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Capital Budgeting: Discounted Cash Flow Analysis

1. A company buys a machine for $500,000 and depreciates it on a straight-line basis over a five-year period for tax purposes. The investment would result in cash cost savings of $200,000 per year, before taxes, for five years. At the end of five years, it was estimated that the machine would be sold for $75,000. The gain on the sale of the machine would be taxed at a 40% rate. Is the investment in the machine attractive in economic terms, given all of the cash flows? Please assume that the cash flows occur at the end of each year, that the tax rate is 40%, and that the appropriate discount rate is 8%. What is the net present value? the internal rate of return? the payback period?

2. Schmidt A.G. is considering the replacement of three hand-loaded block milling machines with an automatic milling machine. The three hand-loaded machines are only three years old and were purchased at a total cost of DM 300,000. The useful life of the machines at the time of their purchase was estimated to be fifteen years. The salvage value at the end of the fifteen years was estimated to be zero.

   Schmidt A.G. can continue to use the three hand loaded machines for their remaining twelve years. The machines would continue to be depreciated at a rate of DM 20,000 per year (the original DM 300,000 divided by the total useful life of fifteen years). The depreciation expense would reduce taxable income and, therefore, tax payments. Schmidt A.G. is taxed at a 40% rate.

   Alternatively, Schmidt A.G. can replace the three hand-loaded machines with an automatic milling machine. The new machine would have the same capacity as the combined capacity of the three hand-loaded machines, would have a twelve year useful life, would be depreciated for tax purposes at a rate of DM 40,000 per year for twelve years, and would have zero salvage value. Cost of the automatic milling machine is DM 480,000. The automatic machine would result in pre-tax labor savings, including benefits, of DM 135,000 per year. Other out-of-pocket cash savings were estimated at DM 25,000 per year, before taxes. Based on the charge made for each square meter of floor space, the machining department would save DM 3,000 in the annual charge for space. No alternative use of the space was anticipated.

This case was prepared as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

If Schmidt acquires the automatic milling machine, it will sell the three hand-loaded machines immediately for a total price of DM 100,000. The loss of DM 140,000 (the book value of DM 240,000 at the end of the third year minus the sale price of DM 100,000) resulting from the sale will be a tax-deductible expense.

No inflation is anticipated. Schmidt A.G. uses a discount rate of 7% to evaluate cost reduction projects.

Is the investment in the automatic milling machine economically attractive?

(i) What are the actual, after-tax cash flows for each of the two alternatives?

(ii) What is the net present value of the actual cash flows for each of the two alternatives?

3. Richard Pitkin, Chief Financial Officer of Draper Corporation, was concerned by the long-term prospects for the Synectics product line. The product line had performed well historically, but the impending loss of its patent position seemed certain to attract new entrants and result in lower product prices and flat unit sales through the year 2004.

Table 1 - Sales Forecast

	1998	1999	2000	2001	2002	2003	2004	2005
Units (000s)	1,000	1,000	1,000	1,000	1,000	1,000	1,000	0
Unit Price	$20.00	$20.60	$21.00	$21.15	$21.25	$21.25	$21.00	$19.00

Profitability of the Synectics product line was forecast at $ 1,166,000 in 1998. However, margins seemed likely to narrow as cash cost of goods sold and selling, general and administrative expense increased with inflation at 3 % per year.

	1998	Beyond 1998
Sales	$20,000,000	see Table 1
Cash Cost of Goods	10,000,000	+3% per year
Depreciation	1,057,000	see Table 2
Gross Profit	8,943,000	
Sell, Gen'l & Admin	7,000,000	+ 3% per year
EBIT	1,943,000	
Tax @ 40%	777,000	
EBIAT	$ 1,166,000	

Pitkin believed that the existing manufacturing and warehousing capacity was sufficient to meet demand over the next seven years. However, some capital expenditures would be necessary as equipment wore out.

Table 2 - Capital Expenditures and Depreciation

$000	1998	1999	2000	2001	2002	2003	2004
Capex	$ 400	$ 400	$ 400	$ 400	$ 300	$ 200	$ 0
Depreciation	1,057	1,124	1,204	1,304	1,404	1,504	1,504

Additional, albeit small, investment in spontaneous working capital would also be required. Accounts receivable were expected to remain at 16% of sales; and inventory, accounts payable and accrued expenses were forecast at 20%, 8%, and 7% of cost of goods, respectively. All of the working capital would be recovered in 2005 when the product line was discontinued.

Table 3 – Spontaneous Working Capital

$000	1998	1999	2000	2001	2002	2003	2004	2005
Working capital	3,700	3,811	3,890	3,930	3,963	3,980	3,957	0
(Investment in) Recovery of working capital	(108)	(111)	(79)	(40)	(33)	(17)	23	3,957

Management was considering the elimination of the product line as of year-end 1997. It seemed likely that the working capital of $3,592,000 could be recovered in its entirety and that the fixed assets with a book value of $7 million could be sold for $3 million. The loss of $4 million on disposition of the fixed assets would be tax deductible. However, Draper Corporation was comfortably within its policy that debt be in the range of 30-35% of total capital, and management felt no pressing need for cash.

Would you recommend that the Synectics product line be discontinued at the beginning of 1998? Please use 12% as the appropriate discount rate and assume that the salvage value of the equipment will be $0 in 2005.

4. Perhaps more surprising to Mr. Pitkin was a proposal by the VP of Marketing to make a major investment in market share by increasing promotional expenditures by $2.5 million during 1998-2000. Sales were forecast to increase by 250,000 units per year throughout the 1998-2004 period. More importantly, the VP of Marketing believed that some economies would be realized in the area of selling, general and administrative expenses.

Table 1 - Increase in Sales and EBIAT

	1998	1999	2000	2001	2002	2003	2004
Units (000s)	250	250	250	250	250	250	250
Unit price	$ 20.00	$ 20.60	$ 21.00	$ 21.15	$ 21.25	$ 21.25	$ 21.00
Sales	$ 5,000	$ 5,150	$ 5,250	$ 5,288	$ 5,312	$ 5,312	$ 5,250
Cash CoGS	2,500	2,575	2,652	2,732	2,814	2,898	2,985
Depreciation	200	200	200	200	200	200	200
Gross profit	2,300	2,375	2,398	2,356	2,298	2,214	2,065
Sell., gen'l, admin	1,250	1,288	1,326	1,366	1,407	1,449	1,493
Special promotion	1,000	1,000	500	0	0	0	0
EBIT	50	87	572	990	891	765	572
Tax @ 40%	20	35	229	396	356	306	229
EBIAT	30	52	343	594	535	459	343

The increase in unit sales would necessitate an investment of $1.4 million in plant and equipment in 1998; the $1.4 million would be depreciated on a straight-line basis over the seven years-ended 2004. Spontaneous working capital would also increase, as shown in Table 2. Salvage value was estimated at $0 in 2005.

Table 2 Spontaneous Working Capital ($000)[1]

1998	1999	2000	2001	2002	2003	2004	2005
$ 925	$ 953	$ 973	$ 983	$ 991	$ 995	$ 989	$ 0

[1]Spontaneous working capital = accounts receivable + inventories - accounts payable - accrued expenses

Would you recommend approval of the program to increase sales by initiating the $2.5 million special promotion? Please use 12% as the appropriate discount rate. Assume that the investment of $1.4 million will occur at the beginning of 1998.

5. Management of Seagate Technologies is considering the investment of $350 million in manufacturing capacity, start-up costs, and net working capital to exploit a unique new technology. The effectiveness of the new technology-developed at a total cost of $80 million – remained highly uncertain. During the project's expected fifteen-year life, free cash flows were forecast at anywhere from $0 per year to $98 million per year. Management believed that the effectiveness of the technology would be known by the end of year one. The expected annual free cash flow was $49 million.

Outcome	Estimated Probability		Free Cash Flow Years 1-15		
Highly successful	.17	X	$98 million	=	$16.66
Most likely	.66	X	$49 million	=	$32.34
Worst case	.17	X	$0 million	=	$0
			Expected annual free cash flow	=	$ 49 million

If the worst case scenario occurred, management planned to terminate the program at the end of year 1 and expected to recover $170 million, including all tax savings resulting from any write-offs. Similarly, management believed that it would be possible to invest an additional $350 million at the end of year 1 if the technology proved to be highly successful. The free cash flows would be $98 million per year and would continue for fourteen years.

Would you recommend that management make the $350 million investment? Please assume that 13% is the appropriate discount rate.

6. Perpetuities are often used to value merger and acquisition targets.

    a) What is the present value of a stable perpetuity of $100,000 per year that starts at the end of year one and continues to infinity? The appropriate discount rate is 10%.

    b) What is the present value of a stable perpetuity of $100,000 per year that starts at the end of year five and continues to infinity? The appropriate discount rate is 10%.

    c) What is the present value of a growing perpetuity that starts at $50,000 at the end of year one and grows at a 4% annual rate? The appropriate discount rate is 10%.

    d) What is the present value of a growing perpetuity that starts at $50,000 at the end of year five and grows at a 4% annual rate? The appropriate discount rate is 10%.

7. Lycos, Inc. was considering the acquisition of a smaller competitor in the hand tool business. The target, Hampton Tool, had been reasonably successful; but sales growth seemed very limited, and the controlling family was interested in 'cashing out'. Management of Lycos believed that the integration of the two firms would result in significant cost savings. Specifically, purchasing economies should reduce cost of goods sold by 1.5 percentage points over the next 2-3 years. It also seemed likely that Hampton Tool's Selling and Administrative costs would decline by 3.0 percentage points. (See Table 1 for pro forma income statements that include the forecast cost saves.)

Table 1 – Hampton Tool Company ($ in thousands)

	1999	2000	2001	2002	2003	Growth to Infinity
Sales	$61,000	63,440	65,978	68,617	71,361	+ 4%
Cash Cost of Goods	29,890	30,768	31,669	32,593	33,896	+4%
Depreciation	4,000	4,160	4,326	4,499	4,679	+4%
Selling and Admin.	21,010	21,570	22,103	22,232	22,407	+4%
EBIT	6,100	6,942	7,880	9,293	10,379	+4%
Tax @ 35%	2,135	2,430	2,758	3,253	3,633	+4%
EBIAT	3,965	4,512	5,122	6,040	6,746	+4%
(+) Depreciation	4,000	4,160	4,326	4,499	4,679	+4%
Cash Flow Operations	7,965	8,672	9,448	10,539	11,425	+4%

Sales growth would require a corresponding buildup of spontaneous net working capital (accounts receivable + inventories – accounts payable – accrued expenses) and capital expenditures in excess of the annual depreciation expense (See Table 2.)

Table 2 – Hampton Tool Company ($ in thousands)

	1999	2000	2001	2002	2003	Growth to Infinity
Spontaneous net working capital	$13,420	$13,957	$14,515	$15,096	$15,700	+ 4%
(Investment) in net working capital	(516)	(537)	(558)	(581)	(604)	+4%
Capital expenditures	4,938	5,136	5,341	5,555	5,777	+4%

Management of Lycos, Inc. used discounted cash flow analyses to value mature acquisition targets. As of late-1998, with inflation stable at a 2% annual rate, management believed that a 10% discount rate was appropriate in valuing acquisitions in the hand tool business.

What is the maximum price that Lycos should be willing to pay?