CORPORATE VALUE CREATION FOR JAPAN'S CONSTRUCTION FIRMS IN THE SHRINKING AND CHANGING DOMESTIC MARKET

by

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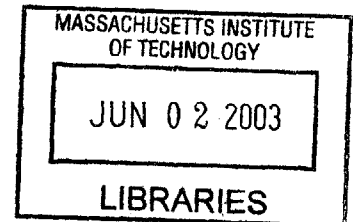in Partial Fulfillment of the Requirements for the Degree of

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BARKER

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ABSTRACT

As Japan's bubble economy collapsed, the time when the economy was surely growing was finished. In this high economic growth period, the social system such as Keiretsu (a network of Japan's firms organized around main bank), the seniority system, and lifetime employment, had formed centering on harmony. But now this system is disappearing. In addition, the introduction of International Accounting Standards (IAS) ruthlessly discloses the real financial conditions of Japan's firms and drives the firms to adverse circumstances. The firms have to sustain these changes and compete to survive in the shrinking market.

It is the time also for Japan's construction firms to change their business policy. The time when keeping a constant share always brought promised profits and the all firms coexisted in harmony has ended. The firms now have to pay attention to their profit rates and promote shareholders' interests as a top priority. At last, the firms have started to take serious approach to create their corporate value.

The main purpose of this thesis is to find ways for the construction firms to create corporate value in Japan's shrinking construction market. To accomplish this purpose, the thesis studies the following three points: (1) the profit structure of Japan's construction firms, (2) the effect of introduction of IAS, especially introduction of cash flow statements, and (3) valuation methods. These three points lead the following three factors to value firms: (1) Invested capital, (2) Free cash flows, and (3) Weighted average cost of capital. The discounted cash flow model including EVA and MVA uses these three factors to value firms. Moreover, the real option method can add the value of the firms' management flexibilities. Real options are becoming crucial for corporate valuation in this uncertain market.

In the end of the thesis, it verifies these valuation methods by using the financial data of Japan's construction firms in fiscal 2001. These valuation methods allow the firms to find right directions in which they should follow in order to create their value in the changing and shrinking construction market.

Thesis Supervisor: Fred Moavenzadeh
Title: **Professor of Civil and Environmental Engineering**

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Masahiko Kanari

Boston, Massachusetts

May, 2003

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CHAPTER 1

INTRODUCTION

1.1 Need for Value Creation

Shrinking demands in Japan's construction market force Japan's construction firms to enter the fierce competition.   Japan's economy centering on "harmony," which could hold because of sharp economic growth, came to an end and genuine competition has begun.   The construction firms have started to explore how they create the corporate value in this competition. Sales-oriented management deteriorated the firms' capital structure, because it lowered the profit rate and escalated the interest bearing debt ratio.   After all, the firms lost their value and some of them went bankrupt one after another.

It became high priority for the firms to create their value in this changing market.

1.2 Value Creation for the Construction Industry

The time when growing sales always brought promised profits has ended.   It became necessary for the construction firms to have the strategy to withdraw from unprofitable projects and to invest management resources intensively into profitable projects.   It was also necessary to find efficient investment strategies and to monitor how the strategies affect the company value. Applying the finance theory and evaluating the strategies with numerical values helped the firms to find ways to maximize their value.   The era in which the construction firms need to keep in mind how they create corporate value has come.

1.3 Purpose of the Thesis

The main purpose of this thesis is to find ways for construction firms to create company value in shrinking Japan's construction market.   To accomplish this purpose, the thesis studies the following three points: (1) the profit structure of Japan's construction firms, (2) the effect of introduction of new accounting standards, especially introduction of cash flow statements, and (3) valuation methods.   These three points lead the following three factors to value firms: (1) Invested capital, (2) Free cash flows, and (3) Weighted average cost of capital.   The discounted cash flow methods including EVA and MVA use these three factors.   Moreover, the real option

method can value the management flexibility.   This method is becoming critical for corporate valuation.   In the end, the valuation methods allow firms to find directions in which they should follow in order to create their value in the changing industry.

1.4 Scope of the Thesis

The valuation methods for Japan's construction firms can be applicable to other industry and firms.   However, the thesis limits its scope to Japan's construction market by Japan's construction firms and shows its applicability to the defined scope through data analyses in Chapter 8.

CHAPTER 2

BACKGROUND

In this chapter, we explore the background of this thesis. In the first section, we examine how Japan's market has changed after bursting Japan's bubble economy. And in the subsequent two sections, we study the effects of the market changes on the construction industry and the current situation of the construction firms. In the last section of this chapter, we review the Construction Industry Revitalization Program released by Ministry of Land, Infrastructure and Transport and further analyze the current situation of the industry.

2.1 Changing the Driving Force of Japan's Economy

2.1.1 Harmony

When we think of what drives the capitalistic economy, we definitely arrive at the word, "competition." In the intensely competitive society, firms make every effort to (1) increase the market share as far as possible and (2) decrease fixed costs and expenses and raise profit rates. In the end, the firms make maximum returns to their shareholders and extend their business.

As we look over the sales ranking of Japan's large construction firms from the end of the 1980s to the present time (Figure 2.1-1 and Figure 2.1-2), we find that the sales ranking did not change significantly until the middle of the 1990s. What does this unchanged trend of ranking for nearly ten years tell us? One possibility is that there could be no real sense of competition during this period. Of course, there are no ways to prove it.

As we examine the trend of sales ranking of overseas construction firms in Figure 2.1-2, not only did their ranking considerably change but also many firms no longer exist now.

Then, how can Japan's firms harmonize their share with each other without competition?

Table 2.1-1: Top 32 Japan's Construction Firms in 2002 (in ¥ millions)

	Firm	Sales		Firm	Sales
1	Kajima Corp.	2,060,353	17	Ando Corp.	244,149
2	Taisei Corp.	1,673,834	18	Okumura Corp.	233,875
3	Shimizu Corp.	1,584,038	19	Toyo Construction	231,872
4	Obayashi Corp.	1,403,671	20	Tekken Corp.	223,089
5	Kumagai Gumi	737,327	21	Asanuma Corp.	216,158
6	Toda Corp.	578,120	22	Taihei Kogyo	197,873
7	Nishimatsu Construction	516,544	23	Zenitaka Corp.	194,501
8	Haseko-Corp.	446,718	24	Fukuda Corp.	190,929
9	Penta-Ocean Construction	440,661	25	Fudo Construction	181,575
10	Maeda Corp.	439,756	26	Matsumura-Gumi	169,165
11	Hazama Corp.	416,902	27	Arai-Gumi	144,441
12	Mitsui Construction	392,825	28	Daiho Corp.	138,224
13	Tokyu Construction	358,174	29	Morimoto Corp.	125,745
14	Tobishima Corp.	333,489	30	Wakachiku Construction	114,139
15	Sumitomo Construction	320,023	31	Ohki Corp.	107,632
16	Toa Corp.	288,931	32	Daisue Construction	97,230

Large blue-chip firms

Super large firms (Their sales over ¥1billion)

Firms receiving financial supports

Firms listed only on the Osaka Stock Exchange

Source: Annual Reports and Financial Statements of FY 2002

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Table 2.1-2: ENR Top 30 Global Contractors (in dollar millions)

	1989			1995		
1	Shimizu Const. Co. Ltd.	Japan		Shimizu Corp.	Japan	17,914.0
2	Flour Daniel	US	12,169.4	Kajima Corp.	Japan	17,765.0
3	Kajima Corp.	Japan	11,790.7	Taisei Corp.	Japan	16,742.0
4	Bechtel Group Inc.	US	10,870.0	Obayashi Corp.	Japan	16,083.0
5	Taisei Corp.	Japan	10,667.1	Mitsubishi Heavy Industries Ltd.	Japan	15,309.0
6	Takenaka Komuten Co. Ltd.	Japan	9,971.4	Takenaka Corp.	Japan	12,792.0
7	M.W.Kellogg Co.	US	9,303.9	Philipp Holzmann AG	Germany	11,716.1
8	Obayashi Corp.	Japan	8,905.4	Bouygues SA	France	11,224.0
9	Bouygues	France	8,100.0	Trafalgar House Eng&Con.	UK	9,044.0
10	Kumagai Gumi Co. Ltd.	Japan	7,797.7	Kumagai Gumi Co. Ltd.	Japan	8,615.0
11	Mitsubishi Heavy Industries Ltd.	Japan	6,280.0	GTM-Entrepose,	France	7,948.0
12	Parsons Corp.	US	6,177.6	Toda Corp.	Japan	7,096.0
13	SGE Group	France	5,802.0	Nishimatsu Construction Co. Ltd.	Japan	6,922.7
14	Philipp Holzmann AG	Germany	5,652.6	Hochtief AG	Germany	6,751.0
15	Lummus Crest Inc.	US	5,430.0	Flour Daniel Inc.	US	6,638.0
16	Rust Int'l. Corp.	US	5,170.0	Bechtel Group Inc.	US	6,553.0
17	Fujita Corp.	Japan	4,914.0	Kinden Corp.	Japan	6,274.0
18	Davy Corp. plc	UK	4,819.1	Kandenko Co. Ltd.	Japan	6,257.0
19	DUMEZ	France	4,329.9	Sato Kogyo Co. Ltd.	Japan	6,144.0
20	Hazama-Gumi Ltd.	Japan	4,139.1	Maeda Corp.	Japan	5,954.0
21	Toda Const. Co. Ltd.	Japan	4,136.0	Tokyu Construction Co. Ltd.	Japan	5,836.0
22	SAE	France	3,926.0	Hazama Corp.	Japan	5,646.6
23	CRSS Constructors Inc.	US	3,875.0	Fujita Corp.	Japan	5,622.0
24	George Wimpey plc	UK	3,803.5	Penta-Ocean Const.	Japan	5,312.0
25	Nishimatsu Const. Co. Ltd.	Japan	3,716.1	Mitsui Construction Co. Ltd.	Japan	5,162.3
26	Turner Corp.	US	3,668.1	Bilfinger+Berger Bau AG	Germany	4,411.4
27	Balfour Beatty Ltd.	UK	3,654.5	Konoike Construction Co. Ltd.	Japan	4,250.0
28	Spie Batignolles	France	3,587.0	STRABAG AG	Germany	3,928.2
29	Mitsui Const. Co. Ltd.	Japan	3,513.0	Chiyoda Corp.	Japan	3,853.0
30	Bovis Int'l. Ltd.	UK	3,459.4	Skanska AB	Sweden	3,758.0

	1999			2002		
1	Taisei Corp.	Japan	13,238.0	VINCI	France	15,378.0
2	Bouygues SA	France	12,517.0	Skanska AB	Sweden	14,342.0
3	Obayashi Corp.	Japan	11,775.0	Bouygues, Guyancourt, France	France	12,830.0
4	Shimizu Corp.	Japan	11,285.7	Kajima Corp.	Japan	12,171.0
5	Kajima Corp.	Japan	11,190.0	Hochtief,	Germany	11,682.0
6	Takenaka Corp.	Japan	10,117.3	Bechtel	US	11,299.0
7	Bechtel Group Inc.	US	9,771.0	Taisei Corp.	Japan	11,279.0
8	Flour Daniel Inc.	US	9,640.0	Obayashi Corp.	Japan	9,972.0
9	SGE	France	9,348.0	Shimizu Corp.	Japan	9,893.7
10	Kumagai Gumi Co. Ltd.	Japan	7,676.0	Takenaka Corp.	Japan	8,803.0
11	Groupe GTM	France	7,430.0	Fluor Corp.	US	7,194.3
12	Philipp Holzmann AG	Germany	7,205.0	Centex	US	6,284.9
13	Skanska AB	Sweden	6,939.0	Halliburton KBR	US	5,858.0
14	Hochtief AG	Germany	6,914.0	China State Constr. Eng	China	5,815.0
15	Kellogg Brown & Root	US	6,835.0	EIFFAGE	France	5,642.0
16	EIFFAGE	France	5,985.0	Kumagai Gumi Co. Ltd.	Japan	5,396.0
17	Nishimatsu Construction Co. Ltd.	Japan	5,829.0	AMEC plc	UK	5,241.9
18	AMEC PLC	UK	5,350.0	China Railway Construction	China	4,941.8
19	Toda Corp.	Japan	5,246.0	Bovis Lend Lease	UK	4,785.0
20	Bilfinger+Berger Bau AG	Germany	5,121.9	China Railway Engineering Corp.	China	4,781.8
21	HBG	Netherland	4,697.0	FCC SA	Spain	4,632.9
22	Kandenko Co. Ltd.	Japan	4,695.7	Grupo Dragados	Spain	4,582.1
23	China State Constr. Eng Corp.	China	4,693.3	Toda Corp.	Japan	4,254.0
24	Kinden Corp.	Japan	4,652.0	Hyundai Eng'g & Constr. Co. Ltd.	S Korea	4,245.0
25	Penta-Ocean Cons	Japan	4,471.0	Grupo Ferrovial	Spain	4,240.0
26	Hazama Corp.	Japan	4,372.0	Balfour Beatty plc	UK	4,050.0
27	Hyundai Eng'g & Constr. Co. Ltd.	S Korea	4,169.0	Peter Kiewit Sons' Inc.	US	3,850.4
28	Maeda Corp.	Japan	3,923.3	Bilfinger Berger AG	Germany	3,785.1
29	Fomento de Construcciones y	Spain	3,864.7	Nishimatsu Construction Co. Ltd.	Japan	3,745.7
30	Grupo Dragados	Spain	3,647.0	Kandenko Co. Ltd.	Japan	3,684.3

Source: Engineering News Record (ENR)

July 13, 1989

August 28, 1995

August 16, 1999

August 26, 2002

Before bursting the bubble economy, Japan's economy consisted of some "Keiretsu's", which were large networks of companies, organized around main banks. There were long standing business relationships between group companies. The bank and other financial institutions at the center owned shares in most of the group companies. These companies in turn held the bank's share or each other's shares. Most debt financing came from the Keiretsu's banks. The construction firm became also one of the members of Keiretsu, and received a considerably large percentage of private orders from other keiretsu's members (Table 2.1-3). Japan's economy formed by the Keiretsu system was based not on "competition" but on "harmony."

Table 2.1-3: Construction Firms and Main Banks (Banks' name before M&A)

Main Bank	Firm	Main Bank	Firm
Mizuho (Dai-Ichi Kangyo bank)	Shimizu Corp.	Mitsui & Sumitomo (Sumitomo)	Kajima Corp.
Mizuho (Dai-Ichi Kangyo bank)	Hazama Corp	Mitsui & Sumitomo (Sumitomo)	Kumagai Gumi
Mizuho (Dai-Ichi Kangyo bank)	Ando Corp.	Mitsui & Sumitomo (Sumitomo)	Sumitomo Const.
Mizuho (Fuji Bank)	Taisei Corp.	Mitsui & Sumitomo (Sumitomo)	Asanuma Corp.
Mizuho (Fuji Bank)	Nishimatsu Const.	Mitsui & Sumitomo (Mitsui)	Mitsui Const.
Mizuho (Fuji Bank)	Penta-Ocean	Mitsui & Sumitomo	Matsumura-Gumi
Mizuho (Fuji Bank)	Maeda Corp.	Mitsui & Sumitomo	Arai-Gumi
Mizuho (Fuji Bank)	Tobishima Corp.	Mitsui & Sumitomo	Daiho Corp.
Mizuho (Fuji Bank)	Toa Corp.	Mitsui & Sumitomo	Morimoto Corp.
Mizuho (Fuji Bank)	Tekken Corp.	UFJ (Sanwa Bank)	Obayashi Corp.
Mizuho	Ohki Corp.	UFJ (Sanwa Bank)	Toyo Const.
Risona (Daiwa Bank)	Haseko-Corp.	UFJ (Sanwa Bank)	Zenitaka Corp.
Risona (Daiwa Bank)	Okumura Corp.	UFJ (Sanwa Bank)	Daisue Const.
Risona	Taihei Kogyo	Tokyo Mitsubishi	Toda Corp.
Sumitomo Trust	Wakachiku Const.	Tokyo Mitsubishi (Tokyu Group)	Tokyu Const.
Daishi	Fukuda Corp.	Tokyo Mitsubishi	Fudo Const.

Source: Weekly Toyo Keizai

Traditionally, Japan's employment system was also developed by a sense of harmony. When Japan's firms hired employees, the firms guaranteed them lifetime job security and asked them to swear their absolute loyalty to the firms. In addition, promotions and pay were determined by the length of the service to the company. It was called seniority ranking system. These systems, in which employees cooperate with each other harmoniously, played an important role only at the time of Japan's high economic growth period in the 1970s and 1980s.

Furthermore, in the public works, selective competitive bidding had been mainly adopted for one hundred years for public bidding. Depending on the scale of project, selective competitive bidding system chose qualified firms that were allowed to bid the project. Because of this, large firms were able to receive large projects and also small firms were able to receive small projects. There was no severe competition between different scales of firms and they could be segregated from each other. Moreover, the Dango system, whereby public projects are divided among certain preselected contractors in a "share the wealth" scheme, still sometimes exists. The Dango system could be the product of the contractors' seeking for not competition but harmony.

2.1.2 Competition

Following the collapse of Japan's bubble economy, Japan's growing economy was forced into negative growth (Figure 2.1-1).

At the same time, the information revolution by the Internet happened, economic activities across national boarders and expanding business overseas became common, and, finally it became required to introduce the International Accounting Standards (IAS) to Japan. Under this situation, Japan's original economic system, the harmony-oriented system, reached its limit of existence.

IAS includes (1) the introduction of the statement of cash flows that reflects the real flows of funds, (2) the new consolidated financial statements that show the financial condition of a parent company and its subsidiaries, (3) the fair value accounting that valuates the fair value of securities holdings, (4) the accounting for retirement benefits that place retirement benefits on balance sheets, (5) accounting for impairment of assets that will be adopted in 2005. Japan's conventional accounting rule was able to absorb some changes in the financial conditions to maintain Japan's inflexible systems, such as the lifetime employment system, the seniority ranking system, and the Keiretsu system. However, the new IAS has disclosed all fluctuations of the financial conditions of Japan's firms.

In the construction industry, the construction firms have started to lay off their employees to reduce their fixed costs and expenses. The introduction of fair value accounting has forced the firms to sell off valueless equity stakes the firms have long held under the cross-shareholding system. Moreover, the firms are ending the seniority ranking system and putting more emphasis on merit-based promotion systems. To receive new construction orders, the firms cannot help entering new markets beyond the Keiretsu system. New Accounting Standards force the construction industry to enter from the harmony-oriented economic system to the competitive market.

At the same time, in the procurement of public construction projects, Japan's government aimed to accelerate competitiveness, fairness, and accountability for the construction industry. The government adopted (1) general competitive bidding corresponding to Agreement on Government Procurement of WTO, (2) introduced an electronic bidding system by using the internet, and (3) accepted various kinds of project delivery systems including Construction Management.

GDP & Construction Investments

In ¥ billions
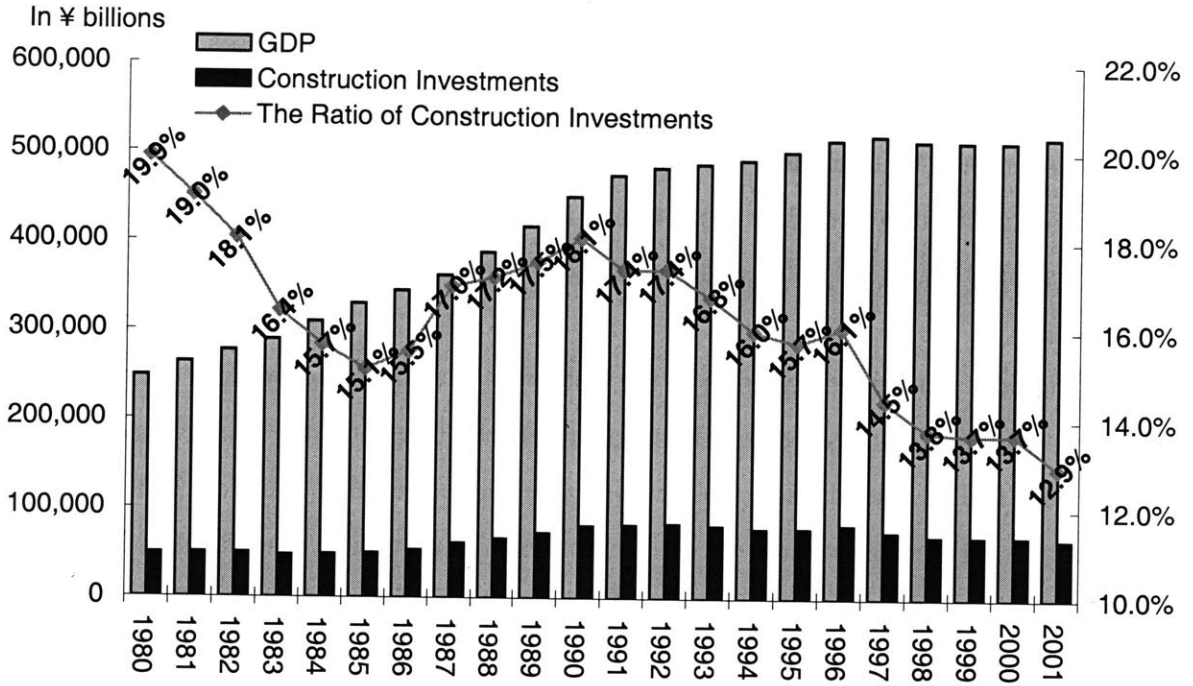
Figure 2.1-1: Trend of Construction Investments

Source: MLIT (Ministry of land, Infrastructure, and Transport)

2.2 The Interests of Shareholders

Cross shareholding in the Keiretsu system had never traded. The firms in the Keiretsu kept cross shareholding, and they, as investors, had never expected returns and never sold them off. The system protected the firms from mergers and acquisitions, even though their stock price fell. The firms thought their shareholders, called "silent stockholders" did not expect returns so that the cost of stock was zero. Moreover, conventional accounting rules did not ask to use the fair value method for securities holding, but used the book value method. At the high economic growth period, only when the firms faced financial difficulties, inflated value of the cross holding was sold. This capital gain was used for covering the losses or shortage of funds. Furthermore, rigid cross holding reduced the real number of exchangeable stocks in the market, thus this could maintain the high stock price.
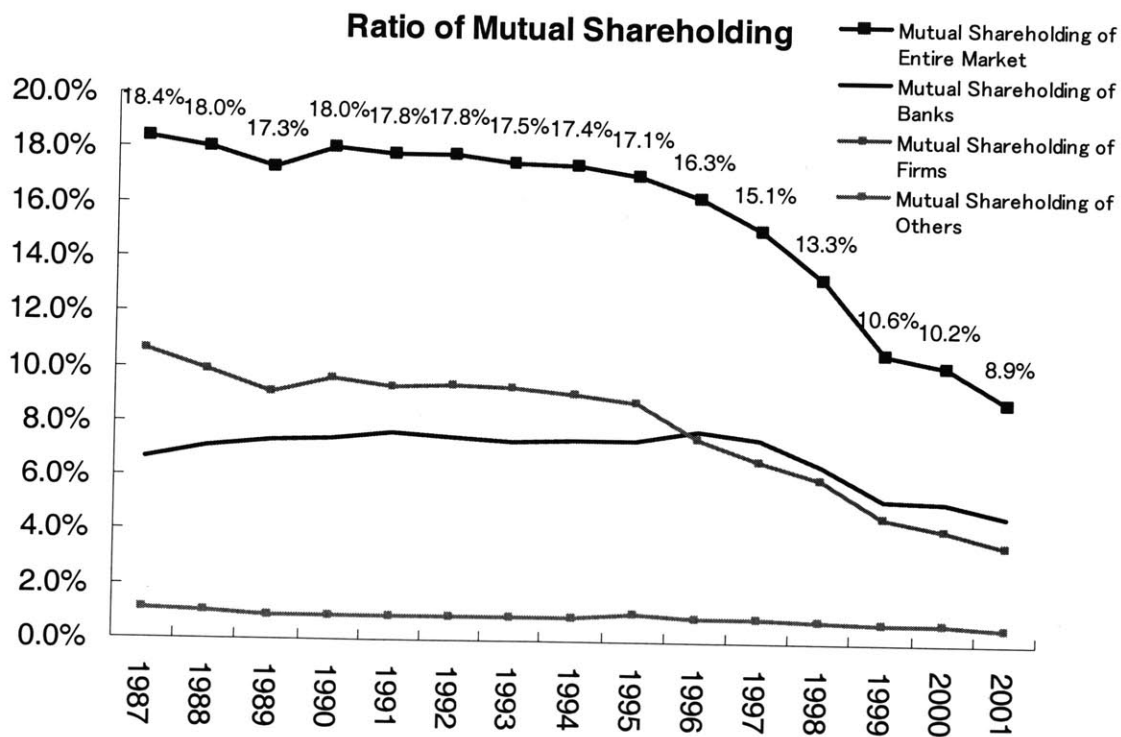
Figure 2.2-1: Ratio of Mutual Shareholding   Source: NLI Research Institute

However, Japan's economy has deteriorated. And new accounting rule was introduced. Then, the Keiretsu system collapsed. Finally, the ratio of cross holding has started to decline and stocks have moved freely around the market since the late 1990s (Figure 2.2-1). All at once, the main bank at the Keiretsu's center lost its financial power and could not play a fund-raising role for other Keretsu's firms. Under this circumstance, corporate managers cannot help attaching more importance to their firm's stock price than ever before, because they need to collect funds from the stock markets and keep the stock price high.

Under the new accounting rule, the corporate managers are striving to disclose their firm's financial conditions and improve the investor relations (Table 2.2-1). Now, they are exploring how they can increase the value of the firm. Every firm has started to disclose its financial and operating information to the public.
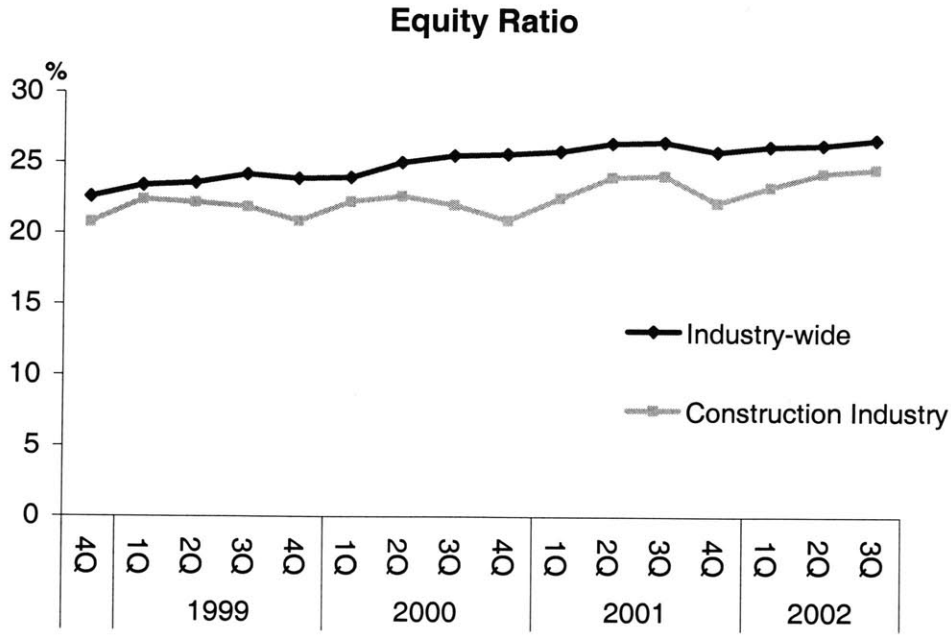
Figure 2.2-2:   Equity Ratio of Construction Industry   Source: MOF (Ministry of Finance)

Table 2.2-1:   Awards for Excellence in Corporate Disclosure

Firm	2002	2001	2000	1999
Penta-Ocean Const.	1st	2	4	4
Taisei Corp.	2	3	7	7
Maeda Corp.	3	1st	3	6
Kajima Corp.	4	5	2	3
Obayashi Corp.	5	4	1st	1st
Shimizu Corp.	6	8	5	8
Nishimatsu Const.	7	7	6	2
Toda Corp.	8	6	8	5

Source: Security Analysts Association of Japan

2.3 The Struggle for Survival

Shrinking Japan's construction market also forces the construction firms to competition. Fierce competition for receiving orders lowers the profitability of projects. Unprofitable projects increase debt ratio of the firm even more and, finally, raises the number of corporate bankruptcies (Figure 2.3-1). As their stored cash is reducing year by year, the construction firm that only focused on the amount of sales started to pay attention to the profit rates and real cash flows. This is the major change from the high growth period when the firms kept away from real competition and could get high profits. After that, because of the introduction of the new accounting rules, the firms are required to prepare the statement of cash flows to add to conventional income statements and balance sheets. Although, for nearly ten years the construction firms had kept the same market share, their share is slightly changing. Figure 2.3-2 shows that the share of two groups of the top twenty-three Japan's contractors in sales. One is the top four firms and four semi-large blue chip firms. The other is six semi-large firms that are receiving financial supports and nine middle-sized firms. The former has increased its market share by nine percent since 1997. The latter has decreased by six percent.

Trend of Bankruptcy in Construction Industry
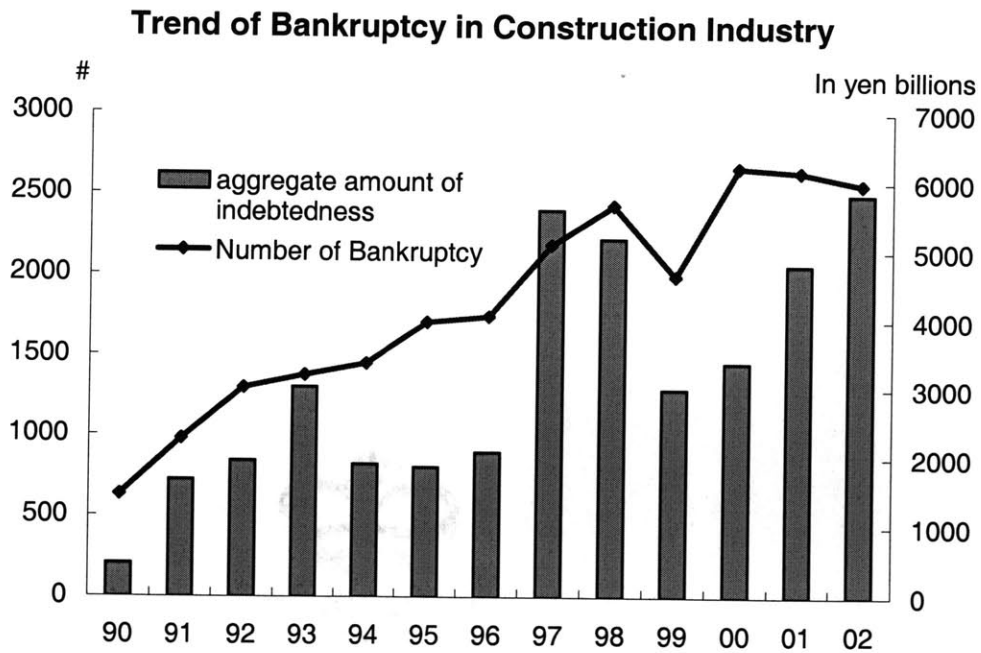
Figure 2.3-1:   Trend of Bankruptcy in Construction Industry   Source: Tokyo Shoko Research

Trend of Market Share in Construction Industry
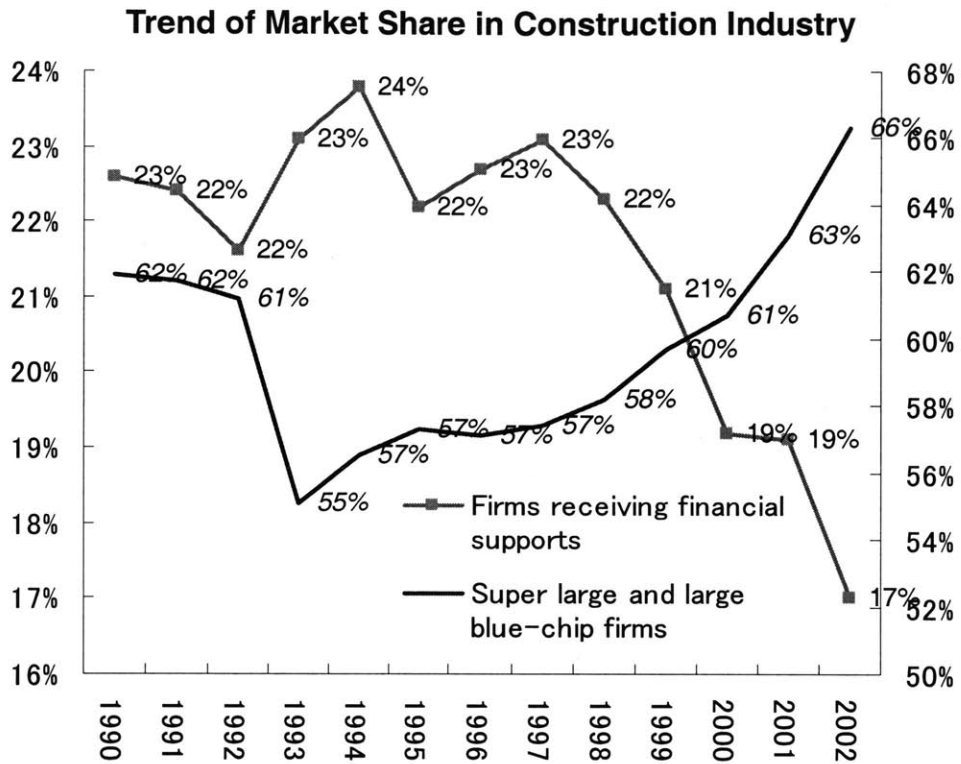
Firms receiving financial supports : Kumagai, Tobishima, Mitsui, Sumitomo, Hazama, Tokyu

Super large firms : Kajima, Taisei, Shimizu, Obayashi

Large blue-chip firms : Nishimatsu, Maeda, Okumura, Toda

Figure 2.3-2:   Trend of Market Share in Construction Industry

Source: Morgan Stanley Research

2.4 The Construction Industry Revitalization Program

In July 1999, the Ministry of Construction (the current Ministry of Land, Infrastructure and Transport (MLIT)) made up the Construction Industry Revitalization Program as a new strategic approach for the construction industry. In the current stagnation of Japan's economy, the construction industry is being required to find urgent restructuring to revive itself again. The revitalization program mentioned, "Through fair competition among firms, the construction industry will revitalize its creativity and strength to meet the needs of economic society of the 21st century."(Translation mine) Moreover, the program suggests four main directions of the corporate strategy that could critically influence the management of construction firms:

a) Concentrate the management resources on core business

Analyzing the profit structure and concentrating the management resources on core business. This strategy suggests the promotion of restructuring the profit structure by reducing debts and cutting personnel costs that have increased during the bubble economy.

b) Strategic investment in growth areas

Investing the management resources in growing areas in which firms could have future competitive advantages.

c) Clarification of the cost structure

Strengthen the cost competitive power. It is necessary to examine the cost structure of construction firms and reduce the costs. Disclosing the cost structure is essential.

d) Strengthen the competitive power

Strengthen and differentiate the competitive power with quality, software, and engineering.

Then, in December 2002, the Ministry of Land, Infrastructure and Transport released the basic policy for the construction industry revitalization. The first part of the policy says that the construction market keeps shrinking, and the construction firms lost their balance between the

earning power and the debt ratio.   The policy also refers to two basic directions for the revitalization: (1) the curtailment of unprofitable departments and shifting management resources to profitable departments, and (2) the improvement of profitability by changing from sales-oriented to profit-oriented management (Translation mine).

In order to implement those management reforms, it is essential for the construction firms to analyze their profit structures and clarify the current management conditions.   And then, by using cash flows, the firm analyzes and evaluates its departments.   Moreover, the changes in the accounting standards, such as new consolidated financial statements rule, fair value accounting, and the statement of cash flows also help clarify the advantage and profitability of the construction firms.

CHAPTER 3

SALES, COSTS, AND PROFITS

In this chapter, we elucidate the characteristics of the construction industry and examine its financial and profit structures. Ratio analyses are useful for capturing these structures. This chapter introduces some of useful ratio analyses. These ratio analyses are based on finance and accounting books (Palepu, Bernard and Healy, 1999, Pratt, 2003, Myers and Brealey, 1999, Adrian, 1999). This chapter also explains two types of revenue recognition methods, the percentage of completion method and the completed contract method. Depending on these methods, accounted revenues are varied. This is the one of the reasons why the statement of cash flows that discloses the firm's real financial condition is becoming important now. In the end, we analyze profit creation ways by using financial and profit structures.

3.1 Characteristics of the Construction Industry

Each firm has its profit structure that has been developed for a long period. We can read the structure's characteristics from the trend of the numbers in the financial statements. The process of making profits and the level of the profits are unique because the profit structure is made up of the firm's system and model. Whether the profitability of the firm is high or low depends on the nature and features of the firm's profit structure. The precise understanding of the profit structure will lead to some clear solutions to improve the profitability.

The construction firms have several different characteristics from those of other firm in the manufacturing industry. The unique characteristics of the construction firms are the following:

a) The construction industry is the general assembling production industry.

b) Each project a construction firm employs is somewhat unique as to its design and required construction methods.

c) Often the construction project takes more than one year to complete.

d) Construction projects are usually manufactured away from the firm's central office.

e) The percentage of subcontract cost is high. The industry's production system highly relies on subcontractors.

3.2 Financial Structure Analysis

3.2.1 Financial Structure

Unique external factors tend to shape the total financial structure of the construction firm. These characteristics of the financial structure can be gathered from the financial statements:

a) The percentage of the fix assets is relatively small:

Because the construction projects are implemented out of doors by single production, the construction firm does not need to own the large amount of fixed assets. Compared to the manufacturing firm, the construction firm has a relatively small percent of fixed assets.

b) The expenditure for uncompleted projects is huge:

The expenditure of construction costs is, at first, treated as the expenditure for uncompleted projects. The expenditure shown on the balance sheets is the results of subtracting the cost of completed construction at the end of the fiscal year from the total expenditure of construction in the fiscal year.

The expenditure deals with the current assets and it corresponds to the inventory in the balance sheet. In the manufacturing industry, the large amount of work-in-process is considered bad inventory and likely to be reduced. In the construction industry, however, each project has its owner and fixed contract price so that the inventory is the promised sales for the next fiscal years.

c) The advanced received for uncompleted projects is huge:

Under a contract for a construction project, the owner often makes payments to a contractor as a deposit paid on the construction project along with its progress. The received payments are, at first, recorded as the advanced received for uncompleted projects and after the project is completed, the payments transfer to the construction of completion.

In Japan, public projects pay forty percent of the total contract price as an advance payment before starting the projects. The payments are also the advanced received.

While the advanced receives for uncompleted projects are treated as the current

liabilities, the firm has a roughly corresponding expenditure for executed work to subcontractors.

d) The percentage of equity capital is relatively small:

Because the construction industry does not need to own the large amount of fixed assets, its equity capital is usually small. The industry's equity ratio is smaller than that of the manufacturing industry.

e) The percentage of subcontract costs among the cost of completion is high:

The construction industry is the general assembling production industry. The materials that are the main components of the buildings are processed by the subcontractors. The labors and machines that assembled the materials in the construction sites are also subcontractors.

f) The percentage of marketing costs and the administrative costs is small:

The construction industry adopts the job order cost system so that the personnel expenditures in the sites and the overhead expenditures for construction are included in the cost of construction.

g) The component percentage of the depreciation expenses is small:

The ratio of the fixed assets is small so that the depreciation expenses are also small.

Figure 3.2-1 shows the percentage of each item in Obayashi's financial statements

Balance Sheets

Statements of Income

Current Assets	Current Liabilities		Cost of Sales	Revenue

Figure 3.2-1:   Financial Structure of Obayashi Corporation in FY2002

Source: Obayashi Corporation Annual Reports FY 2002

3.2.2 Ratio Analysis for Financial Structure

Ratio analysis is among the most popular and widely used tools of financial analysis. Numerous financial ratios[1] can be developed by dividing one of the many different items in a firm's income or balance statement by another item. The firm can then compare the values of its ratios to the average values of the ratios for its industry and perhaps decide to make an adjustment in its financial structure.

Each industry and firm is somewhat unique as to its product, its objectives, and its financial structure. It follows that each firm is somewhat unique as to the values of its ratios. Basing a firm's policies on a specific growth objective may result in variation between its ratios and those accepted as average for the industry, although the firm may have a very sound financial structure.

A difficulty somewhat unique to the construction industry's use of financial ratios has to do with alternative accounting methods used by construction firms. Using alternative accounting methods, such as the completed-contract method versus the percentage-of-completion method, results in different values for certain ratios:

a) Liquidity (Short-term Analysis)

An important liquidity ratio is the current ratio reflecting current assets available to satisfy current liabilities. The current ratio of a firm is derived as follows.

$$Current\ Ratio = \frac{Current\ Assets}{Current\ Liabilities}$$

$$Current\ Ratio = \frac{Current\ Assets - Expenditure\ for\ Uncompleted\ Projects}{Current\ Liabilities - Cash\ Recieved\ for\ Uncompleted\ Projects}$$

Whereas the current ratio includes inventories in determining assets, they are excluded in determining quick assets. Theoretically, the quick ratio is an even more severe test of a firm's solvency. The quick ratio is derived as follows:

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[1] These financial ratios refer to Palepu, Bernard and Healy, 1999, Pratt, 2003, Myers and Brealey, 1999, Adrian, 1999

$$\text{Current Ratio} = \frac{\text{Quickt Assets (Cash + Cash equivalents + Marketable securities + AR)}}{\text{Current Liabilities}}$$

$$\text{Current Ratio} = \frac{\text{Quick Assets - Expenditure for Uncompleted Projects}}{\text{Current Liabilities - Cash Recieved for Uncompleted Projects}}$$

While the quick ratio might be considered as a more critical analysis of a firm's ability to generate cash over a short period of time, as to the construction firm, the difference between the current ratio and quick ratio losses some of its significance, because the construction firm is not heavily invested in inventories. In other words, each inventory item (construction project) has its owner already.

b) Capital Structure and Solvency (Long-term Analysis)

When a firm borrows money, it promises to make a series of fixed payments. Because the shareholders get only what is left over after the debt holders have been paid, debt is said to create financial leverage.

Financial leverage is usually measured by the ratio of long-term debt to total long-term capital. Since long-term lease agreements also commit the firm to a series of fixed payments, it makes senses to include the value of lease obligations with the long-term debt.

$$\text{Debt Ratio} = \frac{(\text{Long - term debt + Value of leases})}{(\text{Long - term debt + Value of leases + Equity})}$$

Another way to describe the same relationship is:

$$\text{Debt to equity ratio} = \frac{(\text{Long - term debt + Value of leases})}{\text{Equity}}$$

Another measure of financial leverage is the extent to which interest is covered by earnings before interest and taxes (EBIT) plus depreciation.

$$\text{Times interest earned} = \frac{(\text{EBIT} + \text{deprereciation})}{\text{Interest}}$$

The regular interest payment is a hurdle that companies must keep jumping if they are to avoid default. The times-interest-earned ratio measures how much room there is between hurdle and hurdler.

3.2.3 Off-Balance-Sheet

Financing that does not add debt on a balance sheet and thus does not affect borrowing capacity as it would be determined by financial ratios is called off-balance financing. The most common example would be a lease structured as an operating lease rather than a capital lease and where management's intent is to acquire an asset and corresponding liability without reflecting either on its balance sheet. In efficient capital markets investors will see through the firm's accounting results to the true value of the asset and liability incurred to finance it.

3.3 Process of Construction and Revenue Recognition
3.3.1 Percentage of Completion Method and Completed Contract Method

Current accounting principles for business enterprise allow use of the both the percentage of completion method on an accrual basis and the completed contract method on a realization basis. The major accounting difference between the two methods is the point in time at which the revenue or expense is recognized.

The percentage of completion method is generally the preferable method for recording income on long duration projects. Its major advantage is that it recognizes income on a current basis and, as such, results in a more regular flow income. On the other hand, the method has the disadvantages of dependence on cost estimates, which are subjects to uncertainties, and spending time and money to estimate costs.

When the completed contract method of recognizing revenue and expense is used, the construction firm recognizes no revenue or expense (or resulting profit or loss) until the completion of the construction project. During construction all costs incurred by the construction firm for building a project are accumulated in the expenditure for uncompleted projects (a construction in progress account), which is an asset account.

The gross profits of construction are varied by the revenue recognition method that the companies choose.

3.3.2 Process of Construction and Accounting Treatments

Some construction projects take more than one year to complete, and the process can be divided into three phases.   The accounting treatments of each phase are shown in Figure 3.3-1.

Construction Process and Accounting Treatments

Receipt of order	Contract Agreement
	Amount of orders received
	(No journal entry or book keeping)
⬇	Deposit paid on construction work
	(Advanced received for uncompleted project)
Construction	Construction in Site
	Expenditure of construction cost
	(Expenditure for uncompleted project)
⬇	Interim paid on construction work
	(Advanced received for uncompleted project)
Completion	Completion of Construction (receive contract amount)
	Accounting for periodic income
	(Transferring advanced received for uncompleted project to construction of completion)
	(Transferring expenditure for uncompleted project to cost of completed construction)
Closing Book	Clearing construction project in the term
	Carry-over project to the next term

Figure 3.3-1:   Construction Process and Accounting Treatments

3.4 Profit Structure Analysis

3.4.1 Profit Structure

The profit structure of the construction industry can be represented by the following equation.

Construction Gross Profit (Gross Margin) = Construction of Completion (Contract Cost)

– Completed Construction Prime Cost (Cost of Completed Construction)

The margin is the main source of the construction firm's earnings and its size can determine whether the profit structure is good or bad.

Because the construction project needs long time for completion and the cost per project is huge, the specific order system is used for accounting. During the construction schedule, the construction project enters basically three phases, the receipt of orders, the execution of works, and completion of the project. The uncompleted projects that are brought over to the next fiscal period or from the previous period are called carry-over projects. The following items are titles of account for the construction industry:

a) **Amount of orders received in this term:**

This is also called as the amount of contracts in this term. The construction of completion, the costs of construction, and the gross profits, all come from the orders received. The amount has significant impact on the construction business.

b) **Total amount of receipt of order:**

Generally, this is also called as total amount of receipt order the firm keeps during this term. The amount represents that the carry-over projects from the previous term plus the amount of orders received in this term, or the sum of the construction completion and carry-over projects to the next term.

c) **Construction of Completion:**

This is the total contract prices of completed projects in the term and used as sales in the completed contract method.

d) Carry-Over Project:

This is the contract price of uncompleted projects to the next term.

e) Total Amount of Executed Work:

The amount of executed works of the all projects at the end of the term, no matter if a whole project is completed or not.   This is used as sales in the percentage of completion method

f) Carry-Over Gross Profit:

The profits are included in the carry-over executed projects to the next term.

g) Cost of Completed Project:

This is the sum of the cost of completed projects.   In the completed contract method, the cost of completed projects is used as the cost.   In the percentage of completion method, the sum of the cost of completed construction and the expenditure for uncompleted work is used.

Figure 3.4-1 shows the process of construction and revenue recognition.

The Process of Construction and Revenue Recognition
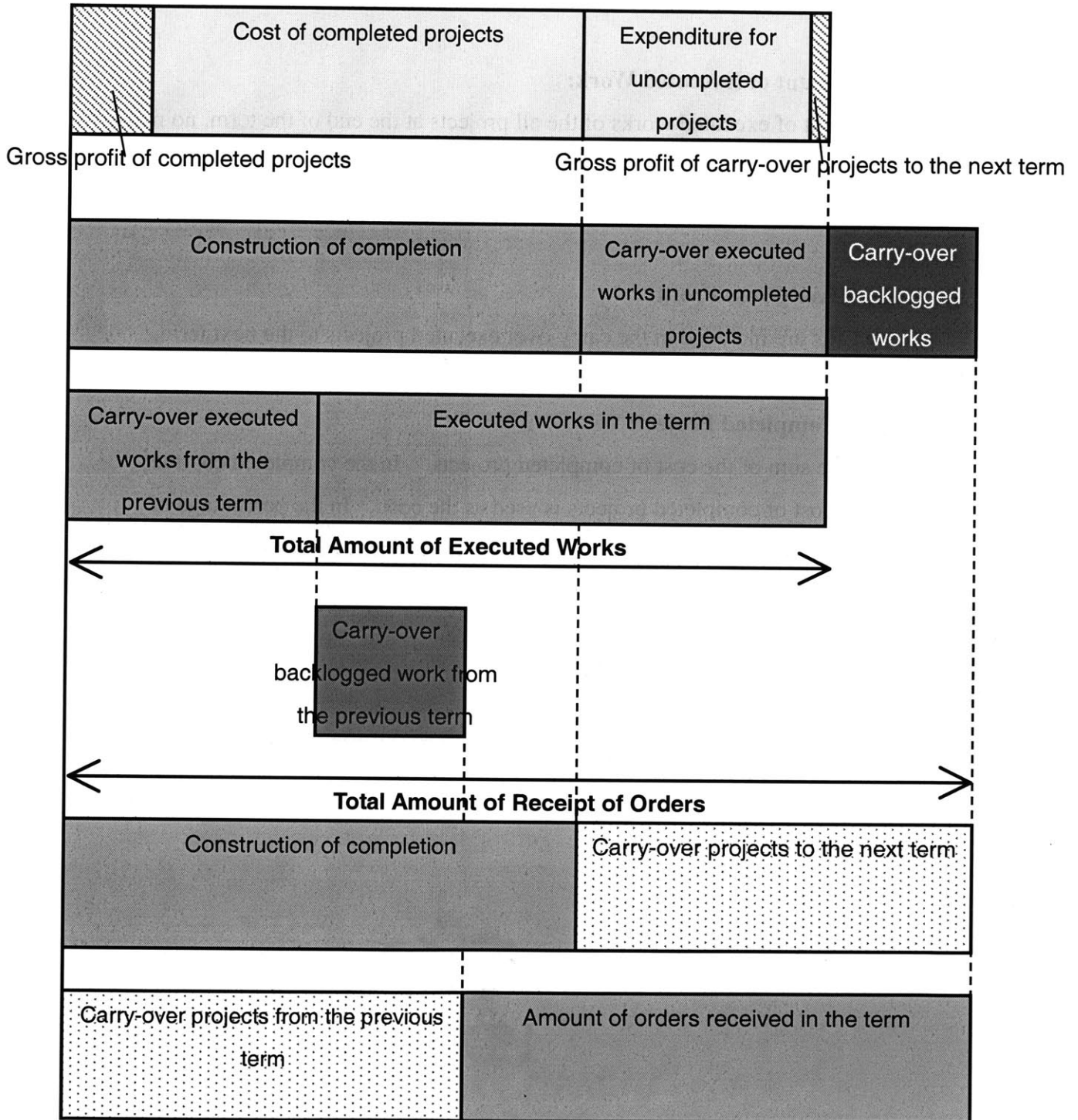
Figure 3.4-1:   The Process of Construction and Revenue Recognition

3.4.2 Ratio Analysis for Profit Structure

a) Trends in Orders Received

Figure 3.4-1 tells that the increase in the total amount of orders received year by year makes the size of the profit structure larger. This is the favorable situation unless the projects are unprofitable.

$$\text{Growth Rate of Order Received}_t = \frac{\left(\text{Order Received}_t - \text{Order Received}_{t-1}\right)}{\text{Order Received}_{t-1}}$$

The trend percentage method is a simple way to represent continuous trends in numbers over several periods. The method uses a number in a certain year as the benchmark and finds change ratio to numbers in other years. The equation is as follows.

$$\text{Percentage Change}_{t\,year} = \frac{\text{Number}_{t\,year}}{\text{Number}_{benchmark\,year}}$$

b) Total Amount of Receipt of Order and Total Amount of Construction

Although it is important to catch the trends of the current term's orders received and construction of completion year-on year, the factor with the most influence on the profit structure is the company's total amount of receipt of orders and executed works in the end of the term. The total amount of receipt of orders is related with the amount of orders received in the term and the carry-over projects from the previous term. The following equations represent the relation.

$$
\begin{aligned}
\text{Total Amount of Receipt of Orders}_t &= \text{CarryOver Projects}_{t-1} + \text{Orders Received}_t \\
&= \text{Constructon of Completion} + \text{CarryOver Projects}_{t+1}
\end{aligned}
$$

$$
\begin{aligned}
&\text{Total Amount of Executed Works}_t \\
&= \text{CarryOver Executed Works in Uncompleted Projects}_{t-1} + \text{Executed Works}_t \\
&= \text{Constructon of Completion} + \text{CarryOver Executed Works in Uncompleted Projects}_{t+1}
\end{aligned}
$$

$$\text{CarryOver Projects}_{t+1}$$
$$= \text{CarryOver Executed Works in Uncompleted Projects}_{t+1} + \text{CarryOver Backlogged Works}_{t+1}$$

The total amount of receipt of order is considered the most important number because it could show the scale or capacity of the construction firm. Moreover, when the profit was promised from any projects, the increase in the amount of orders means the increase in profits. The increase ratio and trend of the number can considerably influence the profit structure.

The ratio of the total amount of the executed works to the total amount of receipt of orders is called the execution rate and is represented by the following formula.

$$\text{Execution Rate} = \frac{\text{Total amount of executed works}}{\text{Total amount of receipt of orders}}$$

Usually, the ratio does not fluctuate significantly unless the size and type of the received orders change significantly. If the ratio moves drastically during a certain period, there should be some particular reasons in the firm.

c) Total Amount of Executed Works and Construction of Completion

The construction of completion is the sum of the contract prices of completed projects. When the project is completed and delivered to the owner, the contract price of the construction is entered the construction of completion. The ratio of the construction of completion to the total amount of executed works is called the completion rate and is obtained by the following formula.

$$\text{Completion rate} = \frac{\text{Construction of completion}}{\text{Total amount of executed works}}$$

d) Gross Profit

        The total gross profit is the total profit of the firm at the end of the term. In the completed contract method, the gross profit is the construction of completion minus the total cost of completed projects. In the percentage completion method, the gross profit is the total amount of executed works minus the total cost of executed works.

Gross profit (Completed contract method)

= Construction of Completion - Total cost of completed projects

= Gross profit of completed projects

Total Gross profit (Percentage completion method)

= Total amount of executed works - Total cost of executed works

= Gross profit of completed projects + Gross profit of carryover projects

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3.5 Break-even Analysis

The cost-accounting concepts of the break-even analysis provide another way to understand profits.   This analysis mainly uses revenues, variable expenses, and fixed expenses. The basic equation for the break-even analysis is as follows:

$$\text{Profit} = \text{Revenue} - \text{Variable expenses} - \text{Fixed expenses}$$

Using the equation, it is possible to calculate a break-even amount of sales for a construction firm, usually referred to as the firm's break-even point.   The break-even point is the amount of sales at which the firm's revenue exactly equals its total costs.   At this point the construction firm neither makes profits nor losses.   See Figure 3.5-1.

Variable costs are costs that vary directly with changes in activity.   Examples of variable costs are costs of material and labor used in the production process and equipment hours expended in the manufacturing process.   Fixed costs are those that vary with the passage of time despite changes in the level of activity.   It should be noted that a fixed cost may vary if the level of activity changes substantially.   Thus, when speaking about a fixed cost, we have to recognize the existence of the relevant range of business activity.   The relevant range is that level of activity for which the firm budgets and expects to operate.   As such, the definition of fixed cost is valid only for the firm's relevant range of activity.   To understand the problem of
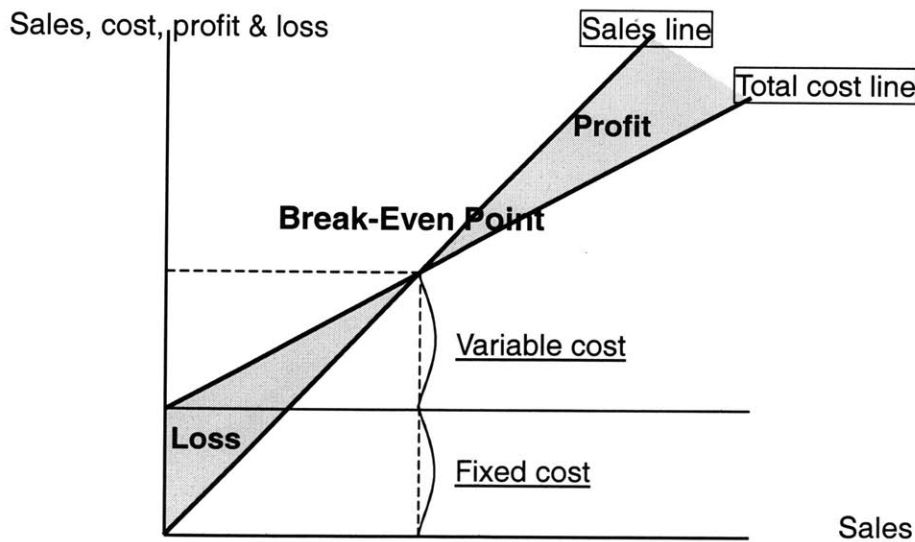
Figure 3.5-1   Break-Even Point

fixed costs not being fixed over unexpected activity levels, the term semifixed is introduced.

Break-even analysis is a useful method for the construction firm to determine what level of sales is needed to cover its planned overhead expenses. In order to perform this analysis, we usually assume that a construction firm's costs of sales are variable expenses, and its general and administrative costs are fixed costs. While there are exceptions to these assumptions, most construction costs are variable, and most operating costs may be considered fixed within a given range of volume.

Establishing a required volume needed to cover overhead effectively sets a minimum goal for the firm. Setting a goal often motivates the firm to achieve it and also serves as the basis for justifying certain marketing plans and expenditures. Periodically the break-even point should be recalculated to recognize charges in overhead expenditures and modifications in the gross margin.

The concept of marginal profits is also useful in profit analysis. Marginal profit is defines as follows:

Marginal profit = Revenue – Variable expenses
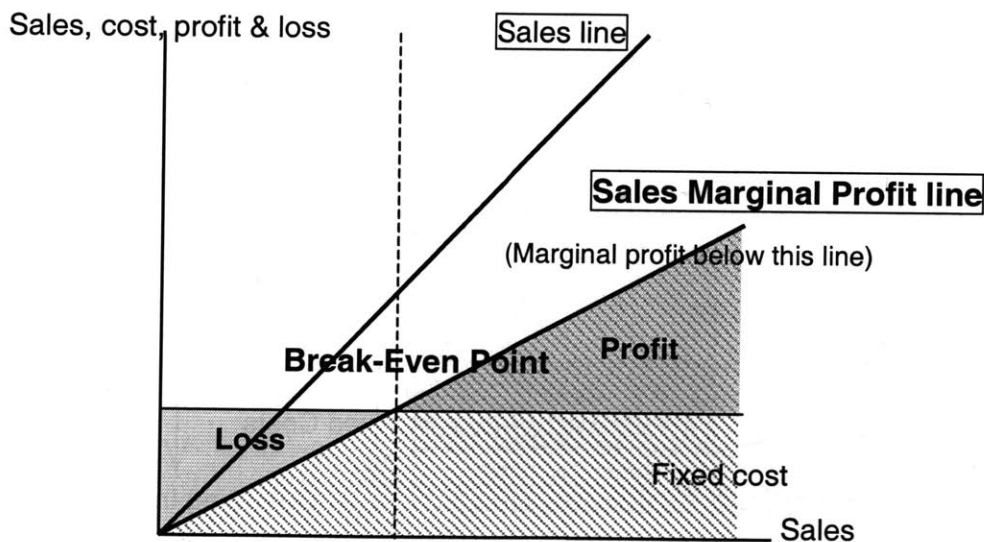
Figure 3.5-2: Marginal Profit & Break-Even Point

A specific construction project yields the construction firm a positive marginal profit as long as the dollar contract amount is greater than the cost of construction (in this case, the cost of construction is defined as mainly a variable cost). As long as a project has positive marginal profit, it contributes to covering some of the firm's overhead.

Having introduced the concept of marginal profits, we can understand the common practice of some construction firms occasionally signing a contract to build a project for less than total costs. The above figure (Figure 3.5-2) shows this case. By total costs is meant the costs of construction and an allocated percentage of the firm's overhead costs.

A construction firm's success is measured by its profitability. The objective or accomplishments of construction firm might include improving its public image and serving a community and employees. However, these seemingly non-monetary objectives are usually tied to making money.

Figure 3.5-3 illustrates how the construction firms used their costs and took net losses in 2002.

*Total amount of major 25 firms in 2002
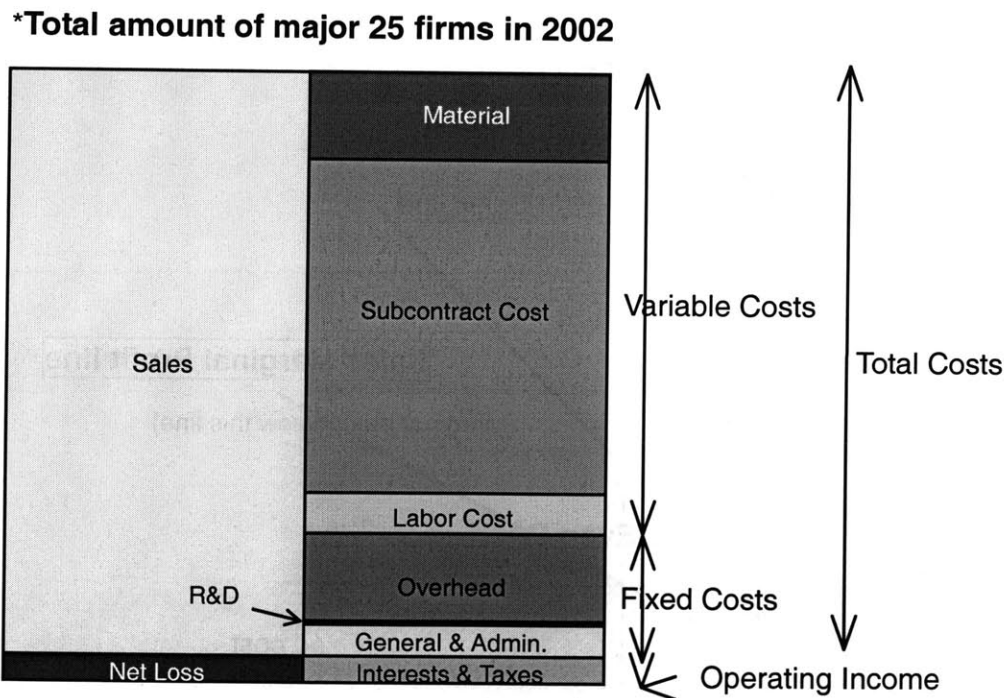
*In this year, most of firms declared net losses

Figure 3.5-3: Income Structure of Japan's Major Construction Firms in 2002

Source: Annual Reports and Financial Statements of FY 2002
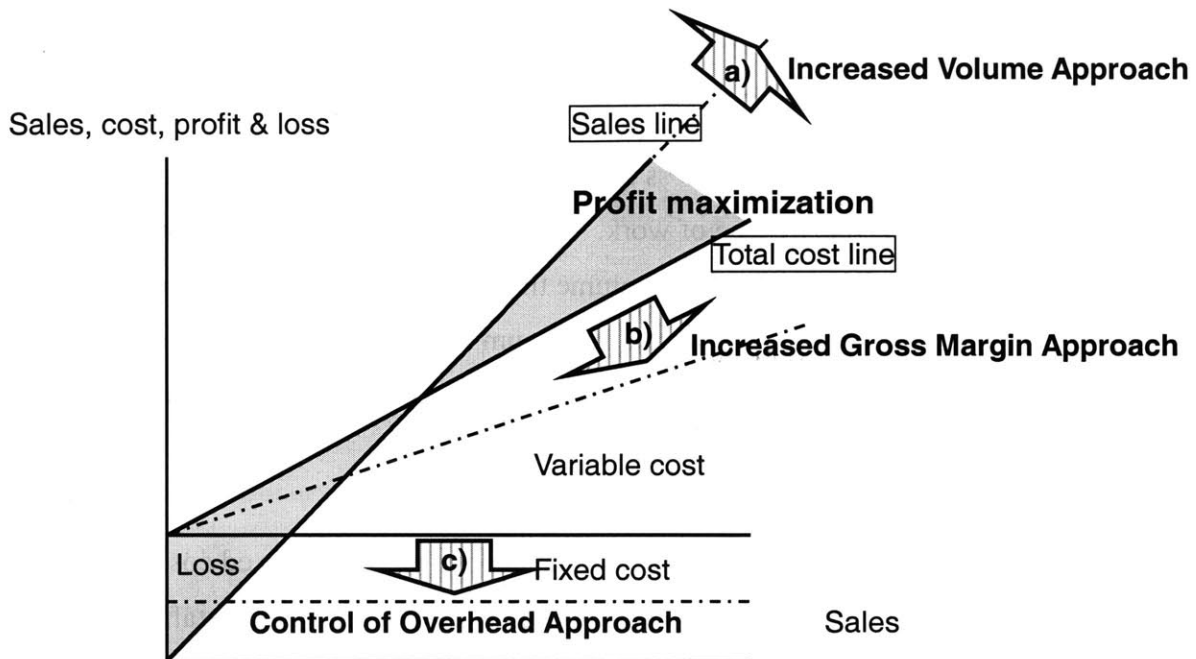
Figure 3.5-4:   Profit Maximization

Given the construction firm's objective of increasing net profits, there are essentially three different approaches taken to improve the profits.   Figure 3.5-4 illustrates the three approaches:

a) Increased volume approach

Most construction firms take the increased volume approach as their means to increase their profits.   The firm assumes that receiving more orders, it can generate more profits.   It should be noticed that their gross margin is reduced by competition and semifixed costs increase along with increases in the volume of construction.

b) Increased gross margin approach

The increased gross margin approach to increasing profits can return significant net income.   As noted earlier, the gross margin is controlled by competition.   In reality, gross margins for construction firms vary significantly.

The increased gross margin approach addresses both the revenue and cost of sales components of the construction firm's income statement.   Gross margin is calculated as follows:

$$\text{Gross margin} = \frac{\text{Gross profit}}{\text{Revenue}}$$

One means of increasing gross margin is for the construction firm to decrease its cost of doing a given volume of work.   Instead of merely seeking greater volume, the construction firm should look for volume that includes significant gross margin.   But the competitive nature of the normal lump sum construction contract weakens the construction firm's ability to secure contracts with an improved profit margin.

c) Control of overhead approach

Many of the construction firm's overhead costs tend to be fixed costs.   Examples include cost of maintaining the company office, cost of the clerical staff, and marketing expense.   The controlling overhead costs approach to increase total profits requires keeping the firm's overhead costs less than the gross profits.   The smaller the overhead costs are relative to the firm's gross profits, the larger the total profits.

3.6 Declining Profitability

As it is getting harder to make profits in the shrinking market, construction firms are attempting to secure high profitability.   In order to enhance profitability, there are three different approaches, (1) Increased sales, (2) Increased gross margin approach, and (3) Control of overhead approaches.   However, it is not easy to adopt these three approaches all at once.   In the shrinking construction market, increasing sales leads share competition with each other and could reduce profitability.   As for every firm, decreasing construction costs that includes fixed costs is approaching its limit.   Unreasonable downsizing and slash capital investments sacrifice the firm's future growth.   Moreover, construction firms' technical capabilities highly rely on their engineers' ability.   The reduction of the number of engineers could lead to lose their technical advantages and, consequently, lower their profits from construction projects. Every construction firm is making every effort to earn profits, such as the introduction of cost down methods, value engineering, the reduction of time for completion, and optimization for the material and subcontract procurement.   However, these efforts at cost reduction are included in construction contracts beforehand and the contractors could not have their merits.
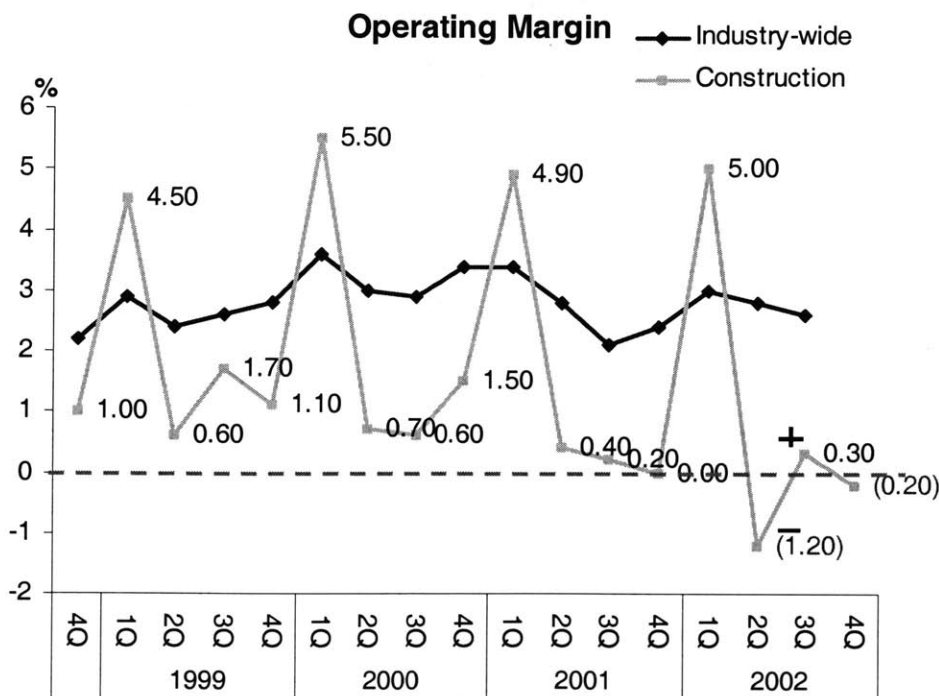
Figure 3.6-1:   Declining Profitability of Construction Industry   Source: MOF

In the bubble economy, the construction firms rejected to disclose the costs of construction projects.   The projects and their costs became black boxes.   Once they received the orders from the owner, the general contractors had the responsibility to take the risk of the projects, surely complete the projects within the schedule, and build high quality buildings with high technology.   Because the firms take all responsibilities of the project for the owner, the owner allowed them to make the real costs of projects vague.

However, as the bubble economy was bursting, these vague costs adversely affected the firms.   Low costs are becoming the most critical factor for the owners to choose contractors. The other factors, such as firm's historical performances, technical capabilities, risk management ability, and brand strength are losing their importance.   Furthermore, the firms did not clearly add their costs in contracts.   Hence, these costs are completely ignored by the owners.

To make this situation worse, in recent years, some firms have attempted to get orders at minimum prices that only have minimum marginal profit (Figure 3.5-3).   This is because they still believe the more sales they accept, the more corporate value they can create.   And also because they are unsuccessful at reducing their overhead costs, they have to cover the costs by accepting orders without profits.   Because of this dumping contract prices, the profitability of all the construction projects is harshly declining.   In this circumstance, the construction firms are required to disclose their profit structure and the costs of construction clearly.   Especially for the public works, it is becoming necessary for the firms to have accountability for every cost of the works.

The governments introduced new delivery methods like Construction Management (CM).   CM is employed in order to manage multiple contracts with subcontractors and to clear the costs of construction.

The profitability of the construction firms has been harshly declining most recently (Figure 3.6-1), so, in fact, disclosing the costs could be a good solution to make profits.

CHAPTER 4

CASH FLOWS

In this chapter, we, first, explore the background of the introduction of International Accounting Standards (IAS). Then, we review Japan's new accounting standards. We especially study the cash flow statements, and difference between profits and cash flows.

4.1 Cash Flows
4.1.1 Changes in Business Environment

Before the burst of bubble economy, Japan's construction firms had the financial structure centered on indirect financing. They were funded and supported by Japan's financial institutions, so they could focus on only gains and losses. This meant, only profits were recognized as important information for management.

Since the burst of Japan's bubble economy, the business environment has been changing dramatically. This is one of the big reasons why the cash flow has become important now. Japan's financial institutions, which supported the growth of Japan's enterprises, lost their financial power due to the accumulated bad debts. This means the financial structure has been changing to direct financing. Under the environment, it became essential for the enterprises to pay great attention to their cash flows.

This change from indirect financing to direct financing is requiring the creation of new management environment and system. The emergence of the concept of the cash flow management could be an inevitable result of this change.

One more reason why the cash flow is bringing attention is that the statement of cash flows has been required for listed companies to prepare since fiscal year 2000. Before then, only income statement and balance sheets were prepared. The statement of cash flows is the useful information source to analyze financial activities. Even though two companies have the same amount of profits, their cash flows are different due to the use of different accounting methods. The difference will affect their management greatly, thus income statements cannot show the appropriate consequence of financial activities.

4.1.2 Definition of Cash Flows

Cash flows are the movement of cash associated with a firm's operating, investing, and financing activities. Cash flows involve inflows and outflows of cash during a particular period, and a firm's cash flows are considered to be strong if it can generate large amount of cash relatively quickly

When companies record their administrative activities, they express their activity results as financial information, such as how much they gain through sales, how much gain through profits, and how much cash they keep. Accounting is a process of recording, measuring how much companies get profits. However, there are many methods for accounting, so profits vary depending on the methods. For example, accounting methods for sales of the construction industry have both "completed contract method," which accounts sales only when projects are completed, and "percentage of completion method," which accounts sales every fiscal term depending on the progress of projects even if the projects are not completed. The revenues are very different by the accounting methods.

Depreciation methods also have some different ways to account such as straight-line, accelerated and so on, and the revenues are varied by the methods. These days, the credit economy has developed, and then credit sales, credit purchases, bills, and checks started to be used. As a result of this, real cash flows and profit/loss calculations on the books became not necessarily the same. However, if only real cash flows are used to show the administrative activities, the results will be always the same. The cash flows will not be affected by the accounting methods used. Some says, "Cash is reality, but Profit is a matter of opinion." The cash flow can be the common measure of value to show the administrative activities.

Although profits that are calculated by a chosen accounting policy vary by the accounting methods, cash is not affected by the policy and standards. Thus, cash flow analysis is being used for corporate business management. For example, flee cash flows are used for corporate or operation department valuation and the concept of present value is becoming important. Figure 4.1-1 shows the characteristics of both profits and cash.

Difference between Profit and Cash

Corporate Business Activity

Difference in Accounting Policy

Change in Accounting Policy

Difference in Valuation Method

Profit	**Cash**
"A Matter of Opinion"	"Reality"
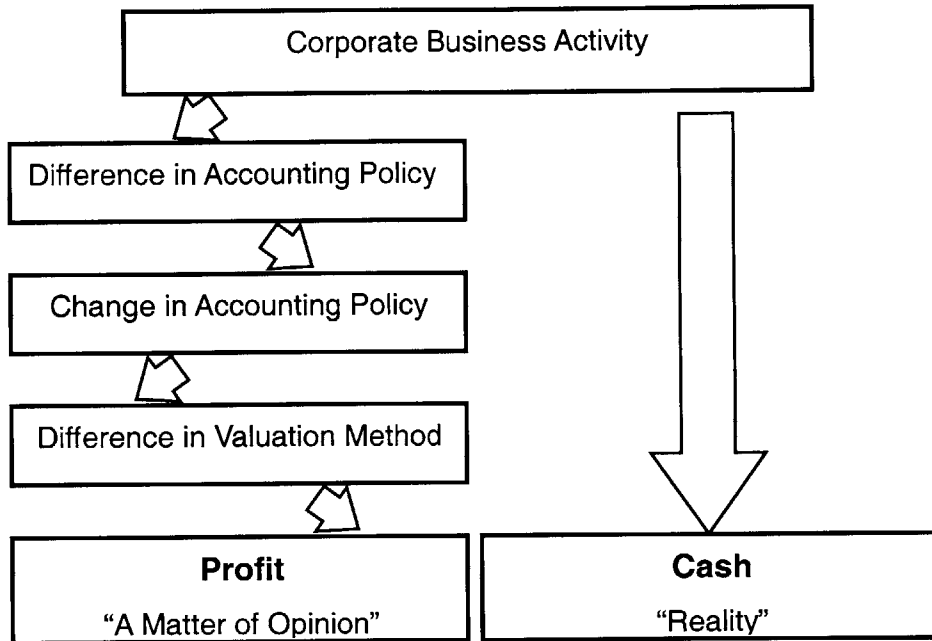
Figure 4.1-1:   Difference between Profit and Cash

4.1.3 Relation between Income Statements and Cash Flows

This section will study the relation between profits in income statements and cash flows. Income statements consist of revenues minus expenses, leading to net income, an important indication of a firm's earnings power. However, the term's net income is different from this term's cash flow in meaning and amount of money (Figure 4.1-2).
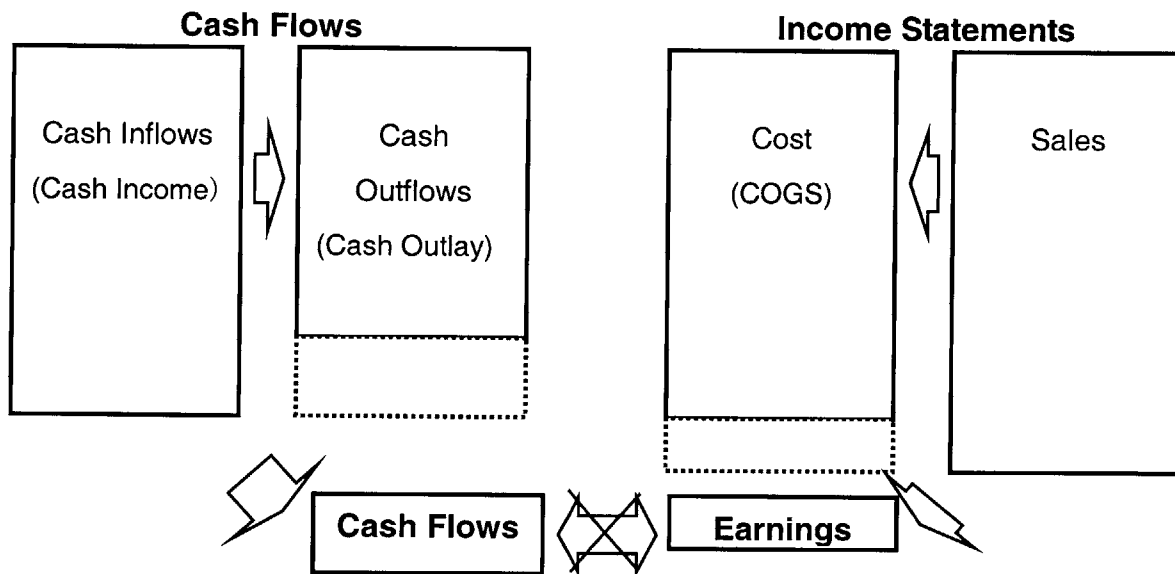
Figure 4.1-2:   Difference between Cash Flows and Income Statements

The main reasons why the cash flows and the earnings become different is the followings: (the following explanations of accrual basis accounting and depreciation refer to "Financial Accounting." (Pratt, 2003)),

a) Accrual Basis Accounting

The accrual basis is a system of accounting that recognizes revenues and expenses when assets and liabilities are created or discharged because of operating activities. Accrual accounting differs from cash flow accounting, which reflects only cash inflows and outflows. Statements prepared under accrual accounting, like the income statement, are designed to measure earning power.

Figure 4.1-3 shows the relation between sales and cash flows

Cash Flows from Sales	=	Sales	+	Collection of Beginning Accounts Receivable	-	Accrual of Accounts Receivable at the end of term
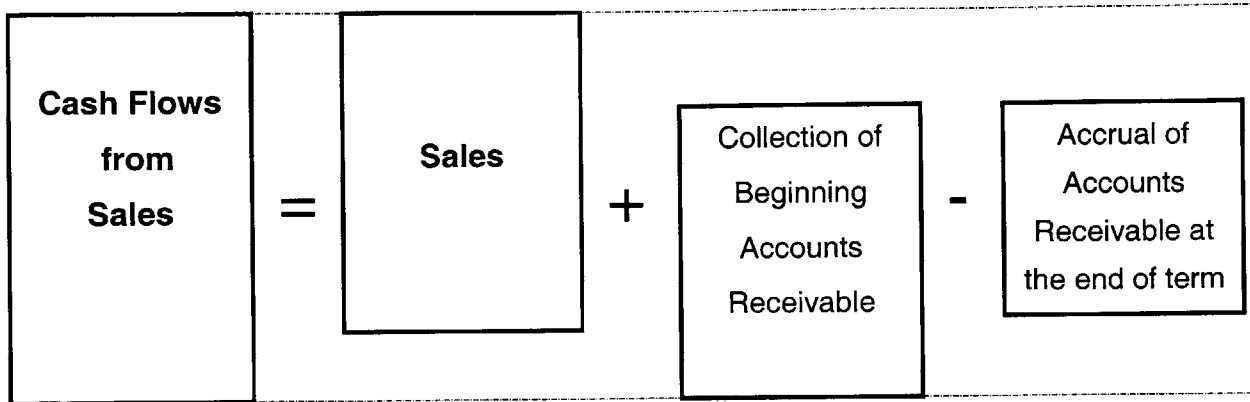
Figure 4.1-3: Relation between Sales and Cash Flows

Costs of goods purchased also have the following relation with cash flows. (Figure 4.1-4)

Cash Flows from COGP	=	Cost of Goods Purchased (COGP)	+	Actual Payment for Beginning Accounts Payable	-	Accrual of Accounts Payable at the end of term
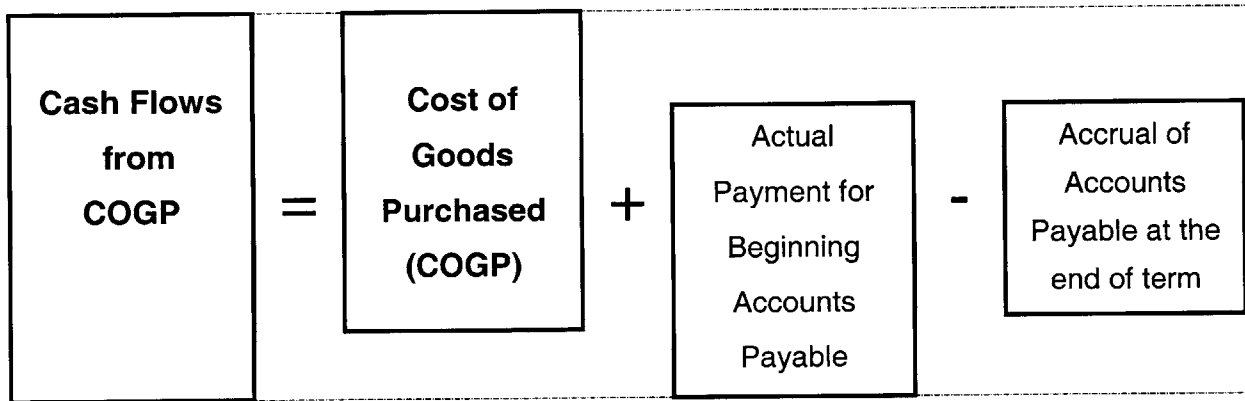
Figure 4.1-4: Relation between COGP and Cash Flows

b) Depreciation

Depreciation is the periodic allocation of the cost of a fixed asset to the income statement over the asset's useful life. Such allocation is necessary if the costs are to be matched against the benefits produced by the asset. For financial reporting purpose, management has much discretion over how depreciation is computed. For income tax purpose, there is much less leeway. A depreciation expense is an item on the income statement and reduces net income. Depreciation is cost expiration; it does not represent a cash outflow (Figure 4.1-5).

	Net Income	**Cash Flows**
At the Time of **Purchasing** Facility	No Changes	Decrease ↑
At the Time of **Depreciation**	Decrease ↑	No Changes
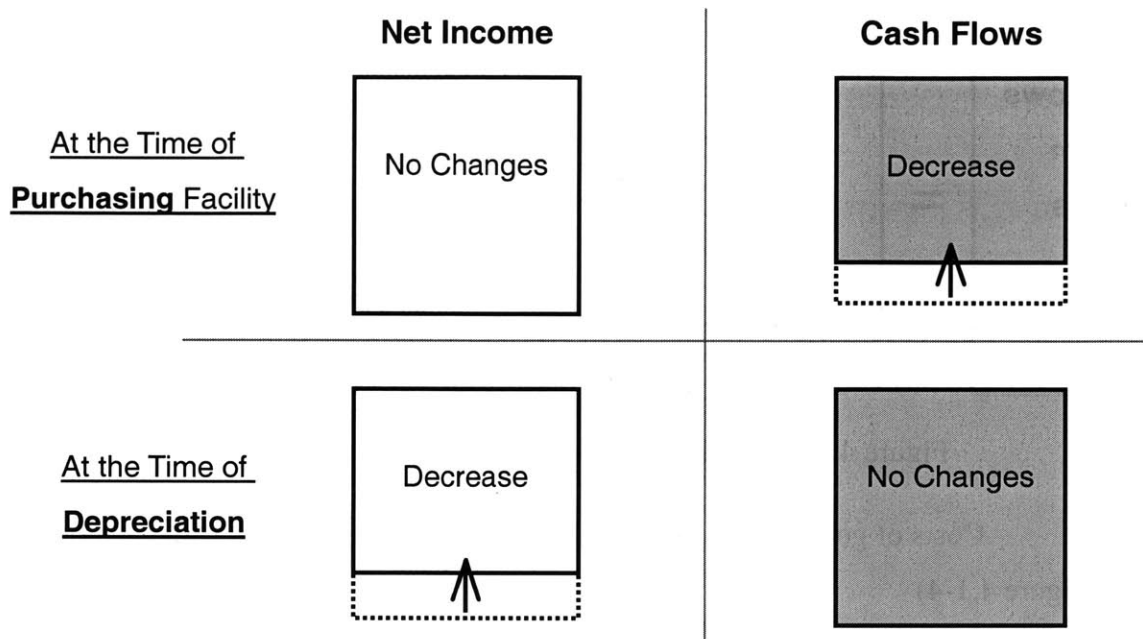
Figure 4.1-5:   Net Income and Cash Flow with Capital Expenditure

As above, the depreciation, accounts receivable and accounts payable make the net income and the cash flows different.   In other words, although the cash flows have close relationship with sales and COGS, they are also greatly affected by the accounts receivable and payable.   Because the cash flows and the net income on the income statement show the different information, it is necessary to prepare statements showing information about the cash flows.

4.2 International Accounting Standard Setting

The International Accounting Standard (IAS) is internationally accepted accounting standards proposed by the International Accounting Standards Committee (IASC). The following explanation of IAS is extracted from "Financial Accounting" (Pratt, 2003).

Just as nations have different histories, economies, cultures, and political systems, they also have different systems of financial accounting. Indeed, accounting systems have evolved in response to the demands of the business environment, and the business environments faced by companies in different parts of the world are vastly dissimilar. For example, financial reporting in North America, the United Kingdom, and Australia tends to be oriented toward the decision needs of investors and designed to measure effectiveness of management. The accounting methods used in Japan and most of the countries in Western Europe were not oriented toward the needs of investors. Rather, they provide information that is used to satisfy government requirements, such as computing income taxes. South American accounting methods are oriented toward the needs of government planners, and uniform rules are imposed on virtually all business entities.

The fact that so much diversity exists in worldwide accounting standards and practice makes it difficult for investors and creditors to compare the performances of companies operating in different companies. The differences in the accounting system can lead to a loss of credibility in the financial statements and investment decisions based on misunderstanding.

Many efforts have been made to achieve greater international understanding and uniformity of accounting practices. The most active, and increasingly important, is the International Accounting Standard Committee (ISAC), formed in 1973 to develop worldwide accounting practice. Japan has accepted the International Accounting Standards and revised the law in 1998.

4.2.1 Introduction of International Accounting Standards, (IAS)

Now, the Japanese accounting system is undergoing significant changes. Japan's Finance Ministry accepted the International Accounting Standards (IAS) and Japan's listed firms have had to introduce the new accounting standards since fiscal 2000. This new rule mainly covers (1) the introduction of new consolidated financial statement rules, (2) fair value accounting, (3) accounting for retirement benefits, and (4) the statement of cash flows.

Table 4.2-1 shows the schedule of the introduction of IAS.

Table 4.2-1: Schedule of the introduction of IAS

Item	FY 1999	FY 2000	FY 2001	FY 2002	FY 2005
New Consolidated Financial Statements Rules		◆—————————————————→			
The Statement of Cash Flows		◆—————————————————→			
Fair Value Accounting			◆———————————→		
Accounting for Retirement Benefits			◆———————————→		
New Accounting Treatment for R&D Expenses		◆—————————————————→			
Tax Effect Accounting		◆—————————————————→			
Accounting for Impairment of Assets				◆———→	

The conventional Japanese accounting system was not always based on international standards. While in the US and UK, the statement of cash flows had already become one of the crucial financial statements along with balance sheets and income statements, in Japan, the cash flow statements had not been prepared. Thus, the Japanese accounting standards were not internationally recognized as enough trustworthy. It was imperative for Japanese firms to increase the transparency of their operating and management information, and disclose their financial information meeting with the international standards in order to earn international trusts.

These changes were for not only reforming the accounting rule, but also increasing in international trust of Japan's firms and encouraging market participation of foreign investors. Moreover, as for corporate executives, the financial information based on the new rules would play an important role in management decision-making. Some say that after the burst of the Japanese bubble economy, the lack of necessary information for business decision is one of the causes for Japan's long economic stagnation.

4.2.2 New Consolidated Accounting Rule

The accounting reforms are being implemented one by one. First of all, the new consolidated accounting rule was introduced. Japan's conventional consolidated accounting rule also needed to include firm's subsidiaries' financial information and the subsidiaries were defined as the firms with over 50% of their stocks owned by their parent firm. The old rule

only focused on the ratios of subsidiaries stocks that the parent firm had.   As a result of this, some parent companies intended to own just fewer than 50% of subsidiaries' stocks, even though they still had virtual control over them.   This became common practice that the parents companies occasionally used their subsidiaries for income manipulation.   Thus, the conventional consolidated financial statements could not disclose precise financial information of parent companies.

In the new consolidated accounting rule, firms in control of parent firms are defined as subsidiaries no matter how many percent of stocks the parent firm has.   Thus consolidated financial statements can show the financial position and results of operations of the parent firm and its subsidiaries as if the group were a single firm with one or more branches.

The new consolidated accounting rule could be an incentive for the group to review the management control system between the parent firm and subsidiaries.   The next table (Table 4.2-2) listed the number of consolidated subsidiaries of the construction firms.

Table 4.2-2:   The Number of Consolidated Subsidiaries

Firm	#Consolidated Subsidiary	Firm	#Consolidated Subsidiary
Kajima Corp.	82	Ando Corp.	4
Taisei Corp.	48	Okumura Corp.	-
Shimizu Corp.	66	Toyo Construction	14
Obayashi Corp.	53	Tekken Corp.	6
Kumagai Gumi	45	Asanuma Corp.	2
Toda Corp.	14	Taihei Kogyo	17
Nishimatsu Construction	1	Zenitaka Corp.	4
Haseko-Corp.	22	Fukuda Corp.	-
Penta-Ocean Construction	28	Fudo Construction	7
Maeda Corp.	6	Matsumura-Gumi	2
Hazama Corp.	19	Arai-Gumi	-
Mitsui Construction	19	Daiho Corp.	7
Tokyu Construction	8	Morimoto Corp.	1
Tobishima Corp.	5	Wakachiku Construction	5
Sumitomo Construction	21	Ohki Corp.	-
Toa Corp.	12	Daisue Construction	1

Source: Annual Reports and Financial Statements of FY 2002

4.2.3 Fair Value Accounting

In 1999, Japan's Business Accounting Council announced the report on the installation of accounting standard for financial products. The report mentioned about four main purposes for the installation:

a) Promotion of investment in Japan's stock market from both domestic and outside investors

b) The investors can make appropriate investment decisions with self-responsibility

c) Firms can also make appropriate management decision based on actual condition

d) Establishment of accounting disclosure system equivalent to international standards

These improvements of the accounting standard aimed at creating the vital and orderly market.

In Japan, the valuation method for assets was conventionally applied the book value method (i.e., the value was based on the price when assets are gained). Therefore, after gaining assets, even if the market value of the assets become significantly below the book value, no gain or loss is recognized. Because book value is based on historical cost, it will differ from market value. Book loss often deteriorated corporate financial condition worse than reported numbers. This means that reported financial statements did not show the appropriate financial condition so that the statements were not necessarily useful information. The fair value accounting will be a good solution for this problem.

4.2.4 Retirement Benefit Accounting

In 1998, Japan's Business Accounting Council announced the report on the installation of the accounting standard for retirement benefits.

In Japan, many firms adopted the corporate pension plan such as employees' pension scheme and approved retirement annuity system. However, nowadays yields to investment assets are declining and unrealized capital losses on assets are growing. As a result, pension assets that are needed to pay future pension tend to fall short. In addition, the shortage of the pension assets could deteriorate the corporate financial condition. The information about

corporate pension is becoming very important for both investment information and corporate management. For this reason, to clarify the current condition of pension assets and liabilities, it was necessary to set up accounting standards about corporate pension.

The features of retirement benefit accounting are the following:

a) Comprehensive standards that will not be affected by the difference of retirement benefit schemes

b) Comparable between enterprises

c) Adopting Fair value Accounting

d) Adopting Present Value

4.3 Statement of Cash Flows

In Japan, firms historically prepared balance sheets and income statements. In addition, they have had to start preparing the statement of cash flows since fiscal 2001. In recent years, some construction firms became bankrupt one after another, even if they had positive net incomes. The main cause of bankruptcy was the shortage of funds.

Now, the statement of cash flows is positioned as a part of fundamental financial statements as well as balance sheets and income statements. The statement of cash flows provides a summery of the activity in a firm's cash account over a period of time. This statement divides cash activity into three categories: the operating activities, investing activities, and financing activities (Figure 4.3-1).

Three Categories of the Statement of Cash Flows

Cash Flow from Operating Activities (**CFO**)

Cash Flow from Investing Activities (**CFI**)

Cash Flow from Financing Activities (**CFF**)

Net Earnings

Goods/Services

Reinvested

Investments in Producing Assets

Debt Payments

Debt Financing

Dividends
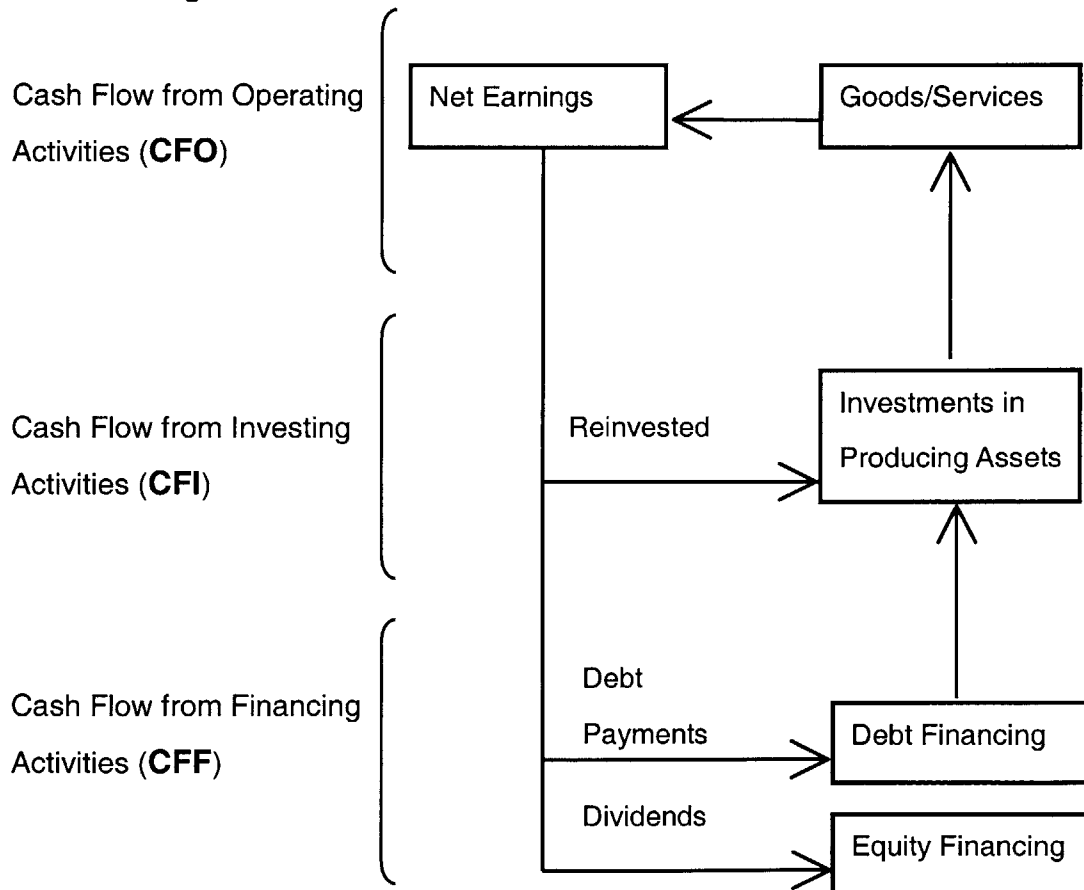
Equity Financing

Figure 4.3-1:   Three Categories of the Statement of Cash Flows

Financing activities involve the collection of capital through equity or debt issuances and any associated payments such as dividends and debt payments. Investment activities involve the acquisition and sales of producing assets, the assets used to produce and support the goods and service provided. Operating activities involve the sale of the goods and services. These activities produce additional capital that can be reinvested in producing assets, used to service debt payments, and distributed to owners in the form of dividends.

The following explanations of each section of the statements of cash flows are extracted from "Financial Accounting" (Pratt, 2003).

4.3.1 Cash Flow from Operating Activities (CFO)

Cash provided and used by operating activities includes those cash inflows and outflows associated directly with the acquisition and sale of the firm's inventories and services. This category includes the cash receipts from sales and accounts receivable as well as cash payments for the purchase of inventories, payments on accounts payable, selling and administrative activities, and interest and taxes. Under generally accepted accounting principles, there are two ways to present the operating section of the statement of cash flows: the direct method and the indirect method.

Under the direct method, in the operating section of the statement of cash flows, the cash flow effects of operating expenses are subtracted from the cash effects of the operating revenues in the computation of net cash from operating activities. This form of presentation is called the direct method because the cash inflows and outflows are taken directly from the cash account in the ledger that is they represent real cash flows.

On the other hand, under the indirect method, the operating section of cash flows contains a series of adjustments that reconcile net income with net cash from operations. This form of presentation is called the indirect method because net cash from operating activities is computed indirectly, starting with net income and then adjusting it for the differences between accrual and cash flow accounting.

Both the direct and the indirect methods result in the same amount of cash provided by operating activities; in that respect, they simply represent two different forms of presentation.

Non-cash charges to noncurrent accounts (e.g., depreciation, amortization, and book gains and losses) affected net income but do not affect cash flows. Depreciation and

amortization charges, for example, simultaneously reduce the dollar amounts of long-lived assets and create expenses, which reduce net income. The entries to record depreciation and amortization, however, do not reduce cash. Consequently, when deriving cash flows from net income, as is done under the indirect method, depreciation and amortization charges are added back. Similarly, gains and losses on the disposal of long-lived assets do not affect operating cash flows.

4.3.2 Cash Flow from Investing Activities (CFI)

Cash provided by investing activities includes the cash flows and out flows associated with the purchase and sale of a firm's noncurrent assets. This section of the statement of cash flows includes the cash effects from purchases and sales of long-term investments, long-lived assets, and intangible assets. The cash inflows and outflows can also be traced to entries in the cash account in the firm's ledger.

4.3.3 Cash Flow from Financing Activities (CFF)

Cash provided by financing activities includes cash inflows and outflows associated with a firm's two sources of outside capital: liabilities and contributed capital. This category primary includes the cash inflows associated with borrowings and equity issuances as well as the cash outflows related to debt repayments, treasury stock purchases, and dividend payments. The cash flows can also be traced to the cash account in the firm's ledger.

Note also that cash interest payments are not included in this section of the statement of cash flows, even though they represent a cost of financing. Instead, such payments are included in the operating section.

CHAPTER 5

CASH FLOW ANALYSIS

In the previous chapter, we examined the concept of cash flows. In this chapter we first explore cash flow profile analysis and ratio analysis, and then study how construction firms should manage their cash flows with cash flow statements. These analyses also refer to accounting and finance books (Palepu, Bernard and Healy, 1999, Pratt, 2003, Myers and Brealey, 1999, Adrian, 1999). The end of this chapter explains how Japan's contractor rating system for public works reflected the concepts of cash flows at the time of its revision in 1999.

5.1 Relation among Statement of Cash Flows and Other Financial Statements

The entire financial accounting process may be seen as preparing financial statements. While financial statements are prepared to meet the needs of external parties, the statements can also serve internal purposes of firms. In particular, the prepared financial statements can assist construction firms in making business decisions.

Financial statements consist of the income statement, balance sheet, statement of cash flows, statement of stockholder's equity, and related footnotes. The balance sheet lists the firm's assets, liabilities, and stockholders' equity as of a certain date. On the income statement, expenses are subtracted from revenues to produce a number called net income. The statement of retained earnings describes the increases and decreases of retained earnings. The statement of cash flows summarizes the increase and decreases in cash over a period of time and includes net cash flows from operating, investing, and financing activities (Figure 5.1-1).

Balance Sheet (Ending of Previous Year)

Assets		Liabilities and Stockholder's Equity	
Cash	xxx,xxx	Current liabilities	xx,xxx,xxx
Other current assets	xx,xxx,xxx	Long-term liabilities	x,xxx,xxx
Fixed assets	x,xxx,xxx	Contributed capital	xxx,xxx
Investment & other assets	x,xxx,xxx	Retained earnings	x,xxx,xxx
Total	xx,xxx,xxx	Total	xx,xxx,xxx

Statement of Cash Flows (Current Year)

Cash from operating activities	xxx,xxx
Cash from investing activities	xxx,xxx
Cash from financing activities	xxx,xxx
Increase in cash balance	xxx,xxx
Beginning cash balance	xxx,xxx
Ending cash balance	xxx,xxx

Income Statement (Current Year)

Revenue	x,xxx,xxx
Expenses	x,xxx,xxx
Net income	xx,xxx

Statement of Retained Earnings (Current Year)

Beginning retained earnings balance	x,xxx,xxx
Plus: Net income	xx,xxx
Less: Dividends	xx,xxx
Ending retained earnings balance	x,xxx,xxx

Balance Sheet (Ending of Current Year)

Assets		Liabilities and Stockholder's Equity	
Cash	xxx,xxx	Current liabilities	xx,xxx,xxx
Other current assets	xx,xxx,xxx	Long-term liabilities	x,xxx,xxx
Fixed assets	x,xxx,xxx	Contributed capital	xxx,xxx
Investment & other assets	x,xxx,xxx	Retained earnings	x,xxx,xxx
Total	xx,xxx,xxx	Total	xx,xxx,xxx

Figure 5.1-1: Relationship among Financial Statements

5.2 Cash Flow Analysis

5.2.1 Solvency Assessment

The statement of cash flows is used primarily to assess performance in two basic areas:

a) A firm's ability to generate cash;

b) The effectiveness of a firm's cash management.

The ability to generate cash is determined by the strength of the firm's operating activities as well as its financial flexibility, which reflects the firm's capacity to borrow, issue equity, and sell non-operating assets.

Effective cash management requires that two competing objectives be balanced. On one hand, cash must be available to meet debts as they come due. That is, solvency must be maintained. On the other hand, cash must be invested in productive assets that provide returns. Effective cash management involves managing the cash sources and uses in a way that provides a high return without bearing too great a risk of insolvency. Construction firms, especially highly leveraged ones, need to manage their cash flows prudently to ensure that cash is available when debt payments come due. The investment community has become increasingly concerned with the assessment of solvency.

Cash flow analysis, also called solvency assessment, involves estimating future cash flows and determining whether future inflows are timed so that adequate cash is available to cover future cash obligations. Three basic factors should be considered in this assessment: operating performance, financial flexibility, and liquidity. Figure 5.2-1 depicts how these factors relate to solvency.

Operating performance represents a firm's ability to grow (increase its net assets) through operations. Since operations are perhaps the most important source of cash to a firm, this concept is very important for solvency assessment. The operating section of the statement of cash flows is especially useful for analysis.

Financial flexibility refers to a firm's ability to produce cash through means other than operations: issuing debt, issuing equity, and selling assets. Firms capable of generating cash through a number of these options are considered financially flexible. Referring to the financial statement footnotes can be useful because a firm's ability to borrow and the conditions of outstanding equity issuances are normally described in some detail.

```
┌─────────────────────────────────────────────────────────────────┐
│                           SOLVENCY                                │
│                                                                   │
│    Ability to Generate Cash              Cash Requirements        │
│                   ↓                             ↓                  │
│   ┌───────────────────────────────────────────────────────────┐  │
│   │                  Operating Performance                     │  │
│   │                                                            │  │
│   │  Operating Revenue              Operating Costs            │  │
│   │     Construction Completion (Sales)  Construction Costs (COGS) │
│   │  Creation of Operating (WIP)    Creation of Operating (WIP)│  │
│   │     Receivables                    Payables               │  │
│   │  (Timing difference)            (Timing difference)        │  │
│   │  Cash inflows from Operations   Cash outflows from Operations │
│   └───────────────────────────────────────────────────────────┘  │
│                   ↓                             ↓                  │
│   ┌───────────────────────────────────────────────────────────┐  │
│   │                  Financial Flexibility                     │  │
│   │                                                            │  │
│   │  Operating Revenue              Operating Costs            │  │
│   │     Construction Completion (Sales)  Construction Costs (COGS) │
│   │  Creation of Operating (WIP)    Creation of Operating (WIP)│  │
│   │     Receivables                    Payables               │  │
│   │  (Timing difference)            (Timing difference)        │  │
│   │  Cash inflows from Operations   Cash outflows from Operations │
│   └───────────────────────────────────────────────────────────┘  │
│                   ↓                             ↓                  │
│    Timing of Cash Inflows           Timing of Cash Outflows       │
└─────────────────────────────────────────────────────────────────┘
```

Figure 5.2-1:   Important Factors in Solvency Assessment

The balance sheet lists the assets of the firm, but users must be cautious because the assets are not carried at market value.   The statement of cash flows may be helpful in assessing financial flexibility because it describes recent debt and equity issues and payments and recent assets acquisition and sales.   Liquidity is part of financial flexibility.   It represents the ability of a firm to convert its existing assets to cash.

5.2.2 Cash Flow Profile Analysis

The statement of cash flows can also be used to identify the cash flow profile of a firm. These profiles can indicate a firm's strategy or position in its life cycle, or key characteristics of its current situation. Such profiles are defined simply by whether net cash from operating, investing, and financing activities are positive or negative (Table 5.2-1).

Table 5.2-1:   Cash Flow Assessment

CFO	Positive	The amount of cash generated through operating activities is especially important because the successful acquisition and sales of a firm's services or inventories is a prerequisite for successful business. The cash flows are normal and expected to recur. Consequently, positive net cash flows from operations, especially across several periods of time, can indicate financial strength.
	Negative	The main business is in a slump. If the cash flows do not show any sign of upturn, it is necessary for a firm to rebuild its management drastically.
CFI	Positive	Positive cash flows associated with the sales of a firm's non-current assets. It is relatively common when a firm sells its idle assets and non-business property to improve the assets efficiency
	Negative	Cash activities include the cash effects from the purchase of long-term investments, long-lived assets, and intangible assets. It is likely to be seen when a firm actively increases its capital expenditures in the start-up and growing period. If the cash flows are negative but below positive operating cash flows, it is still a good sign for a firm's growth.
CFF	Positive	The cash inflows associated with borrowing and equity issuances exceed the cash outflows related to debt payments, treasury stock purchases, and dividend payments. If the positive cash flows would cover the negative operating cash flows, it is not a good sign for the firm.
	Negative	Carrying debt payments and the retirement of stocks, a firm is improving its financial position.

The eight combinations are listed below (Table 5.2-2).   They are followed by a brief description of the firm's activities, based on each profile.

Table 5.2-2:   Cash Flow Profiles

Profile	CFO	CFI	CFF	
1	+	+	+	This firm is generating large amounts of cash from all activities, perhaps in anticipation of a large investment. It is necessary to verify the reason for positive cash flows from investing and financing activities.
2	+	—	+	This firm is financing its growth through operations and by issuing debt and/or equity. If the funds are raised by debt, the firm must pay attention to its solvency.
3	+	+	—	This firm is using operating cash and selling off long-term assets to reduce debt or pay stockholders. The firm needs to consider whether delaying capital investments is sacrificing the firm's future growth.
4	+	—	—	This firm is financing both its growth and payments to capital providers with cash from operations. The firm is in good condition but must verify the effects of capital expenditures (CAPEX).
5	—	+	+	This firm is selling off long-term assets and collecting cash from capital providers to finance operating cash flow losses. The firm must examine the profitability of the current activities and its capital structure.
6	—	—	+	This firm is collecting cash from capital providers to finance growth and operating cash flow losses.
7	—	+	—	This firm is selling off long-term assets to finance operating cash flow losses and payments to capital providers. It is essential for the firm to improve the operating activities.
8	—	—	—	This firm is using its cash reserves to finance operating cash flow losses, payments to capital providers, and growth. Improving its profitability from operating activities is the immediate priority.

Reference: "Financial Accounting" (Pratt, 2003)

Table 5.2-3 represents Japan's top thirty-two construction firms, categorized according to these eight cash flow profiles, in fiscal 2002.   Most of them had lost their power to generate cash flows.

Table 5.2-3:   Cash Flow Profiles of Japan's Construction Firms   (in ¥ millions)

Profile	Firm	Net Income	CFO	CFI	CFF	CF
1	Wakachiku Construction	682	1,553	1,732	2,024	5,309
2	Toa Corp.	2,024	7,393	(7,349)	5,955	5,999
3	Kajima Corp.	(41,153)	15,117	41,639	(65,998)	(9,242)
	Taisei Corp.	(30,997)	50,280	36,271	(121,181)	(34,630)
	Shimizu Corp.	10,077	18,027	40,894	(89,160)	(30,239)
	Obayashi Corp.	(74,078)	33,677	19,212	(58,008)	(5,119)
	Kumagai Gumi	2,549	12,771	41,220	(66,064)	(12,073)
	Penta-Ocean Construction	1,771	25,110	3,559	(31,016)	(2,347)
	Hazama Corp.	(1,659)	8,298	1,862	(19,750)	(9,590)
	Mitsui Construction	171	19,839	5,023	(32,771)	(7,909)
	Tekken Corp.	1,885	2,044	4,973	(10,512)	(3,495)
	Matsumura-Gumi	(1,200)	2,829	998	(1,768)	2,059
	Daisue Construction	(923)	4,275	221	(5,806)	(1,310)
4	Nishimatsu Construction	(4,874)	8,840	(18,034)	(5093)	(14287)
	Sumitomo Construction	(49,151)	10,209	(1,654)	(24,577)	(16,022)
	Toyo Construction	35	6,609	(6,335)	(6,630)	(6,356)
	Fukuda Corp.	1407	149	(364)	(9,502)	(9,717)
5	Tokyu Construction	641	(23,914)	3,628	28,178	7,892
6	Maeda Corp.	191	(15,934)	(3,386)	9,461	(9,859)
	Taihei Kogyo	(1,890)	(5,780)	(1,273)	1,662	(5,391)
	Ohki Corp.	42	(1,226)	(2,469)	3,183	(512)
7	Toda Corp.	577	(9,377)	1,477	(11,394)	(19,294)
	Ando Corp.	(2,379)	(2,705)	2,507	(3,988)	(4,186)
	Okumura Corp.	(3,900)	(8,107)	83,560	(6,004)	69,449
	Asanuma Corp.	219	(2,930)	1,193	(1,369)	(3,106)
	Zenitaka Corp.	1,115	(21,223)	1,917	(3,656)	(22,962)
	Arai-Gumi	(817)	(703)	8,102	(17,533)	(10,134)
	Morimoto Corp.	3	(502)	1,137	(3,542)	(2,907)
8	Haseko-Corp.	(122,631)	(603)	(1415)	(8,569)	(10,587)
	Tobishima Corp.	(11,526)	(8,872)	(9,720)	(3,520)	(22,112)
	Fudo Construction	(7,885)	(4,072)	(2,288)	(2,030)	(8,390)
	Daiho Corp.	428	(723)	(184)	(3,021)	(3,928)

Source: Annual Reports and Financial Statements of FY 2002

The following figure (Figure 5.2-2) describes a standard product life cycle and its income flows and cash flows. Although the characteristics of a construction project are not the same as that of production, the comparison is helpful for understanding the relationship of income flows and cash flows.
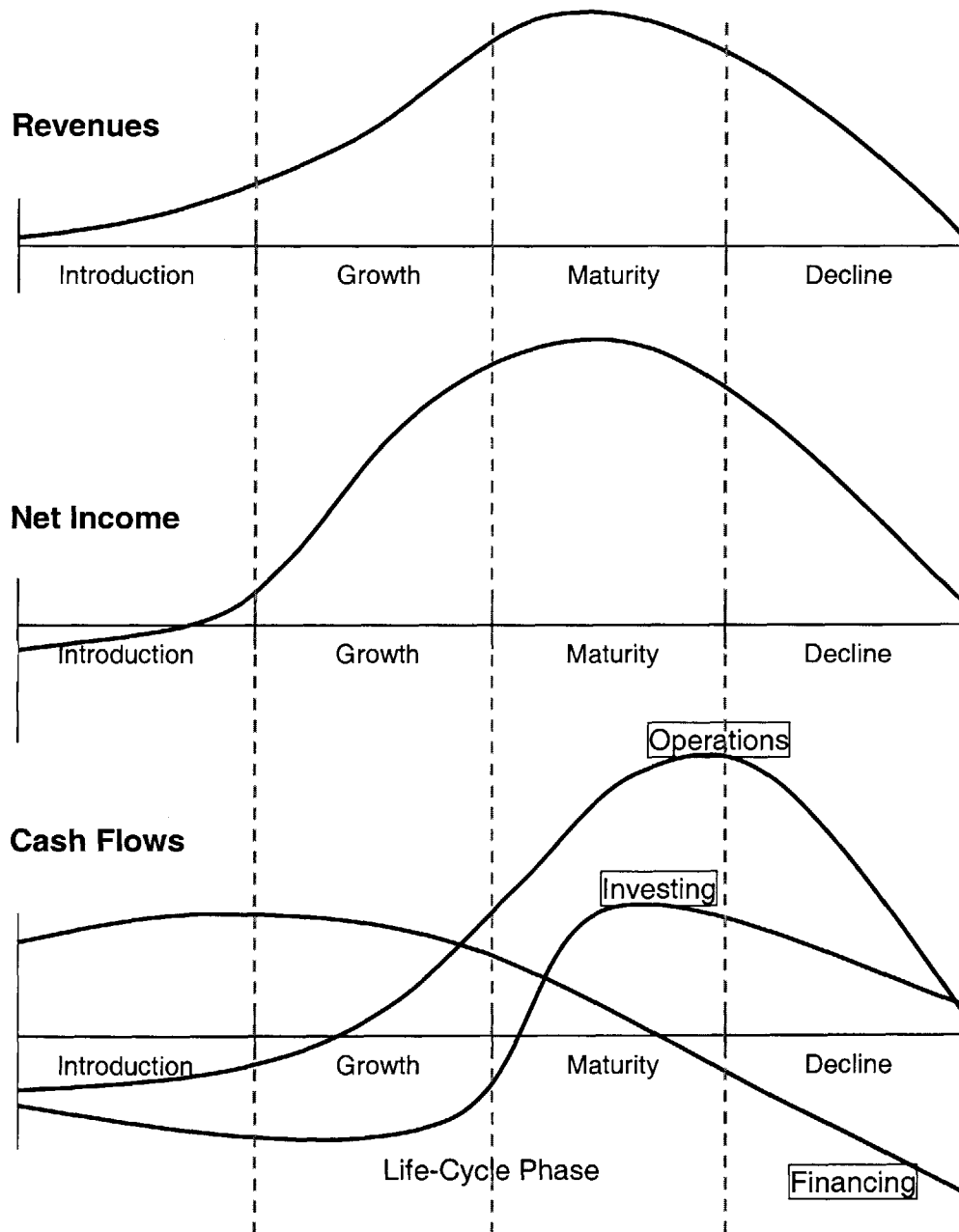

Figure 5.2-2: Relationship of Income Flows and Cash Flows

Source: "Financial Reporting and Statement Analysis: A Strategic Perspective, 4th ed."

(Stickney and Brown, 1998)

5.2.3 Ratio Analysis for Cash Flows

Increasing attention is being paid to the cash-generating ability of firms. Japan's construction firms are now required to include a statement of cash flows in their financial statement and are ranked by their cash flows when they bid on public works. Cash flow ratio[1] analysis provides further insights into the firm's operating, investing, and financing policies, and is an indication of the quality of the information in the firm's income statement and balance sheet.

a) Profitability Analysis

① **Cash flow margin**

$$\text{Cash flow margin} = \frac{\text{Cash flows from operations}}{\text{Sales}}$$

Cash flow margin is measured by cash flows from operating activities / sales. This indicates the proportion of sales that become cash flows from operations. The comparison between cash flow margin and profit margin shows the effect of the noncash item and working capital item.

② **Cash flow on assets**

$$\text{Cash flows on assets} = \frac{\text{Cash flows from operations}}{\text{Total assets}}$$

Firms often measured their performance by the ratio of cash flows from operations to total assets. The ratio is a basic measure of the efficiency with which a firm allocates and manages its resources. The ratio can be divided into two ratios, sales-to-assets ratio and cash flow margin.

$$\text{Cash flows on assets} = \frac{\text{Sales}}{\text{Total assets}} \times \frac{\text{Cash flows from operations}}{\text{Sales}}$$

[1] These financial ratios refer to Palepu, Bernard and Healy, 1999, Pratt, 2003, Myers and Brealey, 1999, Adrian, 1999

All firms would like to earn a higher cash flow on assets, but their ability to do so is limited by competition. If the expected cash flow on assets is fixed by competition, firms face a trade-off between the sales-to-assets ratio and the cash flow margin.

③ Cash flow on equity

Another measure focuses on the ratio of cash flows to the firm's equity.

$$\text{Cash flows on equity} = \frac{\text{Sales}}{\text{Total assets}} \times \frac{\text{Cash flows from operations}}{\text{Sales}} \times \frac{\text{Assets}}{\text{Equity}}$$
$$= \text{Asset turnover} \times \text{Cash flows margin} \times \text{Financial leverage}$$

This formula shows that management has three levers for controlling cash flows on equity: (1) the cash flows squeezed out of each dollar of sales, (2) the sales generated from each dollar of assets employed, and (3) the amount of equity used to finance the assets.

b) Debt Coverage
① Interest coverage ratio

$$\text{Interest coverage ratio} = \frac{\text{Cash flows from operations}}{\text{Interest expense}}$$

This index shows the ability to cover annual financial obligation by cash flows from operating activities. The ratio indicates the number of times interest is covered by cash flows.

② Interest bearing debt coverage ratio

$$\text{Interest bearing debt coverage ratio} = \frac{\text{Cash flows from operations}}{\text{Interest bearing debt}}$$

This index shows the ability to cover interest bearing debts by cash flows from operating activities. The ratio is the ability to generate the cash flows to repay the interest bearing debts.

c) Investment Activity
① **Capital expenditures to operations cash flow ratio**

$$\text{Capital Expenditures to CFO} = \frac{\text{Capital expenditures}}{\text{Cash flows from operations}}$$

This ratio shows the ratio of a firm's capital expenditures to its cash flows from operating activities. In the growing period, the ratio would be more than 100%. In other words, the capital expenditures are financed not only by the firm's cash flows but also by external funds.

5.3 Management of Cash Flows

Often a construction project takes more than a year to complete. Because a large amount of money is injected into the project for years, cash flow management is very essential for firms in the construction industry.

5.3.1 Management of Cash Flows from Operating Activities

Cash flows from operating activities (CFO) include cash receipts and payments during a particular period associated with a firm's operating activities. The major inflows of construction firms derive from the revenue from completed works. The outflows are construction costs, such as material, labor, subcontract, and overhead costs, and general administrative and selling expenses.

For the construction firms, the completion of construction is the major source of CFO. There are two main revenue-recognition methods for the construction industry. These are the percentage of completion method and the completed contract method. The percentage of completion method recognizes income on a current basis and the completed contract method recognizes no revenue or expense until the completion of the construction project. Whichever method the firm chooses, the net cash flows from construction projects do not change. The choice of revenue-recognition method is a matter of accounting method and does not affect the net cash flows.

The features of the construction projects' cash flows are as follows:

a) Payment methods

In the construction industry, the duration of building a project often exceeds a year and the payments of the project are usually allocated and made during the project. The payment method is determined at the time of the contract.

① **Progress payment (Private works)**

The progress of the project is measured and the firm asks for payment at regular intervals.

② **Payment at the time of inspections (Private works)**

The payments are divided and made after inspections between processes, and at the end of the project.

③ **Advance payment (Public works)**

Before the groundbreaking of construction, the first payment is made. The payment is around forty percent of the total contract price. The rest of it is divided and paid at regular intervals according to the progress of the project, or at the end of the project.

The differences in the above payment methods significantly affect the amount of net cash flows from operating activities.

b) Revenue recognition

If a firm adopts the completed contract method, no revenue is recognized until the completion of the construction. Hence, accounts receivable for the construction is not recorded during the construction. Only after the completion of the construction, the revenue is recognized and accounted for accounts receivable. Received money before completion is accounted for cash received for uncompleted projects (accounts payable). After the construction is completed, this accounts payable is offset by the accounts receivable and disappears (Figure 5.3-1).
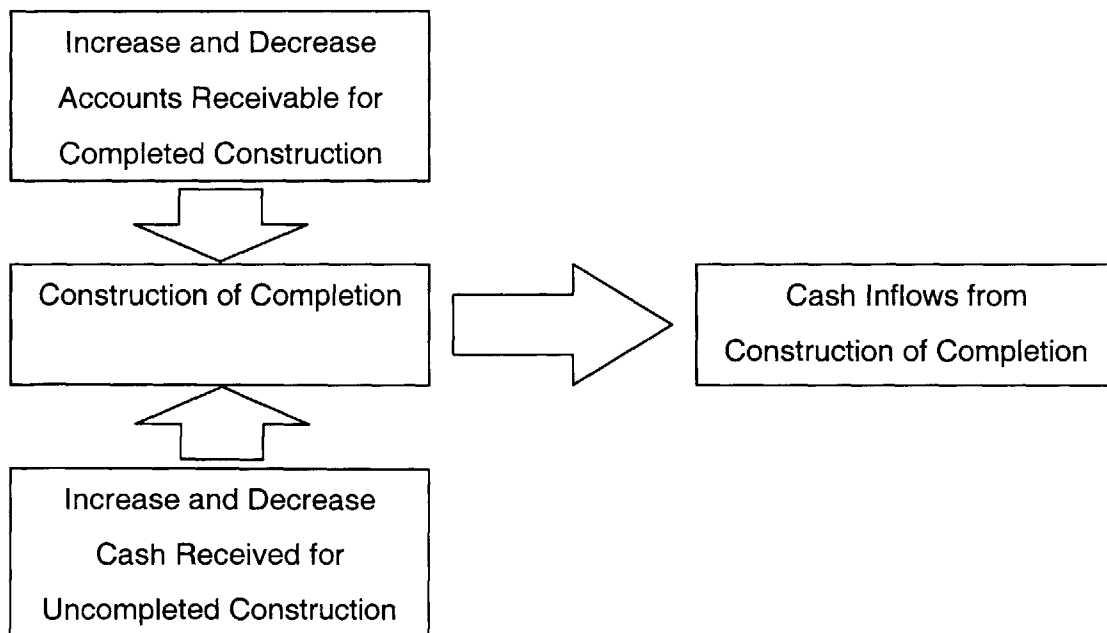
Figure 5.3-1: Cash Inflows from Construction of Completion

As described above, the real cash inflows by the construction of completion are computed by three numbers: the amount of the construction of completion, cash received for uncompleted projects, and accounts receivable for completed projects. Therefore, in order to improve the cash flows from operating activities, it is not necessary to only attempt to increase the volume of the construction of completion, but also to fully consider the influence of increases and decreases of accounts receivable and cash received.

Construction of Completion

+

Beg Balance of AR

−

End Balance of AR

−

End Balance of Cash Received

+

Beg Balance of Cash Received

= | **Real Cash Inflows from Construction of Completion** |
|---|

Figure 5.3-2:   Computing for Cash Inflows from Construction of Completion

c) Cash flow management during construction

① Ratio of cash received for uncompleted projects to expenditures for uncompleted projects

In the construction industry, the ratio of cash received for uncompleted projects to expenditures for uncompleted projects is used as an important index for the management of cash flows. Less than 100% of the ratio of cash received to expenditures means that the firm spends its funds for the project more than it received as advanced payments. Thus, it is necessary to make a policy to raise the ratio for the firm.

$$\text{Ratio of Cash Received to Expenditures} = \frac{\text{Cash Received for Uncompleted Projects}}{\text{Expenditures for Uncompleted Projects}}$$

The firm has the burden of funds for construction.

$$\frac{\text{Cash Received for Uncompleted Projects}}{\text{Expenditures for Uncompleted Projects}} < 100\%$$

The firm does not have the burden of funds for construction.

$$\frac{\text{Cash Received for Uncompleted Projects}}{\text{Expenditures for Uncompleted Projects}} > 100\%$$

Usually, the ratio is under 100%. The next table (Table 5.3-1 shows the ratio of cash received to expenditures of Japan's top 35 construction firms)

Table 5.3-1: Ratio of Cash Received to Expenditure of Japan's Top 35 Construction Firms

Top 35 Construction Firms (in ¥ millions)	2001	2002
Cash received from uncompleted projects	4,574,736	4,109,086
Expenditures for uncompleted projects	4,986,755	4,550,595
Difference	-412,019	-441,509
The ratio of cash received to expenditures	91.74%	90.30%

Source: Research Institute of Construction and Economy, "Construction Economy Report"

② **Timely reports of construction inspections and progress**

The payment method is chosen in the contract. If the progress payment method is adopted, the construction progress information is critical for the payment. If the payments are made at the time of inspection, the inspection information becomes important. Therefore, the timely reports of the progress and inspection information lead the cash flow improvement.

d) Cash flow management after construction

① **Analysis of accounts receivable for completed construction**

Accounts receivable for completed construction is an uncollected balance of the contract price. This is the final step of cash collecting management for the project, and the collecting money largely affects the cash flows.

The collection period highlights the firm's management of accounts receivable.

$$\text{Collection Period} = \frac{\text{Accounts Receivable for Completed Construction}}{\text{Construction of Completion} \div 12\text{months}}$$

In addition, the receivable that the construction firm receives for the projects is sometimes not only accounts receivable for completed projects but also bills and notes. Thus, the following formula is also used as a total collecting period of the firm.

$$\text{Collection Period} = \frac{\text{Accounts Receivable for Completed Construction} + \text{Bills} + \text{Notes}}{(\text{Construction of Completion} + \text{Other Operation}) \div 12\text{months}}$$

② **Receivable management**

Although it is preferable for the firm to collect accounts receivables for completed construction, it usually gets behind with payments for certain reasons. Thus, receivable management plays an important role for maintaining the firm's cash flow management.

e) Cash flow management of construction costs

Another way to improve the cash flows is that the improvement of cash outflows for construction costs.   Construction costs are first entered as expenditures for uncompleted projects until the project is completed.   When the project is completed, the costs are transferred to the costs of completed construction. The unpaid construction costs are collected in accounts payable for completed projects.

As mentioned above, the cash outflows of the construction costs are computed with the expenditures for uncompleted projects and the accounts payable for completed projects.
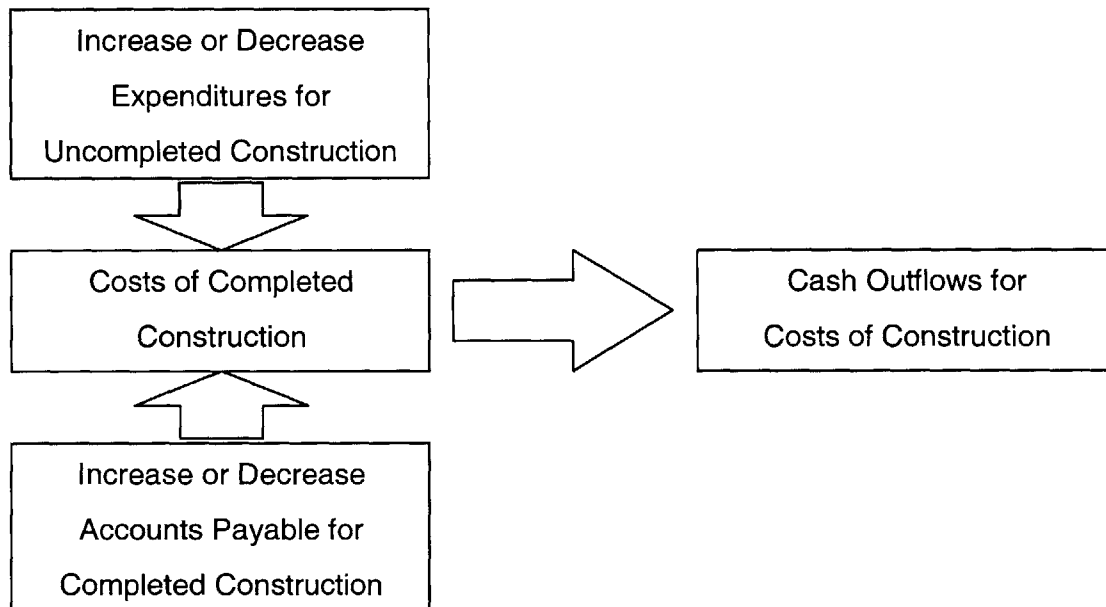
Figure 5.3-3:   Cash Outflows for Costs of Construction

The real cash outflows for the construction costs are derived from three numbers, the costs of completed construction, expenditures for uncompleted projects, and accounts payable for completed projects.   Therefore, in order to improve the cash flows from operating activities, it is not necessary to only attempt to decrease the construction costs but also to fully consider the influence of increase or decrease of accounts receivable and payable.

Costs of Completed Construction

$-$

Beg Balance of Expenditures for Uncompleted Construction

$+$

End Balance of Expenditure for Uncompleted Construction

$+$

End Balance of AP for Completed Construction

$-$

Beg Balance of AP for Completed Construction

$=$ **Cash Outflows for Costs of Construction**

Figure 5.3-4:   Computing for Cash Outflows for Costs of Construction

5.3.2 Management of Cash Flows from Investing Activities

Cash flows from investing activities include the cash inflows and outflows associated with the purchase and sales of a firm's investments during a particular period. Cash effects from purchases and sales of long-term investments, long-lived assets, and intangible assets are included. The purchases or sales of a firm's marketable securities or property, plant, and equipment are common examples.

```
┌─────────────────────────────────────────────┐
│            Tangible Fixed Asset              │
└─────────────────────────────────────────────┘
                      +
┌─────────────────────────────────────────────┐
│            Marketable Securities             │
└─────────────────────────────────────────────┘
                      +
┌─────────────────────────────────────────────┐
│            Long-term Investments             │
└─────────────────────────────────────────────┘

─────────────────────────────────────────────────

   =   ┌─────────────────────────────────────────┐
       │   Cash Flows from Investing Activities   │
       └─────────────────────────────────────────┘
```
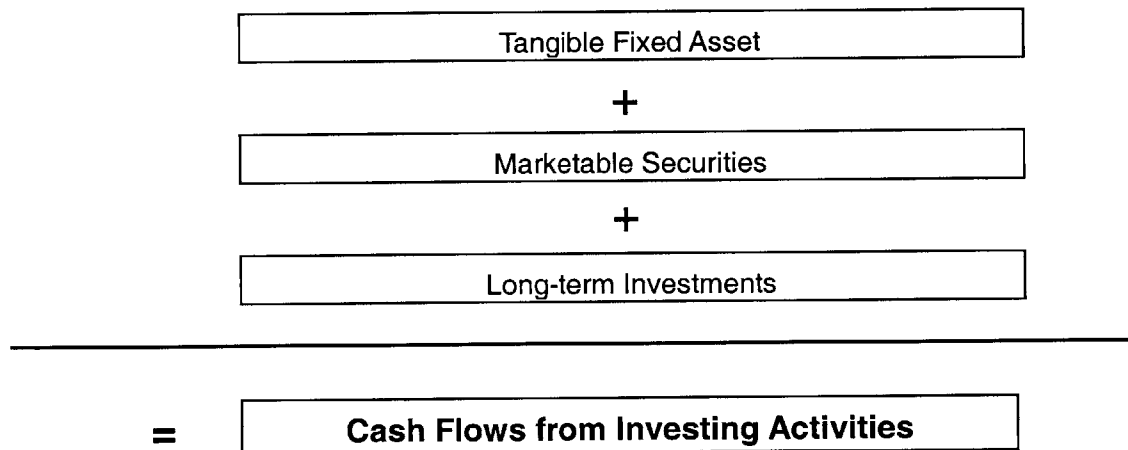
Figure 5.3-5:   Cash Inflows from Investing Activities

As for cash flows from investing activities, it becomes vital whether the investments required for future growth are made or not, and also whether the investments are unnecessarily large amount or not. Moreover, as mentioned early, identifying the cash flow profile of a firm is also important.

Investing activities include a wide variety of things, and are accompanied by risk. The optimal management of investing cash flows is a critical factor for corporate management.

5.3.3 Management of Cash Flows from Financing Activities

Cash provided by financing activities includes cash inflows and outflows associated with a firm's two sources of outside capital: Liabilities and contributed capital. This category primarily includes cash inflows associated with borrowing and equity issuances as well as cash outflows related to debt repayments, treasury stock purchases, and dividend payments.

Liabilities

+

Contributed Capital

= | **Cash Flows from Financing Activities** |
| --- |

Figure 5.3-6:   Cash Flows from Financing Activities

5.4 Contractor Rating System for Public Works and Cash Flows

5.4.1 New indexes of business condition analysis

In the public works sector of Japan's construction industry, a system of government ratings or rankings has been established; this is a prequalification process whereby only those contractors with acceptable ratings and experience on comparable projects will be invited to bid on designated projects.

The government rating system involves a sophisticated process that takes into account the following four items.   The business condition analysis has been revised especially drastically since 1999.

a) **Scale of operation**
   ① Annual average sales volume of completed projects
   ② Net worth & Number of staff members engaged in the construction business.

b) **Business conditions**
   ① Profitability
   ② Liquidity
   ③ Stability
   ④ Soundness

c) **Technical capability**
   ① Number of technical staff members

d) **Others**
   ① State of labor welfare
   ② Safety performance in construction
   ③ Number of years in business
   ④ Number of certified construction accountants

The conventional business condition analysis had been adopted since the review of the contractor rating system in 1983.   The analysis formula was created based on the actual condition of the construction industry at the time.   However, the business environment around the construction industry has severely changed and now the construction industry is in a hard time.

Under the circumstances, twelve indexes of business condition analysis have been revised as follows:

a) In order to analyze the profitability, only the ordinary profit was conventionally used. However, the operating profit and operating cash flows have been used this time to analyze the profitability from various perspectives.

b) As for the indexes that show the stability, the month of interest-bearing debt and ratio of interest expense to volume of completed construction were added in order to analyze the debt burden that the construction industry was saddled.

c) About the indexes that show the soundness, completed construction works per capita and added values per capita were removed.

The following table (Table 5.4-1) shows the twelve indexes of business condition analysis.

Table 5.4-1:   The New Indexes of Business Condition Analysis

	Index	Formula
Profitability	Operating profits margin	$\dfrac{\text{Operation profits}}{\text{Completed Construcion}} \times 100$
	Ratio of ordinary profits to total capital	$\dfrac{\text{Ordinary profits}}{\text{Total capital}} \times 100$
	Cash flows to the volume of completed construction	$\dfrac{\text{Operating Cash Flows}}{\text{Completed construction}} \times 100$
Liquidity	Processing working capital to Sales per month	$\dfrac{\text{Working capital}}{\text{Completed construction/12month}}$
	Accounts receivable rate	$\dfrac{\text{Accounts raceivable}}{\text{Completed construction}} \times 100$
	Collection period (month)	$\dfrac{\text{Accounts receivable}}{\text{Completed construction/12month}}$
Stability	Capital equity ratio	$\dfrac{\text{Equity}}{\text{Total capital}} \times 100$
	Interest-bearing debts to Sales per month	$\dfrac{\text{Interest bearing debts}}{\text{Completed constructon/12month}}$
	Interest expenses to the volume of completed construction	$\dfrac{\text{Interest expenses}}{\text{Completed construction}} \times 100$
Soundness	Ratio of equity to fixed assets	$\dfrac{\text{Equity}}{\text{Fixed assets}} \times 100$
	Long-term fixed ratio	$\dfrac{(\text{Equity} + \text{Fixed liability})}{\text{Fixed assets}} \times 100$
	Added value to fixed assets ratio	$\dfrac{\text{Sales} - (\text{Material} + \text{Subcontract costs})}{\text{Fixed assets}} \times 100$

Source: Construction Industry Information Center, "Contractor Rating System"

Table 5.4-2 lists the points of business condition for each construction firms in 2002.

Table 5.4-2: Points of Business Condition for Construction Firms in 2002

Firm	Points	Firm	Points
Nishimatsu Const.	726	Penta-Ocean Const.	531
Toda Corp.	716	Tekken Corp.	513
Maeda Corp.	707	Hazama Corp.	500
Okumura Corp.	692	Ohki Corp.	500
Daiho Corp.	668	Toyo Const.	487
Shimizu Corp.	660	Taihei Kogyo	462
Fukuda Corp.	655	Mitsui Const.	427
Toa Corp.	638	Tobishima Corp.	416
Kajima Corp.	630	Haseko-Corp.	388
Obayashi Corp.	595	Tokyu Const.	388
Asanuma Corp.	589	Fudo Const.	388
Ando Corp.	578	Matsumura-Gumi	388
Wakachiku Const.	571	Morimoto Corp.	388
Taisei Corp.	567	Kumagai Gumi	341
Zenitaka Corp.	552	Arai-Gumi	320
Daisue Const.	535	Sumitomo Const.	199

Source: Construction Industry Information Center, "Contractor Rating System"

5.4.2 Indexes by Cash Flows

At the review of the business condition indexes in 1999, most of the indexes were revised.   The point to note is that many indexes related to the cash flows and debt capacities were introduced at this time.   The ratio of the cash flows to completed construction, the ratio of processing working capital to sales per month, the accounts receivable rate, and the collection period are related to the cash flows.   The stability and soundness indexes show a firm's debt capacity and financial conditions.

The following formulas explain the ratio of the cash flows to completed construction and the ratio of processing working capital to sales per month:

a) Ratio of Cash flows to completed construction

$$\frac{\text{Net income} \pm \text{Income tax adjustment} + \text{Depreciation} + \text{Estimated liabilities} - \text{Dividens} - \text{Bonus to directors}}{\text{Construction of Completion}}$$

This ratio indicates how much cash flow a firm can generate from construction completion.   The higher the ratio is, the better the condition of the firm's cash flows as the higher ratio gives a positive effect to this contractor rating.   The cash flows in this index mean the cash flows in the operating section of the statement of cash flows. Moreover, while there are two ways to find the operating cash flows, the new index adopts the indirect method.

b) Ratio of processing working capital to Sales per month

$$\frac{\begin{array}{l}\text{Notes receivable} + \text{Accounts receivable for completed work} + \text{Trade accounts receivable} \\ + \text{Expenditures for uncompleted work} - \text{Notes payable} - \text{Accounts payable for completed work} \\ - \text{Trade accounts payable} - \text{Cash received for uncompleted work}\end{array}}{\text{Construction of Completion/12month}}$$

The outstanding balance of the trade receivable and inventory assets, such as the notes receivable and accounts receivable for completed project, is the invested cash, and the outstanding balance of the trade payable, such as the notes receivable and accounts payable for completed work, is the postponement of payment. Thus, the difference between them is the net invested cash in the operating activities, which is called necessary working capital. The ratio of processing working capital to sales per month is the index that indicates the condition of working capital and the smaller this number is, the better the effect on the cash flows and the better the contractor rating points are.

In the U.S., performance bonds and payment bonds show a guarantee from a surety that the contract will be fulfilled in the event of failure or default by the contractor.

CHAPTER 6

INVESTED CAPITAL, RETURN AND COST OF CAPITAL

In this chapter, we examine the relationship among the invested capital, returns from the capital, and the cost of capital. In the previous chapters, we explored the cash flow statements. Although cash flows treated as the returns are derived from the cash flows from operating activities, there are many other cash flow measures (Damodaran, 2002). This chapter explains the concepts of the cash flows as the return from invested capital. Finally, we examine the cost of capital by using the weighted average cost of capital (WACC) and the capital asset pricing model (CAPM) and obtain a clear picture of the relationship among the invested capital, returns and the cost of capital.

6.1 Free Cash Flows

6.1.1 Free Cash Flows (FCF)

In order to analyze the cash flow statements, it is also important to introduce the concepts of free cash flows[1]. One of these concepts is called free cash flow to equity (FCFE) (Damodaran, 2002) as the cash flows left over after meeting all financial obligations, including debt payments, and after covering capital expenditures and working capital needs. The data that we need to find free cash flows can be collected from statements of cash flows. Basically, FCF comes from CFO after a firm's expenditures needed to maintain the current operations are deducted. In other words, FCF is the remaining value after deducting future investments and is used as free cash. The formula is shown as (Figure 6.1-1):

| Free Cash Flows | = | Cash Flows from Operating Activities | − | Future Investments for Continuing Operations |

Figure 6.1-1: Concept of FCF

---

[1] These concepts refer to "Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, 2nd ed.", Damodaran, 2002

Because it is difficult to define the future investments for maintaining operations in the FCF formula and there are many usages, the meaning of FCF becomes unclear. FCF is defined here as the cash not required for operation or for reinvestment to keep its planned level.

To calculate free cash flows, we begin with the net income and convert it to a cash flow by subtracting a firm's reinvestment needs. First, increases in working capital drain a firm's cash flows, while decreases in working capital increase the cash flows available to equity investors. As we find cash flows from operating activities, we subtract changes in non-cash working capital from net income. We only focus on real cash flow effects.

Second, any capital expenditures, defined broadly to include acquisitions, are subtracted from the net income, since they represent cash outflows. As we calculate cash flows from operating activities, depreciation and amortization, on the other hand, are added back in because they are non-cash charges. The difference between capital expenditures and depreciation (net capital expenditures) is usually a function of the growth characteristics of the firm. High-growth firms tend to have high net capital expenditures relative to earnings, while low-growth firms may have low, and sometimes even negative, net capital expenditures. In Japan, before bursting the bubble economy, many firms were likely to have high net capital expenditure and negative FCF.

Allowing for the cash flow effects of net capital expenditures, and changes in working capital, we can define the cash flows left over after these changes as the free cash flow to equity.

Free cash flow (FCF) = Net income - (Capital expenditure - Depreciation)
$-$ (Change in noncash working capital)

This calculation can be simplified as follows:

Free cash flow (FCF) = Net income + Depreciation - Change in noncash working capital
- Capital expenditures
= Cash flows from operating activities - Capital expenditures

---

6.1.2 Free Cash Flows and Other Cash Flow Measures

The free cash flow to the firm (FCFF) is also used when the entire firm is valued (Damodaran, 2002). The FCFF is the sum of the cash flows to all claim holders in the firm, including stockholders, bondholders, and preferred stockholders. A simple way of getting to FCFF is to estimate the cash flows prior to any of these claims. Thus, we could begin with the earnings before interest and taxes, net out taxes and reinvestment needs, and arrive at an estimate of the free cash flow to the firm.

$$\text{Free cash flow to the firm} (FCFF) = EBIT(1 - \text{Tax rate}) + \text{Depreciation} - CAPX - \Delta WC$$

The difference between FCF (FCFE) and FCFF arises primarily from cash flows associated with interest payments.

One measure widely used in valuation is the earnings before interest, taxes, depreciation, and amortization (EBITDA). This free cash flow is a closely related concept but it takes into account the potential tax liability from the earnings, interest expenses, capital expenditures and working capital requirements.
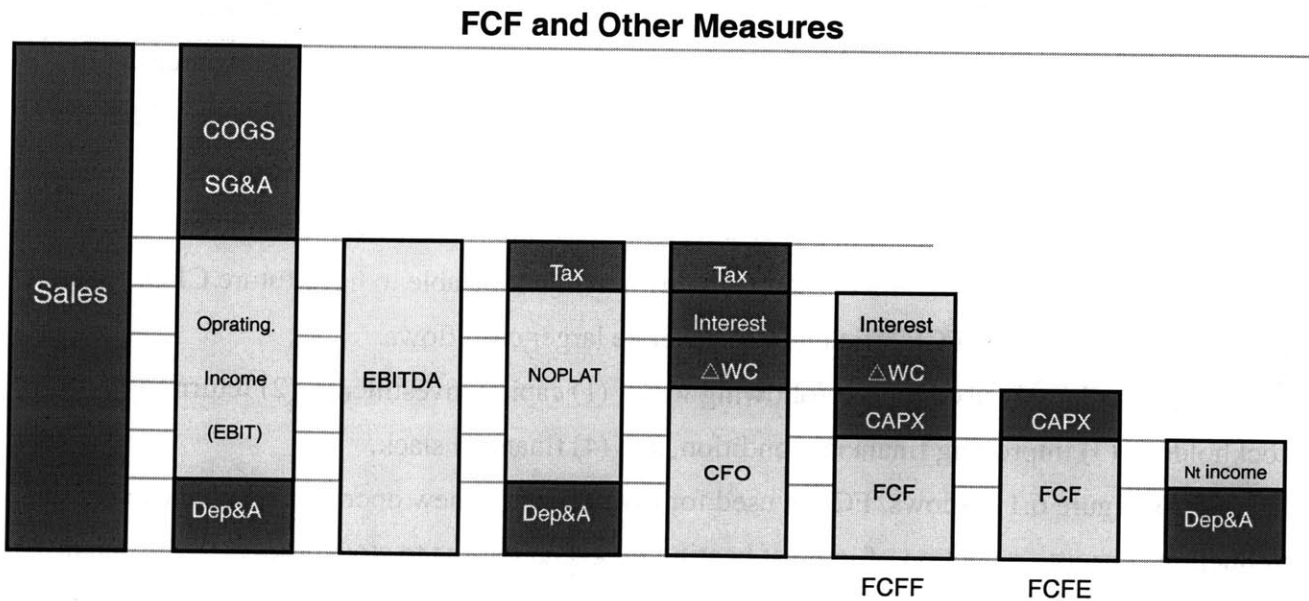

Figure 6.1-2: FCF and Other Measures

Two measures of earnings are also often used to derive cash flows. The amount of earnings before interest and taxes (EBIT) or operating income comes directly from a firm's income statements. Adjustments to EBIT yield the net operating profit or loss after taxes (NOPLAT) (McKinsey & Company and Copeland, 2000).

Each of these measures is used in valuation models, and each can be related to each other. The above figure (Figure 6.1-2) shows their relationships.

6.1.3 Use of Free Cash Flows

In order to continue to operate a firm, it is essential to maintain constant capital expenditures (CAPX). Free cash flows (FCF) are the amount of remaining after deducting capital expenditures from cash flows from operating activities (CFO) and literally free financial resources for the firm. It is also important for the firm to understand the trend of FCF.

In the beginning of a production period, large initial capital expenditures are required and they reduce the amount of FCF. On the other hand, because CFO is not reflected by CAPX, CFO does not decrease as FCF does, because CFO shows us a firm's earning power and level of profit and cash from operating activities. However, FCF can tell not only the earning power but also the firm's real returns after CAPX from its investments in the period. In other words, FCF clearly shows us the relationship between investments and returns. Thus, increase in both FCF and CFO can only indicate that the firm is growing.

If a firm keeps FCF as internal deposits, it becomes the firm's financial slack. Financial slack is valuable because it allows the firm to readily access financial resources. In the long run, the firm's value rests on its capital investments and operating decisions. Therefore, sufficient financial slack is useful for the firm to finance quickly on good investments.

There is also a dark side to financial slack. In order to obtain a large amount of it, a firm does not make new investments so that the firm will not be able to have future CFO. The firm is required to use its FCF efficiently to generate larger cash flows.

FCF is largely used for the following ways: (1) capital investments, (2) return to stockholders, (3) improving financial condition, and (4) financial slack.

As Figure 6.1-3 shows, FCF is used for investments of new operations, enhancement of production capacity, reduction of interest bearing debt, and returns to stockholders. Sufficient FCF enables a firm to invest in growth opportunities, reduce bad debt, and increase dividends to

stockholders.   The efficient and well-balanced use of FCF is one of the crucial managing factors.

It was true that managers of Japan's construction firms were not concerned with their firms' FCF but focused only on amounts of sales.   They also did not care about the usage of FCF.   Although their belief in increasing sales led the firms to invest into new operations excessively, after the burst of Japan's bubble economy, the investments could not generate new cash flows anymore and are devalued now.

For the future, it is required to focus on cash flows and study their usage more carefully by using statements of cash flows in order to conduct management efficiently.

Use of FCF

Operating Activities

⬇

Cash Flows from Operating Activities (CFO)

−

Future Investments for Continuing Operations

=

Free Cash Flows (FCF)

Capital Investments	Return to Stockholders	Improving Financial Condition	Financial Slack
· New projects · New operation · M&A · Enhancing production capacity	· Increasing dividends · Stock repurchase	· Changing capital structure · Reducing interest bearing debt	· Obtaining cash · Obtaining marketable security · Obtaining saleable real assets

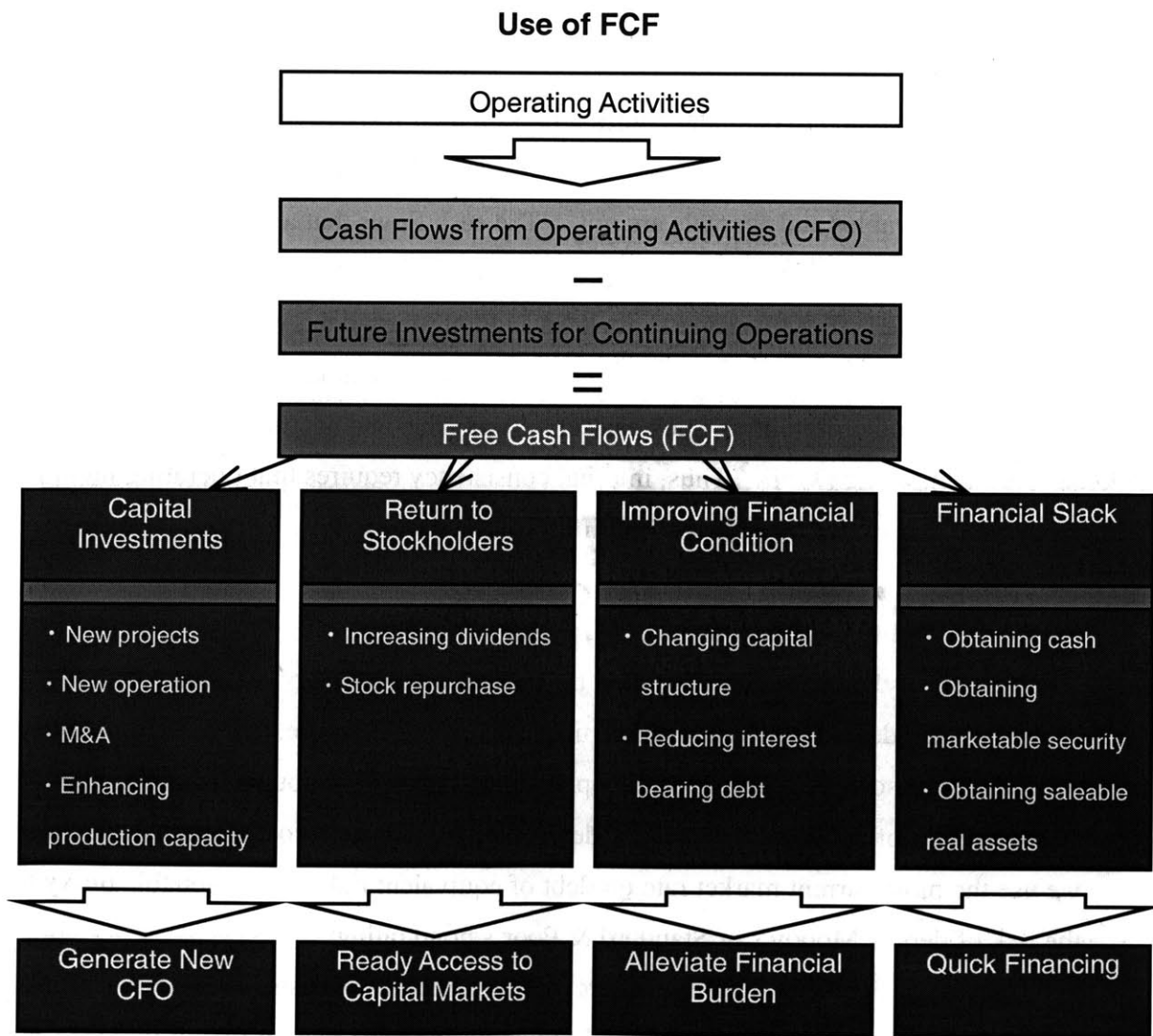| Generate New CFO	Ready Access to Capital Markets	Alleviate Financial Burden	Quick Financing

Figure 6.1-3:   Use of FCF

6.2 Cost of Capital

6.2.1 Weighted Average Cost of Capital (WACC)

Cost of capital is the rate of return that is necessary to maintain market value of a firm, also called the hurdle rate or required rate of return. The firm's cost of capital is calculated as a weighted average of the costs of debt and equity funds.

$$WACC = r_D(1 - T_C)\frac{D}{V} + r_E \frac{E}{V}$$

D = the market value of debt; E = the market value of equity; V = D + E

r_D = the cost of debt; r_E = the cost of equity

T_C = the marginal corporate tax rate

The weights assigned to debt and equity represent their respective fractions of total capital provided, measured in terms of market values. Short-term and long-term debt is included in debt but payables and accruals are not. The cash flows that are discounted by WACC are FCFF. FCFF are the return to the providers of the capital to which WACC applies. FCFF are those available before servicing short-term and long-term debt, which indicates that both short-term and long-term debt should be considered a part of capital when computing WACC. Servicing of other liabilities, such as accounts payable and accruals, should be considered when computing FCFF. Thus, internal consistency requires that operating liabilities not be considered a part of capital when computing WACC.

a) Cost of Debt

The cost of debt should be based on the current market rate of interest. For investment-grade debt, the risk of bankruptcy is low. Therefore, the yield to maturity is usually a reasonable estimate of the opportunity cost. The coupon rate (i.e., the historical cost of debt) is irrelevant for determining the current cost of capital. Always we use the most current market rate on debt of equivalent risk. A reasonable proxy for the risk of debt is Moody's or Standard & Poor's bond rating.

The cost of debt also should be expressed on a net-of-tax basis, because it is after tax cash flows that are being discounted. In most settings, the market rate of interest can

be converted to a net-of-tax basis by multiplying by one minus the marginal corporate tax rate.

b) Cost of Equity

Estimating the cost of equity is difficult. One possibility way to estimate is to use the capital asset pricing model (CAPM) (Sharpe, 1964; Lintner, 1965; Mossin, 1966), which postulates that the opportunity cost of equity is equal to the return on riskless securities plus the firm's systematic risk (beta) multiplied by the market price of risk (market risk premium).

$$r_E = r_f + \beta\left(r_m - r_f\right)$$

r_f is the riskless rate; $\left(r_m - r_f\right)$ is the risk premium expected for the market as a whole, expressed as the excess of the expected return on the market index over the riskless rate; and β is the systematic risk of the equity.

In order to compute the cost of equity, we need to estimate three parameters: the riskless rate r_f; the market risk premium $(r_m - r_f)$, and systematic risk (β). As for Japan's firms, analysts often use the rate on intermediate-term Japanese government bonds (around 1.2%) as a riskless rate r_f. The market risk premium (the price of risk) is the difference between the expected rate of return on the market portfolio and riskless rate. In Japan, average common stock returns (based on the returns to TOPIX (Tokyo stock exchange stock price index)) have exceeded that rate by around 4% over the 1998-2003 period. This excess return constitutes an estimate of the market risk premium $(r_m - r_f)$. Finally, the systematic risk (β) reflects the sensitivity of the firm's value to economy-wide market movements. See Figure 6.2-1.

c) Beta

Beta is a measure of systematic or undiversifiable risk of a stock. The beta is the covariance of a stock in relation to the rest of the stock market. TOPIX has a beta coefficient of one. Any stock with a higher beta is more volatile than the market, and any with a lower beta can be expected to rise and fall more slowly than the market. If

the beta is less than 1, it is less volatile than the market average.   High volatility in stock price may indicate greater business risk, instability in operation, and low quality of earnings.   See Figure 6.2-2.
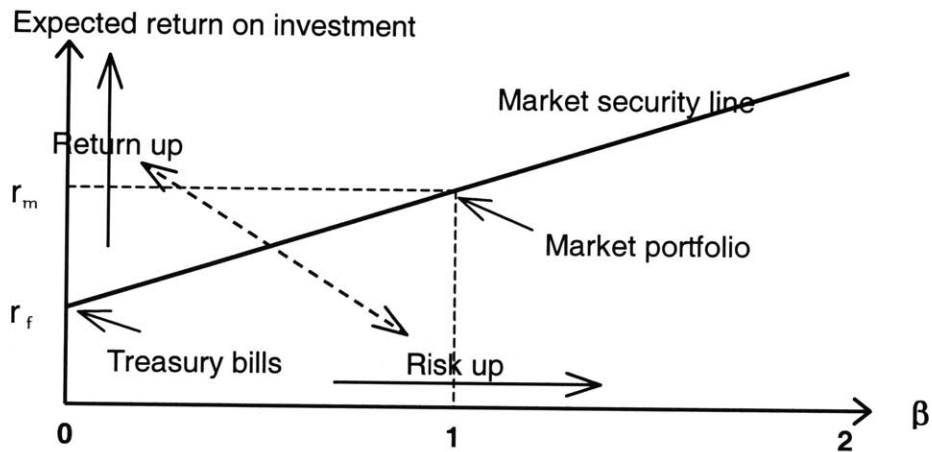
CAPM (Risk & Return)

Figure 6.2-1:   CAPM (Risk & Return)

Reference: Myers, Stewart C., and Brealey, Richard A., 1999, "Principles of Corporate Finance, 6th ed."

Beta

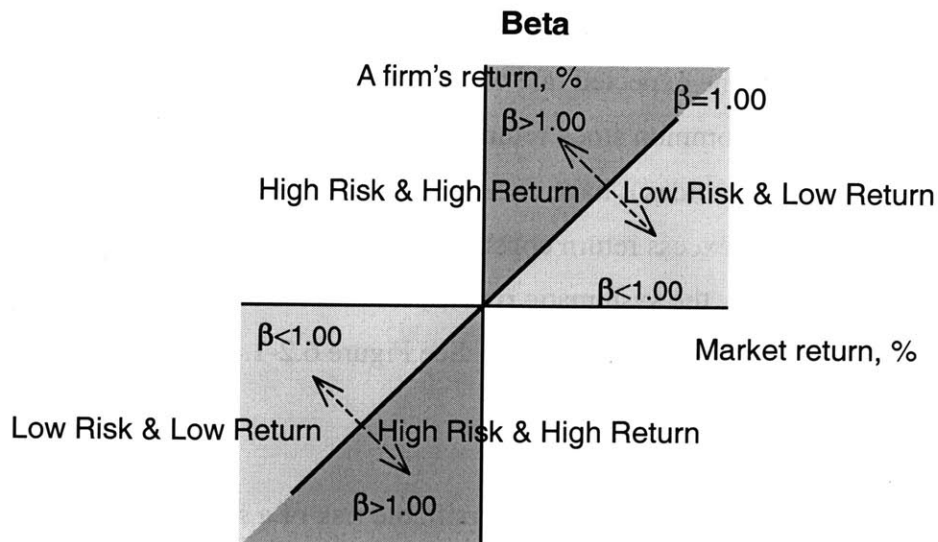

Figure 6.2-2:   Beta

Reference: Myers, Stewart C., and Brealey, Richard A., 1999, "Principles of Corporate Finance, 6th ed."

6.2.2 WACC and Capital Structure

Suppose a firm were all-equity-financed (D/V=0). At that point WACC equals cost of equity, and both equal the opportunity cost of capital. The firm starts to be leveraged by debt from this point. As the debt ratio increases, the cost of equity increases, because of financial risk, but notice that WACC declines. The decline is not caused by use of "cheap" debt instead of "expensive" equity. It decreases because of the tax shields on debt interest payments.

However, a highly leveraged firm faces financial distress (Myers and Brealey, 2000) when promises to creditors are broken or fulfilled with difficulty. Sometimes financial distress leads to bankruptcy, but not always. Direct distress costs are legal costs associated with bankruptcy, financing fees and delayed cash flows. Indirect costs are the losses of customers and suppliers.

Financial distress is costly. Investors know that leveraged firms may fall into financial distress, and they worry about it. That worry is reflected in the current market value of leveraged firms' securities. Thus, the value of the firm can be broken down into three parts:

WACC & Capital Structure

Rate of Return

Cost of Equity

Opportunity Cost of Capital

Tax Effect

WACC

Cost of Financial Distress

Cost of Debt
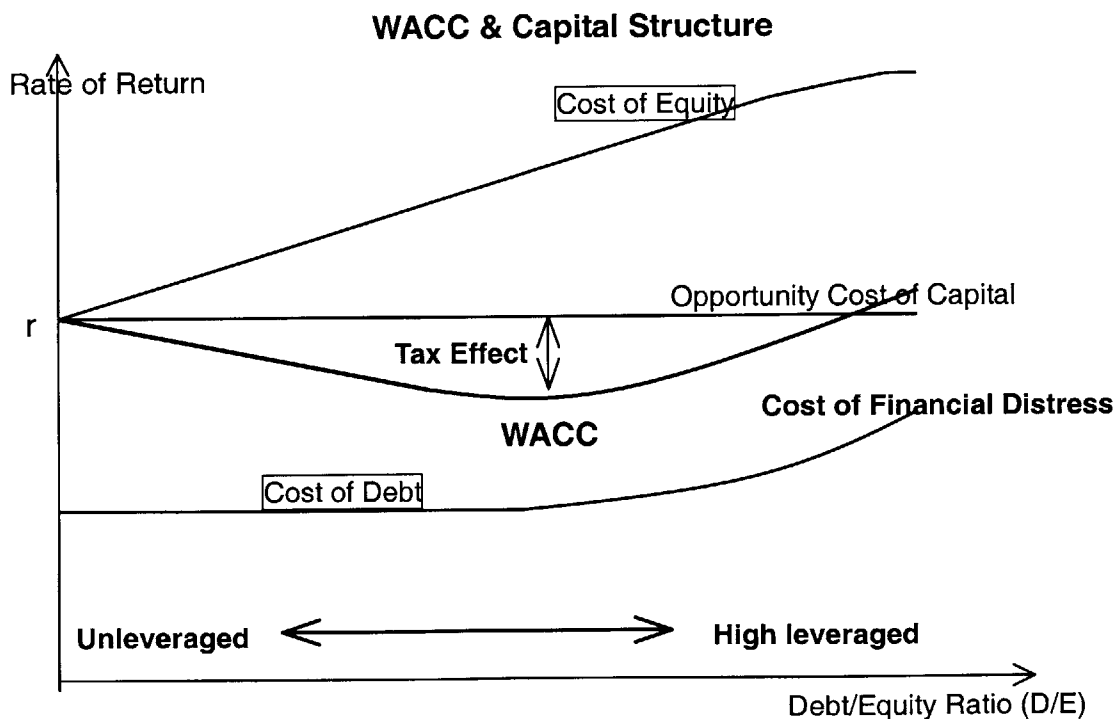
r

Unleveraged ⟵⟶ High leveraged

Debt/Equity Ratio (D/E)

Figure 6.2-3: WACC & Capital Structure

Reference: Myers, Stewart C., and Brealey, Richard A.,1999, "Principles of Corporate Finance, 6th ed."

$$\boxed{\text{Value of Firm} = \text{value if all - equity - financed} + \text{PV(tax shield)} - \text{PV(costs of financial distress)}}$$

The costs of financial distress depend on the probability of distress and the magnitude of costs encountered if distress occurs.

If there were no corporate income taxes and financial distress, the weighted-average cost of capital would be constant and equal to the opportunity cost of capital, at all debt ratios (MM theory) (Modigliani and Miller, 1958).

Figure 6.2-3 illustrates the relationship among WACC, the capital structures and financial distress.

6.3 Return on Invested Capital

6.3.1 Return on Invested Capital (ROIC)

Every business must pay attention to its return on invested capital (ROIC), because it creates the value only when it earns the rate of return on new invested capital that exceeds its cost of capital. The return on invested capital and the proportion of its profits generate free cash flows (McKinsey & Company and Copeland, 2000).

Operating invested capital represents the amount invested in the operations of the business. It is the sum of (1) operating working capital; (2) net property, plant, and equipment, and (3) net other assets (net of noncurrent, non-interest-bearing liabilities). Invested capital, plus any non-operating investments, measures the total amount invested by the firm's investors.

Net operating profit or loss after taxes (NOPLAT) represents the after-tax operating profits of the firm after adjusting the taxes to a cash basis. The NOPLAT calculation begins with EBIT, the pretax operating income that a firm would have earned if it had no debt. It includes all types of operating income, including most revenues and expenses. Generally excluded are interest income, interest expense, the gain or loss from discontinued items, extraordinary income or loss, and the investment income from non-operating investments.

Taxes on EBIT represent the income taxes that are attributable to EBIT. They are the taxes the firm would pay if it had no debt, cash above operating needs, or non-operating income or expenses. Taxes on EBIT equal the total income tax provision (current and deferred) adjusted for the income taxes attributed to interest expense, interest income, and non-operating items.

Return on invested capital is defined as follows:

$$\text{ROIC} = \frac{\text{Net operating profit or loss after taxes (NOPLAT)}}{\text{Invested Capital}}$$

Invested capital is generally measured at the beginning of the period or as an average of the beginning and end of the period. The most important aspect of calculating ROIC is to define the numerator and denominator consistently. In other words, if you include an asset in invested capital, the income related to that asset should be in NOPLAT. The definitions of NOPLAT and invested capital that we have developed above should ensure that consistency is

achieved.

ROIC is a better analytical tool to understand the firm's performance than other return measures such as return on equity (ROE) or return on assets (ROA) because it focuses on the true operating performance of the firm. Return on equity includes the factor of capital structure with the operating performance. This makes it hard to examine the underlying operating performance of the firm. The ROA is inadequate because it includes a number of inconsistencies between the numerator and the denominator. Although the total assets include non-interest-bearing liabilities, the implicit financing cost of the liabilities is included in the expenses of the firm.

6.3.2 Disaggregating ROIC

We analyze ROIC and other measures to derive an integrated perspective on the firm's performance. The following formulas refer to "Valuation: Measuring and Managing the Value of Companies, 3rd ed." (McKinsey & Company and Copeland, 2000).

$$ROIC = \frac{NOPLAT}{Invested\ Capital}$$

Because NOPLAT can be expressed as EBIT times (1-Tc), ROIC can be expressed as a pre-tax ROIC (based on EBIT rather than NOPLAT) adjusted for taxes:

$$ROIC = \frac{EBIT}{Invested\ Capital}(1 - T_c)$$

If we relate EBIT and invested capital to revenues, we get the following equation:

$$\frac{EBIT}{Invested\ capital} = \frac{EBIT}{Revenues} \times \frac{Revenues}{Invested\ capital}$$

Pre-tax ROIC is thus broken down into two components:

    a) Operating margin (EBIT/Revenues) measures how effectively the firm converts revenues into profits.

    b) Capital turnover (Revenues/Invested capital) measures how effectively the firm employs its invested capital.

Each of these components can be further disaggregated into their subcomponents where the expense or capital items are compared to revenues.

$$\frac{EBIT}{Revenues} = 1 - \left(\frac{COGS}{Revenues} + \frac{SG\&A}{Revenues} + \frac{Depreciation}{Revenues} \right)$$

$$\frac{Revenues}{Invested\ capital} = 1 \div \left(\frac{Op.\ working\ capital}{Revenues} + \frac{Net\ PP\&E}{Revenues} + \frac{Other\ assets}{Revenues} \right)$$

CHAPTER 7

VALUATION

In this chapter, we study two main valuation models. One is the discounted cash flow model. This model values the firm's corporate value from the firm's future cash flows and the cost of capital. EVA and MVA (Stewart, 1999) are derived from this model and have been introduced into Japan's firms recently. By using these valuation models, we evaluate if return on the invested capital (ROIC) can exceed the cost of capital (WACC). The other valuation method is real options. This model can add managerial flexibility to the corporate value (McKinsey & Company and Copeland, 2000). In the next chapter, we will explore how the construction firms create corporate value by using these two valuation models.

7.1 Discounted Cash Flow Model
7.1.1 Net Present Value (NPV)

The value of the firm is obtained by discounting expected cash flows to the firm (FCFF) at weighted average cost of capital (WACC). FCFF is the sum of the cash flows to all claim holders in the firm, including stockholders, bondholders, and preferred stockholders. WACC is the cost of different components of financing used by the firm, weighted by their market value proportions.

FCFF is the correct cash flow for the valuation because it reflects the cash flows generated by a firm's capital providers, both debt and equity. For consistency with the cash flow definition, the discounted rate applied to the free cash flow should reflect the opportunity cost of all capital providers weighted by their relative contribution to the firm's total capital (WACC).

$$\text{Value of Firm} = \sum_{t=1}^{t=n} \frac{FCFF_t}{(1+WACC)^t}$$

FCFF = Expected Cashflow to Firm in period t
WACC = Weighted Average Cost of Capital at target capital structure

A publicly traded firm potentially has an infinite life. The value is therefore the present value of cash flows forever[1].

$$\text{Value of Firm (Terminal Value)} = \frac{FCFF_{t+1}}{WACC - g}$$

$$FCFF = Constant$$
$$g = Expected\ growth\ rate$$

Because we cannot estimate cash flows forever, we estimate cash flows for a certain period from now and then estimated a terminal value to capture the value at the end of the period.

$$\text{Value of Firm} = \sum_{t=1}^{t=n} \frac{FCFF_t}{(1 + WACC)^t} + \frac{[FCFF_{n+1} / (WACC - g)]}{(1 + WACC)^n}$$

Other cash flow measures are used in valuation models, and each can be related to the free cash flow to the firm. However, each makes some assumptions about the relationship between depreciation and capital expenditures (Damodaran, 2002) as follows:

a) **FCFE (Free cash flow to equity)**

   Discounting free cash flow to equity at the cost of equity will yield the value of equity in a business.

b) **EBITDA (Earnings before interest, taxes, depreciation, and amortization)**

   Discounting EBITDA at the cost of capital to value an asset assumes that there are no taxes and that the firm will actively disinvest over time. It would be inconsistent to assume a growth rate or an infinite life for this firm.

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[1] This formula was first developed in 1938 by J.B. Williams and was rediscovered by M.J. Gordon and E. Shapiro in 1956.

c) NOPLAT (Net operating profit or loss after taxes)

Discounting after-tax operating income at the cost of capital to value a firm assumes no reinvestment. The depreciation is reinvested back into the firm to maintain existing assets. It would be consistent to assume an infinite life for this firm but no growth.

7.1.2 Economic Value Added (EVA)

The second valuation framework is the Economic Value Added (EVA[2]) model (Stewart, 1999). In this model, the value of a firm equals the amount of capital invested, plus a premium equal to the present value of the value created each year. An advantage of the EVA over the DCF model is that EVA is a useful measure for understanding a firm's performance in any single year, while free cash flow is not.

EVA measures the value created in a firm in a single period and is defined as follows:

$$EVA = Invested\ capital \times (ROIC - WACC)$$

In other words, EVA equals the spread between the return on invested capital and the cost of capital times the amount of invested capital.

Another way to define EVA is as after-tax operating profit less a charge for the capital used by the firm.

$$EVA = NOPLAT - Capital\ change$$
$$= NOPLAT - (Invested\ capital \times WACC)$$

---

[2] EVA is the term used by the consulting firm Stern-Stewart

7.1.3 Market Value Added (MVA)

The EVA approach states that the value of a firm equals the amount of capital invested plus a premium or discount equal to the present value of its projected EVA's. The discounted present value of future expected EVA's is called Market Value Added (MVA), which is also derived that the total market value of the firm less the total invested capital.

Value = Invested capital + Present value of projected EVA's (MVA)

When a firm's ROIC was the exactly the same as its WACC every period, then the total value of the firm (the discounted value of its projected free cash flows) should exactly equal its invested capital (MVA equal zero). The firm is worth exactly what was originally invested. A firm is worth more or less than its invested capital only to the extent that it earns more or less than its WACC. Therefore, the premium or discount relative to invested capital must equal the present value of the firm's EVA's.

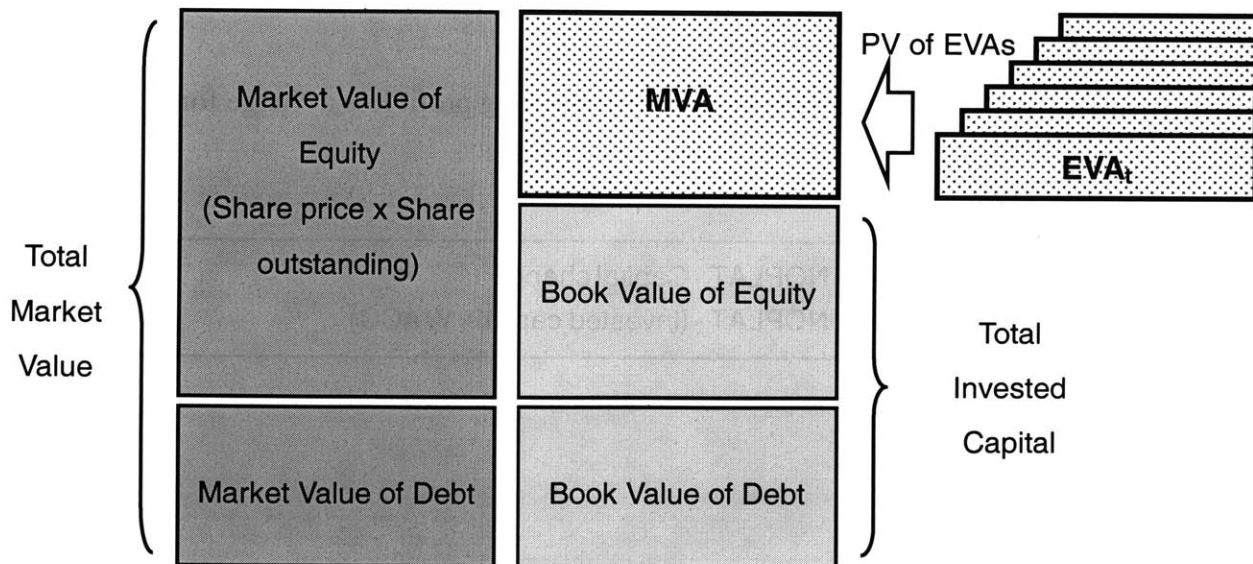Figure 7.1-1 illustrates how EVA and MVA form the corporate value.

Figure 7.1-1:   EVA and MVA

Source: Weekly Toyo Keizai

7.2 Real Options Value (ROV)

Although the DCF method was originally applied for investment valuation, over the past decade, theoretical and computational progresses have allowed us to adopt financial option pricing techniques to the valuation of investment decisions, so-called real options. Real option methods are superior to traditional DCF approaches because they explicitly capture the value of flexibility (McKinsey & Company and Copeland, 2000). As a result, real option approaches will replace DCF approaches for investment decisions where there is significant future flexibility.

DCF approaches tell us that positive net present value projects only can create the value of firms. This straightforward approach cannot account for the flexibility that management has. We sometimes have some flexibility to run projects. If the project goes badly, it may be shrunk or abandoned immediately. If it is successful, it may be extended more. Finally, the investment may not be made immediately. The real options framework takes these types of managerial flexibility into account, while the NPV approach assumes them away.

An option gives its owner the right but not the obligation to buy or sell an asset at a predetermined price, called the strike or exercise price, for a predetermined period of time, called the time to maturity. The right to take an action is flexibility. The necessity of taking an action is inflexibility. Call options give the right to buy, and put options give the right to sell. Options can be found on both the assets and the liabilities side of the balance sheet.

In order to calculating the real option value, using the binominal method and the Black-Scholes formula are very useful. Here explains the Black-Scholes formula, because it is quite straightforward to apply.

Here are the data that we need:

S_0 = Current stock price

X = Exercise price

σ = Standard deviation of annualized continuously compounded rate of return on the stock.

T = Time to maturity of the option in year

r = Risk-free interest rate (annualizes continuously compounded with the same maturity as the option.)

The formula is the follows:

$$C_o = S_o N(d_1) - Xe^{-rT} N(d_2)$$
$$d_1 = [\text{in}(S_o / X) + (r + \sigma^2 / 2)T]/(\sigma T^{1/2})$$
$$d_2 = d_1 - (\sigma T^{1/2})$$

C_o = Current call option value

$N(d)$ = probability   a random draw from a normal dist. Will be less than d.

$e = 2.71828$, the base of the natural log

ln = Natural log function

CHAPTER 8

VALUE CREATION

In this chapter, we study how the construction firms create corporate value by using the valuation methods that we reviewed in Chapter 7. At the same time, we verify the methods by using the financial data of the firms in fiscal 2002. Finally, the valuation methods lead the firms to finding directions in which they should follow in order to create their value in the changing and shrinking construction market.

8.1 Value of Firms in the Construction Industry

8.1.1 Measuring Value of Firm

Until recently, firms in Japan's construction industry set their business goal to increase their sales as much as possible. In the promised growing market, expanding the sales immediately tied to increasing the profits and value of firms. In the current shrinking and changing market, however, it is not possible to ensure the profit margins of projects and thus simply increasing the sales does not directly lead to increasing the corporate value. Hence, this section analyzes the process through which a construction firm creates its value hereafter.

As the previous chapter describes, the present value of the firm can be most simply represented by the following formula:

$$\text{Value of Firm (Terminal Value)} = \frac{\text{FCFF}_{t+1}}{\text{WACC} - g}$$

FCFF = Constant
g = Expected growth rate
WACC (capital structure) is constant.

The value of the firm is represented by the present value of the total future cash flows the firm will generate. The formula assumes that the cash flows will grow at a constant rate forever and the capital structure of the firm will be constant. Although the formula is simple enough, the value of the firm can be basically represented by it.

The formula shows that there are two ways to create the value of the firm. One is to increase the future cash flows as much as possible. The other is to decrease the cost of capital (WACC) as much as the firm can. The following sections explore these two ways more in detail.

8.1.2 Cash Flow Management

Cash flows from operating activities are calculated from net income by the indirect method. The study of profit structure already discussed in Chapter 3 tells that there are three goals to increase the net income (1) to increase sales, (2) to increase profit rates, and (3) to reduce fix costs. Here in this section, we study each item in the calculation process (Figure 8.1-1) from net income to the CFO.

Net income

$\pm$

Noncash charges to noncurrent accounts

$\pm$

Changes in current accounts other than cash

$=$

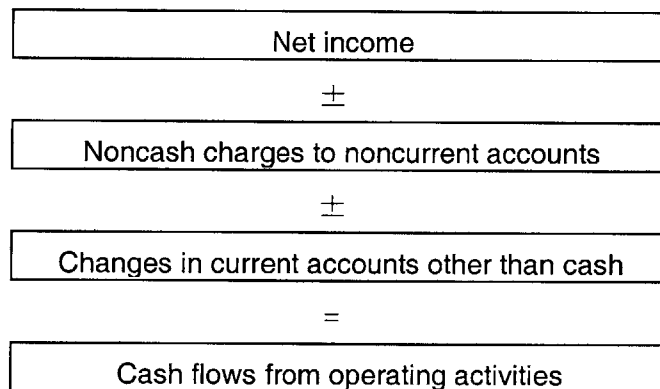| Cash flows from operating activities |
| :---: |

Figure 8.1-1: Cash flows from Operating Activities

As we can see from the balance sheets of construction firms, the construction firm does not need to obtain large fixed assets compared with the manufacturing firm because its production base moves for every project. Thus, it does not have a large amount of items such as depreciation and profits or losses from the revaluation of fixed assets. On the other hand, current assets and liabilities make up the majority of its balance sheet. Accounts receivable in the current assets consist of bills receivable, expenditure for uncompleted projects, trade accounts receivable, and construction work accounts receivable. And accounts payable in the current liabilities consist of advances received for uncompleted projects and construction work accounts payable. From an accounting perspective, reducing accounts receivable and

increasing accounts payable result in increasing the cash flows, because advance payments for construction costs to subcontractors cause high need of working capital.

In order to reduce accounts receivable, early collection of construction costs is essential. Attempting to shorten construction schedules, using of advance payments from the owner especially in public work, and applying to percentage completion payments for public and private works would help to reduce the accounts receivable. Adopting fast track construction methods that reduce the construction schedule might increase the construction costs. However, it would have high merits for both the owner and contractor. Early construction completion reduces the life cycle costs of buildings because the owner can collect funds early from the buildings.

Being adopted as the revenue recognition method along with the International Accounting Standards, the percentage completion payment method could be widely used. Although IAS adopts the percentage completion method in principle, Japan's accounting standards accept both the percentage of completion and construction completion methods. Many small construction firms still adopt construction completion methods because their projects usually don't last for long periods and paperwork for percentage completion recognition costs expensive.

In order to increase accounts payable, delaying payments to subcontractors could be a solution but it does not seem realistic and reasonable. Certainly, we cannot find out any value of firms that are attempting to raise their value by delaying payments to subcontractors.

8.1.3 Capital Structure

To reduce the cost of capital, the firm seeks to find optimal capital structure.
At first, we analyze the WACC formula.

$$ \text{WACC} = r_D \left(1 - T_C \right) \frac{D}{V} + r_E \frac{E}{V} $$

D = the market value of debt ; E = the market value of equity ; $V = D + E$
r_D = the cost of debt ; r_E = the cost of equity
T_C = the marginal corporate tax rate

Interests on debt and its principle are paid on a regular schedule unless the debt defaults. Thus, the risk of debt is low and the cost of debt is basically lower than that of equity. Hence, it is necessary to increase the debt equity ratio as much as possible in order to minimize the firm's cost of capital. Hence, high leveraged firms have low cost of capital.

Although the formula leads high debt ratio makes low cost of capital, the truth is different. When we see the construction firms facing bankruptcy, their debt equity ratio is unusually high and they fall into financial distress. Financial distress is costly because of its
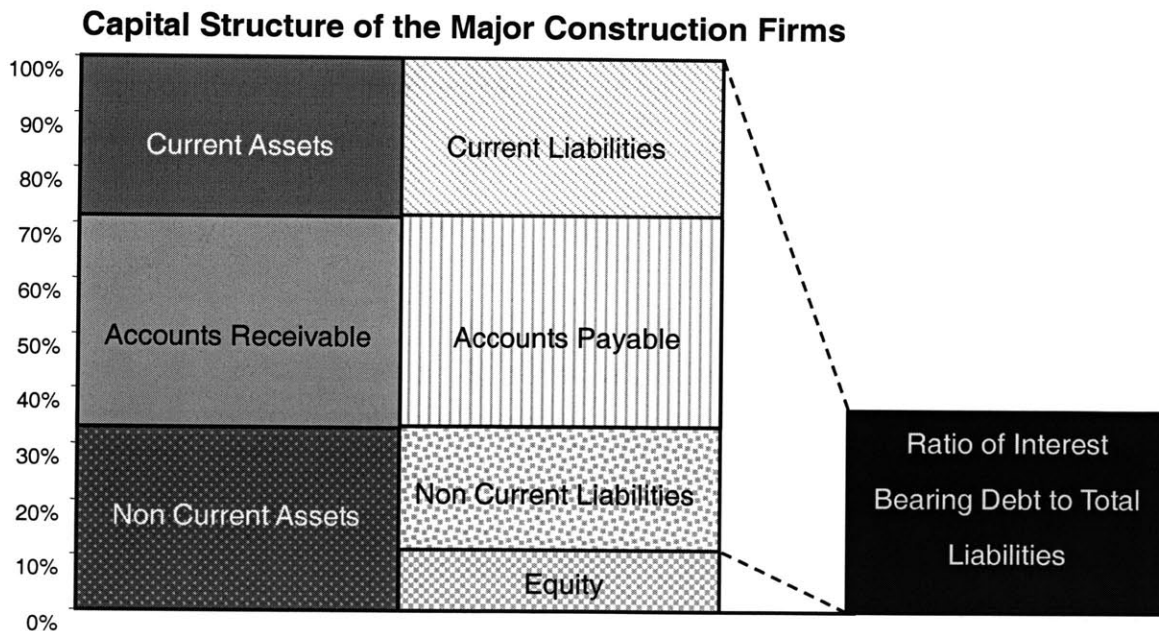

Capital Structure of the Major Construction Firms

Figure 8.1-2:   Interest Bearing Debt Ratio of Top Japan's Construction Firms in 2002

risk and increases the cost of debts and WACC. The costs of financial distress cover several specific items, such as: (1) growing default risk (low credit rating) increases the cost of debts, (2) the growing risk of shareholders increases the shareholders' requirements for return on an investment, (3) the direct costs of bankruptcy (e.g., legal costs associated with bankruptcy, consulting and investment banking costs involved with restructuring), and (4) the indirect costs of bankruptcy (e.g., lose customers and suppliers). If the firm cannot be sure of profiting from the corporate tax shield, the tax advantage of debt is likely to dwindle and eventually disappear.

Because the construction industry needs large working capital and does not have many fixed assets that can be used as collateral, the enhancement of the debt equity ratio and the cost of capital result in increasing the probability of facing financial distress. There are some construction firms that have significantly low debt ratio and finances mainly by equity. In fact, in the construction industry, the profit from tax shields could not be so greater than the costs of financial distress, so that it is rare to leverage the firms in order to get tax benefits.

As mentioned in Chapter 3, it is necessary to add off-balance debts to the balance sheet. The most common example of off-balance debts is an operating lease. As a long-term debt, the cost of the lease can be included in the cost of capital.

8.1.4 Cost of Equity and Debt

The cost of debt is determined by the firm's solvency and credit.   The credit rating by credit rating agencies is one way to gauge default risk.   The lower the rating, the higher the risk of default, and thus the return required by investors is higher.   In the mid-1960s, three economists (William Sharpe, John Lintner, and Jack Treynor) discovered that the cost of equity had the same relationship between risk and return.   Capital asset pricing model (CAPM) is the sophisticated model of the relationship between expected risk and expected return.   The model is grounded in the theory that investors demand higher returns for higher risks.

The risk of an investment is measured by the price volatility relative to the market and called beta.

Table 8.1-1:   Beta of Japan's Construction Firms

	Firm	Beta		Firm	Beta
1	Nishimatsu Const.	0.1851	16	Shimizu Corp.	0.7756
2	Okumura Corp.	0.2641	17	Tekken Corp.	0.7929
3	Toda Corp.	0.2831	18	Asanuma Corp.	0.803
4	Fukuda Corp.	0.4103	19	Penta-Ocean Const.	0.8342
5	Kajima Corp.	0.4169	20	Toyo Const.	0.931
6	Ohki Corp.	0.4508	21	Fudo Const.	0.9461
7	Ando Corp.	0.4992	22	Tobishima Corp.	0.9509
8	Toa Corp.	0.5389	23	Wakachiku Const.	0.9773
9	Maeda Corp.	0.5984	24	Kumagai Gumi	0.9948
10	Mitsui Const.	0.6042	25	Arai-Gumi	1.1275
11	Daiho Corp.	0.6048	26	Tokyu Const.	1.5022
12	Taihei Kogyo	0.6349	27	Daisue Const.	1.6371
13	Obayashi Corp.	0.6611	28	Hazama Corp.	1.743
14	Sumitomo Const.	0.7274	29	Haseko-Corp.	1.7776
15	Taisei Corp.	0.7403			

The above table (Table 8.1-1) shows the beta of twenty-nine large listed firms in Japan's construction industry. They are listed in ascending order of beta. This beta is calculated by the slope of the 60-month regression line of the percentage price change of the stock relative to the percentage price change of the Tokyo stock price index (TOPIX) at every month from March 1997 to March 2002.

The top three firms with the lowest beta have good financial standing and they are three of only four firms that are called "winners" in the current severe construction market. On the other hand, the firms with the highest beta are being financially supported by banks. It should be noted that Mitsui Construction and Sumitomo Construction have relatively low beta, even though they are receiving financial support.

Then, if beta reflects the equity risk, what determines the firm's risk? By using data from each firm's financial statements, we look into the correlation with beta.

At first, we examine the relationship between beta and return. Loss taking firms are facing financial distress, so required return could be high. It is anticipated that there could be correlation between them. In this case, we use return on equity as return that is the average of the five years from 1998 to 2002.
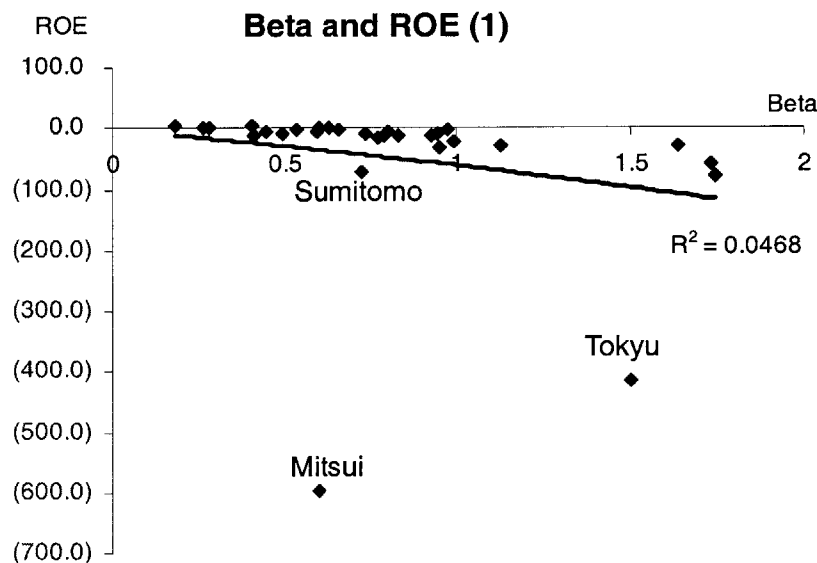

Figure 8.1-3:   Beta and ROE (1)

Table 8.1-2:   Beta and ROE

Firm	Beta	5yr ROE	Firm	Beta	5yr ROE
Nishimatsu Const.	0.1851	3.0	Shimizu Corp.	0.7756	(14.3)
Okumura Corp.	0.2641	0.6	Tekken Corp.	0.7929	(12.0)
Toda Corp.	0.2831	1.8	Asanuma Corp.	0.803	(5.1)
Fukuda Corp.	0.4103	2.9	Penta-Ocean Const.	0.8342	(12.5)
Kajima Corp.	0.4169	(12.3)	Toyo Const.	0.931	(12.9)
Ohki Corp.	0.4508	(6.9)	Fudo Const.	0.9461	(8.1)
Ando Corp.	0.4992	(7.9)	Tobishima Corp.	0.9509	(32.5)
Toa Corp.	0.5389	(1.4)	Wakachiku Const.	0.9773	(1.7)
Maeda Corp.	0.5984	(4.6)	Kumagai Gumi	0.9948	(22.7)
Mitsui Const.	0.6042	(598.7)	Arai-Gumi	1.1275	(29.3)
Daiho Corp.	0.6048	0.6	Tokyu Const.	1.5022	(416.0)
Taihei Kogyo	0.6349	0.1	Daisue Const.	1.6371	(29.1)
Obayashi Corp.	0.6611	(2.3)	Haseko-Corp.	1.7314	(57.8)
Sumitomo Const.	0.7274	(70.4)	Hazama Corp.	1.743	(80.1)
Taisei Corp.	0.7403	(9.3)			

The result (Figure 8.1-3, Table 8.1-2) shows quite low correlation.   Three firms that are making this correlation worse include Mitsui Construction and Sumitomo Construction that have low beta even if they are in financial distress.

All of the three firms belong to big conglomerates (Mitsui group, Sumitomo group, and Tokyu group) and the group companies promised to give financial back ups.   In other words, these three firms are still financially protected by big keiretsu's.   Hence, their risk of them is considered low and even if their rate of return is low, their beta is low.

And then, we delete data of these three firms and examine the correlation between beta and ROE again.   As we can see from the graph (Figure 8.1-4), beta and return indicate high correlation.
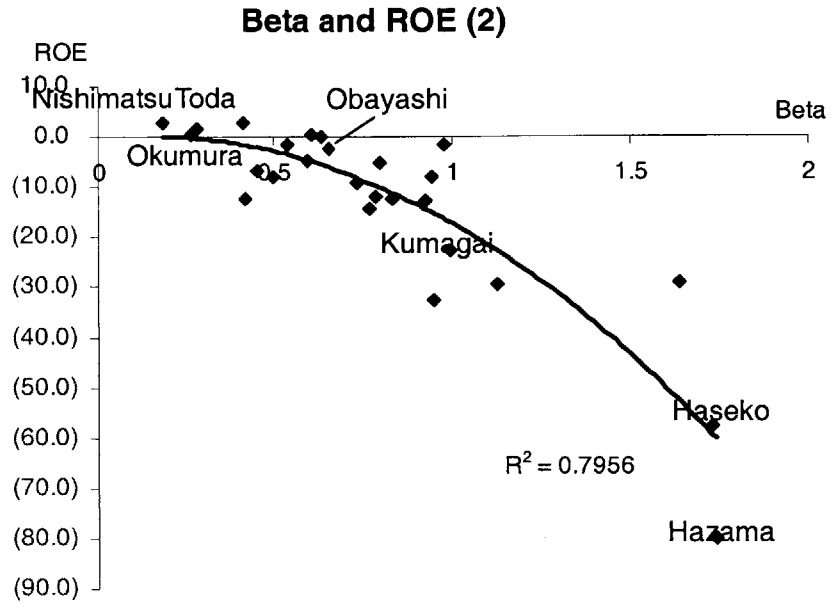
Beta and ROE (2)

Figure 8.1-4:   Beta and ROE (2)

Next, we analyze the relationship between beta and capital structures (Figure 8.1-5, Table 8.1-3).   As the debt equity ratio increases, the firm falls into financial distress.   Thus, debt ratio and beta could have high correlation.   This time, the data of Mitsui Construction, Sumitomo Construction, and Tokyu Construction are deleted in advance.
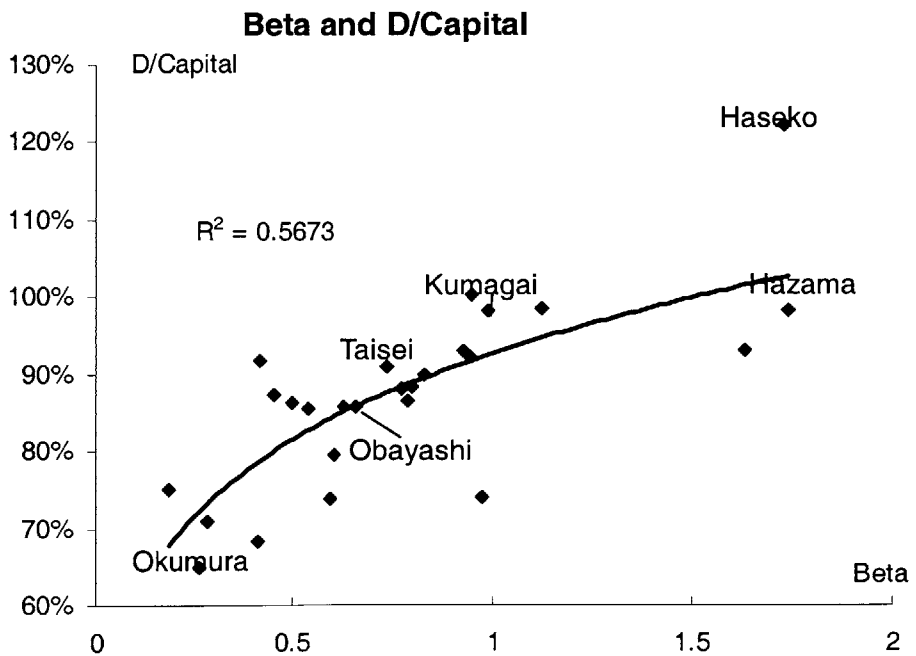
Beta and D/Capital

Figure 8.1-5:   Beta and D/Capital

Table 8.1-3: Beta and D/Capital

Firm	Beta	D/Capital	Firm	Beta	D/Capital
Nishimatsu Const.	0.1851	74.99%	Shimizu Corp.	0.7756	87.98%
Okumura Corp.	0.2641	65.03%	Tekken Corp.	0.7929	86.66%
Toda Corp.	0.2831	70.89%	Asanuma Corp.	0.803	88.24%
Fukuda Corp.	0.4103	68.41%	Penta-Ocean Const.	0.8342	89.86%
Kajima Corp.	0.4169	91.85%	Toyo Const.	0.931	93.07%
Ohki Corp.	0.4508	87.20%	Fudo Const.	0.9461	92.18%
Ando Corp.	0.4992	86.25%	Tobishima Corp.	0.9509	100.33%
Toa Corp.	0.5389	85.50%	Wakachiku Const.	0.9773	74.16%
Maeda Corp.	0.5984	73.76%	Kumagai Gumi	0.9948	98.19%
Daiho Corp.	0.6048	79.42%	Arai-Gumi	1.1275	98.43%
Taihei Kogyo	0.6349	85.88%	Daisue Const.	1.6371	93.07%
Obayashi Corp.	0.6611	85.70%	Haseko-Corp.	1.7314	122.09%
Taisei Corp.	0.7403	90.84%	Hazama Corp.	1.743	98.29%

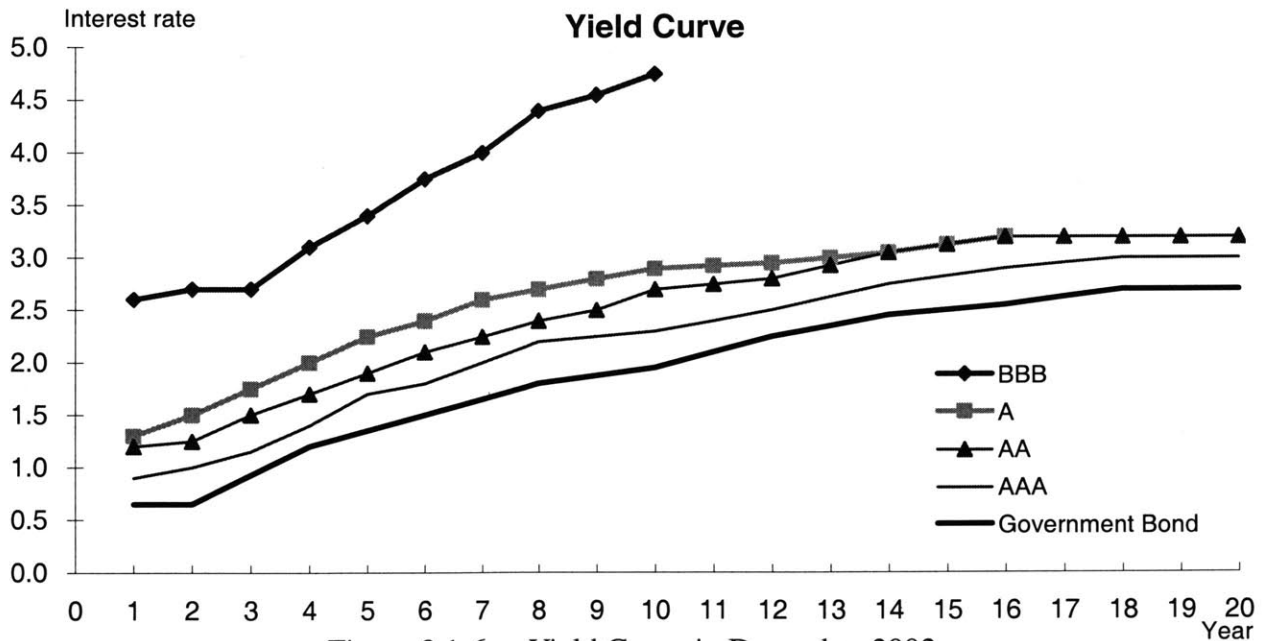The result shows that as beta and the equity ratio have positive correlation.

Figure 8.1-6: Yield Curve in December 2002

Then, we study the cost of debt.   As noted above, the cost of debt is determined by the firm's solvency and credit.   The credit rating is one way to gauge default risk.   The cost of debt is represented by the interest rates.

The government bond is considered a riskless investment because it is the direct obligation of the Japanese government and its interest is the lowest.   As the rating becomes lower, the interest rates increases.   Also, the term of the bond affects the interest rate.   The longer the term, the higher risk of default and thus the higher the interest rate.   Figure 8.1-6 illustrates the yields curve of the government bonds and corporate bonds.

JDC Corporation, which was one of Japan's large construction firms, went bankrupt in 1999.   The following graph (Figure 8.1-7) illustrates the trend of its stock price and spread between its corporate bonds and the government bonds of the same maturity.   The rating of its corporate bond, which has been BBB until 1997, degraded along with worsening business performance and the depressed stock price.   Then, before filing for Chapter 11 bankruptcy, the rating became CCC and the spread increased 3000 basis points.   This case also proves the relationship between the risk and spread.
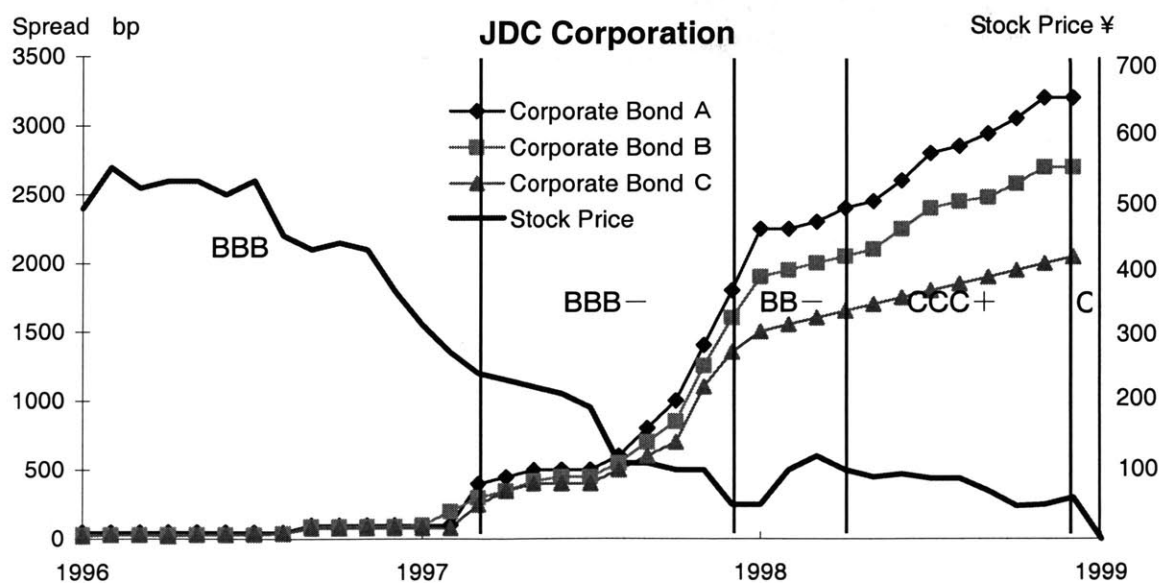

Figure 8.1-7:   Stock Price, Rating, and Yield Curve of JDC Corporation

The next table (Table 8.1-4) lists major large construction firms' issuer credit ratings by Standard & Poor's Corporation and their interest bearing debt to capital ratios.

The nine listed firms (Takenaka Corporation is not publicly traded) received credit ratings below BB that are speculative level (junk bonds). This indicates the firms are losing their financial credit capability. S&P cites the weakness of the financial profile, earnings and cash flows of Japan's general contractors in the shrinking market as the main reason.

Table 8.1-4: Rating and Interest Bearing Debt Rate

Firm	Rating	Interest Bearing Debt to Capital
Takenaka Corp.	BBB-	Not publicly traded
Toda Corp.	BB+	0.13
Nishimatsu Construction	BB+	0.12
Maeda Corp.	BB+	0.16
Obayashi Corp.	BB+	0.23
Shimizu Corp.	BB	0.26
Kajima Corp.	BB-	0.31
Taisei Corp.	B+	0.34
Hazama Corp.	CC	0.52
Kumagai Gumi	CC	0.63

Source: Standard & Poor's long-term issuer credit ratings on March 23, 2003

8.1.5 Cost of Capital

We are seeking ways to increase the corporate value by lowering the cost of capital. The optimal capital structure and high earnings-generating ability reduce the risk of the firm and consequently lower the costs of debt and equity.   The following two graphs show the relationship between WACC and the capital structure (Figure 8.1-8, Table 8.1-5), and five-year average ROEs of Japan's large construction firms (Figure 8.1-9, Table 8.1-6).
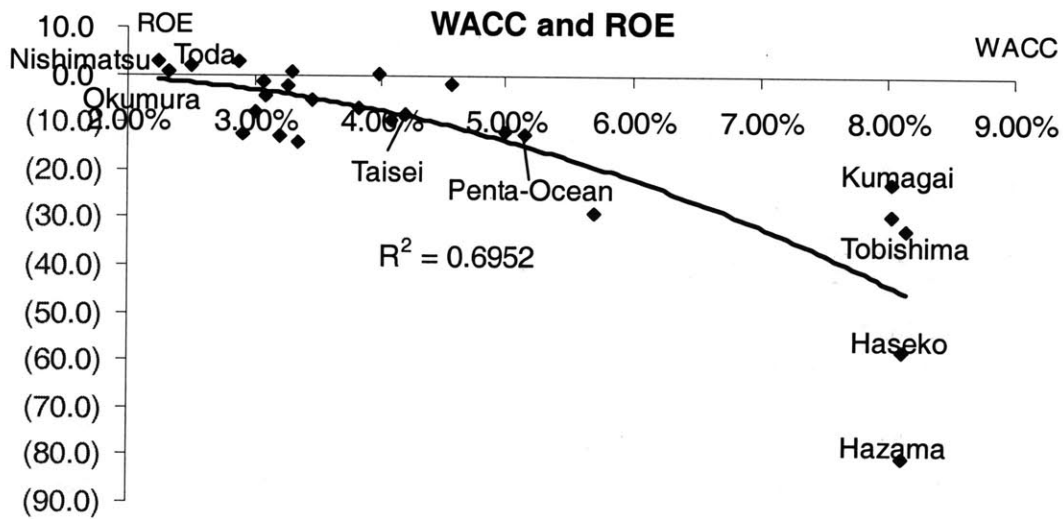

Figure 8.1-8:   WACC and ROE

Table 8.1-5:   WACC and ROE

Firm	WACC	5yr ROE	Firm	WACC	5yr ROE
Nishimatsu Const.	2.25%	3.0	Ohki Corp.	3.82%	(6.9)
Okumura Corp.	2.32%	0.6	Taihei Kogyo	3.98%	0.1
Toda Corp.	2.50%	1.8	Taisei Corp.	4.08%	(9.3)
Fukuda Corp.	2.87%	2.9	Fudo Const.	4.19%	(8.1)
Kajima Corp.	2.89%	(12.3)	Wakachiku Const.	4.55%	(1.7)
Ando Corp.	2.99%	(7.9)	Tekken Corp.	4.99%	(12.0)
Toa Corp.	3.07%	(1.4)	Penta-Ocean Const.	5.15%	(12.5)
Maeda Corp.	3.08%	(4.6)	Daisue Const.	5.70%	(29.1)
Toyo Const.	3.19%	(12.9)	Arai-Gumi	8.04%	(29.3)
Obayashi Corp.	3.26%	(2.3)	Kumagai Gumi	8.04%	(22.7)
Daiho Corp.	3.29%	0.6	Haseko-Corp.	8.12%	(57.8)
Shimizu Corp.	3.34%	(14.3)	Hazama Corp.	8.12%	(80.1)
Asanuma Corp.	3.44%	(5.1)	Tobishima Corp.	8.15%	(32.5)

These graphs tell that the cost of capital and weighted average of cost of debt and equity can reduce with high rate of return and sound financial structures. The construction industry does not have many fixed assets because its production base moves for every project. Less fixed assets that can be used as collateral could lead to relatively high costs of debt. Thus, it is
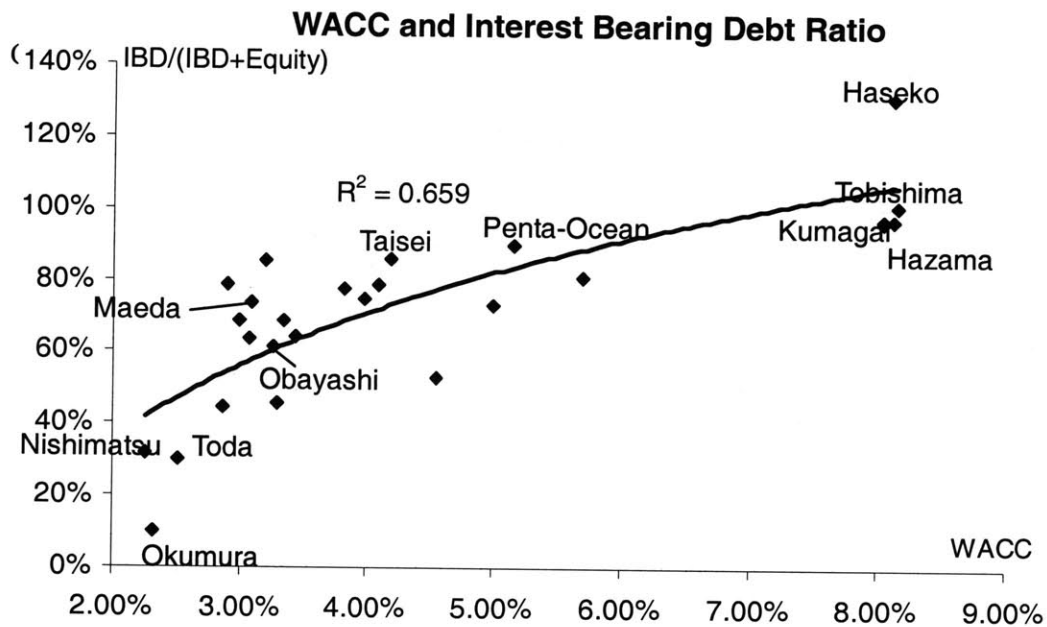
WACC and Interest Bearing Debt Ratio

Figure 8.1-9:   WACC and Interest Bearing Debt Ratio

Table 8.1-6:   WACC and Interest Bearing Debt Ratio

Firm	WACC	IBD/(E+IBD)	Firm	WACC	IBD/(E+IBD)
Nishimatsu Const.	2.25%	32%	Ohki Corp.	3.82%	77%
Okumura Corp.	2.32%	10%	Taihei Kogyo	3.98%	75%
Toda Corp.	2.50%	30%	Taisei Corp.	4.08%	79%
Fukuda Corp.	2.87%	45%	Fudo Construction	4.19%	86%
Kajima Corp.	2.89%	79%	Wakachiku Const.	4.55%	53%
Ando Corp.	2.99%	69%	Tekken Corp.	4.99%	73%
Toa Corp.	3.07%	64%	Penta-Ocean Const.	5.15%	90%
Maeda Corp.	3.08%	74%	Daisue Const.	5.70%	81%
Toyo Const.	3.19%	86%	Arai-Gumi	8.04%	97%
Obayashi Corp.	3.26%	62%	Kumagai Gumi	8.04%	97%
Daiho Corp.	3.29%	46%	Haseko-Corp.	8.12%	131%
Shimizu Corp.	3.34%	69%	Hazama Corp.	8.12%	97%
Asanuma Corp.	3.44%	64%	Tobishima Corp.	8.15%	101%

better to reduce debt ratio as much as possible and gain low WACC than to utilize debts for tax benefits.

8.1.6 Return on invested capital

Firms create their value only when they earn the rate of return on invested capital that exceeds their cost of capital.   In other words, the difference between earnings minus financing costs for equity and debt interests creates the corporate value.   WACC is also called the hurdle rate.

$$ROIC = \frac{NOPLAT}{Invested\,Capital} > WACC$$

NOPLAT : Net Operating Profit or Loss After Taxes

The following graph (Figure 8.1-10) shows the comparison between ROIC and WACC of the large construction firms in fiscal 2002.   Most firms lost their earnings-generating ability and resulted in low ROIC.

Thus far, we have analyzed the ways to create the corporate value through the present value formula.   The corporate value is dependent on the following two factors.   The first one is how much the firm can continuously generate cash flows on its invested capital.   The second is how far the firm lowers its hurdle rate by keeping its optimal capital structure.   In daily operation, it is important for every manager and employee to keep these two factors in mind and make every effort to create the corporate value
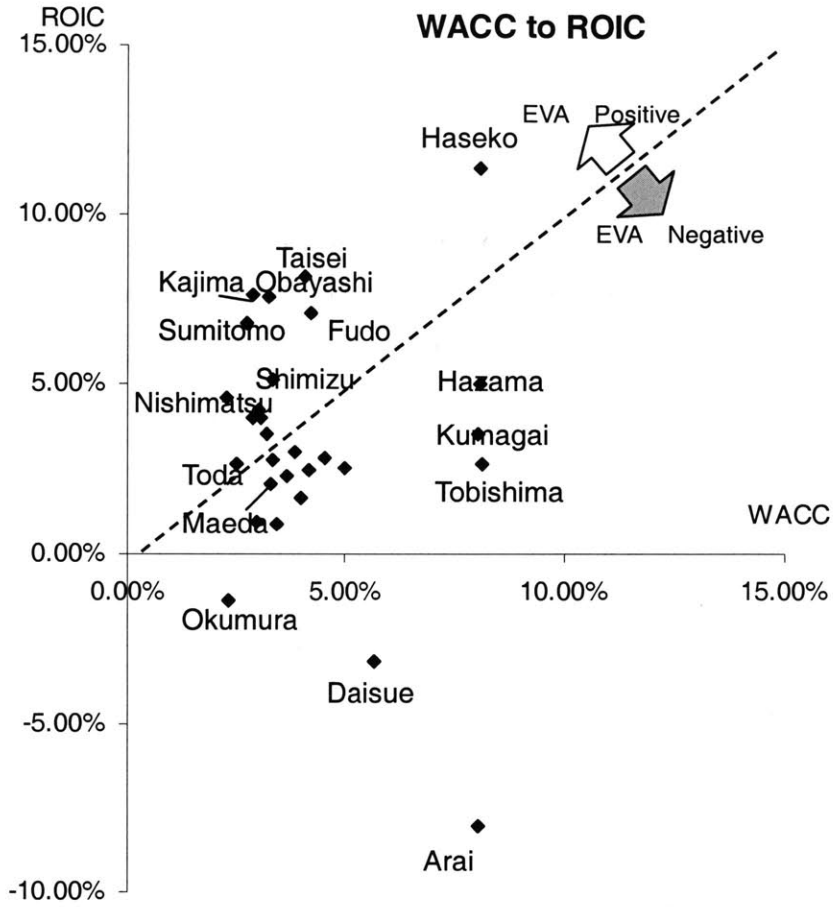
Figure 8.1-10: WACC and Return on Invested Capital

8.1.7 EVA and MVA

Recently, many firms have been introducing EVA and MVA to measure their operating performance and corporate value.   Basically, these valuation methods are derived from discounted cash flow methods and their results are the same.   EVA is the method to measure how much a firm can gain returns from invested capital over the cost of the capital in a certain period.

$$\text{Value of Firm (a certain period)} = \text{EVA}$$
$$= \text{Invested Capital} \times (\text{ROIC} - \text{WACC})$$

$$\text{Terminal Value of Firm} = \frac{\text{FCFF}_{t+1}}{\text{WACC} - g}$$
$$= \text{Invested Capital} + \text{MVA}$$
$$= \text{Invested Capital} + \text{PV of Future EVA's}$$

EVA and MVA help figure out how much a firm or its departments can exceed its hurdle rate in a single period or future years.   The following table (Table 8.1-7) lists EVA of Japan's major construction firms in fiscal 2001.   The firms that could not exceed their hurdle rate have negative EVA.

As described in the chapter 2, on December 19, 2002, the Ministry of Land, Infrastructure and Transport released the basic policy for the construction industry revitalization. The first part of the policy says that the construction market keeps shrinking, and the construction industry lost the balance between the earning power and the debt ratio.   The policy set the criteria as a part of revitalization plan.   These criteria consist of indexes that illustrate the profitability, earning stability, and financial strength.   Among the indexes, a noteworthy index is interest bearing debt to cash flow ratio.   Cash flows reflect the real condition of firms and interest bearing debt reflects the capital structure of firms.   When a firm has low ratio, the firm must have low cost of capital (WACC).

Table 8.1-7:   WACC, ROIC and EVA

Firm	WACC		ROIC	EVA	Firm	WACC		ROIC	EVA
Kajima Corp.	2.89%	<	7.65%	40,632	Wakachiku Const.	4.55%	>	2.86%	-1,346
Taisei Corp.	4.08%	<	8.15%	34,258	Asanuma Corp.	3.44%	>	0.89%	-2,003
Obayashi Corp.	3.26%	<	7.56%	32,459	Daisue Const.	5.70%	>	-3.19%	-2,003
Shimizu Corp.	3.34%	<	5.13%	13,190	Taihei Kogyo	3.98%	>	1.66%	-2,410
Haseko-Corp.	8.12%	<	11.35%	12,643	Tekken Corp.	4.99%	>	2.53%	-3,082
Sumitomo Const.	2.74%	<	6.80%	10,421	Tokyu Const.	3.66%	>	2.30%	-4,263
Nishimatsu Const.	2.25%	<	4.61%	6,280	Mitsui Const.	2.96%	>	0.92%	-5,075
Fudo Const.	4.19%	<	7.09%	3,000	Arai-Gumi	8.04%	>	-8.06%	-5,179
Toa Corp.	3.07%	<	4.01%	1,230	Okumura Corp.	2.32%	>	-1.41%	-6,688
Fukuda Corp.	2.87%	<	4.01%	1,154	Tobishima Corp.	8.15%	>	2.63%	-7,421
Ando Corp.	2.99%	<	4.24%	1,033	Hazama Corp.	8.12%	>	11.35%	-8,352
Toyo Const.	3.19%	<	3.52%	456	Maeda Corp.	3.33%	>	2.76%	-1,554
Toda Corp.	2.50%	<	2.63%	359	Penta-Ocean Const.	4.16%	>	2.46%	-4,090
Ohki Corp.	3.82%	>	3.00%	-504	Kumagai Gumi	8.04%	>	3.57%	-26,892
Daiho Corp.	3.29%	>	2.06%	-608					

$$\text{Interest bearing debt to Cash flow} = \frac{\text{Interest bearing debt}}{\text{Cash flow from operations}}$$

This ratio is the inverted version of interest bearing debt coverage ratio.

This ratio must become one of the most important indexes, because it reflects the firm's earnings-generating ability and capital structure.

8.1.8 Real Option Value

We studied the corporate value by using the discounted cash flow model. The firm has to make an attempt to generate maximum return from minimum invested capital to create its corporate value. Moreover, the firm has to withdraw from projects whose rate of return cannot exceed the cost of capital and concentrate its investment on profitable projects (Selection and concentration).

However, under the real business environment, the firm does not always make an investment into assets that certainly create positive NPV. Sometimes, it invests into negative NPV projects. What does the investment mean? Real option model values these investment decisions by adopting financial option pricing techniques and this value is called real option value (ROV).

ROV is the value that (1) real assets generate with (2) the volatility of future returns from the assets and (3) time to maturity of the option. An option gives its owner the right (but not the obligation) to buy or sell an asset at (4) a predetermined price (called the exercise price) for a predetermined period of time (called time to maturity). The right to take an action has some flexibility so real options capture the value of flexibility. The next table (Table 8.1-8) categorizes real options in business decisions by management flexibility.

Table 8.1-8:   Real Option Examples

Category	Description
Option to Defer	Management has opportunity to wait to invest, and can see if markets warrant further investment
Staged Investment	Staging investment creates the option to reevaluate and/or abandon at each stage
Option to alter operating scale	If market conditions change, the firm can expand/contract or temporarily shut down
Options to abandon	If market conditions decline, management sells off assets
Option to switch	If prices or demand change, management can change product mix (product flexibility) or switch inputs (process flexibility)
Growth options	An early investment opens up future growth opportunities in the form of new products or processes, access to markets, or strengthening of core capabilities-like interproject compound options
Multiple Interacting Options	Projects involve a collection of various options-both put and call types. Values can differ from the sum of separate option values because they interact.

Source: Trigeorgis.L. Real options in Capital investment

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Some real option examples from the construction industry are as follows:

a) Growth option

A firm receives a project that has negative NPV and reduces the firm's EVA. In order to create its corporate value, the firm should essentially refuse this kind of project. However, the firm knows that if it accepts the project, it can gain the right to receive the subsequent project at a certain promised price (¥280 million). The firm is not certain whether the next project become positive NPV (current estimate ¥270 million) or not at this moment. However, because the project has four years to start so the probability of its NPV being positive is high. The firm values the right to receive the next project by using financial option pricing techniques. The current project has negative NPV, but if the ROV of the right to receive the next project can compensate for the loss, the firm receives the current project. Of course, this right is not an obligation. If the firm realizes that the next project has negative NPV until the time to maturity (four years later), the firm can decline the next project and minimize its loss.

Underlying asset: Next project

Current price (S_0): NPV of the next project (current estimate) S_0 =¥280 million

Volatility (σ): Volatility of the next project's cash flows σ=10%

Time to maturity (T): Period from the acceptance of the current project to that of the next project T=4 years
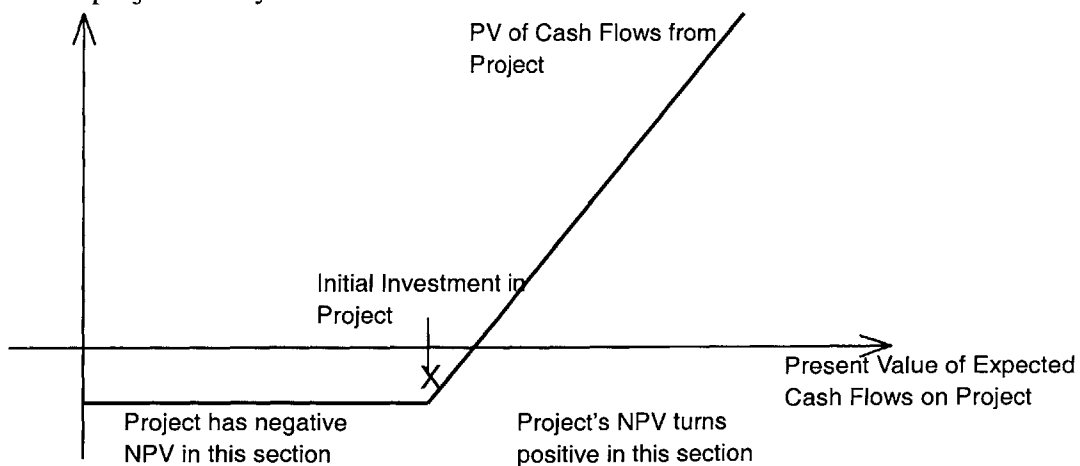

Figure 8.1-11:   Growth Option Payoff Diagram

Exercise price (X): Costs of construction X=¥270 million

Risk free interest rate (r): Four-year Government bond 1.2%

Option: European call option

This real option value can be calculated by the Black-Scholes formula. It is ¥34.6 million. If the current project's NPV is within negative ¥34.6 million, the firm should accept the current project and gains the right to receive the next project.

b) Growth option and option to alter operating scale

The firm gets a building permit or license in a country. Although the firm needs expenditure (negative NPV) which consists of opening office, hiring local stuff, and establishing business partnerships with local firms, this is the valuable first step to expanding its business and entering the new market. If the firm has the chance to receive profitable projects, it accepts the projects and extends its business. When the market is growing, the firm intends to acquire the local firm and expand the office. If the firm cannot expect profitable projects within the effective period of the license because the market is shrinking, it relinquishes the license.

Underlying asset: Future projects from the new market

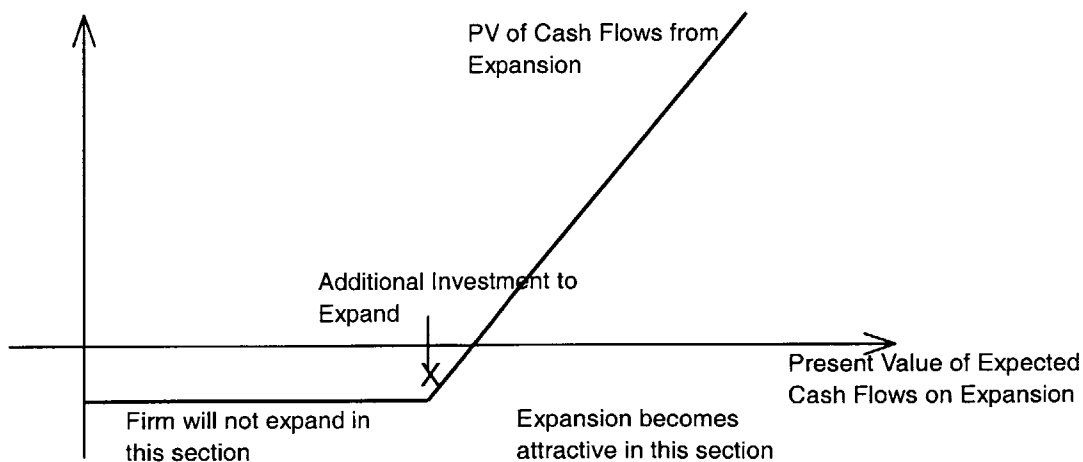Current price (S_o): NPV of the future projects (current estimate)

PV of Cash Flows from Expansion

Additional Investment to Expand

Present Value of Expected Cash Flows on Expansion

Firm will not expand in this section

Expansion becomes attractive in this section

Figure 8.1-12:   Option to Alter Operating Scale Payoff Diagram

Volatility (σ): Volatility of the future project's cash flows

Time to maturity (T): Effective period of building permit or license

Exercise price (X): Costs of construction

Risk free interest rate (r): Government bond

Option: American call option

We compare the expenditure of getting and maintaining the license and the ROV of entering the new market. If the ROV is larger than the expenditure, the firm should obtain the license.

c) Option to abandon

If the market is shrinking, the firm attempts early withdrawal. First, the firm estimates the costs for withdrawal and confirms the effective period of its permit to operate. Within the period, if the firm expects the market is going to shrinking and NPV of the projects is also falling, it abandons the market. It makes a contract with the local firms for transferring its projects and operation to them when it exits the market. This contract creates ROV. If the firm does not determine the period and stays in the market at the end of the license effective period, it is just wasting time and money.

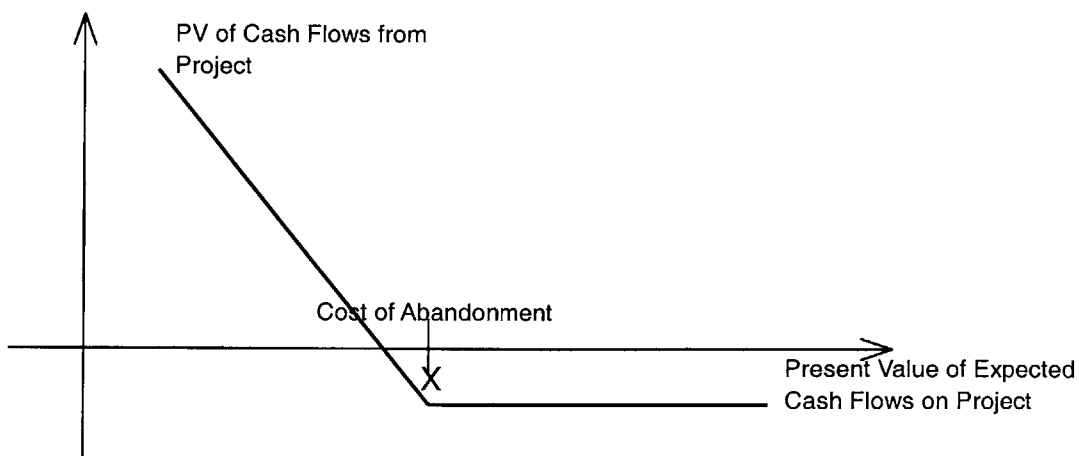Underlying asset: Future projects from the new market

Figure 8.1-13:   Option to Abandon Payoff Diagram

Current price (S_0): NPV of the future projects (current estimate)

Volatility (σ): Volatility of the future project's cash flows

Time to maturity (T): Effective period of building permit or license

Exercise price (X): Costs of abandonment

Risk free interest rate (r): Government bond

Option: American put option

We calculate the balance between the contract price with the local firm and the ROV of the right to exit the market.

As a matter of fact, there are some problems with applying real option model. The most controversial one is estimating the current value of future projects and its volatility. One of the solutions to estimate them is to apply the Monte Carlo simulation and sensitivity analysis. The simulation calculates numerous scenarios of a model by repeatedly picking values from the probability distribution for the uncertain variables and using those values for the event. Also, we can use the volatility of comparable financial options related to the projects.

The point to notice here is that Japan's construction industry stock price index and public investments have high co-movement. See Figure 8.1-14. This is because half of total sales of the construction industry consist of public works and the profitability is often higher than that of private ones. In order to find the volatility of the construction industry, it is better to look into the trend or forecast of public investments than to use the historical volatility of its stock price index.
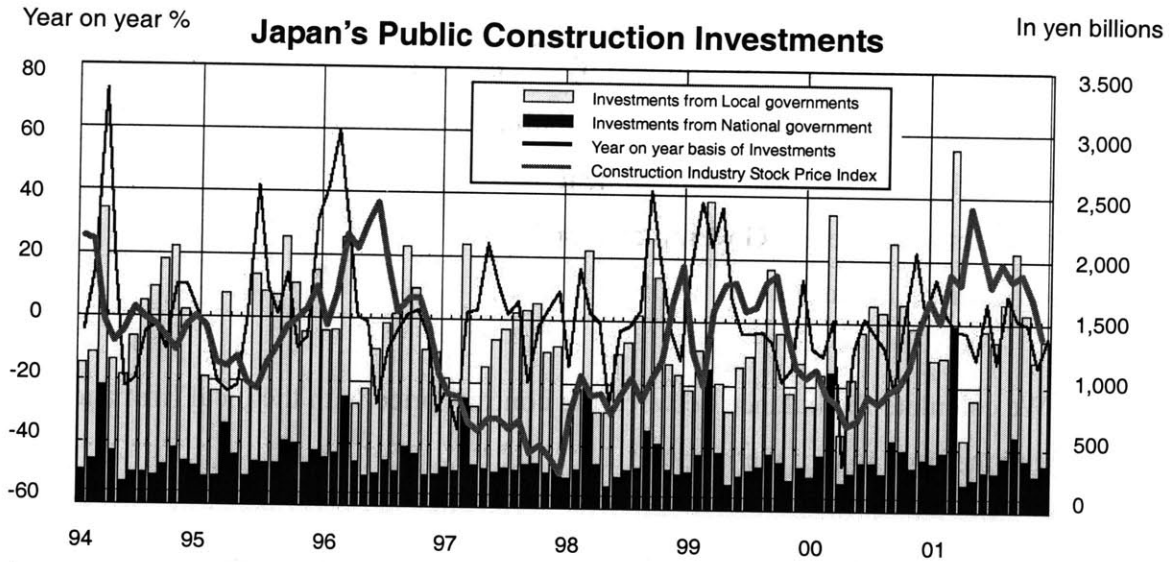
Figure 8.1-14:   Public Construction Investments and Construction Stock Price Index

Source: MLIT and TOPIX

As the market is changing, the value of assets is also starting to fluctuate so that management decisions require some flexibility.   The real option framework can evaluate the corporate value with managerial flexibility that the DCF framework does not take into account. Moreover, the firm can create its corporate value with managerial flexible strategies and from a long-term perspective by using the real option framework.

8.2 Value Creation

As general contractors, Japan's construction firms have aimed for the two types of comprehensive business. The one is horizontal comprehensive operation. Namely, the construction firms are able to build roads, bridges, dams, tunnels, office buildings, factories, condominium buildings, and nuclear power plants at anywhere mainly in Japan (just 10% of sales is overseas). The second one is vertical comprehensive operation. This means that the construction firms undertake projects from the very beginning of projects (development, design, engineering, and construction) to the end phase of building life cycle (maintenance, remodeling). The incentive of the comprehensive business is sales-oriented management, because the firms tended to increase their sales by taking any kinds of projects as much as they can. However, in the current construction market, only increasing sales cannot create the corporate value anymore.
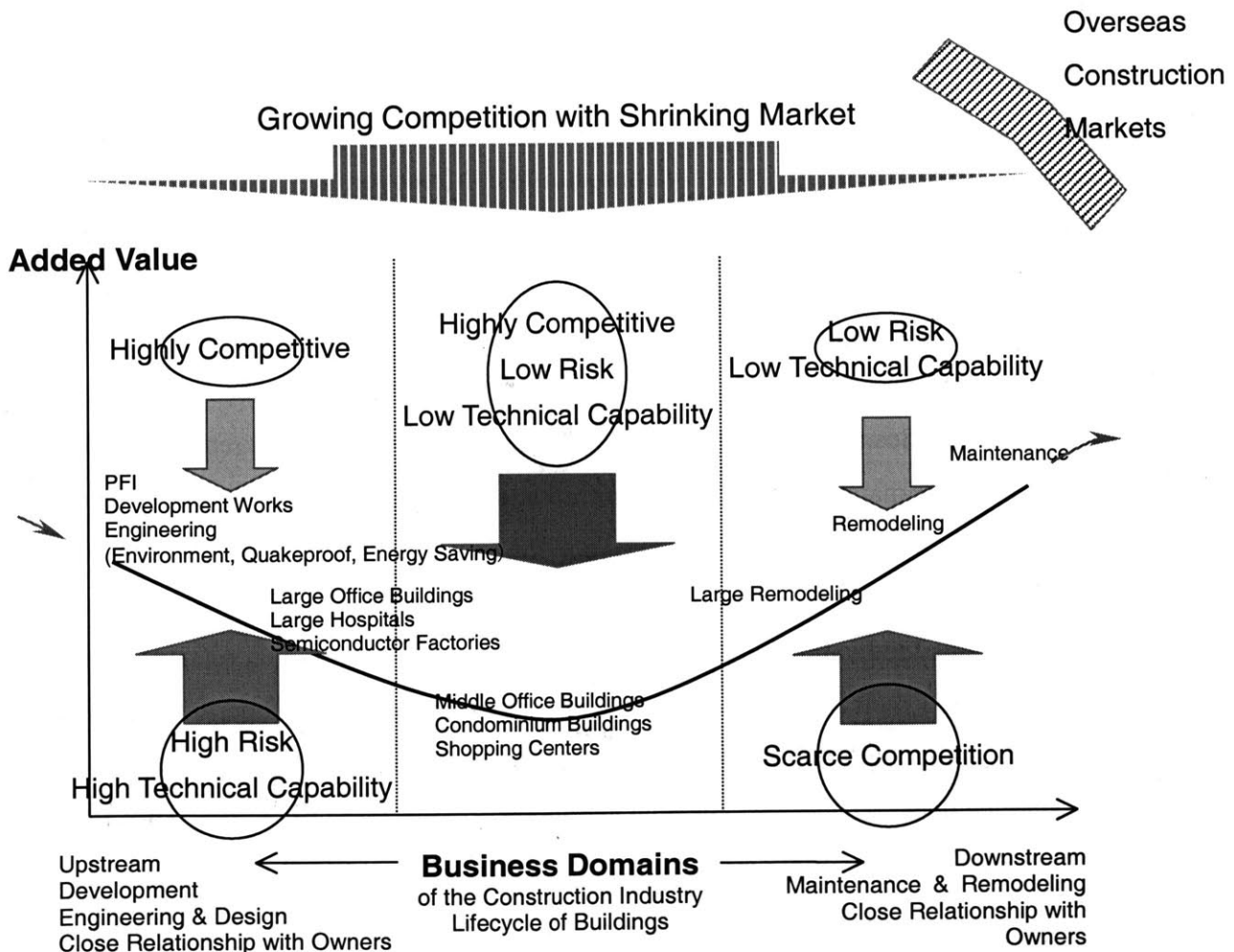

Figure 8.2-1: Business Domain and Added Value in the Construction Industry

Reference: Morgan Stanley Research

In December 2002, the Ministry of Land, Infrastructure and Transport also pointed out as the basic policy for the construction industry revitalization (1) the curtailment of unprofitable departments and shifting management resources to profitable departments, and (2) the improvement of the profitability by changing from sales-oriented to profit-oriented management (Translation mine). The firms are changing their business strategy to profit-oriented management.

Next, we explore the profitable areas in the construction industry. The above graph (Figure 8.2-1) plotted the business domains of the construction industry from upstream, the first phase of planning and development, to downstream, the final phase of building life cycle, in order of their added value and profitability.

The graph shows that the added value is determined by the three factors, price competition, business risk, and required technical capability. The construction of middle size office buildings, condominium buildings, and shopping centers located in the middle part of the business domain does not require high technical capability, so the barrier to entry into this domain is low and thus this domain is highly competitive. Moreover, the business risk is low. Thus, the added value in this domain is the lowest among business domains in the construction industry. The upstream domain covers from PFI[1], development works, and engineering to the construction of large office buildings, hospitals, and semiconductor factories and requires high technical capability and takes high risk. PFI, development, and engineering lead to fee business and create constant cash flows to the firms. Although, because of its risk and required ability, the barrier to enter this domain is high, many firms are attempting to enter this profitable domain. Hence, this domain is going to be more competitive in the future. In addition, high competition would lower the added value. Remodeling and maintenance that are placed in the downstream domain also have high added value, because they are fee business. Moreover, owners tend to ask contractors who built their building to do small remodeling works, so competition is low. The construction firm that built the building has execution schemes, execution scheme drawings, and quality assurance data. Thus, they have an advantage to offer these services. However, when the owners plan the large remodeling project, they choose low cost contractors. Moreover,

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[1] Private Finance Initiative: Under the PFI, building projects that would previously have relied on public money are financed by the private sector.

these services do not require high technical ability, and are low risk.   Thus, every firm is attempting to enter this domain at low costs, so this domain is becoming competitive.

As the competition is intensifying, the plotted added value curve is falling.   Also the competition gradually adds the downward forces to both ends of the curve.   As the curve becomes flat, the firms head to both ends in search of profitable work.   The left end is the beginning phase of new projects and the right end is the final phase of the building life cycle. Interestingly, the firms heading to either end reach the same beginning phase of new projects and make strong relationships with their owners.

Firms with high technical capability and high-risk management ability can give total vertical services from development and engineering to maintenance and remodeling.   These vertical services would strengthen the relationships between the owners and the firms.   The firms can create their distinctive added value for the owner and pass on to the next projects.

Firms, which do not have high technical capability and cannot take high risk, should specialize in one of the categories, such as construction, or maintenance and remodeling.   They aim to be specialized firms for each domain, especially for center and right domain.   They avoid horizontal development and concentrate on their specialty to reduce costs and increase profits. Because of low risk and high competition, profits are low but certain.   The point would be how much they can reduce the costs by specializing in their ability.

As the firms specialize in each category, how would their cost of capital change?   As mentioned above, the firm's equity beta changes according to its business risk and debt ratio. As the firms specialize in the upstream domain, the business risk increases.   As the risk increases, the cost of equity goes up.   Taking into account the effect of reducing the cost of equity, the firms need to conduct risk management and require high-risk management ability. Moreover, the firms need to increase the equity ratio and, thus, change its capital structure to flexibly respond to high-risk business.   By reducing the debt ratio, the firm also can reduce financial distress.   Business in the upstream domain such as PFI and development is capital-intensive.   It is imperative to keep a sound financial condition for fund-raising at low cost of capital.

On the other hand, the firm specializing in the downstream domain does not need to take high risk.   Because low risk reduces the beta of equity, low cost of capital can cover the low profits.   Low cost of equity and constant cash flows from fee business allow the firm to increase

the debt ratio.

Some firms are attempting to enter overseas operations from the shrinking domestic market. It is important for the firms to analyze each market and have a strategy for each and conduct risk management. The overseas markets are out of the scope of the thesis so we don't study them in more detail.

Four specialized categories are as follows:

a) Strengthen the vertical comprehensive operation from the upstream to downstream of the business domain. The firm itself stays upstream and uses its technical and risk management ability for every process of its projects.

b) Specialize in the construction for specific fields.

c) Specialize in remodeling and maintenance.

d) Enter overseas markets.

8.3 Corporate Value

As the market is shrinking, the construction firms are required to find new ways to create corporate value.   The Introduction of the International Accounting Standards is accelerating this trend.   The market share of the firms is changing, and the mobility of employment is increasing.

The previous sections mentioned two major approaches to increasing corporate value:

1. Constantly generate cash flows from the invested capital as much as possible
2. Decrease the firm's hurdle rate by optimizing its capital structure as much as possible

The firms have to make an attempt to generate maximum return from minimum invested capital to create their corporate value.   Thus, the firms have to withdraw from projects whose rate of return cannot exceed the firms' cost of capital and concentrate their investment on profitable projects (Selection and concentration).   To increase their profitability, the firms have to change their policy from sales-oriented to profits-oriented.   Also, the firms have to reduce their debts and optimize their capital structure to lower their hurdle rate.   EVA and MVA help the firms value their performance.   Moreover, the firms have to aim for not only short-term interests with fixed strategies but also long-term interests with some flexible strategies by valuing with real options.   Establishing the real option valuation method is helpful for not only managerial use for the firm itself but also disclosure of the value of the flexible strategies to the public as important investments.

The firms have to (1) look into their own capability and characteristics, (2) analyze risk, competition, and required technical capability of each business domain, and (3) choose their entry domain and invest their management resources intensively.   Also, depending on the level of risk they take, the firms should optimize their capital structures and lower their cost of capital.

Lastly, in the changing market, firms fearing change and challenge will be discarded from the market.

CHAPTER 9

CONCLUSION

In Japan's high economic growth period, corporate value was generated from "harmony." Keiretsu prevented construction firms from competition and formed a system in which the firms harmoniously supported each other within the keiretsu group. The seniority system and lifetime employment also preserved employees in the firms and created a system in which employees put their efforts together and harmoniously corporate with each other for the firms.

In the shrinking and changing market, however, the construction firms have started to lose their corporate value. As economic growth has ended and the market has been shrinking, the firms have been forced into genuine competition. The sales-oriented management has led the firms to fierce competition and made their profitability negative. In addition, the introduction of fair value accounting is devaluing the firms' cross-held shares and the introduction of statements of cash flows is disclosing the real financial conditions of the firms. The firms are being required to sell off valueless cross-held shares and to increase mobility of employment in order to adjust their fixed costs.

In Chapter 2, the thesis explained the current situation of the construction industry with figures and tables. GDP has begun negative growth and the ratio of construction investments to GDP has also been falling. The percentage of mutual shareholding in the entire market is decreasing and shows the collapse of the keiretsu system. Because the construction firms have started share competition for survival beyond keiretsu, their profitability is diminishing. It is imperative for the firms to collect funds from the security markets and pay more attention to their security holders' interests. At last, the firms have had to take a serious approach to create their corporate value.

In Chapter 3, the thesis examined the unique characteristics of the construction industry and analyzed how these characteristics appeared in its financial statements. Moreover, this chapter explored two revenue recognition methods: (1) the percentage of completion method and (2) the completed contract method, and studied how profits are accounted. Finally, using the profit structure of the construction firms and the break-even point analysis, the thesis found three

ways to raise profits: (1) increasing volume, (2) increasing gross margin, and (3) controlling overhead.

In Chapter 4, the thesis analyzed the impact of the introduction of International Accounting Standards (IAS) on the construction industry. Especially, the statement of cash flows had a great influence on the management of the firms. Whichever revenue recognition methods the firms choose, their cash flows show their real financial conditions. Moreover, the thesis analyzed the statements of cash flows.

In Chapter 5, the thesis studied analysis methods for the construction firms' financial conditions using the statement of cash flows. Also, from these ratio analysis and profile analysis, the thesis drew on the methods of cash flow management. The new contractor rating system for public works also reflects the concepts of cash flows.

In Chapter 6, the thesis treated cash flows as returns and examined the relationship between the invested capital and returns from the capital. The cash flows used in this chapter were derived from the cash flows from operating activities and called free cash flows. After a firm's payments for the cost of capital, the free cash flows create its corporate value. The capital asset pricing model (CAPM) is effective to estimate the cost of the invested capital and useful to illustrate the relationship between expected risk and expected return. This chapter explained the relationship among the invested capital, returns from this capital, and the cost of the capital.

In Chapter 7, the thesis explored two valuation methods. One is the discounted cash flow (DCF) model and it values the firms' corporate value from the firms' cash flows and cost of capital. EVA and MVA are derived from this model and have been introduced into Japan's firms recently. By using these valuation models, we evaluate whether return on the invested capital (ROIC) can exceed the cost of capital (WACC) or not. The other valuation method is real options. This method can add the value of strategies with managerial flexibility under uncertainty to the corporate value.

As the result of analyzing the DCF models, there are two major approaches to increasing corporate value:

1. Constantly generate cash flows from the invested capital as much as possible
2. Decrease the firms' hurdle rate (WACC) as much as possible by optimizing its capital structure.

In Chapter 8, the thesis studied how the construction firms create corporate value by using the valuation methods that we reviewed in Chapter 7. Moreover, this chapter verified the methods by using the financial data of the firms in fiscal 2002. Finally, the valuation methods lead the firms to finding directions in which they should follow in order to create their value in the changing and shrinking construction market.

The firms have to make an attempt to generate maximum returns from minimum invested capital to create corporate value. Thus, they have to withdraw from projects whose rate of return cannot exceed the firm's cost of capital and concentrate their investments into profitable projects (Selection and concentration). To increase profitability, the firms have to change their policy from sales-oriented to profits-oriented. Also, they have to reduce its debts and optimize its capital structure in order to lower its hurdle rate. Because the construction firm does not have many fixed assets as collateral on debts, it is better to reduce interest-bearing debts as much as possible to diminish cost of financial distress than to increase the debts to obtain tax benefits. Also, by improving investor relations, the firm discloses their financial condition and maintains good relationship with security markets in order to obtain easy access to direct financing. EVA and MVA help the firms value their performance. Using these methods, the firms have to keep in mind that their return on invested capital must exceed its cost of capital (WACC).

Moreover, under this uncertain market, the construction firms have to aim for not only short-term interests with fixed strategies but also long-term interests with some flexible strategies by valuing with real options. Establishing the real option valuation method is helpful for not only managerial use for the firms but also disclosure of the value of the flexible strategies to public as important investments.

The firms have to (1) look into their own capability and characteristics, (2) analyze risk, competition, and required technical capability of each business domain, and (3) choose their entry domains, and invest their management resources intensively. Also, depending on the level of risk they take, the firms should optimize their capital structure and lower their cost of capital. For example, a firm that enters the business domain with constant and low risk cash flows can have relatively high debt ratio.

In Japan's changing and shrinking market, firms that fear of changes and challenges will fall into a fateful crisis.

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