especially at the beginning of the operations. The following tables are the V.C. based on the different assumptions on the occupancy rate of the hotel and office. The Table 33 assumes the office occupancy rates of the first five years to be 30%, 50%, 70%, 85%, and 95% instead of the original assumptions of 40%, 65%, 90%, 95%, and 95%, and the Table 34 assumes the hotel occupancy rates of the first six years to be 55%, 60%, 65%, 70%, 75%, and 78% instead of the original assumptions of 65%, 70%, 75%, 78%, 78%, and 78%.

Table 33 : Sensitivity to Office Occupancy Rate
(000 U.S. Dollar at the end of 1985)

cash flow components	V.C.	
	U.S. partner	Japan's partner delayed tax
equity contribution	- 188	- 21,578
gross income from operation	26,254	90,244
fixed charges	- 2,711	- 9,093
changes in working capital	- 398	- 1,034
debt service	- 23,892	- 81,037
salvage value	4,331	17,656
tax shield on depreciation	1,412	6,589
tax shield on amortization	139	668
tax shield on interest	3,594	11,124
income and capital gain tax	- 6,458	- 12,593
total	2,083	946
Economic ROI (%)	8.65	0.92
V.C. without tax-related components (000 $)	3,396	- 4,842

Table 34 : Sensitivity to Hotel Occupancy Rate
(000 U.S. Dollar at the end of 1985)

cash flow components	V.C.	
	U.S. partner	Japan's partner delayed tax
equity contribution	- 188	- 21,578
gross income from operation	26,393	90,676
fixed charges	- 2,711	- 9,093
changes in working capital	- 386	- 1,002
debt service	- 23,892	- 81,037
salvage value	4,331	17,656
tax shield on depreciation	1,412	6,589
tax shield on amortization	139	668
tax shield on interest	3,594	11,124
income and capital gain tax	- 6,466	- 12,657
total	2,226	1,346
Economic ROI (%)	9.42	1.31
V.C. without tax-related components (000 $)	3,547	- 4,378

As is the same with the sensitivities to the growth rates, the capital partner's position is more vulnerable to the unexpected changes in the occupancy rates, whereas the managing partners are independent of the risks. This is another indication that the capital partner bears the unsystematic risks of the project, to a great extent, which should be hedged as was discussed in the previous section.

2.4.3. SENSITIVITY TO FORECAST OF YEN-DOLLAR EXCHANGE RATE

The original V.C. was calculated according to the forecasted exchange rates which used the current (as of ending of 1985) spot exchange rate as a base exchange rate.

Here, the earlier-estimated equilibrium exchange rates based on the historical behavior of the Yen-Dollar exchange rates and IFE are used to calculate the V.C.of the project. the result is shown in the table below.

Table 35 : Sensitivity to Exchange Rate Forecast
(000 U.S. Dollar at the end of 1985)

cash flow components	V.C.	
	U.S. partner	Japan's partner delayed tax
equity contribution	- 188	- 19,299
gross income from operation	27,065	82,901
fixed charges	- 2,711	- 8,127
changes in working capital	- 308	- 704
debt service	- 23,892	- 72,661
salvage value	4,331	16,121
tax shield on depreciation	1,412	5,928
tax shield on amortization	139	597
tax shield on interest	3,594	10,143
income and capital gain tax	- 6,502	- 12,152
total	2,940	2,747
Economic ROI (%)	12.21	2.99
V.C. without tax-related components (000 $)	4,297	- 1,769

The result indicates that the variances of the forecasted exchange rates do not seriously affect the capital partner's V.C.. This is probably one of the characteristics of the case project that the value of the project is not in the operations, but rather in the tax shields due to large depreciable value of the buildings and large amount of debt. If the strength of the case project were the profitable operations, the V.C. would have been affected more.

This result is compared to next result, which examined the sensitivity to the depreciation schedule.

2.4.4. SENSITIVITY TO MODIFIED DEPRECIATION SCHEDULE IN MODIFIED ACCELARATED COST RECOVERY SYSTEM (MACRS) IN 1986

The effects of changing the depreciation schedule is measured in this simulation. The depreciation schedule employed here is the 31.5- year straight line depreciation regulated in 1986 instead of the 18-year depreciation schedule employed in the original V.C.. The result is shown below.

Table 36: Sensitivity to Modified Depreciation Schedule (000 U.S. Dollar at the end of 1985)

cash flow components	V.C.	
	U.S. partner	Japan's partner delayed tax
equity contribution	- 188	- 21,578
gross income from operation	27,065	92,746
fixed charges	- 2,711	- 9,093
changes in working capital	- 308	- 798
debt service	- 23,892	- 81,037
salvage value	4,331	17,656
tax shield on depreciation	977	4,133
tax shield on amortization	139	668
tax shield on interest	3,594	11,124
income and capital gain tax	- 6,502	- 12,962
total	2,505	859
Economic ROI (%)	10.40	0.84
V.C. without tax-related components (000 $)	4,297	- 2,104

The result indicates that the capital partner's V.C. drops to marginal amount of profits whereas the managing partner's V.C. is little affected by the MACRS. Because the depreciation schedule is subject to the regulations, the capital partner is fully exposed to the unexpected changes in the depreciation schedule. In fact, the MACRS is currently applied to the case project, affecting the capital partner's V.C., whereas the managing partner is little affected. This is another source of the unsystematic risks born by the capital partner.

Comparing the effects of the forecasted exchange rates and modified depreciation schedule reveals that, for the capital partner, the risks associated with the unexpected changes in the foreign exchange rates are substantially smaller than those associated with the unexpected changes in the depreciable value of the project. Thus, the capital partner should have hedged against the unique risks.

2.4.5. CONCESSIONARY SALES PRICE OF THE SITE AND ADVANCES FOR THE ACQUISITION COSTS

As was discussed earlier, the costs of the acquisition and clearance of the site are financed with TIF(Tax Incremental Financing) by the local government. Furthermore, the local government sold the site to the general partners for a considerably discounted price, which attracted the

general partners. The reason that the local government sold the site for a concessionary sales price is that the local government expects the project to stimulate the local economy, resulting in a increase in tax revenues.

The simulation implemented here is when the project does not vitalize the local economy enough for the local government to recover the loss incurred by the concessionary sales of the site. Because the major sources of the revenues for the local government are tax revenues, the regulations of the tax rates and taxable amount are subject to the balance of the gross revenues and gross expenses. Therefore, it is not likely that the case project only is subject to the risks of the increases in the property taxes, but the project is still exposed to the unexpected changes in the property taxes which are, to some extent, related to the project's success or failure. The result of the simulation when the property appreciation rate is 4% as opposed to 2% in the original V.C. analysis is shown below.

Table 37 : Sensitivity to Appreciation Rate of Property
(000 U.S. Dollar at the end of 1985)

cash flow components	V.C.	
	U.S. partner	Japan's partner delayed tax
equity contribution	- 188	- 21,578
gross income from operation	27,095	92,857
fixed charges	- 3,005	- 10,149
changes in working capital	- 309	- 802
debt service	- 23,892	- 81,037
salvage value	4,331	17,656
tax shield on depreciation	1,412	6,589
tax shield on amortization	139	668
tax shield on interest	3,594	11,124
income and capital gain tax	- 6,431	- 12,845
total	2,746	2,483
Economic ROI (%)	11.40	2.42
V.C. without tax-related components (000 $)	4,032	- 3,053

The result indicates that the increases in the property appreciation rates do not seriously affect the V.C. of both partners, but that the managing partner is in a position of being less affected by the unexpected changes in the property taxes.

2.4.6. FINANCING WITH LONG-TERM DEBT VERSUS REVOLVING LINE OF CREDIT

The original IRR assessment by the accounting firm and the original V.C. analysis are based on the assumption that the case project is financed with the 20-year term loan. However, the project is actually financed with the 10-year

revolving line of credit. The maximum borrowing amount is $107 million with short-term floating interest rate of either the prime rate or the LIBOR plus 7/8 %. A question is why the case project is actually financed with the revolving line of credit, and what are the effects of this financing on the project's value.

It is not known why, but one of possible reasons might be that 1) the decision-maker expects the short-term interest rate to drop to the levels of the short-term interest rates in 1970's because the trend of the short-term interest rates' decline from the beginning of 1980's is observed in 1985, 2) the project is expected to generate cash inflows enough to repay the interest and principal in early years. But, these are simply speculations. The simulation is implemented by using the actual financing terms, whose result is shown below.

Table 38 : Short-Term Financing
(000 U.S. Dollar at the end of 1985)

cash flow components	V.C.	
	U.S. partner	Japan's partner delayed tax
equity contribution	- 188	- 21,578
gross income from operation	26,454	90,499
fixed charges	- 2,711	- 9,093
changes in working capital	- 115	- 296
debt service	- 23,371	- 78,756
salvage value	4,331	17,656
tax shield on depreciation	1,412	6,589
tax shield on amortization	139	668
tax shield on interest	1,336	6,402
income and capital gain tax	- 6,303	- 12,696
total	983	- 605
Economic ROI (%)	4.17	0.60
V.C. without tax-related components (000 $)	4,399	- 1,568

As is expected, the V.C. for both partners substantially decrease mainly due to losing the advantages of the tax shields on the interest payments. Because the profitability of the case project heavily depends on the tax shields, especially for the capital partner, this is a natural result, and this is a case which fits into the Tax-adjusted Modigliani and Miller's Theorem on the capital structure.

In conclusion, the financing method of this case project should have been selected by examining the V.C. structure of the project, in addition to the other considerations such as the term structure of the interest rates, and etc.

2.4.7. OPTIMAL COMPENSATION SCHEME

As was seen in this sub-section, the capital partner is highly exposed to the unsystematic risks of the case project and their tax positions. The managing partner also desires to increase the profitability of the case project, too. A question is whether or not it is possible for both partners to get better off, by changing the structure of the case project given in the beginning of this chapter.

There may be several solutions to the above question, but one of feasible solutions may be to change the compensation scheme given in the assumptions. Because the capital partner is not in a position of paying taxes for coming 10 years, and because the managing partner can currently take advantages of the tax shields, distributing the accounting losses in the start of the project more to the managing partner and distributing the operational cash flows more to the capital partner could increase V.C. for both partners. The table below shows the result of the modified compensation scheme, where both accounting and cash distribution ratio is 85 (to the capital partner) to 15 (to the managing partner).

Table 39 : Optimal Compensation Scheme
(000 U.S. Dollar at the end of 1985)

cash flow components	V.C.	
	U.S. partner	Japan's partner delayed tax
equity contribution	- 188	- 21,578
gross income from operation	16,239	105,112
fixed charges	- 1,626	- 10,305
changes in working capital	- 185	- 905
debt service	- 14,335	- 91,842
salvage value	2,598	20,010
tax shield on depreciation	2,498	6,152
tax shield on amortization	254	621
tax shield on interest	4,265	10,917
income and capital gain tax	- 5,913	- 13,246
total	3,607	4,935
Economic ROI (%)	24.84	4.35
V.C. without tax-related components (000 $)	2,503	491

The result indicates that the V.C. for both partner is considerably increased. However, in this modified compensation scheme, the V.C. structure for both partners also changed substantially.

First, the V.C for the managing partner without the tax-related cash flow components decreases by $1,794,000, meaning that the value of the project for the managing partner shifted from the operational cash flows to the tax-related cash flows. However, the managing partner is better off because he is in a position of being able to take advantages of the tax shields.

Second, the V.C. for the capital partner without the tax-related cash flow components increase by $2,595,000. As

a result, even if the capital partner can not turn into a position of paying taxes over the project's periods, the V.C. for the capital partner can be positive. This a big change from the original V.C. for the capital partner so that the capital partner can lock in a better position independent of the tax position and the degree of the diversification of the portfolio which the capital partner holds.

In conclusion, the modified compensation scheme, where both accounting and cash distribution ratio is 85 (to the capital partner) to 15 (to the managing partner), could improve both profitability to the capital and managing partners, respectively, as seen in table 39, and reduce the risks, by using the V.C. analysis, assuming that the tax rates are not expected to change over the project duration.

3. CONCLUSION

The conclusions on this case analysis is as follows.

1) The base case V.C. analysis reveals that, although the case project is acceptable, given the assumptions, the project is marginally profitable, and that the main cause of the value of the project is the tax shields. Therefore, the tax positions of both partners seriously affect the value of the project.
2) The managing partner successfully locked in a safe position free from his tax position, and improved the profitability by changing the probability distributions of the returns, whereas the project is not attractive enough for U.S. capital partner to finance the project.
3) For Japan's capital partner, the case project is attractive enough due to "international financing effects". However, the capital partner's value is still heavily affected by the tax position. In fact, due to the inability to pay taxes, the value for the capital partner is decreased.
4) The capital partner is also in a position vulnerable to the unexpected changes in the operations or unsystematic risks, such as the changes in the growth rates, occupancy rates, depreciation schedule and so

on.

5) The optimal compensation scheme could be found. Modifying the compensation scheme could improve the profitability and reduce risks for both partners, especially for the capital partner.
6) The actual financing scheme hurt the value of the project by losing the advantages of the tax shields.

The above conclusions are crucial both to the managing partner's and capital partner's decision-making, and also to the project organization, the structure, especially the compensation scheme in terms of the risk and return trade-offs. Most of the conclusions would not have been discovered by the other conventional or popular evaluation methodologies. This is why the "Valuation by Components" can be the most effective evaluation methodology, especially for those international projects which are more complicated than domestic projects, but not limited to.

In next chapter, these conclusions will be elaborated and implications and additional conclusions are drown and discussed.

CHAPTER 6 : CONCLUSIONS AND RECOMMENDATIONS

The purpose of the thesis is to examine the applicability of the Valuation-by-Components with underlying theories and concepts to evaluation of the international investments, in the context of the construction and real estate industries. Through the examinations, the following major points are found:

1) the ZCAPM is, in practice, currently more applicable to pricing the international assets than the CCAPM, which has an issue of the theory to be clarified and an issue of the consumption data quality;
2) investing in the foreign assets related to the construction and real estate industries brings benefits of international diversification both in the long-term and short-term, whereas profit-taking from the short-term investments in the foreign assets are not necessarily expected;
3) given the imperfections in the current capital markets, the firms engaged in the international investments as well as the individual investors should diversify away the unsystematic foreign exchange risks, to some extent, with the firm's portfolio diversification, whereas the systematic foreign exchange risks and the rest of the unsystematic foreign exchange risks can be hedged with the optimal mix of operational and financial hedging instruments;
4) the international financing should be always

accompanied by the international diversification, which motivates the investors to invest in foreign projects which may not be undertaken by the domestic investors, and diversify away the unsystematic risks; and

5) the Valuation-by-Components is the best evaluation methodology among others due to its theoretical correctness, its transparency and flexibility to accommodate the complexity of the structures of the international projects, and its capability of analyzing and allocating the relevant risks in intelligible manners.

The following, in brief, summarizes and concludes the thesis, and makes recommendations for further research areas.

1. PRACTICAL APPLICABILITIES OF ZCAPM AND CCAPM WITH RELATED ISSUES

The Zero-Beta Capital Asset Pricing Model (ZCAPM) as an international asset pricing model, in theory, employs the world market portfolio so as to price the international assets, assuming that the Purchasing Power Parity (PPP) holds. However, it is found that pragmatically applying the ZCAPM to pricing the international assets faces difficulties in defining and finding the appropriate world market portfolio due to the current degree of integration of each

segmented markets and the selection of the base currency unit in converting assets denominated in other currencies. Therefore, defining the appropriate world market portfolio for the use of pricing the international assets must be investigated further as well as the linkages between each segmented market.

In the thesis, the modified ZCAPM, which employs the theory for each segmented market portfolio, is found to be more practically applicable to pricing the international assets, though it is generally recognized to overestimate the risks of the international assets. As a further research, incorporating the international assets, which have strong linkages with each segmented market, to each segmented market portfolio should be studied in order to adjust the pricings of the modified ZCAPM. The recommended research will be able to price the international assets more adequately.

The CCAPM is theoretically superior to the ZCAPM because of its capability of allowing the PPP not to hold, which is a more realistic assumption than the PPP. However, a theoretical discrepancy between the CCAPM proposed by Breeden and Stulz is found, which is left as a further research area. The crucial issue in applying the CCAPM to pricing the assets is the mismatching of the consumption data available and the data which the theory requires. The regression results indicate the mismatching especially for the Breeden-CCAPM. In this connection, as a further research, the consumption

data related to the utility functions should be clarified so as to correspond to the actual data gathered, and at the same time, the consumption data collection should increase the accuracy by eliminating as many statistical errors as possible. Consequently, in the thesis, the Stulz-CCAPM is applied to price the international assets.

The other important issue related both to the ZCAPM and to the CCAPM is to identify the zero-beta portfolios for both CAPMs, which was not implemented in the thesis. Identifying the correct zero-beta portfolios would explain the extremely high historical rates of return on the zero-beta assets.

2. IMPLICATIONS OF ZCAPM AND CCAPM BETAS AND REAL DISCOUNT RATES

The ZCAPM and CCAPM, which are formulated based on the data of U.S. and Japan's construction and real estate industries over the recent three years (1986-1988) are found to reflect the current state of the economy, especially for Japan, by comparing the results with those implemented by the respectable precursors for longer periods of time (about 30 years). The comparison reveals the dynamic movements of the ZCAPM over the long periods, which necessitates distinguishing the short-term and long-term investments in pricing the assets. Especially, for those assets which is highly correlated with the segmented economic expansion, such

as Japan's assets associated with the construction and real estate industries, should be carefully treated in the short-term and long-term.

In examining the calculated betas and real discount rates based on the ZCAPM and CCAPM, the values of the international investments are found not to be identical to those who participate in the projects because of the different risk determinants in different consumption patterns and segmented economies. In general, the investors who invest in the international assets are found to benefit from the diversification effects of the international investments, which should promote the capital mobility across the borders.

In order to examine the CCAPM in the long-term, as a further research, the long-term CCAPM should be tested by employing the data for longer periods, which at least exceed the business cycles of the nations' economies, with the investigation on the theoretical and data-related issues discussed earlier.

3. EFFECTS AND HEDGING OF FOREIGN EXCHANGE EXPOSURES

The foreign exchange risks (FX risks) inherent to the international investments increase the variances of the return on the international projects so highly that the FX risks are found to have to be diversified away or hedged at

the firm's level as well as the individual investors' levels, given the imperfections in the current capital markets. However, because this result can not be explained by the modern finance theory, a theoretical justification is another area for further investigations.

The FX risks relevant to the evaluation of the international projects are, in theory, the systematic FX risks, but not unsystematic FX risks which are caused by the events and factors of unexpected nature. The rationale behind this is that the unsystematic FX risks can be diversified away by holding the well- diversified portfolios at the firm's level and the individual investor's level. However, the systematic and unsystematic FX risks are not easy to measure. In this connection , methods of distinguishing and measuring the systematic and unsystematic FX risks should be pursued as a further research. In this thesis, the systematic FX risks are assumed to be reflected in the market, such as the forward exchange rates and term structure of interests.

The FX risks are grouped into two, one of which is the FX risks associated with the unmatched amounts of foreign cash flows at each point of time, and the other of which is the FX risks associated with the relative price changes among countries. The contractual cash flows are primarily exposed

to the former FX risks, and the non-contractual cash flows are exposed chiefly to the latter FX risks.

The FX risks associated with the unmatched amounts of foreign cash flows at each point of time are caused mainly by the changes in the nominal exchange rates. Those FX risks can be hedged either by changing the markets of input sourcing and output sales so as to reduce or eliminate the unmatched amounts in foreign currencies (the operational hedging) or by generating the offsetting cash flows (the financial hedging).

The FX risks associated with the relative price changes among countries are caused by the changes in the real exchange rates. Those FX risks can be hedged by adjusting the structure of input sourcing and markets to compete in, in the long-term basis.

The general V.C. formula is proposed to conceptually incorporate the FX risks as follows:

Valuation by Components

$$= \sum_{t=0}^{k} \mathbb{E}_t * \mathbb{C}_t * \mathbf{D}_t * \mathbf{T}$$

$$= \sum_{t=0}^{k} \mathbb{E}_t * (\mathbb{X}_t + \mathbb{Y}_t + \mathbb{Z}_t) * \mathbf{D}_t * \mathbf{T}$$

where $\mathbb{E}_t$ denotes an expected exchange rate vector (1,n);
$\mathbb{C}_t$ denotes an expected cash flow matrix (m,n);
$\mathbb{X}_t$ denotes an expected cash flow matrix

without FX hedging;
$\mathbb{Y}_t$ denotes an operational hedging cash flow matrix (m.n);
$\mathbb{Z}_t$ denotes a financial hedging cash flow matrix (m,n);
$\mathbb{D}_t$ denotes a discount factor matrix (n,n); and
$\mathbb{T}$ denotes a unit vector (1,m).

The advantage of the proposed "matrix-type" V.C. formula is its easiness of identifying and hedging the FX risks, its separation of the FX hedging costs from the other cash flows, and its potential possibilities of being applied to computer programings. Optimal solutions for the FX hedging could be obtained with the Matrix-type V.C. formula by using the liner programming, which is another area for research.

4. INTERNATIONAL FINANCING AND DIVERSIFICATION

The capital mobility across the borders benefits both those who need the capital and those who provide the capital. In this connection, the international financings (or international investments) should be promoted. However, it does not necessarily mean that the international financing or investments bring the riskless benefits.

The risks inherent to the international financings or investments should be adequately analyzed and allocated in reasonable manners. Therefore, the risk hedging is essential to the international projects. Equivalently, the international diversification should be always taken into account in order to diversify away the unsystematic risks

inherent to the international projects. Thus, the risk-hedgings and the international diversifications are prerequisites to the international projects, which are often poorly managed.

5. ADVANTAGES OF VALUATION-BY-COMPONENTS

The Valuation-by-Components is one of the best evaluation methodologies among those currently available. In theory, the other evaluation methodologies such as IRR, NPV and ANPV both with WACC, have drawbacks in their theories, whereas the Valuation-by-Components and the Real Option Approach are free from the theoretical drawbacks. Given the level of the developments in the current capital markets, the Valuation-by-Components is more practically applicable than the Real Option Approach which, though, has superior theoretical characteristics to those of V.C. The future development of the capital markets and further applications of the option pricing theory to the real asset pricing will provide another promising area for research. Also, the international assets pricing models, including the ZCAPM and CCAPM, which the V.C. employs, should be further developed and tested as was discussed earlier.

In addition to the theoretical adequacy, the Valuation-by-Components is capable of accommodating the complicated structures of the international projects, such as the

multiple-equityholders in different consumption and risk bases, multiple-currency financings, multiple-currency cash flows in different risk-classes and so on with full flexibility and transparency.

Among others, the Valuation-by-Components shows its outstanding ability of analyzing and allocating all sorts of risks associated with the international projects. This ability not only evaluates the projects in fair fashions to all participants involved in the projects, but also distributes the relevant risks to the participants so that the optimal solutions could be reached in ways intelligible to everyone. This, in turn, would promote the capital mobility across the borders.

BIBLIOGRAPHY

Adler,M. and B.Dumas, "Exposure to Currency Risk: Definition and Management", Financial Management 13, No.2, 1984

Agmon,T. and R.Eldor, "Currency Options Cope with Uncertainty", Euromoney, May 1983

Bar-Or,E.,"Application of the Option Valuation Model to Construction Projects", Thesis(M.S.), M.I.T., Department of Civil Engineering, 1984

Beidleman,C., Hilley,J., and J.Greenleaf, "Alternatives in Hedging Long-Date Contractual Foreign Exchange Exposure", Sloan Management Review, Summer 1983

Black,F., "Capital Market Equilibrium wuth Ristricted Borrowing", Journal of Business, July 1972

Black,F., "International Capital Market Equiribrium with Investment Barriers", Journal of Financial Economics, December 1974

Blitzer,C.,Lessard,D.,and J.Paddock, "Risk-Bearing and the Choice of Contract Forms for Oil Exploration and Development", The Energy Journal, Vol.5,No.1,1984

Brealey,R.A. and Myers,S.C, Principles of Corporate Finance, MacGraw-Hill, New York, 1988

Breeden,D., "An Intertemporal Asset Pricing Model with Stochastic Consumption and Investment Opportunities", Journal of Financial Economics, Vol.7, 1979

Choi,F. and G.Mueller, International Accounting, Prentice-Hall,Inc., New Jersey, 1984

Copeland,T. and J.Weston, Financial Theory and Corporate Policy, Addison-Wesley Publishing Company, Massachusetts, 1979

Cornell,B., "The Consumption Based Asset Pricing Model: A Note on Potential Tests and Applications", Journal of Financial Economics, September 1981

Cornell,B.,and A.Shapiro, "Managing Foreign Exchange Risk", Midland Corporate Finance Journal, Vol.1, No.3, Fall 1983

Cox,J.C. and Rubinstein,M., Option Markets, Prentice-Hall, New Jersey, 1985

Daily Stock Price Record: New York Stock Exchange, Standard & Poor's Corporation, New York, 1986-1988

Daily Stock Price Record: Over-The-Counter, Standard & Poor's Corporation, New York, 1986-1988

Dufey,G. and I.Giddy, "International Financial Planning: The Use of Market-Based Forecasts", California Management Review, Fall 1978

Dufey,G. and S. Srinivasulu, "The Case for Corporate Management of Foreign Exchange Risk", Financial Management 12, No.4, 1984

Dhrymes,C.G., Econometrics: Statistical Foundations and Applications, Harper and Row, New York, 1970

Eaker,M. and D.Grant, "Optimal Hedging of Uncertain and Long-Term Foreign Exchange Exposure", Journal of Banking and Finance, June 1985

Eiteman,D. and A.Stonehill, Multinational Business Finance, Addison-Wesley Publishing Company, Massachusetts, 1989

Engineering News Record, Top 400 Contractors, May 25, 1989

Engineering News Record, Top International Contractors, July 13, 1989

Fama,E., and J.MacBeth, "Risk Return and Equilibrium: Emperical Tests", Journal of Political Economy, May/June 1973

Flood,E. and D.Lessard, "On the Measurement of Operating Exposure to Exchange Rates: A Conceptual Approach", Financial Management, Spring 1986

Garner,C. and A.Shapiro, "A Practical Method of Assessing Foreign Exchange Risk", Midland Corporate Finance Journal, Fall 1984

Geltner,D., "Application of Financial Option Price Theory to Real Investment Decisions:A Practical Guide",Unpublished Class Note, M.I.T., Department of Civil Engineering, 1986

Giddy,I., "The Foreign Exchange Option as a Hedging Tool", Midland Corporate Finance Journal, Vol.1, No.3, Fall 1983

Gomi,Y., Guide to Japanese Taxes: 1984-1985, Zaiki Shoho Sha, Japan, 1984

Grauer,F.,Litzenberger,R., and R.Stehle, "Sharing Rules and Equilibrium in an International Capital Market Under Uncertainty", Journal of Financial Economics, June 1976

Hagemann,H., "Anticipate Your Long-Term Foreign Exchange Risks", Harvard Business Review, March/April 1977

Hansen,L., and K.Singleton, "Stochastic Consumption, Risk Aversion, and the Temporal Behavior of Asset Returns", Journal of Political Economy, Vol.91, No.21, 1983

Hekman,C., "Measuring Foreign Exchange Exposure: A Practical Theory and its Application", Financial Analysts Journal, September/October 1983

Hekman,C., "A Financial Model of Foreign Exchange Exposure", Journal of International Business Studies, Summer 1985

Hoel,P.G., Introduction to Mathematical Statistics, Wiley, New York, 1954

Ibbotson Associates, Stocks Bonds Bills and Inflation (SBBI): 1989 Yearbook Market Results for 1926-1988, Ibbotson Associates, Chicago, 1989

International Monetary Fund, International Financial Statistics, 1971-1989

Kohlhagen,S., "Evidence on the Cost of Forward Cover in a Floating System", Euromoney, September 1975

Kohlhagen,S., "A Model of Foreign Exchange Hedging without Exchange Rate Projections", Journal of International Business Studies, Fall 1978

Krugman,P. and M.Obstfeld, International Economics:Theory and Policy, Scott,Foresman and Company, Illinois, 1987

Lessard,D., "Evaluating International Projects-- An Adjusted Present Value Approach", Presented at Meetings of American Finance Association, Atlanta, GA., December 30, 1979

Lessard,D., International Financial Management: Theory and Application, John Wiley & Sons, New York, 1985

Lessard,D., Flood,E. and J.Paddock, International Corporate Finance, unpublished, 1986

Lessard,D. and J.Paddock, "Evaluating International Projects: Weighted Average Cost of Capital Versus Valuation By Components", Unpublished Draft, 1986

Merton,R.C., "Merton Notes", Unpublished Class Notes, Sloan School Management, 1984

Merrill Lynch, Security Risk Evaluation, January 1989

Ministry of Finance, Monthly Finance Rewiew, Institute of Fiscal and Monetary Policy, Ministry of Finance, Japan, 1986-1989

Moody's Annual Dividend Record, Moody's Investors Service, New York, 1986-1988

Moody's Bank and Financial Mannual, Moody's Investors Service, New York, 1986-1988

Moody's Handbook of Common Stock, Moody's Investors Service, New York, 1986-1988

Moody's Industrial Mannual, Moody's Investors Service, New York, 1986-1988

Moody's International Mannual, Moody's Investors Service, New York, 1986-1988

Morgan Stanley, Morgan Stanley Capital International Perspective (Monthly Issues), Morgan Stanley, New York, 1986-1989

Myers,S., "Finance Theory and Financial Strategy", Interface 14:1, January-February 1984

OECD, Economic Outlook Historical Statistics, 1960-1986

Paddock,L.J., "Paddock Note", Unpublished Class Notes, M.I.T., Department of Civil Engineering, 1989

Paddock,J.,Siegel,D. and J.Smith, "Option Valuation of Claims on Real Assets: The Case of Offshore Petroleum Leases", The Quarterley Journal of Economics, August 1988

Radcliffe, R., Investment: Concepts, Analysis, and Strategy, Scott,Foresman and Company, Illinois, 1987

Sakakibara,S.,Yamaji,H.,Sakurai,H.,Shiroshita,K., and Fukuda,S., The Japanese Stock Market:Pricing Systems and Accounting Information, Praeger Publishers, New York, 1988

Shapiro,A., "Currency Risk and Relative Prive Risk", Journal of Financial and Quantitative Analysis, December 1984

Shapiro,A., Multinational Financial Management, Allyn and Bacon, Massachusetts, 1989

Sharpe,W., Investment, Prentice-Hall, New Jersey, 1985

Siegel,D.,Smith,J., and J.Paddock, "Valuing Offshore Oil Properties with Option Pricing Models", Midland Corporate Finance Journal, Vol.5,No.1, Spring 1987

Soenen,L. and E.Winkel, "The Real Costs of Hedging in the Forward Exchange Market", Management International Review, Vol.22, No.1, 1982

Solnik,B., "An Equilibrium Model of the International Capital Market", Journal of Economic Theory, August 1974

Solnik,B., International Investment, Addison-Wesley Publishing Company, Massachusetts, 1988

Stehle,R., "An Emperical Test of the Alternative Hypotheses of National and International Pricing of Risky Assets", The Journal of Finance, May 1977

Stulz,R., "Pricing Capital Assets in an International Setting: an Introduction", Journal of International Studies, Winter 1984

The Bank of Japan e.d., Economic Statistics Annual, Research and Statistics Department, The Bank of Japan, 1986-1988

Tokyo Shouken Torihikijo, Toushou Toukei Nenpou, Tokyo Shouken Torihikijo, Japan, 1983

Tokyo Stock Exchange, Toushou Kabuka Shisuu TOPIX Deta Shuu, Tokyo Shouken Torihikijo, Japan, February 1989

Trigeorgis,L. and S.Mason,"Valuing Managerial Flexibility", Midland Corporate Finance Journal ,Vol.5,No.1, Spring 1987

United States Department of Commerce,
Current Population Reports, Series P-25, No.1042,
Bureau of the Census, United States
Department of Commerce, June 1989

United States Department of Commerce,
Survey of Current Business, Vol.69, #7,
Bureau of Economic Analysis, Unites States
Department of Commerce, July 1989

Weston,J.F. and T.E.Copeland, Managerial Finance, The Dryden
Press, Chicago, 1986

APPENDIX

LIST OF APPENDICES

YEAR-MONTH	CPI INDEX		MONTHLY INFLATION RATE(%)	
	US	JAPAN	US	JAPAN
85-12	132.70	115.40		
86-01	133.10	115.40	0.30	0.00
86-02	132.70	114.90	-0.30	-0.43
86-03	132.10	114.60	-0.45	-0.26
86-04	131.80	115.00	-0.23	0.35
86-05	132.20	115.80	0.30	0.70
86-06	132.90	115.20	0.53	-0.52
86-07	132.90	115.10	0.00	-0.09
86-08	133.10	114.90	0.15	-0.17
86-09	133.80	115.40	0.53	0.44
86-10	133.90	115.50	0.07	0.09
86-11	134.00	114.90	0.07	-0.52
86-12	134.20	114.70	0.15	-0.17
87-01	135.00	113.90	0.60	-0.70
87-02	135.50	113.90	0.37	0.00
87-03	136.10	114.40	0.44	0.44
87-04	136.80	115.80	0.51	1.22
87-05	137.20	116.00	0.29	0.17
87-06	137.80	115.80	0.44	-0.17
87-07	138.10	115.20	0.22	-0.52
87-08	138.90	115.20	0.58	0.00
87-09	139.50	116.50	0.43	1.13
87-10	139.90	116.40	0.29	-0.09
87-11	140.10	115.80	0.14	-0.52
87-12	140.10	115.80	0.00	0.00
88-01	140.40	115.30	0.21	-0.43
88-02	140.80	115.10	0.28	-0.17
88-03	141.40	115.60	0.43	0.43
88-04	142.10	116.10	0.50	0.43
88-05	142.60	116.20	0.35	0.09
88-06	143.20	116.00	0.42	-0.17
88-07	143.80	115.80	0.42	-0.17
88-08	144.50	116.10	0.49	0.26
88-09	145.40	117.10	0.62	0.86
88-10	145.90	117.60	0.34	0.43
88-11	146.00	117.20	0.07	-0.34
88-12	146.30	116.90	0.21	-0.26

APP 1: CPI Index and Monthly Inflation Rate

in U.S. and Japan

Sources: International Monetary Fund, 1971-1989

YEAR-MONTH	US MARKET PORTFOLIO: NOMINAL RETURNS(%) DIVDEND	CAPITAL GAIN	TOTAL RETURN	REAL TOTAL RETURN
85-12	0.0016	0.0451	0.0467	0.0441
86-01	0.002	0.0024	0.0044	0.0013
86-02	0.0046	0.0715	0.0761	0.0791
86-03	0.0026	0.0528	0.0554	0.0603
86-04	0.0017	-0.0141	-0.0124	-0.0103
86-05	0.0047	0.0502	0.0549	0.0517
86-06	0.0025	0.0141	0.0166	0.0116
86-07	0.0018	-0.0587	-0.0569	-0.0572
86-08	0.0036	0.0712	0.0748	0.0729
86-09	0.0032	-0.0854	-0.0822	-0.0867
86-10	0.0009	0.0547	0.0556	0.0546
86-11	0.0041	0.0215	0.0256	0.0247
86-12	0.0019	-0.0283	-0.0264	-0.0273
87-01	0.0025	0.1318	0.1343	0.1275
87-02	0.0044	0.0369	0.0413	0.0373
87-03	0.0008	0.0264	0.0272	0.0226
87-04	0.0027	-0.0115	-0.0088	-0.0141
87-05	0.0043	0.006	0.0103	0.0073
87-06	0.002	0.0479	0.0499	0.0456
87-07	0.0016	0.0482	0.0498	0.0476
87-08	0.0035	0.035	0.0385	0.0327
87-09	0.0022	-0.0242	-0.022	-0.0268
87-10	0.0024	-0.2176	-0.2152	-0.2172
87-11	0.0034	-0.0853	-0.0819	-0.0832
87-12	0.0009	0.0729	0.0738	0.0741
88-01	0.0023	0.0404	0.0427	0.04
88-02	0.0052	0.0418	0.047	0.0443
88-03	0.0031	-0.0333	-0.0302	-0.344
88-04	0.0014	0.0094	0.0108	0.0056
88-05	0.0046	0.0032	0.0078	0.0044
88-06	0.0031	0.0433	0.0464	0.042
88-07	0.0014	-0.0054	-0.004	-0.0082
88-08	0.0055	-0.0386	-0.0331	-0.0372
88-09	0.0027	0.0397	0.0424	0.0354
88-10	0.0013	0.0026	0.0039	0.0239
88-11	0.0047	-0.0189	-0.0142	-0.015
88-12	0.0034	0.0147	0.0181	0.0164

YEAR-MONTH	JAPAN MARKET PORTFOLIO: TSE INDEX (YEN)	NOMINAL(%) DIVDEND	CAPITAL GAIN	TOTAL RETURN	REAL TOTAL RETURN
85-12	1031.64				
86-01	1034.39	0.92	0.30	1.22	1.22
86-02	1065.03	0.89	3.03	3.92	4.37
86-03	1162.99	0.83	9.10	9.93	10.21
86-04	1233.83	0.79	6.09	6.88	6.51
86-05	1264.45	0.76	2.48	3.24	2.53
86-06	1329.78	0.73	5.17	5.90	6.45
86-07	1394.75	0.73	4.89	5.62	5.71
86-08	1496.38	0.72	7.29	8.01	8.19
86-09	1503.96	0.78	0.51	1.29	0.85
86-10	1414.25	0.75	-5.96	-5.21	-5.30
86-11	1432.65	0.73	1.30	2.03	2.56
86-12	1553.47	0.73	8.43	9.16	9.35
87-01	1648.99	0.71	6.15	6.86	7.61
87-02	1742.31	0.70	5.66	6.36	6.36
87-03	1851.08	0.65	6.24	6.89	6.43
87-04	2050.98	0.63	10.80	11.43	10.08
87-05	2140.02	0.60	4.34	4.94	4.76
87-06	2171.44	0.55	1.47	2.02	2.14
87-07	1996.17	0.55	-8.07	-7.52	-7.04
87-08	2101.60	0.52	5.28	5.80	5.80
87-09	2085.39	0.52	-0.77	-0.25	-1.36
87-10	2023.68	0.53	-2.96	-2.43	-2.35
87-11	1852.26	0.58	-8.47	-7.89	-7.41
87-12	1828.15	0.58	-1.30	-0.72	-0.72
88-01	1828.36	0.57	0.01	0.58	1.02
88-02	1985.47	0.52	8.59	9.11	9.50
88-03	2109.32	0.50	6.24	6.74	6.28
88-04	2165.74	0.49	2.67	3.16	2.72
88-05	2167.79	0.48	0.09	0.57	0.49
88-06	2185.63	0.48	0.82	1.30	1.48
88-07	2177.78	0.50	-0.36	0.14	0.31
88-08	2195.02	0.51	0.79	1.30	1.04
88-09	2124.77	0.57	-3.20	-2.63	-3.46
88-10	2123.30	0.59	-0.07	0.52	0.09
88-11	2217.24	0.56	4.42	4.98	5.34
88-12	2302.54	0.54	3.85	4.39	4.66

APP 2: Nominal and Real Rates of Return on U.S. and Japan's Market Portfolios

Sources: Ibbotson Associates, 1989, and Ministry of Finance, 1986-1989

YEAR-MONTH	86-1	86-2	86-3	86-4	86-5	86-6	86-7	86-8	86-9	86-10	86-11
<<ADJUSTED STOCK PRICE>>											
Fluor Daniel	15.75	16.25	17	17.25	18.375	16.25	13	14.5	12.875	12.125	12.375
CRSS	13.875	13.875	16.375	17.125	16.875	14.25	13	14.5	14.25	14.875	15.875
Morrison Knudsen	39.75	43.75	48.375	49.25	51.375	46.75	42	45.375	43	43.375	43
Foster Wheeler	13.125	14	14.875	13.25	13.875	13.5	11.875	12.25	11.25	13.25	13
Centex General	24.5	29	31.75	32.125	33.25	34.625	30.25	34.25	37.5	34.375	36.5
Stone & Webster	45.5	51.5	56.75	50.125	49	50.5	47.75	52.125	51.75	51.625	51.5
CBI Industries	20.25	22	22.5	24.875	26.25	24.875	26.25	28.875	26.125	26.5	24.875
Turner	26.625	26.5	28.5	27.125	26.25	26.625	24.875	22.375	22.375	22	21.625
Jacobs Engineering	7.5	7	6.625	8.25	9.5	9.375	8.25	8	7.5	8.75	9.5
Perini	27.875	29.875	33	30.125	31.375	31	28.625	26.5	27.125	28.875	27.625
California REIT	12.375	13	12.625	13	11.25	10.75	11	12	11.5	12	12.25
Cenvill	15.875	18.25	18.75	18.25	18.25	18.125	18.125	18	18.625	19	19
Federal Realty	17.375	17.875	19.25	18.75	18.5	20	20.75	22.125	19.625	20	19.25
First Union	25.75	28.875	30.625	29.875	20.75	22.5	23.5	25	24.5	25.75	25.75
Hotel Investment	20.625	21.125	22.875	22.75	22.25	23.5	22.25	22.625	20.375	22.375	22.875
HRE Properties	n/a	n/a	n/a	25	23.5	25.375	25.375	25.375	24.875	24.875	26
IRT Properties	16.375	16.25	19	19.75	19.875	20.5	n/a	19.5	n/a	17.875	16.625
Saul B F RL Inv	17.625	17.5	18	17.5	17.375	18.625	18.625	18.75	19	17.25	17.25
<<STOCK DIVIDENDS>>											
Fluor Daniel	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
CRSS	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Morrison Knudsen	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Foster Wheeler	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Centex General	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Stone & Webster	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
CBI Industries	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Turner	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Jacobs Engineering	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Perini	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
California REIT	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Cenvill	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Federal Realty	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
First Union	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Hotel Investment	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
HRE Properties	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
IRT Properties	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Saul B F RL Inv	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

YEAR-MONTH	86-12	87-1	87-2	87-3	87-4	87-5	87-6	87-7	87-8	87-9	87-10
<<ADJUSTED STOCK PRICE>>											
Fluor Daniel	11.5	13	15.375	16	14.75	17.125	17.625	19.875	19.125	19.375	14.5
CRSS	14.375	17.5	16.25	18	19.125	19.75	24.75	24.625	15.625	15	11.5
Morrison Knudsen	42.25	53	50.125	49.625	48.25	47.625	49.125	54.5	52.75	51.25	33.5
Foster Wheeler	13.125	17	17	16	15.25	19.5	20.25	22	22	21.625	13.125
Centex General	31.25	30.75	35.5	33.125	30.5	27	26.75	28.25	27.25	24.875	16.75
Stone & Webster	49.125	53.25	56.5	53.5	55.125	59	68.375	74.5	86.875	86.25	60.625
CBI Industries	28.875	32	30	27.875	30.875	29.625	30	28.25	30	28.25	20.375
Turner	20.625	24	26	27.375	27.75	23.5	26	24.25	25	25.5	17.5
Jacobs Engineering	9	9	10.125	10.125	10	9.75	10.125	16	14.625	14.25	13.375
Perini	28	30.75	32.5	32.5	32.25	29.625	31	31.75	31.125	31.875	22.875
California REIT	11.375	7.375	7.25	7.25	6	6.5	6.25	6.125	6.5	6.25	5.25
Cenvill	18.875	20.125	20.25	20.5	21.375	20.375	20.75	19.75	19.875	19.875	18.125
Federal Realty	19.875	22.875	23.875	23.5	23.25	21.875	23.25	22.125	22	22	19
First Union	25	25.375	25.5	25.25	26.25	26.625	27.125	26.75	25.5	25.375	18.375
Hotel Investment	22.25	22.875	24	24.75	23.375	21.375	22.875	21.375	21.125	20	15.75
HRE Properties	26.75	26.125	27	23.625	23.5	23.625	23	22.75	21.125	20.375	18.375
IRT Properties	16.375	18.125	19	19.5	18.625	18	19.375	18.75	18.375	18.5	13.625
Saul B F RL Inv	16.5	17	16.875	17	17.125	14.75	16.375	17.375	18.375	18.75	16.75
<<STOCK DIVIDENDS>>											
Fluor Daniel	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CRSS	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Morrison Knudsen	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Foster Wheeler	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Centex General	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Stone & Webster	0.13	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
CBI Industries	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Turner	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Jacobs Engineering	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Perini	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
California REIT	0.11	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cenvill	0.17	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Federal Realty	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
First Union	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Hotel Investment	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
HRE Properties	0.19	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
IRT Properties	0.13	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Saul B F RL Inv	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

APP 3-1:Monthly Stock Price and Dividend of Selected US Firms
Sources: Daily Stock Price Record, 1986-1989,
Morgan Stanley, 1986-1989,
Moody's Handbook of Common Stock, 1986-1989,
Moody's Annual Dividend Handbook, 1986-1989

YEAR-MONTH	87-11	87-12	88-1	88-2	88-3	88-4	88-5	88-6	88-7	88-8	88-9
<<ADJUSTED STOCK PRICE>>											
Fluor Daniel	12	13.75	13.25	17.25	16.25	18	18	21.5	22.25	21.25	21
CRSS	12	12	12.375	15.25	16.625	17.25	17.25	23.25	21.75	20.5	23.375
Morrison Knudsen	32.25	33.25	32.125	35.875	37.25	35.75	37	41.25	41.875	39.5	38.75
Foster Wheeler	10.875	13.75	14.5	14.75	13.125	12	13.375	16.625	15.5	15.875	15.25
Centex General	16.5	17.25	17.125	21.5	20.25	22.25	26.5	27	27.625	27.375	29
Stone & Webster	58	67.5	68.25	72	69.125	70	64.375	67.25	68	69	70.625
CBI Industries	19.25	19.875	20.625	24	27.625	28	28	30.625	29.75	28.375	27.5
Turner	16.625	16.125	15.875	15.875	16.375	15	15.5	19.75	20.25	20	18
Jacobs Engineering	14.625	17.75	16.75	16.625	16.625	15.875	15.625	19.125	23.125	19.75	19.75
Perini	21.375	24.75	25.25	26.375	27.875	26	27.25	29	29.25	31.375	33.5
California REIT	5.25	4.5	6.25	5.625	5.375	5.25	5.125	5.375	5	4.75	4.875
Cenvill	17.5	17	18.875	18.75	19.5	18.5	18.25	18.375	18	17.5	17
Federal Realty	18.375	19.875	19.5	21	20.125	21	20.625	20.875	20.5	20.75	20.625
First Union	18	18.125	21.75	22.75	21.125	21.75	22.125	19.875	20	18.625	18.625
Hotel Investment	15.5	15.25	15.375	16.5	16.5	16	15.375	15.5	14.75	13.875	11.75
HRE Properties	19.5	21.125	22.5	24	22.75	23.375	22.75	23.125	22.75	24.375	24.375
IRT Properties	14.375	15.875	15.375	15.875	16.125	15.875	15.625	18	17.5	18.25	18
Saul B F RL Inv	16.125	17	17.875	17.5	17.5	17.25	16.5	24	27.875	n/a	n/a
<<STOCK DIVIDENDS>>											
Fluor Daniel	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
CRSS	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Morrison Knudsen	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Foster Wheeler	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Centex General	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Stone & Webster	0.15	0.15	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
CBI Industries	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Turner	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Jacobs Engineering	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Perini	0.08	0.08	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
California REIT	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Cenvill	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Federal Realty	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
First Union	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Hotel Investment	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
HRE Properties	0.16	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
IRT Properties	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Saul B F RL Inv	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

YEAR-MONTH	88-10	88-11	88-12
<<ADJUSTED STOCK PRICE>>			
Fluor Daniel	19.625	20.5	23.375
CRSS	23.125	24.125	26.5
Morrison Knudsen	37.125	37.375	39.375
Foster Wheeler	14.375	13.375	14.5
Centex General	27.375	26	29.25
Stone & Webster	73.25	70.75	69.875
CBI Industries	28	26.25	25.375
Turner	16.5	16.5	16.75
Jacobs Engineering	20.625	22.25	23
Perini	35.5	32.75	32
California REIT	5.5	6.25	5.75
Cenvill	16.625	16.375	15.625
Federal Realty	20.5	20.5	21.125
First Union	18.625	17.875	18.25
Hotel Investment	10	9.375	9.25
HRE Properties	25.625	25.5	21.5
IRT Properties	18.125	18	18.5
Saul B F RL Inv	n/a	n/a	n/a
<<STOCK DIVIDENDS>>			
Fluor Daniel	0.02	0.02	0.02
CRSS	0.02	0.02	0.02
Morrison Knudsen	0.12	0.12	0.12
Foster Wheeler	0.04	0.04	0.04
Centex General	0.02	0.02	0.02
Stone & Webster	0.20	0.20	0.20
CBI Industries	0.05	0.05	0.05
Turner	0.11	0.11	0.11
Jacobs Engineering	0.00	0.00	0.00
Penni	0.18	0.18	0.18
California REIT	0.04	0.04	0.04
Cenvill	0.18	0.18	0.18
Federal Realty	0.10	0.10	0.10
First Union	0.07	0.07	0.07
Hotel Investment	0.17	0.17	0.17
HRE Properties	0.15	0.15	0.15
IRT Properties	0.12	0.12	0.12
Saul B F RL Inv	0.01	0.01	0.01

APP 3-2:Monthly Stock Price and Dividend of Selected US Firms
Sources: Daily Stock Price Record, 1986-1989,
Morgan Stanley, 1986-1989,
Moody's Handbook of Common Stock, 1986-1989,
Moody's Annual Dividend Handbook, 1986-1989

YEAR-MONTH	86-1	86-2	86-3	86-4	86-5	86-6	86-7	86-8	86-9	86-10	86-11
<<ADJUSTED STOCK PRICES>>											
Aoki Construction	685	720	775	750	759	736	756	772	855	730	759
Fujita Corp	411	482	668	565	625	666	708	788	775	635	718
Haseko	485	550	850	825	855	860	930	1200	1300	1010	1190
Hazama-Gumi	380	446	435	415	462	449	471	494	580	481	483
Kajima	485	580	830	723	875	910	1000	1300	1480	1120	1200
Kumagai-Gumi	770	854	820	820	833	834	870	890	1280	1070	835
Maeda Corp	774	848	885	816	880	888	868	965	1090	940	1020
Ohbayashi Corp	372	425	642	535	595	665	765	950	939	787	850
Penta Ocean Construction	384	395	541	555	622	660	675	770	735	666	718
Shimizu Construction	366	420	554	588	580	590	615	744	825	683	719
Taisei Corp	326	371	485	450	509	568	598	850	1010	828	846
Daikyo	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2940	2890	2890	3350
Mitsubishi Estate	1090	1270	2230	1750	2030	2090	2220	2270	2770	2170	2250
Mitsui Real Estate	1010	1130	1780	1600	1690	1890	2000	1930	2150	1610	1850
Sumitomo Realty & Dev	n/a	1310	1710	1450	1480	1530	1590	1500	1560	1240	1590
<<STOCK DIVIDENDS>>											
Aoki Construction	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Fujita Corp	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Haseko	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hazama-Gumi	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Kajima	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Kumagai-Gumi	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
Maeda Corp	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Ohbayashi Corp	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Penta Ocean Construction	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Shimizu Construction	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Taisei Corp	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58
Daikyo	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Mitsubishi Estate	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55
Mitsui Real Estate	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58
Sumitomo Realty & Dev	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68

YEAR-MONTH	86-12	87-1	87-2	87-3	87-4	87-5	87-6	87-7	87-8	87-9	87-10
<<ADJUSTED STOCK PRICES>>											
Aoki Construction	830	880	851	867	900	1140	980	937	994	1080	1010
Fujita Corp	685	740	734	795	826	871	765	672	728	720	712
Haseko	1120	1180	1300	1440	1370	1660	1380	1350	1330	1220	1120
Hazama-Gumi	490	565	542	665	707	691	676	664	695	710	735
Kajima	1460	1550	1570	1660	1950	1950	1630	1640	1760	1730	1610
Kumagai-Gumi	1180	1200	1160	1320	1200	1210	1030	1000	1060	1030	1000
Maeda Corp	976	1190	1120	1160	1610	1600	1390	1410	1590	1540	1720
Ohbayashi Corp	911	1070	1050	1240	1210	1170	996	973	1030	1010	1130
Penta Ocean Construction	711	800	763	820	970	983	835	838	910	880	860
Shimizu Construction	740	904	990	1050	1170	1030	914	900	1030	1010	1010
Taisei Corp	910	980	1030	1100	1220	1240	1020	999	1040	1050	1070
Daikyo	3420	3570	3830	3570	3270	4380	3900	4060	4150	3700	3300
Mitsubishi Estate	2490	2720	2700	3300	3110	3040	2700	2520	2620	2510	2250
Mitsui Real Estate	1890	2100	2170	2500	2530	3020	2280	2250	2320	2120	1900
Sumitomo Realty & Dev	1590	1610	1530	1800	1890	1900	1610	1450	1540	1490	1310
<<STOCK DIVIDENDS>>											
Aoki Construction	0.62	0.62	0.62	0.62	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Fujita Corp	0.46	0.46	0.46	0.46	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Haseko	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hazama-Gumi	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Kajima	0.68	0.68	0.68	0.68	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Kumagai-Gumi	0.64	0.64	0.64	0.64	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Maeda Corp	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Ohbayashi Corp	0.46	0.46	0.46	0.46	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Penta Ocean Construction	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Shimizu Construction	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Taisei Corp	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58
Daikyo	0.81	0.81	0.81	0.81	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Mitsubishi Estate	0.55	0.55	0.55	0.55	0.57	0.57	0.57	0.57	0.57	0.57	0.57
Mitsui Real Estate	0.58	0.58	0.58	0.58	0.64	0.64	0.64	0.64	0.64	0.64	0.64
Sumitomo Realty & Dev	0.68	0.68	0.68	0.68	0.75	0.75	0.75	0.75	0.75	0.75	0.75

APP 4-1:Monthly Stock Price and Dividend of Selected Japan's Firms

Sources: Wall Street Journal, 1986-1989,
Morgan Stanley, 1986-1989,
Moody's Handbook of Common Stock, 1986-1989,
Moody's Annual Dividend Handbook, 1986-1989

YEAR-MONTH	87-11	87-12	88-1	88-2	88-3	88-4	88-5	88-6	88-7	88-8	88-9
<<ADJUSTED STOCK PRICES>>											
Aoki Construction	970	940	935	985	995	1030	1090	1030	975	920	940
Fujita Corp	683	650	672	715	740	752	779	765	730	701	731
Haseko	1080	970	1160	1170	1190	1250	1170	1130	1180	1170	1140
Hazama-Gumi	730	676	680	692	705	707	823	768	759	736	780
Kajima	1670	1320	1450	1550	1510	1590	1540	1470	1440	1420	1570
Kumagai-Gumi	900	815	861	910	901	1020	1000	1010	972	935	972
Maeda Corp	1550	1300	1400	1390	1350	1400	1400	1330	1290	1230	1350
Ohbayashi Corp	1010	860	910	960	955	959	966	934	960	890	980
Penta Ocean Construction	821	747	830	897	875	850	900	890	848	850	859
Shimizu Construction	961	821	870	912	931	966	1010	1010	950	970	1080
Taisei Corp	995	820	881	945	920	955	941	927	935	881	1000
Daikyo	3120	3050	3200	3480	3010	3100	2860	2810	2850	2740	2590
Mitsubishi Estate	2050	1620	2080	2210	2410	2410	2500	2390	2430	2330	2390
Mitsui Real Estate	1750	1500	1820	2020	2090	2070	2120	1920	2200	2200	2630
Sumitomo Realty & Dev	1130	995	1210	1400	1400	1370	1390	1310	1380	1340	1380
<<STOCK DIVIDENDS>>											
Aoki Construction	0.67	0.67	0.67	0.67	0.67	0.75	0.75	0.75	0.75	0.75	0.75
Fujita Corp	0.50	0.50	0.50	0.50	0.50	0.17	0.17	0.17	0.17	0.17	0.17
Haseko	0.92	0.92	0.92	0.92	0.92	0.83	0.83	0.83	0.83	0.83	0.83
Hazama-Gumi	0.50	0.50	0.50	0.50	0.50	0.58	0.58	0.58	0.58	0.58	0.58
Kajima	0.71	0.71	0.71	0.71	0.71	0.24	0.24	0.24	0.24	0.24	0.24
Kumagai-Gumi	0.67	0.67	0.67	0.67	0.67	0.79	0.79	0.79	0.79	0.79	0.79
Maeda Corp	0.75	0.75	0.75	0.75	0.75	0.25	0.25	0.25	0.25	0.25	0.25
Ohbayashi Corp	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Penta Ocean Construction	0.25	0.25	0.25	0.25	0.25	0.42	0.42	0.42	0.42	0.42	0.42
Shimizu Construction	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Taisei Corp	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58
Daikyo	0.99	0.99	0.99	0.99	0.99	1.46	1.46	1.46	1.46	1.46	1.46
Mitsubishi Estate	0.57	0.57	0.57	0.57	0.57	0.60	0.60	0.60	0.60	0.60	0.60
Mitsui Real Estate	0.64	0.64	0.64	0.64	0.64	0.71	0.71	0.71	0.71	0.71	0.71
Sumitomo Realty & Dev	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

YEAR-MONTH	88-10	88-11	88-12
<<ADJUSTED STOCK PRICES>>			
Aoki Construction	1010	1040	1120
Fujita Corp	810	918	931
Haseko	1150	1180	1150
Hazama-Gumi	901	905	938
Kajima	1730	1790	1850
Kumagai-Gumi	1110	1140	1200
Maeda Corp	1300	1350	1420
Ohbayashi Corp	1130	1120	1160
Penta Ocean Construction	1090	1000	1020
Shimizu Construction	1340	1340	1480
Taisei Corp	1160	1180	1260
Daikyo	2600	2720	2700
Mitsubishi Estate	2550	2820	2650
Mitsui Real Estate	2780	3030	2900
Sumitomo Realty & Dev	1620	1670	1610
<<STOCK DIVIDENDS>>			
Aoki Construction	0.75	0.75	0.75
Fujita Corp	0.17	0.17	0.17
Haseko	0.83	0.83	0.83
Hazama-Gumi	0.58	0.58	0.58
Kajima	0.24	0.24	0.24
Kumagai-Gumi	0.79	0.79	0.79
Maeda Corp	0.25	0.25	0.25
Ohbayashi Corp	0.50	0.50	0.50
Penta Ocean Construction	0.42	0.42	0.42
Shimizu Construction	0.75	0.75	0.75
Taisei Corp	0.58	0.58	0.58
Daikyo	1.46	1.46	1.46
Mitsubishi Estate	0.60	0.60	0.60
Mitsui Real Estate	0.71	0.71	0.71
Sumitomo Realty & Dev	0.75	0.75	0.75

APP 4-2: Monthly Stock Price and Dividend of
Selected Japan's Firms
Sources: Wall Street Journal, 1986-1989,
Morgan Stanley, 1986-1989,
Moody's Handbook of Common Stock, 1986-1989,
Moody's Annual Dividend Handbook, 1986-1989

YEAR-MONTH	86-1	86-2	86-3	86-4	86-5	86-6	86-7	86-8	86-9	86-10	86-11
<<REAL RATE OF RETURN>>											
CBI Industries	n/a	9.22	2.97	11.03	5.41	-5.55	5.73	10.02	-9.82	1.55	-6.01
Centex General	n/a	18.81	10.05	1.48	3.25	3.65	-12.57	13.12	8.98	-8.35	6.16
CRSS	n/a	0.44	18.69	4.93	-1.65	-15.89	-8.64	11.52	-2.11	4.44	6.77
Fluor Daniel	n/a	16.43	-6.24	1.90	6.39	-11.85	-19.80	11.62	-11.45	-5.64	2.26
Foster Wheeler	n/a	7.27	7.00	-10.47	4.68	-2.95	-11.76	3.31	-8.34	18.02	-1.68
Jacobs Engineering	n/a	-6.39	-4.93	24.81	14.80	-1.84	-12.00	-3.18	-6.74	16.58	8.49
Morrison Knudsen	n/a	10.71	11.36	2.30	4.25	-9.24	-9.90	8.17	-5.46	1.08	-0.66
Perini	n/a	7.74	11.19	-8.30	4.06	-1.50	-7.45	-7.33	2.07	6.62	-4.17
Stone & Webster	n/a	13.82	10.95	-11.24	-2.28	2.79	-5.18	9.28	-0.99	-0.06	-0.06
Turner	n/a	0.24	8.45	-4.23	-3.12	1.30	-6.17	-9.75	-0.04	-1.27	-1.29
California REIT	n/a	6.23	-1.62	4.05	-12.91	-4.00	3.32	9.90	-3.78	5.20	2.90
Cenvill	n/a	16.36	4.12	-1.55	0.61	-0.30	0.92	0.08	3.85	2.83	0.80
Federal Realty	n/a	3.69	8.67	-1.92	-1.17	8.01	4.19	6.89	-11.37	2.28	-3.38
First Union	n/a	12.69	6.73	-2.05	-30.57	8.12	4.69	6.45	-2.30	5.24	0.14
Hotel Investment	n/a	3.54	9.57	0.41	-1.76	5.81	-4.61	2.28	-9.68	10.55	2.90
HRE Properties	n/a	n/a	n/a	n/a	-5.53	8.21	0.75	0.60	-1.74	0.69	5.21
IRT Properties	n/a	0.35	18.28	4.89	1.00	3.27	n/a	n/a	n/a	n/a	-6.32
Saul B F RL Inv	n/a	-0.32	3.42	-2.46	-0.92	6.73	0.09	0.61	0.89	-9.19	0.02
Aoki Construction	n/a	5.66	8.01	-3.48	0.58	-2.44	2.89	2.38	10.35	-14.62	4.60
Fujita Corp	n/a	17.90	39.05	-15.64	9.94	7.19	6.47	11.56	-2.02	-18.08	13.73
Haseko	n/a	14.09	55.12	-3.17	3.03	1.22	8.34	29.36	7.94	-22.30	18.53
Hazama-Gumi	n/a	18.01	-2.10	-4.81	10.68	-2.20	5.10	5.17	17.00	-17.05	1.04
Kajima	n/a	20.25	43.60	-13.11	20.28	4.62	10.06	30.29	13.40	-24.34	7.76
Kumagai-Gumi	n/a	11.47	-3.66	-0.27	0.96	0.72	4.48	2.55	43.27	-16.43	-21.96
Maeda Corp	n/a	10.13	4.73	-8.03	7.19	1.52	-2.08	11.46	12.54	-13.77	9.16
Ohbayashi Corp	n/a	14.87	51.56	-16.88	10.53	12.43	15.21	24.46	-1.54	-16.21	8.63
Penta Ocean Construction	n/a	3.38	37.38	2.28	11.34	6.70	2.40	14.31	-4.93	-9.43	8.41
Shimizu Construction	n/a	15.46	32.43	5.90	-1.92	2.38	4.46	21.31	10.51	-17.19	5.93
Taisei Corp	n/a	14.48	31.23	-7.42	12.46	12.29	5.48	42.49	18.38	-18.03	2.78
Daikyo	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-2.10	-0.06	16.55
Mitsubishi Estate	n/a	17.07	76.09	-21.77	15.23	3.52	6.34	2.45	21.52	-21.71	4.25
Mitsui Real Estate	n/a	12.43	57.99	-10.39	4.93	12.45	5.94	-3.30	10.95	-25.15	15.54
Sumitomo Realty & Dev	n/a	n/a	30.93	-15.46	1.41	3.96	4.06	-5.45	3.59	-20.54	28.95

YEAR-MONTH	86-12	87-1	87-2	87-3	87-4	87-5	87-6	87-7	87-8	87-9	87-10
<<REAL RATE OF RETURN>>											
CBI Industries	16.11	10.34	-6.44	-7.33	10.37	-4.17	0.99	-5.87	5.76	-6.07	-27.91
Centex General	-14.45	-2.12	15.09	-7.04	-8.33	-11.66	-1.28	5.46	-4.02	-9.03	-32.77
CRSS	-9.46	21.15	-7.38	10.40	5.81	3.07	24.87	-0.64	n/a	-4.29	-23.43
Fluor Daniel	-6.94	12.44	17.89	3.66	-8.23	15.82	2.52	12.57	-4.29	0.91	-25.33
Foster Wheeler	1.10	29.04	-0.15	-6.08	-4.95	27.74	3.58	8.59	-0.41	-1.96	-39.31
Jacobs Engineering	-5.40	-0.59	12.08	-0.44	-1.74	-2.78	3.39	57.68	-9.12	-2.98	-6.41
Morrison Knudsen	-1.60	24.99	-5.54	-1.19	-3.02	-1.33	2.96	10.95	-3.54	-3.03	-34.58
Perini	1.45	9.47	5.57	-0.18	-1.02	-8.15	4.47	2.47	-2.27	2.24	-28.18
Stone & Webster	-4.50	8.06	5.99	-5.46	2.79	6.99	15.64	8.94	16.14	-0.97	-29.74
Turner	-4.27	16.19	8.38	5.24	1.24	-15.17	10.61	-6.52	2.94	1.99	-31.15
California REIT	-6.41	-35.08	-1.34	0.29	-16.93	8.90	-3.45	-1.36	6.38	-3.44	-15.39
Cenvill	0.07	6.91	1.12	1.65	4.58	-4.14	2.25	-4.18	0.93	0.45	-8.19
Federal Realty	3.55	14.87	4.39	-1.62	-1.18	-5.79	6.24	-4.65	-0.72	-0.01	-13.46
First Union	-2.85	1.15	0.37	-1.17	3.68	1.38	1.67	-1.36	-4.98	-0.67	-27.54
Hotel Investment	-2.15	2.94	5.26	3.36	-5.37	-8.11	7.33	-6.03	-0.96	-4.95	-20.64
HRE Properties	3.46	-2.32	3.58	-12.30	-0.36	0.92	-2.40	-0.61	-6.98	-3.21	-9.29
IRT Properties	-0.85	10.84	5.17	2.88	-4.30	-2.92	7.91	-2.75	-1.86	0.97	-25.84
Saul B F RL Inv	-4.39	2.52	-1.00	0.39	0.32	-14.02	10.65	5.98	5.24	1.69	-10.83
Aoki Construction	9.63	6.85	-3.22	1.51	2.63	26.52	-13.83	-3.82	6.15	7.51	-6.34
Fujita Corp	-4.37	8.86	-0.74	7.91	2.71	5.33	-11.96	-11.63	8.41	-2.13	-0.96
Haseko	-5.64	6.18	10.25	10.36	-5.95	21.03	-16.67	-1.60	-1.41	-9.23	-8.04
Hazama-Gumi	1.73	16.22	-3.98	22.25	5.10	-2.36	-1.93	-1.19	4.74	1.09	3.68
Kajima	21.94	6.96	1.34	5.32	16.09	-0.14	-16.23	1.18	8.58	-3.85	4.76
Kumagai-Gumi	41.32	2.47	-3.28	13.35	-10.14	0.72	-14.67	-2.34	8.07	-5.63	-2.76
Maeda Corp	-4.07	22.86	-5.82	3.19	37.18	-0.75	-12.93	2.02	12.82	-4.18	11.83
Ohbayashi Corp	7.42	18.33	-1.82	17.63	-3.56	-3.43	-14.68	-1.75	5.91	-2.99	12.03
Penta Ocean Construction	-0.77	13.34	-4.59	7.03	16.89	1.19	-14.88	0.91	8.62	-4.35	-2.16
Shimizu Construction	3.20	23.12	9.60	5.67	10.15	-12.05	-11.04	-0.94	14.53	-2.96	0.16
Taisei Corp	7.82	8.51	5.16	6.39	9.62	1.51	-17.55	-1.49	4.16	-0.11	2.05
Daikyo	2.29	5.15	7.31	-7.17	-9.48	33.74	-10.78	4.67	2.24	-11.81	-10.71
Mitsubishi Estate	10.88	10.03	-0.71	21.71	-6.88	-2.40	-11.01	-6.16	3.99	-5.25	-10.26
Mitsui Real Estate	2.37	11.93	3.36	14.73	0.00	19.19	-24.35	-0.77	3.14	-9.61	-10.27
Sumitomo Realty & Dev	0.22	2.01	-4.93	17.18	3.77	0.39	-15.08	-9.43	6.25	-4.28	-11.96

APP 5-1: Monthly Real Rate of Return of Selected U.S. and Japan's Firms (Calculated by the Author)

YEAR-MONTH	87-11	87-12	88-1	88-2	88-3	88-4	88-5	88-6	88-7	88-8	88-9
<<REAL RATE OF RETURN>>											
CBI Industries	-5.41	3.51	3.80	16.27	14.82	1.04	-0.17	9.09	-3.10	-4.92	-3.51
Centex General	-1.51	4.67	-0.82	25.31	-6.12	9.44	18.78	1.54	1.97	-1.31	5.36
CRSS	4.36	0.16	3.07	23.04	8.68	3.37	-0.24	34.33	-6.76	-6.11	13.42
Fluor Daniel	-17.30	14.65	-3.72	29.95	5.45	-1.76	-0.26	19.04	3.14	-4.88	-1.71
Foster Wheeler	-16.98	26.78	5.50	1.69	-11.14	-8.74	11.37	24.05	-6.93	2.16	-4.30
Jacobs Engineering	9.19	21.37	-5.84	-1.03	-0.42	-4.98	-1.92	21.89	20.41	-15.01	-0.62
Morrison Knudsen	-3.50	3.48	-3.22	11.74	3.73	-4.17	3.48	11.35	1.39	-5.84	-2.20
Perini	-6.32	16.18	2.52	4.86	5.91	-6.55	5.12	6.62	1.05	7.35	6.67
Stone & Webster	-4.22	16.64	1.19	5.49	-4.12	1.05	-8.07	4.34	0.99	1.27	2.01
Turner	-4.52	-2.36	-1.09	0.39	3.39	-8.19	3.69	27.58	2.65	-1.18	-10.02
California REIT	0.87	-13.27	39.42	-9.66	-4.19	-2.11	-2.01	5.17	-6.67	-4.71	2.78
Cenvill	-2.62	-1.86	11.87	0.02	4.53	-4.66	-0.71	1.26	-1.46	-2.24	-2.42
Federal Realty	-2.94	8.67	-1.58	7.91	-4.09	4.34	-1.64	1.28	-1.72	1.23	-0.73
First Union	-1.83	1.05	20.14	4.63	-7.22	2.79	1.70	-10.22	0.57	-6.97	-0.24
Hotel Investment	-0.67	-0.54	1.70	8.09	0.58	-2.50	-3.20	1.47	-4.16	-5.26	-14.65
HRE Properties	6.84	9.15	6.99	7.03	-4.99	2.90	-2.38	1.88	-1.39	7.28	-0.01
IRT Properties	6.33	11.36	-2.52	3.82	1.98	-1.21	-1.08	15.57	-2.45	4.54	-1.25
Saul B F RL Inv	-3.77	5.53	5.00	-2.31	-0.35	-1.84	-4.61	44.92	15.71	n/a	n/a
Aoki Construction	-3.40	-3.02	-0.02	5.36	1.01	3.15	5.81	-5.27	-5.10	-5.81	1.38
Fujita Corp	-3.51	-4.76	3.86	6.41	3.48	1.21	3.52	-1.61	-4.39	-4.20	3.41
Haseko	-2.99	-10.10	20.19	0.86	1.70	4.66	-6.41	-3.18	4.68	-1.03	-3.33
Hazama-Gumi	-0.10	-7.33	1.11	1.77	1.87	-0.07	16.39	-6.45	-0.93	-3.20	5.15
Kajima	-7.22	-20.92	10.34	6.91	-2.57	4.86	-3.21	-4.37	-1.86	-1.63	9.64
Kumagai-Gumi	-9.47	-9.37	6.20	5.70	-0.98	12.81	-1.97	1.25	-3.52	-3.97	3.15
Maeda Corp	-9.37	-16.08	8.18	-0.72	-2.87	3.28	-0.07	-4.82	-2.82	-4.88	8.84
Ohbayashi Corp	-10.11	-14.80	6.33	5.50	-0.52	0.04	0.70	-3.09	3.01	-7.48	9.23
Penta Ocean Construction	-4.01	-8.98	11.65	8.09	-2.44	-3.23	5.84	-0.89	-4.51	0.03	0.24
Shimizu Construction	-4.28	-14.49	6.52	4.84	2.07	3.39	4.54	0.25	-5.70	1.92	10.47
Taisei Corp	-6.47	-17.53	7.98	7.28	-2.63	3.42	-1.49	-1.26	1.10	-5.96	12.60
Daikyo	-4.93	-2.21	5.42	8.76	-13.45	2.59	-7.77	-1.53	1.65	-4.06	-6.23
Mitsubishi Estate	-8.39	-20.95	28.99	10.52	-9.01	-0.41	3.67	-4.21	1.87	-4.34	1.72
Mitsui Real Estate	-7.38	-14.25	21.91	11.01	3.45	-1.35	2.36	-9.24	14.82	-0.23	18.56
Sumitomo Realty & Dev	-13.24	-11.89	22.20	15.73	0.00	-2.52	1.42	-5.54	5.58	-3.10	2.16

YEAR-MONTH	88-10	88-11	88-12
<<REAL RATE OF RETURN>>			
CBI Industries	1.65	-6.14	-3.34
Centex General	-5.85	-5.01	12.35
CRSS	-1.32	4.34	9.70
Fluor Daniel	-6.79	4.47	13.87
Foster Wheeler	-5.82	-6.76	8.46
Jacobs Engineering	4.07	7.80	3.16
Morrison Knudsen	-4.21	0.94	5.46
Perini	6.13	-7.31	-1.95
Stone & Webster	3.64	-3.21	-1.16
Turner	-8.05	0.59	1.96
California REIT	13.20	14.24	-7.59
Cenvill	-1.47	-0.47	-3.66
Federal Realty	-0.45	0.43	3.34
First Union	0.04	-3.71	2.29
Hotel Investment	-13.77	-4.65	0.24
HRE Properties	5.38	0.03	-15.27
IRT Properties	1.09	-0.02	3.31
Saul B F RL Inv	n/a	n/a	n/a
Aoki Construction	7.07	3.40	8.04
Fujita Corp	10.36	13.74	1.69
Haseko	0.52	3.03	-2.22
Hazama-Gumi	15.10	0.85	3.98
Kajima	9.74	3.84	3.63
Kumagai-Gumi	13.79	3.12	5.60
Maeda Corp	-4.09	4.22	5.47
Ohbayashi Corp	14.87	-0.50	3.88
Penta Ocean Construction	26.40	-7.91	2.30
Shimizu Construction	23.62	0.40	10.79
Taisei Corp	15.56	2.12	7.10
Daikyo	0.02	5.03	-0.43
Mitsubishi Estate	6.27	10.99	-5.77
Mitsui Real Estate	5.28	9.39	-4.02
Sumitomo Realty & Dev	16.94	3.48	-3.30

APP 5-2: Monthly Real Rate of Return of Selected U.S. and Japan's Firms (Calculated by the Author)

	*****	***1986***	*****	*****	***1987***	*****	*****	***1988***	*****
	long-term D (thousand $)	num. of shares	share price ($/share)	long-term D (thousand $)	num. of shares	share price ($/share)	long-term D (thousand $)	num. of shares	share price ($/share)
Fluor Daniel	519,439	79,271,954	12.13	232,948	78,939,846	14.50			
CRSS	4,943	4,074,045	14.25	2,807	4,074,000	24.75			
Morrison Knudsen	68,217	10,659,570	42.25	76,311	10,813,144	33.25			
Foster Wheeler	196,503	34,509,327	13.13	189,980	35,111,630	13.75			
Centex General	65,263	17,871,970	31.75						
Stone & Webster	21,075	7,423,613	49.13	29,465	7,622,294	67.50			
CBI Industries	179,018	21,646,000	28.88	261,286	21,797,000	19.88			
Turner	64,206	3,999,444	20.63	67,984	4,291,550	16.13			
Jacobs Engineering	941	4,272,184	7.50	12,276	4,277,254	14.25			
Perini	44,443	3,254,213	28.00	39,774	3,274,000	24.75			
California REIT	3,802	5,015,156	11.38						
Cenvill				99,237	6,882,938	17.00			
Federal Realty				168,590	13,526,572	19.88			
First Union				196,460	18,091,754	18.13			
Hotel Investment	36,414	7,853,000	22.63	42,112	12,244,365	21.13			
HRE Properties	16,119	5,941,071	24.88	14,023	5,970,010	18.38			
IRT Properties	67,220	8,024,186	16.38	97,261	9,586,805	15.88			
Saul B F RL Inv	350,000	5,483,013	19.00	429,295	5,483,013	18.75			

	*****	***1986***	*****	*****	***1987***	*****	*****	***1988***	*****
	long-term D (million yen)	num. of shares	share price (yen/share)	long-term D (million yen)	num. of shares	share price (yen/share)	long-term D (million yen)	num. of shares	share price (yen/share)
Aoki Construction				70,500	264,623,000	855			
Daikyo				489,943	83,230,000	3,700			
Fujita Corp	85,421	330,109,779	718						
Haseko	95,551	284,128,506	855						
Hazama-Gumi				40,095	261,777,013	710			
Kajima	84,305	799,205,281	1,200	205,060	842,722,770	1,570			
Kumagai-Gumi	156,720	464,425,805	1,280	161,741	506,850,869	1,030			
Maeda Corp	26	163,673,000	1,020	29	164,326,000	1,550			
Mitsubishi Estate	252,330	1,185,813,893	2,230				353,359	1,265,462,462	2,410
Mitsui Real Estate	291,357	510,476,268	1,780				624,471	681,775,810	2,090
Ohbayashi Corp							94,858	696,991,186	955
Penta Ocean Const	37,837	301,318,271	541	35,714	301,318,271	820			
Shimizu Construction				134,090	714,000,000	1,050			
Sumitomo Realty & D	69,440	265,195,000	1,800						
Taisei Corp	144,223	778,532,243	485				252,051	920,365,532	920

Debt-Equity ratio		AVERAGE
1986	1987	1988 DEBT-EQUITY
(%)	(%)	(%) (%)
54.04	20.35	37.20
8.51	2.78	5.65
15.15	21.22	18.19
43.38	39.35	41.37
11.50		11.50
5.78	5.73	5.75
28.64	60.31	44.48
77.84	98.24	88.04
2.94	20.14	11.54
48.78	49.08	48.93
6.66		6.66
	84.81	84.81
	62.70	62.70
	59.91	59.91
20.49	16.28	18.39
10.91	12.78	11.85
51.16	63.92	57.54
335.97	417.58	376.77

Debt-Equity ratio		AVERAGE
1986	1987	1988 DEBT-EQUITY
(%)	(%)	(%) (%)
	31.20	31.20
	159.10	159.10
36.04		36.04
39.33		39.33
	21.57	21.57
8.79	14.57	11.68
26.36	30.98	28.67
0.02	0.01	0.01
9.54		11.59 10.56
32.06		43.83 37.95
		14.25 14.25
23.21	14.45	18.83
	17.89	17.89
14.55		14.55
38.20		29.77 33.98

APP 6: Debt-to-Equity Ratio of Selected U.S. and Japan's Firms
Sources: Moody's Bank and Financial Manual, 1986-1988,
Moody's Industrial Manual, 1986-1988, and
Moody's International Manual, 1986-1988

YEAR-MONTH	<<PERSONAL CONSUMPTION EXPENDITURE>> [BILLIONS OF 1982 DOLLARS] TOTAL CONSUMPTION	DURABLE GOODS	NONDURABLE GOODS	SERVICES	RESIDENT POPULATION [THOUSANDS]
85-12	2405.20	360.20	858.40	1186.70	239,827
86-01	2408.50	373.00	862.90	1172.50	240,004
86-02	2407.80	360.60	868.20	1178.90	240,169
86-03	2416.40	357.40	879.20	1179.80	240,325
86-04	2428.90	375.80	876.00	1177.00	240,505
86-05	2439.10	381.20	881.30	1176.50	240,697
86-06	2429.10	366.60	882.20	1180.40	240,900
86-07	2443.60	379.60	881.30	1182.70	241,107
86-08	2453.60	394.20	879.40	1180.00	241,330
86-09	2496.00	432.00	876.50	1187.50	241,562
86-10	2463.60	391.80	884.20	1187.50	241,782
86-11	2482.80	383.60	881.10	1198.10	241,985
86-12	2507.00	417.10	885.20	1204.70	242,150
87-01	2449.80	365.50	877.50	1206.80	242,326
87-02	2494.40	381.60	897.70	1215.10	242,494
87-03	2490.90	381.20	888.00	1221.70	242,653
87-04	2504.10	389.30	888.60	1226.20	242,850
87-05	2502.10	384.50	888.20	1229.40	243,014
87-06	2517.00	393.90	890.20	1232.90	243,217
87-07	2529.60	398.20	891.40	1240.00	243,419
87-08	2548.70	410.90	893.40	1244.40	243,638
87-09	2531.10	402.10	890.60	1238.40	243,873
87-10	2524.90	383.70	889.40	1251.80	244,112
87-11	2525.40	387.30	891.70	1246.50	244,321
87-12	2546.40	397.10	897.60	1251.80	244,523
88-01	2563.70	408.40	891.80	1263.50	244,712
88-02	2569.20	408.20	896.30	1264.70	244,875
88-03	2579.50	408.40	901.50	1269.50	245,033
88-04	2572.50	409.40	894.00	1269.10	245,208
88-05	2582.30	412.40	899.10	1270.80	245,372
88-06	2605.80	422.70	904.50	1278.60	245,585
88-07	2599.70	408.90	906.90	1283.90	245,807
88-08	2620.00	414.20	914.40	1291.40	246,040
88-09	2604.50	409.10	909.70	1285.60	246,286
88-10	2620.80	412.10	911.20	1297.50	246,517
88-11	2627.90	417.30	918.00	1292.60	246,729
88-12	2634.50	432.00	907.00	1295.50	246,924

APP 7: Personal Consumption Expenditure and Resident Population in U.S.

Sources: U.S. Department of Commerce, Bureau of Economic Analysis,1989 and Bureau of Census, 1989

YEAR-MONTH	<<LIVING EXPENDITURE OF ALL JAPAN'S HOUSEHOLDS>> [NOMINAL YEN] TOTAL EXPENDITURE	FUEL,LIGHT& WATER CHRGE	CLOTHING & FOOTWEAR	PERSONS PER HOUSEHOLDS [PERSONS]
85-12				
86-01	261,791	21,740	19,117	3.73
86-02	239,053	23,388	14,489	3.70
86-03	294,406	21,946	23,110	3.71
86-04	264,079	18,933	19,054	3.70
86-05	263,879	17,189	19,219	3.69
86-06	262,517	15,096	19,501	3.67
86-07	286,423	13,781	20,819	3.67
86-08	275,079	14,124	14,891	3.67
86-09	251,608	15,026	14,419	3.68
86-10	267,939	15,037	20,418	3.68
86-11	259,969	15,382	20,323	3.69
86-12	369,761	18,272	31,039	3.69
87-01	260,965	18,686	18,903	3.71
87-02	241,926	19,732	14,852	3.70
87-03	299,163	18,945	22,472	3.70
87-04	265,834	17,003	19,799	3.68
87-05	271,286	15,733	20,111	3.68
87-06	264,781	14,328	18,584	3.67
87-07	291,244	13,548	21,107	3.66
87-08	278,367	14,667	14,435	3.66
87-09	257,080	15,186	15,688	3.65
87-10	275,682	14,767	20,065	3.66
87-11	266,227	15,186	21,089	3.63
87-12	378,771	18,729	33,712	3.63
88-01	272,776	18,688	19,996	3.65
88-02	257,358	19,783	16,803	3.64
88-03	306,394	19,237	21,908	3.62
88-04	294,440	17,284	21,136	3.62
88-05	281,315	16,299	19,928	3.63
88-06	269,944	14,263	19,436	3.61
88-07	303,475	13,793	22,305	3.62
88-08	288,962	14,210	15,077	3.63
88-09	269,402	14,418	16,591	3.64
88-10	282,183	14,709	22,976	3.65
88-11	273,584	15,293	22,505	3.65
88-12	393,636	17,933	33,859	3.64

APP 8: Living Expenditure of All Japan's Household and Persons per Households

Sources: The Bank of Japan, 1986-1988

<<LIVING EXPENDITURE, ALL HOUSEHOLDS, ALL JAPAN : RAW SERIES>> [YEN]

YEAR\MONTH	1	2	3	4	5	6	7	8	9	10	11	12
1965	41,235	39,838	48,484	47,456	46,131	48,126	50,638	46,911	44,474	48,381	46,736	72,343
66	44,880	44,189	52,678	52,035	49,275	51,189	54,184	50,674	47,786	52,029	50,840	80,434
67	49,715	47,989	57,437	55,669	54,484	57,005	58,827	55,232	55,302	55,540	54,131	85,620
68	53,408	53,828	62,642	62,715	59,489	62,636	64,510	61,801	60,197	63,671	61,241	97,142
69	59,292	57,315	70,293	68,509	65,814	69,158	72,373	69,943	65,984	69,365	68,340	108,249
70	66,722	65,079	78,822	76,867	74,502	77,822	81,894	79,129	73,209	80,183	77,058	122,985
71	76,473	72,386	87,406	85,884	81,328	85,931	92,234	86,062	81,374	85,488	84,444	130,689
72	82,956	80,491	95,685	92,305	89,859	92,756	99,164	95,600	89,149	94,699	92,787	146,836
73	92,183	91,099	110,059	104,774	103,255	105,694	115,724	109,666	105,820	113,610	113,988	179,522
74	112,035	106,732	129,105	126,854	124,468	135,280	143,714	138,234	132,870	135,094	134,969	212,932
75	136,913	130,321	160,513	149,932	147,824	156,420	165,180	158,805	143,539	153,062	154,493	236,783
76	151,760	146,333	178,361	168,834	162,428	169,180	181,639	175,447	159,416	171,530	171,556	261,001
77	171,368	158,263	197,641	191,271	179,817	185,486	199,155	192,158	172,419	183,569	179,364	275,453
78	183,640	171,092	207,674	197,996	187,539	194,899	211,640	199,981	184,020	195,692	193,909	292,493
79	194,073	179,271	220,146	210,939	202,464	210,926	223,691	241,203	198,196	207,327	204,052	311,075
80	208,175	201,492	238,193	225,231	214,331	223,637	240,672	230,089	212,227	225,322	217,673	329,771
81	223,153	204,619	254,860	242,830	226,257	227,360	247,715	236,295	219,958	227,936	227,134	342,045
82	232,435	217,665	271,430	252,292	240,494	244,427	259,888	249,543	230,715	247,523	237,839	353,773
83	245,612	223,413	277,218	261,849	244,843	245,469	267,263	254,773	232,929	251,316	245,112	364,450
84	242,488	239,290	279,729	269,952	253,006	250,545	274,773	258,853	245,674	259,162	249,094	373,065

<<LIVING EXPENDITURE, ALL HOUSEHOLDS, ALL JAPAN : SEASONALLY ADJUSTED SERIES> [YEN]

YEAR\MONTH	1	2	3	4	5	6	7	8	9	10	11	12
1965	46,186	46,011	46,991	47,146	47,982	48,355	48,969	48,975	48,909	50,164	50,048	49,840
66	50,290	51,140	51,105	51,705	51,347	51,456	52,546	52,787	52,465	53,939	54,520	55,333
67	55,672	55,560	55,727	55,301	56,883	57,390	57,222	57,329	60,587	57,578	58,131	58,739
68	59,719	62,462	60,787	62,401	62,252	63,148	62,841	63,892	65,799	66,088	65,807	66,560
69	66,184	66,514	68,242	68,321	69,009	69,889	70,539	71,997	72,037	72,076	73,426	74,131
70	74,283	75,499	76,453	76,965	78,321	78,918	79,666	81,175	79,969	83,438	82,633	84,274
71	84,944	83,852	84,666	86,373	85,460	87,462	89,444	88,028	89,049	89,113	90,436	89,807
72	91,849	93,183	92,474	93,233	94,544	94,602	95,809	97,559	97,848	99,030	99,159	100,860
73	101,722	105,363	106,070	106,142	108,760	107,872	111,521	111,575	116,602	119,147	121,656	123,667
74	123,190	123,393	123,920	128,700	131,243	138,125	138,238	140,168	147,056	142,061	143,913	147,271
75	149,916	150,649	153,507	152,024	156,082	159,757	158,683	160,481	159,427	161,181	164,832	166,064
76	165,219	169,222	170,099	170,775	171,687	172,817	174,409	176,924	177,345	180,742	183,225	182,694
77	185,512	182,874	188,093	192,865	190,229	189,843	191,226	193,633	191,697	193,236	191,966	194,150
78	197,720	197,576	197,108	198,976	198,324	199,723	203,377	201,743	204,086	205,639	208,092	207,359
79	208,078	206,888	208,190	211,318	214,065	216,707	215,259	216,625	219,161	217,285	219,478	221,745
80	222,382	232,526	224,246	224,880	226,394	230,549	232,172	233,290	234,156	235,619	234,388	236,083
81	237,885	235,809	238,958	241,600	238,699	235,458	239,529	240,363	242,368	237,731	244,724	245,877
82	247,215	250,534	253,602	249,998	253,265	254,494	251,757	254,420	253,870	257,470	256,001	254,678
83	261,209	257,007	258,743	258,873	257,586	256,676	259,193	260,340	256,128	260,924	263,585	262,725
84	257,770	275,123	260,869	266,579	265,938	262,455	266,743	264,804	270,365	268,965	267,878	269,200

<<SEASONALITY ADJUSTMENT FACTOR>>

YEAR\MONTH	1	2	3	4	5	6	7	8	9	10	11	12
1965	1.1200679	1.15495256	0.96920634	0.99346763	1.04012486	1.00475834	0.96704056	1.04399821	1.09972119	1.03685331	1.07066614	0.68894019
66	1.12054367	1.15730159	0.97013934	0.99365811	1.04204972	1.00541132	0.96976957	1.04169791	1.09791571	1.0367103	1.07238395	0.68793048
67	1.11982299	1.15776532	0.97022825	0.9933895	1.04403128	1.00675379	0.97271661	1.03796712	1.09556616	1.03669427	1.07389481	0.68604298
68	1.11816582	1.16039979	0.97036728	0.99499322	1.04644556	1.00817421	0.97412604	1.0338344	1.09306112	1.03796077	1.07455789	0.68518252
69	1.11590096	1.160499	0.97082213	0.99725583	1.0485459	1.01057	0.97465906	1.02936677	1.09173436	1.03908311	1.07442201	0.68481926
70	1.11332094	1.16011309	0.96994494	1.00127493	1.04985121	1.01408342	0.9727941	1.02585651	1.09233837	1.04059464	1.0723481	0.68523804
71	1.11077112	1.1584008	0.96865204	1.00569373	1.05080661	1.01781662	0.96975085	1.022844	1.0943176	1.04240361	1.07095827	0.68565067
72	1.10720141	1.15768223	0.96644197	1.01005363	1.05202016	1.01987989	0.96616716	1.02049163	1.09757821	1.04573438	1.06855825	0.68688877
73	1.10347895	1.15657891	0.9637558	1.01305667	1.05331461	1.02060666	0.96368083	1.01741652	1.10189	1.04873691	1.06727024	0.68886822
74	1.0995671	1.15610126	0.95983689	1.01455216	1.05443166	1.02103785	0.96189654	1.01399077	1.10676501	1.0515715	1.06626707	0.69163395
75	1.09497272	1.15598407	0.95635244	1.01395299	1.05566373	1.02133359	0.96066715	1.01055382	1.11068769	1.05304366	1.06692213	0.69545989
76	1.08866608	1.15641721	0.95367821	1.0114965	1.05700372	1.02149781	0.96019577	1.0084185	1.11246675	1.05370489	1.06801861	0.69997433
77	1.08253563	1.15550697	0.95169019	1.00833373	1.05790331	1.02241139	0.96018679	1.00767597	1.11180902	1.0526614	1.07027051	0.70483894
78	1.07667175	1.15479391	0.94912218	1.00494959	1.05750804	1.02475128	0.96095729	1.00881084	1.1090425	1.05082988	1.07314256	0.70893662
79	1.07216357	1.15405169	0.94569059	1.00179673	1.05729908	1.02740772	0.96230514	0.89810243	1.10577913	1.04803041	1.07559838	0.71283453
80	1.06824547	1.154021	0.94144564	0.9984416	1.05628211	1.03090723	0.96468222	1.01391201	1.10332604	1.04569904	1.0767895	0.71589982
81	1.06601749	1.15242964	0.93760496	0.99493473	1.05499056	1.03566151	0.96695396	1.01721577	1.10188309	1.04297259	1.07744327	0.71884401
82	1.06358767	1.15100728	0.93431824	0.99090736	1.0531032	1.04118612	0.96871345	1.01954373	1.10036192	1.04018616	1.07636258	0.719891
83	1.0635026	1.15036726	0.9333557	0.98863467	1.0520456	1.04565546	0.96980502	1.02185082	1.09959687	1.03822249	1.07569193	0.72068078
84	1.06302168	1.14974717	0.9325776	0.98750519	1.05111341	1.04753637	0.97077588	1.02298988	1.09960793	1.03782576	1.07540928	0.72159007
AVERAGE	1.09341229	1.15570594	0.95576269	1.00091743	1.05173672	1.02237202	0.9668923	1.01582688	1.10127258	1.04397596	1.07235877	0.69951725

APP 9: Seasonality Adjustment Factor of Japan's Consumption

Sources: The Bank of Japan, 1985

YEAR-MONTH	CHANGES IN REAL CONSUMPTION PER CATPITA(%)		CONSUMPTION PER CAPITA	
	US	JAPAN	US (DOOLAR)	JAPAN (YEN)
85-12				
86-01	-0.62		9,750	62,265
86-02	0.43	0.92	9,793	62,292
86-03	0.66	0.08	9,857	62,019
86-04	-0.08	6.01	9,849	66,205
86-05	0.24	-2.39	9,872	65,523
86-06	0.02	0.04	9,874	64,872
86-07	0.28	1.83	9,901	65,942
86-08	-0.11	0.79	9,890	66,231
86-09	0.20	0.04	9,910	66,835
86-10	0.50	-1.07	9,959	66,235
86-11	0.51	-0.76	10,010	65,048
86-12	0.50	-3.39	10,061	62,623
87-01	0.03	0.81	10,063	62,252
87-02	1.33	2.20	10,197	63,618
87-03	-0.12	-0.26	10,186	64,009
87-04	0.17	3.40	10,203	67,617
87-05	0.24	0.16	10,227	68,163
87-06	0.13	-2.14	10,241	66,473
87-07	0.31	2.47	10,272	67,412
87-08	0.12	-0.15	10,284	67,311
87-09	-0.43	0.66	10,240	69,296
87-10	0.57	0.54	10,298	69,552
87-11	-0.03	-0.71	10,294	68,346
87-12	0.50	-3.94	10,346	65,652
88-01	0.29	2.77	10,375	66,890
88-02	0.06	4.34	10,382	69,554
88-03	0.39	-3.27	10,423	67,865
88-04	-0.30	3.79	10,392	71,046
88-05	0.33	1.31	10,426	72,101
88-06	0.37	-3.82	10,464	69,109
88-07	0.21	3.63	10,486	71,371
88-08	0.33	-0.88	10,520	71,106
88-09	-0.62	1.80	10,454	73,641
88-10	0.57	-3.66	10,514	71,550
88-11	0.17	-0.72	10,532	70,553
88-12	-0.22	-1.06	10,509	69,451

APP 10: Changes in Real Consumption per Capita and Consumption per Capita in U.S. and Japan (Calculated by the author)

YEAR-MONTH	TREASURY BILL RATES (%) US	(%) JAPAN	MONEY MARKET RATES (%) US	(%) JAPAN	EFFECTIVE NOMINAL EXCHANGE RATE US	JAPAN	EFFECTIVE REAL EXCHANGE RATE US	JAPAN
85-12	7.25	4.91	8.01	7.03	116.10	129.20	111.50	105.20
86-01	7.15	4.91	7.91	6.12	115.10	130.10	109.70	105.80
86-02	7.23	4.41	7.80	5.92	111.20	136.60	105.00	113.10
86-03	6.50	3.90	7.34	5.16	109.00	142.30	101.90	116.10
86-04	6.24	3.39	7.17	4.53	108.10	144.90	101.00	117.50
86-05	6.45	3.39	6.96	4.66	105.80	150.90	99.90	121.60
86-06	6.13	3.39	6.75	4.84	106.50	151.10	100.80	121.40
86-07	5.93	3.39	6.52	4.65	104.00	158.60	97.80	127.40
86-08	5.23	3.39	5.65	4.53	102.30	161.70	96.00	127.20
86-09	5.30	3.39	5.96	4.75	102.20	160.80	97.50	126.70
86-10	5.25	3.39	5.81	4.54	102.10	158.40	97.80	124.30
86-11	5.44	2.89	5.79	4.43	103.50	152.70	99.20	119.50
86-12	5.73	2.89	7.78	4.34	102.50	152.40	98.30	118.90
87-01	5.66	2.89	6.76	4.22	98.60	156.40	94.20	121.40
87-02	5.49	2.89	6.06	3.96	96.90	156.40	93.10	120.50
87-03	5.76	2.38	6.70	3.98	96.00	157.90	92.40	121.00
87-04	5.61	2.38	6.98	3.89	94.00	165.90	90.50	126.30
87-05	5.82	2.38	7.12	3.70	93.50	168.20	90.00	127.60
87-06	5.90	2.38	7.10	3.73	94.80	164.70	91.50	124.40
87-07	6.11	2.38	6.98	3.74	96.00	159.10	92.60	120.70
87-08	6.41	2.38	7.10	3.71	95.70	162.70	92.10	123.60
87-09	6.82	2.38	7.94	3.84	93.90	165.40	90.40	125.70
87-10	5.41	2.38	7.58	3.88	93.40	165.10	90.50	124.90
87-11	5.79	2.38	7.80	3.90	90.00	171.20	87.00	129.10
87-12	5.84	2.38	7.21	3.90	87.40	178.60	84.30	136.90
88-01	5.80	2.38	6.90	3.85	87.40	179.80	84.50	137.30
88-02	5.78	2.38	6.77	3.80	88.20	179.30	85.50	136.30
88-03	5.87	2.38	6.90	3.80	88.80	180.70	84.70	136.00
88-04	6.15	2.38	7.20	3.75	85.70	183.30	83.40	137.10
88-05	6.67	2.38	7.75	3.80	86.10	183.70	83.70	137.40
88-06	6.56	2.38	7.87	3.84	87.60	182.00	85.40	135.60
88-07	6.95	2.38	8.29	3.97	90.10	177.40	88.10	131.60
88-08	7.30	2.38	8.66	4.15	91.30	177.70	89.20	131.70
88-09	7.25	2.38	8.52	4.25	91.30	176.80	89.30	130.90
88-10	7.36	2.38	8.61	4.10	88.80	182.40	87.20	134.30
88-11	8.10	2.38	9.48	4.18	86.60	187.60	85.20	137.70
88-12	8.38	2.38	9.39	4.17	86.20	186.70	84.90	136.60

APP 11: Monthly Data of Treasury Bill Rates, Representative Money Market Rates, Effective Nominal Exchange Rates, and Effective Real Exchange Rates

Sources: World Financial Markets, 1986-1989

YEAR(QUART)	EX.RATE (YEN/$)	T-BILL JAPAN	RATE(%) US	CHANGES IN EX.RATE	DIFFERENCES IN INTEREST	ACC.CHANGES IN EX.RATE	ACC. DIFFE. IN INTEREST	ESTIMATE OF REAL EX.RATE	ACTUAL EX.RATE	DIFFERENCE N-M	VARIENCE	
1973-1	287.40	4.91	6.25					280.00	287.40	7	55	78109
2	265.30	4.91	7.23	0.92	1.00	0.92	1.00	279.08	265.30	-14	190	
3	265.30	5.55	7.33	1.00	0.99	0.92	0.99	277.49	265.30	-12	149	
4	274.62	5.80	7.41	1.04	1.00	0.96	0.99	276.28	274.62	-2	3	
1974-1	292.31	6.73	8.30	1.06	1.00	1.02	0.98	275.19	292.31	17	293	
2	279.09	6.83	8.23	0.95	1.00	0.97	0.98	274.13	279.09	5	25	
3	294.64	6.83	9.79	1.06	1.00	1.03	0.98	273.19	294.64	21	460	
4	300.01	6.83	7.54	1.02	0.99	1.04	0.97	271.22	300.01	29	829	
1975-1	293.32	6.83	5.65	0.98	1.00	1.02	0.97	270.66	293.32	23	513	
2	292.36	6.31	5.29	1.00	1.00	1.02	0.97	271.47	292.36	21	437	
3	297.95	6.06	6.52	1.02	1.00	1.04	0.97	272.15	297.95	26	666	
4	303.57	5.68	5.64	1.02	1.00	1.06	0.97	271.84	303.57	32	1007	
1976-1	299.70	5.68	5.01	0.99	1.00	1.04	0.97	271.87	299.70	28	775	
2	297.40	5.68	5.61	0.99	1.00	1.03	0.97	272.32	297.40	25	629	
3	287.45	5.68	5.19	0.97	1.00	1.00	0.97	272.36	287.45	15	228	
4	292.80	5.68	4.56	1.02	1.00	1.02	0.97	272.69	292.80	20	404	
1977-1	277.50	5.68	4.79	0.95	1.00	0.97	0.98	273.45	277.50	4	16	
2	267.70	4.91	5.08	0.96	1.00	0.93	0.98	274.05	267.70	-6	40	
3	265.45	4.91	5.70	0.99	1.00	0.92	0.98	273.94	265.45	-8	72	
4	240.09	4.15	6.18	0.90	1.00	0.84	0.98	273.40	240.09	-33	1110	
1978-1	222.40	4.15	6.56	0.93	1.00	0.77	0.97	272.04	222.40	-50	2464	
2	204.70	3.39	6.78	0.92	0.99	0.71	0.97	270.42	204.70	-66	4319	
3	189.15	3.39	7.74	0.92	0.99	0.66	0.96	268.17	189.15	-79	6244	
4	194.60	3.39	9.20	1.03	0.99	0.68	0.95	265.31	194.60	-71	5000	
1979-1	209.30	3.39	9.60	1.08	0.99	0.73	0.93	261.54	209.30	-52	2729	
2	217.00	4.15	9.74	1.04	0.98	0.76	0.92	257.58	217.00	-41	1646	
3	223.30	5.17	9.97	1.03	0.99	0.78	0.91	254.06	223.30	-31	946	
4	239.70	5.17	11.68	1.07	0.99	0.83	0.90	251.09	239.70	-11	130	
1980-1	243.54	5.68	14.92	1.02	0.98	0.85	0.88	247.12	243.54	-4	13	
2	232.69	6.82	8.05	0.96	0.98	0.81	0.86	241.61	232.69	-9	80	
3	220.08	6.82	10.70	0.95	1.00	0.77	0.86	240.89	220.08	-21	433	
4	210.65	6.44	14.84	0.96	0.99	0.73	0.85	238.61	210.65	-28	782	
1981-1	205.57	5.93	14.80	0.98	0.98	0.72	0.83	233.78	205.57	-28	796	
2	220.00	5.68	16.00	1.07	0.98	0.77	0.82	228.78	220.00	-9	77	
3	231.89	5.68	16.16	1.05	0.98	0.81	0.80	223.10	231.89	9	77	
4	224.68	5.68	10.70	0.97	0.97	0.78	0.78	217.47	224.68	7	52	
1982-1	233.49	5.42	12.93	1.04	0.99	0.81	0.77	214.82	233.49	19	349	
2	244.15	5.42	12.00	1.05	0.98	0.85	0.75	210.91	244.15	33	1105	
3	258.86	5.42	8.01	1.06	0.98	0.90	0.74	207.54	258.86	51	2634	
4	259.68	5.42	8.10	1.00	0.99	0.90	0.74	206.22	259.68	53	2858	
1983-1	235.74	5.42	8.03	0.91	0.99	0.82	0.73	204.87	235.74	31	953	
2	237.55	5.42	8.75	1.01	0.99	0.83	0.73	203.56	237.55	34	1155	
3	242.53	5.42	9.52	1.02	0.99	0.84	0.72	201.90	242.53	41	1651	
4	234.25	5.42	9.05	0.97	0.99	0.82	0.71	199.88	234.25	34	1181	
1984-1	231.01	4.91	9.48	0.99	0.99	0.80	0.71	198.11	231.01	33	1083	
2	229.61	4.91	10.13	0.99	0.99	0.80	0.70	195.89	229.61	34	1137	
3	243.46	4.91	11.06	1.06	0.99	0.85	0.69	193.40	243.46	50	2506	
4	246.02	4.91	8.71	1.01	0.99	0.86	0.68	190.51	246.02	56	3082	
1985-1	257.68	4.91	8.87	1.05	0.99	0.90	0.67	188.74	257.68	69	4753	
2	250.73	4.91	7.63	0.97	0.99	0.87	0.67	186.91	250.73	64	4073	
3	238.64	4.91	7.36	0.95	0.99	0.83	0.66	185.66	238.64	53	2807	
4	207.09	4.91	7.52	0.87	0.99	0.72	0.66	184.54	207.09	23	508	
1986-1	187.88	4.41	7.23	0.91	0.99	0.65	0.65	183.36	187.88	5	20	
2	170.13	3.39	6.45	0.91	0.99	0.59	0.65	182.09	170.13	-12	143	
3	155.77	3.39	5.23	0.92	0.99	0.54	0.65	180.72	155.77	-25	623	
4	160.29	2.89	5.44	1.03	1.00	0.56	0.64	179.90	160.29	-20	385	
1987-1	153.17	2.89	5.49	0.96	0.99	0.53	0.64	178.77	153.17	-26	655	
2	142.67	2.38	5.82	0.93	0.99	0.50	0.63	177.62	142.67	-35	1222	
3	146.92	2.38	6.41	1.03	0.99	0.51	0.63	176.12	146.92	-29	853	
4	135.79	2.38	5.79	0.92	0.99	0.47	0.62	174.37	135.79	-39	1489	
1988-1	128.00	2.38	5.78	0.94	0.99	0.45	0.62	172.91	128.00	-45	2017	
2	125.61	2.38	6.67	0.98	0.99	0.44	0.61	171.46	125.61	-46	2102	
3	133.71	2.38	7.30	1.06	0.99	0.47	0.61	169.65	133.71	-36	1292	
4	125.28	2.38	8.10	0.94	0.99	0.44	0.60	167.60	125.28	-42	1791	
											78109	

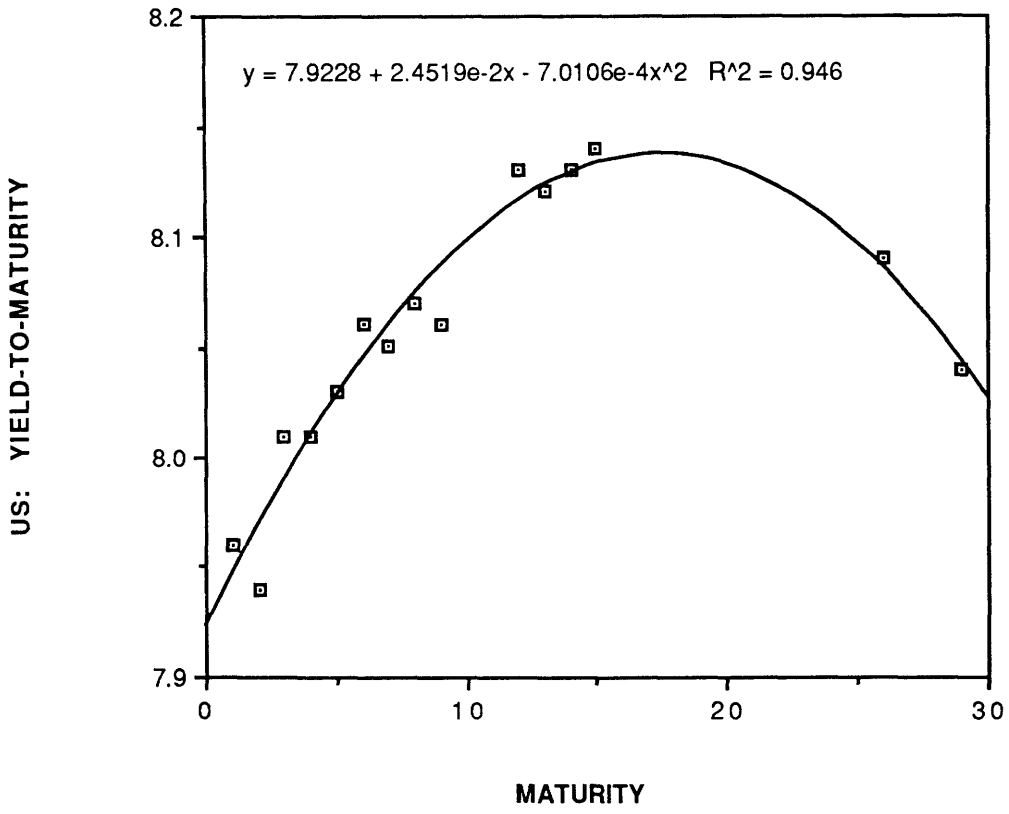
APP 12: Monthly Spot Exchange Rates and Estimated Equilibrium Nominal Exchange Rates per IFE
Sources: International Financial Statistics, 1986-1989
(Equilibrium nominal exchange rates are estimated by the author.)

1985	86	87	88	89	90	91	92	93	94	95	96	97
0	1	2	3	4	5	6	7	8	9	10	11	12
<<YIELD-TO-MATURITY OF TREASURY NOTES>>												
-US	7.96	7.94	8.01	8.01	8.03	8.06	8.05	8.07	8.06			8.13
-JAPAN		5.08	5.12	5.16						5.23		
<<ESTIMATED YIELD-TO-MATURITY OF TREASURY NOTES WITH POLYNOMIAL CURVE(2nd ORDER)>>												
-US	7.95	7.97	7.99	8.01	8.03	8.04	8.06	8.07	8.09	8.10	8.11	8.12
-JAPAN	5.07	5.10	5.12	5.14	5.16	5.18	5.20	5.21	5.23	5.24	5.25	5.26
YEN/$												
185	180	175	171	166	162	157	153	149	145	141	138	134
207	201	196	191	186	181	176	172	167	163	158	154	150
US inflation rate = 5 %												
Japan inflation Rate (%)												
	2.20	2.21	2.21	2.22	2.22	2.23	2.23	2.23	2.24	2.24	2.24	2.25

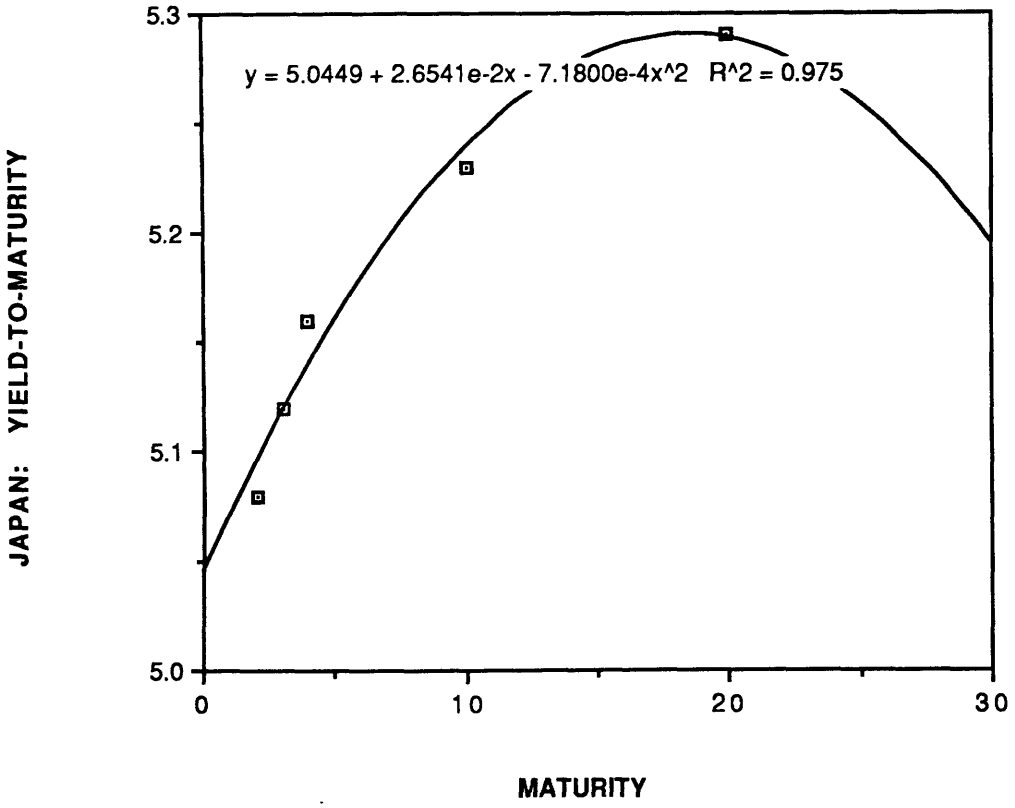
98	99	2000	1	2	3	4	5	6	7	8	9	10
13	14	15	16	17	18	19	20	21	22	23	24	25
8.12	8.13	8.14										
							5.29					
8.12	8.13	8.13	8.14	8.14	8.14	8.14	8.13	8.13	8.12	8.12	8.11	8.10
5.27	5.28	5.28	5.29	5.29	5.29	5.29	5.29	5.29	5.28	5.28	5.27	5.26
131	127	124	121	118	114	111	109	106	103			
146	142	139	135	131	128	125	121	118	115			
2.25	2.25	2.25	2.26	2.26	2.26	2.26	2.26	2.26	2.26			
							average		2.24			

11	12	13	14
26	27	28	29
8.09			8.04
8.09	8.07	8.06	8.04
5.25	5.24	5.23	5.21

APP 13: Term Structure of Interest of Treasury Notes in U.S. and Japan and Estimated Monthly Inflation Rates in Japan
Sources: Wall Street Journal, January 2, 1986, and The Bank of Japan, 1987
(Monthly inflation rates in Japan are estimated by the author.)



APP 14: Polinomial Simulation of Term Structure of Interest in U.S.



APP 15: Polinomial Simulation of Term Structure of Interest in Japan

VC-1

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
ASSUMPTIONS													
1 general assumptions													
- term loan interest rate		8.11%	8.11%	8.11%	8.11%	8.11%	8.11%	8.11%	8.11%	8.11%	8.11%	8.11%	8.11%
- short term interest rate		8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%
- cost of equity		9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%
- property appreciation rate				0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2 hotel assumptions													
- average room rate	growth rate=	0.00		100	100	112	119	129	134	142	150	159	169
- occupancy				0.65	0.70	0.75	0.79	0.79	0.79	0.79	0.79	0.79	0.79
- replacement reserve				0.01	0.015	0.02	0.02	0.025	0.025	0.025	0.025	0.025	0.025
3 office building													
- average annual rent	growth rate=	0.00		30	30	30	31	33	33	37	39	41	
- occupancy				0.40	0.60	0.80	0.85	0.90	0.95	0.95	0.95	0.95	
- property expenses %				0.3	0.28	0.25	0.18	0.18					
4 retail													
- rental partner													
- managing partner													
- term loan principal	insured $												
- total	50%												
- bank	50%												
- term loan interest	insured $												
- total													
- bank													
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
HOTEL CONSTRUCTION													
land													
construction	%												
- site work													
- shell & core													
- services & equip													
- furniture & office													
- contingency													
construction subtotal													
interest, construction													
- loan fees													
- testing & inspection													
- title insurance													
- legal & consulting													
- building permits & fees													
- insurance													
- property tax													
- accounting/auditing aud													
- marketing/rent agent													
- closing commission													
- TI & E Entertainment													
- TI building permit & fees													
- general & administrative													
- contingency reserve													
interest const. subtotal													
finance													
- commitment loan fee													
- contingency reserve													
finance subtotal													
total cost before interest													
construction interest													
- accumulated costs													
- equity used	equity=	19,700.00											
- accumulated equity													
- accumulated principal													
- interest 9.5%													
- interest subtotal													
HOTEL CONSTRUCTION TOTAL													

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
HOTEL OPERATION													
assumptions													
- number of rooms	453.00 rooms												
- occupied	at 365.00 rooms/year												
- 10 year ADR	AS of 1/93			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- 5 year ADR	AS of 1/93			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
revenue													
- room				11,455	13,001	14,550	16,275	17,295	18,432	19,556	20,870	21,917	23,012
- food & beverage	% $ of room revenue			3,555	4,032	4,735	5,219	5,537	5,898	6,258	6,678	7,014	7,364
- various	% $ of room revenue			367	416	488	538	571	609	646	689	724	760
total revenue				15,377	17,454	19,593	21,532	23,404	24,939	26,461	28,237	29,655	31,136
costs of sales													
- room	% $ of room revenue			2,978	3,381	3,793	4,259	4,314	4,793	5,278	5,376	5,648	5,930
- food & beverage	% $ of F&B revenue			4,747	5,442	6,149	6,913	7,312	7,783	8,261	8,777	9,216	9,677
- various	% $ of various revenue			774	943	1,063	1,195	1,179	1,257	1,335	1,419	1,490	1,565
costs of sales subtotal				8,499	9,766	11,005	12,367	12,807	13,832	14,883	15,573	16,355	17,172
general & administrative													
- general & administration	% $ of total revenue except t			1,846	1,955	1,777	1,899	2,027	2,091	2,155	2,472	2,595	2,725
- management fee	% $ (1/93)	4.00%		615	698	711	784	831	894	1,011	1,072	1,106	1,162
- marketing	% last of total revenue or as stated			1,846	1,955	1,955	1,779	1,946	1,991	1,956	1,844	1,973	1,973
- operation & maintenance	% last of total revenue			923	1,047	1,174	1,292	1,381	1,346	1,480	1,554	1,613	1,694
- energy	% $ of total revenue			923	955	783	692	914	995	1,057	1,000	1,184	1,243
general & adm. subtotal		9.23		6,211	6,655	6,400	6,950	7,309	7,324	7,658	7,942	8,470	8,797
income before fixed charges													
fixed charges													
- management base				153	175	196	215	234	249	265	282	297	311
- property tax	growth rate=	0.00		923	941	960	980	999	1,019	1,039	1,060	1,081	1,102
- insurance	growth rate=	0.00		154	157	160	163	167	170	173	177	180	184
fixed charges subtotal				1,230	1,273	1,316	1,358	1,400	1,438	1,477	1,519	1,558	1,597
net operating income				3,436	5,160	6,939	8,556	9,613	9,964	7,439	7,668	8,044	
incentive fee base													
- 10% of equity				1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310
- term loan interest				3,541	3,617	3,535	3,374	3,374	3,374	3,374	3,374	3,374	3,374
total base				4,791	7,927	7,934	7,994	7,994	7,994	7,994	7,994	7,994	7,994
net operating income base				-3,934	-1,540	-1,139	-438	-471	-195	376	766	1,348	1,833
incentive fee(NOI-EQ*9.5			0.00		0	0	0	0	0	81	268	335	484
income after incentive				3,436	5,160	6,939	8,556	9,613	9,964	7,359	7,603	8,035	
depreciation-building	15 years ADRS			4,534	4,534	3,268	3,137	3,137	2,888	2,541	2,541	2,541	2,541
depreciation-FF &E 7)	5 years ADRS			1,372	2,195	1,291	1,291	1,291	0	0	0	0	0
amortization-interest	15 year SYL for const.period interest			5,150	517	517	517	517	517	517	517	517	517
total depreciation & amort				5,123	5,050	5,293	5,953	5,953	3,395	2,759	2,759	2,759	2,759
term loan interest				3,541	3,617	3,535	3,374	3,374	3,374	3,374	3,374	3,374	3,374
income after interest				-7,047	-7,472	-7,371	-7,323	-9,114	-9,104	-1,944	-1,573	787	1,917
operator management fee													
- total fee				846	888	711	784	851	884	1,093	1,071	1,081	1,098
(% over total revenue)				3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
OFFICE CONSTRUCTION													
land		3,000											
construction	%												
- site work		84	336	84									
- shell & core		4,334	13,004	4,334									
- services & equip		1,445	5,780	1,445									
- furniture & office				3,256	3,256	679	336						
- contingency		570	888	570									
construction subtotal		9,186	24,248	9,232	3,256	679	336						
interest, construction													
- prefeasi. & eng.		709	106	86									
- testing & inspection		148	148	74									
- title insurance		86		86									
- legal & consulting		172	43	86									
- building permits & fees		172		172									
- insurance		61	65	13									
- property tax		883	883	88									
- accounting/auditing aud				586									
- marketing/rent agent				586									
- closing commission				586									
- TI & E Entertainment				586									
- TI building permit & fees				156									
- general & administrative		86	173	86									
- contingency reserve				488									
interest const. subtotal		1,311	935	2,941	0	0	0						
finance													
- commitment loan fee		586											
- contingency reserve				356									
finance subtotal		586	0	356	0	0	0						
total cost before interest		11,208	25,176	12,513	3,256	679	336						
construction interest													
- equity used	equity=	12,150											
- accumulated costs			11,208	36,478	49,148								
- accumulated equity			11,208	36,478	49,148								
- accumulated principal			7,530	22,590	30,120								
- interest 9.5%			190	570	760								
- interest subtotal			190	1,710	1,437	0	0	0					
OFFICE CONSTRUCTION TOTAL			11,208	26,886	13,470	3,256	679	336					

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
OFFICE OPERATION													
assumptions													
- rental sq feet	building=	348,000											
- disposal	rental=	14,000											
- 10 year ACRS	AS of 1/93			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- 5 years ACRS	AS of 1/93			0.00	0.00	0.01	0.01	0.01					
revenue													
- rental				3,530	6,001	6,339	10,992	10,992	11,230	11,913	12,227	13,395	
- rental	$ /$ of office rent			177	360	427	550	550	562	596	611	670	
- parking	$ /$ of office rent			106	180	256	396	316	337	357	378	402	
revenue subtotal				3,813	6,579	6,855	10,903	11,858	12,127	12,846	13,839	14,464	
- estimated leasing benchmark			648	1,188	774	888	774	194	198	992	996	833	
- unused commission budget available			1,000	792	18								
- TI expenditure			5,818	1,248	2,496	676	336						
- unused TI budget available			4,000	3,360	1,248	676	336						
- additional depreciation	1993 add			231	231	231	231	231					
	1994 add				369	616	492	492	492				
	1995 add					181	141	141	141	141			
	1997 add					88	74	74	74	74	74		
additional depreciation subtotal				231	647	888	972	938	706	611	74		
general & administrative													
- general & administration	$ /$ of revenue or as stated			750	669	676	645	667	709	772	819	867	
- commission				1,155	774	888	774	194	198	992	996	833	
- marketing	$ /$ of revenue or as stated			191	329	288	324	324	337	357	378	402	
- operation & maintenance	$ /$ of revenue or as stated			191	329	288	324	324	337	357	378	402	
- energy	$ /$ of revenue or as stated			119	197	144	162	162	169	179	189	201	
general & adm. subtotal				2,734	2,330	2,491	2,213	2,151	2,250	2,264	2,330	2,491	
income before fixed charges				1,556	4,249	4,365	8,690	9,720	9,970	10,470	11,509	11,973	
fixed charges													
- property tax	growth rate	0.00		639	641	653	666	679	693	707	721	736	
- insurance	growth rate	0.00		139	137	139	142	145	148	151	154	157	
- expense-straight-line	10 years ADR	10.00%		1,133	1,133	1,133	1,133	1,133	1,133	1,133	1,133	1,133	
- expense-straight-line 7)	5 years ADR	2.00%		229	229	229	229	229	229	229	229	229	
- additional depreciation	5 years ADR			231	647	888	972	938	706	611	74	0	
- amortization-interest	15 years SYL for const.period interest		4,211	0	0	0	0	0	0	0	0	0	
fixed charges subtotal				2,339	2,551	2,551	2,553	2,551	2,337	2,470	2,330	2,314	
income before interest				-4,548	-1,473	1,349	3,235	3,705	3,949	5,997	7,741	9,492	
term loan interest				3,541	3,617	3,535	3,374	3,374	3,374	3,374	3,374	3,374	
income after interest				-8,091	-7,090	-6,613	-9,030	-9,145	-332	1,193	1,967	2,979	

ACCOUNTING LOSS & PROFIT

- investment + effect	0	0	-17,339	-14,784	-10,234	-7,258	-7,261	-2,449	-181	810	2,999	3,094	3,168
CAPITAL PARTNER	0	0	-16,922	-14,374	-10,004	-7,448	-9,971	-9,359	-174	800	1,294	3,313	3,379
MANAGING PARTNER	0	0	-738	-361	-230	-115	-358	-90	-7	30	301	221	225

ACCOUNTING CASHS LOSS & PROFIT(before interest,depreciation, and amortization)

- investment + effect	0	0	4,164	6,888	10,343	14,888	19,150	19,999	19,931	17,488	19,997	19,977	21,122
CAPITAL PARTNER	0	0	3,937	6,695	11,349	14,883	14,455	19,340	19,246	15,418	14,173	14,592	15,942
MANAGING PARTNER	0	0	187	320	494	694	694	948	977	1,479	1,774	1,594	1,691

VC ANALYSIS

																						ZCAP/VC	ZCAP/VC
equity																							
- investment			-2,000	-2,000	-2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- effect			-2,000	-2,000	-2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
equity subtotal			-10,150	-10,150	-4,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
CAPITAL PARTNER			-19,000	-19,000	-4,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MANAGING PARTNER			-150	-150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
gross income from operation																							
- investment (10-11-12)			0	0	4,534	9,268	8,725	7,410	7,405	7,219	8,095	8,555	8,556	9,410	9,983	10,945	10,967	11,203	11,332	12,283	13,182	13,972	14,207
- effect			0	0	4,534	4,268	5,725	5,410	5,405	5,219	5,095	5,555	11,556	9,410	9,983	10,945	10,967	11,203	11,332	12,283	13,182	13,972	14,207
G.I.O. subtotal			0	0	9,068	13,536	14,450	12,820	12,810	12,438	13,190	14,110	20,112	19,820	19,966	21,890	21,934	22,406	22,664	24,566	26,364	27,944	28,414
CAPITAL PARTNER	0.70		0	0	8,868	13,236	14,130	12,537	12,527	12,161	12,898	13,797	19,664	19,276	19,533	21,421	21,462	21,924	22,177	24,032	25,797	27,335	27,797
MANAGING PARTNER	0.04		0	0	544	812	867	769	769	746	791	847	1,207	1,189	1,198	1,313	1,316	1,344	1,360	1,507	1,617	1,715	1,743
fixed charges from operation																							
- rental (10-11)			0	0	-749	-769	-789	-809	-831	-854	-877	-902	-927	-953	-980	-1,008	-1,035	-1,065	-1,095	-1,126	-1,157	-1,190	-1,223
- effect (12-27)			0	0	-749	-769	-789	-809	-831	-854	-877	-902	-927	-953	-980	-1,008	-1,035	-1,065	-1,095	-1,126	-1,157	-1,190	-1,223
fixed charges subtotal			0	0	-1,498	-1,538	-1,578	-1,618	-1,663	-1,708	-1,754	-1,804	-1,853	-1,906	-1,960	-2,016	-2,071	-2,130	-2,190	-2,252	-2,314	-2,380	-2,446
CAPITAL PARTNER	0.70		0	0	-1,139	-1,169	-1,199	-1,214	-1,247	-1,281	-1,318	-1,353	-1,391	-1,429	-1,471	-1,513	-1,557	-1,599	-1,646	-1,690	-1,736	-1,786	-1,835
MANAGING PARTNER	0.04		0	0	-71	-73	-75	-81	-83	-427	-439	-451	-461	-477	-490	-504	-518	-533	-547	-563	-579	-595	-611
changes in working capital																							
- rental			0	0	2,312	1,734	974																
- effect			0	0	-2,250	2,169	2,267																
changes in WC subtotal			0	0	62	3,903	3,240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAPITAL PARTNER	0.70		0	0	-1,100	2,732	2,268	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MANAGING PARTNER	0.05		0	0	-1,238	1,171	972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
interest & principal repayment																							
- loan			0	0	-3,541	-3,617	-3,535	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374
- effect			0	0	-3,541	-3,617	-3,535	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374	-3,374
loan service subtotal			0	0	-11,081	-11,833	-11,711	-11,248	-11,248	-11,248	-11,248	-11,248	-11,248	-11,248	-11,248	-11,248	-11,248	-11,248	-11,248	-11,248	-11,248	-11,248	-11,248
CAPITAL PARTNER	0		0	0	-8,311	-8,283	-8,198	-7,874	-7,874	-7,874	-7,874	-7,874	-7,874	-7,874	-7,874	-7,874	-7,874	-7,874	-7,874	-7,874	-7,874	-7,874	-7,874
MANAGING PARTNER	0		0	0	-2,770	-2,888	-2,928	-2,937	-2,937	-2,937	-2,937	-2,937	-2,937	-2,937	-2,937	-2,937	-2,937	-2,937	-2,937	-2,937	-2,937	-2,937	-2,937
tax shield on depreciation																							
- rental(31-150)			0	0	1,556	2,125	1,797	1,910	1,910	814	792	382	744	744	744	744	744	744	744	744	744	744	744
- effect(232-234+240)			0	0	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417
tax shield on dep. subtotal			0	0	2,973	3,541	3,214	3,327	3,327	2,231	2,209	1,799	2,161	2,161	2,161	2,161	2,161	2,161	2,161	2,161	2,161	2,161	2,161
CAPITAL PARTNER	0.70	0.50	0	0	2,081	2,479	2,250	2,329	2,329	1,562	1,546	1,259	1,513	1,513	1,513	1,513	1,513	1,513	1,513	1,513	1,513	1,513	1,513
MANAGING PARTNER	0.04	0.04	0	0	119	142	129	133	133	89	88	72	86	86	86	86	86	86	86	86	86	86	86
tax shield on amortization																							
- rental(150)			0	0	170	170	170	170	170	170	170	170	170	170	170	170	0	0	0	0	0	0	0
- effect(241)			0	0	143	143	143	143	143	143	143	143	143	143	143	143	0	0	0	0	0	0	0
tax shield on amort subtotal			0	0	313	313	313	313	313	313	313	313	313	313	313	313	0	0	0	0	0	0	0
CAPITAL PARTNER	0.70	0.50	0	0	366	366	366	366	366	366	366	366	366	366	366	366	0	0	0	0	0	0	0
MANAGING PARTNER	0.05	0.04	0	0	13	13	13	13	13	13	13	13	13	13	13	13	0	0	0	0	0	0	0
tax shield on interest																							
- rental (37)			0	0	1,334	1,276	1,201	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207
- effect(307)			0	0	1,334	1,276	1,201	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207
tax shield on int. subtotal			0	0	2,668	2,553	2,402	2,414	2,414	2,414	2,414	2,414	2,414	2,414	2,414	2,414	2,414	2,414	2,414	2,414	2,414	2,414	2,414
CAPITAL PARTNER	0.70	0.50	0	0	1,867	1,787	1,681	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690
MANAGING PARTNER	0.05	0.04	0	0	101	104	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
salvage value before tax																							
- rental																							
- office																							
salvage value subtotal			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAPITAL PARTNER	0.70		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MANAGING PARTNER	0.05		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
income returns from operation and capital gain																							
- investment	0.70		0	0	5,527	9,000	11,043	14,888	14,455	19,340	19,246	15,418	14,173	14,592	15,942	17,719	17,741	18,077	18,332	20,033	21,939	23,327	24,344
CAPITAL PARTNER	0.70		0	0	5,527	9,000	11,043	14,888	14,455	19,340	19,246	15,418	14,173	14,592	15,942	17,719	17,741	18,077	18,332	20,033	21,939	23,327	24,344
MANAGING PARTNER	0.05		0	0	187	320	494	694	694	948	977	1,479	1,774	1,594	1,691	1,813	1,830	1,849	1,860	2,000	2,139	2,233	2,284

		federal	state	total																			
returns rate																							
CAPITAL PARTNER	34%	9.68%	9.68%	43.68%	0	0	-1,410	-3,848	-4,197	-4,888	-4,139	-5,458	-5,284	-5,878	-5,458	6,798	7,160	7,894	7,832	8,447	8,988	9,313	10,048
MANAGING PARTNER	11%	11%	11%	44%	0	0	-359	-982	-1,071	-1,247	-1,056	-1,393	-1,348	-1,500	-1,393	1,735	1,827	2,014	1,999	2,155	2,294	2,377	2,564
							-1,769	-4,830	-5,268	-6,135	-5,195	-6,851	-6,632	-7,378	-6,851	8,533	8,987	9,908	9,831	10,602	11,282	11,690	12,612