PCB SIMULATION ECONOMIC ANALYSIS

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Number of board designs per year	10	10	11	12	14
Number of prototype cycles per design	3	3	3	3	3
Average cost of a prototype cycle	11000	12000	12500	13000	14000
Number of ASIC designs per year	10	12	14	16	18
Average number of gates per ASIC	12000	13000	13000	15000	15000
Number of ASIC re-designs required	5	6	7	8	9
NRE costs per gate	2	2	2	2	2
Test program development COST per board type	25000	26000	27000	28000	30000
INPUT PARAMETERS WHEN PCB SIMULATION IS USED					
Number of prototype cycles per design	2	2	2	2	2
Number of ASIC re-designs required	2	2	2	2	2
TIme To Market improvement (weeks)	6	6	7	7	8
Additional sales from early time to market	600000	600000	700000	700000	800000
Gross profit margin (%)	25	25	25	25	25
Test program cost reduction (%)	40	40	45	45	50
Simulation costs per design	15000	16000	17000	18000	19000
Modelling costs per design	12000	12000	12000	12000	12000
Training costs (Annual)	12000	12000	12000	12000	12000
Hardware maintenance costs (Annual)	12000	12000	12000	12000	12000
Software maintenance costs (Annual)	12000	12000	12000	12000	12000

MANUFACTURING COSTS & SAVINGS					
Annual production volume for new board types	40000	42000	44000	47000	50000
Type of board tester. Process (0) Performance (I)	1	1	1	1	1
First pass yield at board tester (%)	80	80	80	80	80
Fault coverage of Process Tester for design faults (%)	10	10	10	10	10
Fault coverage of Performance tester for design faults (%)	90	90	90	90	90
Design related faults (as % of fault spectrum)	10	10	10	10	10
Reduction of design related faults with sim. (%)	80	80	80	80	80
Fault coverage of system test stage	80	80	80	80	80
Average cost to test one board (Proc. Test)	4	4	4	4	4
Average cost to diagnose one fault (Proc. Test)	3	3	3	3	3
Average cost to test one board (Perf. Test)	4.43	4.43	4.43	4.43	4.43
Average cost to diagnose one fault (Perf. Test)	11	11	11	11	11
Average cost to diagnose one fault (at Sys. Test)	100	100	100	100	100
Average rework cost for a defective board	10	10	10	10	10
Average cost of a field service repair	1500	1500	1500	1500	1500
PCB development costs (prototyping only)	330000	360000	412500	468000	588000
PCB development costs (simulation & prototyping)	370000	400000	462000	528000	658000
ASIC NRE costs (prototyping only)	360000	468000	546000	720000	810000
ASIC NRE costs (simulation & prototyping)	288000	384000	416000	540000	600000
Savings in board test program development	100000	104000	133650	151200	210000
Savings in board test/diagnostics/rework	163427	171598	179769	192026	204283
Savings in system test/diagnostics	6284	6598	6912	7383	7855
Savings in field service	21422	22493	23564	25171	26777
Increased profit from earlier TTM	150000	150000	175000	175000	200000
TOTAL SAVINGS	167132	202689	244395	274780	318915

Figure 5.1 (page 1) An example of a spreadsheet model for the economic analysis of board level simulation.

(continued)

RETURN ON INVESTMENT AND PAYBACK ANALYSIS					
Life of project (Yrs.)	5	PAYBACK ANALYSIS			YEARS
Tax rate (%)	50	Simple payback			1.162
Hurdle rate (%)	15	Payback after tax/depr.			1.795
Depreciation	20	Discounted payback			1.795
Incremental investment (Hardware)	160000				
Incremental investment (Software)	40000				
YEAR	1	2	3	4	5
Total saVings	167132	202689	244395	274780	318915
Tax on savings	83566	101344	122198	137390	159458
Depreciation	40000	40000	40000	40000	40000
Tax saved by depreciation	20000	20000	20000	20000	20000
Net cash flow	103566	121344	142198	157390	179458
Present value factor	1.000	1.000	1.000	1.000	1.000
Discounted cash flow	103566	121344	142198	157390	179458
NET PRESENT VALUE = 503956		PROFITABILITY INDEX = 3.52			

Figure 5.1 (page 2) An example of a spreadsheet model for the economic analysis of board level simulation.