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Assignment 1

Decision Modeling and Analysis

**Questions**

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# 1.Problem Formulation

MODEL:

TITLE Assignment 1;

!

T = Total Fund

I = Income Fund

G = Growth Fund

M = Money Market Fund

Mr= Maximum Risk

Fg = Fraction of Growth Fund in Total Portfolio

Fi = Fraction of Income Fund in Total Portfolio

Fm = Fraction of Money Fund in Total Portfolio;

MAX = 1.065\*M + 1.19\*G + 1.115\*I;

! General Guidelines;

0.2\*T <= G ;

G <= 0.4\*T;

0.25\*T <= I;

I <= 0.5\*T;

M >= .35\*T;

T >= M;

M + G + I = T;

! Golden Luck Risks;

Mr <= 0.06;

Mr > 0;

Fg = G/T;

Fi = I/T;

Fm = M/T;

Fg\*.1+Fi\*.07+Fm\*.01 = Mr;

! Golden Luck Allocation;

T <= 1000000;

END

# 2. Solution and Range Report

**Solution Report**

Local optimal solution found.

Objective value: 1126111.

Infeasibilities: 0.7577631E-07

Total solver iterations: 49

Model Title: Assignment 1

Variable Value Reduced Cost

M 361111.1 0.000000

G 388888.9 0.000000

I 250000.0 0.000000

T 1000000. 0.000000

MR 0.6000000E-01 0.000000

FG 0.3888889 0.000000

FI 0.2500000 0.000000

FM 0.3611110 0.000000

Row Slack or Surplus Dual Price

1 1126111. 1.000000

2 188888.9 0.000000

3 11111.07 0.000000

4 0.000000 0.3333333E-01

5 250000.0 0.000000

6 11111.07 0.000000

7 638888.9 0.000000

8 0.000000 1.051111

9 0.000000 1388889.

10 0.6000000E-01 0.000000

11 -0.1525874E-07 -138888.9

12 -0.2178977E-07 -97222.22

13 -0.7577631E-07 -13888.89

14 0.000000 1388889.

15 0.000000 1.126111

**Range Report**

Ranges in which the basis is unchanged:

Ranges in which the basis is unchanged:

Objective Coefficient Ranges

Current Allowable Allowable

Variable Coefficient Increase Decrease

M NONLINEAR 0.0 0.0

G NONLINEAR 0.0 0.0

I NONLINEAR 0.7500000E-01 4.510000

T NONLINEAR INFINITY 1.127500

MR 0.0 INFINITY 0.0

FG 0.0 INFINITY INFINITY

FI 0.0 INFINITY INFINITY

FM 0.0 INFINITY INFINITY

Righthand Side Ranges

Row Current Allowable Allowable

RHS Increase Decrease

2 0.0 INFINITY 200000.0

3 0.0 INFINITY 0.0

4 0.0 0.0 0.0

5 0.0 INFINITY 250000.0

6 0.0 0.0 0.0

7 0.0 650000.0 INFINITY

8 0.0 0.0 0.0

9 0.6000000E-01 0.0 0.0

10 0.0 0.6000000E-01 INFINITY

11 NONLINEAR 0.0 0.0

12 NONLINEAR 0.0 0.0

13 NONLINEAR 0.0 0.0

14 0.0 0.0 0.0

1. 1000000. 0.0 0.0

# Recommendation

|  |  |
| --- | --- |
| Money Market Fund | $ 361,111.00 |
| Growth Fund | $ 388,889.00 |
| Income Fund | $ 250,000.00 |
| Total | $ 1,000,000.00 |

After investing accordingly as shown above, annual return will be $126,111.00. Which is the maximum yield under the current guidelines and constraints.

# 4. Binding constraints

0.25\*T <= I;

Investment fund makes up of all of all of the allowed 25% of the portfolio thus being a binding constraint.

M + G + I = T;

Money Market, Growth and Income funds are the only stocks that make up the portfolio meaning, no other stocks can be preferred making this constraint binding.

Mr <= 0.06;

The total risk of .06 has been used to the fullest. Meaning the current portfolio has a risk of 6% and there is no more room to increase the risk.

Fg\*.1+Fi\*.07+Fm\*.01 = Mr;

Overall portfolio risk index must be computed as a weighted average of the risk rating for the three funds.

T <= 1000000;

All of the budget has been used in the solution to give the maximum yield. There are no additional funds to be used making this constraint binding.

# 5. Additional Money

Solving the model again we come up with the value $351,333. $351,333 - $126,111 = $225,222 can be earned with an additional investment of $200,000.

# 6. Changed Growth Fund Yield

At 16% Growth Fund yield, the investment recommendation stays the same at;

|  |  |
| --- | --- |
| Money Market Fund | $ 361,111.00 |
| Growth Fund | $ 388,889.00 |
| Income Fund | $ 250,000.00 |
| Total | $ 1,000,000.00 |

However, when the growth fund yield goes down to 12% the recommendation changes as follows;

|  |  |
| --- | --- |
| Money Market | $ 350,000.00 |
| Growth Fund | $ 366,666.00 |
| Income Fund | $ 283,334.00 |
| Total | $ 1,000,000.00 |

# Changed Growth and Income Fund

At 16% Growth Fund and 13.5 Income Fund yield, the recommendation is as follows;

|  |  |
| --- | --- |
| Money Market | $ 350,000.00 |
| Growth Fund | $ 366,667.00 |
| Income Fund | $ 283,333.00 |
| Total | $ 1,000,000.00 |

# Growth Fund <= Income Fund

When Growth Fund cannot exceed Income Fund the annual yield comes to $121,875. The allocation is as follows;

|  |  |
| --- | --- |
| Money Market | $ 350,000.00 |
| Growth Fund | $ 325,000.00 |
| Income Fund | $ 325,000.00 |
| Total | $ 1,000,000.00 |