

CAPITAL STRUCTURE

*“Varying macro economic environment
causes variations in capital structure
across developed countries in the
automobile industry!”*

Submitted to

*Dr. Gary Kawaguchi
Prof. Joseph J. French*

Submitted by

Mukesh Kumar

*For the final completion of the Master in Business
Administration at Webster University*

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A C K N O W L E D G E M E N T

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I. EXECUTIVE SUMMARY

This paper is a research on capital structure. It analyzes the relationship between macroeconomic environment and capital structure across developed countries in the automobile industry. This paper helps to explain why not all companies have same capital structure (that is Universal Capital Structure) irrespective of competition, industry and host country, contrary to the predictions of optimal capital structure theory and globalization. Analysis of the macroeconomic environment's impact on Honda Motor's (Japan) and General Motors's (USA) capital structure explain that Universal Capital Structure is not possible because of different macroeconomic environments.

This paper is a mixture of finance and economics. It gives basic knowledge about finance whereas it only touches macroeconomics. It defines conventional financing tools and hybrid financing tools of capital structure with an emphasis on debt financing. Debt became very important for companies after 1958, when Professor Franco Modigliani and Merton Miller published their article on capital structure. Pecking order theory defines benefits of use of retain earnings and value of the firm. Pecking order theory considered not only benefits and costs, but also agency and bankruptcy costs associated with debt financing. It urged use of internal sources of company to finance business activities rather than using more equity or taking on more debt. Developed countries typically follow pecking order theory.

Every company is affected by internal factors, external factors and the micro-macroeconomic environment. These factors vary from company to company. For example, regression analysis of the macroeconomic environment and capital structure of Honda Motor and General Motors shows that Honda Motor's capital structure is affected by consumer price, tax and lending rate whereas GM's Capital Structure is affected by consumer price, lending rate and unemployment rate.

This paper concludes, as per a combination of theories and data analysis of Honda Motor and General Motors, that Macroeconomic environment do affect capital structure across developed countries in the automobile industry.

II. PROBLEM STATEMENT

Capital structure is made of short-term debt, long-term debt, preferred shares, retain earnings, and common shares. In finance, different combinations of debt (Short term debt and long term debt) and equity (preferred shares, retained earnings and common shares) can adjust a company's cost of capital. To reduce cost of capital, finance department of companies try their best to find the optimal combination of debt and equity that has lowest cost of capital in firm's current condition. As a fact, different companies have different capital structures and this explained by corporation's specific micro and macro economic environment. As these economic conditions change, capital structure costs change. If all companies had the same capital structure, then financial management costs of companies could be reduced.

Globalization and liberalization opened way for companies to be multinationals to maximize corporate value and minimize risk by geographical diversification. Multinational companies (MNC's) operate around the world. In consideration of both cost and complexity, it is difficult for them to maintain different capital structures in different countries. Global capital structure would be a panacea for multinational companies: one capital structure for the entire MNC. Again, different MNC's have different global capital structures. If there were one capital structure for all companies, costs of financial management would be reduced. Reduction of financial cost would have chain reaction of cost cutting and it would improve competitiveness without expensive financial comparative advantage.

Above two paragraphs emphasize on one capital structure (Universal Capital Structure) for all companies unrelated to countries boundary. Universal Capital Structure is not possible because there are various economic factors that affect capital structure. This research will investigate the factors that cause variation in capital structure and provide a theoretical understanding of the inapplicability in practice of Universal Capital Structure.

III. HYPOTHESIS

“Varying macro economic environment causes variations in capital structure across developed countries in automobile industry!”

IV. RESEARCH OBJECTIVE

This financial topic has objective to specify clearly following questions:

- + What is capital structure?
- + What is global capital structure?
- + What factors affect capital structure?
- + Why does Corporation care about capital structure?
- + Why does capital structure vary between companies?
- + Why does capital structure vary between industries?
- + Why does capital structure vary between developed countries?
- + Why Universal capital structure is not possible?

V. BENEFIT OF STUDY

This thesis deals with one of the most crucial parts of corporate finance: capital structure. It will provide current information about capital structure as well as proper understanding of related complex theories like Modigliani and Miller (MM) theory, pecking-order theory and optimal capital structure theory. Although the concept of capital structure is old, this thesis is an effort to add a contemporary dimension to capital structure, for example, Global capital structure and Universal capital structure (new concept).

Apart from financial theories, country analysis, financial analysis, economical analysis, and statistical analysis make it valuable and credible academic research applicable to the world of corporate finance.

VI. RESEARCH DESIGN

This research is based on corporate finance and economics. Combination of capital structure theories and relevant data analysis has been done to achieve research objective. All the data used here are collected from secondary sources, for example annual reports of the company, government websites and several articles.

Lack of secondary data was the biggest problem during the research. Previously, this thesis paper focused on the world's capital structure but it is difficult to get capital structure data on developing countries and underdeveloped countries. Thus, this thesis worked only on developed country's capital structures in automobile industry.

Data of macro environments are collected from CIA (Central Intelligence Agency of USA) world fact book. This paper also got data from International Monetary Fund (IMF). Even for developed counties, all data are not available. For example data of Fiscal deficit of Japan is not available. Even this paper used consumer price instead of Inflation rate for data analysis due to unavailability of data of inflation rate of Japan and USA from 1994 to 2000. As only two companies can not represent industry and country, but in this paper's data analysis of only two automobile companies demonstrated how macroeconomic environment affects capital structures.

Secondary data are reliable because it has been collected from IMF, CIA and prestigious financial company Value Line Corporation. Other data are collected from several articles. Even these articles used data from IMF and the World Bank. Thus my hypothesis slightly changed according to availability of relevant data.

VII. LITERATURE REVIEW

a) Understanding of finance

Finance means money, backup and support. It is one of the comparative and competitive advantages of 21st century's business world.

Definitions:

I. *"to raise money by sale of stock, bonds, or notes"*

(Rosenberg. 126)

II. *"Describes the theory and practice of monetary credit, banking, and comprehensive promotion methods. This theory covers investment, speculation, credits, and securities"*

(Rosenberg. 126)

III. *"to raise money by taxation or bond issue, and to administer revenue and expenditures in a governmental organization. More recently, this activity has become known as public finance"*

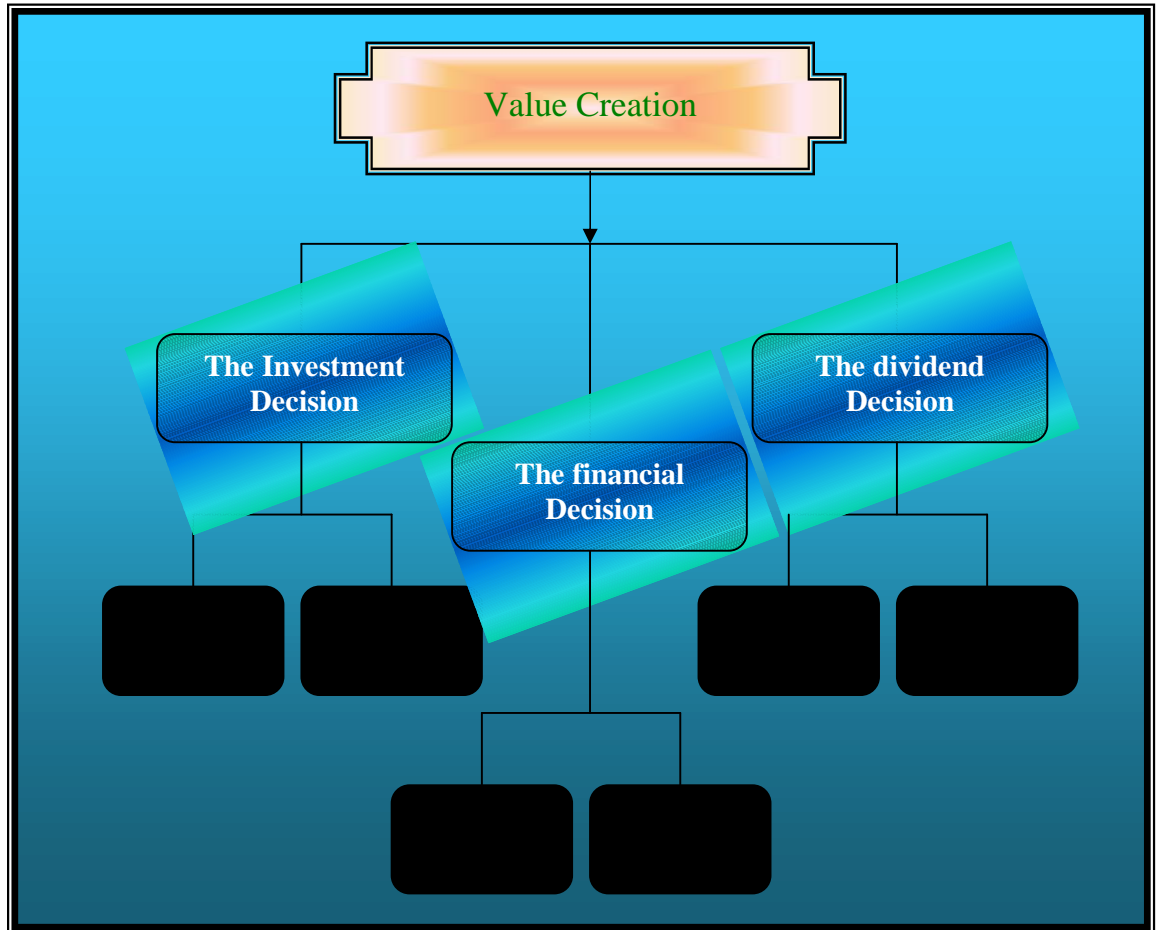
(Rosenberg. 126)

Finance is present everywhere in our life. Education, food, house, utility, gift, business, game, social activities and war require funding. All the above three definitions about finance is establishing its relationship with money. The first two definitions are concerned with manufacturing and service industries and third definition is related to State Government. Therefore, finance affects human activities like economics. Corporate finance main aim is maximization of the value of the corporation. Finance is the measure of success in business, and it helps business to grow by fund inflow and fund outflow decisions.

Before going further in finance, it is important to know about Balance Sheet of Corporation, because it shows corporation's investment strategy and types of funding for assets. Total liabilities and equity finance total assets. Total assets include current asset, fixed assets, and intangible assets. Total liabilities and equity include current liabilities, long-term debt and equity. Capital structure comes under balance sheet, as capital structure consists of debt and equity. Capital structure shows cash generation for capital expenditure requirements in the proportion of current debt, long-term debt and equity. The proportion of debt and equity depends upon cost of financing assets

by these instruments that make more money than it cost. The following diagram shows how corporate finance is related to value of the corporation.

Value Creation (Model 1)



(Brealey 3-5) (Ross 5)

Management takes three decisions for value creation for the corporation and to maximize the value of the corporation. These decisions are - investment decision, financial decision and dividend decision. Let's take example of General Motors Corporation (GM). GM took Investment decision before coming to Thailand. Investment decisions are made on the basis of hurdle rate (required rate of returns) and returns. Always riskier project has higher hurdle rate. Suppose, if GM makes its investment plan in Pakistan, then GM would fix high hurdle rate than its in Thailand's investment because of high (high political risk) business risk in Afghanistan.

The second important decision for value creation is the financial decision. This decision revolves around financial mix decision that is ratio of debt and equity in capital structure. Financial types mean the hybrid financing and conventional financing that should be used for investment. Short term debt, long term debt and equity come under conventional capital structure. Preferred stocks, warrants and convertibles come under hybrid financing. Brief description of types of conventional and hybrid financing are given below.

Conventional financing tools:

Short term debt: Money that is borrowed by Corporation for less than one year. (Shapiro 662-673)

Long-term debt (bond): Money that is borrowed for more than one year.

Equity (common stock): A security that is issued by Corporation for ownership. These securities don't have preference in case of bankruptcy. (Shapiro 699-702)

Hybrid financing tools:

Preferred Stock: it is mixture of bond and common stock. Fixed amount paid to holders of preferred stock at certain time interval possibly at the end of financial year. (Brigham 928)

Warrants: "A warrant is a certificate issued by a Corporation that gives the holder the right to buy a stated number of shares of the Corporation's stock at a specified price for some specified length of time". (Brigham 814)

Convertibles: it may be bond or stock that can be converted to common stock as an option under contract.

(Brigham 809-827 and 928)

The third and last decision is Dividend decision. It depends upon the shareholders and management of the corporation. Management estimates the future growth rate of the corporation and it distributes the profit among shareholders. Dividend decision is very important because it is return of owners of the corporation. Management has to decide how much should be given and in what form should it given. 'What form' means - modes of dividend payments to shareholders, either by cash or shares.

b) Capital Structure

The paragraphs above explain the foundation of finance needed for this thesis. The core element of this thesis is capital structure. The right side of balance sheet is the financial structure and it consists of capital structure and current liabilities of the Corporation.

It is the financial manager responsibility to choose financial tools that minimizes the hurdle rate and matches with assets financed. However financing choices are divided into debt and equity. That is why capital structure can be measured by debt to capital ratio.

$$\text{Debt to capital ratio} = \text{debt} / (\text{debt} + \text{equity})$$

(Harrington 23)

It gives information about how much debt and equity a corporation is using. Debt includes all interest bearing short term and long-term loan whereas equity is ownership of the corporation scattered among shareholders unequally. Cost of equity depends upon risk free rate, market risk and risk premium (market return – risk free rate). Tax shield characteristic of debt makes capital structure important for companies. But debt has disadvantages too. Thus, it is important to know about nature of debt in detail before brief of capital structure theories.

➤ Benefit of debt:

Tax benefit: Interest expenses are deductible to tax. Therefore, it saves tax. In other words interest expenses are tax shield that diverts money from government to bond holders.

(Brealey 122-123)

Adds discipline to management: As debt increases fixed expenses, management get responsibility to increase revenue to pay interest expenses to bondholders and maintain a high retained earning growth to either pay dividend or reserve for future growth. Thus, more debt in capital structure makes management more responsible. (Brigham 647)

➤ Cost of debt:

Bankruptcy cost: bankruptcy is the state when companies are unable to pay its debt. There are two types of costs associated with bankruptcy cost.

✚ Cost incurred due to probability of bankruptcy occurrence and

✚ Cost incurred due to bankruptcy of a corporation.

High employees turnover, lenders demand high interest rate, suppliers refuse to assist financially, and customer dissatisfaction are problems occurred due to the threat of bankruptcy. These problems are cost of bankruptcy. “Firms in bankruptcy have high legal and accounting expenses” (Brigham 644).

(Harrington 237)

Agency cost: “Costs of conflict of interest among stock holders, bondholders and managers. Agency costs are the cost of resolving these conflicts. They include the cost of providing managers with an incentive to maximize shareholder wealth and then monitoring their behavior, and cost of protecting bondholders from shareholders. Agency costs are borne by stockholders.”(Ross 917)

Loss of future flexibility: Highly leverage corporations have fewer options to raise capital for future projects. Creditors become skeptical about getting their money back. Thus, they provide debt to highly leveraged corporation at high interest rates. At the same time issuing of equity is often difficult due to the risk associated with highly leveraged Corporation. (Brigham 650)

(Ross 427-452)

➤ Measuring cost of capital.

Capital structure can be measured by debt equity ratio. As mentioned before, capital costs money for Corporations. This means the corporation pays the cost of capital for its use in business. The most common components of capital structure are common stock, preferred stock and debt. These different components of capital structure have different costs. For capital budgeting decisions corporations use weighted average cost of common stock, preferred stock and debt. This enables a corporation to set a target

Where,

W_d = Weight of debt in capital.

K_d = Cost of debt.

T = Corporate cost.

W_{ps} = Weight of preferred stock in capital

K_{ps} = Cost of preferred stock.

W_{ce} = Weight of common stock in capital.

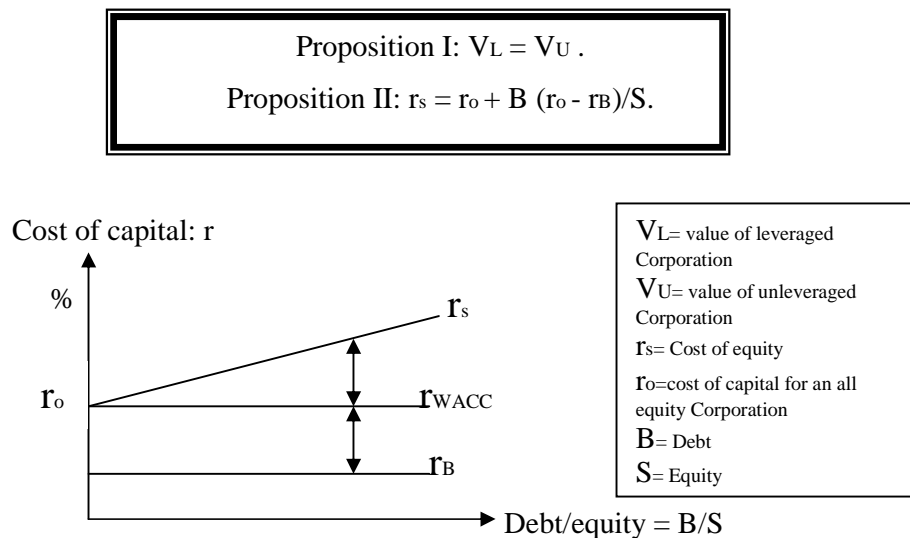
K_s = Cost of common stock.

Weighted average cost of capital is aggregates and weights the costs of all components of capital with their weight in capital.

(Brigham 420-452)(Brealey 533)

c) MM theory without taxes: Capital structure is irrelevant.

MM theory is very important in terms of making choices between debt and equity. In 1958, Professor Franco Modigliani and Merton Miller proved that a corporation's value is independent of its capital structure given certain assumptions such as no taxes, no transaction cost, and individual and corporate borrowing at the same rate.



(Graph 1)

(Ross A. Stempfen, Westerfield W. Randolph and Jaffe Jeffrey (2002). Corporate Finance. McGraw-Hill Irwin. Page 401)

Two result of MM theory are especially important. The First proposition states that under a no tax environment capital structure is irrelevant. Thus, the value of leveraged

corporation is equal to the value of unleveraged corporation. The second proposition is illustrated in the graph above. Cost of equity rises with increase of debt in capital structure because debt increases the risk of equity. On the above graph 1, even though r_B increases, r_{WACC} remains same. Although debt does not affect cost of capital, it does affect risk of equity. Debt makes equity more risky because it increases fixed expenses in the profit and loss account.

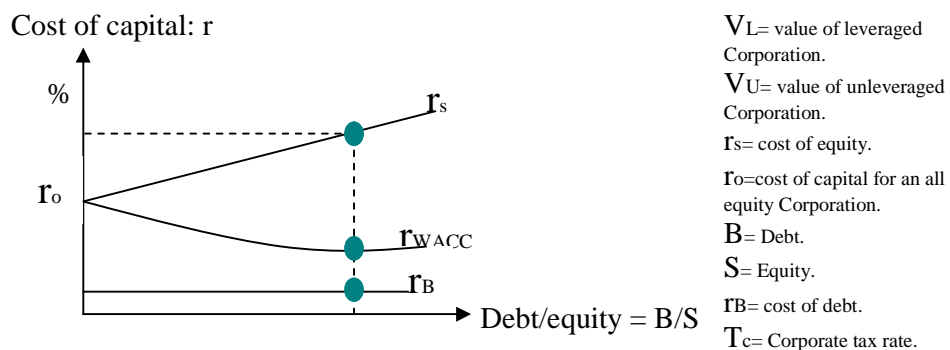
(Ross 395-407)

d) MM theory with tax: Capital structure is relevant

MM published article again on capital structure in 1968. This article was different from the first one only because of corporate taxes. This article says that corporations are taxed at specific rate by government on EBT (Earning before tax) after interest expenses. It also assumed that there is no transaction cost, and individual and corporation borrow at same rate. They said that the corporation's value increases when leverage increases in financial structure.

Proposition I: $V_L = V_U + T_c B$

Proposition II: $r_s = r_o + B (r_o - r_B) (1 - T_c) / S$



(Graph 2)

(Ross A. Stempfen, Westerfield W. Randolph and Jaffe Jeffrey (2002). Corporate Finance. McGraw-Hill Irwin. Page 413)

Result of MM assumption brought revolution in finance. It shows that the values of leveraged corporation are greater than values of unleveraged Corporations by the amount of tax saving due to interest expenses. At the same time, high leverage makes

equity risky. This result was same as before, but only difference is r_{WACC} decreases when more debt introduce in capital structure. The graph above shows more r_B leads to more risk to equity. And cost of capital is reduced because interest expenses are shielded from tax.

(Ross 395-407)

e) The Pecking-order Theory:

This theory says about debt equity ratio in capital structure and establishes the relationship with debt or equity issuance with stock valuation. In addition, it provides information about when a corporation should issue debt to raise capital for potential growth. This paper already discussed about capital structure in terms of tax benefits, distress cost, and agency cost without considering time. Time is called money, by this means, time has been considered in Pecking-order theory that makes it different from other theories of capital structure. This theory is based on two rules:

- Management should first use internal financing (finance by retain earning). It does not give any signal to market about overvaluation about the corporation and its equity. Thus, the corporation can maintain its current value by using internal finance.
- The corporation should not use convertibles (hybrid financing tools) to raise capital. Investors are more careful about their investment in equity rather than investment in debt, because debt is considered less risky than equity. Therefore, convertibles debt is risky than corporate debt. Issuance of convertible debt signals overvaluation of the stock and the corporation.

(Ross 439)

Whenever a corporation issues equity, investors think that the stock is overvalued and they do not buy until there is no arbitrage profit involved by falling of the stock price. In contrast, when corporations issue equity then investors understand that shares are overpriced. Therefore, the corporation should issue debt when stock is undervalued and issue debt when corporation is overvalued. All the above cases suggest that Corporation should issue debt only. Pecking-order theory doesn't say anything on specific debt equity ratio. However it suggests that corporation should choose its leverage ratio according to financial need. Whereas profitable corporation should not use more debt; instead of debt they should use retained earnings that would increase

the value of equity as well as the value of the corporation. Therefore, it suggests companies that they should maintain high cash balance so that in adverse economic condition they can fund itself by using internal cash rather raising costly money from capital market.

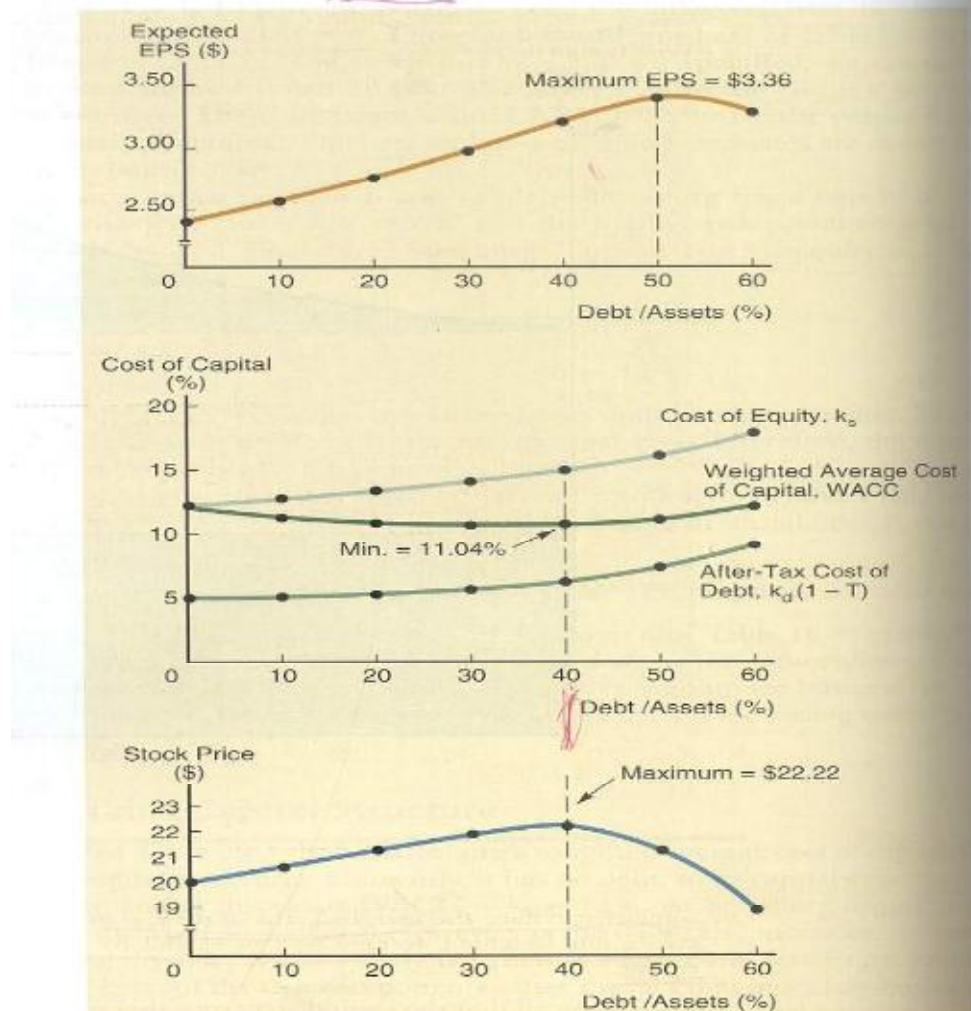
(Brealey 498-503)(Ross 439)

f) Optimal capital structure:

“The optimal capital structure is the one that maximizes the price of the Corporation’s stock, and this generally calls for a debt ratio that is lower than the one that maximizes expected EPS” (Brigham 632)

Every corporation wants to get its optimal capital structure to increase corporate value according to above definition by Brigham. Being more specific, optimal capital structure gives maximum benefit to the corporation in terms of high stock price and lower discount rate. The combination of equity and debt that has lowest WAAC is optimal capital structure. The lowest WACC is not the only consideration of optimal capital structure. If why question comes here, then it would give proper picture. Suppose, cost of debt is lower than cost of equity, then corporations would prefer to include only debt in their capital structure. In addition, risk of the corporation will be very high due to agency cost and bankruptcy cost as defined in trade off theory and Pecking-order theory also the stock price will go down as per signaling and Pecking-order theory. Optimal capital structure can be understood by following graph 3.

FIGURE 16-8 Effects of Capital Structure on EPS, Cost of Capital, and Stock Price



(Graph 1)

(Brigham F. Eugene and Ehrhardt C. Michael (2002). *Financial Management Theory and Practice*. South-Western Thomson Learning. Page 638)

The graph 3 shows EPS is high at 50% debt /equity ratio, whereas WACC is lowest at 40% debt/ equity ratio. At this juncture, debt equity ratio of 40% stock price is highest at \$22.22. In this situation, what would be optimal capital structure? Answer is 40% debt / equity ratio because at this point WACC is lowest and stock price is highest. Optimal capital structure changes, when determinants of capital structure changes due to several factors like “Asset structure, financial distress, non debt tax shield, size, age, growth, profitability, signaling and uniqueness” (Bhaduri 659).

g) Global Capital Structure & Universal Capital Structure

Global capital structure is one capital structure for a corporation around the world. Corporation always thinks about cost of capital while raising capital for future growth. Corporations need more fund to expand globally due to globalization. At the same time, they can access not only one capital market, but also get from several other capital markets around the world. According to development, the world is divided into three parts, developed region, developing region and underdeveloped region. Each region has its own economic environment. The differences are fruitful for MNC's. They can raise fund from that capital market where cost of capital is lowest. This makes them different from Domestic Corporations and makes MNC's more competitive.

(Shapiro 492-498)

Universal Capital structure suggests one capital structure fits all corporations irrespective of their industry and country. It is impossible to create universal capital structure because each corporation has its own micro and macroeconomic conditions different from other corporations.

h) Macro economic factors that affect Capital structure

Macroeconomics is the comprehensive study of economy. It provides understanding about tax, labor, financial market, GDP, and government policies. As this thesis is establishing the relationship between economic and capital structure, it important to know, how macroeconomics variables affect capital structure.

Taxes: as defined in MM theory, debt affects capital structure because of tax shield. It means High tax gives more tax shield. Tax rates are different across the world (for example, tax rate is different in USA compare to Japan according to table 5 and 8). For instance, other things being equal and constant, Companies should introduce more debt to capital structure, where tax rate is high.

Inflation: Sustain increase in general price level is called inflation. Inflation is good and bad both. Counties try to balance the inflation and do their best to maintain a level that will lead to economic growth. Fluctuation in inflation increases the interest rate. If

interest rate increases, debt becomes costlier. In high inflation period, corporation prefers issue equity rather than issue of bond. According to graph 4 and graph 5 of appendix, Interest rate is increases according to inflation rate. Interest rate and inflation rate has approximately same trend from year 1968 to 1990. In the year 1968, 1974 and 1988 inflation is increased as well as interest rate is increased.

GDP: “The total market value of all final goods and services produced domestically during a specified period, usually a year” is called gross domestic product (Gwartney 1014). High GDP means high economic growth. A government wants to maintain high growth rate. One drawback of high GDP is high inflation according to graph 2 and graph 5 of appendix. Inflation makes debt more expensive as interest increases along inflation. In low GDP growth period government cuts interest rate and makes debt less expensive that will help economy to grow. Recent example is United State of America where government cut interest rate to boom its economy in recession period.

Unemployment: Employment and GDP are closely related with each other. Unemployment is high in recession period or at low GDP growth period. High inflation leads to lower interest rate that makes debt cheaper (according to graph 4 of appendix, where interest rate decreases in recession period, for example year 1969 – 70, 1974-1975 and 1980-1982.), but at the same time, business risk increases due to recession. As economy recovers from the recession, employment rate increases (according to graph 1 of appendix). Thus, GDP, interest rate and employment has close relationship that affects capital structure as interest rate associated with cost of debt.

Interest rate: “The interest rate is the amount charged for a loan by a bank or other lender per dollar per year, expressed as a percentage” (Hall 11). Interest rate increases during economic boom and decreases during recession. Beside that interest rate is related to unemployment rate and production. Interest rate decreases when GDP decreases according to graph 4, graph 3 and graph 2 of appendix. In the year 1970, 1975 and 1982, interest rate decreased when GDP decreased.

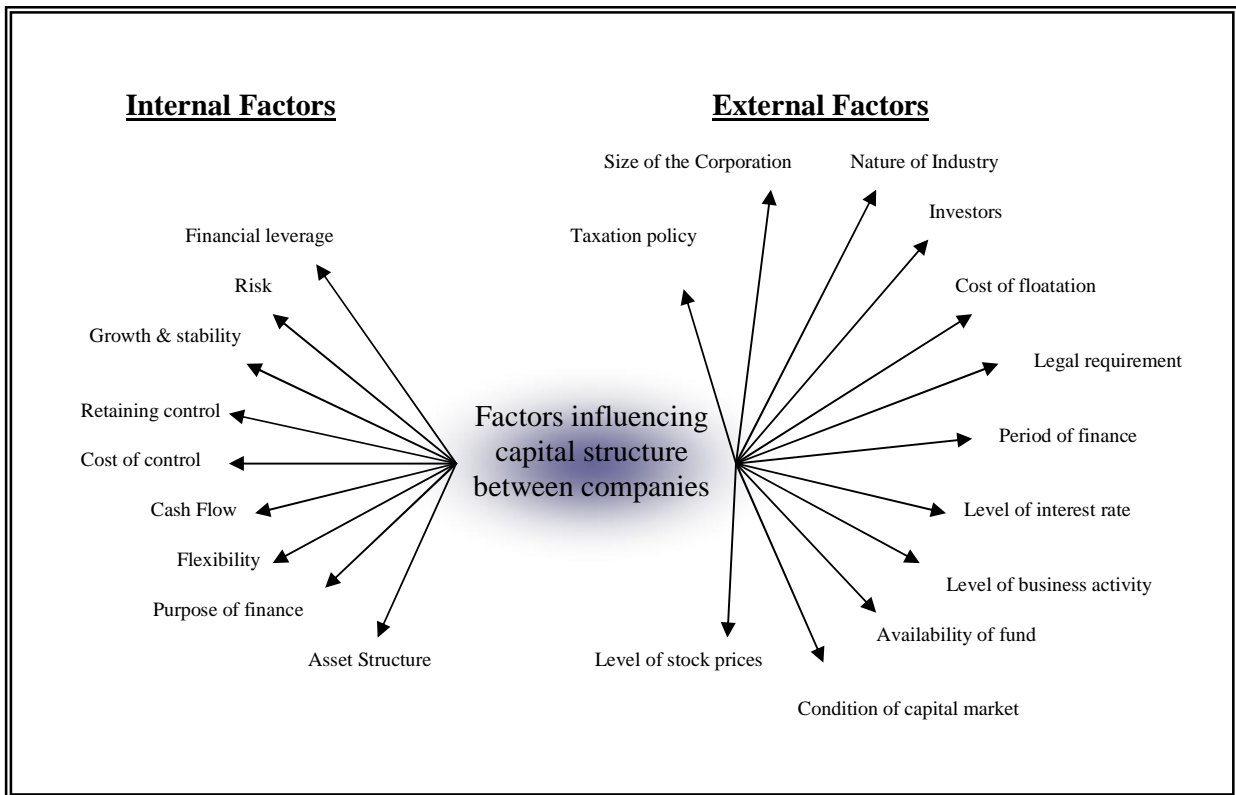
Fiscal policy: government gets money as tax collection from its citizen to run country. Sometimes, government spend more than its earning that is why government have to borrow money from World bank, IMF, ADB, and developed nation to fill the fiscal deficit. Fiscal deficit increases when government spends more than its revenue. For example, USA has huge fiscal deficit due to recession (government spends more to boom economy in recession period) and war (due to heavy investment in defense). To reduce fiscal deficit, government increases tax rate. Accordingly tax affects capital structure of the corporation. Therefore, fiscal policy is one of the variables of macroeconomic that affects capital structure.

(Appendix 1-3) (Gwartney 137-409)

i) Variables that affect capital structure between companies

Capital structure is different between companies and it depends on corporation specific micro environment like availability of fund, immediate need of the project, earnings, capital return, economic value of the project and trend of earnings (Reddy 129). Apart from following (shown in diagram) internal and external variables affect capital structure.

Internal and External Factors (Model 2)



(Reddy P.N, Appannaiah H.R, Satyaprasad (2000). Financial Management. Himalaya Publishing House. Page 279)

If the corporation doesn't have debt or low financial leveraged, then corporation would prefer to issue bond rather than equity. A highly growth and stable corporation prefers to issue equity because of their high P/E ratio (price earning ratio). At the same time manager have to think about taxation policy of government and floatation cost of equity. High floatation costs increase cost of capital in corporations. If managers don't want to increase leverage and issue more common stock, then they can use retained earnings. After all capital structure depends upon the cost of capital which differs in different companies. If cost of equity is cheaper than cost of debt, then issuance of common stock makes sense. If a corporation is predicting high cash flow in future, then more debt in its capital structure would benefit the corporation because of tax benefit characteristic of interest expenses.

Heavy investment in intangible assets leads to more common stock in capital structure. A high tangible asset in balance sheet leads to more debt in capital structure due to collateral securities of fixed assets. Some companies prefer to maintain their financial flexibility so that they make their corporation less leveraged. The level of stock prices also affects the capital structure. If the corporation wants to maintain high stock price, then it would not prefer to float common stock according to signaling theory and Pecking-order theory. Signaling theory says, issuance of equity gives information to investor that stock price is overvalued. High tax on dividend and interest income is another factor that affects capital structure. High tax on dividend and interest income discourages issuance of bond and issuance of dividend. The size of a corporation influences its capital structure. A small size corporate firm (Sole proprietorship and partnership) requires less capital where as a big size corporate firm (Corporation) requires huge amount. That is why big size firm uses many modes of financial tools like conventional financing tools and hybrid financing tools.

Thus, all the above factors affect capital structure. It is highly impossible that all corporations would have the same level of all variables in their business. Therefore, capital structure varies from corporation to corporation as per their specific micro and macro environment.

(Reddy 279- 287)

j) Variables that affect capital structure between Industries

Tangible investment, intangible investment, risk, growth, assets structure, nature of business, investors, research and development expenses, business cycle, good projects and leading policies of financial institution affect capital structure between industries.

Tangible investment can easily get fund from creditors or from financial institutions because of collateral securities that assures investment return. Intangible investment has less financial flexibility; even cost of debt is higher in intangible investment than tangible investment. For example, Microsoft Corporation (Technology Industry) has heavy investment in intangible assets (patent rights) whereas utility industry has heavy investment in tangible assets. As a fact Microsoft Corporation has zero debt in its capital structure where as PPL Corporation (Utility Companies) has 74% debt to capital ratio. Thus, Capital structure is affected by nature of assets (tangible or intangible) used by different industries.

(Rudy 9-42) (McCann 1-45)

Growth industry finances its project from internal (retain earnings) instead of raising money from outside to maintain its stock price level in stock exchange market. Some industries come under mature industries (for example, Utility Industry) and some come under growth industries (for example, Biotechnology industry). Mature industries have high debt to capital ratio with high dividend payout ratio however a growth industry doesn't prefer more leverage in its capital structure. For example, DOMINION Resources Inc (Utility Industry) has 51.1% debt to capital ratio and 119% dividend payout ratio where as AMGEN Inc (Biotechnology Industry) has 4.1% debt to capital ratio and 0% dividend payout ratio in the year 2001. Beside all these factors, financial institution's policy also affects capital structure. For instance, financial institutions always do equity investment in growth industry and prefer loans to mature industries. Therefore, all the above factors change capital structure among industries because all the variables would not be same in all industry.

(Rudy 9-42) (McCann 1-45)

VII. DATA ANALYSIS

a) Developed countries and capital structure

It is common in all developed country that they are following one trend in financing that financing through retained earnings. It means they are following Pecking-order theory of capital structure. However, it doesn't mean that debt financing is not popular tool to raise capital for the corporation growth. According to MM theory with corporate tax makes debt financing one of the tools for the corporation that increases the corporation's value and maximize shareholders value. Whereas signaling theory influences the financing decision and makes share last option to raise capital.

Financing of nonfinancial Enterprises in G7 nations (%) for period 1970-1985

	Canada	France	Germany	Italy	Japan	UK	US
Retain earnings	76	61	71	52	58	102	86
Loans	15	37	12	28	50	8	24
Bonds	9	2	-1	2	2	-1	12
Shares	3	6	1	8	5	-3	1

(Table 4)

(Atkin, Michael, Glen, Jack. Comparing Corporate Capital Structures Around the Globe. *International Executive*. Date: 19920901, Vol. 34, No: 5, Page: 373.)

Above table 4 is showing the difference among developed nations. G7 nations are developed nations in the world. G7 consists of Canada, France, Germany, Italy, Japan, UK, and US. These nations are divided in to bank oriented and market oriented countries that influence corporation's capital structure among G7 countries. For instance, Japan, Germany, France and Italy are bank-oriented countries. That is why Japan is the largest user of bank funding, 50% of financing has been raised through bank loan in Japan (according to above table 4). Whereas market oriented countries (like US, UK and Canada) are the largest user of Internal financing (retained earnings) due to Pecking-order theory.

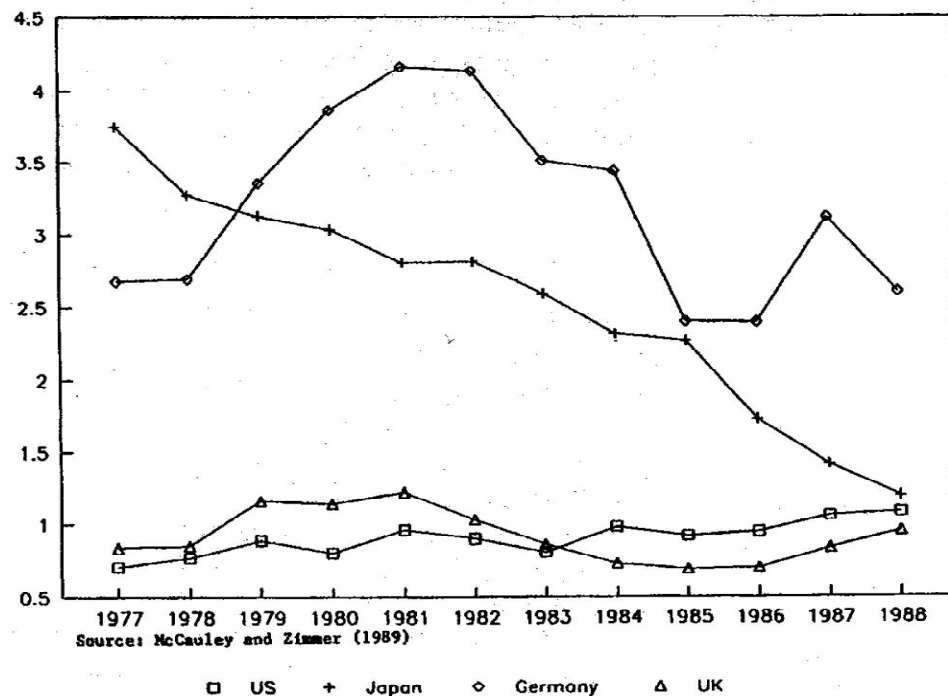


Figure 3. Debt/equity ratio. Source: McCauley and Zimmer (1989).

(Graph 4)

(Atkin, Michael; Glen, Jack. Comparing Corporate Capital Structures Around the Globe. *International Executive*. Date: 19920901, Vol. 34, No: 5, Page: 377.)

Above Graph 4 is showing debt equity ratio of G7 countries from 1977 to 1988. According to graph, Japan has second largest debt equity ratio after Germany. It means corporations in Japan are using high debt in capital structure and UK is the least user of debt. Above variation in debt equity ratio occurred due to many factors (internal factors, external factors and macroeconomic environment). For example, a tax-exempted investor finds debt more tax advantageous in Germany than in United States of America. Second example is differences in different accounting policies among developed nations. For example lease reporting, corporations in Japan is not showing lease financing in their balance sheet whereas lease reporting in balance sheet is compulsory in UK, USA and Canada.

(Rajan 1422-1442) (Atkin 370-378)

Apart from information about debt equity ratio, this graph also shows fluctuation of debt equity ratio according to time.

b) Correlation and Regression analysis

➤ *United States economy, 2000*

USA is the world largest economy with gross domestic product per capita \$33,900. It has market-oriented economy. This means government has less interference in business that allows business more flexibility than corporation in Japan. Businesses are facing tough competition due to entrance of new competitors with low cost product and at the same time facing barrier in entering foreign market. At the same time, there are no foreign competitors' threat in computers, aerospace, and technology advance industries. Good infrastructure, high growth opportunity, adequate financial market makes, and big market make United States still attractive to investors. This is one of the reasons for taking USA in data analysis.

(Photius coutsoukis, United States economy 2000)

➤ *Japan economy, 2000*

Japan is second most technology-advanced country after USA and third largest economy after USA and china with GDP per Capital \$23,400. Japan is expending least in defense (only 1% of gross domestic product). It helped Japan economy to grow fast. Keiretsu is one of popular business concept is working well in Japan. This means effective supply chain management. Economy depends upon import of raw material and other goods. Working robots makes Japan unique from other courtiers and it helps in long-term economic growth. Japanese company is doing well in automobile industry for example, Honda, Toyota, etc. "all roads lead to Japan" (Pandolfi, Auto & truck industry) in automobile industry and bank-oriented economy encourages this paper to take Japan for Regression data analysis.

(Photius coutsoukis, Japan economy 2000)

➤ *Honda Motor, Japan*

For correlation and regression analysis, a number of variables have been taken like long term debt equity ratio, consumer price, unemployment rate, GDP, tax rate and lending rate (shown in below table 5). After doing correlation and regression of several combination of above these variables, only consumer price, tax and lending rate having positive F- test and P- test. F test and P test are the tools of hypothesis testing, which prove whether dataset is significantly relevant among them. Dataset is collected for a limited period (1994-2000). That is why only few data of Japanese economy are significantly correlated with debt equity ratio and helpful to establish relationship between debt equity ratio and Japanese economic environment.

Data of economic environment in Japan and Honda Motor's Long term debt equity ratio

Year	Long term debt/equity	Consumer price	TAX	Lending rate	Unemployment rate	GDP	Exchange rate with US dollar	Long term debt	Equity
1994	0.58	100.1	37.5	4.13	2.9	479260	99.74	6624	11432
1995	0.57	100	37.5	3.4	3.2	483220	102.83	6135.2	10697
1996	0.53	100.1	37.5	2.66	3.4	500310	116	5916.6	11188
1997	0.42	101.8	37.5	2.45	3.4	509645	129.95	5095.9	12090
1998	0.38	102.5	37.5	2.32	4.1	498499	115.6	5583.4	14632
1999	0.30	102.2	35	2.16	4.7	495145	102.2	5420.4	18211
2000	0.17	101.5	30	2.07	4.7		114.9	2971.5	18001

(Table 5)

(Carson Carol S. International Financial statistics, IMF statistic depratment. Aug 2001, Vol. LIV, No 8.)

(Top marginal; corporate income tax rate, 1980-2001. World tax database. Office of tax policy research)

(Beyrouty Joseph A (2003). Honda Motor (ADR) NYSE – HMC. Value line publishing Inc.)

In above table, Bank lending rate is representing interest rate whereas consumer price is representing inflation in Japan. Inflation depends upon consumer price, that's why in absence of inflation rate data; data of consumer price has been taken for analysis. Long-term debt equity ratio has been calculated based on Honda Motor's information available on Value Line.

Correlation among Japan's economic environments and Honda Motor's Long term debt equity ratio

	Long term debt/equity	Consumer price	TAX	Lending rate
Long term debt/equity	1			
Consumer price	-0.728801604	1		
TAX	0.850971983	-0.274221516	1	
Lending rate	0.819606189	-0.763420118	0.505362754	1

(Table 6)

According to above correlation table 5, Consumer price is negatively related to long-term debt equity ratio. In Japan, when inflation rises, debt equity ratio decreases. Inflation decreases debt in capital structure of Honda Motor and both are negatively related (-72%). Tax and long-term debt equity ratio has positive related up to 85%. Increase in tax rate encourages Honda motors to increase debt ratio due to high tax benefit from interest expenses as per MM theory with corporate tax. Due to positive relationship between Tax and lending rate, lending rate has also a positive relationship with long-term debt equity ratio. At the same time, it establishes relationship between Inflation and Lending rate. In periods of high inflation, interest rates increase for a specific period to control inflation. Thus, macro economic environments of Japan are affecting Honda motor's long-term debt equity ratio. In other words, macro economic environments affecting capital structure in Japan.

After correlation analysis, Regression analysis will establish strong relationship among all variables of economic environments by Hypothesis test among data.

Regression analysis of Honda Motors with its macroeconomic environments (Japan)

Regression Statistics					
Multiple R	0.999				
R Square	0.998				
Adjusted R Square	0.995				
Standard Error	0.008				
Observations	6				

ANOVA					
	df	SS	MS	F	Significance F
Regression	3	0.0657	0.0219	319.3675	0.0031
Residual	2	0.0001	0.0001		
Total	5	0.0658			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%
Intercept	4.97	0.58	8.54	0.01	2.47
Consumer price	-0.06	0.01	-11.54	0.01	-0.08
TAX	0.04	0.00	9.06	0.01	0.02
Lending rate	0.03	0.01	4.40	0.048	0.00

(Table 7)

Above table7 is multiple regression analysis of three economic environments (Consumer price, Tax rate and Lending rate of Japan) with Honda Motor's Long-term debt equity ratio. Regression analyses relationship among data of table, by MS Excel and finds out empirical equation for Honda Motor's Long-term equity ratio.

Empirical Equation:

$$\text{Long term Debt equity ratio} = 4.97 - 0.06 \text{ Consumer price} + 0.04 \text{ Tax rate} + 0.03 \text{ lending rate} + c$$

(Where C is is the other factor)

Long-term debt equity ratio can be predicted with the help of above equation that has standard error of 0.8%. Thus, consumer price, tax rate and lending rate of Japan affect Honda Motor's Capital structure.

R square (regression table 7) is called coefficient of determination. It shows how much percentage of all economic environment factors of Japan cause variation in long-term debt equity ratio of Honda motor. In above regression analysis, R square is 99.8% that indicates that 99.8% variations in long-term debt equity is caused by consumer price, tax rate and lending rate of Japan. In other words, if Honda motor changes its capital structure, then there is 99.8% probability that variation in capital structure caused by consumer price, tax rate and lending rate.

Hypothesis test

Null Hypothesis: $H_0: M_{\text{long-term debt equity ratio}} = M_{\text{tax}} = M_{\text{Consumer price}} = M_{\text{Lending rate}}$ (Means are all equal)

Research Hypothesis: $H_1: M_i \neq M_j$ (Means are not all equal)

F- Test

Critical Value = 19.164

F Statistic = 319.3675

As, F Statistics > Critical value,

Thus, H_0 is proved. In detail, it is proved that above regression model, which consists of debt equity ratio, consumer price, tax rate and lending rate, is significant.

P- Test

As, $P = 0.00312$ (significance F)

Where, $P < 0.05$

Therefore, H_0 is proved, it is highly significant at the conventional 5% level but not at the 1% level. Consumer price, tax rates and lending rate of Japan do help to predict capital structure of Honda Motor. However, P value of consumer price, tax rate and

lending rate are less than 0.05, it proves that each individual economic environment can predict capital structure significantly. In case of consumer price, Capital structure is highly significant with consumer price at the 1% level but not at the 0.1% level.

Again, P-test proved that there are relationship among long-term debt equity ratio, Tax rate and lending rate.

➤ *General Motors, USA*

For correlation and regression analysis of General Motors USA, a number of variables (as many as possible) has been taken like Long Term debt equity ratio, consumer price, unemployment rate, GDP, Tax rate, fiscal deficit and lending rate (shown in below table). After doing correlation and regression of several combination of above these variables, only consumer price, unemployment rate, GDP and lending rate having positive F- test and P- test. F test and P test are the tools of hypothesis testing those prove that whether dataset is significantly relevant among them. Dataset is collected for a limited period (1994-2000). That is why only few data are significantly correlated with debt equity ratio and helpful to establish relationship debt equity ratio and economic environment, for example, Tax rate is remains same from 1994 to 2000. Thus, Tax rate would not have any impact on capital structure.

Data of economic environment in USA and GM's Long-term debt equity ratio

Year	Long term debt/equity	Lending rate	Consumer price	Unemployment rate	GDP	Fiscal deficit	TAX	Equity	Long term debt
1994	2.92	7.14	97.3	6.1	7054.3	-184.6	35%	12824	37490
1995	1.57	8.83	100	5.6	7400.5	-146.2	35%	23346	36675
1996	1.63	8.27	102.9	5.4	7813.2	-110.8	35%	23418	38074
1997	2.40	8.44	105.3	5	8300.8	-2.4	35%	17506	41972
1998	3.51	8.35	107	4.6	8790.2	54.4	35%	14984	52574
1999	3.01	7.99	109.3	4.2	9299.2	158.3	35%	20862	62745
2000	2.27	9.23	113		9963.1		35%	30175	68464

(Table 8)

(Carson Carol S. International Financial statistics, *IMF statistic depratment*. Aug 2001, Vol. LIV, No 8.)

(Top marginal; corporate income tax rate, 1980-2001. World tax database. Office of tax policy research)

(Beyrouty Joseph A (2003). Genral Motors NYSE – GM. Value line publishing Inc.)

Bank lending rate is representing interest rate, whereas consumer price is representing inflation here. Inflation depends upon consumer price, that's why in absence of data of Inflation rate consumer price has been taken for analysis. Long-term debt equity

ration has been calculated based on General Motors's information available on Value Line.

Correlation among USA's economic environments and GM's Long term debt equity ratio

	<i>Long term debt/equity</i>	<i>Lending rate</i>	<i>Consumer price</i>	<i>Unemployment rate</i>
Long term debt/equity	1			
Lending rate	-0.48	1		
Consumer price	0.42	0.32	1	
Unemployment rate	-0.462	-0.315	-0.990	1
GDP	0.521	0.225	0.989	-0.995

(Table 9)

According to above correlation table 9 capital structure of General Motors is negatively related (-48%) with lending rate. It was totally different in case of Correlation 6, where lending rate is positively related to capital structure because Japan has Bank oriented economy whereas USA has market-oriented economy. General motors increase debt in inflationary period and it has positive relationship with lending rate and GDP. High GDP leads inflation in economy. At same time, high GDP means high growth opportunity for corporation. High growth opportunity encourages corporations to raise money from capital markets. As per new trend, corporations use retained earnings and after retained earnings they are using debt to finance future projects according to Pecking-order theory (maintain high stock price). General Motors's debt equity ratio has positive relationship (52%) with Gross domestic product of USA. Unemployment has negative impact on debt equity ratio of General motors. High unemployment rate means economy is in recession. As a fact, car demand decreases in recession period. It is better time to decrease debt in capital structure to reduce fix cost. That is why Unemployment rate has negative relationship with debt equity ratio of General motors. Consumer price has positive relationship (with GDP due to high money rotation in economy and has negative relationship unemployment rate due to high unemployment rate restrict supply of money. In same way, Unemployment has negative relationship (-99%) with GDP. Thus, it proves that macroeconomic environments are closely related with debt equity ratio of General Motors. Moreover, these environments correlation are different from correlations of economic environment of Japan with Honda Motor. Regression analysis will prove strong relationship among all variables of economic environments by Hypothesis test among data.

Regression analysis of General Motors with its macroeconomic environments (USA)

Regression Statistics	
Multiple R	0.99993
R Square	0.99985
Adjusted R Square	0.99927
Standard Error	0.02126
Observations	6

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	4	3.0916	0.7729	1709.6173	0.0181
Residual	1	0.0005	0.0005		
Total	5	3.0920			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>
Intercept	-251.915	6.750	-37.320	0.017	-337.684
Lending rate	4.125	0.110	37.481	0.017	2.727
Consumer price	-2.002	0.040	-49.438	0.013	-2.517
Unemployment rate	29.447	0.690	42.683	0.015	20.681
GDP	0.034	0.001	46.537	0.014	0.025

(Table10)

Above table 10 is multiple regression analysis of three economic environments (Consumer price, unemployment rate, GDP and Lending rate of USA) with General Motors's Long-term debt equity ratio. Regression analyses relationship among data of table, by MS Excel and finds out empirical equation for General Motors's Long-term equity ratio.

Empirical Equation:

Long term Debt equity ratio = 4.125 lending rate – 2.002 consumer price + 29.44 Unemployment rate + 0.034 GDP – 251.92 + c

(Where C is is the other factor)

Long-term debt equity ratio can be predicted with the help of above equation that has standard error of 2.1%. Thus, consumer price, unemployment rate, GDP and lending rate of USA affect General Motors's Capital structure.

R Square (regression table 10) is called coefficient of determination. It shows how much percentage of all economic environment factors of USA cause variation in long-term debt equity ratio of General Motors. In above regression analysis, R square is

99.98% that indicates that 99.98% variations in long-term debt equity is caused by consumer price, unemployment rate, GDP and lending rate of USA. In other words, if General Motors changes its capital structure, then there is 99.98% probability that variation in capital structure caused by consumer price, unemployment rate, GDP and lending rate.

Hypothesis test

Null Hypothesis: $H_0: M_{\text{long-term debt equity ratio}} = M_{\text{unemployment rate}} = M_{\text{Consumer price}} = M_{\text{Lending rate}} = M_{\text{GDP}}$ (Means are all equal)

Research Hypothesis: $H_1: M_i \neq M_j$ (Means are not all equal)

F- Test

Critical Value = 224.58

F Statistic = 1709.617

As, F Statistics > Critical value,

Thus, H_0 is proved. In detail, it is proved that above regression model, which consists of debt equity ratio, consumer price, Unemployment rate, GDP and lending rate, is significant.

P- Test

As, $P = 0.0181$ (significance F)

Where, $P < 0.05$

Therefore, H_0 is proved, it is highly significant at the conventional 5% level but not at the 1% level. Consumer price, unemployment rate, GDP and lending rate of USA do help to predict capital structure of General Motors. However, P value of consumer price, tax rate and lending rate are less than 0.05, it proves that each individual economic environment can predict capital structure of General Motors significantly.

Again, P-test proved that there are relationships among long-term debt equity ratio, unemployment rate, GDP, and lending rate.

VIII. Conclusion

This paper starts with uncertainty that whether capital structure across developed countries in automobile industry vary due to variation in macro economic environments or not. There are several factors that affect capital structure like external and internal factors (Model 2). These factors affecting capital structure varies among companies, industries and even developed countries. With the help of Statistical analysis, it is proved that macroeconomic environment does has significant relationship with long term debt equity ratio of Honda Motor (Japan) and GM (USA). Even the analysis of MM theories, Pecking order theory and optimal capital theory support this research hypothesis.

Above Statistical analysis of data from two countries proved that macroeconomic environments does have relationship with capital structure but the factors affecting capital structure is different among developed countries.

With the help of Regression analysis, below empirical equations for Honda Motor, Japan and GM, USA has been derived.

For Honda, Japan

Long term Debt equity ratio = 4.97 - 0.06 Consumer price + 0.04 Tax rate +0.03 lending rate + c.

Where, C is other factors.

It gives information that Long term debt equity ratio of Honda Motor; Japan can be predicted by consumer price, tax rate and lending rate with their coefficient. This formula has been derived at 5% significant level.

For GM, USA

Long term Debt equity ratio =4.125 lending rate – 2.002 consumer price + 29.44 Unemployment rate + 0.034 GDP – 251.92 + c.

Where, C is other factors.

It gives information that Long term debt equity ratio of GM; USA can be predicted by consumer price, unemployment rate, GDP and lending rate with their coefficient. This formula has been derived at 5% significant level.

All the mentioned macroeconomic variables (Table 5 and Table 8) are significantly correlated with long-term debt equity ratios of Honda Motor and GM. Although the

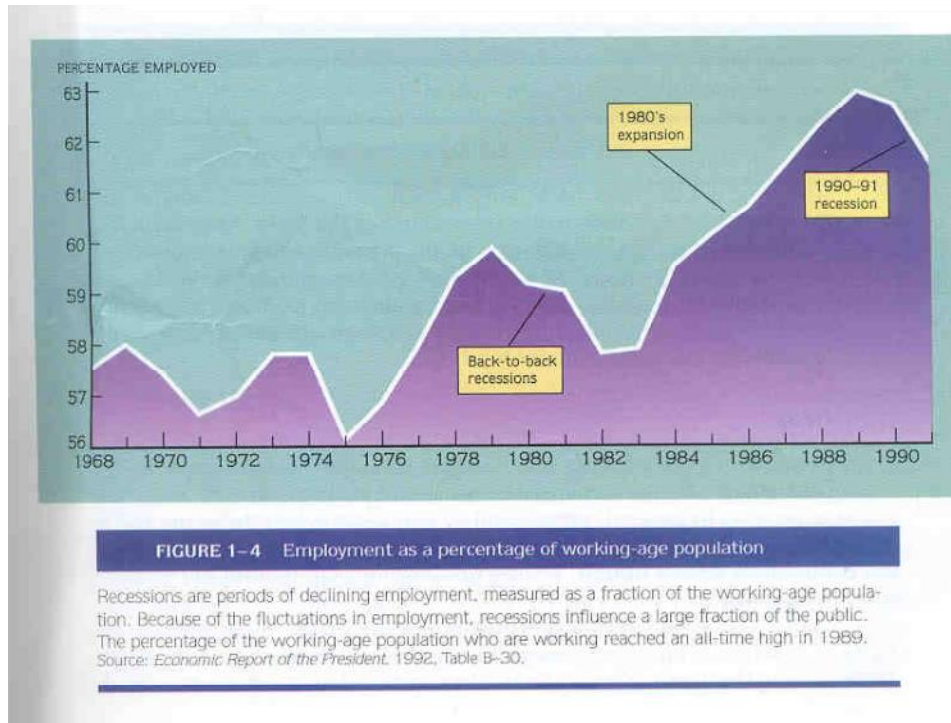
industry characteristic is similar but the Macroeconomic environment of Japan is different from USA macroeconomic environment, this concludes that macroeconomic environments do affect capital structures among developed countries in automobile industry.

Therefore, this research proved that varying macro economic environment causes variations in capital structure across developed countries in automobile industry.

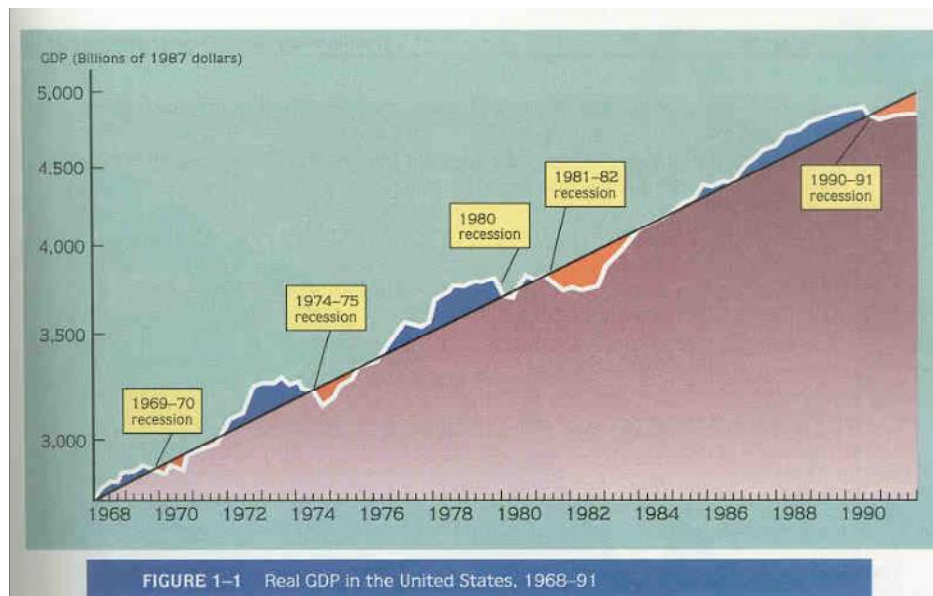
IX. Appendix

(1)

These graphs help to understand relationship among macroeconomic environments.



(Fig 1)



(Fig 2)

(Hall Robert E and Taylor John B (1993). Macro Economics. W.W . Norton & Company, Inc. page 7-12)

(2)

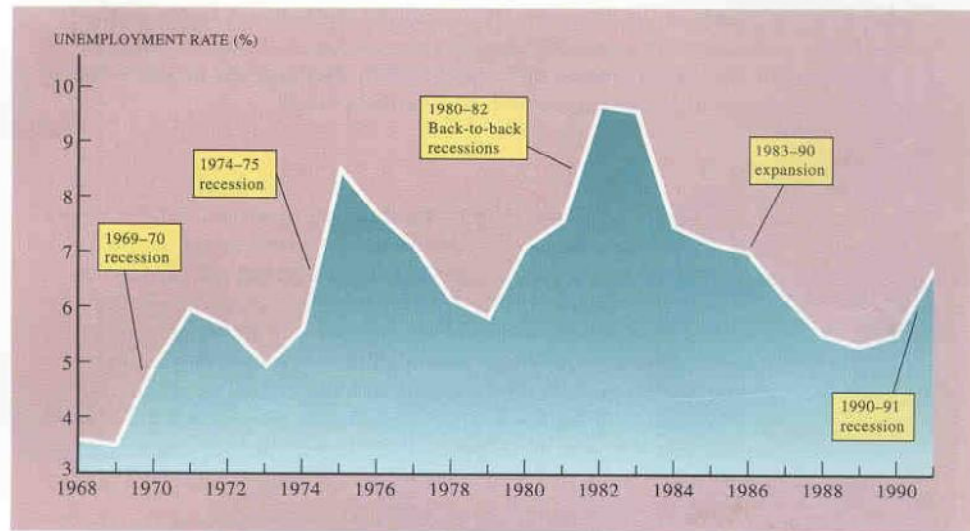


FIGURE 1-5 Annual unemployment rate, 1968-1991

The unemployment rate rises during recessions and falls during recoveries.

(Fig 3)

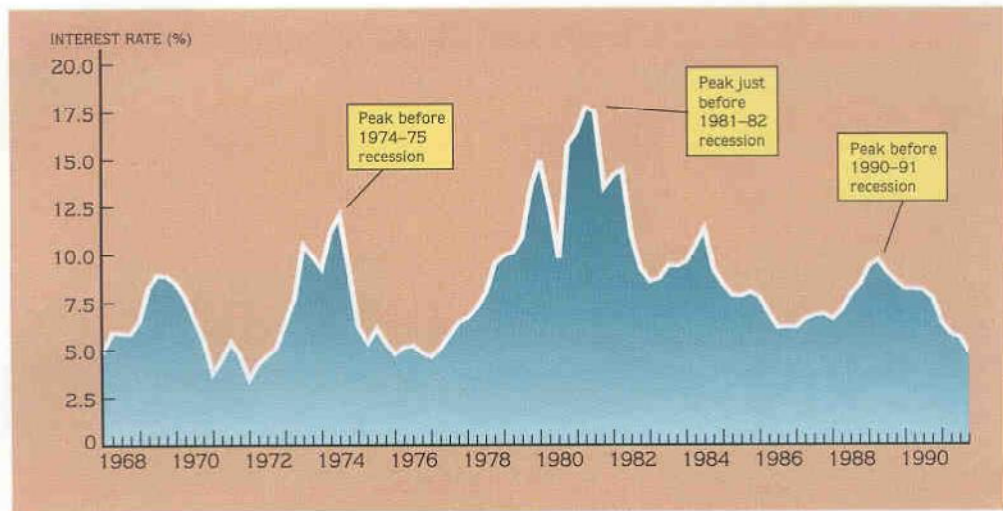


FIGURE 1-7 The federal funds interest rate

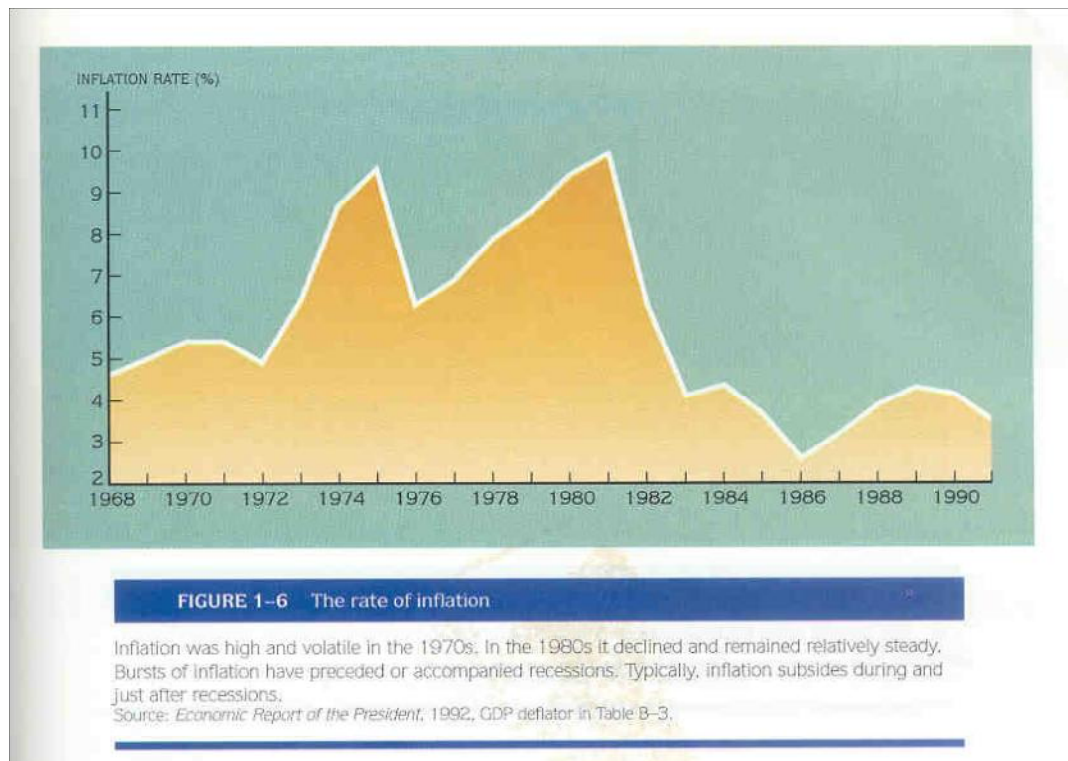
Like other interest rates, the federal funds rate reaches a peak just before a recession and then usually falls sharply.

Source: *Economic Report of the President*, 1992, Table B-69.

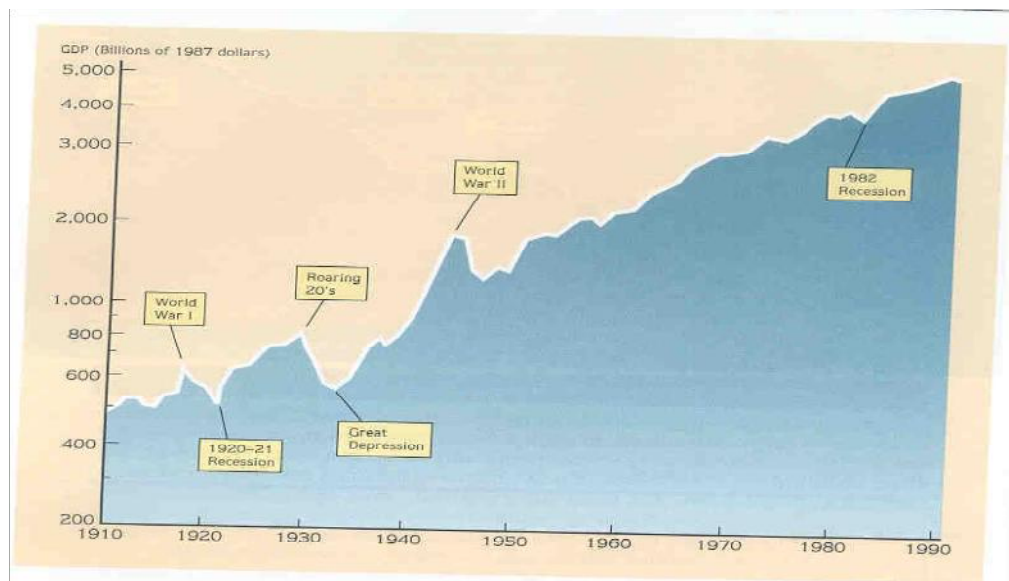
(Fig 4)

(Hall Robert E and Taylor John B(1993). Macro Economics. W.W . Norton & Company, Inc. page 7-12)

(3)



(Fig 5)



(Fig 6)

(Hall Robert E and Taylor John B(1993). Macro Economics. W.W . Norton & Company, Inc. page 7-12)

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