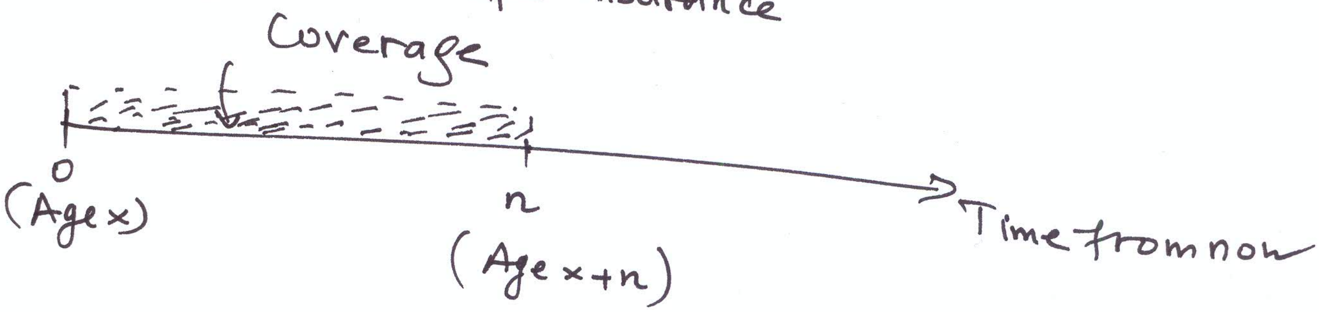
It is important to know how various level-benefit policies are related to each othere. there are 3 eq that you need to remember.

Eq 1: An n-year endowment insurance is a combination of an n-year term life insurance which provides a death benefit, and an n-year pure endowment which provides a survival benefit. $\Rightarrow$

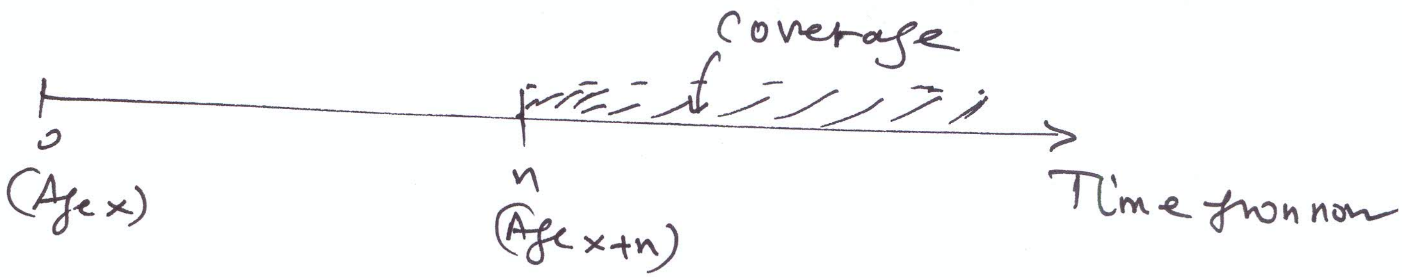
$$\bar{A}_{x:\overline{n|}} = \bar{A}^{1}_{x:\overline{n|}} + A_{x:\overline{n|}}^{\;\;1}.$$

Eq 2 Let us consider 2 policies

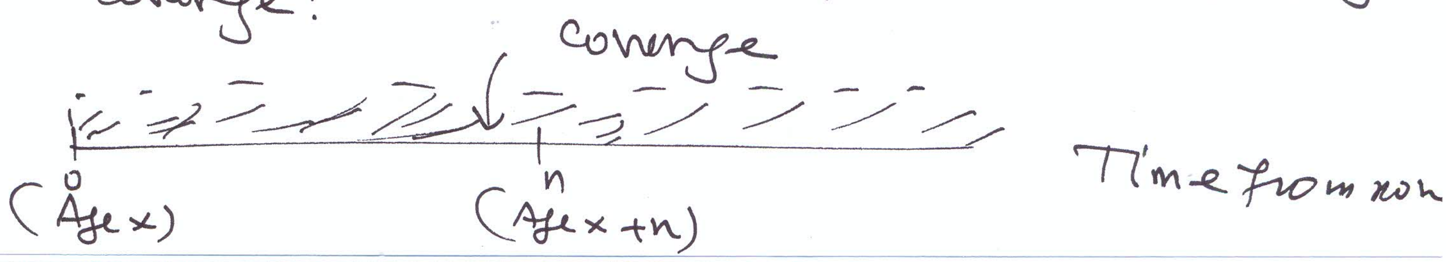
(I) A n-year term life insurance



(II) An n-year deferred whole life insurance



The combination of these two policies is the following coverage:



the above is precisly the coverge provided by a whole life insurance. As a result we have:

$$\bar{A}_x = \bar{A}^1_{x:\overline{n}|} + {}_{n|}\bar{A}_x$$

Eg 3: Suppose that you are now x years old and that you want your life insurance coverage to begin n years from now.

* the first option is to purchase at time 0 an n-year deferred whole life insurance for ${}_{n|}\bar{A}_x$ amount of money.

* the second option is to do nothing now, and then purchase a whole life insurance at time n (if you survive to time n). The amount that you need to pay at time n will be $\bar{A}_{x+n}$, because at that time you age will be $x+n$. Therefore at time 0, the expected present value or the APV of the cost associated with this option is

$$v^n \, {}_nP_x \, \bar{A}_{x+n}$$

As we have with both option the same coverage then

$$ {}_{n|}\bar{A}_x = v^n \, {}_nP_x \, \bar{A}_{x+n}$$

Similary we have;

	continunous	Discrete	mthly
Eq 1	$\bar{A}_{x:\overline{n}\vert} = \bar{A}_{x:\overline{n}\vert}^{1} + A_{x:\overline{n}\vert}^{\ \ 1}$	$A_{x:\overline{n}\vert} = A_{x:\overline{n}\vert}^{1} + A_{x:\overline{n}\vert}^{\ \ 1}$	$A_{x:\overline{n}\vert}^{(m)} = A_{x:\overline{n}\vert}^{1(m)} + A_{x:\overline{n}\vert}^{\ \ 1}$
Eq 2	$\bar{A}_x = \bar{A}_{x:\overline{n}\vert}^{1} + {}_{n\vert}\bar{A}_x$	$A_x = A_{x:\overline{n}\vert}^{1} + {}_{n\vert}A_x$	$A_x^{(m)} = A_{x:\overline{n}\vert}^{1(m)} + {}_{n\vert}A_x^{(m)}$
Eq 3	${}_{n\vert}\bar{A}_x = v^n \, {}_nP_x \, \bar{A}_{x+n}$	${}_{n\vert}A_x = v^n \, {}_nP_x \, A_{x+n}$	${}_{n\vert}A_x^{(m)} = v^n \, {}_nP_x \, A_{x+n}^{(m)}$

We denote by ${}_nE_x = v^n \, {}_nP_x$ the Actuarial discount factor and we demonstrated before that $A_{x:\overline{n}\vert}^{\ \ 1}$ the APV of pure endowment, is also $v^n \, {}_nP_x$ and we have;

$$\boxed{{}_nE_x = A_{x:\overline{n}\vert}^{\ \ 1} = v^n \, {}_nP_x}$$