

Unit 12. Life Insurance

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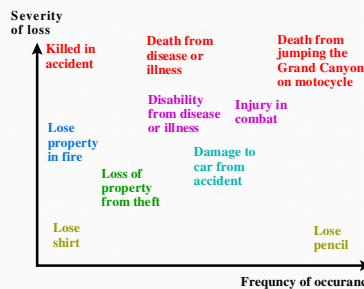
Speculative Risk vs. Pure Risk

- There are two types of risks: speculative risk vs. pure risk.
- So far we have been dealing with speculative risks – all investment risks are speculative risks, in that one can either gain or lose as a result
- In this unit we will deal with pure risks. Pure risks are those risks where only a loss can occur if the event happens.

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Two dimensions of pure risk

- Severity of the potential loss
 - Death has the highest severity of loss
- Frequency of occurrence
 - Lose a pencil has the highest frequency of loss



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What to Do about Pure Risks

- Avoid risk
 - You can choose not to jump off the Grand Canyon on a motorcycle. By doing that you avoid the risk completely.
- Reduce risk
 - Take a defensive driving course and drive defensively reduces your risk of a car accident.
- Self-insure
 - If it's a small severity of loss, then you can self-insure. For example, most consumers do not buy insurance for lost pencils or lost shirts. If a pencil is lost most people just buy another one from their own funds.
- Transfer risk (buy insurance)
 - This is advisable for items that have high severity of loss, like a house, a car, an illness, etc.

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What is life insurance and who needs it?

- Life insurance serves the purpose of providing income to the financial dependents of an income producer.
- Only people with financial dependents need life insurance.
- Life insurance (or any other insurance) operates on a "pooling" principle.
 - Out of a given population of consumers, some will die during the year.
 - Each consumer has a certain probability to die during the year given the age and gender combination. But consumers do not know if himself or herself will die during the year.
 - So consumers are motivated to contribute a small amount each year to a common fund or pool to pay benefits to those who do die during the year.

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Some technical terms

- Insured:
 - The insured is the person who is covered by the life insurance. The death of the insured is the coverage event.
- Owner:
 - The owner pays the premium for the policy. Typically the insured and the owner is the same person.
- Beneficiaries:
 - Beneficiaries are the people who will receive the proceeds of the life insurance policy if the insured were to die.
- Face value:
 - The policy face value is the amount of life insurance purchased, which is the money beneficiaries will receive in the event of the death of the insured.
- Premium:
 - Price paid by the owner for the life insurance policy. Premiums can be paid monthly, quarterly, or yearly.
- Cash value:
 - The value in a permanent life insurance policy that can be withdrawn if the policy is surrendered. The cash value also indicates how much can be borrowed against the policy by the policy holder.

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How much life insurance does one need?

- There are two approaches to determine the amount of life insurance needed
 - The income approach (also called the ‘replacement income approach’):
 - This approach calculates the life insurance face value amount as the investment funds necessary to replace the insured’s future income that is not replaced by other sources of income such as Social Security Survivor’s benefits.
 - The expense approach (also called the “need” approach):
 - This approach computes the life insurance face value needed to pay for the expected expenses of the beneficiaries that won’t be covered by other sources of income.

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The Income Approach to Life Insurance Needs

- An example is used to illustrate this approach.
- John Doe, age 43, earns \$70,000 annually and expects to receive pay raises of 2% per year after inflation. John has three financial dependents: his wife Jan and two children, 12 and 10.
- From his annual Social Security statement, John finds out that Social Security will pay \$3000 a month to his wife and children when both children are under the age of 18, \$2500 a month when one child is under 18, and 0 when both children are 18.
- The Doe family has \$10,000 in savings which will be applied to replace some of John’s future income.
- John wants a life insurance face value amount which will replace 80% of his future real income until the youngest child reaches the age of 18.

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- **Step 1. Decide on the number of years income replacement is needed.**
 - A common possibility is to insure until the youngest child is out of school, either 18 or 22. This number is called “life insurance term”.
 - In this example, the younger child is 10, so the life insurance term should be 8 years (18-10).
- **Step 2. For each year of the life insurance term, write down the insured’s real income. Multiply the real income by the percentage of income to be replaced.**
 - In this example, John’s income is expected to increase by 2% per year in real terms (about 5% per year in nominal terms, minus a 3% expected inflation rate). The table of income is illustrated on the right.
 - $80\% \text{ of income} = 80\% * \text{Income}$

Year	Income	80% of Income
1	70000	56000
2	71400	57120
3	72828	58262
4	74285	59428
5	75770	60616
6	77286	61829
7	78831	63065
8	80408	64326

- **Step 3. Social Security Benefits:** For each year of the life insurance term, write down the Social Security survivorship benefit.
 - SS adjusts for inflation. The first 6 years benefits are higher because both children are under 18.
- **Step 4. Net real income:** Subtract the SS survivorship benefit from the replacement income for each year. Also subtract any other income (such as pension).
 - In this example we assume no income from other sources.
 - $\text{Net real income} = 80\% \text{ of income} - \text{SS benefit}$

Year	Income	80% of Income	SS Benefit
1	70000	56000	36000
2	71400	57120	36000
3	72828	58262	36000
4	74285	59428	36000
5	75770	60616	36000
6	77286	61829	36000
7	78831	63065	30000
8	80408	64326	30000

Year	Income	80% of Income	SS Benefit	Net Real Income
1	70000	56000	36000	20000
2	71400	57120	36000	21120
3	72828	58262	36000	22262
4	74285	59428	36000	23428
5	75770	60616	36000	24616
6	77286	61829	36000	25829
7	78831	63065	30000	33065
8	80408	64326	30000	34326

- **Step 5. Use a real discount rate, such as 3%, to calculate the present value of the “net real income”.**
 - $\text{PV of net real income} = \text{net real income} / (1+r)^n$
 - E.g., for year 8, $\text{PV of } 34326 = 34326 / [(1+3\%)^8] = 27098$.

Year	Income	80% of Income	SS Benefit	Net Real Income	PV of Net Real Income
1	70000	56000	36000	20000	19417
2	71400	57120	36000	21120	19908
3	72828	58262	36000	22262	20373
4	74285	59428	36000	23428	20815
5	75770	60616	36000	24616	21234
6	77286	61829	36000	25829	21631
7	78831	63065	30000	33065	26885
8	80408	64326	30000	34326	27098

- **Step 6. Add up all the PVs of Net Real Income, and then subtract family savings. The end result is the life insurance face value amount.**
 - In this example, the sum of all PV of net real income is 177,361.
 - The family already has \$10,000 savings.
 - So the PV of income needs is \$167,361.

Year	Income	80% of Income	SS Benefit	Net Real Income	PV of Net Real Income
1	70000	56000	36000	20000	19417
2	71400	57120	36000	21120	19908
3	72828	58262	36000	22262	20373
4	74285	59428	36000	23428	20815
5	75770	60616	36000	24616	21234
6	77286	61829	36000	25829	21631
7	78831	63065	30000	33065	26885
8	80408	64326	30000	34326	27098
				sum	177361
				Minus savings	10000
				Life Insurance Needed =	167361

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The Expense Approach to Life Insurance Needs

- This approach uses a 6-step process to compute life insurance needs based on the future net expenses of the beneficiaries.
- We will use the same example of John Doe’s family.

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- Step 1. Decide on the number of years for which family expenses will be covered by life insurance.
 - In this example the life insurance term is still 8 years.
 - Assume after the children are 18, Jane will go to work again and support herself. The children will be financially independent.
- Step 2. For each year of the term, list the annual expenses, include expenses for children, housing, etc.
 - In this case, assume it will be \$50,000 for the first year, and will increase at 5% per year in real terms.
 - Typically expenses increase in real terms as kids get older, and as society gets more affluent in general.

Year	Real Expenses
1	50000
2	52500
3	55125
4	57881
5	60775
6	63814
7	67005
8	70355

- Step 3. Write down the Social Security Survivors' benefits for each year.
 - This column is the same as in the income approach.
- Step 4. Net expenses: For each year of the life insurance term, subtract Social Security Survivors' benefit.
 - E.g. For year #8, Net expenses = 70355 - 30000 = 40355.

Year	Real Expenses	SS Benefit
1	50000	36000
2	52500	36000
3	55125	36000
4	57881	36000
5	60775	36000
6	63814	36000
7	67005	30000
8	70355	30000

Year	Real Expenses	SS Benefit	Net Expenses
1	50000	36000	14000
2	52500	36000	16500
3	55125	36000	19125
4	57881	36000	21881
5	60775	36000	24775
6	63814	36000	27814
7	67005	30000	37005
8	70355	30000	40355

- Step 5. Use a real discount rate, such as 3%, to calculate the present value of the "net annual expenses".
 - PV of net annual = net expenses / (1+r)^n
 - E.g., for year 8, PV of 40355 = 40355 / [(1+3%)^8] = 31857
- Step 6. Add up all the PVs of Net annual expenses, and then subtract family savings. The end result is the life insurance face value amount.
 - In this example, the sum of all PV of net annual expenses is 172,699.
 - The family already has 10,000 savings.
 - So the PV of income needs is 162,699.

Year	Real Expenses	SS Benefit	Net Expenses	PV of Net Expenses
1	50000	36000	14000	13592
2	52500	36000	16500	15553
3	55125	36000	19125	17502
4	57881	36000	21881	19441
5	60775	36000	24775	21371
6	63814	36000	27814	23294
7	67005	30000	37005	30088
8	70355	30000	40355	31857
			Sum	172699
			Minus savings	10000
			Life Insurance Needed =	162699

A Note on Estimating Life Insurance Needs

- The expense approach I give here is slightly different from the example given in the textbook. I assume no debt and mortgage does not need to be paid off, while the textbook example assumes mortgage and all debts will be paid off using life insurance proceeds.
- If college education needs are taken into consideration, the expense approach will typically generate a larger face value amount.
- Income tax is not taken into consideration here. These two examples are more conceptual than practical. In real planning, more factors will need to be considered.
- In real world the life insurance term is likely to be much longer as one need to have life insurance when the children are born.

Inflation Effect and Term Effect

- In both the income and expense approaches all money numbers and discount rates are in real terms, in that they have been adjusted for inflation.
- There is another complication caused by inflation.
 - As the insured lives an additional year, inflation has occurred during that year. This increase all future projected expenses.
 - The face value would have kept up with the inflation if it had been invested. But it was not since the insured lived.
 - The face value is now inadequate to cover the higher future expenses. This is called the inflation effect.
- Counterbalancing the inflation effect is the term effect, in that as the insured lives a year longer, there is one less year of coverage needed.
- When the inflation rate is low, the term effect is larger than the inflation effect so overall the face value provides adequate coverage. If the inflation rate is very high, the inflation effect is larger than the term effect so face value is no longer adequate. There are policy options one can choose to deal with this issue, such as buy a cost-of-living rider so the face value is adjusted for inflation.

Types of Life Insurance Policies

- There are several ways to group life insurance policies.
 - One way is to group policies into
 - Temporary (protection for a specified period of time)
 - Permanent (protection for one's entire life)
 - Another way is to group policies by
 - Protection only
 - Protection + Investment
- From the point of view of economic comparison, the second method of grouping makes more sense.

Basic Types of Protection-Only Policies

- Renewable Term
 - Renewable term plans give you the right to renew for another period when a term ends, regardless of the state of your health. With each new term the premium is increased.
- Level Term
 - Under a level term policy the face amount of the policy remains the same for the entire period. The premium stays the same each year.
- Decreasing Term
 - With decreasing term the face amount reduces over the period. The premium stays the same each year.
- Adjustable Premium
 - Adjustable premium insurance allows insurers to offer insurance at lower "current" premiums based upon less conservative assumptions with the right to change these premiums in the future. The premium, however, can never be more than the maximum guaranteed premiums stated in the policy.

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In-between "Protection Only" and "Protection+Investment"

- Convertible Term
 - Convertible term policies often permit you to exchange the policy for a whole life plan. You must exercise this option during the conversion period.

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Basic Types of "Protection+Investment" Policies

- Non-Participating Whole Life
 - Gives a level premium and face amount during your entire life. No dividends paid.
- Participating Whole Life
 - Pays dividends. The dividends represent the favorable experience of the company and result from excess investment earnings, favorable mortality and expense savings. Dividends are not guaranteed.
- Modified or Graded Premium Whole Life
 - Modified whole life: Lower premiums for the first several years, and then increase to a higher constant level.
 - Graded premium whole life: Lower premiums first, gradually increase for several years to a higher constant level.

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Types of "Protection+Investment" Policies – Cont'd

- Economomic Whole Life
 - Provides for a basic amount of participating whole life insurance with an additional supplemental coverage provided through the use of dividends.
- Limited Payment Whole Life
 - Gives lifetime protection but requires only a limited number of premium payments. Because the premiums are paid over a shorter span of time, the premium payments will be higher than under other whole life plans.
- Single Premium Whole Life
 - It's a limited payment life where one large premium payment is made. The policy is fully paid up and no further premiums are required.
- Indexed Whole Life
 - Face value increases with inflation rate. Premiums are handled in two ways: increasing or leveling. This type of whole life can be used to deal with the inflation effect of life insurance, discussed earlier.

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Types of "Protection+Investment" Policies – Cont'd

- Universal Life
 - A combination of term life insurance plus a side investment fund which earns a current competitive interest rate.
 - Is the most flexible of all the various kinds of policies. Universal life allows you to change or skip premium payments or change the death benefit more easily than with any other policy.
- Variable Universal Life
 - - Universal life where face amount and cash value are specified in units, and the value of the units may increase or decrease depending upon the investment results.
- Single Premium Whole Life
 - One upfront premium payment, determined using the current interest rate assumption. You may be asked to make additional premium payments or coverage could terminate because the interest rate dropped.
- Endowment Life
 - Endowment life pays the face value amount to the beneficiaries if the insured dies, but will also pay the face amount to the insured if the insured lives to a certain age.

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Fixed-dollar vs. Variable Basis

- Most types of "protection+investment" policies can be purchased on either a fixed-dollar or variable basis.
 - On a fixed-dollar basis, premium, face amount and cash values are specified in dollar amounts.
 - On the variable basis, face amount and cash value are specified in units, and the value of the units may increase or decrease depending upon the investment results. You can allocate your premiums among various investment pools (like stock, bond, money market, mutual funds and real estate pools) depending on the amount of risk you are willing to assume in the hope of a higher return.
- Traditional variable life provides a minimum guaranteed death benefit, but many universal variable life products do not, and should investment experience be bad, coverage will terminate if substantially higher premium payments are not made.

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A Note on Types of Life Insurance Policies

- If you surf the web you will find many more permutations of life insurance policies with various specification of premiums structure, interest rate, and face value combinations.
- Keep in mind that while specific products can be endless, the basic structure of all life insurance policies are similar.
- The key in this class is to understand the principle of life insurance instead of trying to get into the details of each specific policy.
- However when making specific decisions, one does need to look into the fine prints, and apply the principles we learned in this class to these specific cases.

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How are Life Insurance Premiums Calculated?

- Basic principle of insurance:
 - PV (Premiums) = PV (Expected Benefits)
 - Expected benefits = Probability of death * Face value of the policy
 - Probability of death comes from the mortality table.
 - For the 2004 mortality table (by gender) see <http://www.ssa.gov/OACT/STATS/table4c6.html>

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Exact age	Male			Female		
	Death probability ¹	Number of lives ²	Life expectancy	Death probability ¹	Number of lives ²	Life expectancy
0	0.001424	100,000	74.83	0.000591	100,000	79.36
1	0.000513	99,253	74.40	0.000461	99,391	79.42
2	0.000329	99,202	73.43	0.000268	99,345	78.49
3	0.000247	99,169	72.46	0.000195	99,316	77.53
4	0.000205	99,145	71.47	0.000166	99,299	76.52
5	0.000189	99,124	70.49	0.000148	99,283	75.54
6	0.000182	99,106	69.52	0.000130	99,266	74.60
7	0.000172	99,088	68.52	0.000130	99,254	73.59
8	0.000153	99,071	67.53	0.000122	99,241	72.57
9	0.000129	99,055	66.54	0.000113	99,229	71.60
10	0.000102	99,043	65.55	0.000107	99,218	70.58
11	0.000104	99,033	64.55	0.000110	99,207	69.59
12	0.000154	99,022	63.56	0.000133	99,196	68.62
13	0.000273	99,007	62.57	0.000178	99,183	67.61

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An Example of an Renewable Term Life Insurance

- Term insurance is plain life insurance with no frills. We will use term insurance as an example to show how premiums are determined.
- John is 35 and wants to buy \$200,000 life insurance for one year. What will be the annual premium?
 - Looking at the mortality table for 2004 (It's normal to have a delay of data publication), John's probability of death is 0.001666.
 - The expected benefit for John for a \$200,000 policy would be: $0.001666 * 200,000 = \$332$
- If John were 55 years old, how much would the premium be?
 - If John were 55, the probability of death is 0.007921.
 - Expected benefit = $0.007921 * 200,000 = \$1,584$
- Typically a service fee will be added to each year's expected benefit.

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- This table to the right shows the annual premium (before service fee is added) for John from 35 to 54 for a renewable life insurance policy with a face value of \$200,000.
- Note as John ages, the probability of death increases quickly, and the insurance premium increases drastically as well.
- The table here shows average mortality rates. If one smokes and drinks, a higher death rate is usually applied.

Age	Death Rate	Face Value	Expected Benefit
35	0.001662	x 200000	= 332
36	0.001782	x 200000	= 356
37	0.001918	x 200000	= 384
38	0.002068	x 200000	= 414
39	0.002235	x 200000	= 447
40	0.00242	x 200000	= 484
41	0.002629	x 200000	= 526
42	0.002863	x 200000	= 573
43	0.003127	x 200000	= 625
44	0.003418	x 200000	= 684
45	0.003732	x 200000	= 746
46	0.004067	x 200000	= 813
47	0.004424	x 200000	= 885
48	0.004805	x 200000	= 961
49	0.005208	x 200000	= 1042
50	0.005657	x 200000	= 1131
51	0.006134	x 200000	= 1227
52	0.006695	x 200000	= 1319
53	0.007027	x 200000	= 1405
54	0.007457	x 200000	= 1491

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An Example of a Traditional Participating Whole Life Policy: \$100,000 Face Value

Age	Premiums	Dividends	Net Premiums	Cash Value
35	\$1,316	\$0	\$1,316	\$0
36	\$1,316	\$151	\$1,165	\$0
37	\$1,316	\$189	\$1,127	\$500
38	\$1,316	\$231	\$1,085	\$1,500
39	\$1,316	\$273	\$1,043	\$2,500
40	\$1,316	\$322	\$994	\$3,740
41	\$1,316	\$371	\$945	\$4,880
42	\$1,316	\$420	\$896	\$6,020
43	\$1,316	\$469	\$847	\$7,160
44	\$1,316	\$518	\$798	\$8,300
45	\$1,316	\$581	\$735	\$9,500
46	\$1,316	\$644	\$672	\$10,700
47	\$1,316	\$707	\$609	\$11,900
48	\$1,316	\$770	\$546	\$13,100
49	\$1,316	\$834	\$482	\$14,300
50	\$1,316	\$899	\$407	\$15,490
51	\$1,316	\$964	\$332	\$16,650
52	\$1,316	\$1,059	\$257	\$17,840
53	\$1,316	\$1,134	\$182	\$19,020
54	\$1,316	\$1,213	\$103	\$20,200
Cash value at age 65:				\$25,500

- Only the first 20 years of the policy are shown.
- Premium is constant over time.
- Policy is participating, as most whole life policies are.
- Net premium = Premium - Dividends
- Cash value is not taxed unless the policy is cancelled.

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An Example of Universal Life (UL) Insurance

- Universal Life is a type of “protection+investment” life insurance. The policy is established with the insurer where premium payments above the cost of insurance are credited to the cash value.
 - The cash value is credited each month with interest, and the policy is debited each month by a cost of insurance (COI) charge, which is drawn from the cash value if no premium payment is made that month.
 - The interest credited to the account is determined by the insurer; often it is pegged to a financial index.
 - Because only the amount of interest credited and not the cash value itself varies, UL policies offer a stable investment option.
- There are two types of UL policies: Option A and Option B.
 - Option A: Death benefit is constant for most of UL life, then rises only when the investment fund exceeds the original death benefits.
 - Option B: Death benefit is the sum of an original fixed benefit plus the investment fund.

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- Surrender charges occur if the policyholder cancels the policy or withdraws some of the investment funds.
- Loads are fees taken off the top of each premium payment. Typically higher for the first year and a lower load for the subsequent years.
- Partial surrender: Some of the investment funds in UL policies can be directly withdrawn by the policyholder. This is called a “partial surrender”.
- Loans: Loans can be taken against UL policies (just like the traditional whole life policies). The term “net cost of borrowing” (e.g. 2%) refers to the difference between the interest earned in the UL investment funds (e.g. 6%) and the interest charged for the loan (e.g. 8%).

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An Example of UL Policy Option A

- Male, 45, non-smoking, \$100,000 face value
- Top part of the table shows rate of return on investment at 4%, the bottom part of the table shows a rate of return on investment at 10.5%.
- Note when the interest rate is higher, the cash value (investment value) of the policy is larger.
- With option A the death benefit is constant.

End of Year	Premium	Investment value, 4%	Surrender Charge	Surrender Investment Value, 4%	Death Benefits
1	\$2,000	\$1,437	\$1,135	\$302	\$100,000
2	\$2,000	\$2,901	\$1,135	\$1,766	\$100,000
3	\$2,000	\$4,392	\$1,135	\$3,257	\$100,000
4	\$2,000	\$5,911	\$1,135	\$4,776	\$100,000
5	\$2,000	\$7,456	\$1,135	\$6,321	\$100,000
10	\$2,000	\$15,462	\$0	\$15,462	\$100,000
15	\$2,000	\$23,596	\$0	\$23,596	\$100,000
20	\$2,000	\$31,362	\$0	\$31,362	\$100,000

End of Year	Premium	Investment value, 10.5%	Surrender Charge	Surrender Investment Value, 10.5%	Death Benefits
1	\$2,000	\$1,629	\$1,135	\$494	\$100,000
2	\$2,000	\$3,406	\$1,135	\$2,271	\$100,000
3	\$2,000	\$5,345	\$1,135	\$4,210	\$100,000
4	\$2,000	\$7,453	\$1,135	\$6,318	\$100,000
5	\$2,000	\$9,778	\$1,135	\$8,643	\$100,000
10	\$2,000	\$25,083	\$0	\$25,083	\$100,000
15	\$2,000	\$49,627	\$0	\$49,627	\$100,000
20	\$2,000	\$90,926	\$0	\$90,926	\$100,000

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An Example of UL Policy Option B

- With option B the death benefit increases with the investment value.
- The investment value, however, is lower than in Option A.
- Male, 45, non-smoking, \$100,000 face value
- Top part of the table shows rate of return on investment at 4%, the bottom part of the table shows a rate of return on investment at 10.5%.
- Note when the interest rate is higher, the cash value (investment value) of the policy is larger.

End of Year	Premium	Investment value, 4%	Surrender Charge	Surrender Investment Value, 4%	Death Benefits
1	\$2,000	\$1,430	\$1,135	\$295	\$101,430
2	\$2,000	\$2,879	\$1,135	\$1,744	\$102,879
3	\$2,000	\$4,345	\$1,135	\$3,210	\$104,345
4	\$2,000	\$5,828	\$1,135	\$4,693	\$105,828
5	\$2,000	\$7,322	\$1,135	\$6,187	\$107,322
10	\$2,000	\$14,756	\$0	\$14,756	\$114,756
15	\$2,000	\$21,330	\$0	\$21,330	\$121,330
20	\$2,000	\$25,581	\$0	\$25,581	\$125,581

End of Year	Premium	Investment value, 10.5%	Surrender Charge	Surrender Investment Value, 10.5%	Death Benefits
1	\$2,000	\$1,623	\$1,135	\$488	\$101,623
2	\$2,000	\$3,286	\$1,135	\$2,251	\$103,286
3	\$2,000	\$5,299	\$1,135	\$4,164	\$105,299
4	\$2,000	\$7,377	\$1,135	\$6,242	\$107,377
5	\$2,000	\$9,634	\$1,135	\$8,499	\$109,634
10	\$2,000	\$24,120	\$0	\$24,120	\$124,120
15	\$2,000	\$45,653	\$0	\$45,653	\$145,653
20	\$2,000	\$77,600	\$0	\$77,600	\$177,600

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How to Compare Life Insurance Policies?

- To compare different life insurance policies, we can convert all net premiums to either present value or future value. Because the life insurance industry uses the FV approach, we will use it here as well.
- The industry name for this FV called “interest-adjusted net cost”.
- An “interest-adjusted net cost index” is also used, which is
 - Interest-adjusted net cost / FVF sum

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An Example of Comparing Two Term Policies

- Suppose there are two 10-year term policies with \$100,000 face value, one charges \$180 constant premium every year, while the other has the regular increasing premium (see next slide). Which one is cheaper?
- Answer:
 - First one needs to choose a term of comparison. In this case the term is 10 years.
 - Second one needs to choose an investment interest rate for comparison. In this case we choose 4%.
 - Next one computes the future value of all premiums.

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Term Policy 1				
Age	Premium	FV (1+5%) ⁿ	FV	
35	180 x	1.62895 =	293	
36	180	1.551328	279	
37	180	1.477455	266	
38	180	1.407100	253	
39	180	1.340096	241	
40	180	1.276282	230	
41	180	1.215506	219	
42	180	1.157625	208	
43	180	1.102500	198	
44	180	1.050000	189	
Sum		13.206787	2377	
Interest-adjusted net cost index			1.80	

Term Policy 2				
Age	Premium	FV (1+5%) ⁿ	FV	
35	120 x	1.62895 =	195	
36	132	1.551328	205	
37	145	1.477455	215	
38	160	1.407100	225	
39	176	1.340096	235	
40	193	1.276282	247	
41	213	1.215506	258	
42	234	1.157625	271	
43	257	1.102500	284	
44	283	1.050000	297	
Sum		13.206787	2431	
Interest-adjusted net cost index			1.84	

- Policy 1 is a level policy.
 - The interest-adjusted net cost = Total FV = \$2,377 with 5% interest rate.
 - The FVFS=13,206787
 - The interest-adjusted net cost index = $\$2377/13,206787(1000/100,000) = 1.80$.
 - Which means \$1.80 per \$1,000 coverage.
- Policy 2 is a regular term policy.
 - The interest-adjusted net cost = Total FV=\$2,431 with 5% interest rate.
 - The FVFS is the same at 13,206787.
 - The interest-adjusted net cost index = $\$2,431/13,206787(1000/100,000) = 1.84$ which means \$1.84 per \$1,000 coverage
- So Policy 1 is cheaper for the same coverage.

An Example Computing Interest-Adjusted Net Cost for a Whole Life Policy

- The computation of interest-adjusted net cost for a whole life policy is similar to a term policy, but with one major difference:
 - After the sum of the interest adjusted net premiums are found, the cash value at the end of the term is subtracted.
 - For whole life policies, the interest-adjusted net cost is also called "surrender cost".

A Whole Life Policy							
Age	Premium	Dividends	Net Premiums	FV (1+5%) ⁿ	FV	Cash Value	
35	\$1,316	\$0	\$1,316	1.62895 =	\$2,144	\$0	\$0
36	\$1,316	\$151	\$1,165	1.551328	\$1,807	\$0	\$0
37	\$1,316	\$189	\$1,127	1.477455	\$1,665	\$500	\$1,500
38	\$1,316	\$231	\$1,085	1.407100	\$1,527	\$1,000	\$1,500
39	\$1,316	\$273	\$1,043	1.340096	\$1,398	\$2,600	\$2,600
40	\$1,316	\$322	\$994	1.276282	\$1,269	\$3,740	\$3,740
41	\$1,316	\$371	\$945	1.215506	\$1,149	\$4,880	\$4,880
42	\$1,316	\$420	\$896	1.157625	\$1,037	\$6,020	\$6,020
43	\$1,316	\$469	\$847	1.102500	\$934	\$7,160	\$7,160
44	\$1,316	\$518	\$798	1.050000	\$838	\$8,300	\$8,300
Sum				13.206787	\$13,767		
						Minus cash value	\$8,300
							\$5,467
						Interest-adjusted net cost index	4.14

- This is the first 10 years of the whole life insurance policy example given on slide #27.
- Note net premium is used instead of premium for FV computation.
- Note at the end of age 44, cash value is \$8,300. For index computation this cash value is subtracted from the total FV.
- This is a simplified version in that tax obligations of cash value is not taken into consideration.
- For the 10 years we use for comparison, this whole life policy is a lot more expensive (\$4.14 per \$1000 of coverage) than the term policies we looked at on slide 34.
- The interest-adjusted net cost decreases as the comparison term increases for whole life policies. For example, if 20 years were used (as in Table 6-9 in the book on page 332), the index would be only 2.39.

Which Policy is the Best for You?

- For the person who just wants simple protection, and who would like to manage his or her own investment, term policies are the best.
- For the person who wants to use life insurance as a means of forced savings, then "protection+investment" options should be considered. Which type of "protection+investment" policy is the best will depend on the person's situation.

Why do Prices of Life Insurance Policies Differ?

- Policy characteristics differ
 - Policies with characteristics more favorable to the policyholder will be more expensive.
- Company risk characteristics differ
 - Policies issued by companies with a better financial rating will be more expensive.

Tax Advantages of Life Insurance Policies

- No taxes are paid on death benefits.
- Interest earned on policies with investment funds is not taxed while left untouched – works like a IRA.