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Financing Leverage Analysis : A Conceptual Framework

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Abstract : *A conceptual framework for intra - firm financing leverage analysis { based on the mechanical analysis of physical leverage (the genesis of the concept of financing leverage) } of a corporate firm under condition of future business risk considering a short - term planning horizon , composed of* ***(a)*** *an ex - ante analysis conducted at the beginning of the period for choosing a ' Financing Account Structural Plan ' (FASP) from alternative FASPs based on the principle of maximization of expected utility { or principle of minimization of absolute value of expected disutility (negative utility) } of the ' elasticity coefficient measure ' of the ' Degree of Financing Leverage ' (DFL) considering the degrees of ' Downside Financing Leverage Risk (DFLR) averseness' and ' Upside Financing Leverage Risk (UFLR) affinity' subjectively assigned by the DFLR averse or UFLR affine decision - maker* ***[*** *noting that a decision - maker with an iota of rationality can never be ' DFLR affine ' or ' UFLR averse' to any degree , and utilizing concave utility function and convex utility function for risk aversion and risk affinity respectively* ***]*** *; and* ***(b)*** *an ex - post analysis conducted at the end of the period for the performance appraisal of the decision-maker based on ' financing leverage efficiency' , is formulated and illustrated in this research paper .*

Keywords: *Physical Leverage , Financing Leverage , Financing Account Structural Plan , Degree of Financing Leverage , Financing Leverage Risk , Downside Financing Leverage Risk , Upside Financing Leverage Risk , Coefficient of Variation , Mean Absolute Deviation , Financing Leverage Efficiency* **.**

I. Introduction

The term ' leverage ' literally means ' the power to influence ' . The concept of ' financial leverage ' (or more appropriately ' financing leverage ' [1]) has been derived from the concept of ' physical leverage ' .

1.1 Concept Of Physical Leverage

In physics , leverage refers to the mechanics of a lever . A lever is a simple machine that can magnify an applied effort (effort force) to overcome a resistance (load) by generating a magnified force (load force) by turning about a fixed point called the fulcrum .

The Mechanical Advantage (M A) of a lever is the factor by which it multiplies the effort force . There are two types of Mechanical Advantage (MA) :

(a) Ideal (or theoretical) Mechanical Advantage (I M A) , and
(b) Actual Mechanical Advantage (AMA) .

The Ideal Mechanical Advantage (I MA) of a lever is the mechanical advantage it would have in the absence of friction or any other means that can waste useful energy and it sets an upper limit on achievable performance of the lever .

The I M A of a lever is given by : I M A = (Effort arm / Load arm) **(1)**
where , effort arm = the perpendicular distance of the effort force from the fulcrum , and
load arm = the perpendicular distance of the load force from the fulcrum .

Thus the relative position of the fulcrum with respect to the effort and load forces affects the degree of I M A .

Physical leverage is ideally said to exist when I M A > 1 , i.e. when Effort arm > Load arm , i .e. when the fulcrum is closer to the load than that to the effort . This happens in the cases of Class I (where the fulcrum is in between the effort and the load) and Class II (where the load is in between the effort and the fulcrum) levers .

Physical leverage is ideally not said to exist even in the presence of the fulcrum when I M A ≤ 1 , i .e when Effort arm ≤ Load arm , i .e. when the fulcrum is equidistant from the effort and the load or when the fulcrum is closer to the effort than that to the load .

[1] *The term ' financing leverage ' (to be used hereafter) is more appropriate than ' financial leverage ' because of its closer proximity to the term ' financing decision ' to which it is related .*

The actual mechanical advantage is the mechanical advantage taking into consideration real world factors such as energy lost by friction and other factors .

The AMA of a lever is given by :

A M A = (Actual magnitude of load force / Actual magnitude of effort force) **(2)**

A M A > 1 for Class I and Class II levers only when the fulcrum is closer to the load than that to the effort .

Now , the ‘ law of lever ’ [based on the principle of linear moments] states that in static equilibrium with the forces balancing and in the absence of friction and other factors wasting useful energy , the ideal (or expected) work output [the product of the ideal (or expected) magnitude of the load force and the load arm] will be equal to the ideal (or expected) work input [the product of the ideal (or expected) magnitude of the effort force and the effort arm] .

Mathematically , Expected work output = Expected work input , or

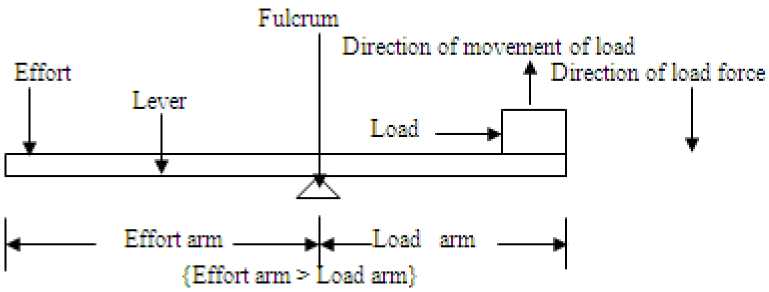
Expected magnitude of load force * Load arm = Expected magnitude of effort force * Effort arm , or

Expected magnitude of load force = I M A * Expected magnitude of effort force **(3)**

From eq. (3) we get :

I MA = (Expected magnitude of load force / Expected magnitude of effort force) **(4)**

The following diagram (based on Class I lever) illustrates the concept of physical leverage .



[Figure 1]

However , in the real world , due to the presence of friction and other factors wasting useful energy , Actual useful work output < actual work input , or

Actual magnitude of load force * Load arm < Actual magnitude of effort force * Effort arm , or

A M A < I M A .

The efficiency of a lever measures the degree to which friction and other factors reduce the actual work output of the machin0e from its theoretical maximum and may be calculated as :

Efficiency = (Actual useful work output / Actual work input) * 100 % , or

Efficiency = (A M A / I M A) * 100 % **(5)**

1.2 Mechanical Analysis Of A Physical Lever

The mechanical analysis (based on the principle of linear moments) of a physical lever in a physics laboratory may be said to involve the following steps :

(a) calculating the I M A of the lever vide eq.(1) for a particular relative position (with respect to the load and the effort forces) of the physical fulcrum (PF) ;

(b) formulating a linear functional relationship between the expected magnitude of the load force { dependent physical variable (D PV) } and the expected magnitude of the effort force { independent physical variable (I PV) } as per eq. (3) , I M A { calculated vide eq.(1) in step (a) } remaining constant ;

(c) actually applying effort force , observing the generated load force and calculating the A M A of the lever vide eq. (2) ;

(d) calculating the efficiency of the lever vide eq. (5) ; and

(e) repeating steps (a) to (d) considering mutually dependent alternative physical scenarios of the physical fulcrum (PF) with its varying relative position .

1.3 Objective Of The Study

Discussions on various aspects of financial (or financing) leverage exist in corporate finance literature which nevertheless lack a thorough and conceptual analysis of financing leverage based on the concept of physical leverage (the genesis of the concept of financing leverage) . The objective of writing this research paper is to formulate and elucidate a conceptual framework for ‘ intra - firm analysis ' [2] of financing leverage (based on the mechanical analysis of physical leverage) in respect of a corporate firm under condition of future business risk with a view to extensively modify the traditional analysis of financing leverage .

II. Financing Leverage

2.1 Concept Of Financing Leverage

Two definitions of financing leverage are cited below :

(A) Financing leverage may be defined as the " firm's ability to use fixed financial charges to magnify the effects of changes in EBIT on the firm's earnings per share " [3] .

(B) Financing leverage refers to " the extent to which fixed - income securities (debt and preferred stock) are used in a firm's capital structure " [4] .

Definition (A) which considers **both** the **cause [** presence of Fixed Financing Cost - Bearing Capital (FFCBC) [5] in its capital structure [6] which gives rise to Fixed Financing Cost (FFC) [7] in its financing cost structure [8] (within its cost structure) **]** and the **effect [** magnification of **' Financing Business Load ' (FBL)** i.e. absolute value [9] of percentage change [10] in the initial value (assumed to be not equal to zero) of ' Earnings Per Share ' { or more appropriately ' Earnings Per Equity Share After Tax ' (EPESAT) } **{** dependent financial variable (DFV) **}** by the application of **' Financing Business Effort ' (FBE)** i.e. absolute value of percentage change in the initial value (assumed to be not equal to zero) of ' Earnings Before Interest and Tax ' (EBIT) { independent financial variable (I FV) } , *ceteris paribus* in the functional relationship between the DFV and the I FV **]** of financing leverage is more akin to the concept of ' physical leverage ' (the genesis of the concept of financing leverage) and hence is more comprehensive and logical than **definition (B)** which considers only the **cause** .

The capital structure , financing cost structure and the analytical accounting earnings statement (on ' after - tax ' and ' before - tax ' basis) relating to the financing decision (for the short - term planning horizon in respect of which operating or investment decision has already been taken) and based on the following ***basic assumptions*** [11] of the traditional financing leverage analysis :

(1) Equity dividend payout ratio is 100 % (so as to segregate dividend decision from financing decision) and the amount of ' Retained Earnings ' [12] is ' zero ' (and not negative) implying that ' earnings ' variables are positive ;

(2) Preference shares are redeemable so that they are characteristically similar to Debt ; and

(3) " Equity Shareholders' Net Worth " (= Paid - up Equity Share Capital *plus* Retained Earnings *minus* Fictitious Assets) is equal to ' Paid - up Equity Share Capital ' based on assumption (1) and the assumption of the non - existence of Fictitious Assets ; are shown below :

[2] *This point will be illustrated further on the basis of an analogy between financing leverage and physical leverage .*

[3] *Gitman (1976) , p. 84 .*

[4] *Brigham & Houston (2001) , p. 610 .*

[5] *Interest - bearing Debt and Preference Shares (assumed to be redeemable) .*

[6] *Capital structure includes ' Variable Financing Cost - Bearing Capital ' (VFCBC) [i.e. equity shareholder's net worth (E)] and FFCBC .*

[7] *Interest on debt and dividend on preference shares .*

[8] *Financing cost structure includes FFC and Variable Financing Cost (VFC) { i.e. amount of equity dividend } .*

[9] *A change may be positive (for increase) or negative (for decrease) . Hence , the absolute value (modulus) of the change should be considered .*

[10] *A percentage change (a relative change) warrants more importance than an absolute change in financial analysis .*

[11] *Other assumptions will be stated wherever necessary .*

[12] *The actual balance of ' Retained Earnings ' , existing at the beginning of the planning horizon , is assumed to be declared for distribution as equity dividend and becomes ' Proposed Equity Dividend ' (an item of Operating Current Liability deducted from Operating Current Assets for calculating Net Operating Current Assets) .*

TABLE 1

CAPITAL STRUCTURE	Rs.	Rs.
VARIABLE FINANCING COST – BEARING CAPITAL (VFCBC) :		
Equity Shareholders' Net Worth (E) [= Paid - up Equity Share Capital]		xxx
FIXED FINANCING COST – BEARING CAPITAL (FFCBC) :		
Paid - up Preference Share Capital (P)	xxx	
Interest - bearing Debt (D)	xxx	xxx
NET CAPITAL EMPLOYED (NCE)		xxx

TABLE 2

FINANCING COST STRUCTURE (BEFORE - TAX OR AFTER - TAX)	Rs.
Variable Financing Cost (VFC) [= Equity Dividend (ED)]	xxx
Fixed Financing Cost (FFC) [= Interest on debt (I) *plus* Preference Dividend (PD)]	xxx
Total Financing Cost (TFC)	xxx

TABLE 3
ANALYTICAL ACCOUNTING EARNINGS STATEMENT
RELATING TO FINANCING DECISION (ON ' AFTER - TAX ' BASIS)

PARTICULARS	Rs.
Earnings Before Interest and Tax **(EBIT)**	xxx
Less : Interest on debt **(I)**	xxx
Earnings Before Tax **(EBT)**	xxx
Less : Corporate income tax **(T)** { EBT * t } [t = marginal corporate income tax rate]	xxx
Earnings After Tax Available to Shareholders **(EATAS)**	xxx
Less : Preference Dividend After Tax **(PDAT)**	xxx
Earnings After Tax Available to Equity Shareholders **(EATAES)**	xxx
Less : Equity Dividend After Tax **(EDAT)** [13]	xxx
Retained Earnings After Tax **(REAT)**	NIL

TABLE 4
ANALYTICAL ACCOUNTING EARNINGS STATEMENT
RELATING TO FINANCING DECISION (ON ' BEFORE – TAX ' BASIS)

PARTICULARS	Rs.
Earnings Before Interest and Tax **(EBIT)**	xxx
Less : Interest on debt **(I)**	xxx
Earnings Before Tax Available to Shareholders **(EBTAS) [= { EATAS / (1 – t) }]**	xxx
Less : Preference Dividend Before Tax **(PDBT) [= { PDAT / (1 – t) }]**	xxx
Earnings Before Tax Available to Equity Shareholders **(EBTAES) [= { EATAES / (1 – t) }]**	xxx
Less : Equity Dividend Before Tax **(EDBT) [= EBTAES = { EDAT / (1 – t) }]**	xxx
Retained Earnings Before Tax **(REBT)**	NIL

We get the linear functional relationship between ' Earnings Per Equity Share After Tax ' (EPESAT) and EBIT as :

$EPESAT = (EATAES / u) = [EBIT (1 - t) - \{ I (1 - t) + PDAT \}] / u$, or

$$EPESAT = \{ (1 - t) / u \} * EBIT - \{ (1 - t) FFCBT / u \} \quad \textbf{(6)}$$

where u = weighted average number of equity shares outstanding for the period , the weights being the various sub - periods of employment of varying number of shares ;

I = interest on debt (before tax) = $(r_D * AD)$;

[13] *EDAT = EATAES vide assumption (1) .*

PDBT (Preference Dividend Before Tax) = (r_P * AP) ;
PDAT (Preference Dividend After Tax) = (1 – t) * PBDT
FFCBT (Fixed Financing Cost Before Tax) = (I + PDBT)
= (r_D * AD + r_P * AP) = r_C * (AD + AP) = (r_C * AFFCBC) ;
FFCAT (Fixed Financing Cost After Tax) = { I (1 – t) + PDAT } = (1 – t) * FFCBT ;
AD = weighted Average D employed during the period (D being interest - bearing debt including long - term and short - term loans with explicit interest charges) , the weights being the proportions of the time of employment of the various types of D during the period
[i.e. AD = { (D_1 * e_1) + (D_2 * e_2) + … + (D_n * e_n) }
where D_1 , D_2 … , D_n are n types of D ; and e_1 , e_2 , … , e_n are the respective proportions of the time of employment] ;
r_D = weighed average rate of cost (before tax) of D for the period
[so that (r_{D1} * D_1 * e_1) + (r_{D2} * D_2 * e_2) + … + (r_{Dn} * D_n * e_n) = r_D *AD
where r_{D1} , r_{D2} , … , r_{Dn} are the respective rates of interest (before tax) per period] ;
AP = weighted Average P employed during the period (P being redeemable preference share capital) , the weights being the proportions of the time of employment of the various types of P during the period [i.e. AP = { (P_1 * g_1) + (P_2 * g_2) + … + (P_n * g_n) } where P_1 , P_2 … , P_n are n types of P ; and g_1 , g_2 , … , g_n are the respective proportions of the time of employment] ;
r_P = weighted average rate of cost (before tax) of P for the period
[so that (r_{P1} * P_1 * g_1) + (r_{P2} * P_2 * g_2) + … + (r_{Pn} * P_n * g_n) = r_P * AP , with r_{P1} , r_{P2} , … , r_{Pn} being the respective rate of interest (before tax) per period] ;
(D + P) = Fixed Financing Cost - Bearing Capital (FFCBC) ;
{ (D + P) / E } = ‘ FFCBC to equity ’ ratio or ‘ capital gearing ratio ’ a variant of the commonly used ‘ debt to equity ratio ’ ;
AFFCBC (weighted Average FFCBC employed during the period) = (AD + AP) ;
r_C = weighted average rate of cost (before tax) of AFFCBC
[so that (r_D * AD + r_P * AP) = r_C * (AD + AP) = (r_C * AFFCBC)] .

The functional relationship between EPESAT and ‘ Earnings Before Interest but After Tax ’ (EBIAT) [= { EBIT (1 – t) }] is given by :
EPESAT = (1 / u) * EBIAT – { (1 – t) FFCBT / u } **(7)**

The functional relationship between ‘ Earnings Per Equity Share Before Tax ’ (EPESBT) and EBIT is given by :
EPESBT = { EPESAT / (1 – t) } = (1 / u) * EBIT – (FFCBT / u) **(8)**

The functional relationship between EPESBT and EBIAT is given by :
EPESBT = { 1 / u (1 – t) } * EBIAT – (FFCBT / u) **(9)**

‘ Return On Equity After Tax ’ (ROEAT) [{ = (EATAES / AE) , where AE is the “ weighted Average Equity Shareholders’ Net Worth ” employed during the period] being a direct and linear function of EATAES (with AE being assumed to remain constant) and ‘ Return On Net Assets Before Tax ’ (RONABT) [14] [{ = (EBIT / Average Net Assets (ANA) }] being a direct and linear function of EBIT (with ANA being assumed to remain constant) , utilizing the net assets structure and capital structure , is another uniform pair (both being ‘ return’ variables’) of DFV and I FV whose functional relationship is given by :
ROEAT = (EATAES / AE) = [EBIT (1 – t) – { I (1 – t) + p }] / AE , or
ROEAT = { (1 – t) (ANA / AE) (EBIT / ANA) } – (1 – t) (FFCBT / AE) , or
ROEAT = (1 – t) [1 + { (AD + AP) / AE }] * RONABT – (1 – t) { (r_D * AD + r_P * AP) / AE }
or , r_E = (1 – t) [1 + { (AD + AP) / AE }] * r_A – (1 – t) [{ r_C * (AD + AP) } / AE] , or
r_E = (1 – t) { 1 + (AFFCBC / AE) } * r_A – (1 – t) { r_C * (AFFCBC / AE) } **(10)**
where r_E = ROEAT ; r_A = RONABT ;
AE (= weighted Average Paid - up Equity Share Capital) = u * n , { n being the ‘ paid - up value per equity share ’ assumed to remain constant [15] } ;
NA (Net Assets) = NCE (Net Capital Employed) = (E + P + D)] ;

[14] *In the traditional leverage analysis , on the assumption of the non - existence of non - operating assets , non - operating revenues and non - operating costs , Operating Earnings (OE) = EBIT , Net Operating Assets (NOA) = Net Assets (NA) and hence ‘ Return On Net Operating Assets’ (RONOA) = ‘ Return On Net Assets’ (RONA) .*

[15] *The consideration of EPES (before or after tax) as the DFV is based on the assumption that the paid - up value per equity share remains unchanged .*

[NA = NOA (Net Operating Assets) = OFA (Operating Fixed Assets) [16] + NOCA (Net Operating Current Assets) [17] { or Net Operating Working Capital (NOWC)]
ANA = weighted Average Net Assets (ANA) ;
[ANA = ANOA (weighted Average NOA) = [AOFA (weighted Average OFA) + ANOCA (weighted Average NOCA) , the weights being the proportions of the time of employment of the individual assets and (current) liabilities during the period] ;
ANCE (weighted Average Net Capital Employed) = (AE + AP + AD) = ANA **(11)**

Now , ' time - weighted averaging ' of capital or asset employed during the planning horizon , though practically feasible , is a complex procedure and also equation (11) { whose validity is a *sine qua non* for financing leverage analysis } **may** not be valid in certain cases . There is certainty in the validity of eq. (11) only on the assumption of the employment of capital (NCE) and asset (NA) for the same period of time during the planning horizon . For instance , if Opening NCE (NCE_O) and Opening NA (NA_O) , Incremental NCE (NCE_I) and Incremental NA (NA_I) or Decremental NCE (NCE_D) and Decremental NA (NA_D) [{ or Net Incremental NCE (NCE_{NI}) and Net Incremental NA (NA_{NI}) or Net Decremental NCE (NCE_{ND}) and Net Decremental NA (NA_{ND}) } with NCE_O , NCE_I , NCE_D , NCE_{NI} , NCE_{ND} , NA_O , NA_I , NA_D , NA_{NI} and $NA_{ND} > 0$] are assumed to be employed for :

(a) for the entire period of the planning horizon , then :

(i) ANCE = Closing NCE (NCE_C) = $NCE_O + (NCE_I - NCE_D) = \mathbf{NCE_O + NCE_{NI}}$ **(12)**

(ii) ANA = Closing NA (NA_C) = $NA_O + (NA_I - NA_D) = \mathbf{NA_O + NA_{NI}}$ **(13)**

(iii) ANCE = NCE_C = $NCE_O - (NCE_D - NCE_I) = \mathbf{NCE_O - NCE_{ND}}$ **(14)**

(iv) ANA = NA_C = $NA_O - (NA_D - NA_I) = \mathbf{NA_O - NA_{ND}}$ **(15)**

where NCE_C and $NA_C > 0$;

(b) for half of the period of the panning horizon , then :

(i) ANCE = $0.5 * NCE_O + 0.5 * (NCE_O - NCE_D) + 0.5 * NCE_I$, or if $NCE_I > NCE_D$
ANCE = $NCE_O + 0.5 * (NCE_I - NCE_D) = NCE_O + 0.5 * NCE_{NI}$, or
ANCE = 0.5 * ($NCE_O + NCE_C$) [where $NCE_C (> 0) = NCE_O + (NCE_I - NCE_D)$] **(16)**

(ii) ANA = $0.5 * NA_O + 0.5 * (NA_O - NA_D) + 0.5 * NA_I$, or if $NA_I > NA_D$
ANA = $NA_O + 0.5 * (NA_I - NA_D) = NA_O + 0.5 * NA_{NI}$, or
ANA = 0.5 * ($NA_O + NA_C$) [where $NA_C (> 0) = NA_O + (NA_I - NA_D)$] **(17)**

(iii) ANCE = $0.5 * NCE_O + 0.5 * (NCE_O - NCE_D) + 0.5 * NCE_I$, or if $NCE_D > NCE_I$
ANCE = $NCE_O - 0.5 * (NCE_D - NCE_I) = NCE_O - 0.5 * NCE_{ND}$, or
ANCE = 0.5 * ($NCE_O - NCE_C$) [where $NCE_C (> 0) = NCE_O + (NCE_I - NCE_D)$] **(18)**

(iv) ANA = $0.5 * NA_O + 0.5 * (NA_O - NA_D) + 0.5 * NA_I$, or if $NA_D > NA_I$
ANA = $NA_O - 0.5 * (NA_D - NA_I) = NA_O - 0.5 * NA_{ND}$, or
ANA = 0.5 * ($NA_O - NA_C$) **[** where $NA_C (> 0) = NA_O - (NA_D - NA_I)$] **(19)**

with eq.(11) being certainly valid for these two instances .

The functional relationship between ROEAT and ' Return on Net Assets After Tax ' (RONAAT) [= { RONABT (1 – t) }] is given by :

ROEAT = { 1 + (AFFCBC / AE) } * RONAAT – (1 – t) { r_C * (AFFCBC / AE) } **(20)**

The functional relationship between ' Return On Equity Before Tax ' (ROEBT) and RONABT is given by : ROEBT = { ROEAT / (1 – t) } , or

ROEBT = { 1 + (AFFCBC / AE) } * RONABT – { r_C * (AFFCBC / AE) } **(21)**

The functional relationship between ROEBT and RONAAT is given by :

ROEBT = [{ 1 + (AFFCBC / AE) } / (1 – t)] * RONAAT – { r_C * (AFFCBC / AE) } **(22)**

The **choice of the financial variables** for financing leverage analysis should be based on the fundamental concept of **' trading on equity '** i.e. the strategy of increasing the earnings or return for equity shareholders by the use of ' Fixed Financing Cost - Bearing Capital ' (FFCBC) . EPES (After or Before Tax) or ROE (After or Before Tax) being **directly related** to FFCBC [and hence FFC (After or Before Tax)] for given capital and financing cost structures , ceteris paribus , and thus validating the concept of ' trading on equity ' is logically construed as a Dependent Financial Variable (DFV) . However , the financial variable ' Earnings (After or Before Tax) Available to Equity Shareholders '

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[16] Net of depreciation .

[17] NOCA refers to the net operating current assets acquired with investor - supplied funds and is the excess of the Operating Current Assets (OCA) { such as cash or bank balance , account receivables , inventories , etc. required to maintain the firm's normal operating capability } over Operating Current Liabilities (OCL) { such as account payables and accruals that arise spontaneously out of the firm's normal business operations and bear no explicit interest charges } . It is assumed that NOCA > 0 .

[EATAES or EBTAES { = EATAES / (1 – t) }] , though being the fundamental variable on which ‘ EPES (After or Before Tax) ’ and ‘ ROE (After or Before Tax) ’ are based , cannot be construed to be a valid ‘ Dependent Financial Variable’ (DFV) for financing leverage analysis as EATAES (or EBTAES) is **indirectly** related to FFC (After or Before Tax) { and hence FFCBC } , ceteris paribus , thus invalidating the concept of ‘ trading on equity ’ .

So , we ***may*** have the following combinations of DFV [‘ Earnings Per Equity Share (After or Before Tax) ’ and ‘ Return On Equity (After or Before Tax) ’] and I FV [‘ Earnings Before Interest (After or Before Tax) ’ and ‘ Return on Net Assets (After or Before Tax) ’] so as to maintain uniformity in the nature (‘ earnings ’ or ‘ return ’ variable) of the variables :

TABLE 5

Independent Financial Variable (IFV)	**Dependent Financial Variable (DFV)**
(a) EBIT	(a) EPESAT
(b) EBIAT	(b) EPESAT
(c) EBIT	(c) EPESBT
(d) EBIAT	(d) EPESBT
(e) RONABT	(e) ROEAT
(f) RONAAT	(f) ROEAT
(g) RONABT	(g) ROEBT
(h) RONAAT	(h) ROEBT

Generalizing the linear and direct functional relationship between the DFV and the I FV { vide eqs.(6) to (10) & (20) to (22) } as : $y = d\,x - f$ **(23)**
where $y\ (> 0)$ and $x\ (> 0)$ { vide assumption (1) on page (5) } are the DFV and the I FV respectively ; ‘ d ’ (> 0) is the rate of change (finite or infinitesimally small) of y with respect to x ; ‘ f ’ (≥ 0) is the fixed financing cost per unit of the related item in the capital structure or financing cost structure or the ‘ fixed financing cost component ’.

If the initial and the final values of x and y be $x_i\ (\neq 0)$ and $y_i\ (\neq 0)$, and x_f and y_f respectively , then from eq. (23) , *ceteris paribus* { ‘ d ’ and ‘ f ’ held constant } , we get :

$y_i = d * x_i - f$ **(24)**

$y_f = d * x_f - f$ **(25)**

Now , the absolute values (moduli) of the finite changes and percentage changes in x and y , *ceteris paribus* , are given as :

$| \Delta x | = | x_f - x_i |$ **(26)**

$| \Delta y | = | y_f - y_i | = | d * \Delta x |$ **(27)**

$| \% \Delta x | = | (\Delta x / x_i) * 100 \% | = \{ | \Delta x | / | x_i | \} * 100 \%$ **(28)**

$| \% \Delta y | = | (\Delta y / y_i) * 100 \% | = \{ | \Delta y | / | y_i | \} * 100 \%$ **(29)**

A measure of the degree of magnification of (% Δ y) for (1 % Δ y) is given by :

$L = \{ | \% \Delta y | / | \% \Delta x | \}$, or

$L = \{ | d * x_i | / | y_i | \} = \{ d * x_i / (d * x_i - f) \}$ [since x , y > 0] **(30)**

The values of ‘ L ’ and its components for the various combinations of x (I FV) and y (DFV) [vide Table 5] considering eqs.(6) to (10) , (20) to (22) and eq. (30) are shown below :

TABLE 6

{ x , y } [Equation No.]	**d**	**f**	**L**
(a) { EBIT , EPESAT } **[6]**	{ (1 – t) / u }	{ (1 – t) FFCBT / u }	(EBIT / EBTAES)
(b) { EBIAT , EPESAT } **[7]**	(1 / u)	{ (1 – t) FFCBT / u }	(EBIT / EBTAES)
(c) { EBIT , EPESBT } **[8]**	(1 / u)	(FFCBT / u)	(EBIT / EBTAES)
(d) { EBIAT , EPESBT } **[9]**	{ 1 / u (1 – t) }	(FFCBT / u)	(EBIT / EBTAES)
(e) { RONABT, ROEAT } **[10]**	(1 – t) * { 1 + (AFFCBC / AE) }	(1 – t) * r_C * (AFFCBC / AE)	(EBIT / EBTAES)
(f) { RONAAT, ROEAT } **[20]**	{ 1 + (AFFCBC / AE) }	(1 – t) * r_C * (AFFCBC / AE)	(EBIT / EBTAES)
(g) { RONABT, ROEBT } **[21]**	{ 1 + (AFFCBC / AE) }	r_C * (AFFCBC / AE)	(EBIT / EBTAES)
(h) { RONAAT, ROEBT } **[22]**	[{ 1 + (AFFCBC / AE) } / (1 – t)]	r_C * (AFFCBC / AE)	(EBIT / EBTAES)

Hence , corporate income tax does not affect the degree of relative magnification (L) .

A pertinent question whether corporate income - tax (payable by the firm) should be considered in the analysis of financing leverage , may arise . Income - tax is a peculiar item . With the realization of any item of revenue , it yields a ' notional cost ' (= revenue * effective income - tax rate) { variable or fixed depending on the nature of the revenue } for each item of revenue , and with the incurrence of any item of cost , it acts as a cost saver and yields a ' notional revenue ' (= cost * effective income - tax rate) { variable or fixed depending on the nature of the cost } for each item of cost . So ' income - tax ' is all pervasive in nature affecting all items of revenue and cost (and hence earnings or return) . Thus , in financing leverage analysis (where the ' relative effect ' of a percentage change in the initial value of the I FV on the percentage change in the initial value of the DFV is sought to be analysed) it does not matter (i.e. the degree of ' relative magnification ' remains unaffected) whether the variables are considered before - tax or after - tax , as mathematically shown in Table 5 .

We will , however , consider in the present treatise , the following pairs of DFV and I FV , both on ' After Tax ' basis , in line with the traditional analysis of financing leverage :

TABLE 7

Independent Financial Variable (I FV)	**Dependent Financial Variable (DFV)**
Earnings Before Interest and Tax (EBIT)	Earnings Per Equity Share After Tax (EPESAT)
Return On Net Assets Before Tax (RONABT)	Return on Equity After Tax (ROEAT)

Now , the **' Financing Break - Even Point ' (FBEP)** [i .e the value of EBIT (or RONABT) for which EATAES or EPESAT (or ROEAT) is zero] may be given from eqs. (6) & (10) as :

$$\mathbf{FBEP_{(EBIT)} = FFCBT} \qquad \mathbf{(31)}$$

$$\mathbf{FBEP_{(RONABT)}} = \{ r_C * (AFFCBC / AE) \} / [\{ 1 + (AFFCBC / AE) \}] \text{, or}$$

$$\mathbf{FBEP_{(RONABT)} = (FFCBT / ANCE) = (FFCBT / ANA)} \qquad \mathbf{(32)}$$

The linear functional relationship between EPESAT (or ROEAT) { DFV } and EBIT (or RONABT) { I FV } being direct , financing leverage is said to be :

(a) favourable or positive , when there is a magnified relative increase in the initial value of EPESAT (or ROEAT) for a given relative increase in the initial value of EBIT (or RONABT) ; and

(b) unfavourable or negative , when there is a magnified relative decrease in the initial value of EPESAT (or ROEAT) for a given relative decrease in the initial value of EBIT (or RONABT) ; thus rendering it to be a double - edged sword .

Since a percentage change (a relative change) can be measured only when the initial value is not equal to zero , the definition of financing leverage presupposes that the firm will not actually not attain the ' Financing Break - Even Point ' (FBEP) [$FBEP_{(EBIT)}$ or $FBEP_{(RONABT)}$ implying that $EPESAT \neq 0$ or $ROEAT \neq 0$ }] which will only be used as a point of reference .

From eq. (30) we see that the question of the existence of the financing leverage effect (i.e. $L > 1$) arises only if $f > 0$. So , the presence of FFCBC in a firm's capital structure (and hence the presence of FFC in its financing cost structure) is ***the actual cause*** of the financing leverage effect .

The **" *ceteris paribus* "** condition in the functional relationship between the DFV and the I FV is a *sine qua non* for measuring the financing leverage effect (i.e. the relative degree of magnification) and a **' Financing Account Structural [18] Plan ' (FASP) [** which may be defined as a strategic combination ' average capital structure ' **{** consisting of Average Variable Financing Cost - Bearing Capital (AVFCBC) and Average Fixed Financing Cost - Bearing Capital (AFFCBC) **}** and ' financing cost structure ' **{** consisting of Variable Financing Cost (Before Tax or After Tax) **(** VFCBT or VFCAT **)** and Fixed Financing Cost (Before Tax or After Tax) **(** FFCBT or FFCAT **) }]** the respective values of whose components { u , n , AE , AFFCBC , r_C , t and FFCBT (or FFCAT) } satisfy the *' ceteris paribus'* condition in the functional relationship between the DFV and the I FV , may be construed to act as a **' Notional Financing Business Fulcrum ' (NFBF)** ; the **' Actual Financing Business Fulcrum ' (AFBF)** being the respective combination of fixed financing cost - bearing components of the FASP { i.e. AFFCBC , r_C , FFCBT (or FFCAT) } which causes the financing leverage effect .

[18] *The basic account structures [an ' account structure ' may be defined as a well defined group of elements , having some similar characteristics , which serves as a fundamental component of the accounting statements comprising the managerial accounting decision system of a firm] include asset structure , capital structure , revenue structure and cost structure .*

An **analogy** (to be extended as we proceed) between ' physical leverage ' and ' financing leverage ' may now be enumerated as follows :

(a) Physical Effort (PE) [magnitude of effort force { independent physical variable (I PV) } or absolute change in the initial magnitude ($= 0$) of the effort force] { i.e. (Δ I PV) } $\approx$ **Financing Business Effort (FBE)** i.e. absolute value of a percentage change in the initial value ($\neq 0$) of an independent financial variable (I FV) [i.e. | % Δ I FV |] ;

(b) Physical Load (PL) [magnitude of load force { dependent physical variable (DPV) } or absolute change in the initial magnitude ($= 0$) of the load force] { i.e. (Δ DPV) } $\approx$ **Financing Business Load (FBL)** i.e. absolute value of a percentage change in the initial value ($\neq 0$) of a dependent financial variable (DFV) } [i.e. | % Δ DFV |] ;

(c) the effect of physical leverage is the magnification of ' Physical Load ' by the application of ' Physical Effort ' $\approx$ the effect of financing leverage is the magnification of ' Financing Business Load ' (FBL) by the application of ' Financing Business Effort ' (FBE) ;

(d) Physical Fulcrum (PF) whose position remains fixed during a particular action of the physical lever **[** i.e. I M A { vide eq. (1) } representing the position of the **PF** remains constant in the functional relationship { vide eq. (3) } between the load force (DPV) and the effort force (I PV) **]** and which causes the physical leverage effect

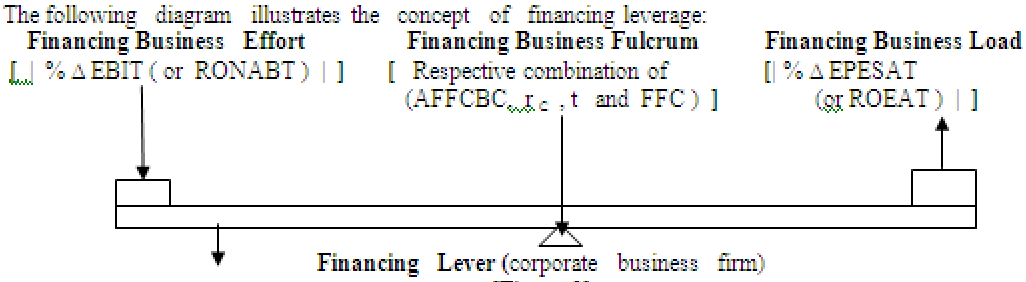
$\approx$ **(i) ' Notional Financing Business Fulcrum ' (NFBF)** i.e. a ' Financing Account Structural Plan ' (FASP) , the respective values of whose components { u , n , AE , AFFCBC , r_C , t , FFCBT (or FFCAT) } are assumed to remain constant in the functional relationship between the DFV and the I FV ; or

(ii) ' Actual Financing Business Fulcrum ' (AFBF) i.e. respective combination of fixed financing cost - bearing components of the FASP { i.e. AFFCBC , r_C and FFCBT (or FFCAT) } , whose presence in the ' average capital structure ' and ' financing cost structure ' is ***the cause*** of the financing leverage effect ;

(e) Physical Lever i.e. a simple machine which has the ability to create the physical leverage effect in the presence of physical fulcrum based on the principle of ***linear*** moments $\approx$ **Financing Lever** i.e. a corporate business firm which has the ability to create the financing leverage effect in the presence of fixed financing cost - bearing components of a FASP based on the ***linear*** functional relationship between the DFV and the I FV] .

We may now **re - define ' financing leverage '** as the ability of a business firm to magnify **' Financing Business Load ' (FBL) [** i.e. absolute value of a percentage change in the initial value (assumed to be not equal to zero) of ' Earnings Per Equity Share After Tax ' (EPESAT) or { ' Return on Equity After Tax ' (ROEAT) } [Dependent Financial Variable (DFV)] **]** by the application of **' Financing Business Effort ' (FBE) [** i.e. absolute value of a percentage change in the initial value (assumed to be not equal to zero) of ' Earnings Before Interest and Tax ' (EBIT) or { ' Return On Net Assets Before Tax ' (RONABT) } [Independent Financial Variable (I FV)] **]** , considering a **' Financing Account Structural Plan ' (FASP) [** i.e. a strategic combination of ' average capital structure ' { consisting of Average Variable Financing Cost - Bearing Capital (AVFCBC) and Average Fixed Financing Cost - Bearing Capital (AFFCBC) employed during the period of the planning horizon **}** and ' financing cost structure ' **{** consisting of Variable Financing Cost (Before Tax or After Tax) **(** VFCBT or VFCAT **)** and Fixed Financing Cost (Before Tax or After Tax) **(** FFCBT or FFCAT **) }]** the values of whose components satisfy the *' ceteris paribus '* condition in the linear functional relationship between the DFV and the I FV ; with ' FASP ' and the ' respective combination of fixed financing cost - bearing components of the FASP ' which causes the financing leverage effect , acting as the **' Notional Financing Business Fulcrum ' (NFBF)** and the **' Actual Financing Business Fulcrum ' (AFBF)** respectively .

The following diagram illustrates the concept of financing leverage:



[Figure 2]

2.2 Measures of ' Degree of Financing Leverage ' (DFL)

Extending the analogy between physical leverage and financing leverage we get the measures of the ' degree of financing leverage ' (DFL) as follows :

(f) Degree of Physical Leverage (DPL) is given by :

(i) { Physical Load / Physical Effort } i .e. I M A { vide eq. (4) } or AMA { vide eq. (2) } [a measure of the degree of the ' physical leverage effect '] ; or

(ii) (effort arm / load arm) i .e. I M A vide eq.(1) { or the relative position of the physical fulcrum with respect to the effort and the load forces } [a measure of the degree of the ' cause of the physical leverage effect ']

≈ Degree of Financing Leverage (DFL) is given by :

(i) (Financing Business Load / Financing Business Effort)

i.e. { | % Δ DFV | / | % Δ I FV | } , which is a measure of the degree of the ' financing leverage effect ' and which may be connoted as the ' elasticity coefficient measure ' of DFL (represented by DFL_E) ; or

(ii) relative proportion of AFFCBC within the ' average capital structure ' or relative proportion of FFCBT (or FFCAT) within the ' financing cost structure ' , which is a measure of the degree of the cause of the financing leverage effect and which may be connoted as the ' structural measure ' of DFL (represented by DFL_S) ;

(g) I M A vide eq.(1) [or the relative position of the physical fulcrum with respect to the effort and the load forces] directly affects I M A [vide eq. (4)] or AMA [vide eq. (2)] ≈ DFL_S may be said to directly affect DFL_E , *ceteris paribus* .

The measures of DFL are discussed below .

(A) Elasticity Coefficient Measure

It is a measure of the effect of financing leverage , given as :

$$DFL_E = \frac{|\ \text{Percentage change in the initial value } (\neq 0) \text{ of DFV } \{\text{EPESAT (or ROEAT)}\}\ |}{|\ \text{Percentage change in the initial value } (\neq 0) \text{ of I FV } \{\text{EBIT (or RONABT)}\}\ |} \qquad \textbf{(33)}$$

Case 1 : I FV = EBIT , DFV = EPESAT

Since for x = EBIT and y = EPESAT : { d = (1 – t) / u } and f = { (1 – t) FFCBT } / u } , we get from eqs.(6) , (30) & (33) :

$DFL_E = (1 - t)\, EBIT_i \,/\, \{ (1 - t)(EBIT_i - FFCBT) \}$, or

$$DFL_E = \{ (1 - t)\, EBIT_i \,/\, EATAES_i \} = (EBIT_i \,/\, EBTAES_i) \qquad \textbf{(34)}$$

where $(.)_i$ is the initial value .

DFL_E (> 0) is thus a non - linear function of $EBIT_i$ defined for $(EBIT_i - FFCBT) \neq 0 \Rightarrow EBIT_i \neq FFCBT$.

Since FFCBT = $FBEP_{(EBIT)}$ we get from eq. (34) :

$$DFL_E = [\ EBIT_i \,/\, \{ EBIT_i - FBEP_{(EBIT)} \}\ ] \qquad \textbf{(35)}$$

From eq. (35) we get :

$$DFL_E = 1 \,/\, [\ \{ EBIT_i - FBEP_{(EBIT)} \} \,/\, EBIT_i\ ] = \{ 1 \,/\, FMS_{(EBIT)} \} \qquad \textbf{(36)}$$

where $FMS_{(EBIT)}$ { Financing Margin of Safety } is the excess of $EBIT_i$ over $FBEP_{(EBIT)}$ expressed as a proportion of $EBIT_i$.

Case 2 : I FV = RONABT , DFV = ROEAT

Results of **CASE 1** will be obtained by replacing :

(i) EBIT with RONABT , (ii) EPESAT with ROEAT , (iii) $FBEP_{(EBIT)}$ with $FBEP_{(RONABT)}$, and (vi) $FMS_{(EBIT)}$ with $FMS_{(RONABT)}$.

From eqs.(10) , (15) , (30) & (33) we get another expression of DFL_E , in this case , as :

$$DFL_E = \frac{r_{Ai} \{ 1 + (AFFCBC / AE) \}}{r_{Ai} + \{ (r_{Ai} - r_C) (AFFCBC / AE) \}} \qquad \textbf{(37)}$$

(B) Structural Measure

This is a measure of the cause of the ' financing leverage effect ' and includes :

(I) Capital Structural Measure , representing the ' relative proportion of AFFCBC within the ' average capital structure ' and given by :

(1) $DFL_{CS} = \dfrac{\text{Amount of Average Fixed Financing Cost - Bearing Capital}}{\text{Amount of Average Variable Financing Cost - Bearing Capital}}$, or

$$DFL_{CS} = (AFFCBC / AE) \qquad \textbf{(38)}$$

Since $AFFCBC \geq 0$ and $AE > 0$, $DFL_{CS} \geq 0$.

(2) $DFL_{CS} = \dfrac{\text{Amount of Average Fixed Financing Cost - Bearing Capital}}{\text{Total amount of Fixed and Variable Financing Cost - Bearing Capital}}$, or

$$DFL_{CS} = [AFFCBC / (AFFCBC + AE)] \qquad \textbf{(39)}$$

Since $AFFCBC \geq 0$ and $AE > 0$, $0 \leq DFL_{CS} < 1$.

(II) Financing Cost Structural Measure , representing the ' relative proportion of FFCBT (or FFCAT) within the financing cost structure ' , given by :

(1) $DFL_{FS} = \dfrac{\text{Amount of Fixed Financing Cost (Before Tax or After Tax)}}{\text{Amount of Variable Financing Cost (Before Tax or After Tax)}}$, or

$DFL_{FS} = \{ (1 - t) * FFCBT / EDAT \} = \{ (1 - t) * FFCBT / EATAES \}$, or

$$DFL_{FS} = (FFCBT / EBTAES) \qquad \textbf{(40)}$$

(2) $DFL_{FS} = \dfrac{\text{Amount of Fixed Financing Cost (Before Tax or After Tax)}}{\text{Amount of Total Financing Cost (Before Tax or After Tax) \{ TFCBT or TFCAT \}}}$, or

$DFL_{FS} = \{ (1 - t) FFCBT / \{ (1 - t) FFCBT + EDAT \}$, or

$DFL_{FS} = \{ (1 - t) FFCBT / \{ (1 - t) FFCBT + EATAES \}$, or

$$DFL_{FS} = \{ FFCBT / (FFCBT + EBTAES) \} \qquad \textbf{(41)}$$

2.2.1 Relationship Between DFL_E And DFL_S

(I) DFL_E and Capital Structural Measure of DFL (DFL_{CS})

(A) I FV = EBIT

Case 1 [DFL_{CS} based on eq. (38)]

Since $AFFCBC = (FFCBT / r_C)$ we get , at a given value of $EBIT_i$, from eq. (38) :

$$\mathbf{DFL_{CS} = \{ FFCBT / (r_C * \gamma * EBIT_i) \}} \qquad \textbf{(42)}$$

where ' γ ' { = (AE / $EBIT_i$) } may be interpreted as the " Average Variable Financing Cost - Bearing Capital per monetary unit of $EBIT_i$ " ;

Since $FFCBT \geq 0$ and γ , $EBIT_i$, $r_C > 0$, $DFL_{CS} \geq 0$.

From eq. (42) we observe that DFL_{CS} is a non - linear function of $EBIT_i$ defined for $EBIT_i \neq 0$. Also from eq.(42) we get :

$$\mathbf{FFCBT = (DFL_{CS} * r_C * \gamma * EBIT_i)} \qquad \textbf{(43)}$$

So from eqs. (34) and (43) we get DFL_E at a given value of $EBIT_i$ as :

$$\mathbf{DFL_E = \{ 1 / (1 - r_C * \gamma * DFL_{CS}) \}} \qquad \textbf{(44)}$$

Now partially differentiating DFL_E with respect to DFL_{CS} , we get from eq. (44) :

$$(\delta DFL_E / \delta DFL_{CS}) = \{ r_C * \gamma / (1 - r_C * \gamma * DFL_{CS})^2 \} \qquad \textbf{(45)}$$

So ($\delta DFL_E / \delta DFL_{CS}$) > 0 . DFL_E is thus a non - linear direct function of DFL_{CS} , ceteris paribus , defined for $DFL_{CS} \neq \{ 1 / (r_C * \gamma)$.

Hence DFL_{CS} directly affects DFL_E .

Case 2 [DFL_{CS} based on eq. (39)]

From eq. (39) we get :

$$\mathbf{DFL_{CS} = \{ FFCBT / (FFCBT + r_C * \gamma * EBIT_i) \}} \qquad \textbf{(46)}$$

Here $0 \leq DFL_{CS} < 1$.

From eq. (46) we observe that DFL_{CS} is a non - linear function of EBIT defined for $EBIT_i \neq -\{ FFCBT / (r_C * \gamma) \}$.

Also from eq.(46) we get :

$$\mathbf{FFCBT = \{ (DFL_{CS} * r_C * \gamma * EBIT_i) / (1 - DFL_{CS}) \}} \qquad \textbf{(47)}$$

So from eqs. (34) and (47) we get DFL_E at a given value of $EBIT_i$ as :

$$\mathbf{DFL_E = [(1 - DFL_{CS}) / \{ (1 - DFL_{CS}) - r_C * \gamma * DFL_{CS} \}]} \qquad \textbf{(48)}$$

Now partially differentiating DFL_E with respect to DFL_{CS} , we get from eq. (48) :

$$(\delta DFL_E / \delta DFL_{CS}) = [r_C * \gamma / \{ (1 - DFL_{CS}) - r_C * \gamma * DFL_{CS} \}^2] \qquad \textbf{(49)}$$

So $(\delta DFL_E / \delta DFL_{CS}) > 0$. DFL_E is thus a non - linear direct function of DFL_{CS} , ceteris paribus , defined for $DFL_{CS} \neq [1 / \{ 1 + (r_C * \gamma) \}]$.

Hence DFL_{CS} directly affects DFL_E .

(B) I FV = RONABT

Similar results will be obtained .

(II) DFL_E and Financing Cost Structural Measure of DFL (DFL_{FS})

(A) I FV = EBIT

Case 1 [DFL_{FS} based on eq. (40)]

From eq. (40) we get :

$$\mathbf{DFL_{FS} = [FFCBT / (\theta * EBIT_i)]} \qquad \textbf{(50)}$$

where ' θ ' { = (EDBT / $EBIT_i$) or ($EBTAES_i$ / $EBIT_i$) [19] } may be interpreted as the ' Variable Financing Cost Before Tax per monetary unit of $EBIT_i$ ' .

Since FFCBT ≥ 0 and $EBIT_i > 0$ (and hence $\theta > 0$) **,** $DFL_{FS} \geq 0$.

From eq. (50) we observe that DFL_{FS} is a non - linear function of $EBIT_i$ defined for $EBIT_i \neq 0$.

Also from eq. (50) we get :

$$\mathbf{FFCBT = (DFL_{FS} * \theta * EBIT_i)} \qquad \textbf{(51)}$$

So from eqs. (34) and (51) we get DFL_E at a given value of $EBIT_i$ (> FFCBT) as :

$$\mathbf{DFL_E = [1 / \{ 1 - (\theta * DFL_{FS}) \}]} \qquad \textbf{(52)}$$

Now partially differentiating DFL_E with respect to DFL_{CS} , we get from eq. (52) :

$$(\delta DFL_E / \delta DFL_{CS}) = \{ \theta / \{ 1 - (\theta * DFL_{FS}) \}^2 \} \qquad \textbf{(53)}$$

So $(\delta DFL_E / \delta DFL_{CS}) > 0$.

DFL_E is thus a non - linear direct function of DFL_{FS} , ceteris paribus , defined for $DFL_{FS} \neq (1 / \theta)$ [20] .

Hence DFL_{FS} directly affects DFL_E .

Case 2 [DFL_{FS} based on eq. (41)]

From eq. (41) we get :

$$\mathbf{DFL_{FS} = [FFCBT / \{ FFCBT + (\theta * EBIT_i) \}]} \qquad \textbf{(54)}$$

Here $0 \leq DFL_{FS} < 1$ **.**

From eq. (54) we observe that DFL_{FS} is a non - linear function of $EBIT_i$ defined for $EBIT_i \neq -(FFCBT / \theta)$.

Also from eq.(54) we get :

$$\mathbf{FFCBT = \{ (DFL_{FS} * \theta * EBIT_i) / (1 - DFL_{FS}) \}} \qquad \textbf{(55)}$$

So from eqs. (34) and (55) we get DFL_E at a given value of $EBIT_i$ as :

$$\mathbf{DFL_E = [(1 - DFL_{FS}) / \{ (1 - DFL_{FS}) - \theta * DFL_{FS} \}]} \qquad \textbf{(56)}$$

Now partially differentiating DFL_E with respect to DFL_{CS} , we get from eq.(56) :

$$(\delta DFL_E / \delta DFL_{CS}) = [\theta / \{ (1 - DFL_{FS}) - \theta * DFL_{FS} \}^2] \qquad \textbf{(57)}$$

So $(\delta DFL_E / \delta DFL_{CS}) > 0$.

DFL_E is thus a non - linear direct function of DFL_{FS} , ceteris paribus , defined for $DFL_{FS} \neq \{ 1 / (1 + \theta) \}$. Hence DFL_{FS} directly affects DFL_E .

(B) I FV = RONABT

Similar results will be obtained .

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[19] *EDBT = EBTAES for EBTAES > 0 ($\Rightarrow$ EBIT > FFCBT) .*

[20] *$(1 / \theta) = (EBIT_i / EBTAES_i) = DFL_E$.*

2.3 Conditions For Existence And Non – Existence Of Financing Leverage Effect

(I) I FV = EBIT

Let us now deduce [from eqs.(34) & (35)] the conditions for the existence and non - existence of the financing leverage effect , considering that FFCBT ≥ 0 **[** hence $FBEP_{(EBIT)}$ { let ' $b_{(EBIT)}$ ' } ≥ 0 **]** , $EBIT_i \neq b_{(EBIT)}$ and $DFL_E > 0$.

The financing leverage effect **will exist** when $DFL_E > 1$ i.e. when :

(a) $EBIT_i > 0$, $b_{(EBIT)} > 0$ and { $EBIT_i - b_{(EBIT)}$ } > 0 **[** $\Rightarrow EBIT_i > b_{(EBIT)}$ **]** , or

(b) $EBIT_i > 0$, $b_{(EBIT)} > 0$ and $EBIT_i > -\{ EBIT_i - b_{(EBIT)} \}$

[$\Rightarrow 2\,EBIT_i > b_{(EBIT)} \Rightarrow EBIT_i > \{ b_{(EBIT)} / 2 \}$ **]** .

Hence the financing leverage effect will exist in the presence of Fixed Financing Cost - Bearing Capital (FFCBC) in the capital structure { and hence the presence of Fixed Financing Cost (FFC) in the financing cost structure } , when { $b_{(EBIT)}$ / 2 } < $EBIT_i$ < $b_{(EBIT)}$ *or* $EBIT_i$ > $b_{(EBIT)}$.

The financing leverage effect **will not exist** when :

(1) $DFL_E = 1$ i.e. when :

(a) $EBIT_i > 0$ and $b_{(EBIT)} = 0$ [$\Rightarrow$ FFCBT = 0] ;

(b) $EBIT_i > 0$, $b_{(EBIT)} > 0$ and $EBIT_i = -\{ EBIT_i - b_{(EBIT)} \}$

[$\Rightarrow 2\,EBIT_i = b_{(EBIT)} \Rightarrow EBIT_i = \{ b_{(EBIT)} / 2 \}$] .

(2) $0 < DFL_E < 1$ i.e. when $EBIT_i > 0$, $b_{(EBIT)} > 0$ and

$EBIT_i < -\{ EBIT_i - b_{(EBIT)} \}$ **[** $\Rightarrow 2\,EBIT_i < b_{(EBIT)} \Rightarrow EBIT_i < \{ b_{(EBIT)} / 2 \}$ **]** .

Hence the **financing leverage effect will not exist :**

(a) in the absence of FFCBC (and hence the absence of FFC) , or

(b) in the presence of FFCBC (and hence the presence of FFC)

when $0 < EBIT_i \leq \{ b_{(EBIT)} / 2 \}$.

Let us now derive the conditions for the existence of the financing leverage effect at a given value of $EBIT_i$ **[** $\{ b_{(EBIT)} / 2 \} < EBIT_i < b_{(EBIT)}$ *or* $EBIT_i > b_{(EBIT)}$ **]** , in terms of DFL_S .

(1) Capital structural measure of DFL (DFL_{CS})

(A) Case 1 [considering eq. (43)]

$\{ b_{(EBIT)} / 2 \} < EBIT_i < b_{(EBIT)}$ ***or*** $EBIT_i > b_{(EBIT)}$ [i.e. $EBIT_i > 0$]

$\Rightarrow$ (FFCBT / 2) < $EBIT_i$ < FFCBT ***or*** $EBIT_i$ > FFCBT

$\Rightarrow \{ (DFL_{CS} * r_C * \gamma * EBIT) / 2 \} < EBIT_i < (DFL_{CS} * r_C * \gamma * EBIT)$

or $EBIT_i > (DFL_{CS} * r_C * \gamma * EBIT)$

$\Rightarrow \{ 1 / (r_C * \gamma) \} < DFL_{CS} < \{ 2 / (r_C * \gamma) \}$ ***or*** $0 < DFL_{CS} < \{ 1 / (r_C * \gamma) \}$

[since $EBIT_i \neq 0$ and $EBIT_i > 0$]

Hence the financing leverage effect will :

(a) exist , when $0 < DFL_{CS} < \{ 1 / (r_C * \gamma) \}$ *or*

$\{ 1 / (r_C * \gamma) \} < DFL_{CS} < \{ 2 / (r_C * \gamma) \}$

(b) not exist , when $DFL_{CS} = 0$ *or* $DFL_{CS} = \{ 1 / (r_C * \gamma) \}$

or **$DFL_{CS} \geq \{ 2 / (r_C * \gamma) \}$.**

(B) Case 2 [considering eq. (47)]

$\{ b_{(EBIT)} / 2 \} < EBIT_i < b_{(EBIT)}$ ***or*** $EBIT_i > b_{(EBIT)}$ [i.e. $EBIT_i > 0$]

$\Rightarrow$ (FFCBT / 2) < $EBIT_i$ < FFCBT ***or*** $EBIT_i$ > FFCBT

$\Rightarrow [\{ (DFL_{CS} * r_C * \gamma * EBIT_i) / (1 - DFL_{CS}) \} / 2] < EBIT_i$

$< \{ (DFL_{CS} * r_C * \gamma * EBIT_i) / (1 - DFL_{CS}) \}$

or $EBIT_i > \{ (DFL_{CS} * r_C * \gamma * EBIT_i) / (1 - DFL_{CS}) \}$

$\Rightarrow \{ 1 / (r_C * \gamma) \} < \{ DFL_{CS} / (1 - DFL_{CS}) \} < \{ 2 / (r_C * \gamma) \}$ ***or***

$0 < \{ DFL_{CS} / (1 - DFL_{CS}) \} < \{ 1 / (r_C * \gamma) \}$ [since $EBIT_i \neq 0$ and $EBIT_i > 0$] .

Hence the financing leverage effect will :

(a) exist , when $0 < \{ DFL_{CS} / (1 - DFL_{CS}) \} < \{ 1 / (r_C * \gamma) \}$ *or*

$\{ 1 / (r_C * \gamma) \} < \{ DFL_{CS} / (1 - DFL_{CS}) \} < \{ 2 / (r_C * \gamma) \}$

(b) not exist , when $DFL_{CS} = 0$ *or* $\{ DFL_{CS} / (1 - DFL_{CS}) \} = \{ 1 / (r_C * \gamma) \}$

or **$\{ DFL_{CS} / (1 - DFL_{CS}) \} \geq \{ 2 / (r_C * \gamma) \}$.**

(2) Financing cost structural measure of DFL (DFL_{FS})

(A) Case 1 [considering eq. (51)]

$EBIT_i > b_{(EBIT)}$ [i.e. $EBIT_i > 0$] $\Rightarrow EBIT_i >$ FFCBT

$\Rightarrow EBIT_i > (DFL_{FS} * \theta * EBIT_i)$

$\Rightarrow 0 < DFL_{FS} < (1/\theta)$ [since $EBIT_i \neq 0$ and $EBIT_i > 0$]
$\Rightarrow 0 < DFL_{FS} < DFL_E$ [$(1/\theta) = (EBIT_i / EBTAES_i) = DFL_E$]
The non - existence of financing leverage effect does not arise in this case .

(B) Case 2 [considering eq. (55)]
$EBIT_i > b_{(EBIT)}$ [i.e. $EBIT_i > 0$] $\Rightarrow EBIT_i > FFCBT$
$\Rightarrow EBIT_i > \{ (DFL_{FS} * \theta * EBIT_i) / (1 - DFL_{FS}) \}$
$\Rightarrow 0 < \{ DFL_{FS} / (1 - DFL_{FS}) \} < (1/\theta)$ [since $EBIT_i \neq 0$ and $EBIT_i > 0$]
$\Rightarrow 0 < \{ DFL_{FS} / (1 - DFL_{FS}) \} < DFL_E$ [$(1/\theta) = (EBIT_i / EBTAES_i) = DFL_E$].
The non - existence of financing leverage effect does not arise in this case .

(II) IFV = RONABT (= r_A)
Similar results will be obtained .

III. Financing Leverage And Risk

The literal meaning of the term ' risk ' is the (exposure to) the possibility of loss , injury , or other adverse or unwelcome circumstance ; a chance or situation involving such a possibility [21] . However , in finance the term ' risk ' encompasses both favourable and unfavourable outcomes of the expected variability of an investment's actual return from the expected return . Frank Knight (1921) interprets ' *risk* ' as situations where mathematical probabilities could be assigned by the decision - maker to the randomness faced by him .

Considering a ' Financing Account Structural Plan ' (FASP) whose elements { u , n , AE , AFFCBC , r_C , t and FFCBT (or FFCAT) } are assumed to be independent of EBIT ; with EBIT , u , n , AE , AFFCBC , r_C , t and FFCBT (or FFCAT) being random variables { u , n , AE , AFFCBC , r_C , t and FFCBT (or FFCAT) being *constant random variables* } whose statistical expected values expected to be observed at the end of a planning horizon (time ' 0 ' to time ' k ' , say) are given as :

$E(EBIT_k) = \Sigma \{ (EBIT_k)_j * p_j \}$; $E(u_k) = \Sigma \{ (u_k)_j * p_j \} = (u_k)_j$;
$E(n_k) = \Sigma \{ (n_k)_j * p_j \} = (n_k)_j$; $E(AE_k) = \Sigma \{ (AE_k)_j * p_j \} = (AE_k)_j$;
$E(AFFCBC_k) = \Sigma \{ (AFFCBC_k)_j * p_j \} = (AFFCBC_k)_j$
$E(r_{Ck}) = \Sigma \{ (r_{Ck})_j * p_j \} = (r_{Ck})_j$; $E(t_k) = \Sigma \{ (t_k)_j * p_j \} = (t_k)_j$;
$E(FFCBT_k) = \Sigma \{ (FFCBT_k)_j * p_j \} = (FFCBT_k)_j$;
$E(FFCAT_k) = \Sigma \{ (FFCAT_k)_j * p_j \} = (FFCAT_k)_j$; (j = 1 , 2 , 3 … n) ;
[$(EBIT_k)_j$, $(u_k)_j$, $(AE_k)_j$, $(AFFCBC_k)_j$, $(r_{Ck})_j$, $(t_k)_j$ and $(FFCBT_k)_j$ { or $(FFCAT_k)_j$ } are the j^{th} possible periodic values under ' n ' possible future business scenarios and p_j is the probability (subjectively assigned by the decision maker) of the occurrence of the j^{th} possible future business scenario] ;
we get from eqs. (6) & (10) the expected periodic values of the related variables as :

$E(EPESAT_k) = \{ E(EATAES_k) / E(u_k) \}$, or

$$E(EPESAT_k) = [\{ 1 - E(t_k) \} / E(u_k)] * E(EBIT_k) - [\{ 1 - E(t_k) \} / E(u_k)] * E(FFCBT_k) \quad (58)$$

$E(r_{Ek}) = \{ E(EATAES_k) / E(AE_k) \}$, or

$$E(r_{Ek}) = [\{ 1 - E(t_k) \} \{ 1 + E((AFFCBC / AE)_k) \}] * E(r_{Ak}) - [\{ 1 - E(t_k) \} * E(r_{Ck}) * E((AFFCBC / AE)_k)] \quad (59)$$

where $E(EATAES_k) = \Sigma \{ (EATAES_k)_j * p_j \}$;
$E(EPESAT_k) = \Sigma \{ (EPESAT_k)_j * p_j \}$ [$(EPESAT_k)_j = \{ (EATAES_k)_j / E(u_k) \}$] ;
$E(r_{Ek}) = \Sigma \{ (r_{Ek})_j * p_j \}$ [$(r_{Ek})_j = \{ (EATAES_k)_j / E(AE_k) \}$] ;
$E((AFFCBC / AE)_k) = \{ E(AFFCBC_k) / E(AE_k) \}$;
$E(AE_k) = E(u_k) * E(n_k)$;
$E(t_k)$, $E(u_k)$, $E(n_k)$, $E(AE_k)$, $E(AFFCBC_k)$, $E(r_{Ck})$, $E(FFCBT_k)$ { or $E(FFCAT_k)$ } and $E((AFFCBC / AE)_k)$ are assumed to remain constant in the above functional relationships . **Hereafter the time subscript ' k ' will be ignored in order to avoid complexities in the formulations .**

[21] *Oxford English Dictionary*

***Case 1* : I FV = EBIT , DFV = EPESAT**

Under condition of future business risk , the initial values of EPESAT and EBIT will be E (EPESAT) and E (EBIT) respectively , and the ex - ante DFL_E [akin to I M A { vide eq. (4) } of a physical lever] is given from eq. (33) as :

$$\tilde{DFL}_E = \frac{|\text{ Expected percentage change in } EPESAT_j \text{ from } E(EPESAT)\ \{\neq 0\}\ |}{|\text{ Expected percentage change in } EBIT_j \text{ from } E(EBIT)\ \{\neq 0\}\ |} \quad \textbf{(60)}$$

If the expected percentage change in E (EBIT) is 1 % [i.e. if the actual ' end - of - the - period ' value of EBIT is expected to be 1% more or 1% less than E (EBIT)] then the corresponding expected percentage change in the actual value of EPESAT from E (EPESAT) is measured by $\tilde{DFL}_E$, ceteris paribus .

Now , for a finite change in $EBIT_j$ from E (EBIT) { $\Delta EBIT_j$ } [= { $EBIT_j - E(EBIT)$ }] , we get the finite change in $EPESAT_j$ from E (EPESAT) , ceteris paribus , from eq. (58) as :

$\Delta EPESAT_j = EPESAT_j - E(EPESAT) = [\{1 - E(t)\} / E(u)] * \Delta EBIT_j$ **(61)**

$\Delta EBIT_j$ and $\Delta EPESAT_j$ being random variables with respective expected values

$E(\Delta EBIT_j) = \Sigma\{\Delta EBIT_j * p_j\}$ **(62)**

$E(\Delta EPESAT_j) = \Sigma\{\Delta EPESAT_j * p_j\} = [\{1 - E(t)\} / E(u)] * E(\Delta EBIT_j)$ **(63)**

The percentage change in $EBIT_j$ from E (EBIT) and the percentage change in $EPESAT_j$ from E (EPESAT) given by :

$(\%\ \Delta EBIT_j) = \{\Delta EBIT_j / E(EBIT)\} * 100$ **(64)**

$(\%\ \Delta EPESAT_j) = \{\Delta EPESAT_j / E(EPESAT)\} * 100$ **(65)**

are also random variables with respective expected values :

$E(\%\ \Delta EBIT_j) = \{E(\Delta EBIT_j) / E(EBIT)\} * 100$ **(66)**

$E(\%\ \Delta EPESAT_j) = \{E(\Delta EPESAT_j) / E(EPESAT)\} * 100$ **(67)**

Considering that E (EBIT) and E (EPESAT) > 0 , we get from eqs.(58) , (60) , (64) (66) & (67) :

$\tilde{DFL}_E = \{ |E(\%\Delta EPESAT_j)| \ / \ |E(\%\Delta EBIT_j)| \}$, or

$\tilde{DFL}_E = \{ |E(\Delta EPESAT_j)| / E(EPESAT) \} / \{ |E(\Delta EBIT_j)| / E(EBIT) \}$, or

$\tilde{DFL}_E = [\{1 - E(t)\} / E(u)] * E(EBIT) \ / \ E(EPESAT)$, or

$\tilde{DFL}_E = \{1 - E(t)\} * E(EBIT) / E(EATAES) = \{E(EBIT) / E(EBTAES)\}$[22] **(68)**

Equations (34) & (68) being similar with the initial values being replaced by the expected values , the other formulations under conditions of future business risk would be similar to that obtained in the preceding section with expected values being replaced with the initial values .

***Case 2* : I FV = RONABT , DFV = ROEAT**

Results of Case 1 will be obtained .

3.1 Financing Leverage Risk

The ' risk ' which is traditionally said to be directly affected by financing leverage of a corporate firm , ceteris paribus , is known as **' financing risk '** and based on the ' stand - alone risk framework '[23] (which ignores the benefits of shareholder diversification) it is defined as the variability (considering both favourable and unfavourable outcomes) of variability (considering both favourable and unfavourable outcomes) of the expected value of EPESAT or ROEAT (DFV) due to the uncertainty inherent in the financing operations of the firm ; the common statistical measures of such risk being :-

(a) in absolute terms :

(i) variance ($\boldsymbol{\sigma}^2$) or standard deviation ($\boldsymbol{\sigma}$) of DFV , or

(ii) ' Mean Absolute Deviation ' (MAD) of DFV ; and

(b) in relative terms :

(i) absolute value (modulus) of the ' Coefficient of Variation ' (CV) [i.e. the ratio of standard deviation of DFV to the expected value of DFV] , or

(ii) ratio of ' Mean Absolute Deviation ' (MAD) of DFV to the expected value of DFV .

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[22] *E (EBTAES) = [E (EATAES) / { 1 – E (t) }] .*

[23] *' Stand - alone risk ' (or ' total risk ') is directly related to its components ' systematic risk ' (beta coefficient) and ' unsystematic risk ' (or ' idiosyncratic risk ') .*

However , the ‘ risk ’ which may be said to be associated with financing leverage of a corporate firm may be termed as **‘ Financing Leverage Risk ’ (FLR)** and based on the ‘ stand - alone risk (or total risk) framework ’ it may be defined as the magnified relative variability of EPESAT (or ROEAT) { DFV } [from their respective expected values] in response to a relative variability of EBIT (or RONABT) { I FV } [from their respective expected values] , in the presence of a ‘ Financing Account Structural Plan ’ (FASP) whose components are assumed to remain constant in the functional relationship between the DFV and the I FV , considering both favourable and unfavourable situations of financing leverage under condition of future business risk .

***Case 1 :* I FV = EBIT , DFV = EPESAT**

The statistical measure of FLR under the ‘ stand - alone risk framework ’ is given as :

(a) $$\text{FLR} = \frac{\text{Coefficient of Variation (CV) of EPESAT}}{\text{Coefficient of Variation (CV) of EBIT}} \qquad \textbf{(69)}$$

(b) $$\text{FLR} = \frac{\text{Mean Absolute Deviation (MAD) of EPESAT / E (EPESAT)}}{\text{Mean Absolute Deviation (MAD) of EBIT / E (EBIT)}} \qquad \textbf{(70)}$$

If σ_{EPESAT} and σ_{EBIT} be the standard deviations of EPESAT and EBIT respectively then from eq. (58) we get : $\sigma_{EPESAT} = [\{ 1 - E(t) \} / E(u)] * \sigma_{EBIT}$ **(71)**

and from eqs. (69) & (72) we get :

$$\text{FLR} = \frac{\text{CV (EPESAT)}}{\text{CV (EBIT)}} = \frac{\{ \sigma_{EPESAT} / E(EPESAT) \}}{\{ \sigma_{EBIT} / E(EBIT) \}} \text{ , or}$$

$\text{FLR} = [\{ 1 - E(t) \} / E(u)] * E(EBIT) / E(EPESAT)$, or

$\text{FLR} = \{ E(EBIT) / E(EBTAES) \} = D\tilde{F}L_E$ [24] **(72)**

Now , $MAD(EBIT) = E (| EBIT_j - E(EBIT) |) = E (| \Delta EBIT_j |)$ **(73)**

$MAD(EPESAT) = E (| EPESAT_j - E(EPESAT) |)$, or

$MAD(EPESAT) = E (| \Delta EPESAT_j |)$, or

$MAD(EPESAT) = [\{ 1 - E(t) \} / E(u)] * E (| \Delta EBIT_j |)$ [25] **(74)**

So from eqs. (70) & (74) we get :

$$\text{FLR} = \frac{\{ MAD(EPESAT) / E(EPESAT) \}}{\{ MAD(EBIT) / E(EBIT) \}} \text{ , or}$$

$\text{FLR} = [\{ 1 - E(t) \} / E(u)] * E(EBIT) / E(EPESAT)$, or

$\text{FLR} = \{ E(EBIT) / E(EBTAES) \} = D\tilde{F}L_E$ [26] **(75)**

Hence $D\tilde{F}L_E$ is a measure of Financing Leverage Risk .

The components of Financing Leverage Risk (FLR) may be said to be :

(1) ‘ Downside Financing Leverage Risk ’ (DFLR) representing the unfavourable situation [i.e. magnified expected percentage decrease in EPESAT from E (EPESAT) for an expected one percentage decrease in EBIT from E (EBIT)] of financing leverage , measured by the :

(i) ratio of CV (EPESAT) { considering values of EPESAT < E (EPESAT) } to CV (EBIT) { considering values of EBIT < E (EBIT) } given as :

$$\text{DFLR} = \frac{CV(EPESAT)_{[EPESAT < E(EPESAT)]}}{CV(EBIT)_{[EBIT < E(EBIT)]}} \text{ , or}$$

$$\text{DFLR} = \frac{\{ \sigma_{EPESAT\ [EPESAT < E(EPESAT)]} / E(EPESAT) \}}{\{ \sigma_{EBIT\ [EBIT < E(EBIT)]} / E(EBIT) \}} \text{ , or}$$

24 *Vide eq. (68) .*
25 *Vide eqs. (61) .*
26 *Vide eq. (68) .*

DFLR = [{ 1 – E (t) } / E (u)] * E (EBIT) / E (EPESAT) , or

DFLR = { E (EBIT) / E (EBTAES) } = $D\tilde{F}L_E$ [27] **(76)**

[since { $\sigma_{EPESAT\ [\ EPESAT\ <\ E(EPESAT)\ ]}$ } / { $\sigma_{EBIT\ [\ EBIT\ <\ E(EBIT)\ ]}$ } = [{ 1 – E (t) } / E (u)] , where $\sigma_{EPESAT\ [\ EPESAT\ <\ E(EPESAT)\ ]}$ is the ' downside semi - standard deviation ' of EPESAT and $\sigma_{EBIT\ [\ EBIT\ <\ E(EBIT)\ ]}$ is the ' downside semi - standard deviation ' of EBIT **]** ;

(ii) ratio of **[** MAD (EPESAT) { considering values of EPESAT < E (EPESAT) } / E (EPESAT) **]** to **[** MAD (EBIT) { considering values of EBIT < E (EBIT) } / E (EBIT) **]** given as :

$$DFLR = \frac{MAD(EPESAT)_{[\ EPESAT\ <\ E(EPESAT)\ ]} / E(EPESAT)}{MAD(EBIT)_{[\ EBIT\ <\ E(EBIT)\ ]} / E(EBIT)}\ , \text{ or}$$

DFLR = [{ 1 – E (t) } / E (u)] * E (EBIT) / E (EPESAT) , or

DFLR = { E (EBIT) / E (EBTAES) } = $D\tilde{F}L_E$ [28] **(77)**

[since { MAD (EPESAT) $_{[\ EPESAT\ <\ E(EPESAT)\ ]}$ / MAD (EBIT) $_{[\ EBIT\ <\ E(EBIT)\ ]}$ } = [{ 1 – E (t) } / E (u)] , where MAD (EPESAT) $_{[\ EPESAT\ <\ E(EPESAT)\ ]}$ is the ' downside MAD ' of EPESAT and MAD (EBIT) $_{[\ EBIT\ <\ E(EBIT)\ ]}$ is the ' downside MAD ' of EBIT . **]**

(2) ' Upside Financing Leverage Risk ' (UFLR) representing the favourable situation [i.e. magnified expected percentage increase in EPESAT from E (EPESAT) for an expected one percentage increase in EBIT from E (EBIT)] of financing leverage , measured by the :

(i) ratio of CV (EPESAT) { considering values of EPESAT ≥ E (EPESAT) } to CV (EBIT) { considering values of EBIT ≥ E (EBIT) } given as :

$$UFLR = \frac{CV(EPESAT)_{[\ EPESAT\ \geq\ E(EPESAT)\ ]}}{CV(EBIT)_{[\ EBIT\ \geq\ E(EBIT)\ ]}}\ , \text{ or}$$

$$UFLR = \frac{\{\ \sigma_{EPESAT\ [\ EPESAT\ \geq\ E(EPESAT)\ ]} / E(EPESAT)}{\{\ \sigma_{EBIT\ [\ EBIT\ \geq\ E(EBIT)\ ]} / E(EBIT)\ \}}\ , \text{ or}$$

UFLR = [{ 1 – E (t) } / E (u)] * E (EBIT) / E (EPESAT) , or

UFLR = { E (EBIT) / E (EBTAES) } = $D\tilde{F}L_E$ [29] **(78)**

[since { $\sigma_{EPESAT\ [\ EPESAT\ \geq\ E(EPESAT)\ ]}$ } / { $\sigma_{EBIT\ [\ EBIT\ \geq\ E(EBIT)\ ]}$ } = [1 – E (t) / E (u)] , where $\sigma_{EPESAT\ [\ EPESAT\ \geq\ E(EPESAT)\ ]}$ is the ' upside semi - standard deviation ' of EPESAT and $\sigma_{EBIT\ [\ EBIT\ \geq\ E(EBIT)\ ]}$ is the ' upside semi - standard deviation ' of EBIT **]** ;

(ii) ratio of **[** MAD (EPESAT) { considering values of EPESAT ≥ E (EPESAT) } / E (EPESAT) **]** to **[** MAD (EBIT) { considering values of EBIT ≥ E (EBIT) } / E (EBIT) **]** given as :

$$UFLR = \frac{MAD(EPESAT)_{[\ EPESAT\ \geq\ E(EPESAT)\ ]} / E(EPESAT)}{MAD(EBIT)_{[\ EBIT\ \geq\ E(EBIT)\ ]} / E(EBIT)}\ , \text{ or}$$

UFLR = [{ 1 – E (t) } / E (u)] * E (EBIT) / E (EPESAT) , or

UFLR = { E (EBIT) / E (EBTAES) } = $D\tilde{F}L_E$ [30] **(79)**

[since { MAD (EPESAT) $_{[\ EPESAT\ \geq\ E(EPESAT)\ ]}$ / MAD (EBIT) $_{[\ EBIT\ \geq\ E(EBIT)\ ]}$ } = [{ 1 – E (t) } / E (u)] , where MAD (EPESAT) $_{[\ EPESAT\ \geq\ E(EPESAT)\ ]}$ is the ' upside MAD ' of EPESAT and MAD (EBIT) $_{[\ EBIT\ \geq\ E(EBIT)\ ]}$ is the ' upside MAD ' of EBIT . **]**

Hence $D\tilde{F}L_E$ is a measure of ' Financing Leverage Risk ' (FLR) as well as its two components ' Downside Financing Leverage Risk ' (DFLR) and ' Upside Financing Leverage Risk ' (UFLR) .

Case 2 : **I FV = RONABT , DFV = ROEAT**

Results of *Case 1* will be obtained .

[27] *Ibid* .
[28] *Ibid* .
[29] *Ibid* .
[30] *Ibid* .

IV. Intra – Firm Financing Leverage Analysis

Extending further the analogy between physical leverage and financing leverage we obtain :
(h) mutually dependent alternative physical scenarios of the physical fulcrum (PF) with its varying relative position ≈ mutually dependent alternative **‘** Financing Account Structural Plans ’ (FASP s) with ***varying*** relative proportion of Average Fixed Financing Cost - Bearing Capital (AFFCBC) within the ‘ average capital structure ’ or ***varying*** relative proportion of Fixed Financing Cost (Before Tax or After Tax) { FFCBT or FFCAT } within the financing cost structure .
Assuming that operating or investment decision has already been taken by choosing an ‘ Operating Account Structural Plan ’ (OASP) **[** which may be defined as a strategic combination ‘ Average Net Operating Assets (ANOA) structure ’ { employed during a short - term planning horizon and consisting of Average Operating Fixed Assets (AOFA) and Average Net Operating Current Assets (ANOCA) } , ‘ operating revenue structure ’ { consisting of operating revenue (or sales) per unit } and ‘ operating cost structure ’ { consisting of variable operating cost per unit and fixed operating cost } **]** from alternative OASPs based on operating leverage analysis , financing leverage analysis is then to be conducted in respect of the chosen OASP .

The intra - firm financing leverage analysis , composed of ex-ante and ex-post analyses , is discussed below .

(I) Ex – Ante Analysis

The ex - ante analysis , conducted at the beginning of the planning horizon , involves the following steps :
(1) The expected value of EBIT { E (EBIT) } already computed for operating leverage analysis is considered .
(2) Mutually dependent alternative ‘ Financing Account Structural Plans ’ (FASPs) with :
(a) varying E (AFFCBC) , E (u) and E (AE) **[** E (n) and E (ANCE) remaining unchanged with full substitutability of E (AFFCBC) for E (AE) or vice versa **]** ; and
(b) varying $E (r_C)$, E (FFCBT) and E (VFCBT) [31] { or varying E (FFCAT) and E (VFCAT) [32] **[** E (t) and E (TFCBT) { or E (TFCAT) } remaining unchanged with full substitutability of E (FFCBT) { or E (FFCAT) } for E (VFCBT) { or E (VFCAT) } or vice versa **]** ;
yielding equivalent value of E (EPESAT) or E (ROEAT) so that the decision - maker is apparently indifferent between the alternative FASPs based on ‘ earnings ’ or ‘ return ’ , are formulated .

If we consider two alternative FASPs ‘ P ’ and ‘ Q ’ with varying E (u) , E (AE) , E (AFFCBC) , E (FFCBT) { or E (FFCAT) } and E (VFCBT) { or E (VFCAT) **[** E (n) , $E (r_C)$, E (ANCE) { = E (ANA) } , E (t) and E (TFCBT) { or E (TFCAT) } remaining unchanged **]** yielding equivalent value of E (EPESAT) or E (ROEAT) { $= E (r_E)$ } at a given value of E (EBIT) or E (ROANBT) { $= E (r_A)$ } such that :
$E (u)_Q < E (u)_P$; $E (n)_Q = E (n)_P$; $E (AE)_Q < E (AE)_P$; $E (AFFCBC)_Q > E (AFFCBC)_P$;
$(\tilde{DFL}_{CS})_Q > (\tilde{DFL}_{CS})_P$ [where $\tilde{DFL}_{CS}$ { = E (AFFCBC / AE) = E (AFFCBC) / E (AE) } is the ex-ante DFL_{CS}] ; $E (ANCE)_Q = E (ANCE)_P$ { i.e. $E (ANA)_P = E (ANA)_Q$ } ;
$E (EBIT)_Q = E (EBIT)_P$; $E (t)_Q = E (t)_P$;
$E (FFCBT)_Q$ { or $E (FFCAT)_Q$ } > $E (FFCAT)_P$ { or $E (FFCAT)_P$ } ;
$E (VFCBT)_Q$ { or $E (VFCAT)_Q$ } < $E (VFCBT)_P$ { or $E (VFCAT)_P$ }
[i.e. $E (EBTAES)_Q$ { or $E (EATAES)_Q$ } < $E (EBTAES)_P$ { or $E (EATAES)_P$ }] ;
$E (TFCBT)_Q$ { or $E (TFCAT)_Q$ } = $E (TFCBT)_P$ { or $E (TFCAT)_P$ } ;
$E (EPESAT)_Q = E (EPESAT)_P$; $E (r_A)_Q = E (r_A)_P$; and $E (r_E)_Q = E (r_E)_P$;
then the following relationships (for given values of the variables in respect of OASP ‘ P ’) are obtained :
(i) since $E (FFCBT)_Q > E (FFCBT)_P$:

$$E (AFFCBC)_Q * E (r_C)_Q > E (AFFCBC)_P * E (r_C)_P \text{ , or}$$
$$E (r_C)_Q > \{ E (AFFCBC)_P / E (AFFCBC)_Q \} * E (r_C)_P \qquad \textbf{(80)}$$

(ii) since $E (r_E)_Q = E (r_E)_P$, we get from eq.(59) [ignoring the time subscript ‘ k ’] :

$$\{ 1 – E (t)_Q \} * \{ 1 + E (AFFCBC / AE)_Q \} * E (r_A)_Q – \{ 1 – E (t)_Q \} * \{ E (r_C)_Q * E(AFFCBC / AE)_Q \}$$
$$= \{ 1 – E (t)_P \} * \{ 1 + E (AFFCBC / AE)_P \} * E (r_A)_P – \{ 1 – E (t)_P \} * \{ E (r_C)_P * E(AFFCBC / AE)_P \} \text{ , or}$$

[31] *E (VFCBT) = E (EDBT) = E (EBTAES)* .
[32] *E (VFCAT) = E (EDAT) = E (EATAES)* .

$\{ 1 + (\tilde{DFL}_{CS})_Q \} * E (r_A)_Q - \{ E (r_C)_Q * (\tilde{DFL}_{CS})_Q \}$

$= \{ 1 + (\tilde{DFL}_{CS})_P \} * E (r_A)_P - E (r_C)_P * (\tilde{DFL}_{CS})_P \}$

[since $E (t)_Q = E (t)_P$] ; or after simplifying ,

$\{ (\tilde{DFL}_{CS})_Q / (\tilde{DFL}_{CS})_P \} = \{ E (r_A)_P - E (r_C)_P \} / \{ E (r_A)_P - E (r_C)_Q \}$

[since $E (r_A)_Q = E (r_A)_P$] , or

$$(\tilde{DFL}_{CS})_Q = (\tilde{DFL}_{CS})_P * \{ E (r_A)_P - E (r_C)_P \} / \{ E (r_A)_P - E (r_C)_Q \} \qquad \textbf{(81)}$$

Also , $E (r_C)_Q = E (r_A)_P - [\{ (\tilde{DFL}_{CS})_P / (\tilde{DFL}_{CS})_Q \} * \{ E (r_A)_P - E (r_C)_P \}]$ **(82)**

(iii) since $E (ANCE)_Q = E (ANCE)_P$:

$$E (AE)_Q = E (ANCE)_P - E (AFFCBC)_Q \qquad \textbf{(83)}$$

$$E (AFFCBC)_Q = E (ANCE)_P - E (AE)_Q \qquad \textbf{(84)}$$

(iv) since $E (n)_Q = E (n)_P$:

$\{ E (AE)_Q / E (u)_Q \} = \{ E (AE)_P / E (u)_P \}$, or

$$E (u)_Q = \{ E (AE)_Q / E (AE)_P \} * E (u)_P \qquad \textbf{(85)}$$

(v) since $E (EPESAT)_Q = E (EPESAT)_P$:

$\{ E (EATAES)_Q / E (u)_Q \} = \{ E (EATAES)_P / E (u)_P \}$, or

$$E (EATAES)_Q = E (EATAES)_P * \{ E (u)_Q / E (u)_P \} \qquad \textbf{(86)}$$

(3) $\tilde{DFL}_E$ { a measure of ' Financing Leverage Risk ' (FLR) and its two components - ' Downside Financing Leverage Risk ' (DFLR) and ' Upside Financing Leverage Risk ' (UFLR) } , on which a decision - criteria should be based for achieving the objective of ' risk - return trade off ' (as the decision - maker is apparently indifferent between the alternative FASPs based on ' earnings ' or ' return ') , is calculated for each of the alternative FASP s .

(4) A decision criterion based on the concept of ' expected utility ' of $\tilde{DFL}_E$ to the decision - maker may be formulated , considering the decision maker's subjective importance of the ' Downside Financing Leverage Risk ' (DFLR) and the ' Upside Financing Leverage Risk ' (UFLR) scenarios [33] .

A rational decision - maker may be said to be fully (100 percent) :

(a) ' DFLR averse ' if he or she does not like DFLR at all while being indifferent to UFLR [i.e. 100 % importance is given to DFLR and no importance is given to UFLR] ;

(b) ' UFLR affine ' if he or she only likes UFLR while being indifferent to DFLR [i.e. 100 % importance is given to UFLR and no importance is given to DFLR] .

So , the degree of ' Downside Financing Leverage Risk Averseness ' or ' Upside Financing Leverage Risk Affinity ' will lie between 0 % to 100 % . For example , a decision - maker may be 60 % ' DFLR averse ' and hence 40 % ' UFLR affine ' , i.e. the importance (subjectively) assigned by the decision maker to ' DFLR averseness ' is 1.5 times (or 20 % more than) the importance assigned to ' UFLR affinity ' .

However , no rational decision - maker may be believed to be (to any degree) :

(a) ' DFLR affine ' i.e. he or she likes DFLR to any degree , or

(b) ' UFLR averse ' i.e. he or she dislikes UFLR to any degree .

For the DFLR averse decision - maker , $\tilde{DFL}_E$ (under the DFLR scenario) , giving rise to disutility (or absolute value of negative utility) , may be considered as an **' economic bad '** . Moreover , this disutility directly varies with the value (strictly positive) of $\tilde{DFL}_E$ (i.e. an increase in $\tilde{DFL}_E$ will increase disutility and vice versa) or in other words negative utility will be indirectly related to $\tilde{DFL}_E$ (in the form of a monotonically decreasing negative utility function of $\tilde{DFL}_E$) , thus giving rise to ' negative marginal utility ' . As each additional unit of $\tilde{DFL}_E$ (under the DFLR scenario) yields increasing amount of disutility (i.e. decreasing amount of negative utility) for the DFLR averse decision - maker , $\tilde{DFL}_E$ (under the DFLR scenario) may be said to follow the ' law of increasing marginal disutility ' [34] or the ' law of diminishing negative marginal utility ' , thus giving rise to a negative convex utility function (or a concave utility function [35]) with the derivative of marginal disutility (i.e. absolute value of negative marginal utility) with respect to $\tilde{DFL}_E$ being positive (i.e. the derivative of negative marginal utility with respect to $\tilde{DFL}_E$ being negative) .

[33] *Since financing leverage acts as a double - edged sword a decision criterion for financing leverage analysis should take into consideration the DFLR and the UFLR scenarios .*

[34] *A corollary of the ' law of diminishing marginal utility ' in respect of an 'economic good ' .*

[35] *A concave utility function is associated with risk aversion .*

For the UFLR affine decision - maker , $\tilde{DFL}_E$ (under the UFLR scenario) , giving rise to utility , may be considered as an **' economic good '** . Moreover , this utility directly varies with the value (strictly positive) of $\tilde{DFL}_E$ in the form of a monotonically increasing utility function of $\tilde{DFL}_E$, thus giving rise to positive marginal utility . As each additional unit of $\tilde{DFL}_E$ (under the UFLR scenario) yields increasing amount of utility for the ULFR affine decision - maker , $\tilde{DFL}_E$ (under the UFLR scenario) may be said to follow the ' law of increasing marginal utility ' , thus giving rise to a convex utility function [36] , with the derivative of marginal utility with respect to $\tilde{DFL}_E$ being positive .

Assuming that the degrees of ' DFLR averseness ' and ' UFLR affinity ' subjectively assigned by the decision - maker are ' α ' ($0 \le \alpha \le 1$) and ' β ' { $\beta = (1 - \alpha)$ } and considering that $\tilde{DFL}_{E\,[\,DFLR\,]} = \tilde{DFL}_{E\,[\,UFLR\,]} = \tilde{DFL}_E$ (> 0) , the twice differentiable utility functions of $\tilde{DFL}_E$ { at given values of E (EBIT) and E (EPESAT) } for DFLR and UFLR scenarios , may be given as :

$$U(\tilde{DFL}_{E\,[\,DFLR\,]}) = -[\,\alpha\{\tilde{DFL}_{E\,[\,DFLR\,]}\}^2] = -\{\alpha(\tilde{DFL}_E)^2\} \qquad \textbf{(87)}$$

[where $0 \le \alpha \le 1$; $U(\tilde{DFL}_{E\,[\,DFLR\,]})$ is a monotonically decreasing concave function of $\tilde{DFL}_E$ with $U'(\tilde{DFL}_E)\,\{= -(2\alpha\tilde{DFL}_E)\} \le 0$ and $U''(\tilde{DFL}_E)\,\{= -2\alpha\} \le 0$; and $U(\tilde{DFL}_{E\,[\,DFLR\,]}) = 0$ for $\alpha = 0$ **]**

$$U(\tilde{DFL}_{E\,[\,UFLR\,]}) = \beta\{\tilde{DFL}_{E\,[\,UFLR\,]}\}^2 = (1-\alpha)(\tilde{DFL}_E)^2 \qquad \textbf{(88)}$$

[where $0 \le \beta\,\{= (1-\alpha)\} \le 1$; $U(\tilde{DFL}_{E\,[\,UFLR\,]})$ is a monotonically increasing convex function of $\tilde{DFL}_E$ with $U'(\tilde{DFL}_E)\,\{= 2(1-\alpha)\tilde{DFL}_E\} \ge 0$ and

$U''(\tilde{DFL}_E)\,\{= 2(1-\alpha)\} \ge 0$; and $U(\tilde{DFL}_{E\,[\,UFLR\,]}) = 0$ for $\beta = 0$ **]** ;

the unit of measurement of utility of $\tilde{DFL}_E$ being the hypothetical unit ' util ' .

The net utility or net disutility function of $\tilde{DFL}_E$ is given from eqs.(85) and (86) as :

$(\tilde{DFL}_E) = -\{\alpha * (\tilde{DFL}_E)^2\} + (1-\alpha) * (\tilde{DFL}_E)^2$, or

$$U(\tilde{DFL}_E) = (1 - 2\alpha)(\tilde{DFL}_E)^2 \qquad \textbf{(89)}$$

From eq. (89) we get :

(a) for $\alpha = 1$ (or $\beta = 0$) { i.e. the decision - maker is fully DFLR averse } ,
$U(\tilde{DFL}_E) = U(\tilde{DFL}_{E\,[\,DFLR\,]}) = -(\tilde{DFL}_E)^2$;

(b) for $\alpha = 0$ (or $\beta = 1$) { i.e. the decision - maker is fully ULFR affine } ,
$U(\tilde{DFL}_E) = U(\tilde{DFL}_{E\,[\,UFLR\,]}) = (\tilde{DFL}_E)^2$;

(c) for $\alpha = \beta = 0.5$ { i.e. the decision - maker is indifferent between DFLR and UFLR scenarios } , $U(\tilde{DFL}_E) = 0$.

The expected value of $U(\tilde{DFL}_E)$ is then given by :

$$E\,\mathbf{(}\,U(\tilde{DFL}_E)\,\mathbf{)} = U(\tilde{DFL}_{E\,[\,DFLR\,]}) * P(DFLR) + U(\tilde{DFL}_{E\,[\,UFLR\,]}) * P(UFLR) \qquad \textbf{(90)}$$

where P (DFLR) and P (UFLR) are the probabilities of occurrences of DFLR and UFLR scenarios respectively , given by :

$$P(DFLR) = P\,\mathbf{(}\,EBIT < E(EBIT)\,\mathbf{)} = P\,\mathbf{(}\,EATAES < E(EATAES)\,\mathbf{)} \qquad \textbf{(91)}$$

$$P(UFLR) = P\,\mathbf{(}\,EBIT \ge E(EBIT)\,\mathbf{)} = P\,\mathbf{(}\,EATAES \ge E(EATAES)\,\mathbf{)} \qquad \textbf{(92)}$$

Now , $E\,\mathbf{(}\,U(\tilde{DFL}_E)\,\mathbf{)}$ may be positive (denoting net utility) or negative (denoting net disutility) . If $E\,\mathbf{(}\,U(\tilde{DFL}_E)\,\mathbf{)} > 0$, then the ' principle of maximization of expected utility ' is to be followed . If $E\,\mathbf{(}\,U(\tilde{DFL}_E)\,\mathbf{)} < 0$, then absolute value of $E\,\mathbf{(}\,U(\tilde{DFL}_E)\,\mathbf{)}$ is to be considered following the ' principle of minimization of the absolute value of expected disutility ' .

(5) A FASP is to be chosen based on the principle of maximization of expected utility { or principle of minimization of the absolute value of expected disutility (negative utility) } of $\tilde{DFL}_E$, considering the degrees of ' Downside Financing Leverage Risk (DFLR) averseness ' and ' Upside Financing Leverage Risk (UFLR) affinity ' , subjectively assigned by the decision - maker .

(II) Ex – post Analysis

The ex - post analysis is conducted for the chosen FASP at the end of the planning horizon by :

(A) Calculating *ex - post* DFL_E [akin to AMA { vide eq. (2) } of a physical lever] from eq.(33) as :

[36] *A convex utility function is associated with risk affinity .*

$$D\check{F}L_E = \frac{|\ \text{Percentage change in } E(EPESAT) \text{ or } \{E(ROEAT)\} \text{ from the revised expected value } (\neq 0) \text{ of } EPESAT \text{ (or } ROEAT) \{\text{based on the actual value of } EBIT\}\ |}{|\ \text{Percentage change in } E(EBIT)\{\text{from the actual value of } EBIT(\neq 0)\} \text{ or } E(RONABT)\{\text{from the revised expected value } (\neq 0) \text{ of } RONABT \text{ based on the actual value of } EBIT\}\ |} \quad \textbf{(93)}$$

Case 1 : **I FV = EBIT , DFV = EPESAT**

The ' revised expected value ' of EPESAT considering the actual value of EBIT [A (EBIT)] , *ceteris paribus* { E (u) , E (t) and E (FFCBT) remaining constant } , is given from eq.(58) as :

$E_R(EPESAT) = [\{1 - E(t)\} / E(u)] * A(EBIT) - [\{1 - E(t)\} / E(u)] * E(FFCBT)$ **(94)**

Now , for a finite change in E (EBIT) from A (EBIT) { $\Delta E(EBIT)$ } **[** = { E (EBIT) – A (EBIT) } **]** , we get the finite change in E (EPESAT) from $E_R(EPESAT)$, *ceteris paribus* , from eq. (58) as :

$\Delta E(EPESAT) = E(EPESAT) - E_R(EPESAT) = [\{1 - E(t)\} / E(u)] * \Delta E(EBIT)$ **(95)**

The percentage change in E (EBIT) from A (EBIT) and the percentage change in E (EPESAT) from $E_R(EPESAT)$ are given by :

$\{\%\,\Delta E(EBIT)\} = \{\Delta E(EBIT) / A(EBIT)\} * 100$ **(96)**

$\{\%\,\Delta E(EPESAT)\} = \{\Delta E(EPESAT) / E_R(EPESAT)\} * 100$ **(97)**

We get from eqs. (93) to (97) :

$D\check{F}L_E = \{\ |\,\%\,\Delta E(EPESAT)\,|\ /\ |\,\%\,\Delta E(EBIT)\,|\ \}$, or

$D\check{F}L_E = \{\ |\,\Delta E(EPESAT)\,|\ /\ |\,E_R(EPESAT)\,|\ \} / \{\ |\,\Delta E(EBIT)\,|\ /\ |\,A(EBIT)\,|\ \}$, or

$D\check{F}L_E = [\{1 - E(t)\} / E(u)] * |\,A(EBIT)\,|\ /\ |\,E_R(EPESAT)\,|$, or

$D\check{F}L_E = \{1 - E(t)\} * |\,A(EBIT)\,|\ /\ |\,E_R(EATAES)\,|$ [37] , or

$D\check{F}L_E = \{\ |\,A(EBIT)\,|\ /\ |\,E(EBTAES)\,|$ [38] $\}$ **(98)**

Case 2 : **I FV = RONABT , DFV = ROEAT**

Results of *Case 1* will be obtained .

(B) Evaluating the performance of the decision - maker by analyzing the **' Financing Leverage Efficiency ' (FLE)** [akin to the Efficiency { vide eq. (5) } of a physical lever] given by :

(a) For under - estimation [i.e. $D\tilde{F}L_E < D\check{F}L_E$] :

$FLE = (D\tilde{F}L_E / D\check{F}L_E) * 100\,\%$ **(99)**

(b) For over - estimation [i.e. $D\tilde{F}L_E > D\check{F}L_E$] :

$FLE = (D\check{F}L_E / D\tilde{F}L_E) * 100\,\%$ **(100)**

FLE may be adjusted for a margin of error .

The intra - firm financing leverage analysis is illustrated through the following example .

EXAMPLE :

(I) Ex – ante Financing Leverage Analysis

A corporate firm has the following capital structure at the beginning of a planning horizon (assumed to be the accounting period from 01.01.2012 to 31.12.2012) :

TABLE 8

CAPITAL STRUCTURE as on 01.01.2012	**Rs.**	**Rs.**
VARIABLE FINANCING COST – BEARING CAPITAL (VFCBC) :		
Equity Shareholders' Net Worth (E) :-		
Equity Share Capital (30,000 equity shares of Rs. 10 each fully paid)		3,00,000
FIXED FINANCING COST – BEARING CAPITAL (FFCBC) :-		
Interest - bearing Debt (D) **{** 5 % Debentures of Rs. 100 each }		2,00,000
Net Capital Employed (NCE)		5,00,000

The Net Operating Assets (NOA) { = Net Assets (NA) = NCE } on 01.01.2012 amount to Rs. 5,00,000 consisting of Operating Fixed Assets (OFA) of Rs. 3,00,000 and Net Operating Current Assets (NOCA) of Rs. 2,00,000 . Let us consider an already chosen ' Operating Account

[37] $E_R(EATAES) = \{E_R(EPESAT) / E(u)\}$

[38] $E_R(EBTAES) = [E_R(EATAES) / \{1 - E(t)\}]$

Structural Plan ' (OASP) whereby additional expected investments in NA (= NOA) of Rs. 3,00,000 are to be made [with investment in OFA (assuming that there is no disposal of OFA during the period) of Rs. 2,00,000 and investment in NOCA of Rs. 1,00,000 to be made at the **beginning** of the period] with E (NA) and E (ANA) [39] for the period being Rs. 8,00,000 and Rs. 8,00,000 respectively [E (OFA) , E (NOCA) , E (AOFA) [40] and E (ANOCA) [41] for the period being Rs. 5,00,000 , Rs. 3,00,000 , Rs. 5,00,000 and Rs. 3,00,000 respectively] . Moreover , the subjective probability distribution of EBIT for the period under possible future business scenarios and the calculated values of E **(** EBIT **)** , CV (EBIT) and MAD (EBIT) are given below :

TABLE 9 : Probability distribution of ' EBIT '

Business Scenarios	**Probability (p_j)**	**Range of ' EBIT '**	**$EBIT_j$**	**($EBIT_j$ * p_j)**
		(Rs.)	**(Rs.)**	**(Rs.)**
Very Good	0.05	1,60,000 – 2,00,000	1,80,000	9,000
Good	0.30	1,20,000 – 1,60,000	1,40,000	42,000
Normal	0.40	80,000 – 1,20,000	1,00,000	40,000
Bad	0.20	40,000 – 80,000	60,000	12,000
Very Bad	0.05	0 – 40,000	20,000	1,000
				E (EBIT) = 1,04,000

TABLE 10 : CV (EBIT) and MAD (EBIT)

Business Scenarios	**Probability (p_j)**	**| $EBIT_j$ – E (EBIT) | * p_j**	**{ $EBIT_j$ – E (EBIT) }^{2} * p_j**
		(Rs.)	**(Rs.) [million]**
Very Good	0.05	3,800	288.8
Good	0.30	10,800	388.8
Normal	0.40	1,600	6.4
Bad	0.20	8,800	387.2
Very Bad	0.05	4,200	352.8
		MAD (EBIT) = Rs. 29,200	**σ^2_q = Rs. 1,424 million**
		CV (EBIT) = 0.36	**σ_q = Rs. 37,736**

Let us now consider two mutually dependent FASPs ' P ' and ' Q ' (assuming that additional capital is employed at the **beginning** of the period and there is no repayment or redemption of capital during the period) the particulars of which under future business scenarios are given below :

TABLE 11 : FASP ' P '

Particulars	**Future Business Scenarios**					**Expected Value**
	Very Good	**Good**	**Normal**	**Bad**	**Very Bad**	
Probability	0.05	0.30	0.40	0.20	0.05	
Additional Equity Shares (10,000 shares of Rs. 10 each) [Rs.]	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Additional FFCBC : 6 % Redeemable Preference Shares (1,000 shares of Rs. 100 each) [Rs.]	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Additional FFCBC : 8 % Bank Loan [Rs.]	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Additional NCE [Rs.]	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
Closing NCE [Rs.]	8,00,000	8,00,000	8,00,000	8,00,000	8,00,000	8,00,000
Average NCE (ANCE) [Rs.]	8,00,000	8,00,000	8,00,000	8,00,000	8,00,000	8,00,000
Average no. of equity shares outstanding (u)	40,000	40,000	40,000	40,000	40,000	40,000

[39] *E (ANA) = Closing NA i.e. E (NA) expected to be observed at the end of the period .*
[40] *E (AOFA) = Closing OFA i.e. E (OFA) expected to be observed at the end of the period .*
[41] *E (ANOCA)= Closing NOCA i.e. E (NOCA) expected to be observed at the end of the period .*

Average Equity (AE) [Rs.]	4,00,000	4,00,000	4,00,000	4,00,000	4,00,000	4,00,000
Average FFCBC (AFFCBC) [Rs.]	4,00,000	4,00,000	4,00,000	4,00,000	4,00,000	4,00,000
DFL_{CS} { = (AFFCBC / AE) }	1	1	1	1	1	1
FFCBT [Rs.]	24,000 [A]	24,000	24,000	24,000	24,000	24,000
Weighted average rate of cost (before tax) of AFFCBC (r_C) [= (AFFCBC / FFCBT) * 100]	6 % p.a.	6 % p.a.	6 % p.a.	6 % p.a.	6 % p.a.	6 % p.a.
EBTAES { = (EBIT – FFCBT) } [Rs.]	1.56,000	1,16,000	76,000	36,000	(-) 4,000	80,000
Corporate income - tax rate (t)	50 %	50 %	50 %	50 %	50 %	50 %
FFCAT { = FFCBT * (1 – t) } [Rs.]	12,000	12,000	12,000	12,000	12,000	12,000
EATAES { = EBTAES * (1 – t) } [Rs.]	78,000	58,000	38,000	18,000	(-) 2,000	40,000
EPESAT { = EATAES / u } [Rs.]	1.95	1.45	0.95	0.45	(-) 0.05	1.00
ROEAT [= (EATAES / AE) * 100]	19.5 %	14.5 %	9.5 %	4.5 %	(-) 0.5 %	10 %
RONABT [= (EBIT / ANA) } * 100]	22.5 %	17.5 %	12.5 %	7.5 %	2.5 %	13 %
$FBEP_{(EBIT)}$ { = FFCBT } [Rs.]	24,000	24,000	24,000	24,000	24,000	24,000
$FBEP_{(RONABT)}$ { = (FFCBT / ANCE)}	3 %	3 %	3 %	3 %	3 %	3 %

[A] FFCBT = Rs. (2,00,000 * 5 % + 1,00,000 * 6 % + 1,00,000 * 8 %) = Rs. 24,000 .

TABLE 12 : FASP ' Q '

Particulars	Future Business Scenarios					Expected Value
	Very Good	Good	Normal	Bad	Very Bad	
Probability	0.05	0.30	0.40	0.20	0.05	
Additional Equity Shares (5,000 shares of Rs. 10 each) [Rs.]	50,000	50,000	50,000	50,000	50,000	50,000
Additional FFCBC : 9.6 % [F] Debentures [Rs.]	2,50,000	2,50,000	2,50,000	2,50,000	2,50,000	2,50,000
Additional NCE [Rs.]	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
Closing NCE [Rs.]	8,00,000	8,00,000	8,00,000	8,00,000	8,00,000	8,00,000
Average NCE (ANCE) [Rs.]	8,00,000	8,00,000	8,00,000	8,00,000	8,00,000	8,00,000
Average no. of equity shares outstanding (u)	35,000	35,000	35,000	35,000	35,000	35,000
Average Equity (AE) [Rs.]	3,50,000	3,50,000	3,50,000	3,50,000	3,50,000	3,50,000
Average FFCBC (AFFCBC) [Rs.]	4,50,000	4,50,000	4,50,000	4,50,000	4,50,000	4,50,000
DFL_{CS} { = (AFFCBC / AE) }	1.29	1.29	1.29	1.29	1.29	1.29
FFCBT [Rs.]	34,000	34,000	34,000	34,000	34,000	34,000 [E]
Weighted average rate of cost (before tax) of AFFCBC (r_C) [= (AFFCBC / FFCBT) * 100]	7.56 % p.a.	7.56 % p.a.	7.56 % p.a.	7.56 % p.a.	7.56 % p.a.	7.56 % p.a.
EBTAES { = (EBIT – FFCBT) } [Rs.]	1,46,000	1,06,000	66,000	26,000	(-) 14,000	70,000 [D]
Corporate income - tax rate (t)	50 %	50 %	50 %	50 %	50 %	50 %
FFCAT { = FFCBT * (1 – t) } [Rs.]	17,000	17,000	17,000	17,000	17,000	17,000
EATAES { = EBTAES * (1 – t) } [Rs.]	73,000	53,000	33,000	13,000	(-) 7,000	35,000 [C]
EPESAT { = EATAES / u } [Rs.]	2.09	1.51	0.94	0.37	(-) 0.2	1.00 [A]
ROEAT [= (EATAES / AE) * 100]	20.9 %	15.1 %	9.4 %	3.7 %	(-) 2 %	10 % [B]
RONABT [= (EBIT / ANA) }*100]	22.5 %	17.5 %	12.5 %	7.5 %	2.5 %	13 %
$FBEP_{(EBIT)}$ { = FFCBT } [Rs.]	34,000	34,000	34,000	34,000	34,000	34,000
$FBEP_{(RONABT)}$ { = (FFCBT / ANCE) }	4.25 %	4.25 %	4.25 %	4.25 %	4.25 %	4.25 %

[[A & B] Same as E (EPESAT) $_P$ and E (ROEAT) $_P$ respectively .
[C] E (EATAES) = E (EPESAT) * u = E (ROEAT) * E (AE) .
[D] E (EBATES) = { E (EATAES) / (1 – t) } .
[E] E (FFCBT) = { E (EBIT) – E (EBTAES) } .
[F] {(34,000 – 10,000) / 2,50,000 } * 100 . E (TFCBT) $_P$ = E (TFCBT) $_Q$ = Rs. 1,04,000 .
E (TFCAT) $_P$ = E (TFCAT) $_Q$ = Rs. 52,000 .]

The Coefficient of Variation (CV) and Mean Absolute Deviation (MAD) of RONABT , EPESAT and ROEAT in respect of the two FASPs are calculated below :

TABLE 13 : CV (RONABT) and MAD (RONABT) for FASP s ' P ' & ' Q '
[E (RONABT) = 13 %]

Business Scenarios	Probability (p_j)	| RONABT $_j$ – E (RONABT) | * p_j	{ RONABT $_j$ – E (RONABT) }^{2} * p_j
		%	%
Very Good	0.05	0.48	4.51
Good	0.30	1.35	6.08
Normal	0.40	0.2	0.1
Bad	0.20	1.1	6.05
Very Bad	0.05	0.52	5.51
		MAD (RONABT) = 3.65 %	**σ^2_{RONABT} = 22.25 %**
		CV (RONABT) = 0.36	**σ_{RONABT} = 4.7 %**

TABLE 14 : CV (EPESAT) and MAD (EPESAT) for FASP ' P '
[E (EPESAT) = Re. 1.00]

Business Scenarios	Probability (p_j)	| EPESAT $_j$ – E (EPESAT) | * p_j	{ EPESAT $_j$ – E (EPESAT) }^{2} * p_j
		Re.	Re.
Very Good	0.05	0.048	0.0451
Good	0.30	0.135	0.0608
Normal	0.40	0.02	0.001
Bad	0.20	0.11	0.0605
Very Bad	0.05	0.052	0.0551
		MAD (EPESAT) = Re. 0.365	**σ^2_{EPESAT} = Re. 0.2225**
		CV (EPESAT) = 0.47	**σ_{EPESAT} = Re. 0.47**

TABLE 15 : CV (ROEAT) and MAD (ROEAT) for FASP ' P '
[E (ROEAT) = 10 %]

Business Scenarios	Probability (p_j)	| ROEAT $_j$ – E (ROEAT) | * p_j	{ ROEAT $_j$ – E (ROEAT) }^{2} * p_j
		%	%
Very Good	0.05	0.48	4.51
Good	0.30	1.35	6.08
Normal	0.40	0.2	0.1
Bad	0.20	1.1	6.05
Very Bad	0.05	0.52	5.51
		MAD (ROEAT) = 3.65 %	**σ^2_{ROEAT} = 22.25 %**
		CV (ROEAT) = 0.47	**σ_{ROEAT} = 4.7 %**

TABLE 16 : CV (EPESAT) and MAD (EPESAT) for FASP ‘ Q ’
[E (EPESAT) = Re. 1.00]

Business Scenarios	Probability (p_j)	$\mid EPESAT_j - E(EPESAT) \mid * p_j$	$\{ EPESAT_j - E(EPESAT) \}^2 * p_j$
		Re.	Re.
Very Good	0.05	0.055	0.0594
Good	0.30	0.153	0.0780
Normal	0.40	0.024	0.0014
Bad	0.20	0.126	0.0794
Very Bad	0.05	0.06	0.0720
		MAD (EPESAT) = Re. 0.418	**σ^2_{EPESAT} = Re. 0.2902**
		CV (EPESAT) = 0.54	**σ_{EPESAT} = Re. 0.54**

TABLE 17 : CV (ROEAT) and MAD (ROEAT) for FASP ‘ Q ’
[E (ROEAT) = 10 %]

Business Scenarios	Probability (p_j)	$\mid ROEAT_j - E(ROEAT) \mid * p_j$	$\{ ROEAT_j - E(ROEAT) \}^2 * p_j$
		%	%
Very Good	0.05	0.55	5.94
Good	0.30	1.53	7.80
Normal	0.40	0.24	0.14
Bad	0.20	1.26	7.94
Very Bad	0.05	0.60	7.20
		MAD (ROEAT) = 4.18 %	**σ^2_{ROEAT} = 29.02 %**
		CV (ROEAT) = 0.54	**σ_{ROEAT} = 5.4 %**

TABLE 18 : Calculation of ex – ante DFL_E ($D\tilde{F}L_E$)

Particulars	FASP ‘ P ’	FASP ‘ Q ’
$D\tilde{F}L_{CS}$ [= { E (AFFCBC) / E (AE) }]	1	1.29
E (FMS) : (i) E ($FMS_{(EBIT)}$) = [{ E (EBIT) – E ($FBEP_{(EBIT)}$) } / E (EBIT)]	0.77	0.67
(ii) E ($FMS_{(RONABT)}$) = [{ E (RONABT) – E ($FBEP_{(RONABT)}$) } / E (RONABT)]	0.77	0.67
$D\tilde{F}L_E$ = { 1 / | E (FMS) | } **or** = { | E (EBIT) | / | E (EBTAES) | } **or** = [1 / { 1 – E (r_C) } * $\tilde{\gamma}$ * $D\tilde{F}L_{CS}$)] [where $\tilde{\gamma}$ = { E (AE) / E (EBIT) }] **or** $= \dfrac{E(r_A) * (1 + D\tilde{F}L_{CS})}{E(r_A) + [\{E(r_A) - E(r_C)\} * D\tilde{F}L_{CS}]}$ **or** { CV (y) / CV (x) } $ **or** [{ MAD (y) / E (y) } / { MAD (x) / E (x) }] $ — $ (a) y = EPESAT and x = EBIT , (b) y = ROEAT and x = RONABT .	1.3	1.5

Now , the conditions for the existence and non - existence of the financing leverage effect in respect of the two FASP s may be summarized as follows :

TABLE 19 : Conditions for existence and non - existence of the Financing Leverage effect

FASP	Financing leverage effect will exist [i.e. $D\tilde{F}L_E > 1$] when :	Financing leverage effect will not exist [i.e. $D\tilde{F}L_E \leq 1$] when :
' P '	**(a)** Rs. 12,000 < E (EBIT) < Rs. 24,000 or E (EBIT) > Rs. 24,000 **(b)** 1.5 % < E (RONABT) < 3 % or E (RONABT) > 3 % **(c)** $0 < D\tilde{F}L_{CS} < 4.33$ or $4.33 < D\tilde{F}L_{CS} < 8.67$	**(a)** E (EBIT) ≤ Rs. 12,000 **(b)** E (RONABT) ≤ 1.5 % **(c)** $D\tilde{F}L_{CS} = 0$ or 4.33 or $D\tilde{F}L_{CS} \geq 8.67$
' Q '	**(a)** Rs. 17,000 < E (EBIT) < Rs. 34,000 or E (EBIT) > Rs. 34,000 **(b)** 2.125 % < E (RONABT) < 4.25 % or E (RONABT) > 4.25 % **(c)** $0 < D\tilde{F}L_{CS} < 3.94$ or $3.94 < D\tilde{F}L_{CS} < 7.87$	**(a)** E (EBIT) ≤ Rs. 17,000 **(b)** E (RONABT) ≤ 2.125 % **(c)** $D\tilde{F}L_{CS} = 0$ or 3.94 or $D\tilde{F}L_{CS} \geq 7.87$

Let us now consider the process of decision - making for the choice between the two alternative FASPs .

Assuming that the degrees of ' DFLR averseness ' and ' UFLR affinity ' subjectively assigned by the decision - maker are 60 % and 40 % respectively , the utility functions of $D\tilde{F}L_E$ for DFLR and UFLR scenarios and the expected value of net utility (or net disutility) of $D\tilde{F}L_E$ in respect of the two FASPs may be given from eqs.(87) to (90) :

(1) FASP ' P '

$U (D\tilde{F}L_{E[\,DFLR\,]}) = - \{ 0.6 * (1.3)^2 \} = - 1.014$ utils .

$U (D\tilde{F}L_{E[\,UFLR\,]}) = (1 - 0.6) * (1.3)^2 = 0.676$ utils .

$E \,\boldsymbol{(}\, U (D\tilde{F}L_E) \,\boldsymbol{)} = (-) 1.014 * 0.65 + 0.676 * 0.35 = (-) 0.4225$ utils .

(2) FASP ' Q '

$U (D\tilde{F}L_{E[\,DFLR\,]}) = - \{ 0.6 * (1.5)^2 \} = - 1.35$ utils .

$U (D\tilde{F}L_{E[\,UFLR\,]}) = (1 - 0.6) * (1.5)^2 = 0.9$ utils .

$E \,\boldsymbol{(}\, U (D\tilde{F}L_E) \,\boldsymbol{)} = (-) 1.35 * 0.65 + 0.9 * 0.35 = (-) 0.5625$ utils .

[P (DFLR) = P **(** EPESAT < E (EPESAT) **)** = P **(** EBIT < E (EBIT) **)**
= P **(** ROEAT < E (ROEAT) **)** = P **(** RONABT < E (RONABT) **)** = 0.40 + 0.20 + 0.05 = 0.65 ;
P (UFLR) = P **(** EPESAT ≥ E (EPESAT) **)** = P **(** EBIT ≥ E (EBIT) **)**
= P **(** ROEAT ≥ E (ROEAT) **)** = P **(** RONABT ≥ E (RONABT) **)** = 0.35 + 0.05 = 0.35 . **]**

Hence , the decision - maker will choose FASP ' P ' yielding the lower value of $| E \,\boldsymbol{(}\, U (D\tilde{F}L_E) \,\boldsymbol{)} |$ **[** 0.4225 utils < 0.5625 utils **]** based on the principle of minimization of the absolute value of expected disutility (negative utility) .

[Notes :

(1) *If the decision - maker is assumed to assign 20 % as the degree of DFLR averseness (and hence 80 % as the degree of UFLR affinity) , then* $E \,\boldsymbol{(}\, U (D\tilde{F}L_E) \,\boldsymbol{)}$ *for the two FASP s will be given as :* $E \,\boldsymbol{(}\, U (D\tilde{F}L_E) \,\boldsymbol{)}_P = \{ (-) 0.2 * 1.69 * 0.65 \} + (0.8 * 1.69 * 0.35) = 0.2535$ *utils ;*

$E \,\boldsymbol{(}\, U (D\tilde{F}L_E) \,\boldsymbol{)}_Q = \{ (-) 0.2 * 2.25 * 0.65 \} + (0.8 * 2.25 * 0.35) = 0.3375$ *utils ;*

and FASP ' Q ' yielding the higher value of $E \,\boldsymbol{(}\, U (D\tilde{F}L_E) \,\boldsymbol{)}$ *based on the principle of maximization of expected utility will be chosen .*

(2) *If the decision - maker is assumed to assign 50 % as the degree of DFLR averseness (and hence 50 % as the degree of UFLR affinity) , then* $E \,\boldsymbol{(}\, U (D\tilde{F}L_E) \,\boldsymbol{)}$ *for the two FASP s will be given as :* $E \,\boldsymbol{(}\, U (D\tilde{F}L_E) \,\boldsymbol{)}_P = \{ (-) 0.5 * 1.69 * 0.65 \} + (0.5 * 1.69 * 0.35) = (-) 0.2535$ *utils ;*

$E \,\boldsymbol{(}\, U (D\tilde{F}L_E) \,\boldsymbol{)}_Q = \{ (-) 0.5 * 2.25 * 0.65 \} + (0.5 * 2.25 * 0.35) = (-) 0.3375$ *utils ;*

and FASP ' P ' yielding the lower value of $| E \,\boldsymbol{(}\, U (D\tilde{F}L_E) \,\boldsymbol{)} |$ *will be chosen .* ***]***

(II) Ex – post Financing Leverage Analysis

Considering that the decision - maker has chosen FASP ' P ' , let us now assume that , at the end of the planning horizon , given the actual value of EBIT { A (EBIT) } , the revised expected values of EBTAES , EATAES , EPESAT , RONABT and ROEAT , *ceteris paribus* [E (u) , E (n) , E (t) , E (r_C) , E (FFCBT) { or E (FFCAT) } , E (AE) , E (AFFCBC) and E (ANA) { or E (ANCE) } remaining constant] , and ex - post DFL_E , under two actual business scenarios I and II are obtained as follows :

TABLE 20 : Calculation of ex - post DFL_E ($D\check{F}L_E$)

Particulars	Scenario I	Scenario II
E (u)	40,000	40,000
E (n)	Rs. 10	Rs.10
E (AE)	Rs. 4,00,000	Rs. 4,00,000
E (AFFCBC)	Rs. 4,00,000	Rs. 4,00,000
E (ANA) { = E (ANCE) }	Rs. 8,00,000	Rs. 8,00,000
E (r_C)	6 %	6 %
E (FFCBT) [= { E (r_C) * E (AFFCBC) }]	Rs. 24,000	Rs. 24,000
E (t)	50 %	50 %
E (FFCAT)	Rs. 12,000	Rs. 12,000
A (EBIT)	**Rs. 1,20,000**	**Rs. 84,000**
E_R (EBTAES) [= { A (EBIT) – E (FFCBT) }]	**Rs. 96,000**	**Rs.60,000**
E_R (EATAES) [= { 1 – E (t) } * E_R (EBTAES)]	Rs. 48,000	Rs. 30,000
E_R (EPESAT) [= { E_R (EATAES) / E (u) }]	Re. 1.20	Re. 0.75
E_R (RONABT) [= { A (EBIT) / E (ANA)]	15 %	10.5 %
E_R (ROEAT) [= { E_R (EATAES) / E (AE) }]	12 %	7.5 %
$D\check{F}L_E$ = { | A (EBIT) | / | E_R (EBTAES) | }]	**1.25**	**1.4**

For ex - ante DFL_E ($D\tilde{F}L_E$) of 1.3 , the **Financing Leverage Efficiency (FLE)** is calculated for the two actual scenarios as follows :

(1) Scenario I [vide eq. (99)] : FLE = (1.25 / 1.3) * 100 % = 96.15 % .

(2) Scenario II [vide eq. (100)] : FLE = (1.3 / 1.4) * 100 % = 81.25 % .

V. Conclusion

The intra - firm analysis of financing leverage based on the mechanical analysis of physical leverage (the genesis of the concept of financing leverage) is thus composed of : **(a)** ex - ante financing leverage analysis conducted at the beginning of a planning horizon for choosing a ' Financing Account Structural Plan ' (FASP) from alternative FASPs based on the principle of maximization of expected utility { or the principle of minimization of the absolute value of expected disutility (negative utility) } of ex - ante DFL_E , considering the degrees of ' Downside Financing Leverage Risk (DFLR) averseness ' and ' Upside Financing Leverage Risk (UFLR) affinity ' subjectively assigned by the decision - maker , and **(b)** ex - post analysis conducted at the end of the planning horizon for the performance appraisal of the decision - maker based on ' Financing Leverage Efficiency ' (FLE) .

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