

**California Institute of Technology**  
**Fall 2001/2**  
**BEM 103**

**Homework 2**

*Due Date: Monday 10/22/2001*

**The Baldwin Company**

We consider a proposed investment in machinery and related items. Our example involves the Baldwin Company and colored bowling balls.

The Baldwin Company, originally established in 1962 to make footballs, is now a leading producer of tennis balls, baseballs, footballs, and golf balls. In 1970 the company introduced “High Flite.” Its first line of high-performance golf balls. The Baldwin management has sought opportunities in whatever businesses seem to have some potential for cash flow. In 1991 W. C. Meadows, vice president of the Baldwin Company, identified another segment of the sports ball market that looked promising and that he felt was not adequately served by larger manufacturers. That market was for brightly colored bowling balls, and he believed a large number of bowlers valued appearance and style above performance. He also believed that it would be difficult for competitors to take advantage of the opportunity because of Baldwin’s cost advantages and because of its ability to use its highly developed marketing skills.

As a result, in late 1992 the Baldwin Company decided to evaluate the marketing potential of brightly colored bowling balls. Baldwin sent a questionnaire to consumers in three markets: Philadelphia, Los Angeles, and New Haven. The results of the three questionnaires were much better than expected and supported the conclusion that the brightly colored bowling ball could achieve a 10- to 15-percent share of the market. Of course, some people at Baldwin complained about the cost of the test marketing, which was \$250,000. However, Meadows argued that it was a sunk cost and should not be included in project evaluation.

In any case, the Baldwin Company is now considering investing in a machine to produce bowling balls. The bowling balls would be produced in a building owned by the firm and located near Los Angeles. This building, which is vacant, and the land can be sold to net \$150,000 after taxes. The adjusted basis of this property, the original purchase price of the property less depreciation, is zero.

Working with his staff, Meadows is preparing an analysis of the proposed new product. He summarizes his assumptions as follows: The cost of the bowling ball machine is \$100,000. The machine has an estimated market value at the end of five years of \$30,000. Production by year during the five-year life of the machine is expected to be as follows: 5,000 units, 8,000 units, 12,000 units, 10,000 units, and 6,000 units. The price of bowling balls in the first year will be \$20. The bowling ball market is highly competitive, so Meadows believes that the price of bowling balls will increase at only 2 percent per year, as compared to the anticipated general inflation rate of 5 percent. Conversely, the plastic used to produce bowling balls is rapidly becoming more expensive. Because of this, production cash outflows are expected to grow at 10 percent per year. First-year production costs will be \$10 per unit.

**Net working capital** is defined as the difference between current assets and current liabilities. Baldwin finds that it must maintain an investment in working capital. Like any manufacturing firm, it will purchase raw materials before production and sale, giving rise to an investment in inventory. It will maintain cash as a buffer against unforeseen expenditures. Its credit sales will generate accounts receivable. Management believes that the investment in the different items of working capital totals \$10,000 in year 0, rises somewhat in the early years of the project, and falls to \$0 by the project's end. In other words, the investment in working capital is completely recovered by the end of the project's life.

Projections based on these assumptions and Meadow's analysis appear in Tables 7.1 through 7.3. In these tables all cash flows are assumed to occur at the *end* of the year. Because of the large amount of data in these tables, it is important to see how the tables are related. Table 7.1 shows the basic data for both investment and income. Supplementary schedules on operations and depreciation, as presented in Tables 7.2 and 7.3, help explain where the numbers in Table 7.1 come from. Our goal is to obtain projections of cash flow. The data in Table 7.1 are all that is needed to calculate the relevant cash flows.

The question for the homework is: compute the Net Present Value assuming the discount rate is a constant 10%.

**Table 7.1** *The worksheet for cash flows of the Baldwin Company (\$ thousands). (All cash flows occur at the end of the year.)*

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Investments:</b>						
(1) Bowling ball machine	-100.00					21.76*
(2) Accumulated depreciation		20.00	52.00	71.20	82.72	94.24
(3) Adjusted basis of machine after depreciation (end of year)		80.00	48.00	28.80	17.28	5.76
(4) Opportunity cost (warehouse)	-150.00					150.00
(5) Net working capital (end of year)	10.00	10.00	16.32	24.97	21.22	0
(6) Change in net working capital	-10.00		-6.32	-8.65	3.75	21.22
(7) Total cash flow of investment [(1) + (4) + (6)]	-260.00		-6.32	-8.65	3.75	192.98
<b>Income:</b>						
(8) Sales revenues		100.00	163.20	249.72	212.20	129.90
(9) Operating costs		50.00	88.00	145.20	133.10	87.84
(10) Depreciation		20.00	32.00	19.20	11.52	11.52
(11) Income before taxes [(8) – (9) – (10)]		30.00	43.20	85.32	67.58	30.54
(12) Tax at 34 percent		10.20	14.69	29.01	22.98	10.38
(13) Net income		19.80	28.51	56.31	44.60	20.16

\*Cash flow from selling of machine, after tax (machine is sold for \$30, and taxes are paid on the capital gain of \$30-\$5.76).

**Table 7.2** *Operating revenues and cost of the Baldwin Company.*

(1) Year	(2) Production	(3) Price	(4) Sales revenues	(5) Cost per unit	(6) Operating costs
1	5,000	\$20.00	\$100,000	\$10.00	\$ 50,000
2	8,000	20.40	163,200	11.00	80,000
3	12,000	20.81	249,720	12.10	145,200
4	10,000	21.22	212,200	13.31	133,100
5	6,000	21.65	129,900	14.64	87,840

**Table 7.3** *Depreciation for the Baldwin Company (\$).*

Recovery period class

Year	3 years	5 years	7 years
1	33,340	20,000	14,280
2	44,440	32,000	24,490
3	14,810	19,200	17,490
4	7,410	11,520	12,500
5		11,520	8,920
6		5,760	8,920
7			8,920
8			4,480
Total	100,000	100,000	100,000

(based on IRS tables; N-year-depreciation actually carries over N+1 years because the IRS assumes you buy mid-year)