Advances in Management & Applied Economics, vol.1, no.1, 2011, 93-109
ISSN: 1792-7544 (print version), 1792-7552 (online)
International Scientific Press, 2011

Present and future value formulae for uneven cash flow Based on performance of a Business

Ameha Tefera Tessema[1]

Abstract

Business firm's income is not constant, or fixed from period to period because of this the firm’s cash inflow or out flow is uneven. The decision of a firm either to invest or to borrow from creditors based on uneven cash in-flow need to have a future or a present value prediction formula. The problem to find future and present value formulae for uneven cash flow stayed unsolved for long periods. However, on this paper it wanted to show future and present value of uneven cash flow prediction formulae based on the performance rate (P_n) of a business. The Performance rate (P_n) is a percentage by which the current performance, economic value added (EVA_n), of the business exceeds the previous performance. Therefore, the firm cash out flows either for investment or for repayment of the borrowed loan growth according to the performance rate (p) of the firm.

Keywords: present value formula, future value formula, performance rate, Rate of growth.

[1] Construction and business bank s.c., P.O. box 20412, Addis Ababa, Ethiopia, e-mail:ambet22002@yahoo.com.

Article Info: *Revised:* March 17, 2011. *Published online*: May 31, 2011

1 Introduction

Money does have different value at different periods. The money we owe now does have more value than we need to owe it in the future. The facts behind this idea are:

1. we prefer to use money more productively now so as to get a real return in the future
2. During inflation period the money we use now does have more purchasing power than we use the money in the future
3. At last since the future is full of risk and uncertainty we prefer current consumption to future consumption.

This phenomenon is also referred to as time preference of money which is expressed by an interest rate ([1]-pp.44-46, [6]-pp.265-267, [8]-pp.19-20). An interest rate is defined as the price paid by a borrower to bank/ creditor for the use of money/ resources during the given time period. A borrower from a bank pays the principal and a percentage of the principal per unit of time. A money depositor into the bank account will receive in the end of interest period the principal deposit amount and a percentage of the principal per unit of time, which is the interest amount.

Compounding and discounting techniques are the two methods by which time value of money calculated. The future and present values of annuity formulae developed in such technique valid only for equal amount of periodic cash flow. The formulae do have the following shortcomings

1. The formulae do not calculate a cash flow which growth according to the increase of the project's performance.

2. The formulae do consider a project performance to be same throughout the project life, which is impossible. A project whose performance does not change according to the market situation throughout the project life may be out of the market.

3. The formulae do not consider the future inflation period where the project cash inflow will be reduced.

4. The formulae do not consider flexibility of deposit to bank or flexibility of payment to creditors.

5. The present value formula doesn't consider low cash flow at initial stage. At initial stage of investment where there is high burden of investment cost, high expense for advertisement of the business products, there might be no cash inflow for the firm. Because of this, the set repayment using present value formula by creditors without considering the business firm's initial investment cost becomes a burden for a borrower.

6. The repayment set for borrowers by using annuity formula goes decreasing from high burden to low because the repayment amount in the end of the loan period comes down to small amount and the borrower gets relief ([6], pp.1015) . This is meaningless since the borrower should have got a relief of loan payment at the beginning of loan period where the project cash inflow is very low.

7. The cash flow we are going to calculate by present value formula doesn't have any future risk premium though the interest rate does have and this creates a mismatch between the cash flow and the interest rate.

As have seen above present and future value formulae fail to calculate uneven cash flow. In the investment decision of a firm, one could receive uneven of cash inflow, which does not enable him/her to put on decision merely for there is no any formula to calculate uneven cash investment shortly. Because of this, we compelled to use a laborious technique
([6]- pp.274, [7]-pp.251, [9]-pp.3-9) by which we are going to calculate each periods' cash flow to get the total sum.

On this paper, the author want to show how the sum of uneven cash flow either for investment or for repayment of borrowed loan from bank based on performance of the business firm can be determined.

2 Preliminary note

Although, Traditional accounting measures of performance of a firm are profit, earning per share(EPS), return on investment (ROI),free cash flow (FCF),capital productivity (KP), labor productivity (LP) and return on capital employed (ROCE) each of each ignores cash and cost of capital so as to generate the target profit ([3]-pp.326, [10]-pp.414). Ruther, the best measuring tool of performance of a business firm is economic value added which provides the money value created for investor in a given period of time by weighting the profit generated against the cost of capital employed so as to generate that profit, [4]-pp.477. From this, since EVA considers the amount of capital invested, the return earned on capital and the cost of capital (WACC) – reflecting the risk adjusted required rate of return, it is thought to have all characteristics of the measure though it is valid only for short period of time. Furthermore, since EVA (Economic Value Added) has considered as a measure of both performance and value of a business firm, it assumes as a way to determine the value created excess above the required return for the shareholder of the business firm. The firm creates wealth for the shareholder when the revenue of the firm exceeds over the cost of doing business and the cost of capital. A business firm creates value for its shareholders on the bases of positive EVA rather than simply making accounting profits. The positive magnitude of EVA indicates as the business firm is improving its net cash return on invested capital. The increment of EVA of the firm from year to year will result an increase of the market value of the firm, [1].

The existence of accounting information of a firm for a single accounting period helps the manager to grasp the basic know how of the firm performance in that accounting period. A manager who has good experience of the firm performance helps in facilitating to predict future performance of a firm basing on the past financial statement such as income statement and balance sheet. The availability of past trend records help to calculate and predict progressive performance rate of the firm so as to determine progressive cash inflow on the firm investment return and the firm progressive bank loan repayment, ([2]-pp.64-65, [11]-pp.331-332). Since the firm's performance rate has assumed to be progressive, the cash flow of the firm assumes to grow from period to period. Performance rate is a percentage by which the current performance of a firm (in this case, EVA) growth from the previous.

3 Main results

An investor who is going to borrow some fixed amount of money will get into commitment to pay the loan repayment amount at every period as per the contractual agreement between the investor and creditor. The loan repayment amount pre-calculated and set by the creditors assuming to pay the period interest amount and a portion of the principal by the excess above the interest amount. Each of the next periods repayment amount is the product of the preceding repayment amount and of the current project’s performance rate.

At initial repayment period, the repayment amount assumed to be a small fixed amount without performance rate. However, the next after the first period repayment amount growth according to the growth of business performance.

Assume that the first small repayment amount to be a_1 and the next after the first repayment consequently be calculated as

$$a_1(P_1+1+i)(P_2+1+i)....(P_{n-2}+1+i)P_{n-1}$$

Such that

Repayment Period	*Repayment amount*
1	a_1
2	$a_1(P_1+1+i)$
3	$a_1(P_1+1+i)P_2$
$\vdots$	$\vdots$
n	$a_1(P_1+1+i)(P_2+1+i)....(P_{n-2}+1+i)P_{n-1}$

where P_n = Performance rate, any arbitrary figure greater than zero, which can be measured as the percentage by which the $(n+1)^{th}$ period EVA growth from the n^{th} period EVA, i.e., $P_n = \frac{EVA_{n+1} - EVA_n}{EVA_n}$.

The reason why the author preferred to put performance rate in such a way is to save the cash flow from un-necessary exaggeration because the ratio is very small though the n^{th} period performance rate is greater than/or less than the $(n-1)^{th}$ period performance rate. Here EVA for n periods is to mean projected net income for n loan periods on the firm projected income statement.

i = Bank interest rate which is added to the performance rate since the n^{th} period repayment should contain a portion of the principal amount and of the period interest amount, [2]-pp.444. It is between 0 and 1

n = Loan period

The current cash value of the future cash flow of these loan repayments expressed as follow

Result 1 :

$$\frac{a_1}{(1+i)^n}\left[\prod_{m=1}^{n-1}(P_m+1+i)+(i+1)^{n-1}\right]$$
$$=\frac{a_1}{(i+1)}+\frac{a_1(P_1+1+i)}{(1+i)^2}+\frac{a_1(P_1+1+i)P_2}{(1+i)^3}+\frac{a_1(P_1+1+i)(P_2+1+i)P_3}{(1+i)^4}+\cdots$$
$$\cdots+\frac{a_1(P_1+1+i)(P_2+1+i)(P_3+1+i)...(P_{n-2}+1+i)P_{n-1}}{(1+i)^n}$$

Another decision of a business firm is a decision to invest cash now in order to receive cash, goods or services in the future period. Here also let represent the cash now investing for each period as

Period	*Investing Cash*
1	a_1
2	$a_1(W_1 - \mathrm{T}_1)$
3	$a_1(p_1+1)(W_2 - \mathrm{T}_2)$
$\vdots$	$\vdots$
n	$a_1(p_1+1)(p_2+1)...(p_{n-3}+1)(p_{n-2}+1)(W_{n-1} - \mathrm{T}_{n-1})$

where $W_n = P_n + 1$, $T_n = 1-(P_n+1)(i)$ for $(P_n+1)(i)$ between 0 and 1,

(i.e., $0 < (P_n+1)(i) < 1$),

T_n = is the firm performance other than bank's deposit interest. The deposit interest rate should not be included into the project performance since it is always less than the bank lending interest rate.

i = Bank interest rate which is between 0 and 1.

n = investing period.

$W_{n-1} - T_{n-1}$ = A portion of performance rate by which the excess above consumption saved into bank account.

Therefore, the future value of investing cash now represented as follow

Result 2:

$$a_1(i+1)\left[\prod_{m=1}^{n-1}(p_m+1)(1+i)^n - i\right]$$
$$= a_1(i+1) + a_1(W_1 - T_1)(i+1)^2 + a_1(p_1+1)\ (W_2 - T_2)(i+1)^3 + \cdots$$
$$\cdots + a_1(p_1+1)(p_2+1)...(p_{n-2}+1)(W_{n-1} - T_{n-1})(i+1)^n$$

3.1 Advantages

The paper deeply focus on how business firms determine their cash inflow or out flow based on their economic profit (or economic value added) .As revealed by the formulae, the first payment, which is excess above consumption , which can be assigned for payment of debt or for saving into bank account is very small amount. The next after the first cash flow amounts progress or growth along with the business firm’s performance rate. Since this performance rate shows the relative level of growth of one firm, current to last economic profit, it embraces all activities of the firm.

EVA reflects net of the cash generated and the cash invested by the business firm. As EVA fluctuates from period to period, the net cash left to the business firm also fluctuates from period to period. This fluctuation of the firm’s cash inflow or out flow has exactly reflected by the business performance rate (P_n).

Financing organs, like banks, use ordinary annuity formula to determine loan capacity as well as loan repayment of the borrowers. Since the formula does not contain any measure of the performance of the borrowing organ, Most of the business loan are seen getting into nonperforming loan category, letting other things being constant. Because of this Banks always lay their own rules and regulations to minimize nonperforming loans at hand but could not reach at a conclusive solution for long periods. Unless otherwise there existed stiff control to collect the disbursed loan, the increment of bad debt from period to period will exactly harm the economic condition of the country as a whole. However, the present value formula stated by this paper calculates the projected fluctuating repayment amount along with the performance of the borrowing organ based on the real cash on hand, which is excess above the consumption.

The present value formula gives an advantage to borrowers since it relieve borrowers’ suffering from paying huge amount at the begging periods. The firm at initial stage assumed at high establishment cost and eventually after covering the investment cost the loan repayment assumes to raise according to the investment performance rate. The repayments calculated and set for each loan periods by creditors/banks in such a way will benefit them in collection of loan interest since at the begging years (periods) the principal loan amount has not much affected by the small repayments comparing to the next periods’ repayments. Each of the periods' repayment amounts assumed to clear first the interest amount and then goes to the principal by the excess above the interest amount.

On the other hand, future value formula relaxed depositors for they can deposit each periods excess above of their consumption. A newly entrant business firm into market does have a little amount of cash at initial stage and eventually after covering the establishment cost the liquidity amount on hand grows accordingly. The growth of the cash inflow of the business firm depends on its performance. When performance of the business improves, its profit and cash inflows increase in the same way. As result of this, the depositor can deposit the excess above his/her business consumption starting by a small amount of money, which can eventually increase from period to period to a higher amount according to the business performance.

3.1.1 Cost

The formulae highly depended on the performance of the firm, Economic value added (EVA).Since all business firms do not use EVA as a measure of performance, they are obliged to go back and recalculate their EVA first before they have arrived at a decision to use the formulae.

Theorem 3.1 *Let for all n elements of natural numbers such that p_n and a_1 are arbitrary real numbers. If the n^{th} term cash out flow can be expressed*

$$Cf_n = a_1 \prod_{r=1}^{n-2} (p_r + 1 + i)\, p_{n-1}$$

then the sum of each cash out flow's present value can calculate as follow

$$\frac{a_1}{(1+i)^n}\left[\prod_{m=1}^{n-1}(P_m + 1 + i) + (i+1)^{n-1}\right]$$

$$= \frac{a_1}{(i+1)} + \frac{a_1(P_1+1+i)}{(1+i)^2} + \frac{a_1(P_1+1+i)P_2}{(1+i)^3} + \frac{a_1(P_1+1+i)(P_2+1+i)P_3}{(1+i)^4} + \cdots$$

$$\cdots + \frac{a_1(P_1+1+i)(P_2+1+i)(P_3+1+i)...(P_{n-2}+1+i)P_{n-1}}{(1+i)^n}$$

where i *is bank interest rate which is between zero and one* ($0 < i < 1$).

Theorem 3.2 *Let for all n elements of natural numbers such that* p_n *and* a_1 *are arbitrary real numbers. If the* n^{th} *term cash in flow be expressed*

$$Cf_n = a_1 \prod_{r=1}^{n-2} (p_r + 1)(W_{n-1} - T_{n-1})(i+1)^n$$

then the sum of each cash in flow future value can calculate as follow

$$a_1(i+1)\left[\prod_{m=1}^{n-1}(p_m+1)(1+i)^n - i\right]$$
$$= a_1(i+1) + a_1(W_1 - T_1)(i+1)^2 + a_1(p_1+1)\ (W_2 - T_2)(i+1)^3 + \cdots$$
$$\cdots + a_1(p_1+1)(p_2+1)...(p_{n-2}+1)(W_{n-1} - T_{n-1})(i+1)^n$$

where $W_n = P_n + 1$, $T_n = 1 - (P_n + 1)(i)$ *for* $(P_n + 1)(i)$ *between* 0 *and* 1,

(i.e., $0 < (P_n + 1)(i) < 1$*),*

P_n *= performance rate i.e. such that* $p_{n+1} \leq$ or $\geq$ p_n *and,*

T_n *is the firm performance other than bank's deposit interest. The deposit interest rate should not be included into the project performance since it is always less than the bank lending interest rate,*

i = Bank interest rate which is between 0 and 1,

n = investing period,

$W_{n-1} - T_{n-1} =$ *A portion of performance rate by which the excess above consumption should be saved into bank account.*

Proof. Let the n^{th} period cash flow (a_n), performance rate (p_n) and the discount rate (x) be expressed by any figure, which can mathematically be expressed as $a_n \in R$ (*R*eal numbers) for all $n \in N$ (natural numbers), such that $a_n, x, p \in R$. Then the sum of cash flow for n periods can be explained as follow

$$\sum_{m=1}^{n+1} a_m = a_1 + a_2 + \cdots + a_{n+1}$$

This can equally expressed as

$$\sum_{m=1}^{n+1} a_m = \frac{a_1 x}{x} + \frac{a_2 x^2}{x^2} + \cdots + \frac{a_{n+1} x^{n+1}}{x^{n+1}}, \quad \text{for } x \neq 0$$

Split the terms as

$$= \frac{1}{x}(a_1 x + 0) + \frac{1}{x^2}((a_2 x^2 + a_1 x) - (a_1 x)) + \frac{1}{x^3}((a_3 x^3 + a_2 x^2 + a_1 x)) - (a_2 x^2 + a_1 x)) +$$
$$+ \cdots + \frac{1}{x^{n+1}}((a_{n+1} x^{n+1} + a_n x^n + \cdots + a_1 x) - (a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x))$$

Collecting like terms in the brackets we get that

$$= a_1 x(\frac{1}{x} - \frac{1}{x^2}) + (a_2 x^2 + a_1 x)(\frac{1}{x^2} - \frac{1}{x^3}) + \cdots + (a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x)(\frac{1}{x^n} - \frac{1}{x^{n+1}}) +$$
$$+ \frac{1}{x^{n+1}}(a_{n+1} x^{n+1} + a_n x^n + \cdots + a_1 x)$$

$$= (a_1 x)(\frac{1}{x} - \frac{1}{x^2} + \frac{1}{x^2} - \frac{1}{x^3} + \cdots + \frac{1}{x^n} - \frac{1}{x^{n+1}}) + (a_2 x^2)(\frac{1}{x^2} - \frac{1}{x^3} .... + \frac{1}{x^n} - \frac{1}{x^{n+1}}) +$$
$$+ \cdots + (a_n x^n)(\frac{1}{x^n} - \frac{1}{x^{n+1}}) + \frac{1}{x^{n+1}}(a_{n+1} x^{n+1} + a_n x^n + \cdots + a_1 x)$$

$$= a_1 x(\frac{1}{x} - \frac{1}{x^{n+1}}) + a_2 x^2(\frac{1}{x^2} - \frac{1}{x^{n+1}}) + \cdots + a_n x^n(\frac{1}{x^n} - \frac{1}{x^{n+1}}) + \frac{1}{x^{n+1}}(a_{n+1} x^{n+1} + a_n x^n + \cdots + a_1 x)$$

$$= a_1 x \frac{x^n - 1}{x^{n+1}} + a_2 x^2 \frac{x^{n-1} - 1}{x^{n+1}} + \cdots + a_n x^n \frac{x - 1}{x^{n+1}} + \frac{1}{x^{n+1}}(a_{n+1} x^{n+1} + a_n x^n + \cdots + a_1 x)$$

Multiply both sides by $\frac{x^{n+1}}{x-1}$, for $x \neq 1$

$$\left(\sum_{m=1}^{n+1} a_m\right) \frac{x^{n+1}}{x-1} = a_1 x \frac{x^n - 1}{x-1} + a_2 x^2 \frac{x^{n-1} - 1}{x-1} +$$
$$+ \cdots + a_n x^n \frac{(x-1)}{x-1} + \frac{1}{x-1}(a_{n+1} x^{n+1} + a_n x^n + \cdots + a_1 x)$$

Since the formula of geometric progression at ratio= x can be expressed as

$\frac{x^n - 1}{x-1} = 1 + x + \cdots + x^{n-1}$ ([12]-pp.519), it follows that

$$= a_1(x + x^2 + \cdots + x^n) + a_2(x^2 + x^3 + \cdots + x^n) + \cdots + a_n(x^n) + \frac{1}{x-1}(a_1 x + a_2 x^2 + \cdots + a_{n+1} x^{n+1})$$

Equivalently this can express as

$$= a_1 x + (a_1 + a_2)x^2 + (a_1 + a_2 + a_3)x^3 +$$

$$+ \cdots + (a_1 + a_2 + \cdots + a_n)x^n + (a_1 x + a_2 x^2 + \cdots + a_{n+1}x^{n+1})\frac{1}{x-1}$$

Let $a_{n+1} = 0$, then it follows that

$$\left(\sum_{m=1}^{n} a_m\right) x^n \frac{x}{x-1} = (a_1 \frac{x}{x-1})x + (a_1 + a_2 \frac{x}{x-1})x^2 +$$

$$+ (a_1 + a_2 + a_3 \frac{x}{x-1})x^3 +$$

$$+ \cdots + (a_1 + a_2 + \cdots + a_n \frac{x}{x-1})x^n \qquad (1)$$

From this expression let's assume that the cash flow of a project for each period can be defined as

$$a_n = p_{n-1}(a_1 + a_2 + a_3 + \cdots + a_{n-1})$$

This can explain as

$a_1 = a_1$,

$a_2 = p_1 a_1$,

$a_3 = p_2(a_1 + a_2)$,

$a_4 = p_3(a_1 + a_2 + a_3)$, …,

$a_n = p_{n-1}(a_1 + a_2 + \cdots + a_{n-1})$

or can be written as

$a_1 = a_1$,

$a_2 = p_1(a_1)$,

$a_3 = p_2(a_1)(p_1 + 1)$,

$a_4 = p_3(a_1)(p_1 + 1)(p_2 + 1)$, …,

$a_n = p_{n-1}(a_1)(p_1 + 1)(p_2 + 1)...(p_{n-2} + 1)$

Such that $P_{n+1} \leq$ or $\geq$ P_n & $P_0 = 1$ and putting this in (1), we have

$$=\left(a_1\frac{x}{x-1}\right)x+\left(a_1+a_1P_1\frac{x}{x-1}\right)x^2+\left((a_1+a_2)+(a_1+a_2)P_2\frac{x}{x-1}\right)x^3+$$
$$+\left((a_1+a_2+a_3)+(a_1+a_2+a_3)P_3\frac{x}{x-1}\right)x^4+$$
$$+\cdots+\left((a_1+a_2+a_3+\cdots+a_{n-1})+(a_1+a_2+\cdots+a_{n-1})P_{n-1}\frac{x}{x-1}\right)x^n$$

$$=a_1\frac{x^2}{x-1}+(a_1)\left((p_1+1)x-1\right)\frac{x^2}{x-1}+\left(a_1+a_2\right)\left((P_2+1)x-1\right)\frac{x^3}{x-1}+$$
$$+(a_1+a_2+a_3)\left((P_3+1)x-1\right)\frac{x^4}{x-1}+$$
$$+\cdots+(a_1+a_2+a_3+\cdots+a_{n-1})\left((P_{n-1}+1)x-1\right)\frac{x^n}{x-1}$$

$$=a_1\frac{x^2}{x-1}+(a_1)\left((p_1+1)x-1\right)\frac{x^2}{x-1}+\left(a_1+a_2\right)\left((P_2+1)x-1\right)\frac{x^3}{x-1}+$$
$$+(a_1+a_2+a_3)\left((P_3+1)x-1\right)\frac{x^4}{x-1}+$$
$$+\cdots+(a_1+a_2+a_3+\cdots+a_{n-1})\left((P_{n-1}+1)x-1\right)\frac{x^n}{x-1}$$

Multiplying both sides of the equation by $x-1$, we obtain

$$\left(\sum_{m=1}^{n}a_m\right)x^{n+1}=a_1x^2+a_1\left((p_1+1)x-1\right)\,x^2+(a_1+a_2)\left((\mathrm{p}_2+1)x-1\right)x^3+$$
$$+(a_1+a_2+a_3)((p_3+1)x-1)x^4+$$
$$+\cdots+(a_1+a_2+\cdots+a_{n-1})\left((p_{n-1}+1)x-1\right)x^n$$

$$\left(\sum_{m=1}^{n}a_m\right)x^{n+1}=a_1x^2+a_1\left((p_1+1)x^3-x^2\right)+(a_1+a_2)\left((\mathrm{p}_2+1)x^4-x^3\right)$$
$$+(a_1+a_2+a_3)\left((p_3+1)x^5-x^4\right)+$$
$$+\cdots+(a_1+a_2+\cdots+a_{n-1})\left((p_{n-1}+1)x^{n+1}-x^n\right)\qquad(2)$$

if the bank interest rate (i) expressed as $x=\frac{1}{i+1}$ and putting this in (2) and multiplying both sides of the equation by $(i+1)$ we have the following

$$\left(\frac{1}{i+1}\right)^n\left(\sum_{m=1}^{n} a_m\right) = \frac{a_1}{(i+1)} + \frac{a_1(p_1 - i)}{(i+1)^2} + \frac{(a_1 + a_2)(p_2 - i)}{(i+1)^3} + \frac{(a_1 + a_2 + a_3)(p_3 - i)}{(i+1)^4} + \\ + \cdots + \frac{(a_1 + a_2 + \cdots + a_{n-1})(p_{n-1} - i)}{(i+1)^n} \qquad (3)$$

Suppose that in the above equation (3) $P_n = P_n + i$, and adding both sides of the equation $\frac{a_1}{(i+1)}$ we obtain the following present value formula

$$\frac{a_1}{(1+i)^n}\left[\prod_{m=1}^{n-1}(P_m + 1 + i) + (i+1)^{n-1}\right] \\ = \frac{a_1}{(i+1)} + \frac{a_1(P_1 + 1 + i)}{(1+i)^2} + \frac{a_1(P_1 + 1 + i)P_2}{(1+i)^3} + \frac{a_1(P_1 + 1 + i)(P_2 + 1 + i)P_3}{(1+i)^4} + \\ + \cdots + \frac{a_1(P_1 + 1 + i)(P_2 + 1 + i)(P_3 + 1 + i)...(P_{n-2} + 1 + i)P_{n-1}}{(1+i)^n}$$

The initial cash flow (a1), in the above formula, growth progressively from one period's to another by multiplying with progressive performance rate of the period. Each of the periods cash flow contains an interest rate that resists an inflation and risk which might be happened in the future period. Furthermore each of the period cash flow contains the period performance rate that can move along with the strength of the business which can lead the cash flow highly volatile.

Again let consider equation (2), by putting firs $x = (i+1)$ and then deducting $a_1(i+1)^2$ from both sides, and then after adding both side of the equation $a_1(i+1)$, we have the following future value formula

$$[\sum_{m=1}^{n} a_m](i+1)^{n+1} - a_1(i+1)i \\ = a_1(i+1) + a_1(W_1 - T_1)(i+1)^2 + (a_1 + a_2)(W_2 - T_2)(i+1)^3 + \\ + \cdots + (a_1 + a_2 + \cdots + a_{n-1})(W_{n-1} - T_{n-1})(i+1)^n$$

This can be written as

$$a_1(i+1)\left[\prod_{m=1}^{n-1}(p_m+1)(1+i)^n - i\right]$$
$$= a_1(i+1) + a_1(W_1 - T_1)(i+1)^2 + a_1(p_1+1)(W_2 - T_2)(i+1)^3 +$$
$$+\cdots + a_1(p_1+1)(p_2+1)\ldots(p_{n-2}+1)(W_{n-1} - T_{n-1})(i+1)^n$$

where $W_n = P_n + 1$, $T_n = 1-(P_n+1)(i)$ for $(P_n+1)(i)$ between 0 and 1, (i.e., $0 < (P_n+1)(i) < 1$),

P_n = performance rate i.e. such that $p_{n+1} \leq$ or $\geq$ p_n and

T_n = is the firm performance other than bank's deposit interest. The deposit interest rate should not be included into the project performance since it is always less than the bank lending interest rate.

i = Bank interest rate which is between 0 and 1.

n = investing period

$W_{n-1} - T_{n-1} =$ A portion of performance rate by which the excess above consumption should be saved into bank account.

4 Conclusion

Most business organ uses EVA as a measure of both value and performance. The main objective of a bank is accepting deposit from the society and lending the collected deposit amount to the people who met liquidity shortage. The loan officer of the bank ought to provide a strong realistic feasibility study regarding the project to identify the eligibility of the person to be a borrower based on the projected net cash inflow of the business. The main problem stayed for long is that projected cash flow of the business ignores future risk of interest rate fluctuation and future inflation. Because of these shortcomings, the loan repayment set by the bank disregarding inflation and risk in interest rate fluctuation will become a burden to the borrower when this factor happens in the real market. Because of this, the borrowers fail to climb their loan repayment obligation within the given loan life and this result the bank to fail for collecting the disbursed loan amount properly. The increase of uncollectable loans from period to period leads the bank to meet liquidity problem, which will also levy a shadow to the country economy as a whole. However, the bank liquidity problem will have a solution if the bank has a habit of keeping reserve a portion of net cash on hand to fill back the shortage of liquidity.

The future value formula enable people, who have no excess cash on hand for investment, to decide now saving a portion of income according to their earnings growth from period to period so as to realize their dream after some fixed period. This also encourages the saving habits of people those who have low income and those who are salaried, people who get their income from their employment at a fixed period interval such as monthly or annually.

Generally, the formulae can easily help creditors, investors and persons who have low income in order to facilitate their decision shortly and accurately. They can also help to estimate either the present or the future cash flow of a firm more perfectly.

References

[1] Aswath Damodaran, *Corporate finance*, 2nd edition, John Wiley & Sons, Inc., USA, 791-827, 2001.

[2] Alexander Hamilton Institute, *Financial management hand book*, global books and subscription services, New Delhi, 39-486, 1998.

[3] R.A. Brealey and S.C. Myers, Principles of corporate finance, McGraw-Hill Inc., New York, 321-334, 2003.

[4] Colin Firer, S.A. Ross, R.W. Westerfield and B.D. Jordan, *Fundamentals of Corporate Finance*, 3rd edition, McGraw-Hill Companies, London, 477-480.

[5] Construction and Business Bank SC, www.cbb.com.et.

[6] I M Pandey, *Financial Management*, 8th edition, Vikas publishing house Pvt Ltd, New Delhi, 265 – 616, 1999.

[7] A.N. Mosich, *Intermediate accounting*, 6th edition, McGraw-Hill, Inc., U.S.A, 239 – 274, 1963.

[8] D.R. Myddelton, *The Essence of Financial Management*, Prentice Hall International Limited, United Kingdom(UK), 19-29, 1995.

[9] Chandra Prasanna, *Fundamentals of financial management*, 3rd edition, Tata McGraw-Hill, Publishing Company Limited, New Delhi, 3.1 – 18.11, 1993.

[10] Proctor Ray, *Managerial Accounting For Business Decisions*, 2nd edition, Pearson Education Limited, England, 413-432, 2006.

[11] R.F. Reilly and R.P. Schweihs, *Hand Book of Advanced Business Valuation*, McGraw-Hill Companies, Inc., New York, 329-349, 2000.

[12] M.A. Sobel and N. Lerner, *College algebra*, 4th edition, Prentice-Hall, Inc., New Jersey, 515 – 535, 1995.