ACCOUNTING FOR INFLATION IN CAPITAL DECISIONS

by

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ABSTRACT

At the present time the earnings price ratios at which earnings are being capitalized in the market are extremely high. This indicates that any investment undertaken by firms should yield a very high rate of return to reflect the high cost of equity capital which the market is demanding. However, aggregate investment in the economy is very high at this point in time which is inconsistent with the prevailing assessment of scarcity of projects with extraordinarily high rates of return. One of the explanations of this inconsistency may be that investors and corporations are not taking inflation into proper account when making investment decisions.

The purpose of this thesis is to investigate exactly how corporations have taken inflation into account when evaluating investment decisions. A survey of the top one hundred companies in the Fortune 500 was undertaken to determine what types of changes have been made in their methods of evaluating projects to adjust for rising inflation. The survey data was gathered by requesting the comptrollers of the Fortune one hundred to complete a written questionnaire.

The results of the survey indicate that a significant percentage of companies have not made what would be considered to be the appropriate adjustments for inflation. These errors will lead to some companies viewing an unprofitable investment as profitable, while others will see attractive investments as being unattractive. Although the net bias which results from these errors is not completely clear, indications are that it would be towards over investment. This supports the hypothesis that the very high level of investment in the economy may be due to inflation induced errors.

Two methods of evaluating investments under inflationary conditions are presented. One of these methods uses a traditional net present value approach, while the other utilizes the newer adjusted present value method. In each case the appropriate adjustments for inflation are discussed at length.

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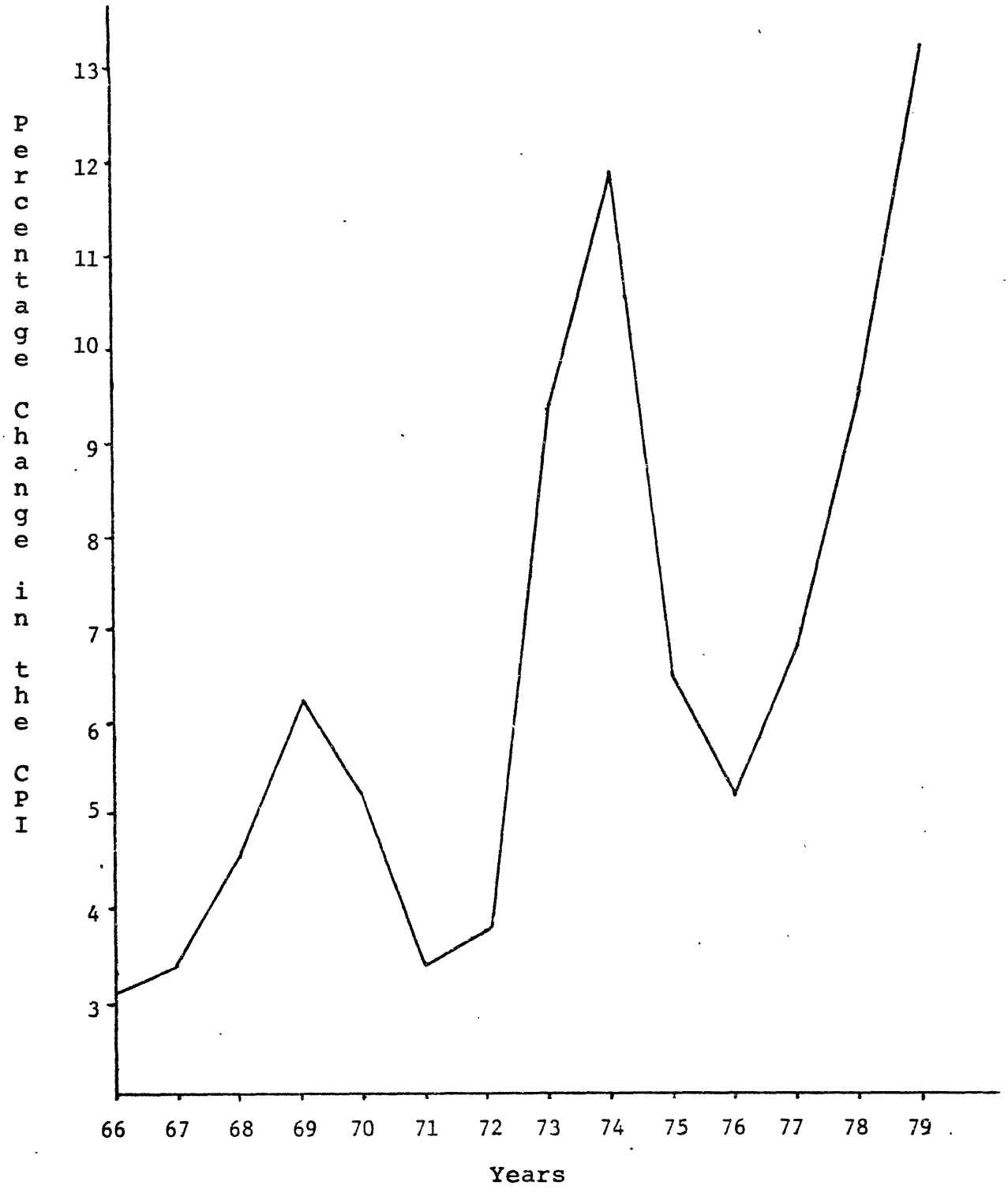
Chapter I: INTRODUCTION

In recent years the economy of the United States has experienced ever increasing rates of inflation. As measured by the Consumer Price Index, inflation has risen from 3.4 percent in 1971 to 13.2 percent during 1979. Figure I illustrates the dramatic increases which have taken place over the last decade in the rate of inflation. The purpose of this thesis is to investigate one of the effects which inflation has had on our economy; namely, its effect on the allocation of capital by U.S. corporations for investment in real assets.

In 1978 Modigliani and Cohn[9] hypothesized that the stock market was substantially undervalued. They noted that Standard and Poors index of five hundred stocks had shown a 45 percent decrease in stock values in real terms since 1968. The article shows how many investors may be suffering from a type of money and interest rate illusion when they value claims on real assets. Due to the high rates of inflation which have persisted over the past decade, this interest rate illusion, they claim, has led to a systematic undervaluation of the stock market. One of the author's hypotheses is that market participants do not distinguish well between real and nominal rates of return and often demand nominal rates of return when in fact they should be capitalizing current earnings by a real rate. If it is true that market investors are not dealing with inflation correctly, this certainly raises the question of how managers, who are making decisions on investments in

FIGURE I

Percentage Increase in the Consumer Price Index
from 1966 to 1971



real assets, are dealing with inflation. Furthermore, if managers too are confusing real and nominal returns, this could have an impact on the level of aggregate investment in real assets made by corporations.

Chapter II: AN INVESTMENT PARADOX?

Over the past decade investment in real goods in the economy has remained relatively strong despite a downward trend in the stock market. This has led some economists to believe that real investment in the economy is greater than the required rate of return demanded by investors would indicate it should be. In order to display this effect, a rough measure of the real cost of capital to U.S. corporations has been plotted in series 1 of Figure II. Series 2 and 3 of Figure II plot real fixed nonresidential investment in structures and producers durable equipment respectively as a percentage of real GNP. The real cost of capital was calculated by using the following formula and assumptions:

$$\rho = si + L(R(1-T)-pT)^*$$

where:

ρ = Post tax required rate of return

i = Market capitalization rate. In this case taken to be equal to the earnings price ratio of the S&P 500.

R = The real required return on AAA debt, taken to be 2% over the entire period.

p = The rate of inflation the market was forecasting in the year examined. Calculated as the difference between AAA yields in the year examined minus the real required rate of 2%.

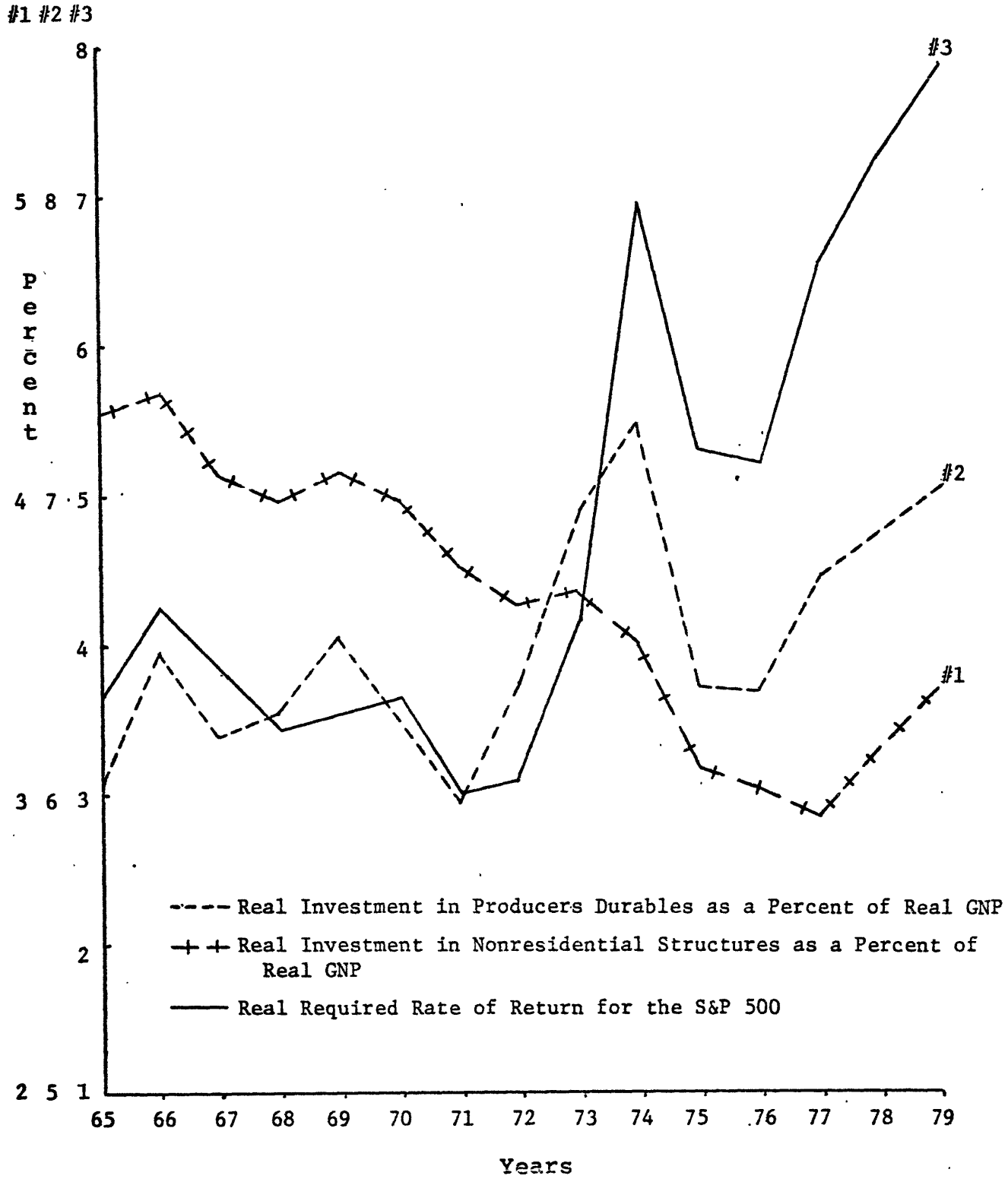
T = Corporate tax rate of 50%.

s = Percentage of corporate capital structure comprised of stock. For the S&P 500 this was assumed to be 67%.

*A more correct form would be $\rho = si + L(R(1-T) - pT - pRT)$, but the pRT term has been dropped because it is extremely small.

FIGURE II

Real Investment in Durables & Structures and
the Real Cost of Capital for the S&P 500 Over Time



L = Percentage of debt in the corporate capital structure. For the S&P 500 this was assumed to be 33%.

r = The nominal rate of return on AAA debt.

Note: $r = R + p + pR$

Post tax nominal debt rate $= r(1 - T) = (R + p + pR)(1 - T)$

Post tax real debt rate $= r(1 - T) - p - pR =$
$(R + p + pR)(1 - T) - p - pR$

Post tax real debt rate $= R(1 - T) - pT - pRT$
$\approx R(1 - T) - pT$

Note that this formula is the well accepted form of the average cost of capital formula. The pT term in the debt portion of the equation represents the gain which accrues to the debtor by borrowing during a period of inflation. The tax deductibility of the inflation premium in the nominal interest rate reduces the real rate of interest of the debt.

If we subscribe to the notion that business managers look to the capital markets to determine the required rate of return for investment proposals, Figure II raises some interesting questions. In aggregate, the cost of capital to U.S. corporations appears to have nearly doubled since the Sixties. As one would expect, the real investment in nonresidential structures as a percentage of real GNP has declined over this period. However, it has increased dramatically for the last two years, while the aggregate cost of corporate capital has also increased. This is not explicable in light of the classical relationship which is assumed between interest rates and investment. Theory predicts that firms invest less as the cost

of capital increases because projects which yield rates of return greater than the cost of capital become more scarce. This is a very short run phenomena, though, and it doesn't seem that we should jump to conclusions based upon two years of increase in the rate of investment in structures. If we turn our attention to durables, the paradox becomes much more striking. While the cost of corporate capital has risen dramatically since 1965, the amount of real investment in producers durable equipment as a percentage of real GNP has also increased significantly. This certainly seems counter intuitive. We would expect that as managers saw the required rate of return which the market demanded of their firms rising they would be able to find fewer real investments which met the criteria for acceptance. The observed trend might make sense if real returns to capital as measured by the rate of return on depreciable assets were increasing over this period. However, this is not the case. Real returns to capital* have decreased, which makes it hard to understand why corporations increase their rate of investment.

It is not the purpose or intent of this thesis to prove or disprove the above mentioned paradox. This has merely been presented so as to illustrate the need to investigate the methods by which managers evaluate investment proposals. Particularly since much of the paradoxical nature of Figure II

*Profits before taxes plus capital consumption adjustment and inventory valuation adjustment plus net interest paid divided by the stock of depreciable assets valued at current replacement cost.

has taken place during periods of high inflation, it may be worthwhile to investigate exactly how large corporations are accounting for inflation in their capital budgeting processes.

Chapter III: INFLATION IN CAPITAL BUDGETING

Inflation has introduced a number of new problems into the process of capital budgeting. These problems are not unavoidable, although care must be taken so that the method of analysis which has been selected is internally consistent. Let's review a number of issues which would cause problems if a proposal was to be evaluated in the context of standard capital budgeting theory in a non-inflationary environment.

First, in a period of inflation investors do not reap the full benefits of depreciation tax shields. Unlike most revenues and costs depreciation expense does not increase with inflation. As a result, the investor pays income tax on a greater percentage of his real income in times of inflation. This effect must be explicitly modeled in the capital budgeting process in order to arrive at an unbiased estimate of the attractiveness of an investment proposal.

Secondly, inflation has a favorable effect upon the interest tax shields which accrue to the debtor during inflationary periods. The interest rates which debtors face during times of inflation reflect the real interest rate plus an inflation premium. The inflation premium is to compensate debtholders for the fact that they are being repaid in deflated dollars. Since the Internal Revenue Service allows full expensing of nominal interest costs, the debtor deducts not only interest but part of the repayment of principal made to the debtholders on his income tax return. The net effect

is that the real interest rate which debtors face with inflation is lower than the rate they would pay without inflation. Again, unless explicitly accounted for, this effect could lead to a distorted view of a potential investment by a corporation.

Many firms choose to project cash flow based on present revenues and costs. This approach could lead to a poor estimate of future cash income for two reasons. First, inflation may not have an equal effect upon both costs and revenues. The corporation may be in a situation where costs increase at a rate faster than inflation while revenue increases at a rate slower than inflation. The elasticity of the demand curve which the firm faces may not allow all cost increases to be passed through to consumers and thus the company's real profit margin declines. Finally, competitors and substitution goods may be affected quite differently by inflation. This may put a firm at a relative advantage or disadvantage with regards to its competition during periods of inflation.

The effects mentioned in the preceeding paragraphs are not impossible to model or even particularly difficult to account for. The point to be noted here is that naive application of capital budgeting theory in an inflationary environment will lead to errors. Beyond the problems already mentioned there exists the problem of choosing the correct discount rates. If cash flow forecasts are based on current prices and costs it would be consistent to use rates which did not include inflation premiums. On the other hand,

forecasting cash flows based upon future prices and costs should lead to the use of a discount rate which includes an inflation premium. This simply means that real cash flows should be discounted at real interest rates while nominal cash flows should be discounted at nominal rates. This is precisely what this piece of research intends to find out. Are corporations consistent in their use of real and nominal rates or are they confusing these two in the same way as Modigliani and Cohn have suggested market investors have done?

Chapter IV: SUGGESTED APPROACHES TO CAPITAL BUDGETING UNDER INFLATION

In this section two methods for dealing with inflation in the capital budgeting process will be reviewed. The first method will be for those who project cash flows in terms of future prices and costs and will utilize the standard net present value (NPV) rule. The second method will be for those who project cash flows in terms of today's prices and costs and will make use of the adjusted present value (APV) rule. The APV rule is required in the constant dollar case so that inflation's effect on depreciation and interest tax shields can be explicitly modeled. In each case a discussion about how the proper discount rates are estimated so as not to confuse constant dollars and nominal rates, or vice versa, will be given. The purpose of this section is to illustrate the consistent application of financial analysis with inflation. It is not meant to be a complete discussion of all of the complexities or issues surrounding capital budgeting.

IV.1 A Nominal Dollar NPV Approach

In order to circumvent the problems which are introduced into the constant dollar approach to investment analysis by inflation, all cash flows and interest rates can be stated in nominal terms. The first step in any capital budgeting analysis is to make forecasts of future cash flows. Forecasts of future revenues can be arrived at by estimating revenues at present prices and then adjusting this revenue stream by some

assumed inflation rate. Calculating the correct inflation rate, however, presents somewhat of a problem. A number of approaches may prove useful. One such method suggested by M. K. Kim[6] would be to see how the price inflation of the company's output has been correlated with the consumer price index or the GNP deflator over past years. This index would then be used with an estimate of what the CPI would be over the life of the project to obtain an inflation rate to modify the constant dollar revenue stream. Such an approach can be illustrated as follows:

Where: p = Best estimate of the CPI

λ = Regression coefficient between the CPI and the price inflation of the company's product

r_i = Revenue estimate for year i stated in today's dollars

R_i = Revenue estimate for year i stated in year i dollars

$$R_i = r_i \lambda (1 + p)$$

This explicit treatment of inflation has a very convenient characteristic. It forces companies to see how their product's price is correlated with the general level of prices. To the extent that a substitutable product is less correlated with inflation, there may be a decrease in revenue due to demand effects. The substitutable product's price would not increase as rapidly with inflation and thus the price would decrease relative to the price of your product. In such a case, your company would lose real revenue because of the fact that

volume would be lost to the substitute product or because price would have to be reduced to maintain volume. However, the correlation approach has drawbacks also. The correlation coefficient of a company's price inflation with the CPI may not remain stationary over time. Thus, it may be wisest when using this method to question whether there have been any major restructurings in the economy which could have changed your λ. Another method of determining an appropriate inflator for revenue estimates may be to rely upon some type of econometric model. However, the user should be aware that most econometric models are notoriously poor at predicting prices and price levels.

Costs associated with a specific investment can be treated in the same manner as the revenues. Forecasts of the specific amount of inputs required for a project can be estimated and their costs determined based upon today's prices. Cost inflators are calculated in the same manner as described in the above paragraph. It is best though to calculate a different inflator for each of the components which make up the total costs, such as labor, materials, energy, etc. Once estimates of future nominal costs have been made, they can be combined with revenue estimates to obtain the gross margin stream.

One aspect of the estimation of future nominal revenues and costs has been omitted until this point. How to determine what the general rate of inflation, GNP deflator or CPI will be over the life of an investment can be very difficult. Economists have different opinions as to what the best

estimate of the markets expected rate of inflation can be calculated. It is important to use debt issues which are of the same maturity as the investment proposal under consideration. It should be noted here that the effect of taxes has led some to question the accuracy of the Fisher principle. However, this issue has not been resolved at this time, and the approach outlined here seems to be the best possible under the present set of circumstances.

Before arriving at the post tax nominal cash flows, depreciation's effect upon taxes must be modeled. Here it is important not to inflate depreciation expenses. Depreciation is an expense which is fixed in terms of the dollars of the year in which the investment is made. Since the depreciation is fixed in nominal terms, as time passes the real value of depreciation expense declines. However, this is not a real cash expense but only an expense for the purpose of calculating the firms tax liability. As the real value of depreciation declines, the benefits of the tax deductible nature of depreciation to the firm also declines. This can be seen clearly in the equation for the projects NPV on page 24. Depreciation times the tax rate enters the equation as a positive term. The DT term stays the same with or without inflation but the discount rate rises with inflation. Thus, the present value of depreciation tax shields is reduced in a world of inflation lowering the total NPV of any project under consideration.

Because post tax cash flows have now been calculated in nominal terms, it is important to use the appropriate nominal

interest rates when discounting these flows. Using real rates or nominal rates which include an inflation premium, which is lower than the market's current estimate of inflation, will bias the analysis heavily in favor of accepting the investment. Regardless of the method being used to calculate the corporation's cost of capital, it will be necessary to obtain estimates of both the nominal cost of debt and equity. Estimating the nominal cost of debt should not be difficult at all. The market yield of bonds which are of the same maturity as the proposed investment and issued by companies of similar risk to our company should be a very close estimate of the correct rate. An alternative would be to consult with the company's investment banker and ask for an estimate of the coupon rate which would have to be paid to issue debt of a specific maturity at par value. It should be emphasized that the book rate of interest currently being paid on outstanding corporate debt will in general <u>not</u> be the correct rate to use.

An estimate of the corporation's cost of equity must also be made. This can be done by looking at the historical return on equity (Net Income divided by Market Equity) series over the past few years. This is essentially the earnings price ratio of the company's stock and, as Modigliani and Cohn[9] have shown, should be a good estimate of the real cost of equity capital. It is important, however, that the adjusted income and the not reported net income be used in the calculation of the return on equity. Adjusted income would be calculated on the basis of the replacement cost of the corporation's assets and would

estimate of future inflation may be. Most agree that the best estimate of future inflation will be found in the capital markets. The Fisher principle leads us to believe that investors, in forming their demands for real and nominal returns, will expect the nominal rate of return to equal the desired real rate of return plus the expected rate of inflation plus the cross product of the two. Unfortunately, neither the expected real riskless rate nor the expected inflation rate is directly observable in the market. The ex-post real rate of return on treasury bills over the past 50 years has been nearly zero. This suggests to some that the best estimate of future inflation over the next few months to a year may be the nominal yield on treasury bills. However, this may not be correct for two reasons. First, the real ex-post rate of return on treasury bills may not equal the ex-ante expected real rate of return. In this case investors may expect a small real rate of return on treasury bills but not have realized this return on the average over the past 50 years. Secondly, this reasoning assumes that the expected real rate of return on treasury bills remains constant over time. This may not be the case. Just because investors expected a zero real rate of return in the past, if in fact they did, does not mean that this holds today or in the future. However, it does not seem unreasonable to assume that the real expected rate is very low, on the order of one or two percent, and doesn't change too much. Using this assumption and the nominal yields on government debt, which can be observed in the marketplace, a reasonable

not include inventory holding gains attributable to inflation. This rate is then adjusted upwards using our best estimate of future inflation to arrive at the required nominal return on equity.

Because of the difficulty in adjusting historical net income for inflation, the Capital Asset Pricing Model (CAPM) approach may be more desirable and provides a useful check on the method described above. Estimates of beta can be made using historical stock market data without being biased by the existence of inflation. This approach relies strictly upon market data and is fundamentally different from the prior method. Beta is the regression coefficient which relates the return on a company's stock to the return on the market portfolio in excess of the risk free rate. The returns in the equation are measured by dividing the holding gain on the stock or the market portfolio by the value of the stock or market portfolio at the beginning of the period in question. The equation used to estimate a stock's beta is as follows:

$$R_s = R_f + \beta_s(R_m - R_f) \quad \text{(Regression equation)}$$

Where:

R_s = Return obtained by holding the stock

R_f = Risk free interest rate

R_m = Return obtained by holding the market portfolio

β_s = Beta of the firms stock

Once the stock's beta has been estimated using historical data, it is then adjusted for the effect of leverage. This is done

because the cost of capital equations calls for the use of the unlevered required return on equity. To perform this calculation, the beta of the firm's debt must also be calculated and is done so in the same manner as was used for the stock beta.

β_u = Beta of the unlevered equity

β_s = Beta of the stock

β_D = Beta of the debt

E = Value of the firm's equity

D = Value of the firm's debt

T = Corporate tax rate

$$\beta_u = a\beta_s + (1 - a)\beta_D$$

Where:

$$a = \frac{E}{E + (1 - T)D}$$

The resultant beta, β_u, is then used to calculate the required return on equity for the all equity financed firm. This is done by using the regression equation which was presented above. The inputs to the equation are the real risk free rate and the expected excess return on the market portfolio, which is usually taken to be 7-8 percent. The resultant real rate in turn is adjusted for inflation by using our best estimate for inflation to get the nominal required return on equity for the unlevered firm.

Finally, the nominal debt and equity rates are used as inputs to the Modigliani Miller[8] formula for the cost of

capital or the classical textbook formula* to yield the cost of corporate capital. The weights which are used in these formulas should be weights based on the market values of debt and equity or on the target debt-equity ratio of the company. Lastly, this nominal cost of capital is used to discount nominal cash flows and the NPV rule is applied. If the NPV is less than zero, reject the investment; if greater than zero, accept. The whole process looks like the following:

Where: R = Revenues (Nominal $1)

C = Costs (Nominal $1)

COC = Modigliani Miller cost of capital

D = Depreciation

T = Tax rate

R_E = Required return on unlevered equity capital (Nominal)

L = Percentage of Debt in the target Capital Structure

I = Cost of the initial investment

Subscript i denotes a year in the life of the investment

j = Number of years the investment will last

$$NPV = -I + \sum_{i=1}^{j} \frac{(R_i - C_i)(1-T) + D_i T}{(1+COC)^i}$$

*Weighted Cost of Capital = $(1-T)r\frac{D}{V} + k\frac{E}{V}$

where T = tax rate, k = cost of levered equity
r = cost of debt, D = value of debt
E = Value of Equity, V = D + E

$$COC = R_E(1 - LT)^*$$

IV.2 A Constant Dollar APV Approach

If future revenues and costs are to be estimated in current dollars, then there are a few added aspects to the investment analysis. Inflation increases the benefit of holding debt because the government allows full deduction of nominal interest payments from taxable income. The effect of the deductibility of nominal interest rates is to reduce the real cost of borrowing. This effect must be modeled explicitly. At the same time, the constant dollar approach overstates the benefit of the deduction allowed for depreciation expense. As inflation swells income before depreciation, the depreciation expense does not change from the no inflation case. Thus, a greater percentage of real income is subject to taxes; the naive application of the constant dollar approach will not account for this effect. In order to deal with both of these problems the Adjusted Present Value method of evaluation will be used.[10]

The APV method of evaluation recognizes the fact that an investment is comprised of different cash inflows and outflows which need to be discounted at different rates. This makes it possible for us to deal with the interest and depreciation tax shields in a different way than the rest of the project.

*If the effect of taxes upon the present value of the firm has not been correctly modeled by Modigliani and Miller, then the COC should be calculated using the weighted cost of capital formula. See Merton H. Miller, "Debt and Taxes," Journal of Finance, May, 1977.

As in the previous example, the first step which is necessary is to determine the magnitude of the future revenue and cost streams associated with a project. These streams should be forecast based on current dollars. This does not necessarily mean that the projections should be based upon today's prices and costs. If both prices and costs are correlated one hundred percent with inflation, then this will be possible. However, if costs and revenues don't rise at the same rate as inflation, then the real or constant dollar margin must reflect this effect. Another way to think about this effect is in terms of inflationary and relative changes of costs and prices. A good example of this may be found in an industry such as electronics. Although the cost of inputs may be rising at the rate of inflation, economies of scale have greatly reduced the cost of producing many electrical components. Great care must be taken to arrive at accurate estimates of both future real prices and costs.

Once all of the constant dollar future gross margins (Revenue minus all costs except depreciation, tax and interest) have been calculated, we can begin to apply the APV method. APV recognizes that a project has basically two cash flows, each of different risk: first, the after tax cash flows arising from the project itself and second the tax shields arising from debt financing associated with the project. If there is no debt financing specifically associated with the project, then the tax shields can be computed on an allocated basis of total corporate debt. Thus, the APV method takes the

following form in a world of no inflation.

A = Cost of the investment in year 0

R = Revenues

C = Costs

r_e = Cost of equity capital (unlevered)

r_d = Cost of debt

T = Tax rate

I_i = Interest payment

D = Depreciation

The subscript i designates a year in the life of the investment

j is the number of years the investment exists

$$APV = -A + \sum_{i=1}^{j} \frac{(R_i - C_i)(1-T) + D_i T}{(1+r_e)^i} + \frac{I_i T}{(1+r_D)^i}$$

It should be noted that the above is the generalized form of the APV method without inflation. Some modifications will follow in order to adapt the method to the case of an inflationary environment. These modifications are necessary because $(R_i - C_i)$ changes with respect to $D_i T$ and $I_i T$ when stated in real terms. As with the NPV rule, we will accept an investment with a positive APV and reject one with a negative APV.

The interest charge should be calculated by determining the amount of debt the investment will support. Usually this would be the same percentage of the investments cost as the debt percentage of the book value of the firm. Thus, if the firm was fifty percent debt, fifty percent of the purchase price of

the project would be assumed to be debt financed. Using this assumed percentage of the purchase price of the asset, and a nominal interest rate for the corporations debt, it is possible to determine what I_j would be for every period of the life of the project.

The rate used for the debt should be a current nominal rate obtained from the market as explained in the NPV analysis. The interest charge times the tax rate equals the nominal tax shield in a given year. This tax shield is stated in nominal terms and therefore can be discounted at the nominal debt rate to obtain the present value of the interest tax shields due to debt financing. Alternatively, these nominal tax shields can be changed into real tax shields and discounted at the real debt rate. Either method yields the same end result, as is illustrated below.

For a one period investment:

A = Price of the asset purchased

L = Percentage of debt in the corporate capital structure

r_D = Nominal corporate debt rate

R_D = Real corporate debt rate

p = Rate of inflation

$A \cdot L$ = Amount of debt associated with the asset

$ALr_D = I$ The Nominal Interest Charge

IT = Nominal tax shield

$\frac{IT}{(1+p)}$ = Real Value of the tax shield

$$\frac{IT}{(1+p)(1+R_D)} = \frac{IT}{(1+r_D)} = \text{Present Value of the tax shield due to debt financing}$$

The fact that the depreciation tax shield declines in real terms as inflation is introduced can be easily modeled in the APV format. The real value of the depreciation tax shield declines at the rate of inflation. Therefore, a simple adjustment can be made to the depreciation stream to account for this effect. The real value of the depreciation tax shield in year j is $D_jT/(1+p)^j$. Discounting the real depreciation tax shield stream by the real cost of equity capital gives the present value of the depreciation tax shields. Again, the net effect of adjusting the depreciation for inflation and then discounting at the real cost of equity capital is the same as discounting the nominal depreciation tax shields by the nominal cost of equity capital.

Finally, the stream of payments from the project, which has been called the gross margin stream, is discounted at the real rate of equity capital. This term is straightforward and is merely an application of the APV formula already presented. The results of the entire real analysis are as follows:

$$APV = -A + \sum_{i=1}^{j} \frac{(R_i - C_i)(1-T)}{(1+r_e)^i} + \frac{TD_i}{(1+R_e)^i} + \frac{I_iT}{(1+R_D)^i}$$

Where: A = Cost of the project

R_i = Real Revenue in year i

C_i = Real Costs in year i

D_i = Depreciation allowed in year i

I = Interest payments in year i stated in nominal dollars

r_e = Real cost of unlevered equity capital

R_e = Nominal cost of unlevered equity capital

R_D = Nominal cost of corporate debt

j = Life of the project in years

The procedure used to estimate all of the discount rates from market data is essentially the same as that described in the section on the NPV analysis. The nominal debt rate can be obtained directly from capital market data or through consultation with an investment banker. The market's estimate of inflation can be approximated from examining the yields on bonds of the same maturity as the project. This inflation estimate in turn can be used to convert the nominal cost of equity capital into the real cost of equity capital using Fisher's rule.

In both the APV and NPV analyses there are certain problems associated with estimating inflation rates and real required rates. For this reason it would be advisable to calculate the APV or NPV of an investment over a range of inflation rates. Different assumptions about the rate of inflation will yield different real rates and therefore a range of probable present values. It is also clear from the previous analysis that inflation is an important factor in evaluating investment proposals. In a market where investors' expectations regarding inflation are liable to change dramatically from year to

year, it is necessary that the rates used by the analyst remain current. Failure to regularly examine one's discount rates could lead to a great bias in the results of the analyses which are performed.

In the following sections the results of a survey which was performed to assess the consistency with which corporations have made changes to account for inflation in their capital budgeting process will be reported. Obviously, anything short of a full field study would not allow an investigation of this type to be conducted in as much detail as was presented in this chapter. Therefore, the goals of the survey are somewhat more modest. We know from the prior analyses that those companies which use forecasts of future prices and costs should be using discount rates, hurdle rates or other criteria of project selection which are nominal in nature. These criteria will change as inflation changes. The APV analysis illustrates the complexity of dealing with constant dollar projections in an inflationary period. Different cash flows are discounted at different rates, some nominal, some real. However, to the extent that few firms have adopted the APV method, we would expect that those who project cash flows based upon present prices and costs will not have changed their discount rates, hurdle rates, required return on assets or payback period in response to inflation.

Chapter V: THE SURVEY PROCEDURE

In order to determine exactly how corporations deal with inflation in their capital budgeting systems, a survey of the top one hundred companies in the Fortune 500* was performed. Although this cannot be considered a statistical sample in the sense that the participants were selected randomly from all U.S. corporations, it should provide insight into how the larger corporations deal with inflation in capital budgeting. It is expected that the largest companies would be more advanced when it comes to selecting investments in an inflationary period and thus the results of the survey should be biased towards a rational approach to investment evaluation. Therefore, our a priori expectation would be that the sample companies do at least as well as the average U.S. corporation when it comes to dealing with inflation.

Before constructing a questionnaire to be sent to each of the Fortune 100 corporations, interviews were conducted with three firms in the Boston area. Each of these firms had annual capital budgets in excess of fifteen million dollars, while one planned expenditure of over two hundred million dollars for the coming year. None of these companies were members of the Fortune 100 and therefore were not included in the results presented in this thesis. The purpose of these interviews was to become familiar with the budgeting

*As found in the May 7, 1979 issue of Fortune magazine (See Appendix I)

processes of a few companies. This familiarity greatly aided in constructing the questionnaire so that it would be easy to respond to, as well as include all relevant data for this study. A number of questions were rewritten while additional selections were provided for multiple choice questions as a result of these interviews.

An overview of the questionnaire will be presented here, while a more detailed discussion will be provided in the following chapter. The survey form utilized the multiple choice format with spaces provided for additional comments by those who wished to elaborate. A copy of the questionnaire can be found in Appendix II.

The questionnaire was designed to provide answers to a number of basic questions regarding each corporation's capital budgeting system. First, what method or methods of analysis does the company use to screen investment proposals? Does the company project future cash flows based on present prices and costs or based on forecasts of future prices and costs? Has the company changed the acceptance criteria for investments due to inflation? Finally, how does the company determine the parameters which it uses in its investment screening process? The answers to these questions should help us to understand if companies have made rational adjustments in their capital budgeting systems for inflation. For example, we would expect that a company which primarily uses a net present value approach to capital budgeting and projects cash flows based on present prices and costs would use a discount rate which

reflected the company's real, not nominal, cost of capital. If they were to use a nominal cost of capital, there would be an inconsistency between the way they project cash flows and the way they discount the flows.

Although it is difficult to identify real and nominal rate users, we know that a nominal rate user should have increased their discount rate over the past five years because of inflation. Real rate users would not have changed their discount rates because of inflation. The questionnaire will allow us to determine if those companies which project nominal cash flows have in fact raised their discount rates commensurate with inflation. Similarly, we will find out if those who project real cash flows have left their discount rates unchanged as would be expected.

At this juncture it is important to note that there are many problems with collecting data of this type through the use of a questionnaire. First, there is always a tradeoff between detail and simplicity. The researcher would like to obtain as much data as possible about each company, but a complex questionnaire will probably result in fewer responses. In this case, the questionnaire was kept short and simple. The fact that the survey form was short combined with the fact that interviews preceded construction of the survey hopefully helped to avoid another problem: understanding. The critical reader must question whether the recipients of the survey actually understood the questions. There was no indication of gross misunderstanding on those surveys which were

returned. All of the responses and comments which were made by the respondents showed that the questions, as well as the multiple answers which the participants were asked to choose from, were well understood. Finally, there is the question of whether the participants do what they say they do. Unfortunately, there is no way to control for this type of error outside of undertaking a field study of each of these companies. This final type of error seems to be the most likely source of bias in this study. The capital budgeting process of any large corporation is a complex and lengthy exercise. It seems highly improbable that any questionnaire could capture all of the facets of this process. Still, it is believed that the questionnaire used in this survey at least caught the basic flavor of the analytical tools which major corporations use to screen investment proposals.

Chapter VI: THE PURPOSE OF THE QUESTIONNAIRE

This section consists of a detailed discussion of each of the questions which were asked in the survey and the purpose behind each question. Although most of the questions are straightforward, a short discussion of each may help the reader understand the interpretation of the results. A copy of the questionnaire can be found in Appendix II.

The first question merely asks the size of the firm's 1979 capital budget. The purpose of this question was to provide the capability to determine if firms which have larger capital budgets tend to deal with inflation more effectively than firms with smaller capital budgets.

The second question asks whether the company arranges projects into groups and applies different screening criteria or methods of analysis to each group. This is an attempt to determine if companies group investments according to size, divisions, business line, purpose, etc. This question does not relate directly to the purpose of the study but is meant to provide some background information about each firm's screening system. Furthermore, preliminary interviews indicated that executives are uncomfortable answering specific questions regarding their capital budgeting systems, since they treat many things differently. Thus, the question also serves the purpose of communicating to the participant that we were aware of the fact that different projects are sometimes treated differently.

The third question asks which methods of analysis are used to screen investment projects. The companies are asked to indicate whether they use an accounting return on asset or investment method, the payback method, a discounted cash flow analysis, a discounted payback method, or some other form of analysis to screen investments. The companies were not limited to just one response and most indicated they used more than one type of analysis. It is necessary to determine which methods are being used by the participant so as to be able to evaluate the adjustments which the firm has made for inflation. For example, a company which used a payback method would be expected to shorten the required payback period to adjust for inflation if they projected cash flows based on future prices and costs.

Question four merely asks if investments are ever accepted without the type of analysis the company usually requires. If the answer to this question is "yes," they are then asked what criteria are used for acceptance. This provides background information as well as allows the participant to indicate any exceptions to the company's normal capital budgeting procedures.

The fifth question of the survey is key to the results of this study. The company is asked to indicate which of the methods they said are used in question three is the most important when it comes to making a final decision. Many companies use multiple methods of analysis, and it was the purpose of this question to find out which one method was focused

upon by management in the final decision process. The consistency of the approach each company has taken with regards to adjusting for inflation will be judged in reference to the answer given in this question. It is necessary to discover which method of analysis is most heavily weighted because companies are not always consistent in their adjustments for inflation across all screening methods.

Question six asks exactly how pro forma income or cash flow statements are constructed. The participant is asked to indicate if he bases his future cash flow estimates on present prices and costs or forecasts of future prices and costs. Those who project based on present prices and costs are, in essence, forecasting real cash flows. If they indicated they primarily use a net present value method for project screening, we would expect that they would use a real, not inflation adjusted, discount rate. If the company makes projections based on forecasts of future prices and costs, then they are using a nominal dollar approach to capital budgeting. It would then be expected that the firm would use a nominal or inflation adjusted discount rate if they utilized a net present value method for screening. The answer to this question will allow us to judge the appropriateness of the adjustments which firms have made to their discount rates, hurdle rates, required returns on assets or required payback periods.

Question seven probes further into the mechanics of how major firms are forecasting cash flows. Specifically it is directed towards those who indicated they used future prices

and costs in question six. The question has two purposes. First, to determine if firms use a different rate of inflation when forecasting revenues than they do for costs. Those firms which are more advanced in the area of making inflation adjustments will probably have examined their cost and revenue streams in more detail and most likely will be using different rates of inflation to make each of these projections.* The second purpose is to poll major corporations as to their opinions of what rates of inflation they feel will prevail within the economy over the next five to ten years. Again, this is not a perfect measure of what they think will happen to the CPI since we are asking for what rate will prevail in their market. But it should give a rough gauge of the degree of pessimism or optimism within the business community with regards to inflation.

Questions eight, nine and ten determine what type of adjustments the company has made to its discount rate, hurdle rate, required return on asset rate or required payback period within the past five years. Ideally, we would like to ask whether the company has changed these criteria since a period of zero inflation. It was unlikely that any of the respondents would be able to remember back to such a period. Since the rate of inflation has increased substantially within the past

*It is possible that a firm has examined their cost and revenue structure in detail and found that each is correlated with inflation in the same manner. In such cases, whether or not the company uses different inflation rates to project future revenues and costs is not a good surrogate variable for sophistication in coping with inflation.

five years, the answer to this question will reveal whether the company is keeping up with inflation by making the appropriate changes to its capital budgeting system. If a firm is projecting revenues and costs at today's best estimate of future inflation while using a discount or hurdle rate that has not been changed within the past five years, then something is wrong. They will be discounting at too low of a rate. By juxtaposing the answers to questions eight, nine or ten against the answers to questions five (type of screening method) and six (present or future prices and costs to construct cash flows) it is possible to judge the appropriateness of the corporation's response to inflation. The respondents were asked to indicate if the changes which took place were made in response to inflation. This avoids mixing up changes in the real cost of capital with changes made due to inflation.

The final question the participants are asked deals with the way the corporation has chosen the cutoff point for accepting an investment. They are asked how they calculate what constitutes a minimum rate of return, required payback, discount rate, etc. The answers to this question will provide insights into how corporations are calculating their cost of capital, required payback or whatever criteria they apply based on their screening method. This question also provides a further test for consistency of the changes which companies have made to accommodate inflation. For example, a company that had claimed to project future prices and costs while not having changed their discount rate would be suspect if they

indicated that they use the corporate debt interest rate to calculate their discount rate. Certainly the debt's interest rate has risen over the past five years. Why hasn't the corporate discount rate gone up also? One of two possible explanations seem in order. Either the company rarely bothers to check its cutoff criteria or else the questionnaire was misunderstood. Therefore, this question serves as a partial check on the validity of the questionnaire as well as provides interesting information.

At the end of the questionnaire, the companies had the option of revealing their identity. This was done so that those who wished to submit data on their firms anonymously could do so.

Chapter VII: SURVEY RESULTS

Seventy-four of the one hundred companies which received surveys took the time to respond to the questionnaire. This is an indication of two things. First, the content of the questionnaire was easily understood by the participants. And secondly, the issue of inflation in capital budgeting is one which is of real concern to corporations at this time. This second notion is further supported by the fact that forty of the respondents expressed a desire to obtain a summary of the results of the survey.

Although seventy-four responses were received, the following results have been compiled from seventy-two of these responses. The reason for excluding two of the responses was simply that they were received after all of the data and statistics for this thesis were compiled. Adding them to the study would have in no way materially affected the results which will follow. The distribution of answers for each of the questions in the survey will be presented first, followed by a series of cross tabulations of the data which will display exactly how different groups of companies have responded to inflation.

Table I shows exactly how the respondents were distributed with regards to size of their 1979 capital budgets. Roughly half (38) had capital expenditures above $500 million. At a later point an attempt will be made to determine if the size of a company's capital budget is related to the degree of sophistication it uses in dealing with inflation.

Table I

Size of 1979 Capital Budgets of Respondents

Size of Capital Budget	Number of Companies	Percentage of Respondents (72)
Less than $50 Million	0	0
$50-100 Million	2	3%
$100-500 Million	36	50%
$500 Million - $1 Billion	16	22%
$1-2 Billion	10	14%
More than $2 Billion	8	11%
TOTAL	72	100%

When asked if they grouped projects and treated each group differently in the investment screening process, thirty-seven companies responded they did group, thirty-one responded they didn't, and four did not answer (See Table II). Those who did group investments most frequently indicated that these groups were classified as expansion projects, replacement projects, and legal/regulatory projects. It is surprising that more companies do not group investments according to size or functional areas, especially given the diversity of markets in which most of the Fortune 100 compete (See Table III).

Table II

Grouping of Capital Investment Proposals

Response	Number of Companies	Percentage of Respondents (72)
No Answer	4	6%
Don't Group	31	43%
Group	37	51%
TOTAL	72	100%

Table III

Criteria for Grouping Investment Proposals

Grouping Criteria	Number of Companies	As a Percent of Companies that do Group
Expansion	20	54%
Replacement	17	46%
Legal/Regulatory	17	46%
Functional	6	16%
Geographic	3	8%
Size	1	3%
No Answer	6	16%

Of all the companies surveyed, ninety-three percent indicated that they use more than one method of formal analysis for screening investment proposals. Table IV shows the distribution of methods which are employed by the companies in the sample. It is interesting that although a large percentage

of companies use some type of discounting procedure such as Net Present Value (NPV) or Internal Rate of Return (IRR), they also make heavy use of both payback and accounting measures of Return on Assets or Investment (ROA/ROI).

Table IV

Methods of Analysis Used to Screen Investment Proposals

Method	Number of Companies Using Method	Percent of Respondents (72) Using Method
ROA/ROI	31	43%
Payback	42	58%
NPV	65	90%
Discounted Payback	22	31%
IRR	11	15%
Other	3	4%
Use more than one Method	67	93%

Forty-six companies indicated that they accept investments without performing any of the formal types of analysis that they normally use. This seems somewhat surprising at first but the vast majority of these companies indicated that the analysis was not used on projects which were legally required or which were required to keep a large facility in operation.

Table V shows the distribution of the primary methods of investment screening among the companies responding to the survey. These are the methods which each company judged to be of

primary importance when it came to making a final decision on an investment proposal. A full seventy-eight percent of the responding companies stated that they used some type of discounted cash flow analysis (IRR or NPV) as their primary method of project screening. This is slightly lower than the eighty-six percent figure obtained by Schall, Sundem and Geijsbeck[12] in their 1978 study. I believe that my questionnaire was worded more precisely in that it asked for the primary method of screening used in the final analysis. Another factor which may account for the difference is the fact that the Schall, Sundem and Geijsbeck study used a sample size of 189 firms.

Table V

Primary Methods of Screening Investment Proposals

Method	Number of Companies Using Method	As a Percentage of the Companies in the Study (72)
ROA/ROI	10	14%
Payback	9	13%
NPV	46	64%
Discounted Payback	1	1%
IRR	10	14%
Other	1	1%
2 of Above Methods Used	5	7%
3 of Above Methods Used	1	1%

Table VI shows the number of companies which project future cash flows based upon present prices and costs (22) and the number which base the cash flows on forecasts of future prices and costs (50). This data will not support the hypothesis that a firm is equally likely to use either of these methods when subjected to chi-squared testing. Thus we can conclude that significantly more companies use forecasts of future prices and costs to project cash flows. In a later section the response of each of these groups to inflation will be examined separately in order to determine the internal consistency of the methods used by each firm.

Table VI

Method Used to Project Future Cash Flows

Method	Number of Companies Using Method	As a Percentage of the Companies in the Study (72)
Present Prices & Costs	22	31%
Future Prices & Costs	50	69%

Of the fifty firms which forecast future prices and costs, thirty provided enough information to determine if the inflation rates the company was building into these forecasts were the same for both prices and costs. Eighteen firms assume prices and costs will increase at the same rate while twelve use different rates of inflation for prices and costs. Twenty-seven firms actually gave the rate or range of rates they use

to forecast revenues and costs. If the mean of the range of rates which a firm said it uses is assumed to be the average rate of inflation used by the firm, then it is possible to calculate the average inflation rate used by all firms which have provided this information. The average rates of inflation used for both revenues and costs by all firms can be found in Table VII. These two rates do not differ significantly in a statistical sense at the 95 percent level.

Table VII

Average Inflation Rates Used by Companies Reporting Rates

	Average Rate	Standard Deviation
Corporate Costs	9.4%	2.7
Corporate Revenues	8.6%	2.1

Table VIII shows the type of adjustment which the seventy-two firms made to their discount rates, required rates of return, hurdle rates, and payback periods in the last five years. This tabulation does not provide very much information alone but is key to this study when cross-tabulated with the type of method used to project cash flows. It should be noted that all of the changes in acceptance criteria shown in Table VIII were explicitly attributed to inflation by the respondents. If a company claimed to have raised their discount rate but said the change was not due to inflation, their answer was tabulated under the "No Change" column.

Table VIII

Changes to Acceptance Criteria Due to Inflation

	No Change	Increase	Decrease	No Answer
Required Payback	35	5	11	21
Required ROR/ Hurdle Rate	32	30	1	9
Discount Rate	27	35	0	10

The techniques which corporations use to determine the minimum acceptance criteria for their methods of analysis are shown in Table IX. This tabulation is somewhat abbreviated from the questionnaire. A more detailed tabulation of this question can be found in Appendix III although these details are not likely to enhance the reader's understanding of this thesis.

The most surprising thing about the data found in Table IX is the large percentage of firms which base their cutoff criteria upon "strategy." Fifty-three percent of the sample uses strategy at least in part to determine cutoff criteria while twenty-eight percent base the criteria solely upon strategy. It is impossible to determine exactly how a company translates strategic goals into a specific discount rate or hurdle rate in their capital budgeting process. However, this issue did arise when interviews were conducted before constructing the questionnaire. Two of the firms which were interviewed explained the process as follows. First, a desired growth rate is chosen. Then this growth rate can be translated into a return on equity through constructing pro forma income statements

using standard accounting procedures. This return on equity "goal" can then be used to calculate the appropriate cost of capital for the firm. Thus, the main difference between this approach is that the firm treats the required return on stock-holders equity as a decision variable as opposed to an exogenous variable which is determined in the capital markets. It should be remembered that the researcher's perception of what is meant by using strategy to determine cutoff criteria is based on a very limited sample. Certainly all those who claim to determine their cutoff criterion strategically are not doing exactly the same thing. However, it does not seem unreasonable to say that these companies are using methods which are outside of the mainstream of current financial theory.

With the exception of those who base financial acceptance criteria upon strategic goals, most of the companies in the study utilize a weighted cost of capital technique to determine cutoff points. Forty-seven percent of the sample use the weighted cost of capital approach at least with some other method while twenty-six percent use it exclusively.

Table IX

Methods Used to Calculate Cutoff Criteria

Cutoff Criteria Based Upon:	Companies Using Exclusively	Companies Using in Combination with Another Method	Total
Historial Return on Book Equity	0	1	1
Industry Average ROE	0	2	2
Strategy	20	18	38
Corporate Debt Rate	2	6	8
Weighted Cost of Capital	19	15	34
Capital Asset Pricing Model	1	4	5
No Answer	9	--	9

VII.1 Cross Tabulations

The real purpose of this survey is to assess the consistency of the changes which large corporations have made in their capital budgeting procedures to account for inflation. In order to make this judgment it will be necessary to split the companies in the sample into two groups. One group will consist of the twenty-two companies which use present prices and costs to project future corporate cash flows. This group will be called present price and cost users. The other group will consist of the fifty companies which use forecasts of future prices and costs to project cash flows. This group will be called future price and cost users.

VII.1.1 Present Price and Cost Users

Looking at the present price and cost users, the distribution of primary methods of investment screening can be found in Table X.

The purpose of this thesis is to determine if corporations have made adjustments to their capital budgeting acceptance criteria to account for inflation. Those who project cash flows in terms of today's prices and costs are essentially using a real dollar approach to capital investment analysis. We would expect that these firms would also use real screening criteria to determine whether they would accept or reject an investment. Those who use an ROA or ROI approach would use a real hurdle rate as would those who used the IRR approach. Those who used NPV would discount using a real cost of capital, while those who used payback would use a fixed minimum payback period as their cutoff point. Although it is difficult to determine if the participants truly are using real criteria, we know that inflation should not have an effect upon the magnitude of the cutoff which is used. Therefore, none of the present price and cost users would be expected to have changed their cutoff criteria over the past five years in response to inflation. However, if corporations had noticed the tax advantages which accrue from the use of debt in an inflationary period, they may have slightly relaxed some of the cutoff criteria. (See equation for the real post tax cost of debt in Chapter II.) This would take the form of a decrease in the required ROA/ROI, a decrease in the discount rate used in the NPV analysis, a

decrease in the hurdle rate for the IRR method or an increase in the required payback period. Thus we would expect to see either no change at all in the cutoff criteria, or possibly a slight relaxation of the criteria which an investment must meet for acceptance. Table XI shows exactly how each of the primary methods being used by the present price and cost users were changed in response to inflation over the past five years.

Table X

Primary Evaluation Methods Used By Present Price and Cost Users

Method	Number of Methods Used
Return on Assets/Investment (ROA/ROI)	2
Payback	4
Net Present Value (NPV)	17
Discounted Payback (Dis. Pay)	1
Internal Rate of Return (IRR)	2
TOTAL	26*

*Total exceeds 22 because two companies use two primary methods and one company uses three

Table XI

Adjustments to Primary Cutoff Criteria Due to Inflation By Present Price and Cost Users

Method	No Change in Criteria	Criteria Increased	Criteria Decreased	No Answer
ROA/ROI	1	0	1	0
Payback	2	0	2	0
NPV	5	11	0	1
Dis. Pay.*	1/1	0	0	0
IRR	2	0	0	0

*Discounted Payback requirements can be changed by either a change in the discount rate used or the required period. The number on the left indicates a change in the period and the number on the right a change in discount rate.

The data in Table XI shows a very surprising trend. Despite the fact that these companies are dealing in constant dollars in their capital budgeting systems, some have changed their screening criteria due to inflation. Of the twenty-six primary methods used, there are fourteen instances where the screening criteria have been changed in a way that would be consistent if a nominal dollar approach to cash flow projection had been used. In only one case, decreasing the ROA/ROI, could this change have been justified. (Nominal interest rates are deductible; this effect decreases the real cost of capital and might lead a company to decrease its real required return on assets.) Each of the companies which made these changes explicitly indicated that the change was in response to inflation. If this is the case, then we can conclude that thirteen

of the changes are incorrect and the companies have not responded to inflation in the correct manner. As noted in Table X, some companies use more than one primary method to evaluate investment proposals so both of the previous tables show twenty-six methods being used by twenty-two companies. Interestingly enough, the two companies which used two primary methods incorrectly changed the cutoff criteria for both methods. The company which weighted three methods of equal importance in the final decision process had not changed any of their cutoff criteria. A company using more than one method seems to have either completely responded in the expected manner or totally in an unexpected manner to inflation. On a company by company basis, then, nine firms have left their cutoff criteria unchanged, twelve have changed them in some way and one did not answer the question. Only the firm which decreased its required ROA/ROI made a change which could be anticipated through application of financial principles. Over fifty percent of those companies who do their capital budgeting in constant dollar terms may have incorrectly adjusted their cutoff criteria in response to inflation. Table XII summarizes these findings.

In each of the cases where the cutoff standards were changed due to inflation the companies introduced a bias which would result in rejecting some projects which would be considered profitable. In the case of raising the discount rate this bias is easily seen. The company uses a constant dollar approach to project cash flows and thus a change in inflation

will have no effect on these projections. However, if the company raises its discount rate, then the NPV of the project will be reduced. This could change what should be a positive into a negative NPV and result in the incorrect rejection of a profitable investment. Because over fifty percent of the present price and cost users have made this type of erroneous adjustment, because of inflation, as a group they are probably investing less than they would be in a world of zero inflation.

Table XII

Present Price and Cost Users and How They Have Responded to Inflation

	Number of Companies	Percent of Total
Correct Adjustment to Cutoff Criteria	10	45%
Incorrect Adjustment to Cutoff Criteria	11	50%
Adjustment Not Known from Data	1	5%
TOTAL	22	100%

Almost all companies claimed to use more than one method of analysis for evaluation of investments. Table XIII shows how the criteria of acceptance changed for those methods of evaluation which the present price and cost users indicated were not their primary means of analysis. It appears that the companies have made fewer changes and thus fewer incorrect adjustments to these methods. This is probably due to the fact that the companies put less effort into the maintenance of these methods rather than conscious decisions not to change these other cutoff criteria. This notion is supported by the fact that many companies indicated on the questionnaire that the other methods were used merely to obtain another perspective of the project. Still, it seems that as companies incorrectly adjust their primary cutoff criteria while not changing secondary criteria, they must interpret results which would tend to diverge as inflation accelerated. It is not possible to determine from this study exactly how management resolves this conflict.

Table XIII

Adjustments to Non-Primary Cutoff Criteria Due to Inflation By Present Price and Cost Users

Method	No Change in Criteria	Criteria Increased	Criteria Decreased	No Answer	Total
ROA/ROI	3	0	1	0	4
Payback	7	0	1	1	9
NPV	3	0	0	1	4
Dis. Pay.*	2/2	1/2	0	2/1	5
IRR	0	0	0	0	0

*Period/Rate

VII.1.2 Future Price and Cost Users

The distribution of the primary methods of investment screening used by future price and cost users can be found in Table XIV. Since these companies take a nominal dollar approach to forecasting cash flows, we would expect that the cutoff criteria they use would be affected by inflation. As the rate of inflation increases, we would anticipate that the nominal cutoff criteria which were used by each of the methods would be made more stringent. Although the real values of future cash flows may all be equal, inflation will increase their nominal value over time. Methods which don't use discounting, such as ROA/ROI or payback, will show higher returns or shorter paybacks because of the previously mentioned effect. Thus, the required ROA/ROI should be raised in periods of inflation so that a company continues to accept projects with a desired

minimum real return. The required payback must be shortened for the same reason. The NPV analysis must utilize a nominal discount rate when nominal cash flows are projected. As inflation rises, the nominal rate must rise to assure a company of a minimum real return on their investments. Similarly, the hurdle rate used in the IRR method must reflect a desired minimum real return and thus the nominal hurdle rate will increase with inflation. In conclusion, we expect the required ROA/ROI, discount and hurdle rates to have risen while the required payback period will have dropped in response to the rise in the level of inflation over the past five years. Table XV shows exactly how each of the primary methods being used by the future price and cost users were changed in response to inflation over the past five years.

Table XIV

Primary Evaluation Methods Used by Future Price and Cost Users

Method	Number of Methods Used
Return on Assets/Investment (ROA/ROI)	8
Payback	5
Net Present Value (NPV)	29
Discounted Payback (Dis. Pay.)	0
Internal Rate of Return (IRR)	8
TOTAL	50*

*Although a total of 50 methods are used, this covers only 47 companies. Three companies did not indicate a primary method, while three claimed to use two primary methods.

Table XV

Adjustments to Primary Cutoff Criteria Due to Inflation By Future Price and Cost Users

Method	No Change in Criteria	Criteria Increased	Criteria Decreased	No Answer
ROA/ROI	4	3	0	1
Payback	3	1	1	0
NPV	11	15	0	3
Dis. Pay.	0	0	0	0
IRR	3	5	0	0

Once again, the data shows that a great number of firms have not made the expected changes to account for the increase in inflation over the past five years. In twenty-one of the cases no adjustment has been made to cutoff criteria for inflation, while in twenty-four cases some type of adjustment has been made. If the data that has been gathered is accurate, then we must conclude that in twenty-one instances companies have mistakenly let their cutoff criteria remain constant over a period of rising inflation. Finally, in one instance the cutoff point was changed in the wrong direction. Instead of decreasing the required payback period to account for higher inflation, one firm actually claims to have increased the required payback and attributed this change to inflation. Thus, in twenty-two instances, companies which use future prices and costs have responded in an unanticipated manner to inflation.

As with the present price and cost users, those who made one wrong adjustment were likely to make all wrong adjustments.

Two of the instances of there being no change in the cutoff criteria belong to one company. However, the company that adjusted its payback in the wrong direction did make the correct adjustment to its discount rate. We will assume that this firm made the correct adjustment. The third firm claiming to use two primary methods correctly adjusted its discount rate but didn't say how they adjusted the required return on assets. We will assume this firm is correct, too.

We are still faced with a situation where twenty companies didn't make the expected adjustment, twenty-four did, and three cannot be determined. Three companies indicated they had no primary method of analysis and were therefore not included in Table XV. However, closer examination shows that one of these firms made at least one of the correct changes to its cutoff criteria, while the two others did not provide enough information to determine they were one hundred percent wrong. If we put the partially correct firm in the correct group and leave the other two as unknowns, then Table XVI summarizes the performance of the fifty future price and cost users. It should be noted that these results are biased in favor of showing more companies making the anticipated adjustments because of the two questionable firms which were placed in this group.

Those firms which have not made the expected adjustments for inflation to their cutoff criteria have biased their

investment evaluation process. The future price and cost users who are still using criteria which was determined five years ago will accept projects which they would otherwise reject if proper changes had been made. The easiest way to see this fact is to consider a firm which uses the NPV rule for investment evaluation. An increase in inflation will swell the nominal value of future cash flows. If the nominal discount rate is not also increased, the analyst will be discounting at a rate which is too low. This, of course, may lead to acceptance of projects which in reality are not good investments.

Table XVI

Future Price and Cost Users and How They Have Responded to Inflation

	Number of Companies	Percent of Total
Correct Adjustment to Cutoff Criteria	25	50%
Incorrect Adjustment to Cutoff Criteria	20	40%
Adjustment Not Known from Data	5	10%
TOTAL	50	100%

Table XVII shows the adjustments which the future price and cost users have made to their non-primary cutoff criteria. This data shows more instances where the cutoff criteria has been left unchanged despite rising inflation. As in the previous case of the present price and cost user group, this is probably due to the lack of maintenance of this criteria. The

fact that these measures are of secondary importance to the firm and often used merely for comparative purposes means the cutoff criteria is probably not updated as often. Even so, the fact that the future price and cost users appear to have made fewer updates to their secondary cutoff points raises some questions. If the required payback period is never changed while the discount rate is properly adjusted for inflation, how do the firms interpret the data they receive from their analysis? As inflation accelerates, the NPV of a given project at any point in time should be the same. However, as time passes, inflation will tend to make a project look better and better if the payback method is used. It would be interesting to know how firms deal with this issue. It's possible that a certain point may be reached where the primary method of analysis makes an investment look marginal but the secondary measures, which are less correctly adjusted for inflation, make the investment look so attractive that it is accepted. The survey data really are not sufficient to allow us to explore this issue.

Table XVII

Adjustments to Non-Primary Cutoff Criteria Due to Inflation By Future Price and Cost Users

Method	No Change in Criteria	Criteria Increased	Criteria Decreased	No Answer	Total
ROA/ROI	4	11	0	2	17
Payback	19	3	6	6	34
NPV	8	7	0	0	15
Dis. Pay.*	10/7	2/8	2/0	2/1	16
IRR	0	1	0	0	1

*Period/Rate

VII.2 Cutoff Criteria Calculation

Combining the future price and cost users with the present price and cost users shows that of the seventy-two firms, thirty-five have made the expected adjustment to their cutoff criteria while thirty-one have not. The data for six firms did not allow determination of the adjustments which have been made over the past five years to account for inflation. The fact that a very large portion of the firms surveyed have made what appears to be an incorrect adjustment of their cutoff criteria for inflation is disturbing. We may be able to obtain some more insight into this matter if we examine exactly how those companies which we have judged to be incorrect have calculated their cutoff criteria.

The various methods which were used to calculate primary cutoff criteria by the present price and cost users that made

faulty adjustments are shown on the left of Table XVIII. Those who made correct adjustments appear on the right. The most frequently made mistake was that of increasing the discount rate to account for inflation. Unfortunately there does not appear to be any trend in Table XVIII that gives a clue as to what the source of this error may be. Both groups seem to have applied the same techniques when they calculated their cutoff points. It seems that the one group must just have been more careful about keeping inflation out of their criteria having realized the danger of mixing constant dollar cash flows with nominal interest or hurdle rates. Four firms which appear to have made an incorrect adjustment claim to have used the weighted cost of capital method in determining their cutoff criteria. This could possibly explain the fact that they raised their cutoff criteria. If their real cost of capital increased over this period, then they would be justified in raising their cutoff criteria. Figure II shows that this has been the case for all corporations in general over the past five years. However, each of these respondents indicated that the change in their cutoff criteria was due to inflation. Therefore, it is difficult to assess the consistency of these changes. If they are in fact due to inflationary adjustments, as the firms claim, then the changes are not consistent. If, however, they were due to real changes in the cost of capital, the changes may well have been justifiable.

Table XVIII

Methods Used to Calculate Primary Cutoff Criteria By Present Price and Cost Users

	Companies with Incorrect Adjustment	Companies with Correct Adjustment
ROE Book	0	0
Industry Averages	0	0
Strategy	1	2
Strategy & WCC	5	1
Strategy & Cost of Debt	0	1
Weighted Cost of Capital	4	5
No Answer	1	0

The future price and cost users present more of a paradox to the researcher. Many firms have not changed any of their primary cutoff criteria during the past five years. If they have used any type of market measure to determine what the cutoff should be, this is hard to understand. The reason is that all of the rates which are observable in the market are nominal rates and should have increased over the past five years. Table XIX shows which types and combination types of methods were used by both the firms which made correct and incorrect adjustments for inflation. It is interesting to note that the companies which made the correct inflation adjustments in their cutoffs used some type of market measure more frequently than their counterparts. Of the companies which made the correct adjustments, sixteen used market data to some

extent and only seven relied on strategy alone. The companies which made the wrong adjustments or no adjustments at all were split evenly between market and non-market methods to determine cutoff criteria. However, among those companies which did not change their cutoffs are six companies which claim to rely exclusively upon market data to calculate these cutoffs. How these companies could not have changed their nominal cutoff criteria over the past five years under these circumstances remains a mystery.

Table IXX

Methods Used to Calculate Primary Cutoff Criteria
By Future Price and Cost Users

	Companies with Incorrect Adjustment	Companies with Correct Adjustment
Strategy	9	7
Strategy & Cost of Debt	1	2
Strategy & WCC	1	4
Strategy & CAPM & Book ROE	1	0
Cost of Debt	0	2
Weighted Cost of Capital	4	7
CAPM	1	0
WCC & Ind. Avgs.	1	0
WCC & Cost of Debt	0	1
No Answer	2	2

VII.3 Company Size

Schall and Sundem[13] found that larger firms tend to be more sophisticated in the methods which they use for capital budgeting. Although their sample was larger than the one used in this study, it is possible for us to test this hypothesis on the respondents of this study also. If it is correct that larger firms are more sophisticated in their capital budgeting, then this effect may appear in the data in one of two ways. First, as was mentioned in the section on capital budgeting under inflation, there are certain problems with using a constant dollar approach to screen investments. The problem of eroding depreciation tax shields and the greater deductibility of nominal interest charges can be overcome in the constant dollar approach by using the Adjusted Present Value method (APV) of analysis. None of the companies indicated that they use this newer technique of evaluation. Therefore, it would be more correct to use a nominal dollar approach to capital project screening. The data will be examined to determine if firms with larger capital budgets are more likely to use forecasts of future prices and costs to calculate cash flows. Secondly, if larger firms are more sophisticated, then we would expect them to have fewer inconsistencies between the way they determine cash flows and how they have changed their cutoff criteria in response to inflation.

The sample was divided into two groups; one group with 1979 capital expenditures over $500 million and one with capital expenditures below $500 million. Table XX shows how each

of these groups projected future cash flows. It does appear, from this data, that firms with larger capital budgets tend to use forecasts of future prices and costs more frequently than firms with smaller capital budgets. The difference between these two groups is statistically significant at the 90 percent but not the 95 percent level. Thus, the data obtained in this survey tends to support the finding of Schall and Sundem that larger firms use more sophisticated techniques for project screening. Here it should be noted, though, that this study has used the size of a company's capital budget as a surrogate for corporate size.

Table XX

Method of Cash Flow Projection Used By Firms with Small and Large Capital Budgets

Size of Capital Budget	Number of Present Price & Cost Users	Number of Future Price & Cost Users
Below $500 Million	15	23
Above $500 Million	7	27

The same type of tests can be applied to determine if firms with larger capital budgets tend to cope with inflation better than those with smaller capital budgets. Table XXI shows the correctness of the changes made to primary cutoff criteria vis-a-vis the method of cash flow projection used by each company for both of the groups that have been defined. It seems that once again those companies with larger capital budgets tend to have done better with regards to making

adjustments for inflation. However, when subjected to statistical tests these two samples differ in the way they handled inflation at only the 68 percent level. This does not disprove the hypothesis that larger firms are dealing better with inflation, but it does not unambiguously support the hypothesis either. Perhaps it is necessary to extend the survey to include even smaller companies to obtain more insight into this point. Most of the companies which fell into the "small" group had capital budgets in excess of $100 million dollars. Although small in comparison to some of the other Fortune 100 companies, these certainly are not small companies when compared with all U.S. industrial corporations.

Table XXI

Adjustments Made by Small and Large Firms to Account for Inflation

Size of Capital Budget	No. of Cos. Making Incorrect Adjustment	No. of Cos. Making Correct Adjustment	Not Discernible
Below $500 million	18	16	4
Above $500 million	13	19	2

Chapter VIII: IMPLICATIONS OF SURVEY RESULTS

The results of this survey have in many ways been surprising and startling. If we are to believe the results of the survey, then we must conclude that a large percentage of firms have difficulty making the correct adjustments to their investment screening process to compensate for inflation. Sixty-six firms provided enough information to enable us to judge the correctness of the changes which they made over the past five years for inflation. Of these firms, thirty-one, or forty-seven percent, have compensated for inflation in an incorrect manner. With this data, we could not refute the hypothesis that half of all major U.S. firms have introduced some type of bias into their investment screening process as a result of inflation. A large percentage of U.S. firms have often mixed real and nominal terms together in the same analysis.

The error which many companies have made can lead to a bias in the way they invest their funds. As previously mentioned, present price and cost users who increase their acceptance criteria due to inflation are mixing constant or real dollar cash flows with nominal criteria. This would tend to make all investment proposals look worse than they actually are since the cutoff criteria have been made too stringent. The future price and cost users who have not changed their cutoff criteria in response to inflation introduce the opposite bias. They have made all investment proposals look better than they actually are. The present price and cost users

will probably invest less than they should while the future price and cost users will likely invest more than they should. Clearly neither of these errors is in the best interest of the companies' stockholders.

Earlier in this thesis a discussion of what some economists have called the investment paradox was presented. Some economists have noted that real investment in the economy appears to be at a level higher than market rates would dictate in the last few years. It is possible that the biases which have been shown to exist by this survey explain this paradox. Present price and cost users as a group are making a mistake which will lead them to underinvest while future price and cost users, as a group, make a mistake which leads to overinvestment.

Although it is not possible to determine the exact magnitude of each of these errors from this survey, the prevailing direction would likely be towards overinvestment. There is no statistically significant difference between the percentage of present price and cost users and future price and cost users which have made errors in adjusting for inflation. However, the number of future price and cost users is significantly larger than the number of present price and cost users. It has also been shown that the larger firms are more likely to use the future price and cost method to project their cash flows. Finally, some of the present price and cost users may have correctly increased their criteria in response to real increases in the cost of equity capital, not due to inflation

as they indicated. These facts strongly suggest that the aggregate amount which future price and cost users overinvest is greater than the amount which present price and cost users underinvest. Thus, the biases which inflation has introduced into the capital screening process could be a source of the investment paradox.

Although the errors due to inflation in investment screening processes may result in overinvestment in the economy, this survey is far from conclusive. There are, of course, the usual problems with sample size and reliability of the data. However, there are a number of reasons why this survey makes the situation look worse than it may be. First, the data will tend to overemphasize the bias in the amount that a firm invests in real assets. It is true that the mistakes which firms have made will make an investment look better or worse than it actually may be. But this will not always result in a good investment looking bad and a bad one good. If a company is faced with a number of projects with huge net present values the bias introduced by inflation into the method of analysis may decrease the net present value but not turn it negative. Therefore it is possible that an error will actually have a very small effect or no effect at all upon the amount of money a company invests. More research is needed to determine whether the effect is large or small. Secondly, the study has focused exclusively upon the formal methods of financial analysis which are used by companies. The capital investment decision process in any large company is involved and complex. The formal

financial tools which are used to evaluate investments are only part of this complex process. Many companies which have made errors in the application of the financial measures may be compensating for these errors in an ad hoc way. A complete field study of the decision processes within these companies is really needed in order to determine exactly what effect inflation may be having on the way the company invests its funds.

Finally, this survey can leave little doubt in even the most skeptical reader's mind that there is a great deal of confusion in the corporate world about how inflation is to be dealt with in capital budgeting. Sufficient confusion has been shown to exist that it would merit all corporations to take a closer look at how they screen capital projects and how they have adjusted for the effects of inflation.

Chapter IX: CONCLUSION

This thesis has attempted to illustrate the fact that a great deal of confusion exists within the corporate world with regards to making allowances for inflation when evaluating investment proposals. Furthermore, to the extent that errors are being made a bias may exist which would drive aggregate investment to a level greater than it would otherwise be without these errors.

The survey of the top Fortune one hundred companies yielded seventy-two responses providing insight into corporate capital investment screening processes. Much data was gathered but of primary interest was whether corporations made the correct adjustments to their screening criteria to account for the increase in inflation over the past five years. The results were somewhat surprising. Many of those who forecast investment cash flows in terms of current dollars had raised their cutoff criteria because of inflation instead of continuing to use real criteria. On the other hand, many who claim to forecast investment flows in nominal dollars had not changed their cutoff criteria to account for increased inflation. A full forty-seven percent of those who provided enough information to judge the appropriateness of their response to inflation made the wrong adjustment. This error would lead those who used present prices and costs to project cash flows to invest less, as a group, then they would otherwise. Conversely, those who use forecasts of future prices and costs to project cash

flows will tend to invest more than they would otherwise due to those who have made errors.

The fact that a large percentage of corporations may not be dealing with inflation correctly leads one to question the effects of these errors upon the aggregate level of investment in the economy. Although the errors made by the present price and cost users would bias investment in the opposite direction of the errors made by future price and cost users, there is reason to believe that the latter effect (resulting in over-investment) prevails. Because as a group, those who used forecasts of future prices and costs had larger capital budgets. Also, more than twice as many companies use the future price and cost method of cash flow projection. The fact that we cannot be sure that the present price and cost users did not increase their cutoff criteria in response to real increases in the cost of equity capital (regardless of the reason they gave for the change) further supports the over-investment hypothesis. However, this conclusion as to the prevailing direction of the bias is highly judgmental and more research is really needed. If this conclusion is correct, the errors which are made in accounting for inflation could be a potential explanation of the investment paradox.

The results of this study are startling; forty-seven percent of those who provided the necessary information appear to have made an error in adjusting for inflation. Of course, the capital budgeting process is very complex and certainly all of its detail cannot be captured in a twelve question survey.

However, forty-seven percent is a very significant portion of the sample. These results should at least show the need for a more detailed field study to investigate exactly how the entire investment screening process in corporations copes with inflation. Finally, this study should provide motivation for managers to review those adjustments which they have made for inflation and judge the appropriateness of those changes in the context of the methods used to evaluate investments.

Appendix I

The Fortune One-Hundred Companies

General Motors
Exxon
Ford Motor
Mobil
Texaco
Standard Oil of California
IBM
General Electric
Gulf Oil
Chrysler
International Tel & Tel
Standard Oil (Indiana)
Atlantic Richfield
Shell Oil
U.S. Steel
E.I. du Pont de Nemours
Western Electric
Continental Oil
Tenneco
Procter & Gamble
Union Carbide
Goodyear Tire & Rubber
Sun
Caterpillar Tractor
Eastman Kodak
Phillips Petroleum
Dow Chemical
International Harvester
Westinghouse Electric
RCA
Beatrice Foods
United Technologies
Occidental Petroleum
Bethlehem Steel
Union Oil of California
Xerox
Rockwell International
Esmark
Kraft
Boeing
General Foods
LTV
Standard Oil (Ohio)
Ashland Oil
Monsanto
Philip Morris
R.J. Reynolds Industries
Firestone Tire & Rubber
Amerada Hess
Minnesota Mining & Mfg.
Cities Service
Marathon Oil
Georgia-Pacific
Armco
Greyhound
Coca-Cola
Colgate-Palmolive
Gulf & Western Industries
W. R. Grace
PepsiCo
Deere
International Paper
McDonnell Douglas
Ralston Purina
Aluminum Co. of America
American Can
Continental Group
Borden
Weyerhaeuser
TRW
National Steel
Litton Industries
Sperry Rand
Champion International
Bendix
Signal Companies
Honeywell
Consolidated Foods
Getty Oil
Johnson & Johnson
Lockheed
Republic Steel
American Brands
Allied Chemical
Inland Steel
General Mills
CBS
Raytheon
Textron
CPC International
Farmland Industries
General Dynamics
Owens-Illinois
American Home Products
Dresser Industries
Iowa Beef Processors
FMC
Warner-Lambert
Reynolds Metals
PPG Industries

Appendix II

The Questionnaire

1. What is the approximate size of your 1979 capital budget?

_____ $50 million or less _____ $500 million - $1 billion

_____ $50 - 100 million _____ $1 - 2 billion

_____ $100 - 500 million _____ $2 billion or more

2. Do you arrange capital investment projects into groups, analyzing projects in each group differently and applying different cutoff criteria?

_____ Yes _____ No

If so, how do you group projects?

PLEASE ANSWER THE FOLLOWING QUESTIONS WITH REGARDS TO A TYPICAL DIVISION.

3. Please indicate which of the following (one or more) methods of financial analysis you use to evaluate capital investment proposals.

_____ A. The average Return on Assets (Net income divided by the book value of assets) is calculated over the life of the project/asset.

_____ B. The projects payback period is calculated.

_____ C. A Discounted Cash Flow or Net Present Value is calculated.

_____ D. The projects discounted payback period is calculated.

_____ E. Other; explain please.

4. Are any investments accepted without such an analysis?

_____ Yes _____ No

If so, what are the criteria for acceptance?

5. Which of the methods mentioned, if any, in question 3 is weighted most heavily when it comes to making a final

invest/no invest decision?

A B C D E

6. In constructing pro forma income or cash flow statements, do you project revenues and costs based on current unit prices and costs or on forecasts of future unit prices and costs?

_____ Present prices and costs _____ Forecasts of future prices and costs

7. If you use forecasts of future revenues and costs:

   A. What rate of inflation are you assuming over the next five to ten years to project revenues?

   B. What rate of inflation are you assuming over the next five to ten years to project costs?

8. If you use the payback method, has the payback period you require of an investment changed significantly in the last five years?

_____ No change _____ Increased _____ Decreased

If so, was this change in response to inflation?

_____ Yes _____ No

9. If you use an internal rate of return or return on asset method, has your acceptance criteria (cutoff rate) changed significantly over the past five years?

_____ No change _____ Increased _____ Decreased

If so, was this change in response to inflation?

_____ Yes _____ No

10. If you use the Net Present Value method or some other discounting method, has your discount rate changed significantly over the past five years?

_____ No change _____ Increased _____ Decreased

If so, was this change in response to inflation?

_____ Yes _____ No

11. How is your company choosing the minimum financial criteria (cutoff point) for accepting a project? I.e., how did you choose your hurdle rate, discount rate, or cutoff ROA?

_____ A. By looking at the company's past net profits divided by net worth (Return on book equity).

_____ B. By looking at the industry average return on book equity and setting criteria equal to or greater than industry averages.

_____ C. The criteria (ROA/Hurdle/Discount Rates) used are derived from strategic goals which the company wishes to attain; i.e., target growth goals would translate into a specific ROA.

_____ D. The rates are determined from the current cost of debt to the corporation.

_____ The before tax cost of debt is used for calculations.

_____ The after tax cost of debt is used for calculations.

_____ E. The rates are determined by using a weighted cost of capital technique. The inputs are the company's cost of debt and equity each weighted by their relative portion of the company's capital structure.

i. The cost of debt used is calculated from:

___ The before tax cost of debt to the corporation.

___ The after tax cost of debt to the corporation.

ii. The cost of equity capital is determined by using:

___ The company's historical return on <u>book</u> equity.

___ The company's historical return on <u>market</u> equity -- <u>net income</u> divided by the market value of outstanding stock. (Price/earnings ratio)

___ The company's historical return on <u>market</u> equity -- <u>cash flow</u> divided by the market value of outstanding stock.

___ A dividend-growth model of the company's stock.

iii. The weighting factors are determined by using:

___ The percentages of debt and equity in the corporate capital structure as shown on the balance sheet.

___ The percentage of debt and equity reflected by the market value of the corporations debt and equity.

_____ F. A Capital Asset Pricing Model approach is used.

Comments:

12. Do you wish to receive a summary of the results of this survey?

_____ Yes _____ No Company Name _____

Appendix III

Methods Used by Companies to Calculate Cutoff Criteria

Cutoff Criteria Based Upon:	Companies Using Exclusively	Companies Using in Combination with Another Method	Total
1. Historical Return on Book Equity	0	1	1
2. Industry Average ROE	0	2	2
3. Strategy	20	18	38
4. Corporate Debt Rate:	2	6	8
A) Pre Tax	2	3	5
B) Post Tax	0	2	2
C) N/A	0	1	1
5. Weighted Cost of Capital	19	15	34
A) Debt			
1. Pre Tax	1	1	2
2. Post Tax	18	13	31
3. No Answer	0	1	1
B) Equity			
1. Book ROE	2	1	3
2. Net Income/Mkt. Value	3	6	9
3. Cash Flow/Mkt. Value	0	1	1
4. Dividend-Growth Model	13	4	17
5. CAPM	2	1	3
6. No Answer	0	3	3
C) Weighting Factors			
1. Balance Sheet Weights	12	6	18
2. Market Value Weights	1	4	5
3. Target Capital Structure	3	2	5
4. No Answer	3	2	5
6. CAPM	1	4	5
7. No Answer	9	--	9

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