Project Evaluation under Inflation Condition

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Abstract

This paper analyzes the role of inflation in capital budgeting and attempts to introduce solutions to such implication in order to make the appropriate decision for the firm' stockholders under these circumstances.

Inflation leads to biasness in evaluating the investment projects, due to its impact on the cash flow, the discount rate, the initial investment cost, and the depreciation. This paper has shown that the capital budgeting process is not neutral with respect to inflation, as the output prices will raise as well as the operating and capital expenditures will also be adjusted due to inflation. In addition, it has shown that it is reasonable to expect that the cost of capital will increase as a result of an increase in the real interest rate, the inflation premium, and the cost of equity.

Of critical importance is the basis used in calculating the annual depreciation which may lead to the transfer of wealth from the investment projects to the government and will result in underestimating the net present value of the investment projects, if these depreciation charges is calculated based upon the historical values and not on the replacement cost of the fixed assets.

1. Introduction

Inflation is a sustained and continuous increase in the economy's average price level. It has been a major macroeconomic problem since mid 60's. Macroeconomic instability has necessitated that expectation about the future rate of inflation has to be taken into consideration when making decisions about which capital projects will be undertaken by firms. Thus firms must be careful of either underestimating or overestimating investment because of the improper treatment of inflation in the financial appraisal.

2. Causes of inflation

One major cause of inflation is the excessive growth of the aggregate demand which is named as **Demand-pull inflation**. As any autonomous increase in spending whether by consumers, investors, governments, or foreigners will have a multiplier effect on aggregate demand, hence, a stimulus to aggregate demand will normally pull up both real output and prices. And as the real output increases, this means faster growth in the number of jobs, therefore a decrease in the unemployment rate (Boumal & Blinder, 1997, p.769).

Thus, if business fluctuations emanate from the demand side and the economy is not at full employment, then unemployment and inflation should move inversely. But at full employment, increased spending will result in pure inflation. This inverse relationship between unemployment and inflation is called Phillips curve. In other words, a stimulus to the demand mostly raises output and decreases the unemployment rate in the short run and leads to increase in the cash flows of the undertaken capital projects, but mostly rises in prices in long run, results in a decrease in the cash flows of the projects (Boumal & Blinder, 1997, p.771).

On the other hand, during the last half-century, inflation process changed, as prices nowadays travel a one-way street-up in recessions, up faster in booms. This phenomenon is known as **supply-shock or cost-push inflation**. This means, inflation may result from a decrease in the aggregate supply which takes place when the cost of production increase and this may be due to scarcity of raw materials or increase in the cost of imported raw material due to raise in exchange rate or increase in demand for labor resulting in increase in wages and prices of raw materials rapidly. These sources of a decrease in aggregate supply of inputs operate by increasing costs and the resulting inflation is so called cost-push inflation (Samulelson & Nordhaus, 2001, p.693).

This means, other things remaining the same, the higher the cost of production, the smaller is the amount produced, and the higher the cost per unit produced. At a given price level, rising wage rates or rising prices of raw materials makes firms cut of production and decrease the numbers of labor employed. Hence, any fluctuations in economic activity emanate from the supply side will result in higher rates of inflation which will be associated with higher rates of unemployment and a decrease in cash flows of investment projects accordingly.

Thus, while inflation can be initiated from either the demand side or the supply side of the economy, there is a crucial difference. Demand side inflation is normally accompanied by a real increase in the GDP, while the supply side inflation may be accompanied by a decrease in the GDP (Boumal & Blinder, 1997, p.773).

3. The impact of inflation on capital budgeting

The correct treatment of inflation requires taking into consideration its impact on capital budgeting as the anticipated inflation affects both the expected cash flows and the required rate of return. So it is essential that the two elements of the Net Present Value (NPV) calculation be treated in a manner that is internally consistent as the NPV represents the most appropriate frame work for evaluating a project's true economics because it incorporates cash flow, expected rates of return, and risk.

3.1 Impact of Inflation on cash flows

During long periods of price stability, managers believe that they can predict future prices and can therefore plan accordingly. As Keynes (1936) once said "money is an important link between the present and future". Uncertainty about inflation undermines the ability of money to serve as such a link. When inflation grows unexpectedly, the purchasing power of the currency declines unexpectedly and the future value of the currency becomes more uncertain. Since the future is cloudier, planning for that future investment becomes more difficult (McEachern, 1994, p.166).

Hence, the correct treatment of inflation must take into consideration its impact on cash flows of the project undertaken in making financial decision, as cash flows are affected in several ways. Inflows may rise if they come from products sold at higher prices, outflows may increase with higher wages and materials costs. However, the most important implication of inflation is on the firm's output prices. If the required rate of return used as an acceptance criterion, includes a premium for anticipated inflation, then, the estimated cash flows must also reflect this premium.

Thus, according to the traditional capital budgeting theory, the equilibrium position will be such that the firm will continue to invest up to the point where marginal costs equal marginal revenues, where:

$$I_0 + WC_0 = \frac{(Ri-Ci)(1-t)}{(1+r)^i} + \frac{D_i t}{(1+r)^i} + \frac{WC_0}{(1+r)^n} \qquad (1)$$

Where:

I_0: Initial investment in fixed assets

WC_0: Net working capital required for the project

R_i: Real Revenues generated from the project in period i

C_i: Real Cash outflows in period i

t: Marginal tax rate

r: firm's real cost of capital

D_i: Depreciation charge during period i

$\frac{WC_0}{(1+r)^n}$: the present value of net working capital when the project is terminated

But, if we introduce inflation, and assume that the cost of capital perfectly reflects the inflation assumption, as do revenues and costs, equation (1) becomes as follows:

$$I_0 + WC_0 = \frac{(Ri-Ci)(1+f)^{i-1}(1-t)}{(1+r)^i(1+f)^{i-1}} + \frac{D_i t}{(1+r)^i(1+f)^{i-1}} + \frac{WC_0 + WC_i}{(1+r)^n(1+f)^{i-1}} \qquad (2)$$

The appearance of the new term in equation (2), WCi represents the increase in the net Working capital each year as a result of inflation. That is to say, inflation reduces the present value of the cash inflows for any given project.

There are two reasons why this reduction in value takes place. The first reason is that the cash flow from depreciation is reduced on a present value basis, as depreciation charges are based on historical rather than replacement costs and as income grows with inflation, an increasing portion is taxed, with an unadjusted real after-tax cash flows with inflation while the discount rate is adjusted to the inflation, that is to say, there may be a transfer of wealth from the investment project to the government. The second reason for the reduction in the present value of the cash flows is the appearance of net working capital and its increased requirements during the life of the project. Although these outflows are recovered, the time value of money reduces the present value of the entire stream.

Hence, during inflation period, the exact amount that prices would have to be raised depends on the degree of Net Working Capital required relative to the overall level of investment, and also on the structure of the market that firms are in. thus as Van Horne stated that there must be consistent between prices and the discount rate as an acceptance criterion so as not to reject the investment project. Overall, inflation will lead to two internal adjustments in the Net Working Capital and capital structure.

3.2 Impact of Inflation on discount rate

Because the future is uncertain, lenders and borrowers must make expectations about inflation, and base their willingness to lend and to borrow on these expectations. Predictably, higher inflation rates will result in an increase in the anticipated rate of inflation. When a high rate of inflation is anticipated, lenders will demand and borrowers will grant higher interest rates on loans because both parties expect the value of the currency to depreciate. This higher interest rate would compensate the lender for the expected decline in the purchasing power of the currency during the course of the loan (Gwartney & Stroup, 1998, p.173).

Thus, it is clear that introducing inflation places upward pressure on interest rates. In this sense, Irving Fisher had suggested Fisher effect which relates the nominal interest rate to the real rate of interest through the rate of inflation expected over the life of the investment.

$$(1+r_{nominal}) = (1+r_{real}) \times (1+i_{expected\ inflation}) \qquad (3)$$

While it is true that nominal interest rates do not adjust upwards with inflation to keep real interest rate constant (fisher effect), but, there is a positive association between inflation and nominal interest rates. This suggests that firms with high debt/equity ratios will be exposed to higher risk and, in turn, have correspondingly higher nominal interest rate charges on the debt outstanding. This is clarified below in Hamada equation that indicates how increase in the debt ratio increases the risk of the investors.

$$b = b_u[1+(1-T)(D/E)] \qquad (4)$$

Where

b: the firm's levered beta coefficient

b_u : the firm's unlevered beta coefficient

T: tax rate

D/E: financial leverage (debt/equity ratio)

Hamada equation showed how an increase in the debt/ equity ratio increase beta coefficient which is a product of business risk which is represented in b_u, and financial risk that is related to the second part of the equation. However, beta for a leveraged firm is affected by its operating decisions as well as by its capital structure decisions as reflected in its Debt/Equity ratio (Brigham& Ehrhadt, 2002, p.560).

As a result, both debt/equity ratio and bankruptcy risk increase during periods of inflation which lead to decrease in the value of the firm. But this is not always the case, as some firms have control over their debt/equity mix which means that they can overcome bankruptcy risk. The reason for that is, with a certain debt level and with corporate tax shield on interest payments, a higher nominal interest rate makes debt relatively more attractive at the margin, thus tending to encourage firms to take on more loans. This indicates that there is a positive association between nominal interest rates and debt/equity ratio, and suggests that tax advantages in inflationary times, as well as the erosion of the real value of debt, outweigh the costs of bankruptcy risk (McNabb & McKenna, 1990, p.133).

When a project is financed purely by equity capital (either new issues of equity or retained earnings), finance theory assumes that its cost of capital is equal to return that would otherwise have been available from investing the money in the capital markets over the same period and at a similar risk. In other words, the required rate of return is the opportunity cost of capital for a stock market investment that is comparable to the proposed project in terms of maturity and risk exposure.

Thus, investors adjust differences in risk between series of investment by changing the rate at which they discount expected cash flows. The greater the received riskness of an investment, the greater will be the required rate of return (also known as the discount rate or cost of capital).

The most commonly advocated framework for specifying the relationship between risk and return is the capital asset pricing model (CAPM). According to CAPM theory, investors determine their required return by adding a risk premium to the interest rate of virtually risk free security. This risk premium is a function of the project's systematic risk (Mayo, 1991, p.207).

4. Literature overview

Van Horne (1971) has mentioned that if the required rate of return which is used as an acceptance criterion includes a premium for anticipated inflation, then, the estimated cash flows must also reflect inflation. Such cash flows are affected in several ways. Inflows may rise if they come from products sold at higher prices, outflows may increase with higher wages and materials costs. He also stated that future inflation does not affect depreciation charges on existing assets. Once the asset is acquired, these charges are known with certainty. Overall, the effect of anticipated inflation on cash inflows and cash outflows will vary with the nature of the project.

Thus, if the cash flows are not adjusted for inflation and the real cash flows are discounted with a nominal required return, then, there will be a bias toward rejection of the investment proposal, because a rate higher than the real required return is used as an acceptance criterion. If a nominal required return is used, nominal cash flows (inflation adjusted) should be employed. If a real required rate of return is used, the cash-flow estimates should not be adjusted for inflation.

The following equation (5) represents Van Horne Equation after adjusting the Net Present Value with inflation.

$$NPV = \sum \frac{[(R_t - C_t)(1+f_t)^t](1-T) + D_t T}{(1+k)^t} - I_0 \qquad (5)$$

Where:

R_t: Revenues generated from the project in period t

C_t: Cost incurred from the project in period t

f_t: inflation rate in period t

T: tax rate

D_t: Depreciation charge during period t

I_0: Original investment cost

K: firm's nominal cost of capital

On the other hand, Hindy (1991) has argued that Van Horne hasn't taken into account the factor of inflation in calculating the discount rate, as Van Horne has assumed that the discount rate is constant, which is not true because the value of the real interest rate changes over time, inflation premium changes from year to another, also risk premium as Myron and Gordon have mentioned in their model changes over time.

Hindy (1991) has stated that the discount rate in Van Horne equation can be constant in either of the following cases has taken place, first: if the loan that has been taken to finance the project has a constant interest rate paid on it and continue to be constant until the end of the loan repayment period, or if the project life time was only one year as this was the basis that Fisher effect was built on.

At the end, Hindy (1991) had concluded that a change on the discount rate must be introduced in the equation of the NPV as the discount rate changes as real interest rate, inflation and risk premium change. Therefore in each year, there will be a different value for the discount rate. However, it is possible, to use one single discount rate based on the geometric mean of the anticipated interest rate and the anticipated inflation. Thus, this relation that Hindy has illustrated, is shown below in the following equation (6)

$$PV = \frac{[(Rt-Ct)(1+f_t)^t](1-T) + D_tT}{(1+k_t)^t} \qquad (6)$$

The last point in this subject is that, Hindy (1991) made another argument on Van Horne equation's that is, calculating the net present value by subtracting the initial investment cost from the present value of the net cash flows. The researcher argued that the value of the initial cost can be correct only if the project life time is one year. But, because of replacement policy and inflation, replacement cost will exceed the initial investment cost at this time. So, if this is the core of calculating the initial cost, then some projects may be accepted, but in reality, it must be rejected as it may represent a negative impact on the wealth of shareholders.

Hence, the researcher had introduced a change in the technique used to calculate the investment cost of the project during inflation periods which is.

$$I_0' = I_0 + \frac{RC - I_0}{(1+K_n)^n} \qquad (7)$$

Where:

I_0': Adjusted Initial cost

I_0: Original investment cost

RC: replacement cost

K: discount rate in period n

n= t: time

Finally, the NPV equation is represented as follows after the adjustment of Van Horne and Hindy:

$$NPV = \sum \frac{[(R_t - C_t)(1+f_t)^t](1-T) + D_t T}{(1+k_t)^t} - \left\{ I_0 + \frac{RC - I_0}{(1+K_n)^n} \right\} \qquad (8)$$

Despite of the many changes that occurs in equation (8), but it still contain an error in giving an unreal value for the net present value, the source of this error is not due to the equation itself but due to the basis that was used in calculating the annual depreciation. It is known that the depreciation is calculated based on the historical value and not on the replacement costs during inflation period. Thus, using this approach in calculating the annual deprecation leads to unreal increase in the net profit after taxes, which means that inflation will encourage investment and that is not true. In addition to that, this will lead also to transfer of unrealistic revenues from the investment project to the government (Hindy, 1991). Therefore, equation (8) will be amended as follows:

$$NPV = \sum \frac{[(R_t - C_t)(1+f_t)^t](1-T) + D^*_t T}{(1+k_t)^t} - \left\{ I_0 + \frac{RC - I_0}{(1+K_n)^n} \right\} \quad (9)$$

Where D^*_t: the annual depreciation calculated based on replacement cost

5. Case Study

5.1 Description of the Case Study:

This case study has been prepared for a Natural Gas Transmission Pipeline project which is considered as a part of the natural gas industry. This natural gas pipeline project is with a length of 197 KM and a diameter of 36 inches. This project which is built on Built, Own, Operate and Transfer (BOOT) system, consist of two stages, the first stage started operating in 1st of September, 2003 and the second stage will operate in 1st of July, 2006 whereas the study is concentrating on. The Construction Period of this second stage is three years starts from 1st of January, 2004 and is expected to end at 30th June, 2006. The operational Period of the second stage is expected to start at 1st of July, 2006 and will end at the 26th of July, 2033 as the expected termination of the contract period is 30th of November, 2033. Thus, the estimated Project life time is 30 years.

5.2 Input Data

5.2.1 Project Capital Expenditure:

The total investment cost of this natural gas project is US$ 123 million, distributed along the three years of the construction period. In year 2004, US$ 66.27 million of the total investment cost will be spent, constituting 50 % of the total investment cost. In year 2005, US$ 47.75 million will be spent, representing 40 % of the total investment cost. While, in year 2006, US$ 8.98 million will be spent, this represents 10 % of total Capital expenditure.

The following table (1) describes the details of the project's investment cost. This cost consists of the project equipments which includes the cost of the pipeline, the cost of the gas compression station, and many other items, amounts US$120 million. This project's investment cost also includes the cost of the company building which amounts US$ 0.64 million, the company equipments which amounts US$ 0.06 million, the company furniture and fixtures which amounts US$ 0.13 million, and the company vehicles which amounts US$ 0.07 million.

Table 1

Total investment cost (in million US $)

Description	Total	2004	2005	2006
Total fixed investment cost	120.94	65.77	47.75	7.42
A-Total fixed investment costs (the Project)	120.04	65.32	47.30	7.42
B-Total fixed investment costs (the Company)	0.90	0.45	0.45	0.00
1- company building	0.64	0.355	0.29	0.00
2- company equipment	0.06	0.03	0.03	0.00
3- company furniture and fixtures	0.13	0.065	0.065	0.00
4- company vehicles	0.07	0.00	0.07	0,00
Foundation Expenses	0.06	0.00	0.00	0.06
Working capital	2.00	0.50	0.00	1.50
1-cash in hand during construction	0.50	0.50	0.00	0.00
2-Spare parts inventory	1.50	0.00	0.00	1.50
Total Investment Cost	**123**	**66.27**	**47.75**	**8.98**

5.2.2 Depreciation and Amortization:

The depreciation of the project equipment is on 20 years at 5 % depreciation rate each year, while the depreciation of the company building is on 50 years at a rate of 2 % each year, but since this project is built on BOOT basis, then the building will be depreciated on 27 years with a salvage value at the end of the project contract equals to US $ 0.308 million, while the equipment will be depreciated on 5 years with a rate of 20%. Finally, the furniture & fixtures and vehicles are depreciated over 7 years with a rate of 15 %.

Table 2

Depreciation (in million US $)

Description	%	Assets	2007	2008	2009	2010	2011	2012	2013
Project Equipment	5%	115.15	5.758	5.758	5.758	5.758	5.758	5.758	5.758
Project Company Fixed Assets		0.90	0.05	0.05	0.05	0.05	0.05	0.04	0.03
Building	2%	0.641	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Equipment	20%	0.06	0.013	0.013	0.013	0.013	0.013	0.00	0.00
Furniture & Fixtures	15%	0.13	0.02	0.02	0.02	0.02	0.02	0.02	0.01
Vehicles	15%	0.07	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total		116.05	5.81	5.81	5.81	5.81	5.81	5.80	5.79

Source: confidential source

On the other side, there are some items in the investment cost that are amortized over the first five years of operation. These items include the cost of the market analysis and survey, the cost of the professional services and the cost of the supervision services.

5.2.3 Project Operating Expenditures:

The management & maintenance cost of the pipeline contributes the large portion of the operating cost of the project; it is about 78 % of the total Operating expenses. It includes all company costs and overhead. Table (3) below describes the details breakdown of the operating cost of the project during the period 2004 to 2010.

Table 3

Project Operating Expenditure (in million US $)

Operating Expense item	2004	2005	Jun. 2006	Dec. 2006	2007	2008	2009	2010
Management and Maintenance	0.50	0.50	0.25	2.46	4.92	4.92	4.92	4.92
Payment to Gov	1.00	0.00	0.00	2.08	0.15	1.15	0.15	0.15
a. Land Lease	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b. License Lease	1.00	0.00	0.00	2.00		1.00		
c. Gas Regulator Expense	0.00	0.00	0.00	0.08	0.15	0.15	0.15	0.15
Insurance Expenses	0.13	0.25	0.13	0.13	0.25	0.25	0.25	0.25
Gas Expenses	0.36	0.35	0.16					
a. Gas Shrinkage Losses Value	0.36	0.35	0.16	During Mid 2003 - 2021 =Gas Demand* 0.8%*2 US$, Beyond 2021 =Gas Demand * 1%*2 US$				
b. Compressors Fuel Gas	0.00	0.00	0.00	0.49	0.98	0.98	0.98	0.98
Maintenance	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.50
a. Renewal Costs	0.00	0.00	0.00	0.00	0.25	0.25	0.25	0.25
b. Overhauling & Corrective maintenance Cost	0.00	0.00	0.00	0.00	0.25	0.25	0.25	0.25
Spare Parts	0.13	0.13	0.06	0.06	0.13	0.13	1.13	0.13
a. Spare parts and Oil & Lub Cost	0.13	0.13	0.06	0.06	0.13	0.13	0.13	0.13
b. Overall Spare parts	0.00	0.00	0.00				1.00	
Letters of Credit	0.18	0.18	0.07	0.07	0.15	0.15	0.15	0.15
a. Performance Bond	0.08	0.08	0.02	0.02	0.04	0.04	0.04	0.04
b. Gas Purchase LC	0.10	0.10	0.05	0.05	0.10	0.10	0.10	0.10
c. Reserve Account LC				0.003	0.005	0.005	0.005	0.005
Total Operating Expenses	2.29	1.40	0.67	4.796	6.092	7.092	7.092	6.092

Source: confidential source

5.2.4 Revenues

The revenues of this project are calculated based upon multiplying the quantities demanded of the natural gas with the transportation tariff. There are three demand scenarios were analyzed in the model, where each of the three demand scenarios includes two sub-scenarios: power stations, and power stations and industries, there is also estimated revenue for each scenario shown below in table (4):

Table 4

Revenues (in million US $)

Year	Power stations only			Power stations & industry		
	Low	Medium	High	Low	Medium	High
2004	3.3	3.3	3.3	3.3	3.3	3.3
2005	3.2	3.2	3.2	3.2	3.2	3.2
2006	10.5	11.5	12.6	11.0	12.0	13.1
2007	21.8	23.9	26.5	22.9	23.9	27.6
2008	17.1	21.9	24.3	17.9	21.9	29.6
2009	19.4	22.6	25.5	20.2	22.6	30.8
2010	20.7	23.3	26.4	21.4	23.3	34.1
2011	21.1	23.8	29.3	21.8	23.8	37.0
2012	21.6	26.8	30.7	22.3	26.8	42.8
2013	21.9	27.2	31.5	22.7	27,2	43.6
2014	22.1	27.7	33.3	22.9	27.7	45.4
2015	22.2	28.3	34.3	23.0	28.3	46.4
2016	22.7	28.9	35.6	23.4	28.9	47.6

Source: confidential source

5.2.5 Financial inputs

This Gas Transmission Pipeline project has two sources of capital injection, equity and debt. The equity portion constitutes 35 % of the total capital injected to the project which is about US$ 45.6 million, while the debt portion is 65 % which is US$80 million. Each source of these funds is distributed along the period of construction (2004 to mid 2006), according to table (5) below.

Table 5

Total Capital Injection (in million US $)

Capital Injection	2004	2005	2006	Total
Equity	43.10	1.55	1.97	**46.62**
Loan in USD	23.22	47.75	8.98	**79.95**
Total Capital Injection	**66.32**	**49.31**	**10.95**	**126.58**
Total Investment Cost	66.27	47.75	8.98	123.01

Source: confidential source

5.3 Data-analysis techniques used

The technique which will be applied in order to determine the impact of inflation on capital budgeting is, comparing between the results of the traditional equation of the NPV (equation (10)) and the adjusted NPV equations established by Van Horne (equation (5)) and Hindy (equation (8)).

$$NPV = \frac{\sum (R_t - C_t)(1-T) + D_t T}{(1+k)^t} - I_0 \qquad (10)$$

In fact, when computing the values of the variables in these mentioned equations, an error coefficient will arise due to applying the traditional NPV equation (equation 10) during inflation periods. This error coefficient will be calculated based on the difference in the values of the net present value of equations (10&5) and equations (10&8).

In conclusion, this shows how the adjusted NPV equation made by Van Horne and Hindy, tries to overcome some problems such as adjusting the cash flows of the project undertaken through adjusting the price of output and also the cost of good sold.

Hindy has also adjusted the discount rate by introducing changes in the real interest rate, inflation and risk premiums. Therefore in each year, there will be a different value for the discount rate.

Hindy has also overcome the problem of the investment cost by using a new technique to calculate the investment cost of the project during inflation periods as replacement cost will exceed the initial investment cost at the time of the replacement policy. He also overcomes the problem of the annual depreciation by using the replacement cost and not the historical value and this is shown in equation (9) (Hindy, 1991).

Finally, the values of the variables in equation (9) will be computed and then compared with the results of equation (8), in order to estimate the wealth that may be transferred to the government due to calculating the annual depreciation depending on the historical value of the initial cost and not on the replacement cost.

5.4 study findings

The following table (6) indicates the Net Present Values for each of the weighted average models, and according to equations (10), (5), (8) and (9) respectively.

Table 6

Net Present Value (in million US$)

Equation	Weighted Average Model
Traditional NPV Equation (10)	123.3
Van Horne Equation (5)	80.4
Hindy Equation (8)	56.6
Hindy Equation (9)	58.7

It is clear, after computing the values of the variables in equations (10) and (5); an error coefficient arose due to applying the traditional equation during inflation periods. This error occurred due to the difference in the value of the net present values in equations (10) and (5). This coefficient which is equals to 0.53 [(123.3- 80.4) / 80.4], indicates that the Net Present Value that is calculated according to equation (10) will be overestimated by US $ 42.9 million during the inflation period when applied as the cash flows in this equation hasn't been adjusted with inflation. The reason behind the decrease in Van Horne NPV equation is that, the revenues were constant and the operating cost and the net working capital were increasing due the increase in the inflation rate.

In addition, after computing the values of the variables in Hindy's equation (8), an error coefficient arose, equals to 1.178 [(123.3- 56.6) / 56.6], indicates that the Net

Present Value that is calculated according to equation (10) is overestimated by US$ 66.7 million during the inflation period due to the improper adjustment of the NPV variables such as the cash flows, the discount rate and the initial investment cost with inflation.

In fact, another error coefficient arose between Van Horne equation (6) and Hindy equation (8), equals to 0.42 [(80.4 - 56.6) / 56.6], indicates that the Net Present Value that is calculated according to Van Horne equation is overestimated by US$ 23.8 million during the inflation period. The reason behind that is the unadjustment of the initial investment cost to reflect the replacement cost and the discount rate in Van Horne NPV equation.

Finally, the Net Present Value of equation (9) was compared with the results of equation (8), in order to estimate the wealth that may be transferred to the government due to calculating the annual depreciation depending on the historical value of the initial cost and not on the replacement cost.

Hence, if we calculate the annual depreciation based on the historical cost, we will find that it will be equal to US$ 116.05 million, while that one that is calculated based upon the replacement cost will be equal to US$ 175.3 million. Accordingly, this will lead to the transfer of unreal revenues that government may gain, based on the difference between these two depreciation values, which is equal to US$ 8.89 million (US$ 59.25 million x 15 %).

At the end, the Net Present Value will decrease by U.S$ 2.1 million as the difference between the Net Present Value using equation (8) was US$ 56.6 million and that in equation (9) was US$ 58.7 million. Accordingly, firms may reject investment proposals that may be good value enhancing projects for the stockholders and for the economy as a whole due to the loss in tax saving.

6. Conclusion and Recommendations

This paper has explored the impact of inflation on the capital budgeting process. It has shown that it is reasonable to expect that the cost of capital will increase as a result of the increase in the real interest rate, the inflation rate, and the cost of equity.

In addition, it has shown that the capital budgeting process is not neutral with respect to inflation, even if output prices rise as well as the operating and capital costs are adjusted to inflation. Of critical importance is the basis used in calculating the annual depreciation which will lead to underestimating the net present value of the investment projects if not calculated based upon the replacement cost.

Finally, due to such circumstances, it would appear that corporate financial behavior is influenced by inflation. Inflation will cause the firm to choice between many and various schemes of depreciation techniques to allow 'accelerated' depreciation expenses by those companies to treat that concern. As, using this historical values in calculating the annual deprecation will arise unreal increase in the net profit after taxes, which means increasing the tax portion taken on that unreal achieved profits and that is not true. In addition to that, it will lead to transferring unrealistic revenues from the investment project to the government.

Thus, it would be recommended to overcome the problem of depreciation by applying accelerated depreciation schedules which appear in almost infinite variety. Their common characteristic is to allow write-offs at a pace faster than that implied by the straight-line depreciation method.

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