

Modelling LP: A multi-period cash flow Problem

A Multi-Period Cash Flow Problem: The Taco-Viva Sinking Fund - I

- Taco-Viva needs a sinking fund to pay \$800,000 in building costs for a new restaurant in the next 6 months.
- Payments of \$250,000 are due at the end of months 2 and 4, and a final payment of \$300,000 is due at the end of month 6.
- The following investments may be used.

Investment	Available in Month	Months to Maturity	Yield at Maturity		
Α	1, 2, 3, 4, 5, 6	1	1.8%		
В	1, 3, 5	2	3.5%		
С	1, 4	3	5.8%		
D	1	6	11.0%		

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The table indicates that investment A will be available at the beginning of each of the next six months, and funds invested in this manner mature in one month with a yield of 1.8%.

Funds can be placed in investment C only at the beginning of months 1 and/or 4, and mature at the end of three months with a yield of 5.8%.

The management of Taco-Viva needs to determine the investment plan that allows them to meet the required schedule of payments while placing the least amount of money in the construction fund.

Summary of Possible Cash Flows

	Cash Inflow/Outflow at the Beginning of Month								
Investment	1	2	3	4	5	6	7		
A ₁	-1	1.018							
B ₁	-1	<>	1.035						
C ₁	-1	<>	<>	1.058					
D ₁	-1	<>	<>	<>	<>	<>	1.11		
$\mathbf{A_2}$		-1	1.018						
$\mathbf{A_3}$			-1	1.018					
\mathbf{B}_{3}			-1	<>	1.035				
$\mathbf{A_4}$				-1	1.018				
C_4				-1	<>	<>	1.058		
$\mathbf{A_5}$					-1	1.018			
\mathbf{B}_{5}					-1	<>	1.035		
$\mathbf{A_6}$						-1	1.018		
Req'd Payments	\$0	\$0	\$250	\$0	\$250	\$0	\$300		
(in \$1,000s)									

Defining the Decision Variables

- A_i = amount (in \$1,000s) placed in investment A at the beginning of month *i*=1, 2, 3, 4, 5, 6
- B_i = amount (in \$1,000s) placed in investment B at the beginning of month *i*=1, 3, 5
- C_i = amount (in \$1,000s) placed in investment C at the beginning of month *i*=1, 4
- D_i = amount (in \$1,000s) placed in investment D at the beginning of month *i*=1

Defining the Objective Function

Minimize the total cash invested in month 1.

MIN: $A_1 + B_1 + C_1 + D_1$

Defining the Constraints

- Cash Flow Constraints
- Nonnegativity Conditions
 A_i, B_i, C_i, D_i >= 0, for all i