Chapter 13

13-1
a. Net Working Capital equals 91524 - 50596 = 40928.
b. Non-cash working capital equals 40928 - 19927 + 36240 = $57241.
c. Ford's working capital is high because it has a high amount of receivables. If Ford Capital were consolidated into this balance sheet, then this would make sense, since Ford Capital's business is to make short-term loans to enable consumers to purchase cars.
d. Non-cash working capital as a percent of revenues for the 1994 year is 36.94% If I wanted to estimate non-cash working capital for a future year, I could use this ratio along with an estimate of future revenues. Whether this is a good way of forecasting working capital needs in the future will depend upon how volatile this number is from period to period.

13-2
a. The net working capital is 118 - 46.1 or $71.9
b. Non-cash working capital is $71.9 – 6.5 = $65.4, assuming that Other current liabilities do not include short-term borrowings.
c. Non-cash working capital as a percentage of revenues for 1995 is 65.4/440.3 = 14.85%; I would use this to estimate non-cash working capital for a new store, since the entire firm is essentially a conglomeration of stores.

13-3
a., b. If inventory requirements dropped by 50%, there would have been an immediate reduction in inventory of $54.2. In addition, each year, the additions to working capital would be 6% of this amount less. This would increase cashflow by the same amount. The present value of this is +54.2 + 54.2(.06)/(.11-.06) = $119.24m.

13-4
a. Value of Firm at current working capital ratio
FCFF = After-tax Operating income - Change in Working Capital
= $10 million (1.05) - ($105 - $100) (.10) = 10
Value of Firm = $10 million / (.11 -.05) = $166.67

b. Firm Valuation at different Working Capital Ratios

WC as % of Rev	Expected Growth	FCFF	Cost of Capital	Firm Value
0%	4.50%	10.45	10.90%	$163.28
10%	5%	10	11%	$166.67
20%	5.20%	9.48	11.11%	$160.41
30%	5.35%	8.93	11.23%	$151.87
40%	5.45%	8.365	11.36%	$141.54
50%	5.50%	7.8	11.50%	$130.00
60%	5.54%	7.23	11.65%	$118.33
70%	5.55%	6.67	11.80%	$106.72

80%	5.55%	6.115	11.95%	$95.55
90%	5.55%	5.56	12.10%	$84.89
100%	5.55%	5.005	12.35%	$73.60

The optimal working capital policy for the firm is to maintain the working capital at 10% of revenues.

c. Firm Valuation at different Working Capital ratios

WC as % of Rev	**Expected Growth**	**FCFF**	**Cost of Capital**	**Firm Value**
0%	4.50%	10.45	11%	$160.77
10%	5%	10	11%	$166.67
20%	5.20%	9.48	11%	$163.45
30%	5.35%	8.93	11%	$158.05
40%	5.45%	8.37	11%	$150.72
50%	5.50%	7.8	11%	$141.82
60%	5.54%	7.23	11%	$132.42
70%	5.55%	6.67	11%	$122.39
80%	5.55%	6.12	11%	$112.20
90%	5.55%	5.56	11%	$102.02
100%	5.55%	5.01	11%	$91.83

The optimal working capital is still 10% of revenues.

13-5
Free Cash Flow to Firm = After-tax Operating Income - Change in Working Capital
= $5 million (1.05) - ($100 million) (.05) (.2) = $4.25
Value of Firm = $4.25/(.12-.05) = $60.71
Increase in Current Cash Flow from cutting back inventory = $8 million
Firm value has to be at least $52.71 million to break even.
Let the revenues be X.
After-tax Operating Income = X (.05). Note that After-tax Operating Margin is 5%.
Change in Working Capital = X (.05) (.12). Note that Working Capital is now 12% of revenues.
Free Cash Flow to Firm = X(.05) - X(.05)(.12)
Value of Firm = $52.71 = X(.05)(.88)/(.12-.05)
Solve for X,
X = $83.86
Revenues have to be at least $83.86 million for firm to break even
If revenues drop more than $16.14 million, the firm will be worse off.

13-6

Company	Net WC	Revenues	Beta	Exp Growth	Mkt Value	WC/Revenues
Arco Chemical	$579	$3,423	0.8	13.00%	$4,517	16.91%
Dow Chemical	$2,075	$20,015	1.25	16.00%	$19,398	10.37%
Du Pont	$3,543	$39,333	1	17.50%	$44,946	9.01%
Georgia Gulf	$127	$955	1.7	26.50%	$1,386	13.30%
Lyondell Petro	$264	$3,857	1.1	23.50%	$2,080	6.84%
Monsanto	$2,948	$8,272	1.1	11.50%	$9,296	35.64%
Olin Corp	$749	$2,658	1	22.00%	$1,205	28.18%
Sterling Chemical	$21	$701	0.95	43.00%	$724	3.00%
Union Carbide	$329	$4,865	1.3	16.00%	$4,653	6.76%

a. Average WC as % of Revenues = 14.45%
Standard Deviation in WC as % of Revenues = 10.84%

b. Running a multiple regression, regressing WC as % of Revenues against the other variables
WC as % of Revenue = f(Beta , Expected Growth , Market Value).
Here are the results of the regression:

	Coefficients	*Standard Error*	*t Stat*
Intercept	0.379009	0.206554	1.834913
Beta	-0.05906	0.1507806	-0.39172
Expected Growth	-0.67587	0.4303771	-1.57041
Market Value	-2.6E-06	2.889E-06	-0.90688

R^2 = 0.35; hence 35% of the variation in WC/Revenue is explained by the information provided on the different companies.

c. If we substitute the values for Monsanto into the estimated regression line, we find WC/Revenue for Monsanto = 0.212; hence the optimal working capital ratio for Monsanto is 21.2%.

13-7. a.

Period	**Current Assets**	**Current Liabilities**	**Revenues**	**Working Cap**	**Current Assets as % of Revenues**
1990-1	$300	$150	$3,000	$150	10.00%
1990-2	325	160	3,220	165	10.09%
1990-3	350	180	3,450	170	10.14%
1990-4	650	300	6,300	350	10.32%
1991-1	370	170	3,550	200	10.42%
1991-2	400	200	4,100	200	9.76%
1991-3	420	220	4,350	200	9.66%
1991-4	755	380	7,750	375	9.74%
1992-1	450	220	4,500	230	10.00%

1992-2	480	240	4,750	240	10.11%
1992-3	515	265	5,200	250	9.90%
1992-4	880	460	9,000	420	9.78%
1993-1	550	260	5,400	290	10.19%
1993-2	565	285	5,600	280	10.09%
1993-3	585	300	5,900	285	9.92%
1993-4	1010	500	1,0000	510	10.10%
1994-1	635	330	6,500	305	9.77%
1994-2	660	340	6,750	320	9.78%
1994-3	665	340	6,900	325	9.64%
				Average =	**9.97%**

a. See above
b. See above
c. The working capital as a percent of revenues should decline as revenues increase. There is little evidence of that in this table.

13-8
a. Optimal Order Quantity = 424.26
b. The delivery lag is one month; the safety inventory in therefore one month's sales which is 1,500 units.
c. The average inventory maintained by the firm will approximately 1,712 units.

13-9
If sales were random, and the standard deviation of sales is 4000 units, we'd have to decide on the acceptable probability of running out of inventory. If this is taken to be 1%, then we'd increase the safety inventory by 2(4000) or 8000 units to 9,500 units. Hence the average inventory would increase to 9,712 units.

13-10
We assume that working capital requirements are based on last year's revenue. The value of the firm with no increase in product offerings is: expected cash flow next year/(discount rate - growth rate) = [100(1.04) – 1000(.04)(.15)]/(.11 – 0.04) = $1.4 billion. With an increase in product offerings, inventories would have to rise immediately from 1000(.15) to 1000(0.2), i.e. an increase of $50. Also, the expected cashflow to the firm the next year would be 100(1.05) – 1000(0.2)(.05) = 95; the present value of the firm based on this would be 95/(.11-.05) = 1.58333 billion. Netting the immediate increase in working capital of $50 against this, we see that there will still be a net increase of $133.33 million in firm value.

13-11
a.

Firm	Inventory	Revenues	Inventory/Revenues
Apple	473	6134	7.72%
Cisco	655	12154	5.39%
Compaq	2131	39250	5.43%
Dell	374	25600	1.46%

Gateway	172	8650	1.99%
HP	2637	42370	6.22%
IBM	5130	88000	5.83%
Iomega	132	1694	7.79%
Micron	223	1438	15.51%
NCR	392	6200	6.32%
	1231.9	22699	0.0848909

Looking only at the average inventory, Apple has too little inventory; however, if we look at inventory as a percentage of revenues, Apple has too much inventory relative to the average firm.

b. Regressing Inventory as a percent of revenues on ln(Revenues), we find that
Inventory/Revenues = 0.2174 -0.0164(ln Revenues)
(2.86) (2.05)
R^2 = 34.36%.
Yes there is a relationship; the t-statistic is significant.

c. According to the regression in part b), Apple should have inventory of 0.2174 – 0.0164(ln(6134)) = 0.0744 (7.44%). Its actual holdings were very close at 7.72%
IBM, based upon its revenues of $ 88 billion, should have inventory at 3.07% of revenues; its actual inventory is much higher.
13-12
a. Projected CF for next year

	Without credit	**With credit**	**Differential CF**
Revenues	$31.50	$36.75	$5.25
AT operating income	$9.45	$11.03	$1.58
- Increase in WC	$-	$0.18	$0.18
ATCF	$9.45	$10.85	$1.40

Initial Investment needed to initial credit sales = 0.1 ($35 million) = $3.5 million

b. Present value of incremental CF assuming 5% growth forever and 12% cost of capital,
PV of incremental CF = $1.40/(.12-.05) = $20 - Initial Investment needed = $3.50
NPV of Project = $ 16.50 million

13-13
a. Implied Interest Rate = (1+2/98)^(365/40)-1 = 20.24%
b. Implied Interest Rate if customer takes 100 days = (1+2/98)^(365/90)-1 = 8.54%
(Customer takes 100 days to pay; she could have obtained the 2% discount by paying within 10 days)

13-14
a. Accounts payable would increase by (100/365)(90-30) = $16.438 million, from (100/365)(30) = 8.219 to 24.657 million.
b. This strategy would release $16.438 m. immediately. In addition, it would release

100[(90-30)/365](.04) = 0.6575 next year, 104[(90-30)/365](.04), the year after that, and so on. The present value of this is 16.438 + 0.6575/(.10 – 0.04) = $27.397 million. The cost of this strategy is the loss of the $ 2 million in discounts this year, with the amount growing 4% a year in perpetutity. This is tax-deductible, though, and the present value would therefore be

2 (1 - .4) (1.04)/(.10-.04) = $ 20.8 million

. Hence the strategy will increase value.

c. If the bond rating dropped and the cost of capital increased, the present value of the savings would drop. However, the present value of all the other cashflows of the firm would drop as well. The strategy continues, though, to increase value.