

PRIVATE WEALTH RISK MANAGEMENT

Petra and Frank Simpkins are ages 40 and 43, respectively, and both envision working to age 66. They live in a quiet suburb, in a house that is currently valued at \$625,000, with their two children: Marion, age 9, and Gordon, age 12. Petra's annual pretax earnings are \$75,000, while Frank's are \$62,000. The Simpkins pay tax on their income at a rate of 35%. Petra and Frank are debt free, apart from the mortgage on their house, which currently stands at \$225,000 with 17 years remaining.

The Simpkins have a joint investment portfolio that, together with their cash holdings, totals \$120,000. Both have vested retirement accounts, with present values of \$220,000 for Petra and \$165,000 for Frank. In the event of the death of one spouse, the survivor would be entitled to 50% of the deceased's account value.

Petra purchased a whole life insurance policy upon the birth of her eldest child—the death benefit from which, payable to her estate, is \$280,000. Frank is covered by a \$120,000 term life policy, provided for him by his employer, the beneficiary of which is Petra. Life insurance payouts are tax free in the state in which the Simpkins live. Frank and Petra consult Louise Kaufmann, a financial advisor, with a view to deciding whether they need to increase their life insurance coverage.

The family's annual living costs are currently \$70,000. Kaufmann estimates that this figure comprises \$15,000 that is specific to each spouse (no longer incurred in the event of the spouse's death), \$26,000 of joint expenses (incurred even if only one spouse lives), and \$7,000 for each child. Kaufmann advises that extra medical/care expenses are likely from age 80 onward, and she suggests that they budget for \$9,000 per person per annum (in today's terms). She also suggests that the children's living

expenses should be assumed to remain the parents' responsibility until the child reaches age 23 (so, for example, the parents will pay Gordon's expenses for a further 11 years).

In the event of the death of one spouse, Kaufmann has estimated that final expenses would be \$14,000, and further, that an emergency fund of \$15,000 would be required. Additionally, she assumes that the mortgage would need to be fully repaid, and projects total education costs prepaid at a cost of \$120,000.

For the purpose of present value calculations, Kaufmann assumes that all annual cash flows (both income and expenses) grow at a rate of 2.3% per annum, with the exception of Petra's salary where a 3.5% rate is more appropriate. She plans to use a nominal risk-free discount rate of 5% per annum, subject to a risk adjustment of 1.5% to reflect the volatility of Petra's salary.

Kaufmann wishes to establish whether the insurance coverage of Petra's life is adequate. For the purpose of this exercise, Kaufmann assumes that Frank will live to age 90.

Question 4 of 19

Question ID: 1609289

Use the human life value method to **determine** whether the insurance coverage of Petra's life is adequate; if not, then **calculate** the additional amount of coverage required to the nearest \$1,000.

Grading Guide

Using the **human life value** method, Petra's current life coverage is inadequate.

A further \$340,000 of coverage is needed.

Calculations

The risk-free nominal discount rate is 5%, which applies to all flows other than Petra's salary where the rate is $5\% + 1.5\% = 6.5\%$ (adding the income volatility risk adjustment).

The growth rate in nominal flows is 2.3% (apart from Petra's salary, where the rate is 3.5%).

Adjusting the nominal discount rates for the growth rates, we arrive at:

Petra's salary: $(1.065 / 1.035) - 1 = 2.90\%$

All other flows: $(1.05 / 1.023) - 1 = 2.64\%$

These rates can be applied directly to the current-value (real) cash flows.

If Petra dies, then her future net-of-tax earnings of $\$75,000 \times (1 - 0.35) = \$48,750$ per annum are lost in each of the next $66 - 40 = 26$ years, but \$15,000 of annual living expenses are no longer incurred.

We discount the income and expenses separately because different discount rates apply to each.

PV of annual posttax earnings:

$N = 26$; $I/Y = 2.9$; $PMT = 48,750$; $FV = 0$ [BGN mode]

$PV = (-) \$907,178$ (in all later workings, the reversal of sign will be ignored)

PV of living expenses avoided:

$N = 26$; $I/Y = 2.64$; $PMT = 15,000$; $FV = 0$ [BGN mode]

$PV = \$286,991$

Net PV to be replaced = $\$907,178 - \$286,991 = \$620,187$

Candidate note: There is no need to gross-up because we are told that insurance proceeds are not taxed.

Extra coverage required = $\$620,187 - \$280,000 = \$340,187$ (\$340,000 to the nearest \$1,000).

Scoring key: 9 points total for the extra coverage of \$340,000. Partial credit can be earned as follows:

2 points each for correctly calculating the adjusted growth discount rates of 2.9% and 2.64%.

2 points for correctly calculating the PV of annual posttax earnings of \$907,178

2 points for correctly calculating the PV of living expenses avoided of \$286,991

1 point for correctly calculating the net PV to be replaced of \$620,187

(Module 27.2, LOS 27.d)

Question 5 of 19

Question ID: 1609290

Use the needs analysis method to **determine** whether the insurance coverage of Petra's life is adequate; if not, then **calculate** the additional amount of coverage required to the nearest \$1,000.

Grading Guide

Using the **needs analysis** method, Petra's current life coverage is inadequate.

A further \$300,000 of coverage is needed.

Calculations

This time, we look at all the family's outgoings, net of Frank's income and assets. We use the 2.64% discount rate as calculated for the previous question.

Immediate outflows in the event of Petra's death:

	\$
Final expenses (funeral, etc.)	14,000
Establish emergency fund	15,000
Repay mortgage	225,000
Prepay children's education	120,000
	\$374,000

Future outgoings:

Frank's spending (excluding extra expenses from age 80):

$\$26,000 + \$15,000 = \$41,000$ per annum for $90 - 43 = 47$ years:

$N = 47$; $I/Y = 2.64$; $PMT = 41,000$; $FV = 0$ [BGN mode]

PV = \$1,125,633

Frank's extra medical (etc.) expenses from age 80:

\$9,000 per annum for 90 – 80 = 10 years

PV at age 80:

N = 10; I/Y = 2.64; PMT = 9,000; FV = 0 [BGN mode]

PV at age 80:

PV now (discount for 80 – 43 = 37 years, at 2.64%)

PV at age 80 = \$80,266

PV now (discount for 80 – 43 = 37 years, at 2.64%)

PV now = \$80,266 / 1.0264³⁷ = \$30,607

(or, use TVM buttons: N = 37; I/Y = 2.64; PMT = 0; FV = 80,266 [END mode])

Candidate note: Had \$9,000 been the actual first cash flow at age 80, then we would have used 5% in place of 2.64%. However, we use the lower rate in this case to reflect the growth of the amount before age 80, because it is given in today's terms. Compare this with the calculation shown in the CFA Institute curriculum for the Private Wealth Management (2) study session at the end of the Risk Management for Individuals reading in the Exhibit showing the needs analysis method for calculating life insurance.

Spend on Marion, \$7,000 per annum for 23 – 9 = 14 years:

N = 14; I/Y = 2.64; PMT = 7,000; FV = 0 [BGN mode]

N = 14; I/Y = 2.64; PMT = 7,000; FV = 0 [BGN mode]

PV = \$83,188

Spend on Gordon, \$7,000 per annum for 23 – 12 = 11 years:

N = 11; I/Y = 2.64; PMT = 7,000; FV = 0 [BGN mode]

PV = \$67,824

Frank's net of tax income, \$62,000 × (1 – 0.35) = \$40,300 per annum for 66 – 43 = 23 years:

N = 23; I/Y = 2.64; PMT = 40,300; FV = 0 [BGN mode]

PV = \$706,347

PV of net outgoings = \$1,125,633 + \$30,607 + \$83,188 + \$67,824 – \$706,347 = \$600,905

Total of all outgoings = \$374,000 + \$600,905 = \$974,905

Existing assets:

Cash and investments	\$120,000
----------------------	-----------

50% of Petra's retirement account	\$110,000
-----------------------------------	-----------

Frank's retirement account	\$165,000
----------------------------	-----------

Petra's current life cover	\$280,000
----------------------------	-----------

\$675,000

Extra coverage required = \$974,905 – \$675,000 = \$299,905 (\$300,000 to the nearest \$1,000)

Candidate note: *The calculations required in this case, particularly for the needs analysis method, are extensive—and it is highly unlikely that an exam question would require as many to be done. You might have to work out one or two of the PV figures, and the others would be provided in the question. It is also unlikely that you would be required to use both the needs analysis and human life methods—which one is required would be made clear. This question aims to give you practice at both methods, and all the stages of those methods; if you are able to tackle it successfully, then you are well placed for a real, less extended, question.*

Scoring key: 11 points total for the extra coverage of \$300,000. Partial credit can be earned as follows:

- 1 point for calculating the immediate outflows in the event of Petra's death of \$374,000
- 2 points for calculating the PV of Frank's spending of \$1,125,633 which excludes the extra medical expenses
- 1 point for calculating the PV of Frank's extra medical expenses at age 80 of \$80,266
- 1 point for calculating the PV of Frank's extra medical expenses today of \$30,607
- 1 point for calculating the PV of spending on Marion of \$83,188
- 1 point for calculating the PV of spending on Gordon of \$67,824
- 1 point for calculating the PV of Frank's net income of \$706,347
- 1 point for calculating the PV of net outgoings of \$600,905
- 1 point for calculating the total outgoings of \$974,905
- 1 point for calculating the existing assets of \$675,000

(Module 27.1, LOS 27.b)