Investigation 3 – Finance

# STEP 1 – PROBLEM

## Clarification

Oliver inherited $300,000 from his father. Oliver has found 5 schemes available for him to invest his inheritance, however, he needs advice as to which scheme to choose.

Schemes Oliver has found are:

* Scheme 1 – Safe in his own home.
* Scheme 2 – Bank Romano
* Scheme 3 – Credit Union Woodsy
* Scheme 4 – Holiday
* Scheme 5 – House

## Questions to Answer

Oliver wants advice on which scheme is the best option considering both:

* The term length of each scheme
* The return of each scheme over its lifetime (term)

# STEP 2 – DATA COLLECTION

## Design and Plan

Oliver sourced the data and forwarded it onto me.

## Data Collected

* Inheritance total = $300,000
* Scheme 1 – Safe in his own home.
  + Withdraws $2000 / month
  + Safe cost $299 taken from inheritance
* Scheme 2 – Bank Romano
  + Withdraws $2000 / month
  + 5% p.a. compounded monthly
* Scheme 3 – Credit Union Woodsy
  + Withdraws $26,000 / year
  + 4.9% p.a. compounded monthly
* Scheme 4 – Holiday
  + $35,000 pays for holiday
  + ($300,000 - $35,000) invested
  + Withdraws $500 / week
  + 1.25% p.a. compounded weekly
* Scheme 5 – House
  + Sells in 20 years
  + Inflation rate 2.1%

# STEP 3 – ANALYSE DATA

## Scheme 1 - Safe

Investment in SAFE = $300,000 - $299

= 299701

Using a spreadsheet, I receive the following results:

=300000 - 299

|  |  |
| --- | --- |
| Period No. | Remaining Investment |
| 0 | $ 299,701.00 |
| 1 | $ 297,701.00 |
| 2 | $ 295,701.00 |

…

= period before - 2000

|  |  |
| --- | --- |
| 147 | $ 5,701.00 |
| 148 | $ 3,701.00 |
| 149 | $ 1,701.00 |
| 150 | -$ 299.00 |

### Result:

Term Length = 150 months

= 150 / 12

= 12.5 years

Total Return over term = $299,701

Finance:

Number of compounding periods = ?? need to find

Interest (% p.a.) = 0%

Initial Investment = -300,000 + 299 = 299701

Amount Withdrawn each period = 2000

Future Value = 0

Number of withdraws per year = 12

Number of times interest is compounded per year = 12

Number of compounding periods = 149.8505

Term = 149.8505/12 = 12.48754167 years

Total Return = 299701

Recursive Rule:

To = $300,000 - $299 = 299701

Tn+1 = Tn - 2000

T149 = 1701 T150 = -299

Rounds to 18 years, 18th year:

Total return = 299,701

## Scheme 2 – Bank Romano

Investing full inheritance of $300,000 into Bank Romano.

Using a spreadsheet I receive the following:

= Remaining Investment x (1+(0.05/12))

=Cell above x (1+(0.05/12))-2000

=(I+P) – Remaining Investment

=(I+P) – 2000

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Period No. | Remaining Investment | I+P | I+P-W | Remaining Interest | |
| 0 | $ 300,000.00 | $301250 | $ 299,250.00 | $ 1,250.00 |  |
| 1 | $ 299,250.00 | $300496.875 | $ 298,496.88 | $ 1,246.88 |  |
| 2 | $ 298,496.88 | $299740.612 | $ 297,740.61 | $ 1,243.74 |  |
| 3 | $ 297,740.61 | $298981.1979 | $ 296,981.20 | $ 1,240.59 |  |

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 234 | $ 3,755.57 | 3771.220675 | $ 1,771.22 | $ 15.65 |
| 235 | $ 1,771.22 | 1778.600761 | -$ 221.40 | $ 7.38 |
| 236 | -$ 221.40 | -222.3217362 | -$ 2,222.32 | -$ 0.92 |

### Result:

Term Length = 236 months

= 236 / 12

= 19.6 years

Total Return over term = $ 171,778.60 (interest) + 300,000 (initial)

= $471,778.68

Finance:

Number of compounding periods = ?? need to find

Interest (% p.a.) = 5%

Initial Investment = -300,000

Amount Withdrawn each period = 2000

Future Value = 0

Number of withdraws per year = 12

Number of times interest is compounded per year = 12

Number of compounding periods = 235.8890955

Term = 235.8890955/12 = 19.65742 years

Total Return = (235.889\*2000) -

= 471778.191

Interest = 471778.191 - 300,000 = 171778.191

Recursive Rule:

Ratio =

= 1.0041666666666

= 1.004 (2d.p.)

To = 300,000 Tn+1 = Tn x ( - 2,000

T235 = 1771.2 T236 = -221.4

Rounds to 236 /12 = 19.666 years:

2000 – 1771.2 = 228.8 -221.4= 7.4 interst

Total return = (235\*2000)+228.8 = 470,228

Interest = 7.4+(470228 - 300000) = 170,235.4

442 +300+8814 = 750814

## Scheme 3 – Woodsy’s Credit Union

Invests entire amount of $300,000 into Woody’s Credit Union

Interest = 4.9% p.a. compounded monthly

Withdrawl $26,000 end of each year

Recursive Rule:

Ratio =

=

= 1.050115575

= 1.05 (2d.p.)

To = 300,000 Tn+1 = Tn x 1.05 - 26,000

T17 = 16366 T18 = -8814

Rounds to 18 years, 18th year:

26000 – 16366 = 9634

Total return = 17\*26000 +9634 = 451634

Interest = 451634-300000 = 151634

Using Finance tool on CASIO ClassPad II calculator:

Number of compounding periods = ?? need to determine this

Interest (% p.a.) = 4.9%

Initial Investment = -300,000

Amount Withdrawn each period = 26000

Future Value = 0

Number of withdraws per year = 1

Number of times interest is compounded per year = 12

Number of compounding periods = 17.65550592

### Result:

Term Length = 17.65550592 years

= 17.66 years (2d.p)

Total Return over term = 17.65550592 x 26000 = 459,043.1539

Interest = $ 459,043.1539 (total) - 300,000 (initial)

= $ 159,043.1539

## Scheme 4 - Holiday

Spend $35,000 on holiday first

Invests remaining amount of $300,000 – 35000 = 265000

Interest = 1.25% p.a. compounded weekly

Withdrawl 500$ per week

Using spreadsheet:

= Remaining Investment x (1+(0.0125/52))

=(I+P) – 2000

=(I+P) – Remaining Investment

=Cell above x (1+(0.0125/52))-2000

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Period No. | Remaining Investment | Interest+ P | I+P-W | Interest Earned |
| 0 | $ 265,000.00 | 265063.7019 | $ 264,563.70 | $ 63.70 |
| 1 | $ 264,563.70 | 264627.299 | $ 264,127.30 | $ 63.60 |
| 2 | $ 264,127.30 | 264190.7911 | $ 263,690.79 | $ 63.49 |

…

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 566 | $ 501.39 | 501.5151315 | $ 1.52 | $ 0.12 |
| 567 | $ 1.52 | 1.51549576 | -$ 498.48 | $ 0.00 |
| 568 | -$ 498.48 | -498.6043322 | -$ 998.60 | -$ 0.12 |

### Result:

Term Length = 568 weeks

= 568 / 52

= 10.92307692 years

Total Return over term = $ 18,501.52 (interest) + 265,000 (initial)

= $283,501.52

Recursive Rule:

Ratio = (

= 1.00024038461

To = 265,000 Tn+1 = Tn x 1.00024 - 500

T567 = 1.515131 T568 = -498.5

Rounds to 567 years, 568th year:

500 – 1.5515131 = 498.4848689 – 498.5 = 0.0151311 int

Total return = 567\*500 + 498.4848689

= 283,998.4849

Interest = 283998.4849 –265000 +0.0151 = 18998.50

Finance:

Number of compounding periods = ?? need to find

Interest (% p.a.) = 1.25%

Initial Investment = -265,000

Amount Withdrawn each period = 500

Future Value = 0

Number of withdraws per year = 52

Number of times interest is compounded per year = 52

Number of compounding periods = 567.0030306

Term = 567.0030306/52 = 10.90390443 years

Total Return = 567.0030306\*500

= 283501.5153

Interest = 283501.5153 - 265,000 = 18501.5153

## Scheme 5 – House

Spend $300,000 on a house

House inflation rate is 2.1% p.a.

Term = 20 yrs

Using spreadsheet:

= Remaining Investment – 300,000

=Cell above x (1+(0.021))

|  |  |  |
| --- | --- | --- |
| Period No. | Remaining Investment | Inflation |
| 0 | $ 300,000.00 | $ - |
| 1 | $ 306,300.00 | $ 6,300.00 |
| 2 | $ 312,732.30 | $ 12,732.30 |

…

|  |  |  |
| --- | --- | --- |
| 18 | $ 436,098.52 | $ 136,098.52 |
| 19 | $ 445,256.59 | $ 145,256.59 |
| 20 | $ 454,606.98 | $ 154,606.98 |

### Result:

Term Length = 20 years

Total Return over term = $ 154,606.98 + 300,000

= $454,606.98

Finance:

Number of compounding periods = 20

Interest (% p.a.) = 2.1%

Initial Investment = -300,000

Amount Withdrawn each period = 0

Future Value = ?? need to find

Number of withdraws per year = 1

Number of times interest is compounded per year = 1

Future Value= $454,606.9767

Term = 20 years

Total Return = $454,606.9767

Inflation = $454,606.9767.5153 - 300,000 = 154,606.98

Recursive Rule:

Ratio = (

= 1.021

To = 300,000 Tn+1 = Tn x 1.021

T19 = 445256.588 T20 = 454606.9767

20th year:

Total return = $454,606.98 (2dp)

Inflation = $454,606.98 – 300000

= $154,606.98

## Summary of Results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scheme** | | **Spreadsheet** | **Finance Tool** | **Recursive Rule** |
| 1 – Safe | Term | 150 months  12.5 years | 149.8505 months | 18 years |
| Total Return | $299,701 | $299,701 | $299,701 |
| Interest |  |  |  |
| 2 – Romano | Term | 236 months  19.6 years | 235.8890955 months  19.65742 years | 236 months  19.666 years |
| Total Return | $471,778.68 | $471,778.19 | $470,228 |
| Interest | $ 171,778.60 | $171,778.191 | $170,235.4  To = 300,000  Tn+1 = Tn x ( - 2,000 |
| 3 – Woodsy | Term |  | 17.65550592 years | 18 years |
| Total Return |  | $ 459,043.1539 | $451,634 |
| Interest |  | $ 159,043.1539 | $151634 |
| 4 – Holiday | Term | 568 weeks  10.92307692 years | 568 weeks | 567.0030306 weeks  10.90390443 years |
| Total Return | $283,501.52 | $283,501.515 | $283,998.4849  To = 300,000  Tn+1 = Tn x 1.05 - 26,000 |
| Interest | $ 18,501.52 | $18,501.5153 | $18,998.50  To = 265,000  Tn+1 = Tn x 1.00024 - 500 |
| 5 – House | Term | 20 years | 20 years | 20 years |
| Total Return | $ 454,606.98 | $454,606.9767 | $454,606.98 (2dp) |
| Inflation | $ 154,606.98 | $ 154,606.98 | $154,606.98  To = 300,000  Tn+1 = Tn x 1.021 |

# STEP 4 – Interpret the Results