Example 4: Working Capital Management.

Determine how to invest excess cash in 1-month, 3-month and 6-month CDs so as to maximize interest income while meeting company cash requirements (plus safety margin).

	Yield	*Term*
1-mo CDs:	1.0%	1
3-mo CDs:	4.0%	3
6-mo CDs:	9.0%	6

Purchase CDs in months:
1, 2, 3, 4, 5 and 6
1 and 4
1

	Interest Earned:
Total	**$7,700**

Month:	***Month 1***	***Month 2***	***Month 3***	***Month 4***	***Month 5***	***Month 6***	***End***
Init Cash:	$400,000	$205,000	$216,000	$237,000	$158,400	$109,400	$125,400
Matur CDs:		100,000	100,000	110,000	100,000	100,000	120,000
Interest:		1,000	1,000	1,400	1,000	1,000	2,300
1-mo CDs:	100,000	100,000	100,000	100,000	100,000	100,000	
3-mo CDs:	10,000			10,000			
6-mo CDs:	10,000						
Cash Uses:	75,000	(10,000)	(20,000)	80,000	50,000	(15,000)	60,000
End Cash:	$205,000	$216,000	$237,000	$158,400	$109,400	$125,400	$187,700

Color Coding

Target cell

Changing cells

Constraints

If you're a financial officer or a manager, one of your tasks is to manage cash and short-term investments in a way that maximizes interest income, while keeping funds available to meet expenditures. You must trade off the higher interest rates available from longer-term investments against the flexibility provided by keeping funds in short-term investments.

This model calculates ending cash based on initial cash (from the previous month), inflows from maturing certificates of deposit (CDs), outflows for new CDs, and cash needed for company operations for each month.

You have a total of nine decisions to make: the amounts to invest in one-month CDs in months 1 through 6; the amounts to invest in three-month CDs in months 1 and 4; and the amount to invest in six-month CDs in month 1.

Problem Specifications

Target cell	H8	Goal is to maximize interest earned.
Changing cells	B14:G14 B15, E15, B16	Dollars invested in each type of CD.
Constraints	B14:G14>=0 B15:B16>=0 E15>=0	Investment in each type of CD must be greater than or equal to 0.
	B18:H18>=100000	Ending cash must be greater than or equal to $100,000.

The optimal solution determined by Solver earns a total interest income of $16,531 by investing as much as possible in six-month and three-month CDs, and then turns to one-month CDs. This solution satisfies all of the constraints.

Suppose, however, that you want to guarantee that you have enough cash in month 5 for an equipment payment. Add a constraint that the average maturity of the investments held in month 1 should not be more than four months.

The formula in cell B20 computes a total of the amounts invested in month 1 (B14, B15, and B16), weighted by the maturities (1, 3, and 6 months), and then it subtracts from this amount the total investment, weighted by

4. If this quantity is zero or less, the average maturity will not exceed four months. To add this constraint, restore the original values and then click **Solver** on the **Tools** menu. Click **Add**. Type **b20** in the **Cell Reference** box, type **0** in the **Constraint** box, and then click **OK**. To solve the problem, click **Solve**.

To satisfy the four-month maturity constraint, Solver shifts funds from six-month CDs to three-month CDs. The shifted funds now mature in month 4 and, according to the present plan, are reinvested in new three-month CDs. If you need the funds, however, you can keep the cash instead of reinvesting. The $56,896 turning over in month 4 is more than sufficient for the equipment payment in month 5. You've traded about $460 in interest income to gain this flexibility.