University of Alberta

The Minimum Acceptable Rate of Return: Engineering Economic Theory and Practice

by

Lisa Prescott

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Lisa Prescott

22 Macalester Bay
Winnipeg, MB
CANADA R3T 2X5

Date: August 26, 1999

University of Alberta

Faculty of Graduate Studies and Research

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled The Minimum Acceptable Rate of Return: Engineering Economic Theory and Practice submitted by Lisa Prescott in partial fulfillment of the requirements for the degree of Master of Science.

Dr. J.D. Whittaker

Dr. A. Narsing

for

A Robinson

Dr. A. Robinson

Date: 18 AUG 99

ABSTRACT

The Minimum Acceptable Rate of Return (MARR) is the rate used to discount cash flows and, consequently, has a direct affect on the outcome of project selection.

The MARRs of eleven companies were calculated using methods commonly described in engineering economic literature. The average range between the highest and lowest MARR for each company was 14.62%, while the greatest difference approached 60%. This analysis showed that the methods used to calculate the MARR are incompatible. The costs of equity for one company were calculated over a four-year period. The findings showed that the net equity flow methods yield very unstable results, ranging between 9% and 26%, whereas the CAPM and Tobin's q are within a 2.5% range. Since the company was considered stable over this period by Standard & Poor's, the net equity flow methods are deemed unsuitable for use in practice.

A literature review demonstrated that both academia and industry are undecided as to which method should be used to determine the MARR. However, Economic Value Added (EVA), a financial performance measure, is gaining widespread popularity in industry. This technique recognizes the weighted average cost of capital as the MARR and due to its appeal and acceptance should be carried over to the engineering economy classroom.

Incorporating risk into the MARR results in favouritism toward short-term projects. Risk should be factored into project cash flows with the MARR left as a risk-free rate. It is recommended that the engineering economic community recognize the MARR as the weighted average cost of capital, using Tobin's q to determine the cost of equity.

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CHAPTER 1

INTRODUCTION

1.1 History

Since the 1700's, economists have recognized that in order for a firm to create wealth, it must earn more than its cost of debt and equity (Hamilton; Marshall). The engineering economist Wellington in his 1880's book on the economics of railways stressed that an investment must cover its cost of capital. Marshall called this concept Economic Profit and defined it as total net gain less the interest on invested capital at the current rate. Early in the twentieth century, this theory appeared in accounting theory literature by Church in 1917 and Scovell in 1924 (Makelainen, p. 6). In the 1920s, General Motors and DuPont applied this concept (Chen & Dodd) and, in the 1950s, General Motors dubbed it 'residual income' (Biddle et al.). The concept of residual income appeared in management accounting literature in the 1960s (Makelainen, p. 6). In the twentieth century, variations of economic profit have been given many names: abnormal earnings (Feltham & Ohlson), excess earnings (Canning; Preinreich 1936, 1937, 1938), excess income (Kay; Peasnell 1981, 1982), excess realizable profit (Edwards & Bell), and super-profits (Edey).

Despite this history, engineering economy has not fully supported using the cost of capital as the Minimum Acceptable Rate of Return (MARR).

1.2 Definition of the MARR

The Minimum Acceptable Rate of Return, commonly referred to as the MARR or Hurdle Rate, is defined as "...the interest rate chosen such that, under local circumstances and assumptions, a project having positive worth is attractive" (Young, p. 215). While this definition is accurate, it is not intuitive and a brief example is necessary for a better understanding of the MARR.

At Canada Trust a $5000 loan over a one to five year period incurs an interest rate in the range of 10.50%-13.75%. For simplicity, the rate is assumed to be 10.50% over five years. Using this money to invest in a five year Government of Canada Savings Bond, currently yielding 5.159% (The Edmonton Journal, p. G7), results in a loss of $267.05. In fact, any investment with a return less than 10.50% would result in a loss because, in this case, 10.50% is the MARR. Funds should only be borrowed and invested if the rate of return is greater than 10.50%.

In business, the MARR is used in project selection. According to Merrett & Sykes, "The selection and financing of capital projects are indisputably two of the most important and critical business decisions" (p.xi). Specifically, the MARR is used to discount project cash flows. This means that the MARR used has a direct affect on the outcome of project evaluation and comparison. As a result, the rate chosen as the MARR is extremely important (Park & Sharpe-Bette, p.167). However, despite its significance, engineering economy does not have a clear consensus on how this rate should be determined (Eschenbach, p.1).

1.3 Economic Profit in the 1990s

In the most recent incarnation of Economic Profit, it is labeled 'Economic Value Added' (EVA). The name was coined by Stern Stewart & Co., a New York based consulting firm, in 1989 as a measure of corporate financial success (Spero). However, EVA isn't the only new economic profit metric competing for the spotlight. Other consulting groups, such as HOLT Value Associates, the Boston Consulting Group (BCG), Braxton & Associates, and McKinsey, have developed such measures as the Cash Flow Return On Investment (CFROI), the Total Shareholder Return (TSR) and the Total Business Return (TBR) among others. In addition to these new measures are the old tried and true ones such as Return On Investment (ROI), Return On Equity (ROE), Return On Assets (ROA), Return On Cash Employed (ROCE), Return On Net Assets (RONA) and Earnings Per Share (EPS) (*CFO*).

Many articles (McDonald; Stephens & Bartunek; McConville; Kreger) have been written on the merits of new valuation metrics. Case studies (Tully, Sept. 20, 1993; Shiely; Rice; Martin; Klinkerman) show how companies have substantially increased shareholder wealth by switching to EVA. Other articles (Hamel & Ehrbar; Bacidore et al.; Brabazon & Sweeney; Glasser) discuss EVA's limitations. In a 1995 AICPA workshop on the future of financial management, it was predicted that EVA would replace EPS in *The Wall Street Journal*'s regular stock and earnings reports (Zarowin).

Now, more than 300 firms worldwide are using EVA to gauge their financial performance (Ehrbar, Fall 1998). Giants such as Coca-Cola, AT&T, Sprint, Briggs & Stratton and Goldman Sachs claim that EVA is the best indicator of stock performance. The EVA formulation states that in order for a company to create wealth, it must earn more on its investments than the total cost of debt and equity capital. Thus, EVA recognizes the total cost of capital as the minimum acceptable rate of return (MARR).

1.4 Purpose

It is the purpose of this paper to:

i. present the methods commonly used in engineering economy to calculate the MARR
ii. review capital budgeting techniques used in industry, concentrating on the values used for the MARR and how these values are determined
iii. apply the methods for calculating the MARR to demonstrate their incompatibility
iv. describe the method for determining the EVA of a corporation
v. review the literature on EVA
vi. recommend a method to determine the MARR.

CHAPTER 2

CALCULATING THE MARR

This chapter focuses on the methods used in engineering economic literature to calculate the MARR. It begins with the cost of equity method, then the cost of capital method, followed by ranking by internal rate of return and the perfect market model. A full description of each method is included, accompanied by the advantages and disadvantages associated with each.

2.1 Cost of Equity

Equity is the ownership interest of common and preferred stockholders in a corporation. The logic of using the cost of equity as the value for MARR is succinctly explained by Park when he states "...the goal of the firm is to maximize the wealth of the stockholders, [the focus should be] only on the after-tax cash flow to equity, instead of on the flow to all suppliers of capital" (Park et al., p.697). Park advises that this method be used in cases where the exact debt-financing and repayment schedules are known (Park et al., p.700). This is because the cost of debt must be taken into account when determining all the projects' rates of return. Using this method allows the cost of financing to be project dependent, as opposed to a function of the company's strength.

There are three techniques for determining the cost of equity. In the first method, known as the Net Equity Flow method, Park recommends using a weighted average cost of equity as follows. (Park et al., p.692)

$$i_e = a \times k_r + b \times k_e + c \times k_p$$

$$a + b + c = 1$$

$$k_r = \frac{D_0}{P_0} + g$$

$$k_e = \frac{D_0}{P_0(1 - f_c)} + g$$

$$k_p = \frac{D_\bullet}{P_\bullet(1 - f_c)}$$

i_e= MARR = Cost of Equity
a = Fraction of Total Equity Financed from Retained Earnings
b = Fraction of Total Equity Financed from Common Stock
c = Fraction of Equity Financed from Preferred Stock
P_0 = Market Price
D_0 = First Year Dividend
g = Growth Rate of Dividend
f_c = Flotation Cost as a percentage of Common Stock Price (i.e. Cost of issuing new stock)
$D_\bullet$ = Fixed Annual Dividend
$P_\bullet$ = Issuing Price
k_r = Cost of Retained Earnings
k_e = Cost of Common Stock
k_p = Cost of Preferred Stock

This method can easily be converted to determine the marginal cost of equity by replacing the fraction financed from stock with the fraction financed from new stock. Similarly, the fractions financed from Preferred Stock and Retained Earnings are replaced with the fractions financed from new Preferred Stock and Retained Earnings respectively. The advantage of using the marginal cost of equity as the MARR is that it more closely reflects the current sources of the firm's equity financing. The weighted average cost of equity determines the cost of equity based on the firm's overall equity composition, which may not be the same as its most recent financing composition. However, a difficulty that arises with both methods is determining the cost of equity when the firm does not give out dividends, but instead reinvests the funds into Retained Earnings. When this occurs, the weighted and marginal cost of equity both equal zero, even though the firm may be issuing new stock and incurring the associated flotation costs. Additionally, the marginal cost of equity method does not allow for a reduction in stated share value or Retained Earnings. When this occurs, the resulting cost of equity does not reflect the firm's true cost of equity.

The second technique avoids the dividend problem by utilizing Tobin's q ratio, to determine the cost of equity. "The q-ratio is defined as the ratio of the market value of the firm's securities to the replacement cost of its assets" (Weston et al., p.78). According to Jeffrey L. Callen of McMaster University, the developer of this technique, there is a direct relationship between Tobin's q and a firm's cost of equity capital, at least for some valuation models. The method for calculating the cost of equity using Tobin's q is shown below.

$$k = \frac{(1 - c + c \times q \times V)}{(V + (1 - q)D)} \times \frac{E}{V}$$

$$q = \frac{V}{RC}$$

$$c = b + s$$

k = Cost of Equity = MARR
q = Tobin's q
c = Firm's Investment Rate
V = Market Value of the Firm
E = Expected Value of the Firm's Accounting Earnings in the coming year
D = Market Value of the Firm's Debt and/or Preferred Shares
RC=Replacement Cost of Firm's Assets
b = Expected Value of Firm's Retention Rate
s = Expected Stock Financing Rate (expressed as a proportion of earnings)

Callen cites a number of benefits associated with using Tobin's q to determine the cost of equity. The most notable is that, with the exception of next period's earnings, little estimation is involved because the Tobin's q approach is a function of market value data and management's own recent estimate of the current cost of its assets. He also claims that using this method will result in a more meaningful estimate of the cost of equity capital.

The Capital Asset Pricing Model (CAPM) is the third method used to determine the cost of equity for use as the MARR. The CAPM was developed in an attempt to explain the variation in yield rates on various types of investments and also to provide insight into the appropriate rate to use in discounted cash flow analysis (Kellison, p. 350). Thus, the main benefit of this method is that it shows the relationship between project risk and return.

In Park et al., the term 'risk' is defined as an investment project whose cash flow is not known in advance with absolute certainty, but for which an array of alternative outcomes and their probabilities are known. Furthermore, 'project risk' refers to the variability in a project's net present worth (NPW). A greater project risk indicates more variability in the project's NPW (Park et al., p. 749).

Eschenbach states that intuitively, risk is the chance of getting an outcome other than the expected value. Quantitatively, risk is the probability of certain outcomes. Usually, it is measured as the amount of dispersion about the expected value. The most common of the measures is the standard deviation of the outcomes. Alternatives with higher risk are generally accepted only when higher returns are also expected. Risks include a project or investment losing money, bankruptcy, a firing, or death (Eschenbach, pp. 504-510).

When the probabilities of possible outcomes are not known, the problem is said to involve uncertainty, as opposed to risk. However, more general use of the word 'risk' connotes the possibility of the negative outcome associated with an investment. Since the future cannot be known, most business decisions are made with some uncertainty. The uncertainty may create an element of risk in the form of an unfavourable outcome. As such, it is the uncertainty that must be addressed (Whittaker & Sprague, p. 396). Uncertainty may arise from: (Whittaker & Sprague, pp. 397-398)

i. a misinterpretation or misunderstanding of the causative factors that worked in the past
ii. changing external circumstances that invalidate past experience
iii. technological change and obsolescence
iv. excessive optimism
v. flexibility
vi. government action
vii. errors.

The CAPM identifies two types of risk. The first is unsystematic risk, also known as unique risk. This is the risk reflected in price movements that cannot be explained by collective market behaviour. The model assumes that unsystematic risk can be eliminated in a diversified portfolio and is therefore neglected. The second type of risk is systematic or market risk. This type of risk reflects price movements for the market as a whole and cannot be diversified away (Kellison, pp. 350-351). In this section, the terms security and investment will be used interchangeably. First, the equation known as the CAPM is introduced followed by a brief description.

The CAPM equation: (Kellison, p. 351)

$$\overline{R} = R_F + \beta \times \left(\overline{R}_M - R_F\right)$$

$\overline{R}$ = Expected Yield Rate on an Investment
R_F = Risk-Free Rate of Interest
β = Beta, a Measure of the Systematic Risk for the Investment
$\overline{R}_M$ = Yield Rate on the Market Portfolio

Literally, this means "the expected return on an investment depends on the investment's risk relative to the risk of a market portfolio" (Ross et al., p. 310). This equation is based on two assumptions: (Ross et al., p. 312)

i. All individuals have homogeneous expectations

ii. All individuals can borrow and lend at the risk-free rate.

The general practice for determining the risk-free rate of interest is to use the yield to maturity on 10-year government securities (Weston et al., p. 189). From the firm's point of view, the expected return of the investment is the cost of equity capital (Ross et al., p. 344). Of the four variables in the equation, only β is difficult to understand and determine. "Researchers have shown that the best measure of risk of a security in a large portfolio is the beta of the security" (Ross et al., p.304). The large portfolio is actually a market value weighted portfolio of all existing securities, known as the market portfolio. In practice, this is estimated using a broad-based index such as the Toronto Stock Exchange 300 Index (TSE 300).

Generally, the last term of the CAPM, $\left(\overline{R}_m - \overline{R}_f\right)$, is known as the Market Risk Premium and is about 6%, based on historical evidence (Stewart, p. 438). "Is there any fundamental reason why market risk premium should be 6%? Not that I can figure. The question is a little like asking why did God make pi the number 3.14159... Don't ask. Just memorize it, and then head out to recess" (Stewart, p. 438).

The β for security 'i' is found using, (Ross et al., p. 304)

$$\beta_i = \frac{Cov(R_i, R_M)}{\sigma^2(R_M)}$$

$Cov(R_i, R_M)$ = Covariance Between the Actual Values of Security i (R_i) and the Market Portfolio (R_M)

$$= Expected\ Value\ of\ \left(R_i \times \overline{R}_i\right) \times \left(R_m \times \overline{R}_m\right)$$

$\sigma^2(R_M)$ = Variance of the Market

From these equations, it is evident that beta is an indicator of the sensitivity of change in the return of an individual security to the change in the market portfolio's return. Thus,

$$\sum_{i=1}^{N} X_i \beta_i = 1$$

where X_i is the proportion of each security's market value to that of the market portfolio and N is the number of securities in the market portfolio (Ross et al., p. 304).

Graphically, beta is perhaps easier to understand. Plotting the expected value of an individual security against that of the market results in a best–fit line known as the characteristic line, as shown in Figure 2.1. The slope of this line is the responsiveness coefficient or β.

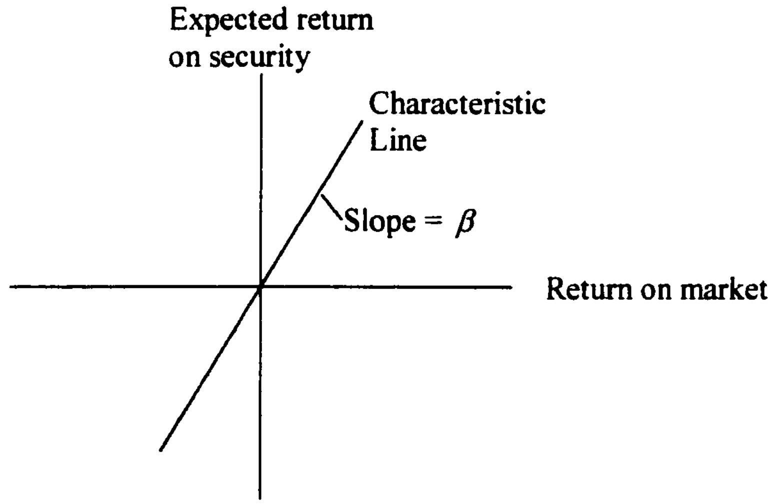

Figure 2.1: Characteristic Line (Ross et al., p. 306)

Beta is also called the responsiveness coefficient or magnification factor because it shows how responsive the security is to changes in the market. For instance, a beta of 1.5 indicates that any change in the market will be magnified 1.5 times in the change of the return for that security. In industry, beta is usually determined using regression analysis based on historical data (Ross et al., p. 306). For project selection, beta is obtained by examining a portfolio of assets or projects that have a similar risk structure to the project (Frimpong, p. 128).

Plotting the expected return of any security against its beta results in the following graph.

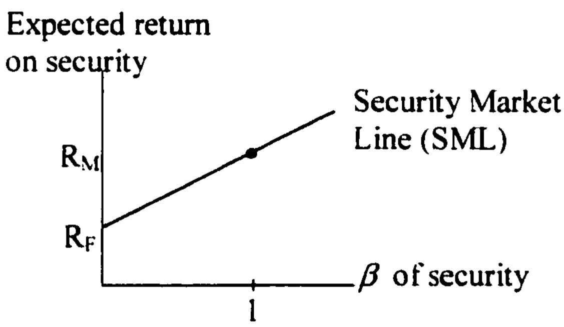

Figure 2.2: Security Market Line (Ross et al., p. 309)

There are 5 points worth noting on this graph:

i. When $\beta = 0$, the expected value is the risk-free rate.

ii. When $\beta = 1$, the expected value is the market value.

iii. Points lying above the SML are underpriced and their prices would rise until they fell on the SML. Likewise, points lying below the SML are overpriced and their prices would fall until they were also on the SML. Thus, linearity is achieved.

iv. The slope of the SML is ($\overline{R}_M - R_F$) since $\beta = 1$ at $\overline{R}_M$ and its intercept is R_F. Thus, the equation of the SML is the CAPM equation,

$$\overline{R} = R_F \times \beta \times \left(\overline{R}_M - R_F\right).$$

v. The SML holds for portfolios as well (the β is determined as a weighted average of the βs in the portfolio).

The CAPM has been subjected to extensive empirical testing and has performed reasonably well. In addition, it is widely used and has proven to be quite useful in practical applications (Kellison, p.352). However, it does suffer from some imperfections. According to Frimpong, the CAPM fails to capture the real discount rate for a specific project since no two projects are similar. Also, the CAPM fails to recognize the use of new information over time to resolve uncertainties (Frimpong, p.7). Furthermore, it has been shown that other factors in addition to systematic risk have an influence on actual realized yield rates, seasonal factors and size factors for instance. Also, the systematic risk for particular securities has been found to vary over time (Kellison, p. 352).

2.2 Cost of Capital

The reasoning behind using the cost of capital as the MARR is as follows. In order to be acceptable, the project must have a higher rate of return than the cost of raising capital. The cost of capital is the minimum rate of return on capital required to compensate debt and equity investors for bearing risk (Dierks & Patel).

There are two popular methods for determining the cost of capital. Both of these methods involve calculating the cost of equity. This can be determined using any of the methods described in the previous section. The first method for calculating the cost of capital is the Weighted Average Cost of Capital (WACC). Park recommends using this method when debt-financing is unknown and not identified with specific investments (Park et al., p.700). With this method, there are a number of assumptions (Park & Sharpe-Bette, p.181). These are:

i. the corporation is operating in a stable situation
ii. the ratio of debt financing to equity financing remains constant
iii. the cost of individual financing sources remain the same
iv. the ratio of dividend growth remains constant
v. the marginal tax rate remains the same.

The calculation of the cost of capital is shown below (Park et al., p.696).

$$MARR = WACC$$

$$WACC = \frac{i_d \times D}{V} + \frac{i_e \times E}{V}$$

$$V = D + E$$

i_e = Average Equity Interest Rate per Period Considering all Equity Sources
i_d = After-Tax Average Borrowing Interest Rate per Period Considering all Debt Sources
D = Total Debt Capital in Dollars
E = Total Equity in Dollars

It is interesting to note that the WACC and Net Equity Flow methods for determining the MARR usually lead to the same accept/reject decision for independent projects and rank projects identically for mutually exclusive alternatives. However, special financing arrangements may change the attractiveness of a project by manipulating tax shields and the timing of financing inflows and payments (Park et al., p.699).

The second cost of capital method is a variation of the first. This method determines the Marginal Cost of Capital (MCC) and is used to avoid including sources of financing that have rates very different from current ones. Sometimes the MCC is defined as the highest rate of current and additional financing (Eschenbach, Unpublished).

The MCC method for determining the MARR is as follows (Park et al., p.696).

$$\text{MARR} = \text{MCC}$$
$$MCC = \frac{i_d \times D}{V} + \frac{i_e \times E}{V}$$
$$V = D + E$$

i_d = After-Tax Average Borrowing Rate per Period on New Debt
i_e = Average Equity Interest Rate per Period Considering New Equity
D = Total of New Debt Capital ($)
E = Total of New Equity Capital ($)

Despite the logic behind the Marginal Cost of Capital method, Eschenbach mentions that properly applying the principle of marginality proves to be challenging (Eschenbach. Unpublished).

In addition to this difficulty, the Marginal Cost of Capital method also suffers from problems common to it and the Weighted Average Cost of Capital method. In particular. Eschenbach in his unpublished paper, noted three challenges in determining the cost of capital:

i. ensuring inflation is accounted for in project costs and benefits as it is in current market rates for loans, bonds or stock returns
ii. choosing which method to use in determining the cost of capital
iii. many decision-makers prefer less complex methods, such as the benefit/cost ratio or payback period, to determine the MARR.

Park & Sharpe-Bette present an additional three difficulties with the cost of capital method. These are: (pp. 193-194)

i. predicting future costs of capital
ii. determining whether to base the cost of debt and cost of equity functions on the current debt ratio or the optimal debt ratio, if the two are not the same
iii. accounting for changes in the risk class of a firm.

2.3 Ranking on Internal Rate of Return (IRR)

"If there is a limit on the total funds available for investment in capital assets from all sources including borrowing, and if there are many proposals for investments in assets that seem likely to yield high returns, [ranking on IRR] is applicable" (Grant, E., p. 335). This method is used when there is insufficient funds to pursue all projects, a common situation known as capital rationing. In this method, the MARR is the value of the best-rejected (or worst-accepted) project when projects are ranked according to their rate of return. This value is known as the opportunity cost. However, if the rate at which the firm can lend funds is higher than this, then the MARR is equal to this lending rate. If the opportunity cost is less than the cost of borrowing funds, then the MARR is equal to the borrowing rate (Park et al., p. 700-701).

However, Grant argues that the MARR should always be greater than the borrowing rate. If the return on the project is the same as the borrowing rate, there is no incentive to pursue the project and it will not be undertaken. Hence, the MARR must be greater than the borrowing rate. Grant also claims that the amount of funds that can be borrowed is dependent on the amount of equity capital. For this reason, the cost of capital to the company should be a weighted average of the cost of debt and the cost of equity. This weighted average is almost always much higher than the cost of borrowed funds (Grant, E., p. 335).

Eschenbach, in his unpublished paper, noted a number of difficulties associated with the ranking on IRR method. These include:

i. projects may not be simultaneously evaluated
ii. projects are usually indivisible wholes and financing may also include indivisibilities (further analysis shows that this is rarely a problem, (Smith, pp. 450-457))
iii. some projects do not have or have many IRRs due to multiple sign changes
iv. since quality of projects is shifting over time, the reinvestment rate implied by the opportunity cost of capital needs to be shifting as well (the reinvestment rate assumption is a factor in IRR, Net Present Value and Equivalent Annual Cost despite common belief (Lohmann)).

A practical difficulty with the Ranking on IRR method is that without inside knowledge of the firm's potential investments and financing sources, it is impossible to calculate.

2.4 Perfect Market Model

Similar to the Ranking on IRR Method, this method requires complete information on the firm's potential projects and financing sources. An investment opportunity schedule is created by ranking all projects from highest IRR to the lowest and then plotting them against the cumulative investment. Then, a financing curve is plotted on the same graph. This is done by ranking the financing sources from lowest cost to highest (expressed as a percentage) and then plotting these against cumulative investment (in this case funds generated). The financing curve will be upward sloping, and thus intersect with the investment opportunity schedule, because the company will seek out the lowest cost sources of financing first. In addition, as the company increases its debt level, securing more debt will be more expensive since it becomes riskier for the lenders. The interest rate at which the two curves intersect is the MARR and the cumulative investment is the budget (Eschenbach, p.229). According to Eschenbach, "Economic and financial theory (and simple logic) imply that a firm optimizes its performance by operating at the intersection of the two curves" (Eschenbach, p.230).

This model is based on four assumptions: (Eschenbach, pp. 229-230)

i. investment opportunities and financing sources are available in small, divisible pieces

ii. the investment opportunities are independent of each other

iii. the firm has some profitable investments (at least some have IRRs that are greater than the firm's financing rate)

iv. the firm can both invest and borrow at the MARR with no transaction costs.

However, this last assumption is questionable since a firm must typically borrow money at a higher rate than it could loan money and there are significant transaction costs involved in terms of fees, employee time, and managerial time (Eschenbach, p. 230).

Eschenbach also notes that in reality, firms should not operate at the Perfect Market MARR because this method doesn't:

i. adjust for the firm's larger risk as compared to the bank's
ii. allow for a margin to protect against overly optimistic estimates
iii. concentrate the firms' attention on the best projects
iv. allow more flexibility to pursue new projects
v. account for investment-dependent financing opportunities.

CHAPTER 3

THE MARR IN INDUSTRY

While there is a lack of empirical evidence showing how firms arrive at a MARR for use in evaluating investment projects (Lefley), there are a number of papers that describe capital budgeting techniques used in practice (Baker et al.; Blume et al., 1980, 1984; Pinegar & Wilbricht; Pohlman et al.; Rockley; Schall et al.). Many papers (Pike; Blazouske et al.; Klammer & Walker; Klammer) discuss industry's initial tendency to rely on management's judgement in capital financing decisions and its slow adoption of more sophisticated techniques.

In Canada, empirical studies on capital budgeting are scarce (Blazouske et al.). One of the earlier papers on capital budgeting in Canada showed that the percentage of firms using a Discounted Cash Flow method for evaluating projects increased from 35% in 1962 to 79% in 1972 (Hoskins & Dunn). Similarly, Smee found that 84% of large Canadian firms used Discounted Cash Flow methods in 1970 compared to the 24% reported by Helliwell in 1963, using an equivalent sample.

More recently, a study of 208 Canadian firms found that 40% used Internal Rate of Return as a primary criterion in 1985, followed by the Payback method (25%), the Net Present Value method (22%) and the Average Rate of Return (11%). Of these, only the Internal Rate of Return and the Net Present Value method are considered sophisticated methods whereas the others are known as rules of thumb (Blazouske et al.). Typically these papers do not describe how the MARR is calculated, despite its use in Discounted Cash Flow methods, the Internal Rate of Return and the Net Present Value. However, Jog & Srivastava provide an exception to the other papers by describing how Canadian firms calculate the rate used to discount project cash flows, a synonym for the MARR. They found that slightly more than 50% use the WACC as the MARR and about 25% use the cost of debt. The use of cost of debt as a discount rate is surprising, since this means that all projects with a rate of return greater than the cost of debt would be accepted, even though this is generally less than the cost of capital. Accepting projects with rates of return between the cost of debt and the cost of capital would not be profitable for the shareholders and since the purpose of the firm is to earn a profit for its owners, the shareholders, using the cost of debt as the MARR is an unacceptable practice.

Jog & Srivastava also found that the most popular method for determining the cost of equity was judgemental, with 26.3% of firms using it. Accounting Return on Equity came in second with 21.8%, followed by the CAPM with 13.5% and the Net Equity Flow method and Earnings to Current Market Price ratio, both at 11.3%. Historical common stock return was used by 9% of firms. These results are similar to those found by Blume et al. in 1980. Consequently, Jog & Srivastava conclude their paper with, "the substantial research on the CAPM or the [net equity flow method], and their universal use in the MBA programs, does not seem to have had much of an impact on the sample firms" and that "it appears that [Canada is] where the United States was about a decade back in terms of the use of theoretically sound techniques for estimating the cost of equity capital" (Jog & Srivastava).

In the U.S., Poterba and Summers surveyed the CEO's at Fortune 1000 firms about hurdle rates. Their findings show that the average hurdle rate used by the responding firms is 12.2%, considerably higher than equity holder's average return rates and return on debt over the past 50 years. This value of 12.2% is close to the MARRs for The Thomson Corporation as calculated in Chapter 4. Using the CAPM, the cost of equity and capital for The Thomson Corporation was 13.54% and 10.40% respectively, suggesting that firms are taking risk into account and adjusting their hurdle rate according to the CAPM. However, Poterba and Summers also found that the betas of the firms did not correlate with their hurdle rates, as would be the case if the firms were using the CAPM to account for risk. Kennedy & Sugden suggest this may be the result of firms arbitrarily raising hurdle rates to adjust for risk, a popular method used by 36% of American and 35% of U.K. firms.

A 1985 survey of 208 Canadian firms found that 55% dealt with risk subjectively or did not adjust for risk at all, although 61% of the firms used some form of management science technique, such as computer simulation or sensitivity analysis (Blazouske et al.). In their 1994 survey of Canadian firms, Jog & Srivastava found that the majority, 58.7%, used sensitivity analysis to deal with risk and 28.6% used no formal risk analysis technique at all.

While these surveys indicate that firms are starting to use more advanced methods for determining hurdle rates and accounting for risk, Hayes & Garvin concluded that many hurdle rates contain unreasonably high risk components. A survey of 612 American companies by the Institute of Management Accountants found that over 34% used hurdle rates of 12% or more. Scapens and Sale found that discount rates in the U.K. were as high as 32%, averaging 18.5%, and in the U.S. as high as 40%, averaging 17.1%. Furthermore, in a survey of U.S. firms, Fotsch discovered the average hurdle rate to be 25%. These rates are substantially higher than the real rate of the cost of capital, which should be in the region of 8% according to Kaplan and around 7% according to Samuels & Wilkes.

Allen maintains that high hurdle rates lead to short-termism, stating that "the higher the hurdle rate the quicker the payback has to be to make financial sense". This is because the risk premium, added to the cost of capital, is compounded over time when discounting project cash flows, thereby reducing the value of future cash flows and resulting in a bias against long-term investment (Reimann).

One explanation for the high hurdle rates is that companies set the hurdle rate sufficiently high to allow as many project proposals through as the company can cope with (Allen). Another, more popular explanation, is that the accountants raise the hurdle rate in an attempt to compensate for the overly optimistic project cash flow estimates submitted by managers (Primrose; Allen; Poterba & Summers).

Recognizing that uncertainty must be taken into consideration when evaluating potential projects, many papers (Coulthurst; Bierman & Haas; Reimann; Lefley) have suggested that the element of risk be incorporated into the project's cash flows instead of the firm's hurdle rate. This would imply that the CAPM should not be used to evaluate the cost of equity, but instead the Net Equity Flow method or Tobin's q method.

CHAPTER 4

COMPARING THE METHODS

4.1 Comparing the Methods in Theory

According to Eschenbach, the methods for calculating the MARR described in Chapter 3 are not compatible, meaning that they do not always yield the same results (Eschenbach, Unpublished). This is shown in Figure 4.1:

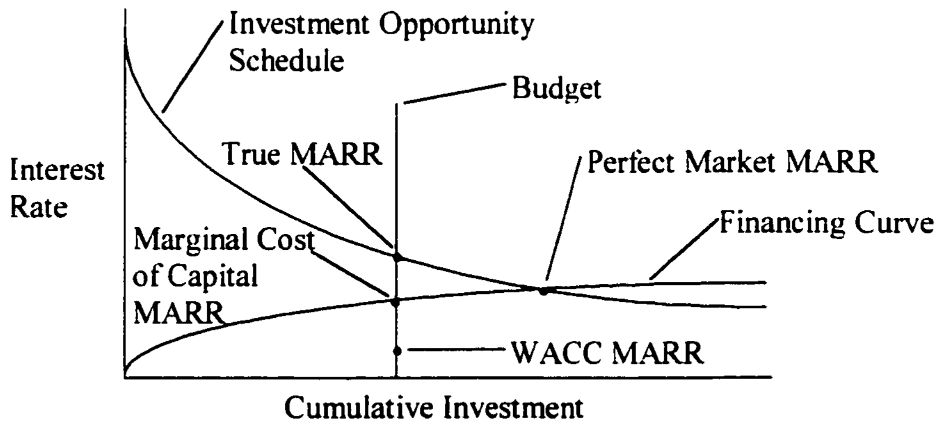

Figure 4.1: Four Possible MARRs (Eschenbach, p. 232)

Figure 4.1 shows that the true MARR, the MARR imposed by the capital budget, is the greatest of the MARRs followed by the Perfect Market MARR, the Marginal Cost of Capital MARR and the Weighted Average Cost of Capital MARR. Figure 4.1 shows that the methods for calculating the MARR are incompatible in theory; in the next section, an example will be used to show Eschenbach's incompatibility theory is valid in reality.

4.2 A Practical Example: The Thomson Corporation

The Thomson Corporation is a leading information and publishing business with interests in specialized information and publishing worldwide and in newspaper publishing in North America. The Thomson Corporation operates mainly in the U.S., Canada, and the United Kingdom and has annual revenues of over US$6 Billion.

The MARRs for The Thomson Corporation were calculated using all of the previously described techniques for determining the cost of equity and cost of capital. With few exceptions, the required information for these calculations was gleaned from The Thomson Corporation's 1997 Annual Report. Ranking on IRR and the Perfect Market Model were not included in this example since information on the potential projects and financing sources of The Thomson Corporation are not publicly available. The results of these calculations, described in detail in Appendix O, are shown in Table 4.1 and Figure 4.2.

Table 4.1: The 1997 MARRs for The Thomson Corporation	
Method	**MARR**
Net Equity Flow	7.16%
Marginal Net Equity Flow	7.38%
CAPM	12.01%
Tobin's q	3.97%
WACC & Net Equity Flow	6.60%
WACC & Tobin's q	4.79%
WACC & CAPM	9.35%
MCC & Marginal Net Equity Flow	6.28%
MCC & Tobin's q	5.35%
MCC & CAPM	7.54%

Table 4.1: The 1997 MARRs for The Thomson Corporation

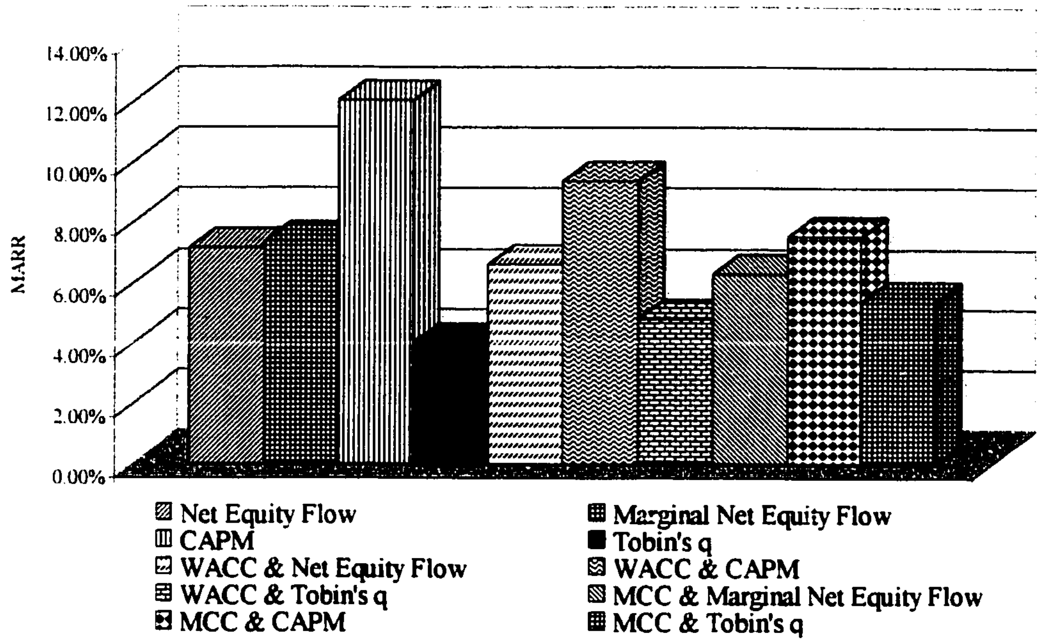

Figure 4.2: The 1997 MARRs for The Thomson Corporation

Figure 4.2 shows that for The Thomson Corporation, the MARRs produced varied widely, ranging from 3.97% to 12.01%. Using the CAPM resulted in the highest MARRs while Tobin's q gave the lowest MARRs. Not surprisingly, the CAPM gave the highest cost of equity, since it is the only method to take risk into account. However, it is somewhat surprising the cost of equity calculated using Tobin's q is so much lower than the other methods. This is attributed to the calculation of the replacement cost of the firm's assets. For this calculation, the market values of the firm's assets were not available and thus the book values were substituted. In order for the Tobin's q method to produce a cost of equity more in line with the others, the market values of The Thomson Corporation's assets must be less than the book values for those same assets.

Also notable for The Thomson Corporation in 1997 is that the Marginal Cost of Capital (MCC) is within 0.25% of the Weighted Average Cost of Capital (WACC), contradicting Figure 4.1 which shows the WACC as much higher than the MCC. This discrepancy is a result of The Thomson Corporation not issuing any new Preferred Shares in 1997. Preferred Shares are the most costly financing source and not issuing them resulted in lowering the marginal cost of equity and consequently a lower marginal cost of capital.

4.3 Analysis of Practical Examples

In addition to The Thomson Corporation, the 1997 MARRs for ten other companies were calculated from their published data. There was no basis for the selection of these companies other than the availability of their annual reports. The companies selected are shown below along with the Appendix that contains their calculations.

i. Air Canada (AC), Appendix B

ii. BCE Inc. (BCE), Appendix C

iii. IBM Corporation (IBM), Appendix D

iv. Imasco (IM), Appendix E

v. Imperial Oil Limited (IO), Appendix F

vi. McDonald's Corporation (McD), Appendix I

vii. The Molson Companies (MO), Appendix K

viii. Newbridge Networks Corporation (NN), Appendix L

ix. Petro Canada (PC), Appendix M

x. Suncor Energy (SE), Appendix N

xi. The Thomson Corporation (TC), Appendix O.

Similar to The Thomson Corporation, these results indicate that the methods for calculating the MARR are incompatible. Significantly, this conclusion was reached based on the results from a sample of only eleven companies. Even though only a small convenience sample was tested, each company demonstrated the inconsistent results produced from using different methods of calculating the MARR. A larger sample group would reveal the same conclusion.

Figure 4.3 shows the range between the highest and lowest MARR for each company.

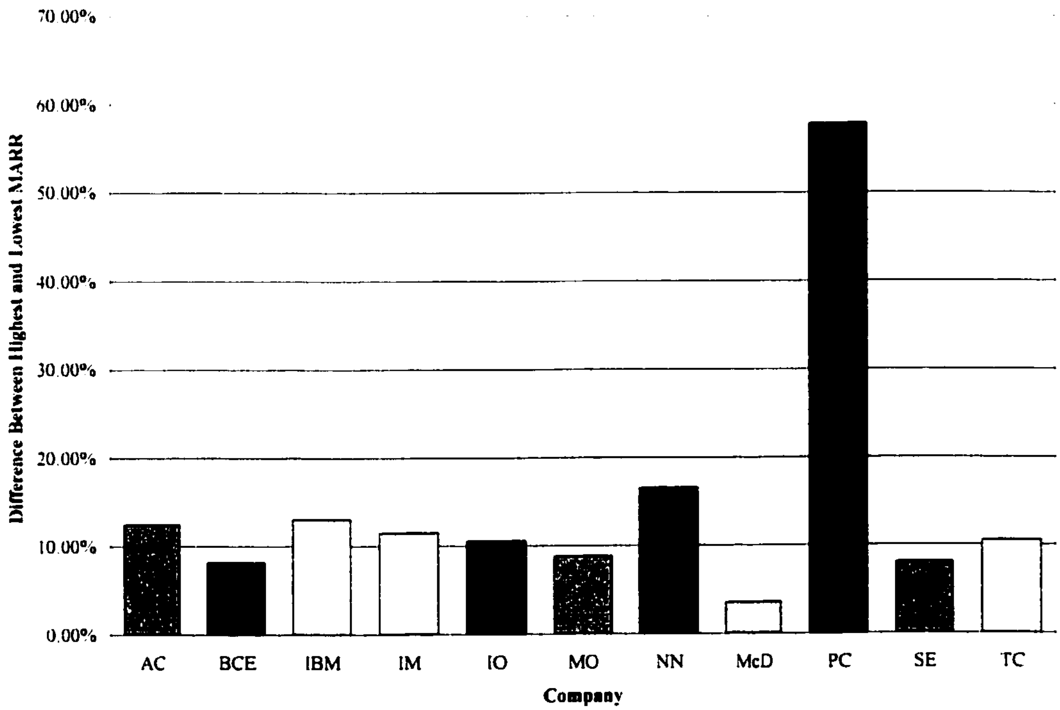

Figure 4.3: Range Between the Highest and Lowest MARR for Each Company

McDonald's Corporation has the smallest range between its MARRs, 3.51%, while Petro Canada's MARRs differ by nearly 60%. The average range between the highest and lowest MARR for each company is 14.62%. This value is nearly 9% greater than the historical risk premium of 6%, therefore it is unlikely that the reason for the difference is simply that the CAPM takes risk into account while the other methods do not.

Since only one method was used to determine the cost of debt, the differences in the MARRs result from the methods used to calculate the cost of equity. Consequently, this analysis will focus on the cost of equity results. Figure 4.4 shows the 1997 cost of equity for each company using the Net Equity Flow method, the Marginal Net Equity Flow method, the CAPM and Tobin's q.

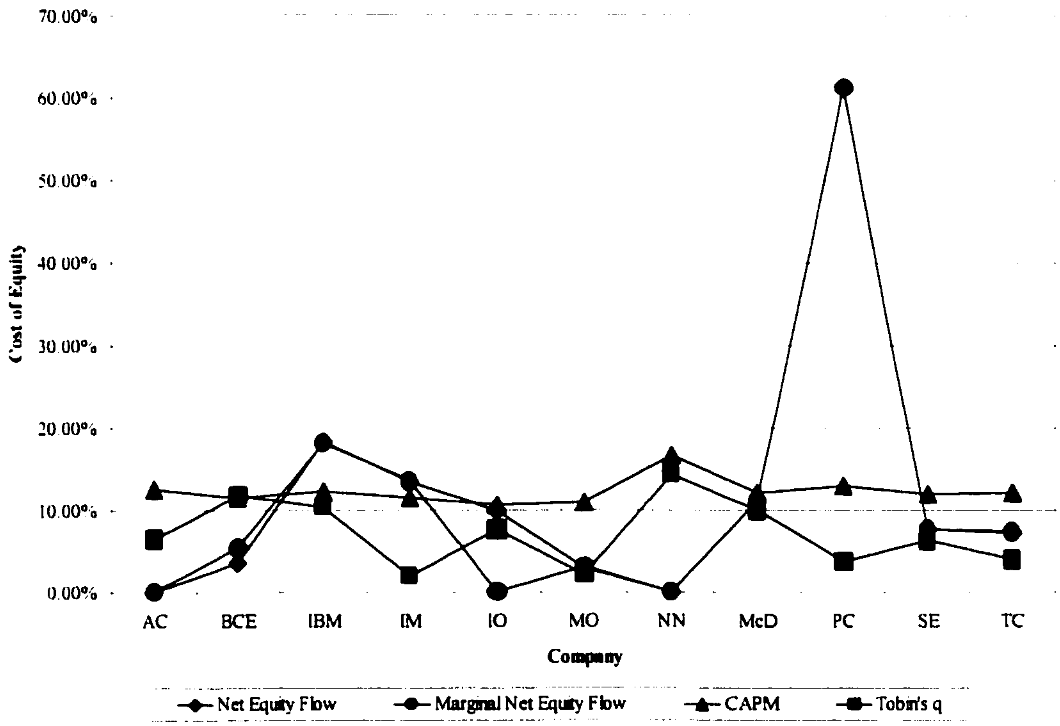

Figure 4.4: The Four Different Costs of Equity for Each Company

Figure 4.4 shows the remarkable differences between the costs of equity calculated for each company. The Net Equity Flow methods yield similar results, but differ greatly from the costs of equity determined using the CAPM and Tobin's q. Figure 4.5 shows how often each method produces the highest, second highest, third highest and lowest MARR for each company.

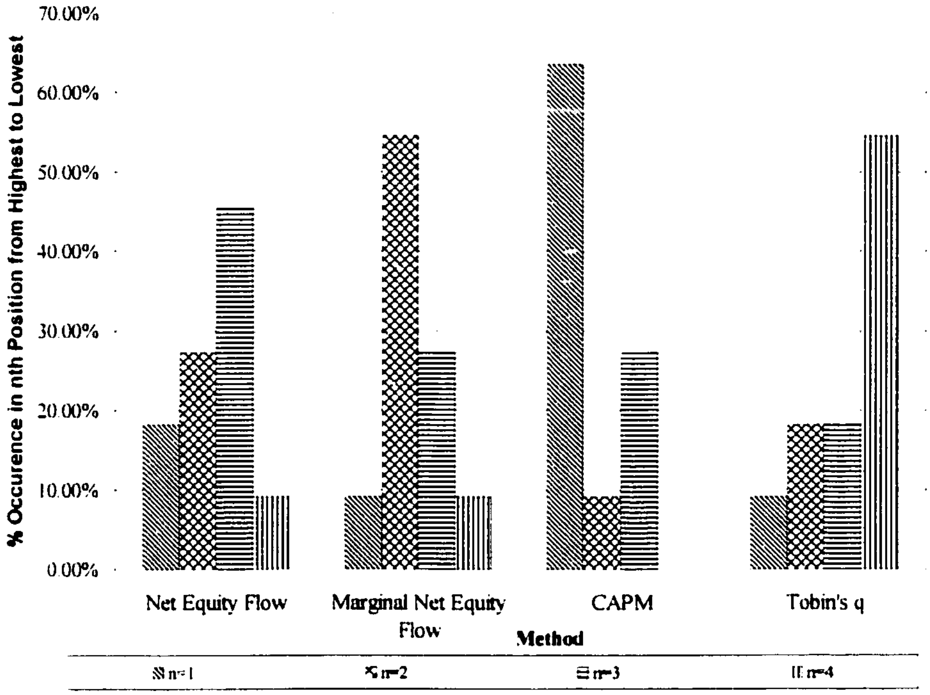

Figure 4.5: Ranking the Cost of Equity Methods by Occurrence

Figure 4.5 shows that the CAPM most often yields the highest cost of equity, followed by the Marginal Net Equity Flow, Net Equity Flow and Tobin's q. The Net Equity Flow methods rely heavily on the increase in common stock dividends from one year to the next. Anything more than a small increase results in a vast overestimation of the cost of equity. However, these methods also suffer when there is no dividend given or expected. In these cases, the Net Equity Flow methods estimate the cost of equity to be 0% as they did with the Newbridge Networks Corporation. In light of these difficulties and the variability of the Net Equity Flow methods as evidenced in Figures

4.4 and 4.5, it can be concluded that they are not suitable methods for determining the cost of equity in practice.

Tobin's q and the CAPM produce results that are much more promising. Tobin's q gives a cost of equity almost always less than that found using the CAPM, indicating that the difference between the two may be because the CAPM adjusts the cost of equity to reflect risk whereas Tobin's q does not. The average range between the cost of equity calculated using Tobin's q and the CAPM is 5.09%, less than 1.0% below the historical risk premium.

4.4 McDonald's 1995-1998

The stability of the CAPM and Tobin's q is vividly demonstrated on Figure 4.6 which shows the costs of equity for the McDonald's Corporation from 1995 to 1998. Individual results for McDonald's for these years are shown in Appendices G through J.

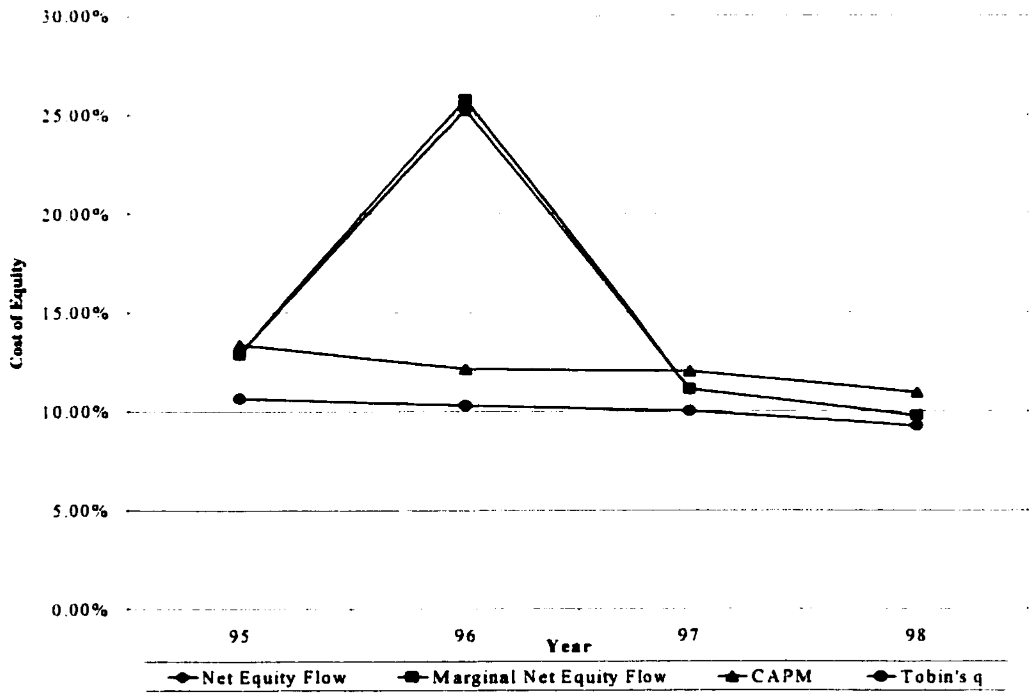

Figure 4.6: The Costs of Equity for the McDonald's Corporation

According to Standard & Poor's, McDonald's bonds were rated an 'A' over this period and it was considered a stable company. Given this rating, the cost of equity for McDonald's should also be stable. However, the wide range of values produced by the Net Equity Flow methods provide further evidence that these methods are not reliable indicators of a firm's true cost of equity.

Tobin's q and the CAPM, on the contrary, are very stable. The difference between these two values is never less than 1.70% and never greater than 2.73%. Both methods appear to be calculating a stable cost of equity for McDonald's.

While both methods are straightforward, the CAPM requires only 2 input variables versus a minimum of 12 for Tobin's q. However, with the exception of share price, Tobin's q can be determined using only information from a company's annual reports whereas the CAPM requires an estimation of the firm's beta.

CHAPTER 5

EVA

EVA uses the weighted average cost of capital, calculated using the CAPM, as the MARR. The broad appeal and recognition of EVA suggest that this method for determining the cost of capital should be adopted by the engineering economic community as a suitable method for the MARR.

5.1 The EVA Formulation

EVA is a relatively simple concept based on Marshall's general idea of Economic Profit (EP). The main benefit of this concept is that it reminds managers that a profit is not made until an economic return is earned on the capital used in pursuit of projects (Rutledge). EVA is a specific method for calculating the EP and includes capital charges and many other account adjustments. EVA is defined as a firm's (yearly) net operating profit after taxes (NOPAT) less the dollar cost of capital (Grant, J.).

Mathematically, (Stewart, p.137)

$$\text{EVA}=\text{NOPAT}-\$\text{Cost of Capital}$$

where

$$\$\text{Cost of Capital} = \%\ \text{Cost of Capital} \times \text{Invested Capital}$$

Defining %Rate of Return as NOPAT ÷ Invested Capital then,

$$\text{EVA} = (\%\text{Rate of Return}-\%\text{Cost of Capital}) \times \text{Invested Capital}$$

For publicly traded companies, Stern Stewart advocates using the financing approach to determine the cost of capital. In this approach, the Weighted Average Cost of Capital is computed using,

$$MARR = WACC$$

$$WACC = \frac{i_d \times D}{V} + \frac{i_e \times E}{V}$$

$$V = D + E$$

i_e = Average Equity Interest Rate per Period Considering all Equity Sources
i_d = After-Tax Average Borrowing Interest Rate per Period Considering all Debt Sources
D = Total Debt Capital in Dollars
E = Total Equity in Dollars

5.2 EVA's Cost of Equity and Cost of Debt

The cost of equity is calculated using the Capital Asset Pricing Model (CAPM) as described in Section 2.1. The main equation is shown below (Kellison, p. 351).

$$\overline{R} = R_F + \beta \times \left(\overline{R}_M - R_F\right)$$

$\overline{R}$ = Expected Yield Rate on an Investment
R_F = Risk-Free Rate of Interest
β = Beta, a Measure of the Systematic Risk for the Investment
$\overline{R}_M$ = Yield Rate on the Market Portfolio

The cost of debt when publicly traded is simply the yield. However, for companies that do not have publicly traded debt, Stern Stewart's Bond Rating Scoring System or the company's actual bond ratings must be used to rate the company's bonds. Bonds are rated by Moody's, Standard & Poor's, Duff & Phelps, and Fitch. The ratings produced are similar enough that the nomenclature used by Standard & Poor's can be used to describe bond ratings in general (Stewart, p. 392). Bond ratings range from AAA, the least risky, to CCC, the most risky. In between, are bond ratings of AA, A, BBB, BB, and B, in order of least to most risky. The risk involved with bonds is the risk of default and this is how the bond rating agencies rate the bonds.

The Bond Rating System developed by Stern Stewart rates bonds based on the:

i. Company Size as measured by total assets
ii. Risk-adjusted rate of return calculated by dividing the company's total profits after taxes by the total capital employed
iii. Ratio of long-term debt to total capital as measured by the 3-year average ratio of long-term debt to total capital, including the present value of noncapitalized operating leases (over the next 5 years).
iv. Ratio of adjusted total liabilities to net worth using current year's data
v. Ratio of investments and advances to unconsolidated subsidiaries to total capital for the current year.

These five factors result in bond ratings that are the same as the actual ratings about 70% of the time. When they do differ, it is rarely by more than one grade, and "there is reason to believe that the predicted ratings are often more accurate than the actual ones" (Stewart, p. 399).

Once the values for these factors have been calculated, they are each multiplied by a coefficient. The method for determining these coefficients is considered proprietary information and is therefore unknown. However, the values of the coefficients are:

Factor	Coefficient
i. Log of Total Assets	0.5320
ii. Risk-Adjusted Rate of Return	0.0958
iii. Long-Term Debt/Net Worth	-0.0458
iv. Adjusted Total Liabilities/Net Worth	-0.0939
v. Investments & Advances/Total Capital	-0.0077

Table 5.1: Coefficients for Stern Stewart & Co.'s Bond Rating Scoring System (Stewart, p. 401)

The products of the factors and their coefficients are added and this score is compared to the Bond Rating Score Scale to determine the bond rating. The Bond Rating Score Scale is as follows:

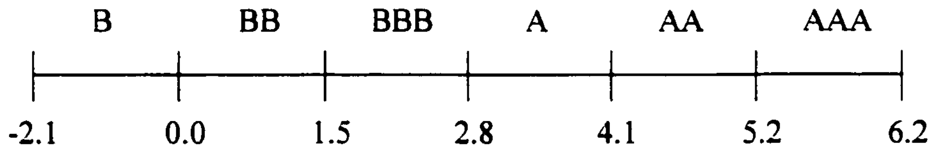

Figure 5.1: Bond Rating Score Scale (Stewart, p. 401)

Scores falling between –2.1 and 0.0 result in a B rating for the company's debt obligations. Scores above 0.0 but less than 1.5 result in a BB rating. The other ratings are determined similarly.

The following example illustrates how General Electric's debt is rated using Stern Stewart's Bond Rating Scoring System.

Factor	**Coefficient**
Assets	\$41,924,000000
i. Log of Total Assets	10.64
Average Total Return	12.3%
Standard Deviation of Total Return	1.0%
ii. Risk-Adjusted Rate of Return	11.3%
iii. Long-Term Debt/Net Worth	17.8%
iv. Adjusted Total Liabilities/Net Worth	1.09
v. Investments & Advances/Total Capital	15.8%

Table 5.2: Bond Rating Factor Values for General Electric in 1988 (Stewart, p. 402)

Multiplying these values by their coefficients,

Factor	**Value (V)**	**Coefficient (c)**	**V × c**
i.	10.64	0.5320	5.66048
ii.	11.3%	0.0958	1.08254
iii.	17.8%	-0.0458	-0.81524
iv.	1.09	-0.0939	-0.102351
v.	15.8%	-0.0077	-0.12166
Total			**5.7037**

Table 5.3: Computing General Electric's 1988 Bond Rating

Plotting this value on the Bond Rating Score Scale, it is evident that in 1988 General Electric's debt was a solid AAA. This corresponds to Standard & Poor's rating of General Electric's debt for the same year.

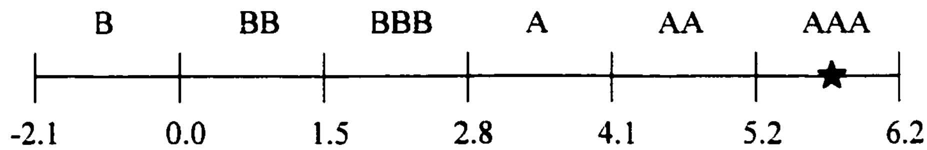

Figure 5.2: Rating General Electric's Debt in 1988

Once the rating for the company's debt has been determined, the cost of its debt can be estimated using historical averages. For instance, Moody's Bond Record shows the following Bond and Borrowing Rates for 1988.

Bond Rating	AAA	AA	A	BBB
Cost of Debt	9.36%	9.62%	9.99%	10.66%

Table 5.4: 1988 Average Bond Ratings and Borrowing Rates (Stewart, p. 395)

Since General Electric's Bonds were rated as AAA for 1988, a good estimate of its cost of debt is 9.36%.

5.3 A Practical Example: The Thomson Corporation

To demonstrate how a firm's EVA is calculated, the EVA for The Thomson Corporation will be determined using information from its 1997 Consolidated Financial Statements unless otherwise noted.

Using the CAPM, the cost of equity, $\overline{R}$, for The Thomson Corporation is computed.

R_F = 6.61% (McDonald's Corporation)
β = 0.9 (Value Line)
$\overline{R}_M - R_F$ = 6% (Stewart, p. 438)

Thus,

$$\overline{R} = 0.0661 + 0.9 \times (0.06)$$
$$\overline{R} = 0.1201 = 12.01\%$$

Standard & Poor's Bond Rating for The Thomson Corporation in 1997 was 'A'. Average 'A' rated bond yields for December 1997 was 6.92%, also according to Standard & Poor's. Taking into account the tax benefits of debt as opposed to equity, where The Thomson Corporation's effective tax rate is 15.20%, the total cost of debt is 5.87%.

With $5,252,000,000 in equity and $4,527,000,000 in debt, the Weighted Average Cost of Capital for The Thomson Corporation is 9.17%.

From the financial statements, the NOPAT is $579,000,000 and the total capital is the sum of the debt and equity capital, $9,779,000,000. EVA can now be computed,

EVA = NOPAT - %Cost of Capital × Capital

EVA = $579,000,000 – 9.17% × $9,779,000,000

EVA = -$317,734,300

According to Stern Stewart, the negative EVA indicates that The Thomson Corporation did not earn its cost of capital and therefore is not adding value, but losing it.

5.4 Market Value Added (MVA)

MVA is the value the market places on the future stream of annual EVAs (Tully, Nov. 28, 1994). The economic foundation for this interpretation is found in the neoclassical wealth model developed by Irving Fisher during the early 1930s (Grant 1997, p. 13). Mathematically, it is expressed as

MVA = Company's Total Market Value - Total Capital Invested

where,

Company's Total Market Value = number of shares × share price

Total Capital Invested = number of shares × economic book value per share

The Thomson Corporation has 610,224,658 shares outstanding, with a share price of $39.40 (The Financial Post, p. 25). Thus, its total market value is $24,042,851,525. The total capital invested is $9,779,000,000. Using these values, the 1997 MVA for The Thomson Corporation is,

MVA = $24,042,851,530 - $9,779,000,000

MVA = $14,263,851,530

Since incorporation, The Thomson Corporation has earned its shareholders $14,263,851,530 on the capital they invested.

The relationship between MVA and EVA can also be shown using a constant growth model. This is expressed as: (Grant, 1997, p. 4)

$$MVA = \frac{EVA(1)}{COC - g}$$

where.

MVA	= Market Value Added
EVA(1)	= Firm's current Economic Value added outlook (one-year ahead forecast)
COC	= Weighted average cost of debt and equity capital
g	= Firm's assessed long-term EVA growth rate

This constant-growth model shows that the firm's MVA is directly related to its near-term EVA outlook and its assessed long-term EVA growth rate.

CHAPTER 6

EVA IN LITERATURE

The interest in EVA is reflected in the many articles and papers written on it. "Citations of EVA in the business press have grown exponentially, rising from 1 in 1989 to 294 in 1996" (Biddle et al.). The following sections show that writers are rhapsodical about EVA.

6.1 EVA and Firm Valuation

"One of the greatest challenges facing corporate management is designing an internal performance measurement and evaluation system" (Lamy). Proponents of EVA and MVA make a strong case for its use. "MVA tends to move in tandem with the market" (Lieber). "EVA is the best predictor of future share price" (Freedman).

Other articles suggest that EVA is superior to traditional performance measures, such as ROI and EPS (Armitage & Jog; Shih & Kantor), in indicating shareholder wealth creation. Lamy goes so far as to claim "Only if EVA is positive has the firm created value for shareholders." Pettit deems the reason for this is that EVA, unlike traditional measures, reflects the cost of capital. Armitage & Jog agree stating on average, firms showing rates of return higher than their costs of capital have an increase in their stock market value.

More than 300 firms worldwide have implemented Stern Stewart's EVA framework for financial management and incentive compensation (Ehrbar, Fall 1998). Previous results have shown that managers who run their business according to EVA principles have vastly increased the value of their companies (Tully, Sept. 20, 1993). Certainly this is one reason why investors favour companies committed to increasing their EVA (Tully, ibid), but also because EVA offers investors an insight into the soundness of decision-making at the top of the organization (Henry). In addition, using EVA makes it easier to compare firms internationally as opposed to using accounting measures. Different countries have different accounting regulations which makes it difficult to compare the value of companies across borders (*The Economist*). Also, it is easier for management to manipulate accounting figures than EVA (Bennett).

6.2 EVA in Industry

Companies that have implemented EVA credit it with dramatic improvements in operating and financial results. These in turn have been rewarded with a hefty appreciation in stock price (Kroll).

According to Daniel Meckstroth, staff director of a recent Manufacturer's Alliance survey, "The support EVA has within manufacturing is surprising...because manufacturing is a traditional industry and its executives are very reluctant to change. It suggests there may be something to the concept of EVA" (Christinat).

Coca-Cola Co.'s stock has increased more than ten times since adopting EVA in the early 1980s (Borowsky). When Briggs & Stratton introduced EVA in 1989, it showed a deficit of $20 million. By 1996, its net income was $92 million (Borowsky).

At AT&T, EVA was calculated back to 1984 and found to correlate almost perfectly with stock price (Brabazon & Sweeney). Sprint CFO Art Krause concurs, saying that

MVA gauges true economic performance (Tully, Nov. 28, 1994). Goldman Sachs also uses MVA and sees it as a good measure of a company's performance (Lieber).

At Eastman Chemical, EVA is the final measure used to determine capital projects (Freedman). Even the U.S. Postal Service, in 1994, hired Stern Stewart to convert it to EVA (Tully, Jul. 10, 1995).

6.3 EVA and Management

The fact that EVA provides a method for converting 'wrong' accounting numbers into 'correct' estimates of value is one of its more appealing features (O'Hanlon & Peasnell). However, EVA is also "the framework for a complete financial management and incentive compensation system that can guide every decision a company makes, from the boardroom to the shop floor; that can transform a corporate culture; that can improve the working lives of everyone in an organization by making them more successful; and that can help them produce greater wealth for shareholders, customers, and themselves" (Ehrbar, Fall 1998).

Top managers can use EVA to determine which departments are performing well and which ones are destroying capital (Rutledge). Other managers like EVA and MVA because they enhance accountability (Chang), are forward-looking (Walbert), can be applied to all industries (Gupta), and are easy to understand, apply and use without ongoing consultant help (Birchard). Gressle states that EVA is the best-integrated measure of growth and operating efficiency. It helps managers by identifying strategic and tactical actions that will significantly increase shareholder value (Gressle). In this way, it is more concerned with future economic profits that are likely to be generated over the life of a business and the risk associated with them (Mills et al.).

6.4 Difficulties with EVA

6.4.1 Difficulties Calculating and Using EVA

Despite all its apparent benefits, EVA does have its detractors. Cates states that EVA is as limited an information system as the one produced using Generally Accepted Accounting Principles (GAAP). GAAP are a common set of accounting concepts, standards, and procedures by which financial statements are prepared (Ross et al.). O'Hanlon & Peasnell agree, saying that EVA suffers from exactly the same interpretive problems that plague conventional accounting. Some think the reason for EVA's success is the attractive packaging done by consultants (Freedman).

Other articles (*Management Today*; Blair, Apr. 1997) indicate a return to EPS and other traditional measures as the true measures of the ongoing rate of profitability of a business. Blair claims this is because EVA requires "a lot of working out", which is why the traditional measures, such as EPS, won't be discarded. Leslie C. Ravitz, a chemical analyst at Morgan Stanley & Co., has examined a number of chemical companies that have employed EVA or are about to and states that "the data we have examined suggest that EVA has very little predictive power for chemical company stock price movements" (Henry).

Confounding these claims is the problem of verification. The restatements and estimates used in the calculation of EVA are not published, making it difficult to understand and verify EVA achievements (Cates). For instance, it is difficult to understand how Stern Stewart could calculate British Telecom's MVA in 1993 as $46 billion and in 1995 as only $6 billion (Blair, Jan. 1997).

Further obstacles arise in determining EVA. Difficulties such as how to define earnings and capital (Brabazon & Sweeney) and allocation of costs from such things as factories serving more than one unit, interest-bearing liabilities and managers' time (Birchard). Additionally, calculating cost of capital becomes very challenging since it is often very volatile when measured in discrete time frames (Brossy & Balkcom).

A further disadvantage to using EVA is that it doesn't take inflation into account (Blair, Apr. 1997; Walbert). However, Walbert also mentions that this distortion isn't as great as it might seem, since the low cost of old assets is offset by the high cost of maintaining and running them.

6.4.2 EVA Doesn't Reflect Future Opportunities

Another main problem with EVA, cite its detractors, is that it is inherently backward looking since it determines the value added in the previous accounting period (*The Economist*). It is measuring the value created by past strategic decisions and investments and not taking into account current strategy or plans to maintain a competitive edge (Brabazon & Sweeney). Dierks & Patel echo this statement stating that EVA does not account for growth opportunities inherent in investment decisions whereas the market value of the firm will reflect these. This means that year-to-year changes in EVA will be a good indicator of firm value for firms in mature industries with few growth opportunities. However, for firms with many growth opportunities, year-to-year changes in EVA will not necessarily be a good indicator of firm value. For this reason, EVA is of limited use for young, growing companies (Brabazon & Sweeney). Even Stern Stewart admits that EVA is not effective in very young companies (*The Economist*). However, MVA is supposed to remedy this problem with EVA by taking into account the market's estimate of a firm's growth prospects (*The Economist*). In fact, using MVA in conjunction with EVA allows companies to account for long-term changes in value in addition to year-to-year changes (Dierks & Patel).

6.4.3 EVA Shows Favouritism

Other problems with EVA exist. According to Glasser, components of EVA penalize older capital-intensive companies for which the payout is long-term and work against companies that have cyclical periods of reinvestment. EVA also favours older businesses whose assets are more fully depreciated. With greater depreciation, cash flows are judged on a smaller net asset base, compared to newer businesses whose assets have not been depreciated as much (Chang). Birchard agrees stating that EVA can be biased against low-return start-up investments and can favour businesses with heavily depreciated assets (Birchard).

According to its detractors, using EVA may result in some unintended consequences. EVA encourages conservative decision-making (Freedman) and managers measured by EVA may avoid investing in the business because the short-term EVA may drop (Barfield). Eric Olsen of the BCG claims that EVA discourages big investments because the upfront capital charge for them immediately depresses EVA. In addition, he claims that the easiest way to boost EVA in the short run is to "milk" a business by slashing capital spending, which could destroy the business in the long run (*The Economist*).

Robert C. Ochsner, vice president of Hay Management Consultants, states that EVA is subject to short-term manipulation through management decisions (Bennett).

6.4.4 Difficulties Educating the Workforce

Some firms have trouble explaining the purpose of EVA to nonfinancial managers and professionals (Spero). Other firms don't make the necessary financial investment to educate their entire workforce and as a result those in the lower levels do not understand how they are expected to do their jobs differently (Borowsky). But, Saint argues that it's not practical to measure EVA in organizational levels without separate financial statements. Consequently, the drivers of economic value, such as manufacturing output relative to budgeted work standards or sales quotas, become the real measurement. The problem is that these drivers tend to look like the measures they're replacing. Therefore, everyone in the organization except for the senior executives is subject to the same manipulation-prone system and its flawed reward structure (Saint). This sentiment is restated by Bruce D. Keener, executive vice president of Kepner-Tregoe, a Princeton, N.J., systems consultant. He says that EVA speaks only to the financial side of the business, not taking into account the firm's investment in people (McConville). Further, EVA does not try to place a value on intellectual assets or good will and therefore may overstate the wealth generated during an individual accounting period (Brabazon & Sweeney).

6.5 Empirical Evidence

6.5.1 Academic Research

So far, academic testing of EVA has not shown significantly different results from residual income. In addition, researchers who have examined EVA were not able to replicate the results reported by Stern Stewart (*Management Accounting*). The following are the results determined by academic researchers: Dodd & Chen, Clinton & Chen, Lehn & Makhija, Grant, J. and Biddle, Bowen & Wallace.

Analysing 566 companies over a 10-year period, Dodd & Chen found that stock return and EVA are correlated, but the correlation is far from perfect. EVA accounted for 20.2% of the variation in stock return while ROA accounted for 24.5%. EPS and ROE and other accounting measures each accounted for between 5% and 7% of the variation in stock return. Traditional Residual Income (RI) explained 19.4% of the variation in stock returns. These findings show that nearly 80% of the 566 companies' stock returns cannot be accounted for by EVA. More complete models using multiple regression found an explanatory ability for EVA-based measures of 41.1% and 40.9% for RI (Dodd & Chen).

A later study of 325 firms by Clinton & Chen showed that for the five years from 1991 to 1995 most of the residual income and EVA correlations with stock prices or stock returns were either insignificant or of unexpected negative signs (Clinton & Chen).

Lehn and Makhija's study of 241 firms from 1987 to 1993 found that "EVA and MVA are significantly positively correlated with stock price performance attesting to their effectiveness as performance measures" (Lehn & Makhija).

Grant's study found variations in the EVA-to-capital ratios for firms listed in the Stern Stewart Performance 1000 at year-end 1993 account for about 32% of the movement in the MVA-to-capital ratios for the U.S. large-capitalization firms. For the largest U.S. wealth creators at year-end 1993, the correlation is even better, 83% (Grant, 1996).

A study using a sample of 6,174 firm-years representing both adopters and non-adopters of EVA over the period 1984-1993 was performed by University of California Professors Biddle, Bowen and Wallace. They conclude that as a performance measure, earnings are more highly associated with returns and firm values than EVA, residual income or cash flow from operations.

6.5.2 Independent Studies

The following studies were conducted by researchers with no known affiliation with Stern Stewart.

Milunovich and Tsuei found EVA to have a 42% correlation with market performance whereas EPS growth was only 34% and ROE and EPS were only 29%. They used data from companies in the computer industry (Makelainen).

A 1996 study by Simmons & Co. International, the Houston investment bank found about two-thirds of the move up or down in service stock prices was predicted by EVA. Simmons analyzed 27 companies' results since 1990 using the EVA model (Haines).

In a study to determine EVA's worth in takeovers it was found that EVA is useful in determining takeover targets. Of the ten banks in the bottom 20% of EVA performers, according to the Stern Stewart list of top 50 1997 EVA performers in the banking industry, five have already been acquired or merged. In contrast, none of the banks in the top 20% have been acquired. Thus, the five remaining banks in the bottom 20% are prime acquisition targets (*Corporate Finance*).

6.5.3 Stern Stewart Research

Stern Stewart has done a number of empirical tests on the relationship between EVA and MVA using the Performance 1000 database. The results of these tests are shown in Figure 6.1.

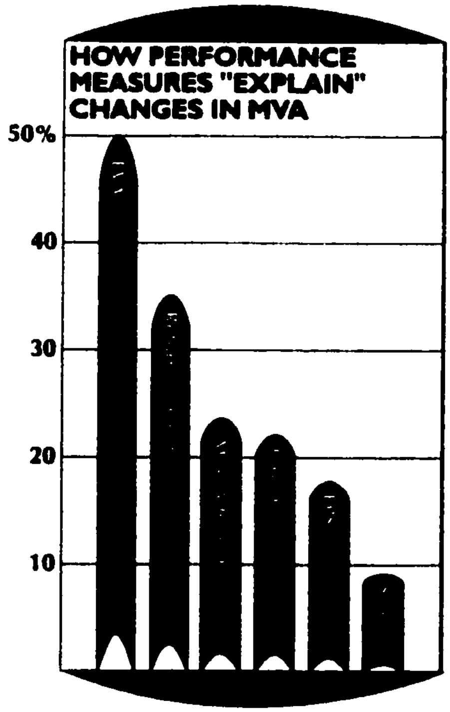

Figure 6.1: How Performance Measures "Explain" Changes in MVA

(Ehrbar, 1998, p. 77)

The following studies were conducted by employees of Stern Stewart: Stewart, O'Byrne, and Uyermura, Kantor & Pettit.

Stewart studied the relationship between EVA and stock return for 618 U.S. companies. His findings show that EVA and market value correlate quite well except when EVA and market value are negative (Makelainen).

O'Byrne conducted a 1996 study and found that EVA accounts for 31% of the variance with market value while NOPAT only explains 17%. Further, he found that changes in EVA account for 55% of changes in market value while NOPAT accounts for only 33% (Makelainen).

A 1996 study by Uyermura, Kantor and Pettit analysed the relationship between EVA and market performance for 100 bank holding companies for the years 1986 through 1995. The correlations found with respect to market performance were: EVA 40%, ROA 13%, ROE 10%, Net Income 8% and EPS 6% (Makelainen).

In a broad study of Canadian companies, it was found that net income grew 84% of the time when EVA grew. However, in the same study it was also found that 32% of the time, EVA declined when net income grew (Pettit).

CHAPTER 7

DISCUSSION, CONCLUSIONS & RECOMMENDATIONS FOR FURTHER RESEARCH WORK

7.1 Discussion

Eschenbach concluded in his paper that "it is damaging to the teaching and practice of engineering economy to have this level of disagreement on the fundamental question of picking [the MARR]".

These are the methods for determining the MARR presented in the leading engineering economy textbooks:

i. Cost of Equity
ii. Cost of Capital
iii. Ranking on IRR
iv. Perfect Market Model.

The cost of equity can be determined using four methods:

i. Net Equity Flow
ii. Marginal Net Equity Flow
iii. CAPM
iv. Tobin's q.

The cost of capital is determined using a weighted average cost of debt and equity capital. This method can be adjusted to determine only the cost of recent capital, known as the Marginal Cost of Capital. To determine the Weighted Average Cost of Capital, the cost of equity must be calculated. This can be done using either the Net Equity Flow, Marginal Net Equity Flow, the CAPM or Tobin's q.

To test these methods, the MARRs for eleven companies were calculated. Ranking on IRR and the Perfect Market Model were not included since they require information on a company's potential projects and financing sources, which is not publicly available. The average range between the highest and lowest MARR for each company was 14.62% and the greatest range was nearly 60%.

Since the cost of debt was determined using Standard & Poor's Bond Record for all companies, the variation between the MARRs is a result of the cost of equity calculations. The costs of equity yielded for each company were ranked from highest to lowest. The number of times a method ranked first, second, third and fourth were then summed. These tabulations are shown in Table 7.1.

Method	Number of Times in nth Position			
	n=1	n=2	n=3	n=4
Net Equity Flow	2	3	5	1
Marginal Net Equity Flow	1	6	3	1
CAPM	7	1	3	0
Tobin's q	1	2	2	6

Table 7.1: Number of Occurrences in nth Position

Table 7.1 shows that not only do the methods give inconsistent results, they do not yield results that have a consistent ranking. On average, the CAPM tends to give the highest cost of equity, followed by the Marginal Net Equity Flow, the Net Equity Flow and Tobin's q methods.

Clearly, this finding indicates that the methods used to calculate the MARR yield inconsistent results and are therefore incompatible. However, courses in engineering economy at the undergraduate level continue to teach these methods. A brief review of engineering economy textbooks verifies this point. Eschenbach found that of twenty surveyed texts:

i. nine supported the use of ranking on IRR,
ii. seven selected the Weighted Average Cost of Capital (WACC)
iii. four chose a cost of capital other than the WACC
iv. two preferred the use of the opportunity cost of capital
v. one chose the investment opportunity schedule used in the Perfect Market Model
vi. one text described the methods for calculating the MARR without supporting any one method
vii. one text did not include any coverage of how the MARR is calculated.

Also notable, is that five of the texts support more than one method showing that even some of the authors have not decided which method to use for the MARR calculation. These results show that there is much disagreement within the engineering economic community over which is the appropriate method for calculating the MARR.

This disagreement over how to determine the MARR is reflected in industry. A study by Jog & Srivastava discovered that slightly more than half of Canadian firms use the Weighted Average Cost of Capital as their MARR, although this same study also found that the most popular method for determining the cost of equity was judgemental.

Further review of the literature on capital budgeting techniques showed that industry appears to be as undecided as academia as to how to calculate the MARR.

Recently, however, one method for determining the MARR has been gaining widespread recognition and acceptance within the business industry. The method is Economic Value Added (EVA) and it measures the performance of a company by subtracting its weighted average cost of debt and equity capital from its rate of return. With the popularity and support of EVA in industry, it seems logical that the Weighted Average Cost of Capital should be used as the value for the MARR and that this method of calculation should be carried over to the classroom.

This leaves unanswered the question of how to calculate the cost of equity. Analysis of a single company over a four-year period demonstrated that the inconsistent values produced using the cost of equity methods is a result of the variability of the Net Equity Flow methods. The costs of equity were calculated for McDonald's from 1995 to 1998. According to Standard & Poor's, McDonald's was considered a stable company over this period. Thus, its cost of equity should also be stable. However, the cost of equity calculated using the Net Equity Flow method ranged from 9.76% to 25.26%. The Marginal Net Equity Flow method exhibited a similar range from 9.76% to 25.78%. In contrast, the CAPM and Tobin's q ranged from 10.96% to 13.39% and 9.26% to 10.66%, respectively.

Additionally, the Net Equity Flow methods rely heavily on the growth of common stock dividends. When companies increase their dividend, the cost of equity rises greatly. When companies do not give out dividends and do not plan to, their cost of equity using the Net Equity Flow methods is 0%. In light of the vast fluctuation of the

Net Equity Flow methods and their inherent difficulties, it is concluded that these methods are not suitable for calculating the cost of equity in practice.

Eliminating the Net Equity Flow methods, leaves the CAPM and Tobin's q in contention. The CAPM is the method used in EVA to determine the cost of equity and thus has the support and recognition of industry. Both the CAPM and Tobin's q proved to be stable indicators of the cost of equity. Calculating the cost of equity for McDonald's over a four-year period, their results had a range of less than 2.5%. These tests also showed that Tobin's q tends to yield a cost of equity that is less than the one produced by the CAPM. This is most likely due to the fact that the CAPM incorporates risk into the cost of equity whereas Tobin's q does not. Thus, the range between the two is related to the firm's beta. While it is certainly easier to factor risk into the cost of equity as the CAPM does, this practice is not necessarily justified.

The beta used in the CAPM equation represents the risk for the entire firm, not a specific project, therefore assuming all projects have the same risk level. This means that the cost of equity calculated, while helpful to investors, does not benefit the firm in determining which projects to accept because "no two projects are similar, and therefore this approach fails to capture the actual discount rate for a project" (Frimpong, p. 129).

Also, adjusting for risk as the CAPM does raises the cost of equity, which in turn raises the Weighted Average Cost of Capital. When the cost of capital is high, the future cash flows of projects are worth less when they are discounted to present value, thus promoting short-termism. Incorporating the risk component into the cost of capital results in the riskiness of future cash flows being automatically compounded over time even though the risk of a project often decreases over time as more information becomes available (Reimann). "A number of financial theorists have recognized the serious shortcoming of the CAPM method and have proposed that risk should be incorporated, not in the discount rate, but rather in the estimates of the future cash flows which are ' at risk'... These...cash flows then need only be discounted at a risk-free rate..." (Reimann). This risk-free rate is the MARR.

The previous discussion has shown that the value used as the MARR should be the risk-free weighted average cost of capital. The Net Equity Flow methods and the CAPM were rejected as suitable methods for calculating the cost of equity. Through this process of elimination, Tobin's q is deemed the optimal method for determining the cost of equity.

The value found for Tobin's q represents the "ratio of the market value of the firm's securities to the replacement cost of its assets" (Weston et al., p. 78). Tobin's q, while not taught in undergraduate engineering economy courses, is covered in most corporate finance classes. However, calculating the cost of equity using Tobin's q is not. A review of the Tobin's q method for determining the cost of equity follows.

$$k = \frac{(1 - c + c \times q \times V)}{(V + (1-q)D)} \times \frac{E}{V}$$

$$q = \frac{V}{RC}$$

$$c = b + s$$

k = Cost of Equity = MARR
q = Tobin's q
c = Firm's Investment Rate
V = Market Value of the Firm
E = Expected Value of the Firm's Accounting Earnings in the coming year
D = Market Value of the Firm's Debt and/or Preferred Shares
RC=Replacement Cost of Firm's Assets
b = Expected Value of Firm's Retention Rate
s = Expected Stock Financing Rate (expressed as a proportion of earnings)

A more detailed explanation of the Tobin's q method for calculating the cost of equity can be found in Appendix A.

Callen notes that the cost of equity using Tobin's q is simple to determine because little estimation is involved. He also claims that this method results in a more meaningful estimate of a firm's cost of equity capital.

7.2 Conclusions

From the discussion of this paper, it is concluded that:

i. the engineering economic academic community has not reached a consensus on how the MARR should be calculated
ii. business practices demonstrate that industry has not lent its support to any one method for determining the MARR
iii. the widespread acceptance of EVA in industry suggests that it should be taught to engineering economy undergraduates
iv. engineering economy should follow the lead of EVA and recognize the Weighted Average Cost of Capital as the MARR
v. the variability and inherent difficulties of the Net Equity Flow methods make them unsuitable for calculating the cost of equity in practice
vi. risk should be incorporated into projects' cash flows instead of the MARR, thus the CAPM should not be used to calculate the cost of equity
vii. the Tobin's q method of determining the cost of equity is a reliable, effective and simple technique that does not incorporate the firm's level of risk. As such, it is recommended that the engineering economic

community recognize the MARR as the Weighted Average Cost of Capital, using Tobin's q to determine the cost of equity.

7.3 Recommendations for Further Research Work

The recommendations for further research work are the following:

i. calculate the cost of equity using the Net Equity Flow, CAPM and Tobin's q methods with a larger sample group to determine statistically significant results

ii. again using a larger sample group, calculate the cost of equity with the CAPM and Tobin's q and compare the difference to the historical risk premium

iii. validate the use of EVA in industry

iv. examine Stern Stewart's claim of the relationship between EVA, MVA and stock market prices

v. for a large group of companies, calculate the costs of equity over a ten-year period to determine the stability of the Net Equity Flow, CAPM and Tobin's q methods

vi. compare changes in the companies' costs of equity with changes in their Standard & Poor's bond record ratings and betas for corresponding years

vii. determine the methods companies are currently using to calculate the cost of equity.

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APPENDIX A:

Notation and Notes

A.1Notation

The information for all companies was obtained from their Annual Reports unless otherwise noted. The notation used in calculating the MARR with each method is defined as follows:

Net Equity Flow Method

A	=	Total Retained Earnings (RE)
B	=	Total Common Stock (CS)
C, D, E…	=	Total Preferred Stock
Total Equity	=	$A+B+C+D+E+\ldots$
a	=	Fraction of Total Equity financed from RE $=\dfrac{A}{Total\ Equity}$
b	=	Fraction of Total Equity financed from CS $=\dfrac{B}{Total\ Equity}$
c	=	Fraction of Total Equity financed from PS $\dfrac{C,D,E\ldots}{Total\ Equity}$
P_0	=	Market Price of CS[1]
D_0	=	CS Dividend for 1997
$P_{\bullet C,D,E\ldots}$	=	Market Price of PS C, D, E…[2]
$D_{\bullet C,D,E\ldots}$	=	PS C, D, E… Dividend for 1997
g	=	Growth rate of CS dividend $=\dfrac{1997\ D_0}{1996\ D_0}-1$
f_c	=	Flotation costs[3]
k_r	=	Cost of RE $=\dfrac{D_0}{P_0}+g$
k_e	=	Cost of CS $=\dfrac{D_0}{P_0(1-f_c)}+g$
$k_{P\,C,D,E\ldots}$	=	Cost of PS C, D, E… $=\dfrac{D_{\bullet c,d,e\ldots}}{P_{\bullet c,d,e\ldots}(1-f_c)}$
i_e	=	Cost of Equity $=a\times k_r+b\times k_e+c,d,e\ldots\times k_{c,d,e\ldots}$

Marginal Net Equity Flow Method

A	=	New Retained Earnings (RE)
B	=	New Common Stock (CS)
C ,D, E...	=	New Preferred Stock
New Equity	=	$A+B+C+D+E+...$
a	=	Fraction of New Equity financed from RE $=\dfrac{A}{New\ Equity}$
b	=	Fraction of New Equity financed from CS $=\dfrac{B}{New\ Equity}$
c, d, e...	=	Fraction of New Equity financed from PS $\dfrac{C, D, E...}{New\ Equity}$
P_0	=	Market Price of New CS[1]
D_0	=	CS Dividend for 1997
$P_{\bullet C,D,E...}$	=	Market Price of New PS C, D, E...[2]
$D_{\bullet C,D,E...}$	=	PS C, D, E... Dividend for 1997
g	=	Growth rate of CS dividend $=\dfrac{1997\ D_0}{1996\ D_0}-1$
f_c	=	Flotation costs[3]
k_r	=	Cost of New RE $=\dfrac{D_0}{P_0}+g$
k_e	=	Cost of New CS $=\dfrac{D_0}{P_0(1-f_c)}+g$
$k_{P\ C,D,E...}$	=	Cost of New PS C, D, E... $=\dfrac{D_{\bullet c,d,e...}}{P_{\bullet c,d,e...}(1-f_c)}$
i_e	=	Cost of New Equity $=a\times k_r + b\times k_e + c,d,e...\times k_{c,d,e...}$

The Capital Asset Pricing Model

R_f	=	Risk-Free Rate[4]
R_m-R_f	=	Market Risk Premium[5]
Beta	=	Measure of the Systematic Risk of the Firm[6]
R	=	Cost of Equity $= R_f + \beta(R_m - R_f)$

Tobin's q

CS	=	Number of Common Shares Outstanding
P_0	=	Market Price of Common Shares[1]
V_{CS}	=	Value of CS $= CS \times P_0$
$PS_{C,D,E\ldots}$	=	Number of Preferred Shares C, D, E… Outstanding
$P_{\bullet C,D,E\ldots}$	=	Market Price of Preferred Shares C, D, E…[2]
$V_{PSC,D,E\ldots}$	=	Value of PS C, D, E… $= PS_{C,D,E\ldots} \times PS_{\bullet C,D,E\ldots}$
STLIAB	=	Book Value of Short-Term Liabilities
STASST	=	Book Value of Short-Term Assets
STDEBT	=	Book Value of Current Portion of Long-Term Debt
BKINV	=	Book Value of Inventory
LTDEBT	=	Book Value of Long-Term Debt (Fair Value if available)
NETSTASST	=	Short-Term Assets Net of Short-Term Liabilities
	=	$STASST - BKINV - STLIAB + STDEBT$
V	=	Market Value of Firm[7]
	=	$V_{CS} + V_{PSC,D,E\ldots} + LTDEBT + STDEBT - NETASST$
RC	=	Replacement Cost of Firm's Assets = Book Value of Firm's Assets After Depreciation
q	=	Tobin's q $= \dfrac{V}{RC}$
E	=	Earnings Attributable to CS
D	=	Total Debt $= V - V_{CS}$
b	=	Retention Rate = 1 – Payout Ratio
	=	$1 - \dfrac{D_0}{Earnings\ per\ Common\ Share\ (EPS)}$
s	=	Stock Financing Rate $= \dfrac{New\ Capital\ Raised\ from\ CS}{E}$
c	=	Investment Rate = $b+s$
k	=	Cost of Equity $= \left((1-c) + \dfrac{c \times q \times V}{V + (1-q) \times D}\right) \times \dfrac{E}{V}$

Weighted Average Cost of Capital (WACC)

D	=	Total Debt = Debentures & Bonds + Bank Loans
E	=	Total Equity (from Net Equity Flow Method)
V	=	Total of Debt and Equity = $D+E$
Cost of Debt	=	Before-Tax Cost of Debt[8]
Tax Rate	=	Firm's Effective Tax Rate
i_d	=	After-Tax Cost of Debt
	=	Cost of Debt × (1- Tax Rate)
i_e	=	Cost of Equity (from Net Equity Flow Method)
k	=	Cost of Equity (from Tobin's q Method)
R	=	Cost of Equity (from CAPM Method)

$WACC_{ie}$	=	Cost of Capital using $i_e = \frac{i_d \times D}{V} + \frac{i_e \times E}{V}$
$WACC_k$	=	Cost of Capital using $k = \frac{i_d \times D}{V} + \frac{k \times E}{V}$
$WACC_R$	=	Cost of Capital using $R = \frac{i_d \times D}{V} + \frac{R \times E}{V}$

Marginal Cost of Capital (MCC)

D	=	New Debt = New Debentures & Bonds New Bank Loans
E	=	New Equity (from Marginal Net Equity Flow Method)
V	=	Total of New Debt and Equity = $D+E$
Cost of Debt	=	Before-Tax Cost of New Debt[8]
Tax Rate	=	Firm's Effective Tax Rate
i_d	=	After-Tax Cost of New Debt
	=	Cost of New Debt × (1-Tax Rate)
i_e	=	Cost of New Equity (from Marginal Net Equity Flow Method)
k	=	Cost of Equity (from Tobin's q Method)
R	=	Cost of Equity (from CAPM Method)

MCC_{ie}	=	Marginal Cost of Capital using $i_e = \frac{i_d \times D}{V} + \frac{i_e \times E}{V}$
MCC_k	=	Marginal Cost of Capital using $k = \frac{i_d \times D}{V} + \frac{k \times E}{V}$
MCC_R	=	Marginal Cost of Capital using $R = \frac{i_d \times D}{V} + \frac{R \times E}{V}$

A.2 Notes

1. *The Financial Post*, "Toronto Stock Exchange", (December 31, 1997), pp. 22-25. Prices for McDonald's Corporation and IBM Corporation are courtesy of the yahoo finance website located at: finance.yahoo.com

2. *The Financial Post*, "Toronto Stock Exchange", (December 31, 1997), pp. 22-25. Prices that were not available in The Financial Post were estimated based on the share's dividend and the rate of return on other series of preferred shares offered by the company.

3. Chen, Hsuan-Chi & Jay Ritter, "The Seven Percent Solution", Working Paper, Department of Finance, Insurance and Real Estate, University of Florida, Gainesville, FL, (April 15, 1999).

4. 1997 Annual Report for the McDonald's Corporation, p.42.

5. Stewart, G. Bennett III, *The Quest for Value: The EVA Management Guide*, USA: HarperCollins, Publishers Inc., (1991).

6. Value Line, "Ratings & Reports", *Investment Survey*, (1997). Betas were not available for Air Canada, Petro Canada and Suncor Energy in Value Line. For these companies, their 1998 Betas were used instead since they do not change substantially from year to year. This practice and the values are courtesy of William Gee, Investment Advisor, RBC Dominion Securities, Personal Conversation, (April 26, 1999).

7. Market value of each firm was determined using the method presented in the National Bureau of Economic Research (NBER) Working Paper No. W 3366 "The Manufacturing Sector Master File: 1959-1987" by Bronwyn H. Hall, (May 1990).

8. Cost of Debt was estimated using Standard & Poor's Bond Record Rating and the December 1997 monthly average borrowing rate.

APPENDIX B:

Air Canada, 1997

Table B.1: The Cost of Equity Using the Net Equity Flow Method

A	$	171,000,000
B	$	818,000,000
C	$	245,000,000
Total Equity	$	1,234,000,000
a		0.14
b		0.66
c		0.20
P_0	$	14.75
D_0	$	-
P_*	$	13.65
D_*	$	-
g		0.00%
f_c		7.00%
k_r		0.00%
k_e		0.00%
k_p		0.00%
i_e		0.00%

Table B.2: The Cost of Equity Using the Marginal Net Equity Flow Method

A	$	428,000,000
B	$	2,000,000
C	$	5,000,000
New Equity	$	435,000,000
a		0.98
b		0.00
c		0.01
P_0	$	14.75
D_0	$	-
P_*	$	13.65
D_*	$	-
g		0.00%
f_c		7.00%
k_r		0.00%
k_e		0.00%
k_p		0.00%
i_e		0.00%

Table B.3: The Cost of Equity Using the CAPM	
R_f	6.61%
R_m-R_f	6.00%
Beta	0.97
R	12.43%

Table B.4: The Cost of Equity Using Tobin's q	
CS	120063018
P_0	$ 14.75
V_{CS}	**$ 1,770,929,515.50**
PS	36675760
P_*	$ 13.65
V_{PS}	**$ 500,624,124.00**
Sum of Equity	**$ 2,271,553,639.50**
STLIAB	$ 1,139,000,000.00
STASST	$ 1,394,000,000.00
STDEBT	$ 71,000,000.00
BKINV	$ -
NETSASST	**$ 326,000,000.00**
LTDEBT	$ 3,094,000,000.00
V	**$ 5,110,553,639.50**
RC	$ 5,991,000,000.00
q	0.853038498
E	$ 427,000,000.00
D	$ 3,339,624,124.00
b	100.00%
s	0.47%
c	100.47%
k	6.49%

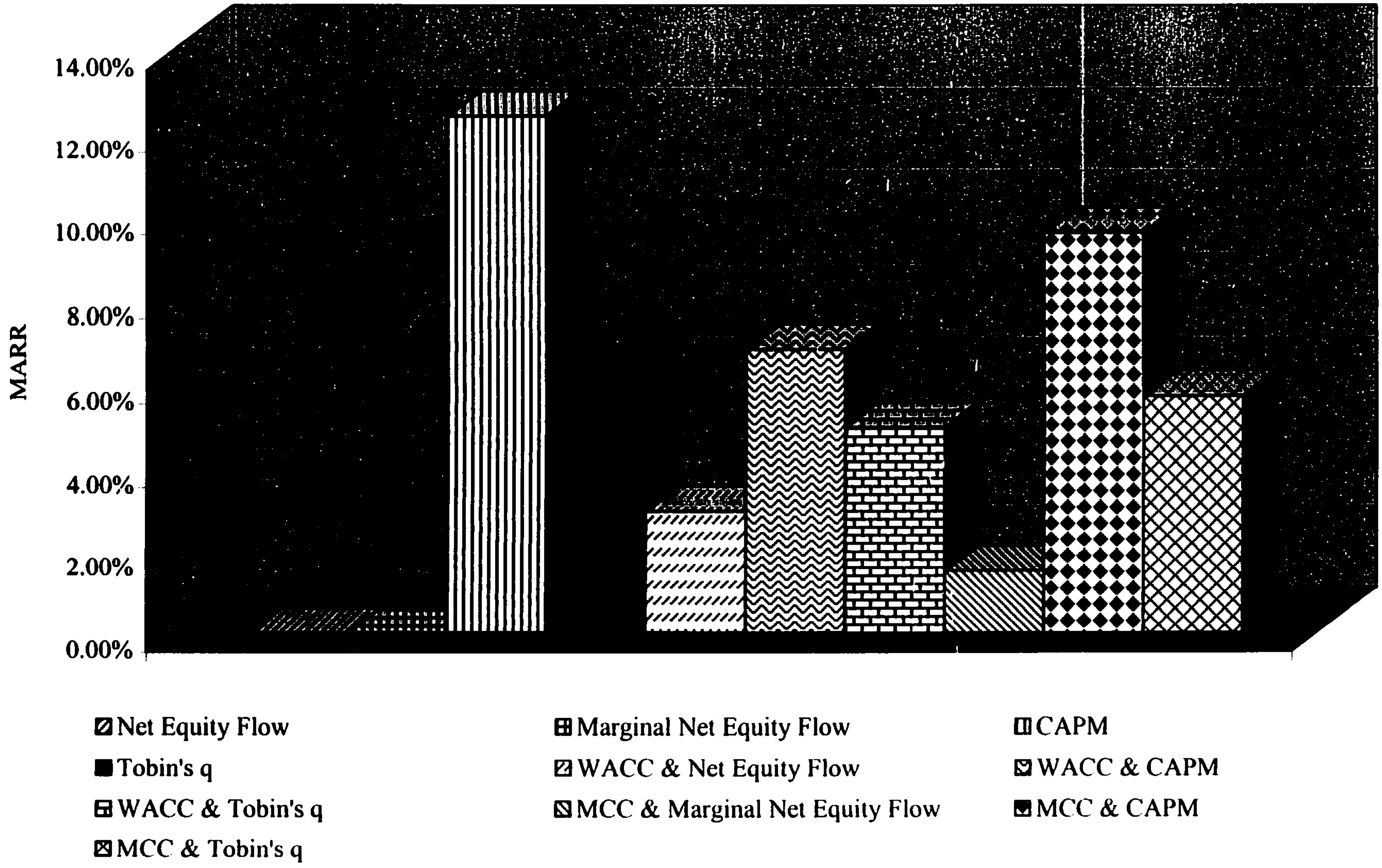
Table B.5: Weighted Average Cost of Capital (WACC)	
D	$ 2,739,000,000.00
E	$ 1,234,000,000.00
V	$ 3,973,000,000.00
Rating	B-BB
Cost of Debt	7.74%
Tax Rate	44.40%
i_d	4.30%
i_e	0.00%
k	6.49%
R	12.43%
$WACC_{ie}$	2.97%
$WACC_k$	4.98%
$WACC_R$	6.83%

Table B.6: Marginal Cost of Capital (MCC)	
D	$ 235,000,000.00
E	$ 435,000,000.00
V	$ 670,000,000.00
i_e	4.30%
i_d	0.00%
k	6.49%
R	12.43%
MCC_{ie}	1.51%
MCC_k	5.73%
MCC_R	9.58%

Table B.7: The 1997 MARRs for Air Canada

Method	MARR
Net Equity Flow	0.00%
Marginal Net Equity Flow	0.00%
CAPM	12.43%
Tobin's q	6.49%
WACC & Net Equity Flow	2.97%
WACC & Tobin's q	4.98%
WACC & CAPM	6.83%
MCC & Marginal Net Equity Flow	1.51%
MCC & Tobin's q	5.73%
MCC & CAPM	9.58%

Chart B.1: The 1997 MARRs for Air Canada



APPENDIX C:

BCE Inc., 1997

Table C.1: The Cost of Equity Using the Net Equity Flow Method		
A	$	596,000,000
B	$	6,316,000,000
C	$	400,000,000
D	$	200,000,000
E	$	200,000,000
F	$	300,000,000
G	$	350,000,000
H	$	250,000,000
Total Equity	$	8,612,000,000
a		0.07
b		0.73
c		0.05
d		0.02
e		0.02
f		0.03
g		0.04
h		0.03
P_0	$	48.10
D_0	$	1.36
$P_{\bullet P}$	$	27.00
$D_{\bullet P}$	$	1.60
$P_{\bullet Q}$	$	26.95
$D_{\bullet Q}$	$	1.72
$P_{\bullet S}$	$	25.25
$D_{\bullet S}$	$	1.32
$P_{\bullet U}$	$	26.49
$D_{\bullet U}$	$	1.39
$P_{\bullet W}$	$	26.06
$D_{\bullet W}$	$	1.36
$P_{\bullet Y}$	$	24.00
$D_{\bullet Y}$	$	1.15
growth		0.00%
f_c		7.00%
k_r		2.83%
k_e		3.04%
k_{pP}		6.37%
k_{pQ}		6.86%
k_{pS}		5.62%
k_{pU}		5.62%

Table C.2: The Cost of Equity Using the Marginal Net Equity Flow Method		
A	$	-
B	$	-
C	$	-
D	$	-
E	$	-
F	$	300,000,000
G	$	350,000,000
H	$	250,000,000
New Equity	$	900,000,000
a		0.00
b		0.00
c		0.00
d		0.00
e		0.00
f		0.33
g		0.39
h		0.28
P_0	$	48.10
D_0	$	1.36
$P_{\bullet P}$	$	27.00
$D_{\bullet P}$	$	1.60
$P_{\bullet Q}$	$	26.95
$D_{\bullet Q}$	$	1.72
$P_{\bullet S}$	$	25.25
$D_{\bullet S}$	$	1.32
$P_{\bullet U}$	$	26.49
$D_{\bullet U}$	$	1.39
$P_{\bullet W}$	$	26.06
$D_{\bullet W}$	$	1.36
$P_{\bullet Y}$	$	24.00
$D_{\bullet Y}$	$	1.15
growth		0.00%
f_c		7.00%
k_r		0.00%
k_e		0.00%
k_{pP}		0.00%
k_{pQ}		0.00%
k_{pS}		0.00%
k_{pU}		5.62%

Table C.1: The Cost of Equity Using the Net Equity Flow Method	
k_{pW}	5.62%
k_{pY}	5.15%
i_e	3.59%

Table C.2: The Cost of Equity Using the Marginal Net Equity Flow Method	
k_{pW}	5.62%
k_{pY}	5.15%
i_e	5.49%

Table C.3: The Cost of Equity Using the CAPM	
R_f	6.61%
R_m-R_f	6.00%
Beta	0.8
R	11.41%

Table C.4: The Cost of Equity Using Tobin's q	
CS	246719043
P_0	$ 48.10
V_{CS}	**$ 11,867,185,968.30**
PS_P	16000000
$P_{\bullet P}$	$ 27.00
V_P	**$ 432,000,000.00**
PS_Q	8000000
$P_{\bullet Q}$	$ 26.95
V_Q	**$ 215,600,000.00**
PS_S	8000000
$P_{\bullet S}$	$ 25.25
V_S	**$ 202,000,000.00**
PS_U	14000000
$P_{\bullet U}$	$ 26.49
V_U	**$ 370,907,196.97**
PS_W	12000000
$P_{\bullet W}$	$ 26.06
V_W	**$ 312,755,681.82**
PS_Y	10000000
$P_{\bullet Y}$	$ 24.00
V_Y	**$ 240,000,000.00**
Sum of Equity	**$ 13,640,448,847.09**
STLIAB	$ 11,729,000,000.00
STASST	$ 14,585,000,000.00
STDEBT	$ 2,402,000,000.00
BKINV	$ 2,726,000,000.00
NETSASST	**$ 2,532,000,000.00**
LTDEBT	$ 12,384,000,000.00
V	**$ 25,894,448,847.09**
RC	$ 40,298,000,000.00
q	0.642574045
E	$ 3,618,000,000.00
D	$ 14,027,262,878.79
b	35.55%
s	0.00%
c	35.55%
k	11.68%

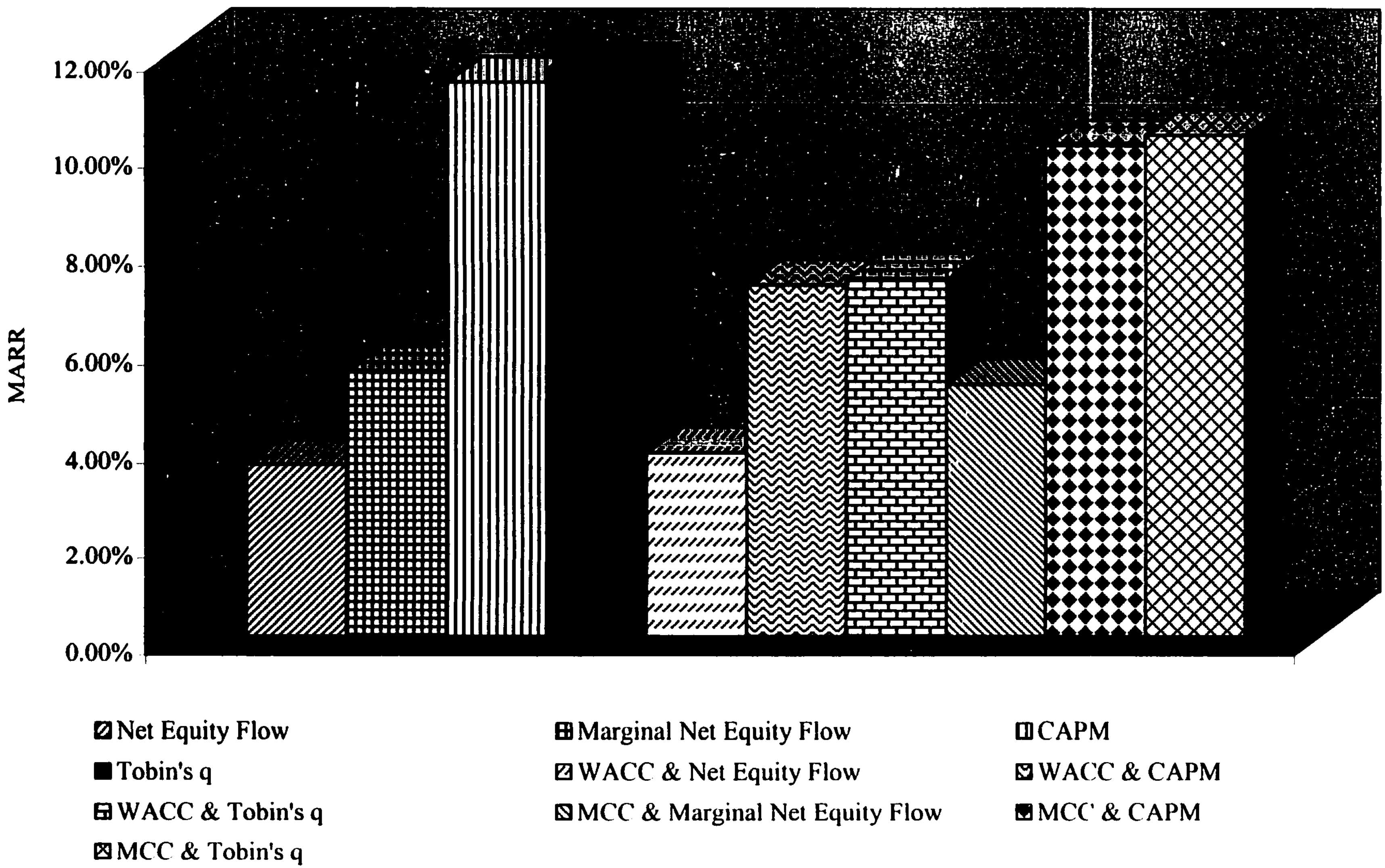
Table C.5: Weighted Average Cost of Capital (WACC)	
D	$ 11,155,000,000.00
E	$ 8,612,000,000.00
V	$ 19,767,000,000.00
Rating	A
Cost of Debt	6.92%
Tax Rate	42.10%
i_d	4.01%
i_e	3.59%
k	11.68%
R	11.41%
$WACC_{ie}$	3.82%
$WACC_k$	7.35%
$WACC_R$	7.23%

Table C.6: Marginal Cost of Capital (MCC)	
D	$ 198,000,000.00
E	$ 900,000,000.00
V	$ 1,098,000,000.00
i_d	4.01%
i_e	5.49%
k	11.68%
R	11.41%
MCC_{ie}	5.22%
MCC_k	10.30%
MCC_R	10.07%

Table C.7: The 1997 MARRs for BCE Inc.

Method	MARR
Net Equity Flow	3.59%
Marginal Net Equity Flow	5.49%
CAPM	11.41%
Tobin's q	11.68%
WACC & Net Equity Flow	3.82%
WACC & Tobin's q	7.35%
WACC & CAPM	7.23%
MCC & Marginal Net Equity Flow	5.22%
MCC & Tobin's q	10.30%
MCC & CAPM	10.07%

Chart C.1: The 1997 MARRs for BCE Inc.



APPENDIX D:

IBM Corporation, 1997

Table D.1: The Cost of Equity Using the Net Equity Flow Method

A	$	11,010,000,000
B	$	8,601,000,000
C	$	252,000,000
Total Equity	$	19,863,000,000
a		0.55
b		0.43
c		0.01
P_0	$	104.05
D_0	$	0.79
P_*	$	27.03
D_*	$	7.70
g		17.21%
f_c		7.00%
k_r		17.97%
k_e		18.02%
k_p		30.63%
i_e		18.15%

Table D.2: The Cost of Equity Using the Marginal Net Equity Flow Method

A	$	-
B	$	849,000,000
C	$	-
New Equity	$	849,000,000
a		0.00
b		1.00
c		0.00
P_0	$	104.05
D_0	$	0.79
P_*	$	27.03
D_*	$	7.70
g		17.21%
f_c		7.00%
k_r		0.00%
k_e		18.02%
k_p		0.00%
i_e		18.02%

Table D.3: The Cost of Equity Using the CAPM	
R_f	5.56%
R_m-R_f	6.00%
Beta	1.1
R	12.16%

Table D.4: The Cost of Equity Using Tobin's q	
CS	969015531
P_0	$ 104.05
V_{CS}	**$ 100,826,066,000.55**
PS	2597261
P.	$ 27.03
V_{PSV}	**$ 70,203,964.83**
Sum of Equity	**$ 100,896,269,965.38**
STLIAB	$ 33,507,000,000.00
STASST	$ 4,041,800,000.00
STDEBT	$ 13,230,000,000.00
BKINV	$ 5,139,000,000.00
NETSASST	**-$ 21,374,200,000.00**
LTDEBT	$ 13,696,000,000.00
V	**$ 149,196,469,965.38**
RC	$ 81,499,000,000.00
q	1.830653995
E	$ 6,073,000,000.00
D	$ 48,370,403,964.83
b	87.27%
s	13.98%
c	101.25%
k	10.27%

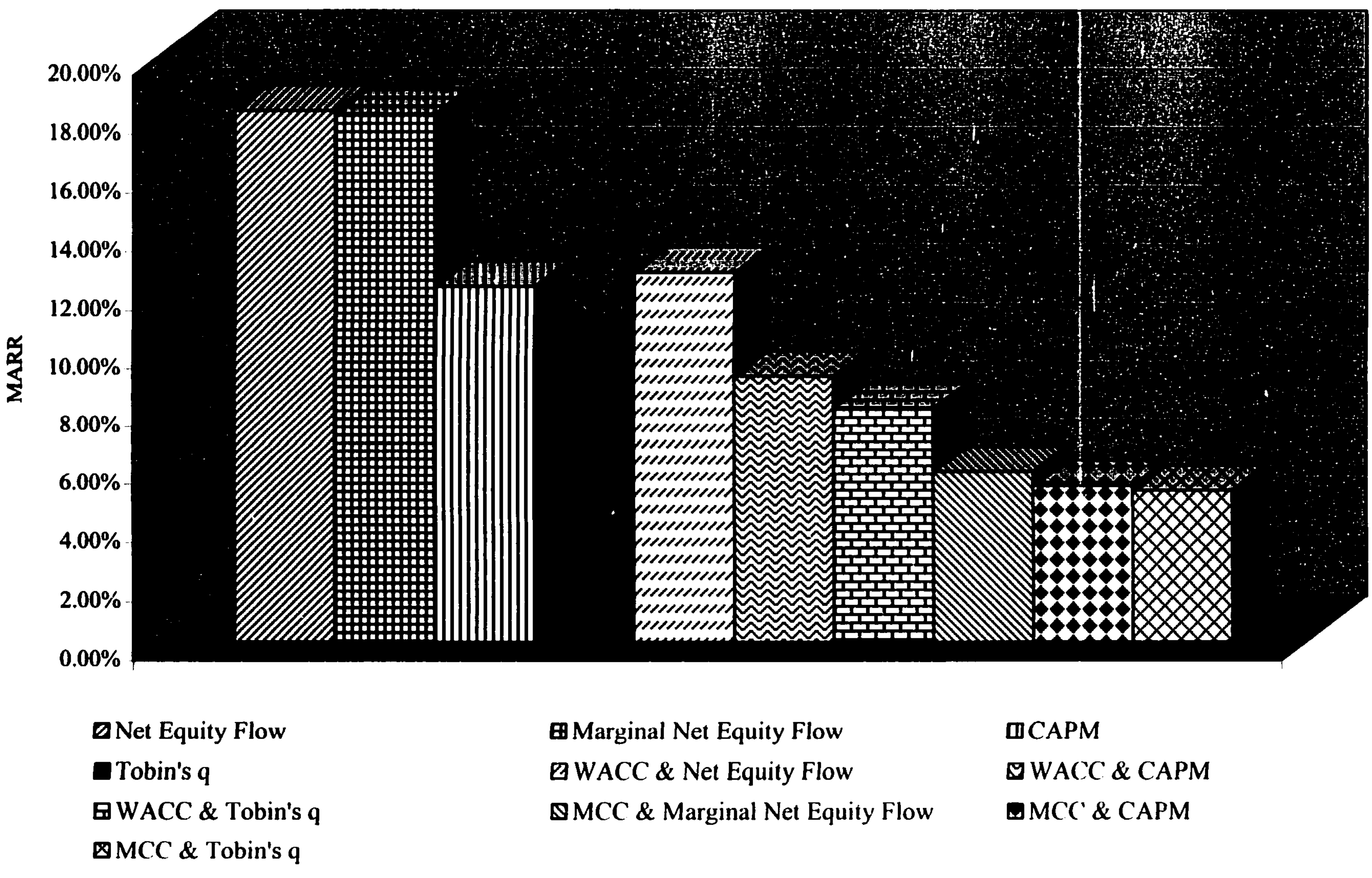
Table D.5: Weighted Average Cost of Capital (WACC)	
D	$ 13,696,000,000.00
E	$ 19,863,000,000.00
V	$ 33,559,000,000.00
Rating	A
Cost of Debt	6.92%
Tax Rate	33.00%
i_d	4.64%
i_e	18.15%
k	10.27%
R	12.16%
$WACC_{ie}$	12.64%
$WACC_k$	7.97%
$WACC_R$	9.09%

Table D.6: Marginal Cost of Capital (MCC)	
D	$ 9,142,000,000.00
E	$ 849,000,000.00
V	$ 9,991,000,000.00
i_d	4.64%
i_e	18.02%
k	10.27%
R	12.16%
MCC_{ie}	5.77%
MCC_k	5.12%
MCC_R	5.28%

Table D.7: The 1997 MARRs for The IBM Corporation

Method	MARR
Net Equity Flow	18.15%
Marginal Net Equity Flow	18.02%
CAPM	12.16%
Tobin's q	10.27%
WACC & Net Equity Flow	12.64%
WACC & Tobin's q	7.97%
WACC & CAPM	9.09%
MCC & Marginal Net Equity Flow	5.77%
MCC & Tobin's q	5.12%
MCC & CAPM	5.28%

Chart D.1: The 1997 MARRs for the IBM Corporation



APPENDIX E:

Imasco, 1997

Table E.1: The Cost of Equity Using the Net Equity Flow Method		Table E.2: The Cost of Equity Using the Marginal Net Equity Flow Method	
A	$ 2,882,000,000	A	$ 380,000,000
B	$ 851,000,000	B	$ 17,000,000
C	$ 135,000,000	C	$ -
Total Equity	$ 3,868,000,000	New Equity	$ 397,000,000
a	0.75	a	0.96
b	0.22	b	0.04
c	0.03	c	0.00
P_0	$ 51.10	P_0	$ 51.10
D_0	$ 1.20	D_0	$ 1.20
P_*	$ 500,000.00	P_*	$ 500,000.00
D_*	$ 34,500.00	D_*	$ 34,500.00
g	11.11%	g	11.11%
f_c	7.00%	f_c	7.00%
k_r	13.46%	k_r	13.46%
k_e	13.64%	k_e	13.64%
k_p	7.42%	k_p	0.00%
i_e	13.29%	i_e	13.47%

Table E.3: The Cost of Equity Using the CAPM	
R_f	6.61%
R_m-R_f	6.00%
Beta	0.8
R	11.41%

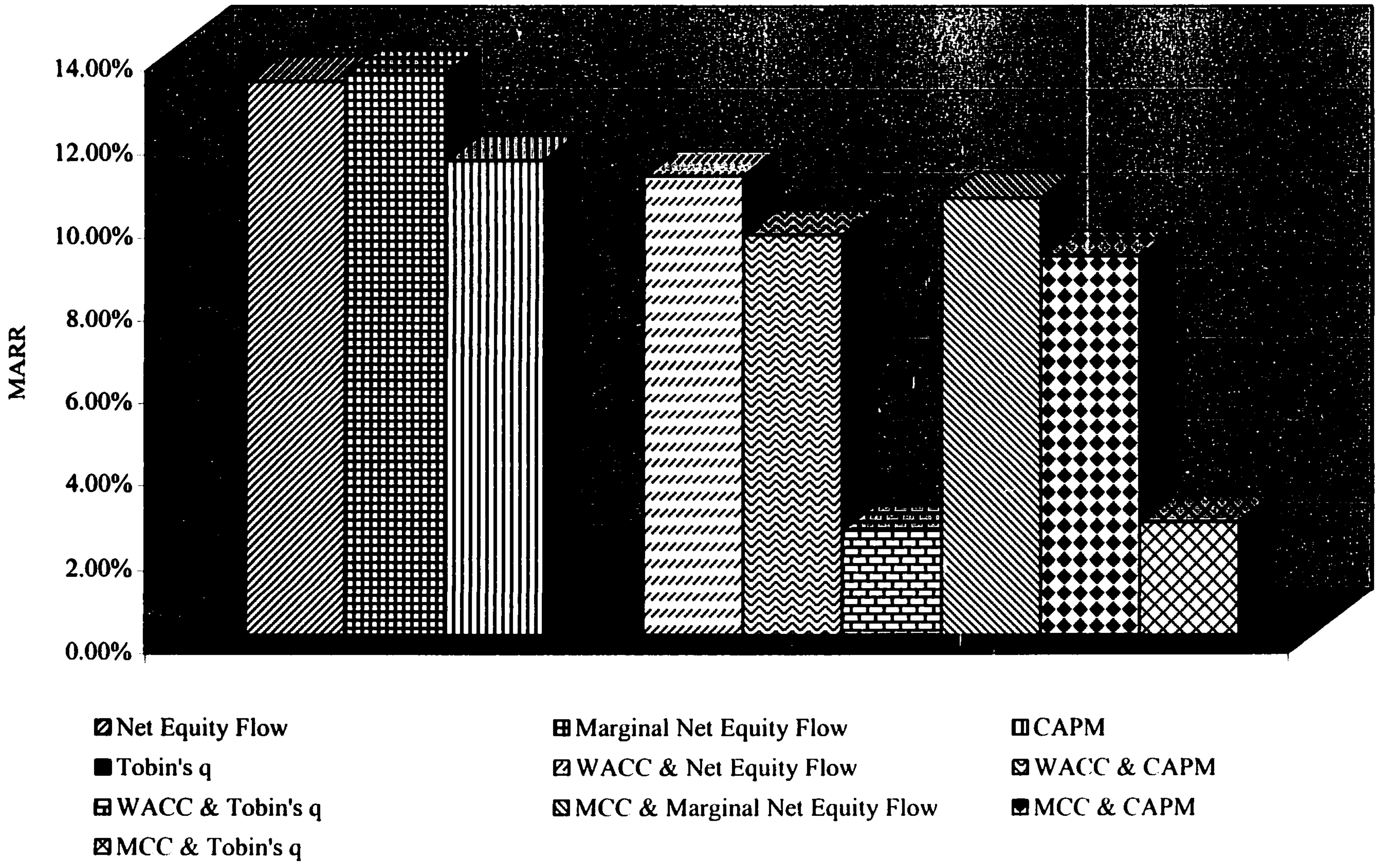
Table E.4: The Cost of Equity Using Tobin's q	
CS	229498832.00
P_0	$ 51.10
V_{CS}	**$ 11,727,390,315.20**
PS	270
P_*	$ 500,000.00
V_{PS}	**$ 135,000,000.00**
Sum of Equity	**$ 11,862,390,315.20**
STLIAB	$ 1,137,000,000.00
STASST	$ 1,650,000,000.00
STDEBT	$ 102,000,000.00
BKINV	$ 1,075,000,000.00
NETSASST	**-$ 460,000,000.00**
LTDEBT	$ 1,357,000,000.00
V	**$ 13,781,390,315.20**
RC	$ 50,844,000,000.00
q	0.271052441
E	$ 550,000,000.00
D	$ 2,054,000,000.00
b	64.71%
s	3.09%
c	67.80%
k	1.95%

Table E.5: Weighted Average Cost of Capital (WACC)		
D	$	1,285,000,000.00
E	$	3,868,000,000.00
V	$	5,153,000,000.00
Rating	A	
Cost of Debt		6.92%
Tax Rate		38.40%
i_d		4.26%
i_e		13.29%
k		1.95%
R		11.41%
$WACC_{ie}$		11.04%
$WACC_k$		2.52%
$WACC_R$		9.63%

Table E.6: Marginal Cost of Capital (MCC)	
D	$ 188,000,000.00
E	$ 397,000,000.00
V	$ 585,000,000.00
i_d	4.26%
i_e	13.47%
k	1.95%
R	11.41%
MCC_{ie}	10.51%
MCC_k	2.69%
MCC_R	9.11%

Table E.7: The 1997 MARRs for Imasco	
Method	**MARR**
Net Equity Flow	13.29%
Marginal Net Equity Flow	13.47%
CAPM	11.41%
Tobin's q	1.95%
WACC & Net Equity Flow	11.04%
WACC & Tobin's q	2.52%
WACC & CAPM	9.63%
MCC & Marginal Net Equity Flow	10.51%
MCC & Tobin's q	2.69%
MCC & CAPM	9.11%

Chart E.1: The 1997 MARRs for Imasco



APPENDIX F:

Imperial Oil Limited, 1997

Table F.1: The Cost of Equity Using the Net Equity Flow Method	
A	$ 2,090,000,000
B	$ 2,293,000,000
Total Equity	$ 4,383,000,000
a	0.48
b	0.52
P_0	$ 91.50
D_0	$ 2.20
g	7.32%
f_c	7.00%
k_r	9.72%
k_e	9.90%
i_e	9.82%

Table F.2: The Cost of Equity Using the Marginal Net Equity Flow Method	
A	$ -
B	$ -
New Equity	$ -
a	0.00
b	0.00
P_0	$ 91.50
D_0	$ 2.20
g	7.32%
f_c	7.00%
k_r	0.00%
k_e	0.00%
i_e	0.00%

Table F.3: The Cost of Equity Using the CAPM	
R_f	6.61%
R_m-R_f	6.00%
Beta	0.65
R	10.51%

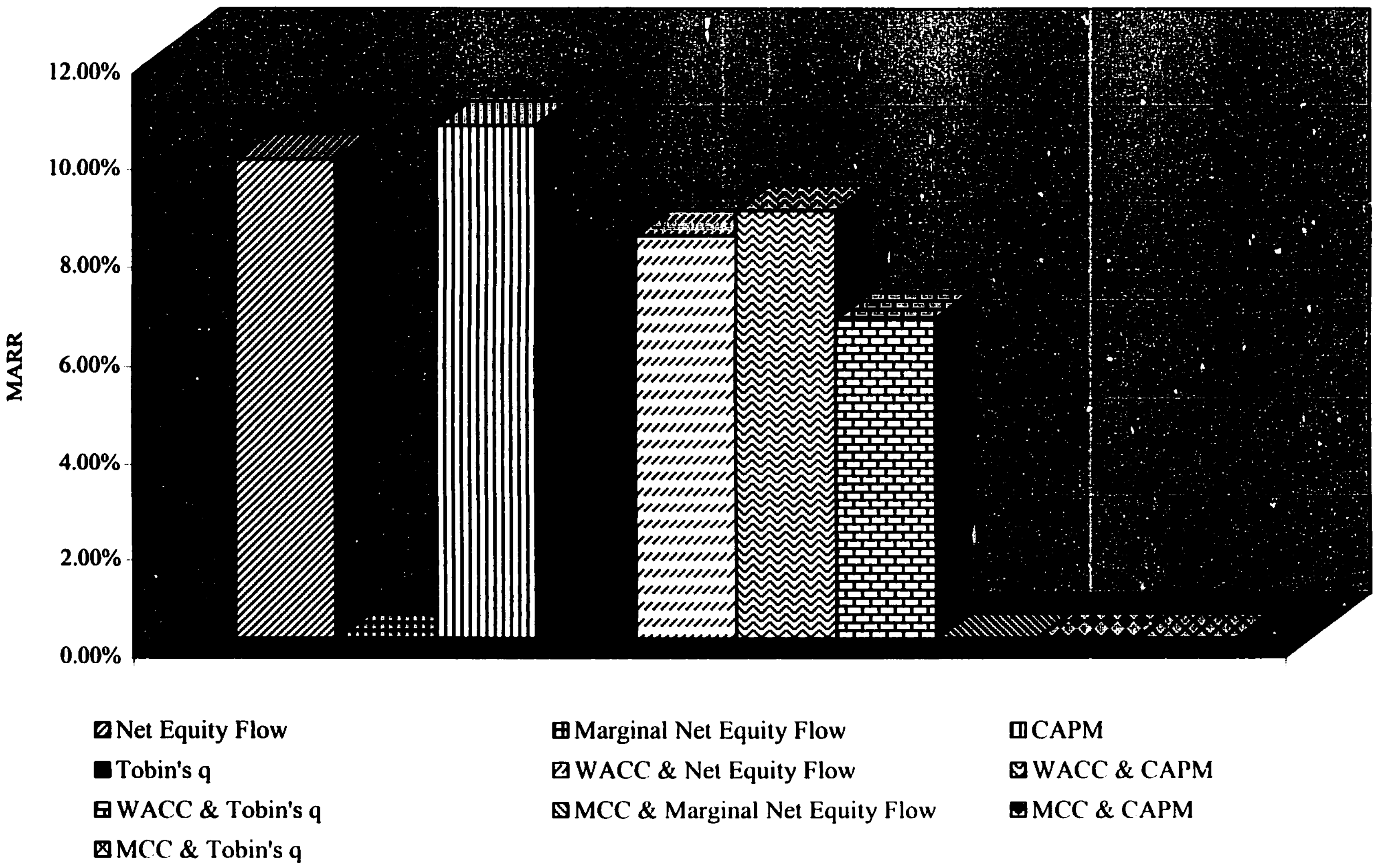
Table F.4: The Cost of Equity Using Tobin's q	
CS	149328323
P_0	$ 91.50
V_{CS}	**$ 13,663,541,554.50**
Sum of Equity	**$ 13,663,541,554.50**
STLIAB	$ 2,158,000,000.00
STASST	$ 2,428,000,000.00
STDEBT	$ -
BKINV	$ 466,000,000.00
NETSASST	**-$ 196,000,000.00**
LTDEBT	$ 1,506,000,000.00
V	**$ 15,365,541,554.50**
RC	$ 10,060,000,000.00
q	1.527389817
E	$ 847,000,000.00
D	$ 1,702,000,000.00
b	60.00%
s	0.00%
c	60.00%
k	7.57%

Table F.5: Weighted Average Cost of Capital (WACC)		
D	$	1,506,000,000.00
E	$	4,383,000,000.00
V	$	5,889,000,000.00
Rating	AA	
Cost of Debt		6.74%
Tax Rate		45.20%
i_d		3.69%
i_e		9.82%
k		7.57%
R		10.51%
WACCie		8.25%
WACCk		6.58%
WACCR		8.77%

Table F.6: Marginal Cost of Capital (MCC)		
D	$	-
E	$	-
V	$	-
i_d		3.69%
i_e		0.00%
k		7.57%
R		10.51%
WACCie		0.00%
WACCk		0.00%
WACCR		0.00%

Table F.7: The 1997 MARRs for Imperial Oil Limited	
Method	**MARR**
Net Equity Flow	9.82%
Marginal Net Equity Flow	0.00%
CAPM	10.51%
Tobin's q	7.57%
WACC & Net Equity Flow	8.25%
WACC & Tobin's q	6.58%
WACC & CAPM	8.77%
MCC & Marginal Net Equity Flow	0.00%
MCC & Tobin's q	0.00%
MCC & CAPM	0.00%

Chart F.1: The 1997 MARRs for Imperial Oil Limited



APPENDIX G:

McDonald's Corporation, 1995

Table G.1: The Cost of Equity Using the Net Equity Flow Method		
A	$	9,831,300,000
B	$	92,300,000
C	$	358,000,000
Total Equity	$	10,281,600,000
a		0.96
b		0.01
c		0.03
P_0	$	45.13
D_0	$	0.26
P_*	$	49,722.22
D_*	$	6,126.39
g		12.30%
f_c		7.00%
k_r		12.88%
k_e		12.92%
k_p		13.25%
i_e		12.89%

Table G.2: The Cost of Equity Using the Marginal Net Equity Flow Method		
A	$	1,205,400,000
B	$	-
C	$	-
New Equity	$	1,205,400,000
a		1.00
b		0.00
c		0.00
P_0	$	45.13
D_0	$	0.26
P_*	$	49,722.22
D_*	$	6,126.39
g		12.30%
f_c		7.00%
k_r		12.88%
k_e		0.00%
k_p		13.25%
i_e		12.88%

Table G.3: The Cost of Equity Using the CAPM

R_f	7.39%
R_m-R_f	6.00%
Beta	1
R	13.39%

Table G.4: The Cost of Equity Using Tobin's q

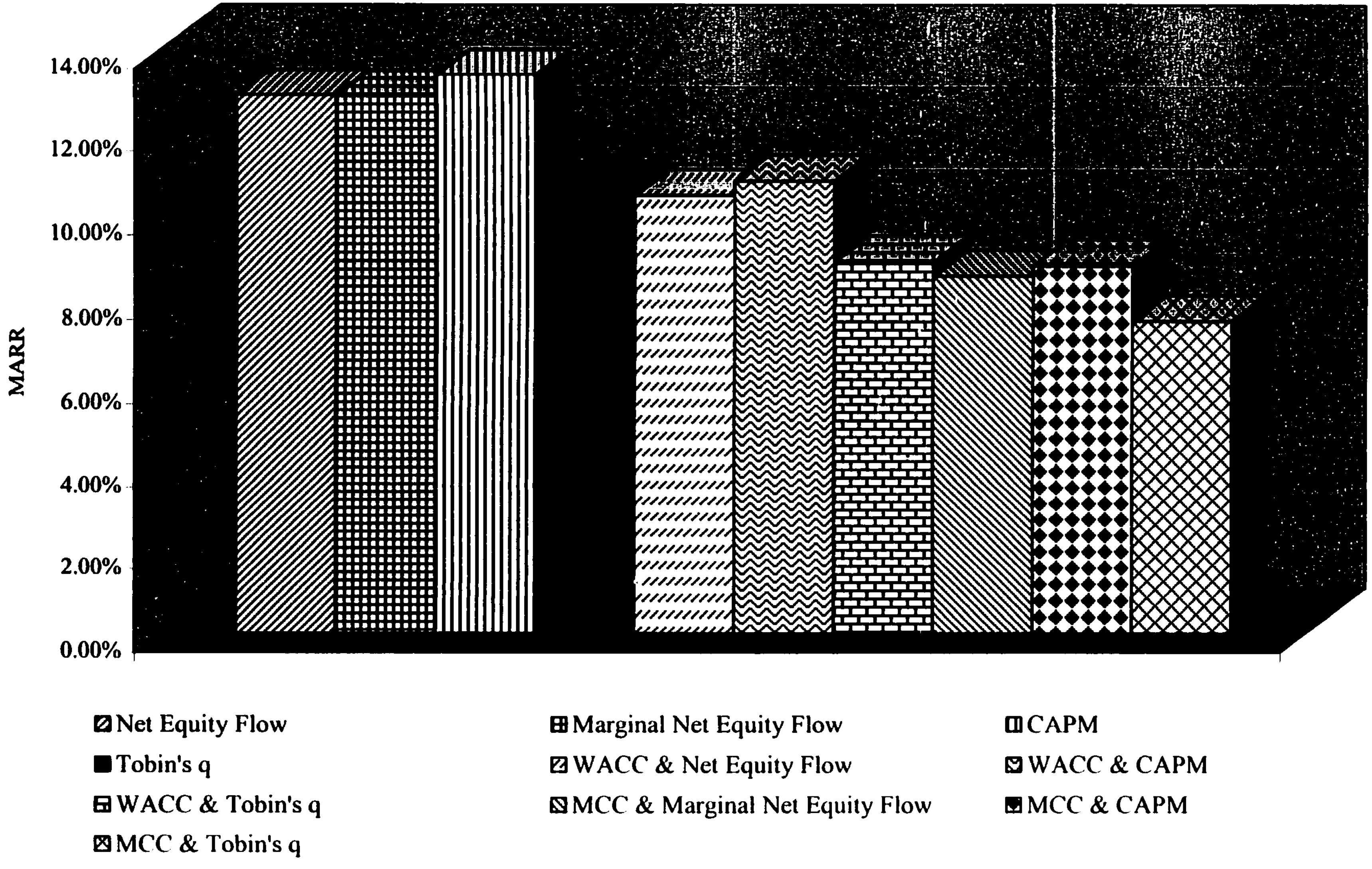
CS	701500000
P_0	$ 45.13
V_{CS}	**$ 31,655,187,500.00**
PS	7200
P_*	$ 49.722.22
V_{PS}	**$ 358,000,000.00**
Sum of Equity	**$ 32,013,187,500.00**
STLIAB	$ 1.794.900,000.00
STASST	$ 955.800.000.00
STDEBT	$ 165.200.000.00
BKINV	$ 58.000.000.00
NETSASST	**-$ 731,900,000.00**
LTDEBT	$ 4.257.800.000.00
V	**$ 37,168,087,500.00**
RC	$ 15.414.900.000.00
q	2.411179281
E	$ 1.427.300.000.00
D	$ 5.512.900.000.00
b	86.68%
s	0.00%
c	86.68%
k	10.66%

Table G.5: Weighted Average Cost of Capital (WACC)	
D	$ 4,257,800,000.00
E	$ 10,281,600,000.00
V	$ 14,539,400,000.00
Rating	AA
Cost of Debt	7.06%
Tax Rate	34.20%
i_d	4.65%
i_e	12.89%
k	10.66%
R	13.39%
$WACC_{ie}$	10.48%
$WACC_k$	8.90%
$WACC_R$	10.83%

Table G.6: Marginal Cost of Capital (MCC)	
D	$ 1,322,400,000.00
E	$ 1,205,400,000.00
V	$ 2,527,800,000.00
i_d	4.65%
i_e	12.88%
k	10.66%
R	13.39%
MCC_{ie}	8.57%
MCC_k	7.51%
MCC_R	8.82%

Table G.7: The 1995 MARRs for The McDonald's Corporation	
Method	**MARR**
Net Equity Flow	12.89%
Marginal Net Equity Flow	12.88%
CAPM	13.39%
Tobin's q	10.66%
WACC & Net Equity Flow	10.48%
WACC & Tobin's q	8.90%
WACC & CAPM	10.83%
MCC & Marginal Net Equity Flow	8.57%
MCC & Tobin's q	7.51%
MCC & CAPM	8.82%

Chart G.1: The 1995 MARRs for the McDonald's Corporation



APPENDIX H:

McDonald's Corporation, 1996

Table H.1: The Cost of Equity Using the Net Equity Flow Method

A	$	11,173,000,000
B	$	8,300,000
C	$	358,000,000
Total Equity	$	11,539,300,000
a		0.97
b		0.00
c		0.03
P_0	$	45.13
D_0	$	0.29
P_*	$	49,722.22
D_*	$	4,100.28
g		25.13%
f_c		7.00%
k_r		25.78%
k_e		25.83%
k_p		8.87%
i_e		25.26%

Table H.2: The Cost of Equity Using the Marginal Net Equity Flow Method

A	$	1,341,700,000
B	$	-
C	$	-
New Equity	$	1,341,700,000
a		1.00
b		0.00
c		0.00
P_0	$	45.13
D_0	$	0.29
P_*	$	49,722.22
D_*	$	4,100.28
g		25.13%
f_c		7.00%
k_r		25.78%
k_e		0.00%
k_p		8.87%
i_e		25.78%

Table H.3: The Cost of Equity Using the CAPM	
R_f	6.14%
R_m-R_f	6.00%
Beta	1
R	12.14%

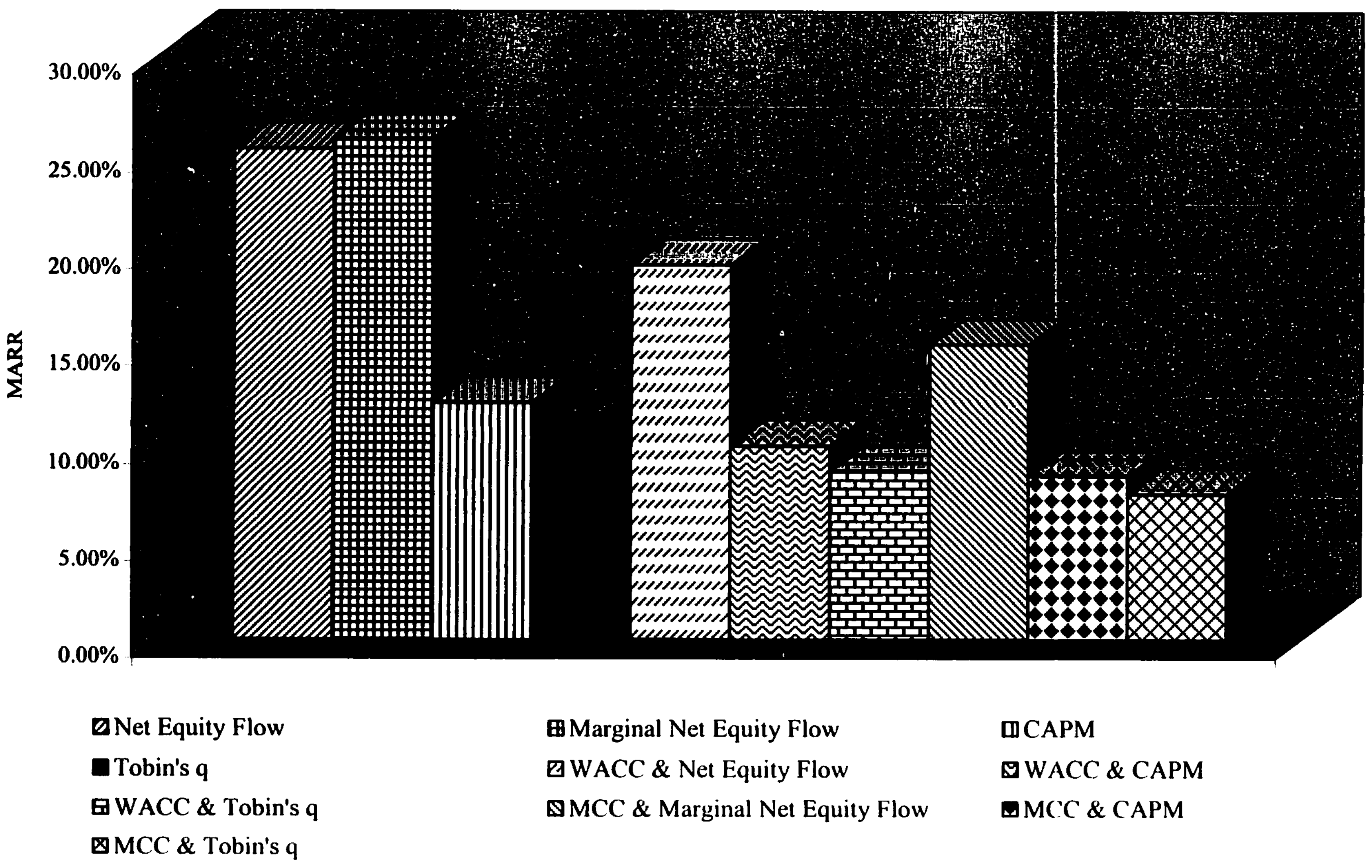
Table H.4: The Cost of Equity Using Tobin's q	
CS	698200000
P_0	$ 45.13
V_{CS}	**$ 31,506,275,000.00**
PS	7200
P.	$ 49,722.22
V_{PS}	**$ 358,000,000.00**
Sum of Equity	**$ 31,864,275,000.00**
STLIAB	$ 2,135,300,000.00
STASST	$ 1,102,500,000.00
STDEBT	$ 95,500,000.00
BKINV	$ 69,600,000.00
NETSASST	**-$ 1,006,900,000.00**
LTDEBT	$ 4,830,100,000.00
V	**$ 37,796,775,000.00**
RC	$ 17,386,000,000.00
q	2.173977626
E	$ 1,572,600,000.00
D	$ 6,290,500,000.00
b	86.76%
s	0.00%
c	86.76%
k	10.30%

Table H.5: Weighted Average Cost of Capital (WACC)	
D	$ 4,830,100,000.00
E	$ 11,539,300,000.00
V	$ 16,369,400,000.00
Rating	AA
Cost of Debt	6.96%
Tax Rate	30.10%
i_d	4.87%
i_e	25.26%
k	10.30%
R	12.14%
$WACC_{ie}$	19.24%
$WACC_k$	8.70%
$WACC_R$	9.99%

Table H.6: Marginal Cost of Capital (MCC)	
D	$ 1,391,800,000.00
E	$ 1,341,700,000.00
V	$ 2,733,500,000.00
i_d	4.87%
i_e	25.78%
k	10.30%
R	12.14%
MCC_{ie}	15.13%
MCC_k	7.53%
MCC_R	8.44%

Table H.7: The 1996 MARRs for The McDonald's Corporation	
Method	**MARR**
Net Equity Flow	25.26%
Marginal Net Equity Flow	25.78%
CAPM	12.14%
Tobin's q	10.30%
WACC & Net Equity Flow	19.24%
WACC & Tobin's q	8.70%
WACC & CAPM	9.99%
MCC & Marginal Net Equity Flow	15.13%
MCC & Tobin's q	7.53%
MCC & CAPM	8.44%

Chart H.1: The 1996 MARRs for the McDonald's Corporation



APPENDIX I:

McDonald's Corporation, 1997

Table I.1: The Cost of Equity Using the Net Equity Flow Method		Table I.2: The Cost of Equity Using the Marginal Net Equity Flow Method	
A	$ 12,569,000,000	A	$ 1,310,600,000
B	$ 8,300,000	B	$ -
Total Equity	$ 12,577,300,000	New Equity	$ 1,310,600,000
a	1.00	a	1.00
b	0.00	b	0.00
P_0	$ 38.44	P_0	$ 38.44
D_0	$ 0.32	D_0	$ 0.32
g	10.26%	g	10.26%
f_c	7.00%	f_c	7.00%
k_r	11.10%	k_r	11.10%
k_e	11.16%	k_e	0.00%
i_e	11.10%	i_e	11.10%

Table I.3: The Cost of Equity Using the CAPM	
R_f	6.61%
R_m-R_f	6.00%
Beta	0.9
R	12.01%

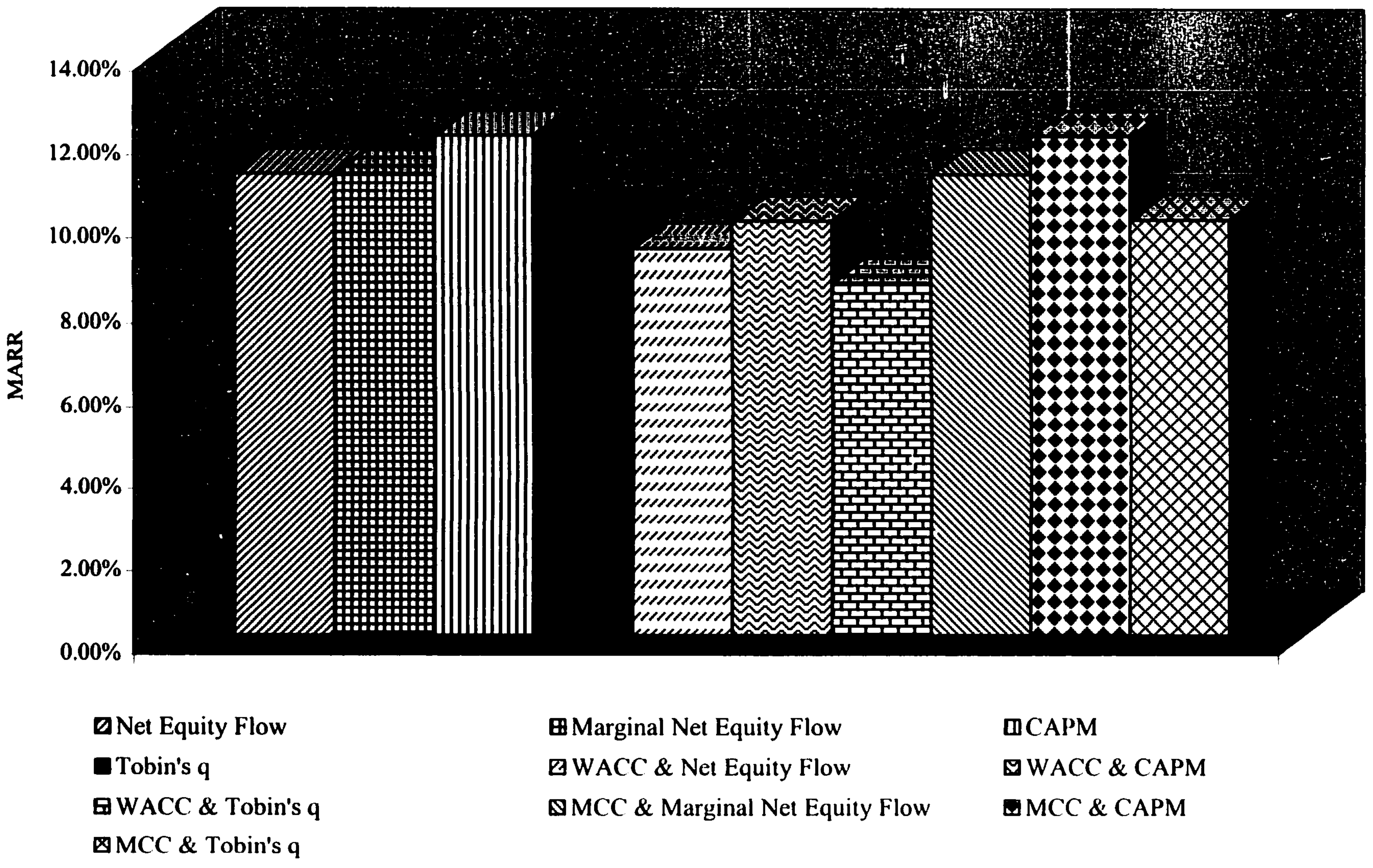
Table I.4: The Cost of Equity Using Tobin's q	
CS	689300000.00
P_0	$ 38.44
V_{CS}	**$ 26,494,968,750.00**
Sum of Equity	**$ 26,494,968,750.00**
STLIAB	$ 2,984,500,000.00
STASST	$ 1,142,300,000.00
STDEBT	$ 335,600,000.00
BKINV	$ 70,500,000.00
NETSASST	**-$ 1,577,100,000.00**
LTDEBT	$ 4,834,100,000.00
V	**$ 33,241,768,750.00**
RC	$ 18,241,500,000.00
q	1.822315531
E	$ 1,642,500,000.00
D	$ 6,746,800,000.00
b	86.28%
s	0.00%
c	86.28%
k	10.00%

Table I.5: Weighted Average Cost of Capital (WACC)	
D	$ 4,834,100,000.00
E	$ 12,577,300,000.00
V	17411400000
Rating	AA
Cost of Debt	6.74%
Tax Rate	31.80%
i_d	4.60%
i_e	11.10%
k	10.00%
R	12.01%
$WACC_{ie}$	9.29%
$WACC_k$	8.50%
$WACC_R$	9.95%

Table I.6: Marginal Cost of Capital (MCC)	
D	$ 4,000,000.00
E	$ 1,310,600,000.00
V	$ 1,314,600,000.00
i_d	4.60%
i_e	11.10%
k	10.00%
R	12.01%
MCC_{ie}	11.08%
MCC_k	9.99%
MCC_R	11.99%

Table I.7: The 1997 MARRs for The McDonald's Corporation	
Method	**MARR**
Net Equity Flow	11.10%
Marginal Net Equity Flow	11.10%
CAPM	12.01%
Tobin's q	10.00%
WACC & Net Equity Flow	9.29%
WACC & Tobin's q	8.50%
WACC & CAPM	9.95%
MCC & Marginal Net Equity Flow	11.08%
MCC & Tobin's q	9.99%
MCC & CAPM	11.99%

Chart I.1: The 1997 MARRs for the McDonald's Corporation



APPENDIX J:

McDonald's Corporation, 1998

Table J.1: The Cost of Equity Using the Net Equity Flow Method	
A	$ 13,879,600,000
B	$ 16,600,000
Total Equity	$ 13,896,200,000
a	1.00
b	0.00
P_0	$ 38.44
D_0	$ 0.18
g	9.30%
f_c	7.00%
k_r	9.76%
k_e	9.80%
i_e	9.76%

Table J.2: The Cost of Equity Using the Marginal Net Equity Flow Method	
A	$ 1,310,600,000
B	$ -
New Equity	$ 1,310,600,000
a	1.00
b	0.00
P_0	$ 38.44
D_0	$ 0.18
g	9.30%
f_c	7.00%
k_r	9.76%
k_e	0.00%
i_e	9.76%

Table J.3: The Cost of Equity Using the CAPM	
R_f	5.56%
R_m-R_f	6.00%
Beta	0.9
R	10.96%

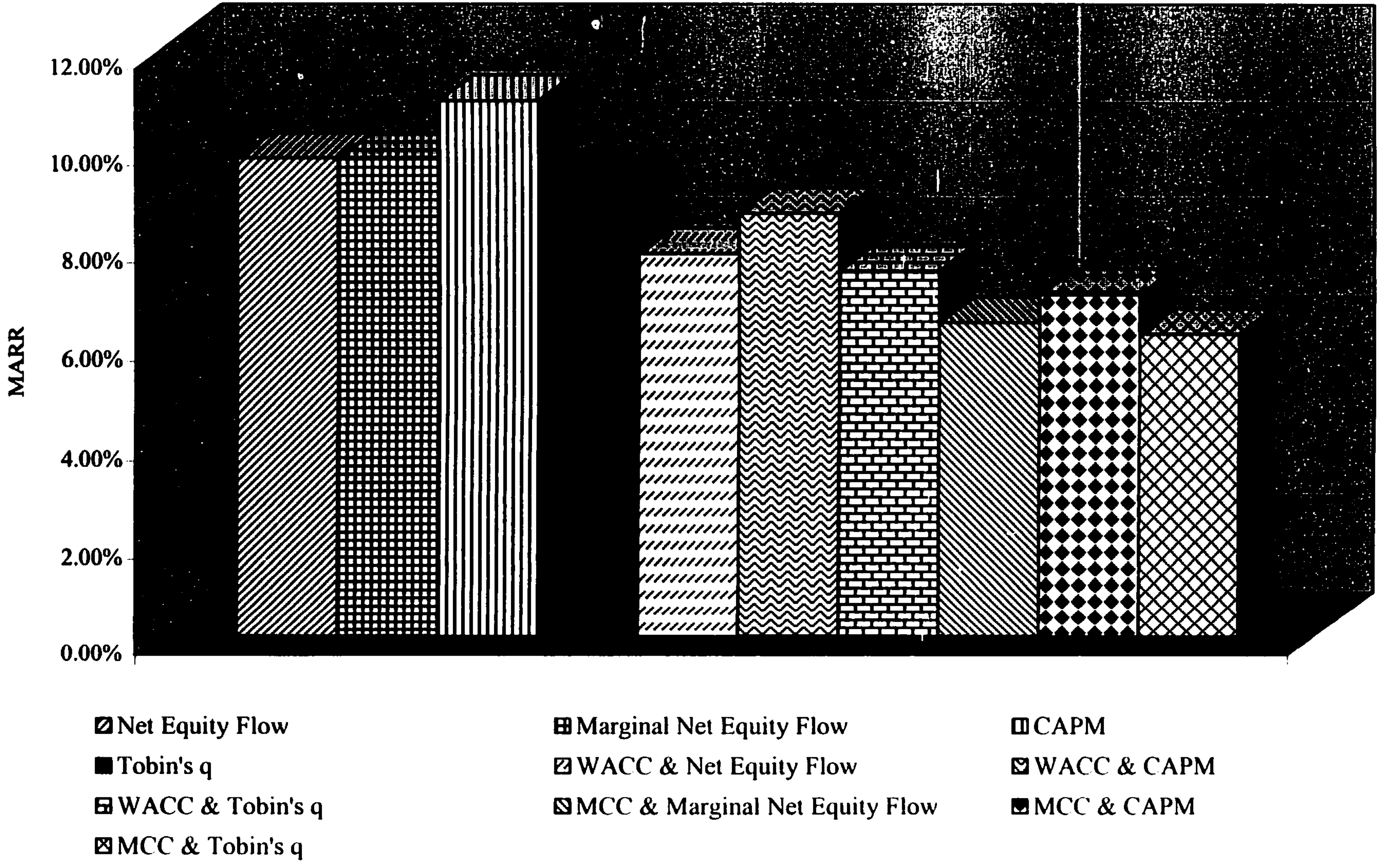
Table J.4: The Cost of Equity Using Tobin's q	
CS	1365300000.00
P_0	$ 38.44
V_{CS}	**$ 52,478,718,750.00**
Sum of Equity	**$ 52,478,718,750.00**
STLIAB	$ 2,497,100,000.00
STASST	$ 1,309,400,000.00
STDEBT	$ 168,000,000.00
BKINV	$ 77,300,000.00
NETSASST	**-$ 1,097,000,000.00**
LTDEBT	$ 6,188,600,000.00
V	**$ 59,932,318,750.00**
RC	$ 19,784,400,000.00
q	3.029271484
E	$ 1,550,100,000.00
D	$ 7,453,600,000.00
b	84.54%
s	0.00%
c	84.54%
k	9.26%

Table J.5: Weighted Average Cost of Capital (WACC)	
D	$ 6,188,600,000.00
E	$ 13,896,200,000.00
V	20084800000
Rating	AA
Cost of Debt	5.01%
Tax Rate	32.80%
i_d	3.37%
i_e	9.76%
k	9.26%
R	10.96%
$WACC_{ie}$	7.79%
$WACC_k$	7.44%
$WACC_R$	8.62%

Table J.6: Marginal Cost of Capital (MCC)	
D	$ 1,461,500,000.00
E	$ 1,310,600,000.00
V	$ 2,772,100,000.00
i_d	3.37%
i_e	9.76%
k	9.26%
R	10.96%
MCC_{ie}	6.39%
MCC_k	6.15%
MCC_R	6.96%

Table J.7: The 1998 MARRs for The McDonald's Corporation	
Method	**MARR**
Net Equity Flow	9.76%
Marginal Net Equity Flow	9.76%
CAPM	10.96%
Tobin's q	9.26%
WACC & Net Equity Flow	7.79%
WACC & Tobin's q	7.44%
WACC & CAPM	8.62%
MCC & Marginal Net Equity Flow	6.39%
MCC & Tobin's q	6.15%
MCC & CAPM	6.96%

Chart J.1: The 1998 MARRs for the McDonald's Corporation



APPENDIX K:

The Molson Companies, 1997

Table K.1: The Cost of Equity Using the Net Equity Flow Method		
A	$	447,624,000
B	$	453,036,000
C	$	6,317,000
Total Equity	$	906,977,000
a		0.49
b		0.50
c		0.01
P_0	$	25.50
D_0	$	0.72
P_*	$	25.50
D_*	$	0.72
g		0.00%
f_c		7.00%
k_r		2.82%
k_e		3.04%
k_p		3.04%
i_e		2.93%

Table K.2: The Cost of Equity Using the Marginal Net Equity Flow Method		
A	$	-
B	$	11,021,000
C	$	-
New Equity	$	11,021,000
a		0.00
b		1.00
c		0.00
P_0	$	25.50
D_0	$	0.72
P_*	$	25.50
D_*	$	0.72
g		0.00%
f_c		7.00%
k_r		0.00%
k_e		3.04%
k_p		0.00%
i_e		3.04%

Table K.3: The Cost of Equity Using the CAPM	
R_f	6.61%
R_m-R_f	6.00%
Beta	0.7
R	10.81%

Table K.4: The Cost of Equity Using Tobin's q		
CS		45759224
P_0	$	25.50
V_{CS}	**$**	**1,166,860,212.00**
PS		12847767
P.	$	25.50
V_{PS}	**$**	**327,618,058.50**
Sum of Equity	**$**	**1,494,478,270.50**
STLIAB	$	551,473,000.00
STASST	$	1,072,137,000.00
STDEBT	$	16,631,000.00
BKINV	$	154,161,000.00
NETSASST	**$**	**383,134,000.00**
LTDEBT	$	515,963,000.00
V	**$**	**1,643,938,270.50**
RC	$	2,172,341,000.00
q		0.756758847
E	$	33,465,000.00
D	$	477,078,058.50
b		-26.32%
s		32.93%
c		6.62%
k		2.00%

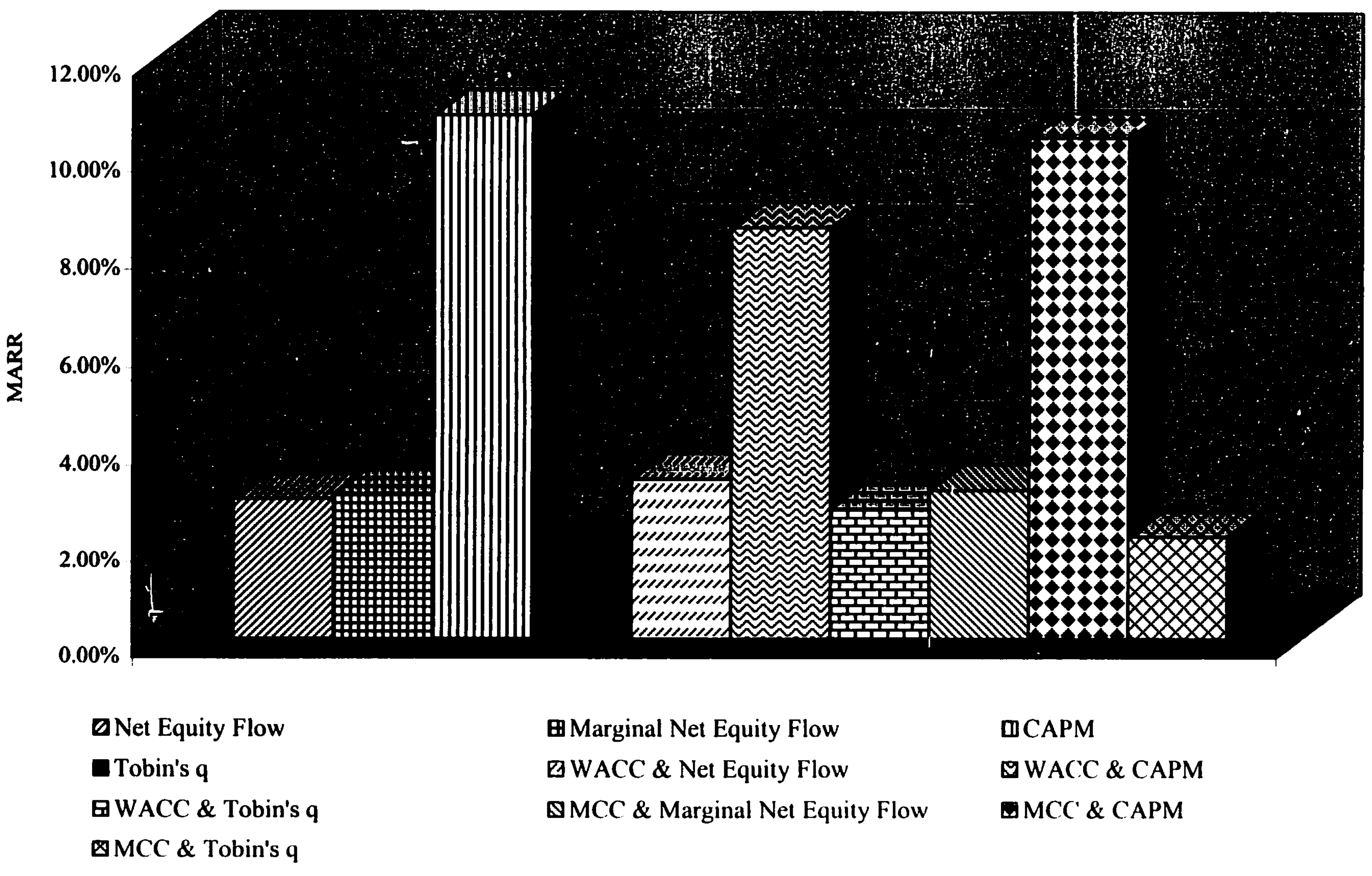
Table K.5: Weighted Average Cost of Capital (WACC)		
D	$	486,221,000.00
E	$	906,977,000.00
V	$	1,393,198,000.00
Rating	A	
Cost of Debt		6.92%
Tax Rate		40.70%
i_d		4.10%
i_e		2.93%
k		2.00%
R		10.81%
$WACC_{ie}$		3.34%
$WACC_k$		2.73%
$WACC_R$		8.47%

Table K.6: Marginal Cost of Capital (MCC)	
D	$ 864,000.00
E	$ 11,021,000.00
V	$ 11,885,000.00
i_d	4.10%
i_e	3.04%
k	2.00%
R	10.81%
MCC_{ie}	3.11%
MCC_k	2.15%
MCC_R	10.32%

Table K.7: The 1997 MARRs for The Molson Companies

Method	MARR
Net Equity Flow	2.93%
Marginal Net Equity Flow	3.04%
CAPM	10.81%
Tobin's q	2.00%
WACC & Net Equity Flow	3.34%
WACC & Tobin's q	2.73%
WACC & CAPM	8.47%
MCC & Marginal Net Equity Flow	3.11%
MCC & Tobin's q	2.15%
MCC & CAPM	10.32%

Chart K.1: The 1997 MARRs for The Molson Companies



APPENDIX L:

Newbridge Networks Corporation, 1997

Table L.1: The Cost of Equity Using the Net Equity Flow Method		
A	$	768,148,000
B	$	351,388,000
Total Equity	$	1,119,536,000
a		0.69
b		0.31
P_0	$	49.30
D_0	$	-
g		0.00%
f_c		7.00%
k_r		0.00%
k_e		0.00%
i_e		0.00%

Table L.2: The Cost of Equity Using the Marginal Net Equity Flow Method		
A	$	1,434,000,000
B	$	143,000,000
New Equity	$	1,577,000,000
a		0.91
b		0.09
P_0	$	49.30
D_0	$	-
g		0.00%
f_c		7.00%
k_r		0.00%
k_e		0.00%
i_c		0.00%

Table L.3: The Cost of Equity Using the CAPM	
R_f	6.61%
R_m-R_f	6.00%
Beta	1.65
R	16.51%

Table L.4: The Cost of Equity Using Tobin's q		
CS		171858984
P_0	$	49.30
V_{CS}	**$**	**8,472,647,911.20**
Sum of Equity	**$**	**8,472,647,911.20**
STLIAB	$	306,536,000.00
STASST	$	944,928,000.00
STDEBT	$	7,353,000.00
BKINV	$	159,495,000.00
NETSASST	**$**	**486,250,000.00**
LTDEBT	$	10,817,000.00
V	**$**	**8,004,567,911.20**
RC	$	1,496,703,000.00
q		5.348133806
E	$	156,917,000.00
D	-$	468,080,000.00
b		100.00%
s		91.13%
c		191.13%
k		14.19%

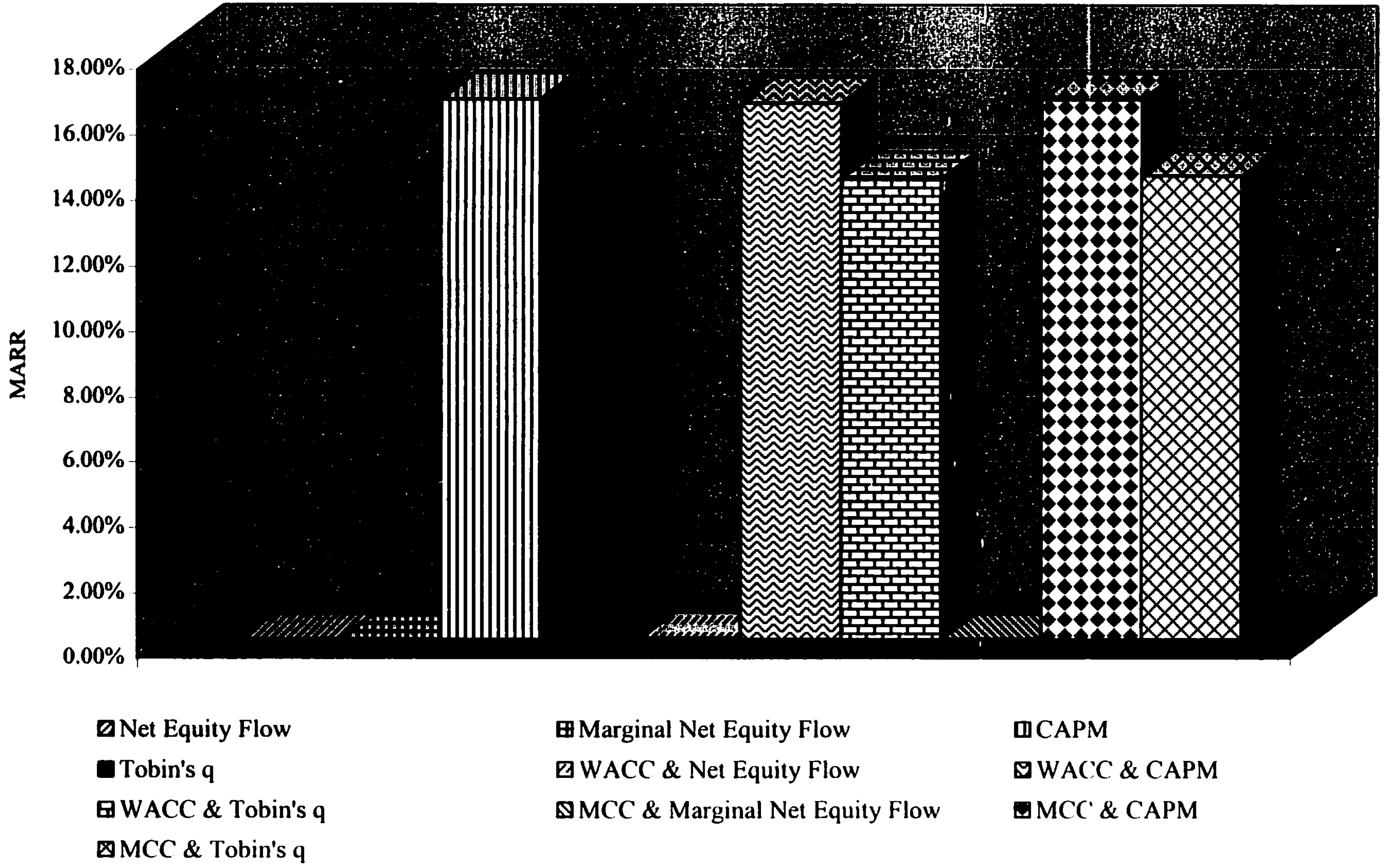
Table L.5: Weighted Average Cost of Capital (WACC)	
D	$ 10,817,000.00
E	$ 1,119,536,000.00
V	$ 1,130,353,000.00
Rating	Unknown, estimate A
Cost of Debt	6.92%
Tax Rate	42.10%
i_d	4.01%
i_e	0.00%
k	14.19%
R	16.51%
$WACC_{ie}$	0.04%
$WACC_k$	14.09%
$WACC_R$	16.39%

Table L.6: Marginal Cost of Capital (MCC)	
D	$ 1,515,000.00
E	$ 1,577,000,000.00
V	$ 1,578,515,000.00
i_d	4.01%
i_e	0.00%
k	14.19%
R	16.51%
MCC_{ie}	0.00%
MCC_k	14.18%
MCC_R	16.50%

Table L.7: The 1997 MARRs for The Newbridge Networks Corporation

Method	MARR
Net Equity Flow	0.00%
Marginal Net Equity Flow	0.00%
CAPM	16.51%
Tobin's q	14.19%
WACC & Net Equity Flow	0.04%
WACC & Tobin's q	14.09%
WACC & CAPM	16.39%
MCC & Marginal Net Equity Flow	0.00%
MCC & Tobin's q	14.18%
MCC & CAPM	16.50%

Chart L.1: The 1997 MARRs for the Newbridge Networks Corporation



APPENDIX M:

Petro Canada, 1997

Table M.1: The Cost of Equity Using the Net Equity Flow Method		
A	$	139,000,000
B	$	1,211,000,000
Total Equity	$	1,350,000,000
a		0.10
b		0.90
P_0	$	26.45
D_0	$	0.32
g		60.00%
f_c		7.00%
k_r		61.21%
k_e		61.30%
i_e		61.29%

Table M.2: The Cost of Equity Using the Marginal Net Equity Flow Method		
A	$	227,000,000
B	$	3,000,000
New Equity	$	230,000,000
a		0.99
b		0.01
P_0	$	26.45
D_0	$	0.32
g		60.00%
f_c		7.00%
k_r		61.21%
k_e		61.30%
i_e		61.21%

Table M.3: The Cost of Equity Using the CAPM	
R_f	6.61%
R_m-R_f	6.00%
Beta	1.06
R	12.97%

Table M.4: The Cost of Equity Using Tobin's q		
CS		271007532
P_0	$	26.45
V_{CS}	**$**	**7,168,149,221.40**
Sum of Equity	**$**	**7,168,149,221.40**
STLIAB	$	1,192,000,000.00
STASST	$	1,577,000,000.00
STDEBT	$	3,000,000.00
BKINV	$	510,000,000.00
NETSASST	**-$**	**122,000,000.00**
LTDEBT	$	1,488,000,000.00
V	**$**	**8,781,149,221.40**
RC	$	8,338,000,000.00
q		1.053148144
E	$	306,000,000.00
D	$	1,613,000,000.00
b		71.68%
s		0.98%
c		72.66%
k		3.65%

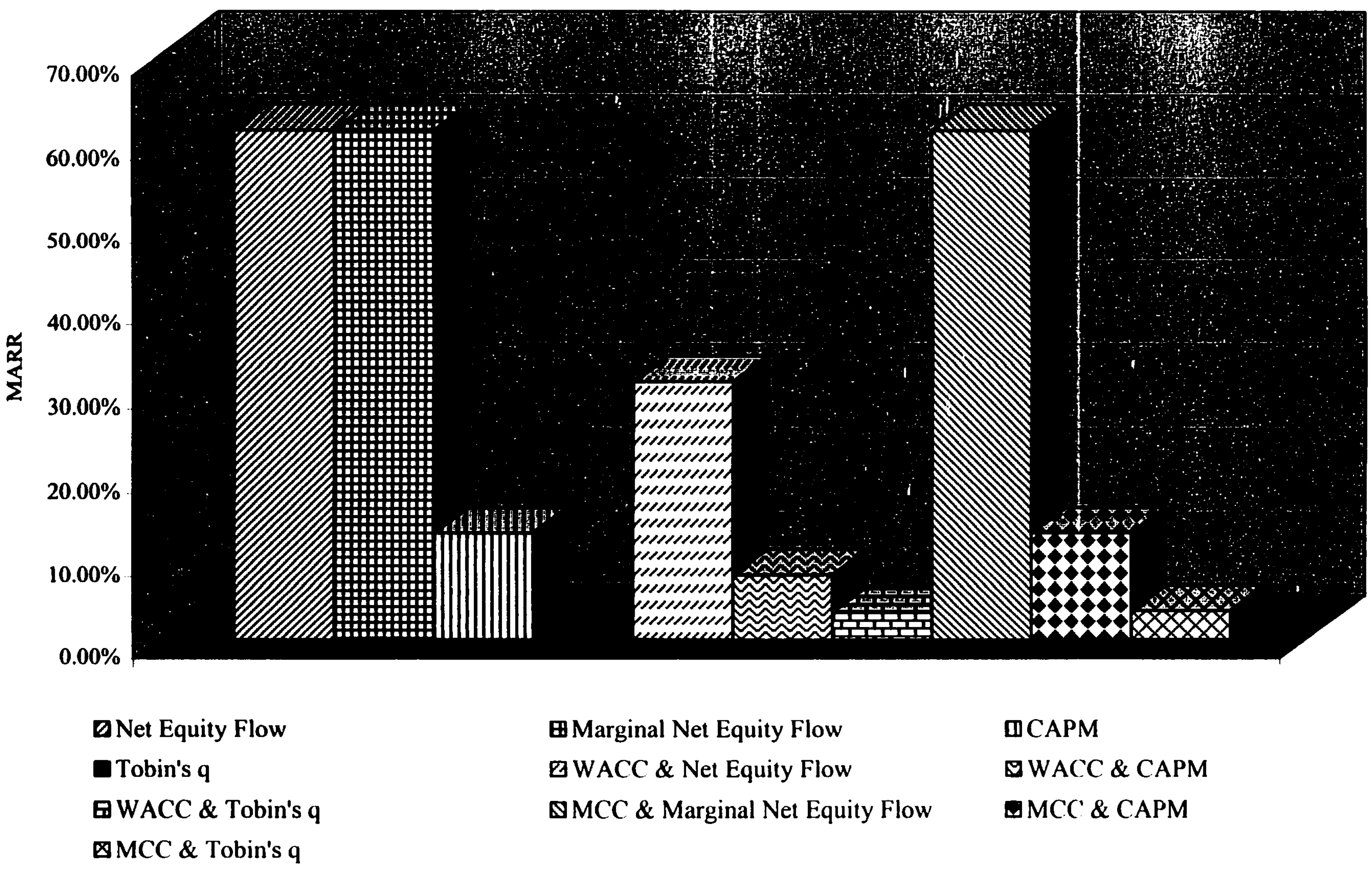
Table M.5: Weighted Average Cost of Capital (WACC)	
D	$ 1,488,000,000.00
E	$ 1,350,000,000.00
V	$ 2,838,000,000.00
Rating	A
Cost of Debt	6.92%
Tax Rate	51.90%
i_d	3.33%
i_e	61.29%
k	3.65%
R	12.97%
$WACC_{ie}$	30.90%
$WACC_k$	3.48%
$WACC_R$	7.91%

Table M.6: Marginal Cost of Capital (MCC)	
D	$ -
E	$ 230,000,000.00
V	$ 230,000,000.00
i_d	3.33%
i_e	61.21%
k	3.65%
R	12.97%
MCC_{ie}	61.21%
MCC_k	3.65%
MCC_R	12.97%

Table M.7: The 1997 MARRs for Petro Canada

Method	MARR
Net Equity Flow	61.29%
Marginal Net Equity Flow	61.21%
CAPM	12.97%
Tobin's q	3.65%
WACC & Net Equity Flow	30.90%
WACC & Tobin's q	3.48%
WACC & CAPM	7.91%
MCC & Marginal Net Equity Flow	61.21%
MCC & Tobin's q	3.65%
MCC & CAPM	12.97%

Chart M.1: The 1997 MARRs for Petro Canada



APPENDIX N:

Suncor Energy, 1997

Table N.1: The Cost of Equity Using the Net Equity Flow Method	
A	$ 888,000,000
B	$ 513,000,000
Total Equity	$ 1,401,000,000
a	0.63
b	0.37
P_0	$ 48.95
D_0	$ 0.68
g	6.25%
f_c	7.00%
k_r	7.64%
k_e	7.74%
i_e	7.68%

Table N.2: The Cost of Equity Using the Marginal Net Equity Flow Method	
A	$ 149,000,000
B	$ 7,000,000
New Equity	$ 156,000,000
a	0.96
b	0.04
P_0	$ 48.95
D_0	$ 0.68
g	6.25%
f_c	7.00%
k_r	7.64%
k_e	7.74%
i_e	7.64%

Table N.3: The Cost of Equity Using the CAPM	
R_f	6.61%
R_m-R_f	6.00%
Beta	0.87
R	11.83%

Table N.4: The Cost of Equity Using Tobin's q	
CS	109906633
P_0	$ 48.95
V_{CS}	**$ 5,379,929,685.35**
Sum of Equity	**$ 5,379,929,685.35**
STLIAB	$ 513,000,000.00
STASST	$ 439,000,000.00
STDEBT	$ 6,000,000.00
BKINV	$ 159,000,000.00
NETSASST	**-$ 227,000,000.00**
LTDEBT	$ 787,000,000.00
V	**$ 6,399,929,685.35**
RC	$ 3,457,000,000.00
q	1.85129583
E	$ 223,000,000.00
D	$ 1,020,000,000.00
b	66.67%
s	3.14%
c	69.81%
k	6.26%

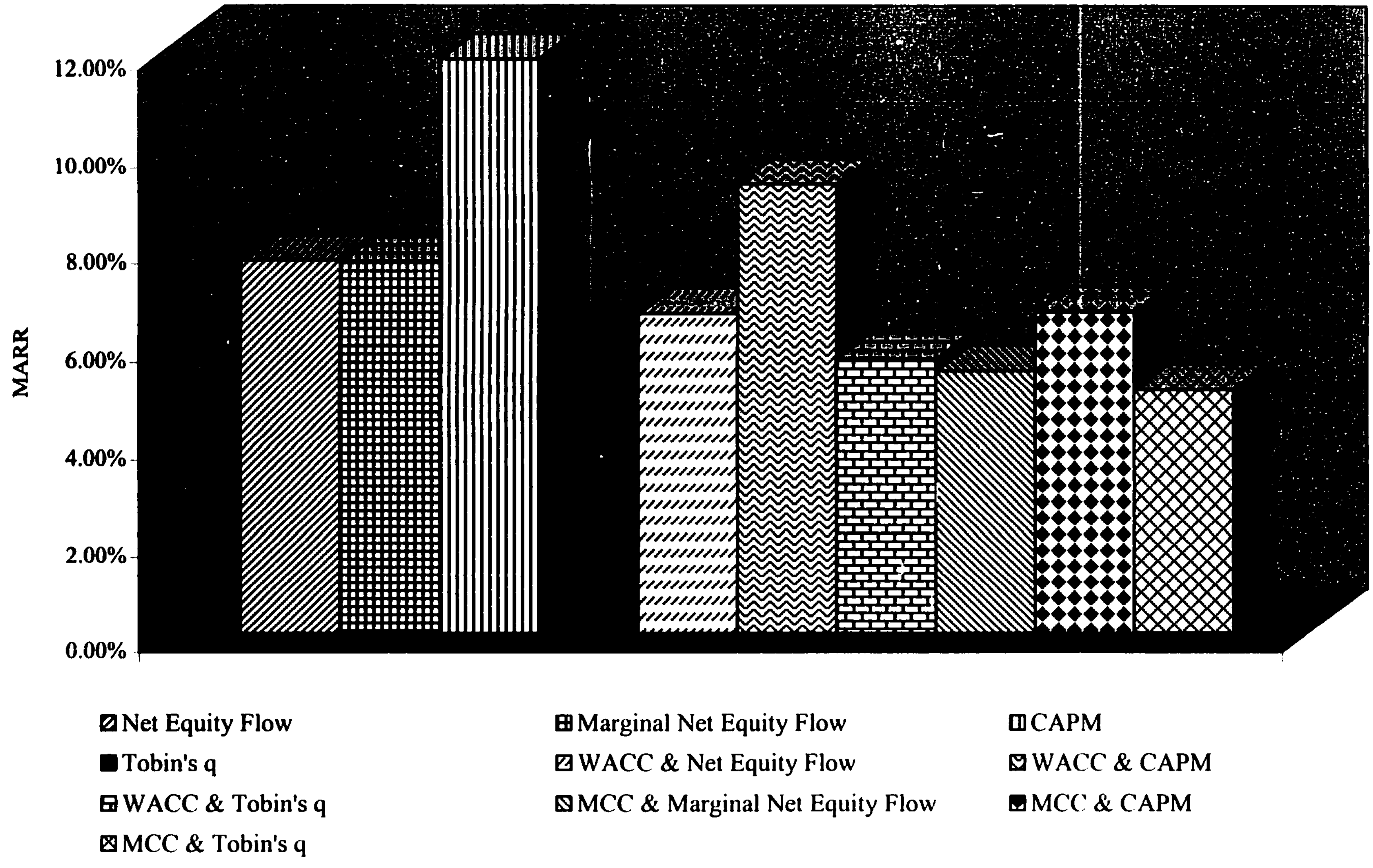
Table N.5: Weighted Average Cost of Capital (WACC)	
D	$ 767,000,000.00
E	$ 1,401,000,000.00
V	$ 2,168,000,000.00
Rating	A
Cost of Debt	6.92%
Tax Rate	34.00%
i_d	4.57%
i_e	7.68%
k	6.26%
R	11.83%
$WACC_{ie}$	6.58%
$WACC_k$	5.66%
$WACC_R$	9.26%

Table N.6: Marginal Cost of Capital (MCC)	
D	$ 400,000,000.00
E	$ 156,000,000.00
V	$ 556,000,000.00
i_d	4.57%
i_e	7.64%
k	6.26%
R	11.83%
MCC_{ie}	5.43%
MCC_k	5.04%
MCC_R	6.60%

Table N.7: The 1997 MARRs for Suncor Energy

Method	MARR
Net Equity Flow	7.68%
Marginal Net Equity Flow	7.64%
CAPM	11.83%
Tobin's q	6.26%
WACC & Net Equity Flow	6.58%
WACC & Tobin's q	5.66%
WACC & CAPM	9.26%
MCC & Marginal Net Equity Flow	5.43%
MCC & Tobin's q	5.04%
MCC & CAPM	6.60%

Chart N.1: The 1997 MARRs for Suncor Energy



APPENDIX O:

The Thomson Corporation, 1997

Table O.1: The Cost of Equity Using the Net Equity Flow Method		
A	$	3,665,000,000
B	$	1,145,000,000
C	$	110,000,000
D	$	332,000,000
Total Equity	$	5,252,000,000
a		0.70
b		0.22
c		0.02
d		0.06
P_0	$	39.40
D_0	$	0.59
$P_{\bullet II}$	$	24.25
$D_{\bullet II}$	$	0.93
$P_{\bullet V}$	$	25.00
$D_{\bullet V}$	$	1.25
g		5.83%
f_c		7.00%
k_r		7.33%
k_e		7.44%
k_{pII}		4.12%
k_{pV}		5.38%
i_e		7.16%

Table O.2: The Cost of Equity Using the Marginal Net Equity Flow Method		
A	$	192,000,000
B	$	152,000,000
C	$	-
D	$	-
New Equity	$	344,000,000
a		0.56
b		0.44
c		0.00
d		0.00
P_0	$	39.40
D_0	$	0.59
$P_{\bullet II}$	$	24.25
$D_{\bullet II}$	$	0.93
$P_{\bullet V}$	$	25.00
$D_{\bullet V}$	$	1.25
g		5.83%
f_c		7.00%
k_r		7.33%
k_e		7.44%
k_{pII}		0.00%
k_{pV}		0.00%
i_e		7.38%

Table O.3: The Cost of Equity Using the CAPM	
R_f	6.61%
R_m-R_f	6.00%
Beta	0.9
R	12.01%

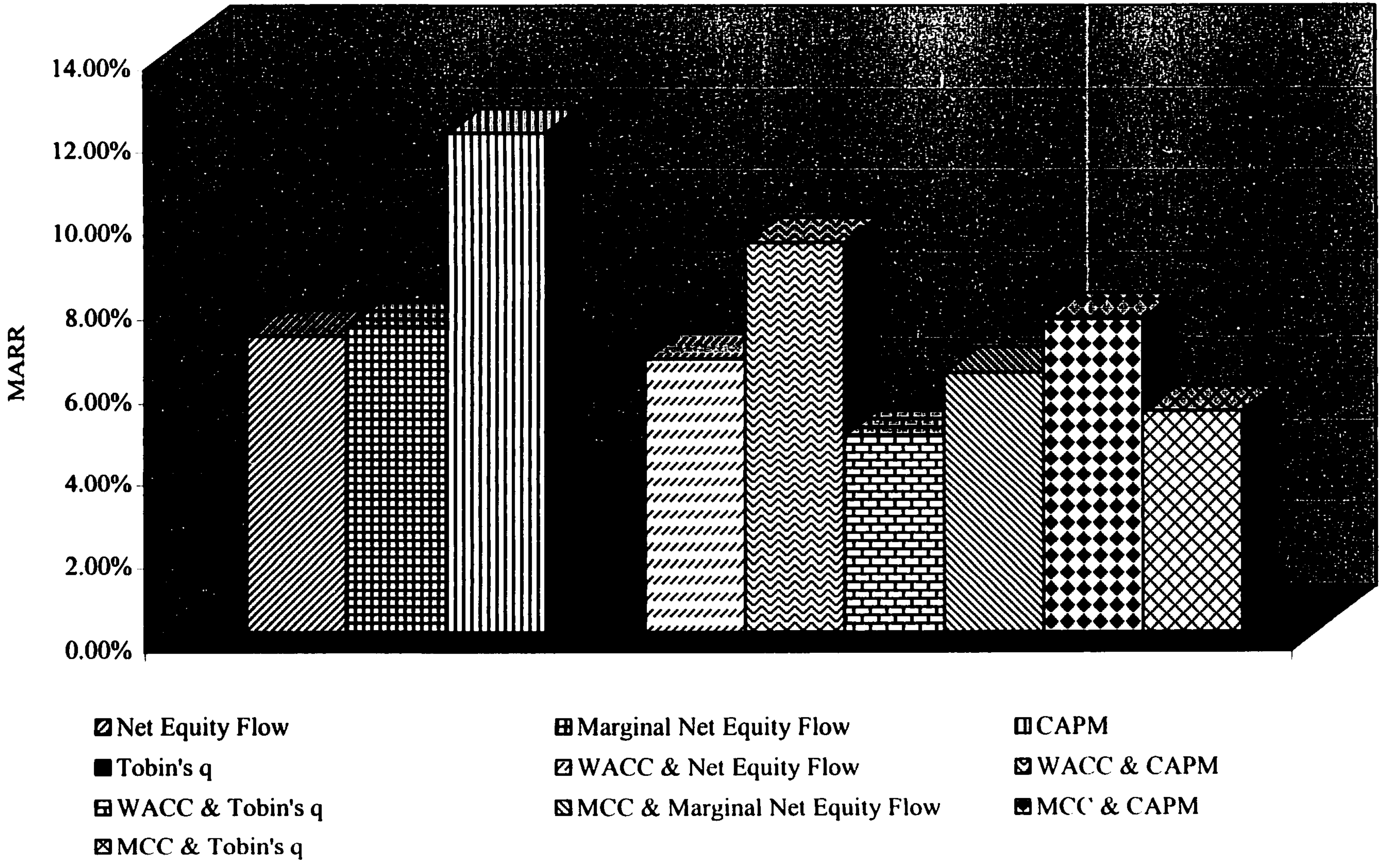
Table O.4: The Cost of Equity Using Tobin's q	
CS	610224658.00
P_0	$ 39.40
V_{CS}	**$ 24,042,851,525.20**
PS_{II}	6000000
$P_{\bullet II}$	$ 24.25
V_{PSII}	**$ 145,500,000.00**
PS_V	18000000
$P_{\bullet V}$	$ 25.00
V_{PSV}	**$ 450,000,000.00**
Sum of Equity	**$ 24,638,351,525.20**
STLIAB	$ 2,872,000,000.00
STASST	$ 2,680,000,000.00
STDEBT	$ 208,000,000.00
BKINV	$ 281,000,000.00
NETSASST	**-$ 265,000,000.00**
LTDEBT	$ 4,006,000,000.00
V	**$ 29,117,351,525.20**
RC	$ 13,333,000,000.00
q	2.183855961
E	$ 550,000,000.00
D	$ 5,074,500,000.00
b	35.16%
s	27.64%
c	62.80%
k	3.97%

Table O.5: Weighted Average Cost of Capital (WACC)	
D	$ 4,006,000,000.00
E	$ 5,252,000,000.00
V	9258000000
Rating	A
Cost of Debt	6.92%
Tax Rate	15.20%
i_d	5.87%
i_e	7.16%
k	3.97%
R	12.01%
$WACC_{ie}$	6.60%
$WACC_k$	4.79%
$WACC_R$	9.35%

Table O.6: Marginal Cost of Capital (MCC)	
D	$ 918,000,000.00
E	$ 344,000,000.00
V	$ 1,262,000,000.00
i_d	5.87%
i_e	7.38%
k	3.97%
R	12.01%
MCC_{ie}	6.28%
MCC_k	5.35%
MCC_R	7.54%

Table O.7: The 1997 MARRs for The Thomson Corporation	
Method	**MARR**
Net Equity Flow	7.16%
Marginal Net Equity Flow	7.38%
CAPM	12.01%
Tobin's q	3.97%
WACC & Net Equity Flow	6.60%
WACC & Tobin's q	4.79%
WACC & CAPM	9.35%
MCC & Marginal Net Equity Flow	6.28%
MCC & Tobin's q	5.35%
MCC & CAPM	7.54%

Chart O.1: The 1997 MARRs for the Thomson Corporation



APPENDIX P:

Summary of MARRs

Table P.1: 1997 MARRS

Method	AC	BCE	IBM	IM	IO	MO	NN	McD	PC	SE	TC	Low	High
Net Equity Flow	0.00%	3.59%	18.15%	13.29%	9.82%	2.93%	0.00%	11.10%	51.29%	7.68%	7.16%	0.00%	61.29%
Marginal Net Equity Flow	0.00%	5.49%	18.02%	13.47%	0.00%	3.04%	0.00%	11.10%	61.21%	7.64%	7.38%	0.00%	61.21%
CAPM	12.43%	11.41%	12.16%	11.41%	10.51%	10.81%	16.51%	12.01%	12.97%	11.83%	12.01%	10.51%	16.51%
Tobin's q	6.49%	11.68%	10.27%	1.95%	7.57%	2.00%	14.19%	10.00%	3.65%	6.26%	3.97%	1.95%	14.19%
WACC & Net Equity Flow	2.97%	3.82%	12.64%	11.04%	8.25%	3.34%	0.04%	9.29%	30.90%	6.58%	6.60%	0.04%	30.90%
WACC & Tobin's q	4.98%	7.35%	7.97%	2.52%	6.58%	2.73%	14.09%	8.50%	3.48%	5.66%	4.79%	2.52%	14.09%
WACC & CAPM	6.83%	7.23%	9.09%	9.63%	8.77%	8.47%	16.39%	9.95%	7.91%	9.26%	9.35%	6.83%	16.39%
MCC & Marginal Net Equity Flow	1.51%	5.22%	5.77%	10.51%	0.00%	3.11%	0.00%	11.08%	61.21%	5.43%	6.28%	0.00%	61.21%
MCC & Tobin's q	5.73%	10.30%	5.12%	2.69%	0.00%	2.15%	14.18%	9.98%	3.65%	5.04%	5.35%	0.00%	14.18%
MCC & CAPM	9.58%	10.07%	5.28%	9.11%	0.00%	10.32%	16.50%	11.99%	12.97%	6.60%	7.54%	0.00%	16.50%
Difference	12.43%	8.09%	13.03%	11.52%	10.51%	8.81%	16.51%	3.51%	57.81%	8.04%	10.51%	3.51%	57.81%
CAPM - Tobin's q	5.94%	-0.27%	1.89%	9.46%	2.94%	8.81%	2.32%	2.01%	9.32%	5.57%	8.04%		

14.62% =Average Range
5.09% =Average CAPM-Tobin's q

Table P.2: MARRs for McDonald's				
	95	96	97	98
Net Equity Flow	12.89%	25.26%	11.10%	9.76%
Marginal Net Equity Flow	12.88%	25.78%	11.10%	9.76%
CAPM	13.39%	12.14%	12.01%	10.96%
Tobin's q	10.66%	10.30%	10.00%	9.26%
WACC & Net Equity Flow	10.48%	19.24%	9.29%	7.79%
WACC & Tobin's q	8.90%	8.70%	8.50%	7.44%
WACC & CAPM	10.83%	9.99%	9.95%	8.62%
MCC & Marginal Net Equity Flow	8.57%	15.13%	11.08%	6.39%
MCC & Tobin's q	7.51%	7.53%	9.98%	6.15%
MCC & CAPM	8.82%	8.44%	11.99%	9.96%
CAPM - Tobin's q	2.73%	1.84%	2.01%	1.70%