Insurance Policy Calculations

HUMAN LIFE VALUE (HLV)

- Human Life Value = (E-M) * a_n
- E = Earnings per annum
  - Of the client only by his own capacity
  - At Current Basis (Present Value)
  - Gross without any deductible

M = Maintenance Expenses which include
- Self Maintenance Expenses
- Income Related Taxes
- Life insurance Premiums being paid (From his income for any)

a_n = Present value of an Annuity Due
PMT (Begin) = (E-M)
N = Periods of Future Earnings of Life
I = Interest

HUMAN LIFE VALUE (HLV)

Age = 30

Retirement Age = 65

Present Monthly Income = 60000

Professional Tax = 4000

Income Tax = 130000

Self Maintenance Expenses = 40000

Life insurance premium for self 20000 (SA = 150000)

Life Insurance Premium for wife and children = 11000 and 6000 respectively

Rate of interest = 7%

Solution:

Earnings = 60000*12 = 720000

Maintenance Expenses = (4000+130000+40000+20000+11000+6000)

Earnings – Maintenance = 720000 – 211000 = 509000

HUMAN LIFE VALUE (HLV)

Earnings = 60000*12 = 720000

Maintenance Expenses = (4000+130000+40000+20000+11000+6000)

Earnings – Maintenance = 720000 – 211000 = 509000

n	35
i	7
PMT	509000
FV	0
PV	?
=PV(B2%,B1,B3,0,1)	
₹ -70,51,690.76	

Multiple Approach

Multiple Approach

- Simplest and Easiest but less accurate

Multiple Approach = (100/i) * Income needed by family

Mr X Earnings = 100000 Per Annum Debts = 128572

% of salary required by dependents = 75%

Interest Rate = 7%

Solution

Income required by family = 100000 * 75% = 75000

Insurance Required = (100/7%) * 75000

Multiple Approach

Mr X Earnings = 100000 Per Annum Debts = 128572

% of salary required by dependents = 75%

Interest Rate = 7%

Solution

Income required by family = 100000 * 75% = 75000

Insurance Required = (100/7) * 75000 = 107142857.1

Debts = 128572

Total SA required = 107142857 + 128572 = 12,00,000

Multiple Factor = Total SA / Income = 12,00,000/1,00,000 = 12

Multiple Approach

Two variations of multiple approach

1 Interest income equivalent method

2 Total of expected earnings method

1. Interest income equivalent method

Amount of risk = Income needed by family / Interest Rate

Add – Outstanding Debts (Loans) If given

Less – Existing insurance of the client

Multiple Approach

2. Total of expected earnings method

Amount of Risk

= Income required for family * life expectancy of dependents

Income needed for family = 120000 Per Annum

Life expectancy of dependents = 30 Years

Amount of Risk cover or insurance required = 120000 * 30

= 36,00,000

Need Based Approach

Better method and gives more accurate picture

Current and future needs are estimated.

Funds are named as:

- Clean up funds: Funeral, last rites, hospital expenses
- Adjustment funds : Legal expenses, inheritance expenses etc.,
- Education Fund
- Marriage Fund
- Spouse Fund for family support
- Mortgage redemption fund
- Retirement Fund

Need Based Approach

Mr and Mrs Rao aged 46 and 42 years respectively. Both have a life expectancy of 35 years. Mr Rao current investments 25 Lakh. Expenses are 300000 out of which 1 Lakh are his personal expenses. His Income Tax is 350000 and Final cost is 1 Lakh

Inflation, discount factor is 3%. Calculate Need based insurance requirement?

Solution:

Spouse Fund = Expenses – Husband's Personal Expenses

= 300000 -100000 = 200000 = 200000/0.03 = 66,66,667

Liabilities	Amount	Assets	Amount
Final Cost	100000	Investments	2500000
Spouse Fund	6666667	HLV (Balance)	4266667
	6766667		6766667

Belth Method

Belth Method is used for calculating cost per thousand of risk cover under existing policy

Various factors to be considered are:

- Risk Cover

  Cash Surrender Value

- Premium Amount
- Interest Rate
- Next year dividend forecast

Cost per thousand = {(P+CVP)* (1+i)} – (CSV+D)/(F-CSV) * 0.001

Belth Method

Cost per thousand = {(P+CVP)* (1+i)} – (CSV+D)/(F-CSV) * 0.001

P = Annual Premium

CVP = Cash value Previous years (or) Surrender Value of Previous Year

i = Rate of Interest

CSV = Current Surrender Value

D = Cash Dividend

F = Sum Assured (Full Risk Cover)

Belth Method

SA of an existing policy purchased 10 years back is 100000. Annual Premium is 1800.

Current surrender value is 20000. It will go up to 22900 if policy is continued. Client current age is 30 years. If Client wants to switch to a new policy for SA of 80000 with annual premium of 300. Tax free interest is 6% on cash value of existing policy. Can a client switch the policy?

Cost per thousand = {(P+CVP)* (1+i)} – (CSV+D)/(F-CSV) * 0.001

= {(1800+20000)* (1+0.06)} – (22900+0) / (100000 – 22900)*0.001

=208/77.1 = 2.69 i.e cost of existing policy per thousand = 2.69

Cost of new policy = (300/80000) * 1000 = 3.75

Existing life insurance policy is cheaper and should continue

Probability Of Different Outcomes

Probability of 1 means CERTAIN

Probability of 0 means IMPOSSIBLE

Probability = Number of favourable events / Number of mutually exclusive and exhaustive event

Accidents	Vehicles	Relative Frequency	Cumulative Relative Frequency
0	60	.60	.60
1	20	.20	.80
2	10	.10	.90
3	7	.07	.97
4 or More	3	.03	1.00

Mortality Rate

At age 21, Number of persons living at that age in the beginning of the year is 993957. Number of persons dying within the year is 1027. What is the mortality rate at the age of 21?

Mortality Rate = Persons dying in the year / Total at the beginning of the year

= 1027/9939597 = 0.0010324

Survival Rate = 1- Mortality Rate = 1-0.0010324 = 0.99896676

If insurance is to be done for Rs 1 then premium would be 0.0010324

For 1 Lakh = 100000 * 0.0010324 = 103.32

For 1 Crore = 10000000 * 0.0010324 = 10332.4

Age Calculation

Age is round off to the year in integer which can be

1. Age Nearer Birthday
2. Age Next Birthday
3. Age Last Brithday

On 07 Jun 2017 for a person born on 20-09-1993, actual age is 23 years 8 months. But for the purpose of insurance policy his age

1. Nearer birthday will be 24 years
2. Last birthday will be 23 years
3. Next birthday will be 24 years

Paid Up Value

On default of premium payment after 3 years, Original SA is reduced.

Reduced SA = (No Of Premiums Paid) / Number of Premiums Payable

Reduced SA is also called Paid-up Value. In participating policies, Vested bonuses are also added.

Paid up value = Reduced Sum Assured (Non Participating Policies)

Paid up value = Reduced SA + Bonuses Vested (Participating Policies)

Paid up value is payable on maturity or premature death

Paid Up Value

SA of a 15 year endowment policy is 20000. Policy Start Date is 01 October 2010. Due date of last paid premium is 01 October 2015. Mode of payment is half yearly. What is the paid up value?

First unpaid premium is 01 April 2016

Date of Commencement is 01 October 2010

Total No of paid premiums = 11

Number of premiums payable = 30

SA = 20000

Paid up value = 20000 * (11/30)

= 7333.33

Surrender Value

Surrender value is voluntary of the contract by the policy holder.

Surrender value is also called as Cash Value.

Surrender Value = Paid up value * Surrender Value Factor

Loan Value = Surrender Value * Loan Percentage Factor

Surrender Value

An endowment plan of 30 years with SA of 50000. Half yearly Premium. Start Date is 15-06-1996. Last premium paid was due on 15-12-2010. Surrender Value factor is 52.3. Vested bonus is Rs 750 per thousand and loan provided is 80%

No of paid premiums = 30 (15 years)

No of premiums payable = 60 (30 year policy and half yearly payment)

Paid up value = (30/60) * 50000 = 25000

Bonus = (750/1000)*50000 = 37500

Paid up value = 25000 + 37500 = 62500

Surrender Value = 62500 * (52.3/100) = 32687.50

Loan = 32687.5 * 0.8 = 26150