

Part I: Overview of the 3 Statements

Underlying concepts

1. How the three statements link with each other
2. Balancing the three statements: A company's receipt or expenditure of cash will change either an asset, liability or shareholder equity account. We can balance our three statements by projecting balance sheet or cash flow statement accounts in tandem with their related accounts on the cash flow statement and balance sheet respectively

We will be focusing on building only the most simplified versions of the following schedules for the three statements:

1. Depreciation Schedule
2. Debt Schedule

Legend:

Blue Outline: Line items Income statement

Green Outline: Line items on Cash Flow statement

Gray Outline: Line items on Balance sheet

Yellow highlight: Affected line items

Part II: Building the 3 Statements

Modeling Conventions

Blue font: Hard-coded

Green font: Link from another sheet

Black font: Formula

I: Model Set-up

Populate historical data

Populate the income statement, balance sheet and cash flow statement with historical data. If you are linking it from another spreadsheet with an external data source, use the font color **green**. If you are hard-coding your data, use the font color **blue**.

	2018A	2019A	2020A	2021A	2022A	2023E	2024E	2025E	2026E	2027E
Cash Flows from Operating Activities										
Net income	2,591.60	2,592.30	3,553.70	5,883.20	5,624.20					
Operating adjustments:										
Depreciation and amortization	422.70	448.50	490.80	471.00	583.60					
Loss on disposal of property, plant and equipment	3.60	3.10	53.90	117.50	68.90					
Other operating adjustments	103.00	120.90	(2.40)	(518.30)	(231.10)					
Changes in assets and liabilities:										
Accounts receivable	212.40	(255.00)	507.50	(1,754.90)	(2,338.00)					
Inventories, net	(515.70)	(404.70)	(706.70)	(483.20)	(2,080.90)					
Other assets	(1,068.90)	(294.40)	(1,200.50)	320.10	(652.10)					
Accounts payable	97.90	(12.10)	334.30	718.60	406.20					
Accrued liabilities	237.70	82.10	47.50	347.60	439.70					
Other liabilities	988.40	995.70	1,549.50	5,744.20	6,666.30					
Net cash provided by operating activities	3,072.70	3,276.40	4,627.60	10,845.80	8,486.80	-	0	0	0	0
Check	-	-	-	-	-					
Cash Flows from Investing Activities										
Purchase of property, plant and equipment	(574.00)	(766.60)	(962.00)	(900.70)	(1,281.80)					
Other investing activities	82.50	(390.90)	(390.20)	828.70	252.90					
Net cash used in investing activities	(491.50)	(1,157.50)	(1,352.20)	(72.00)	(1,028.90)	0	0	0	0	0
Check	-	-	0.00	-	-					
Cash Flows from Financing Activities										
Dividend paid	(597.10)	(1,325.70)	(1,066.40)	(1,368.30)	(2,559.80)					
Purchase of treasury shares	(1,146.20)	(410.00)	(1,207.50)	(8,560.30)	(4,639.70)					
Net proceeds from issuance of shares	21.80	27.20	37.90	49.00	81.80					
Net proceeds from issuance of notes, net of issuance costs	-	-	1,486.30	-	495.60					
Repayment of debt and finance lease obligations	(2.80)	(3.80)	(3.30)	(12.10)	(516.20)					
Net cash used in financing activities	(1,724.30)	(1,712.30)	(753.00)	(9,891.70)	(7,138.30)	0	0	0	0	0
Check	-	0	0	0	0					
Net cash flows	856.90	406.60	2,522.40	882.10	319.60	0	0	0	0	0
Effect of changes in exchange rates on cash	5.20	4.60	(5.30)	20.30	(3.10)					
Net increase (decrease) in cash and cash equivalents	862.10	411.20	2,517.10	902.40	316.50	0	0	0	0	0
Cash and cash equivalents at beginning of the year	2,259.00	3,121.10	3,532.30	6,049.40	6,951.80	7,268.30	7,268.30	7,268.30	7,268.30	7,268.30
Cash and cash equivalents at end of the year	3,121.10	3,532.30	6,049.40	6,951.80	7,268.30	7,268.30	7,268.30	7,268.30	7,268.30	7,268.30
Check	-	-	-	-	-					

Link the three statements

Income Statement: “Net income” from income statement flows into the cash flow statement

R&D	(1,575.90)	(1,968.50)	(2,200.80)	(2,547.00)	(3,253.50)					
SG&A	(488.00)	(520.50)	(544.90)	(725.60)	(945.90)					
D&A	(422.70)	(448.50)	(490.80)	(471.00)	(583.60)					
Operating Income	2,542.60	2,342.30	3,560.70	6,065.40	5,917.10					
Interest	(28.30)	(25.00)	(34.90)	(44.60)	(44.60)					
Income before taxes	2,514.30	2,317.30	3,525.80	6,020.80	5,872.50					
Provision for income taxes	(351.60)	(191.70)	(551.50)	(1,021.40)	(969.90)					
Net Income	2,162.70	2,125.60	2,974.30	4,999.40	4,902.60					

	2018A	2019A	2020A	2021A	2022A	2023E	2024E	2025E	2026E	2027E
Cash Flows from Operating Activities										
Net income	2,591.60	2,592.30	3,553.70	5,883.20	5,624.20	=income!B2	-	-	-	-
Operating adjustments:										
Depreciation and amortization	422.70	448.50	490.80	471.00	583.60					
Loss on disposal of property, plant and equipment	3.60	3.10	53.90	117.50	68.90					
Other operating adjustments	103.00	120.90	(2.40)	(518.30)	(231.10)					
Changes in assets and liabilities:										

Cash Flow Statement: “End-of-Year Cash & Equivalents” flows into the ‘Current Assets’ section of the balance sheet

Dividend paid	(597.10)	(1,325.70)	(1,066.40)	(1,368.30)	(2,559.80)						
Purchase of treasury shares	(1,146.20)	(410.00)	(1,207.50)	(8,560.30)	(4,639.70)						
Net proceeds from issuance of shares	21.80	27.20	37.90	49.00	81.80						
Net proceeds from issuance of notes, net of issuance costs	-	-	1,486.30	-	495.60						
Repayment of debt and finance lease obligations	(2.80)	(3.80)	(3.30)	(12.10)	(516.20)						
Net cash used in financing activities	(1,724.30)	(1,712.30)	(753.00)	(9,891.70)	(7,138.30)	0	0	0	0	0	0
<i>Check</i>	-	0	0	0	0						
Net cash flows	856.90	406.60	2,522.40	882.10	319.60	0	0	0	0	0	0
Effect of changes in exchange rates on cash	5.20	4.60	(5.30)	20.30	(3.10)						
Net increase (decrease) in cash and cash equivalents	862.10	411.20	2,517.10	902.40	316.50	0	0	0	0	0	0
Cash and cash equivalents at beginning of the year	2,259.00	3,121.10	3,532.30	6,049.40	6,951.80	7,268.30	7,268.30	7,268.30	7,268.30	7,268.30	7,268.30
Cash and cash equivalents at end of the year	3,321.10	3,532.30	6,049.40	6,951.80	7,268.30	7,268.30	7,268.30	7,268.30	7,268.30	7,268.30	7,268.30
<i>Check</i>	-	-	-	-	-						

ASSETS											
Cash & cash equivalents	3,121.10	3,532.30	6,049.40	6,951.80	7,268.30	=CashFlow!I47	7,268.30	7,268.30	7,268.30		
Accounts receivables	1,498.20	1,786.80	1,310.30	3,028.00	5,323.80						
Inventories	3,439.50	3,809.20	4,569.40	5,179.20	7,199.70						
Other current assets	2,472.60	3,002.80	4,000.90	3,031.20	3,273.10						
Total current assets	10,531.40	12,131.10	15,930.00	18,190.20	23,064.90		7,268.30	7,268.30	7,268.30	7,268.30	7,268.30

Balance Sheet: [Total Assets = Total Liabilities + Shareholders' Equity]

Assume there are no changes to the balance sheet within the projection period by referencing the cell in each projection year to the preceding year for all balance sheet accounts.

Add up the accounts and build in a *check* at the end of the balance sheet to ensure that the balance sheet balances.

ASSETS											
Cash & cash equivalents	3,121.10	3,532.30	6,049.40	6,951.80	7,268.30		7,268.30	7,268.30	7,268.30	7,268.30	
Accounts receivables	1,498.20	1,786.80	1,310.30	3,028.00	5,323.80	=H11	=H12	=H13	=H14	=H15	
Inventories	3,439.50	3,809.20	4,569.40	5,179.20	7,199.70						
Other current assets	2,472.60	3,002.80	4,000.90	3,031.20	3,273.10						
Total current assets	10,531.40	12,131.10	15,930.00	18,190.20	23,064.90		7,268.30	7,268.30	7,268.30	7,268.30	7,268.30
PPE	1,589.50	1,999.30	2,470.30	2,982.70	3,944.20		3,944.20	3,944.20	3,944.20	3,944.20	
Goodwill	4,541.10	4,541.10	4,629.10	4,555.60	4,555.60		4,555.60	4,555.60	4,555.60	4,555.60	
Other non-current assets	3,474.90	3,958.10	4,238.00	4,502.50	4,735.70		4,735.70	4,735.70	4,735.70	4,735.70	
Total non-current assets	9605.5	10498.5	11337.4	12040.8	13235.5		13235.5	13235.5	13235.5	13235.5	13235.5
Total assets	20136.9	22629.6	27267.4	30231	36300.4		36,300.40	36300.4	36300.4	36300.4	36300.4
LIABILITIES & SHAREHOLDERS' EQUITY											
Accounts payable	964.00	1,062.20	1,377.90	2,116.30	2,565.20		2,565.20	2,565.20	2,565.20	2,565.20	
Accrued liabilities	911.40	1,039.90	1,146.00	1,435.50	1,875.90		1,875.90	1,875.90	1,875.90	1,875.90	
Current portion of long-term debt	-	-	15.40	509.10	746.20		746.20	746.20	746.20	746.20	
Other current liabilities	1,916.50	2,592.00	4,064.20	8,237.10	12,796.30		12,796.30	12,796.30	12,796.30	12,796.30	
Total current liabilities	3,791.90	4,694.10	6,603.50	12,298.00	17,983.60		17983.6	17983.6	17983.6	17983.6	17983.6
Long-term debt	3,026.50	3,108.30	4,662.80	4,075.00	3,514.20		3,514.20	3,514.20	3,514.20	3,514.20	
Other non-current liabilities	1,677.50	2,235.00	2,135.70	3,717.40	5,991.80		5,991.80	5,991.80	5,991.80	5,991.80	
Total non-current liabilities	4,704.00	5,343.30	6,798.50	7,792.40	9,506.00		9506	9506	9506	9506	9506
Total liabilities	8495.9	10037.4	13402	20090.4	27489.6		27489.6	27489.6	27489.6	27489.6	27489.6
Common stock	38.60	38.20	37.60	36.50	36.30		36.30	36.30	36.30	36.30	
APIC	3,741.30	3,772.00	3,780.10	3,876.10	3,940.80		3,940.80	3,940.80	3,940.80	3,940.80	
Treasury stock	(1,621.80)	(1,019.60)	(863.20)	(2,422.80)	(4,641.30)		(4,641.30)	(4,641.30)	(4,641.30)	(4,641.30)	
Retained earnings	9,197.90	9,523.80	10,731.50	8,317.30	9,046.70		9,046.70	9,046.70	9,046.70	9,046.70	
Accumulated other comprehensive income	285.00	277.80	179.40	333.50	428.30		428.30	428.30	428.30	428.30	
Total shareholders' equity	11,641.00	12,592.20	13,865.40	10,140.60	8,810.80		8810.8	8810.8	8810.8	8810.8	8810.8
Total liabilities and shareholders' equity	20136.9	22629.6	27267.4	30231	36300.4		36300.4	36300.4	36300.4	36300.4	36300.4
<i>Check</i>	-	-	-	-	-		-	-	-	-	-

Note: *Check* = Total assets - Total liabilities and shareholders' equity (Should be 0)

II: Income Statement

Income Statement Overview (Basic line items)

Sales (-) COGS
Gross Profit
(-) R&D (-) SG&A (-) D&A
Operating Income
(-) Net interest expense
Income before taxes
(-) Provision for income taxes
Net Income

Projecting Line Items

<u>Line Item</u>	<u>Assumption</u>
Sales	Sales, %Growth
COGS	% of Sales
R&D	% of Sales
SG&A	% of Sales
D&A	<i>To build out D&A Schedule on Balance Sheet</i>
Interest	<i>To build out Debt Schedule on Balance Sheet</i>
Provision for Income Taxes	Corporate tax rate/ Adopt historical effective tax rate

In the figure below, we built out assumptions for the projected period by taking an average of historical figures (for simplicity).

Assumptions										
Sales, %Growth	8.00%	18.26%	33.14%	13.77%	18.29%	16.29%	14.29%	12.29%	10.29%	
COGS, %Sales	54.05%	55.33%	51.37%	47.29%	49.46%	51.50%	50.99%	50.13%	49.88%	50.39%
R&D, %Sales	14.40%	16.65%	15.74%	13.69%	15.37%	15.17%	15.32%	15.06%	14.92%	15.17%
SG&A, %Sales	4.46%	4.40%	3.90%	3.90%	4.47%	4.23%	4.23%	4.23%	4.23%	4.23%
Effective tax rate	16.26%	9.02%	18.54%	20.43%	19.78%	16.81%	16.81%	16.81%	16.81%	16.81%

Using the assumptions above, we populate the relevant line items for their projection period.

	2018A	2019A	2020A	2021A	2022A	2023E	2024E	2025E	2026E	2027E
Sales	10,944.00	11,820.00	13,978.50	18,611.00	21,173.40	25,046.77	29,127.77	33,291.16	37,383.83	41,231.95
COGS	(5,914.80)	(6,540.20)	(7,181.30)	(8,802.00)	(10,473.30)	(12,899.62)	(14,853.22)	(16,687.42)	(18,645.57)	(20,777.74)
Gross Profit	5,029.20	5,279.80	6,797.20	9,809.00	10,700.10	12,147.15	14,274.55	16,603.74	18,738.26	20,454.21
R&D	(1,575.90)	(1,968.50)	(2,200.80)	(2,547.00)	(3,253.50)	(3,799.56)	(4,463.51)	(5,012.94)	(5,577.89)	(6,253.91)
SG&A	(488.00)	(520.50)	(544.90)	(725.60)	(945.90)	(1,058.32)	(1,230.76)	(1,406.68)	(1,579.61)	(1,742.21)
D&A	(422.70)	(448.50)	(490.80)	(471.00)	(583.60)					
Operating Income	2,542.60	2,342.30	3,560.70	6,065.40	5,917.10	7,289.27	8,580.28	10,184.12	11,580.75	12,458.09
Interest	(28.30)	(25.00)	(34.90)	(44.60)	(44.60)					
Income before taxes	2,514.30	2,317.30	3,525.80	6,020.80	5,872.50	7,289.27	8,580.28	10,184.12	11,580.75	12,458.09
Provision for income taxes	(351.60)	(191.70)	(551.50)	(1,021.40)	(969.90)	(1,225.07)	(1,442.04)	(1,711.59)	(1,946.31)	(2,093.76)
Net Income	2,162.70	2,125.60	2,974.30	4,999.40	4,902.60	6,064.21	7,138.24	8,472.54	9,634.44	10,364.33

Note: While we leave out the projections for D&A and Interest in the meantime, we still sum up all line items to obtain net income. (The model adjusts itself when we populate the assumptions for *D&A* and *Interest*)

Rebalancing the 3-statements

Accounting Concept: A change in Net Income on the Income Statement will result in a change in Retained Earnings on the balance sheet.

The *Check* line item of the balance sheet looks like this:

Total liabilities and shareholders' equity	20136.9	22629.6	27267.4	30231	36300.4	36,300.40	36300.4	36300.4	36300.4	36300.4
Check	-	-	-	-	-	6,064.21	13,202.45	21,674.99	31,309.43	41,673.76

Recall from above that net income flows into the cash flow statement. This means that the balance sheet would not be balanced unless we make accounting adjustments. Since the net income at the end of each fiscal year feeds into the *Retained Earnings* account, we make the following adjustment for each year:

Common stock	38.60	38.20	37.60	36.50	36.30	36.30	36.30	36.30	36.30	36.30
APIC	3,741.30	3,772.00	3,780.10	3,876.10	3,940.80	3,940.80	3,940.80	3,940.80	3,940.80	3,940.80
Treasury stock	(1,621.80)	(1,019.60)	(863.20)	(2,422.80)	(4,641.30)	(4,641.30)	(4,641.30)	(4,641.30)	(4,641.30)	(4,641.30)
Retained earnings	9,197.90	9,523.80	10,731.50	8,317.30	9,046.70	=H39+Income! 22	30,721.69	40,356.13	50,720.46	
Accumulated other comprehensive income	285.00	277.80	179.40	333.50	428.30	428.30	428.30	428.30	428.30	428.30

III: Working Capital

Common working capital accounts

1. Accounts receivables (Current assets)
2. Inventory (Current assets)
3. Other current assets (Current assets)
4. Accounts payable (Current liabilities)
5. Accrued liabilities (Current liabilities)
6. Other current liabilities (Current liabilities)

Working Capital Assumptions

While working capital assumptions for some line items could differ depending on financial reporting practices, the table below provides a guide for some of the common approaches:

<u>Line Item</u>	<u>Assumption</u>
Current Assets	
Accounts receivables	Days Sales Outstanding = $\frac{\text{Accounts Receivables}}{\text{Revenue}} \times 365$
Inventory	Days Inventory Outstanding = $\frac{\text{Inventory}}{\text{COGS}} \times 365$
Other current assets	% of Sales
Current Liabilities	
Accounts payable	Days Payable Outstanding = $\frac{\text{Accounts Payable}}{\text{Revenue}} \times 365$
Accrued liabilities	% of COGS
Other current liabilities	% of Sales

Step 1: Building out Working Capital assumptions

In the example below, we populated historical figures using the formulas listed above. For the projection period, we simply took an average of historical figures. However, these could change depending on management expectations, analyst expectations or further research.

Working Capital Assumptions										
	365									
Days sale outstanding	50.0	55.2	34.2	59.4	91.8	=AVERAGE(D48:H48)		58.1	58.1	58.1
Days inventory outstanding	212.3	212.6	232.2	214.8	250.9	224.6	224.6	224.6	224.6	224.6
Other current assets (% of sales)	22.6%	25.4%	28.6%	16.3%	15.5%	21.67%	21.67%	21.67%	21.67%	21.67%
Days payable	59.5	59.3	70.0	87.8	89.4	73.2	73.2	73.2	73.2	73.2
Accrued liabilities (% of COGS)	15.4%	15.9%	16.0%	16.3%	17.9%	16.30%	16.30%	16.30%	16.30%	16.30%
Other current liabilities (% of sales)	17.5%	21.9%	29.1%	44.3%	60.4%	34.64%	34.64%	34.64%	34.64%	34.64%

Step 2: Building out Working Capital accounts (Balance Sheet)

With the working capital assumptions, fill out the projections section of the balance sheet.

	2018A	2019A	2020A	2021A	2022A	2023E	2024E	2025E	2026E	2027E
ASSETS										
Cash & cash equivalents	3,121.10	3,532.30	6,049.40	6,951.80	7,268.30	13,332.51	20,470.75	28,943.29	38,577.73	48,942.06
Accounts receivables	1,498.20	1,786.80	1,310.30	3,028.00	5,323.80	3,987.14	4,636.79	5,299.55	5,951.05	6,563.62
Inventories	3,439.50	3,809.20	4,569.40	5,179.20	7,199.70	7,199.70	7,199.70	7,199.70	7,199.70	7,199.70
Other current assets	2,472.60	3,002.80	4,000.90	3,031.20	3,273.10	3,273.10	3,273.10	3,273.10	3,273.10	3,273.10
Total current assets	10,531.40	12,131.10	15,930.00	18,190.20	23,064.90	27,792.44	35580.3337	44715.6313	55001.5765	65978.4843
PPE	1,589.50	1,999.30	2,470.30	2,982.70	3,944.20	3,944.20	3,944.20	3,944.20	3,944.20	3,944.20
Goodwill	4,541.10	4,541.10	4,629.10	4,555.60	4,555.60	4,555.60	4,555.60	4,555.60	4,555.60	4,555.60
Other non-current assets	3,474.90	3,958.10	4,238.00	4,502.50	4,735.70	4,735.70	4,735.70	4,735.70	4,735.70	4,735.70
Total non-current assets	9605.5	10498.5	11337.4	12040.8	13235.5	13235.5	13235.5	13235.5	13235.5	13235.5
Total assets	20136.9	22629.6	27267.4	30231	36300.4	41,027.94	48815.8337	57951.1313	68237.0765	79213.9843
LIABILITIES & SHAREHOLDERS' EQUITY										
Accounts payable	964.00	1,062.20	1,377.90	2,116.30	2,565.20	2,565.20	2,565.20	2,565.20	2,565.20	2,565.20
Accrued liabilities	911.40	1,039.90	1,146.00	1,435.50	1,875.90	1,875.90	1,875.90	1,875.90	1,875.90	1,875.90
Current portion of long-term debt	-	-	15.40	509.10	746.20	746.20	746.20	746.20	746.20	746.20
Other current liabilities	1,916.50	2,592.00	4,064.20	8,237.10	12,796.30	12,796.30	12,796.30	12,796.30	12,796.30	12,796.30
Total current liabilities	3,791.90	4,694.10	6,603.50	12,298.00	17,983.60	17,983.6	17,983.6	17,983.6	17,983.6	17,983.6

Check	-	-	-	-	-	4,727.54	12,515.43	21,650.73	31,936.68	42,913.58
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Note: Balance sheet will not balance because assets and liabilities have changed but adjustments have not been made to the cash flow statement.

Step 3: Adjustments to Cash Flow Statement

Accounting concept

1. Increase in assets → Decrease in cash
2. Increase in liabilities → Increase in cash

Identify related accounts on the cash flow statement and make adjustments to the related line items:

Accounts receivables	1,498.20	1,786.80	1,310.30	3,028.00	5,323.80	3,987.14	4,636.79	5,299.55	5,951.05	6,563.62
Inventories	3,439.50	3,809.20	4,569.40	5,179.20	7,199.70	7,199.70	7,199.70	7,199.70	7,199.70	7,199.70
Other current assets	2,472.60	3,002.80	4,000.90	3,031.20	3,273.10	3,273.10	3,273.10	3,273.10	3,273.10	3,273.10
Total current assets	10,531.40	12,131.10	15,930.00	18,190.20	23,064.90	29,129.11	36,267.34855	44,739.88507	54,374.32801	64,738.66179

Accounts receivable	212.40	(255.00)	507.50	(1,754.90)	(2,338.00)	=BalanceSheetI11-BalanceSheetII11		(651.50)	(612.57)
Inventories, net	(515.70)	(404.70)	(706.70)	(483.20)	(2,080.90)	-	-	-	-
Other assets	(1,068.90)	(294.40)	(1,200.50)	320.10	(652.10)	-	-	-	-
Accounts payable	97.90	(12.10)	334.30	718.60	406.20	-	-	-	-
Accrued liabilities	237.70	82.10	47.50	347.60	439.70	-	-	-	-
Other liabilities	988.40	995.70	1,549.50	5,744.20	6,666.30	-	-	-	-

Completed working capital accounts on Cash Flow Statement:

Changes in assets and liabilities:										
Accounts receivable	212.40	(255.00)	507.50	(1,754.90)	(2,338.00)	1,336.66	(649.65)	(662.76)	(651.50)	(612.57)
Inventories, net	(515.70)	(404.70)	(706.70)	(483.20)	(2,080.90)	(736.33)	(1,201.89)	(1,128.43)	(1,204.68)	(1,311.74)
Other assets	(1,068.90)	(294.40)	(1,200.50)	320.10	(652.10)	(2,155.29)	(884.48)	(902.33)	(887.00)	(834.00)
Accounts payable	97.90	(12.10)	334.30	718.60	406.20	21.50	391.75	367.80	392.66	427.55
Accrued liabilities	237.70	82.10	47.50	347.60	439.70	226.40	318.39	298.93	319.13	347.49
Other liabilities	988.40	995.70	1,549.50	5,744.20	6,666.30	(4,119.57)	1,413.75	1,442.29	1,417.79	1,333.07

Post-adjustment Balance Sheet:

Total liabilities and shareholders' equity	20,136.90	22,629.60	27,267.40	30,231.00	36,300.40	38,492.94	47,755.06	58,336.61	70,100.63	82,573.07
Check	-	-	-	-	-	-	-	-	-	-

IV: Depreciation/PPE Schedule

PPE-related Accounts

	2018A	2019A	2020A	2021A	2022A	2023E	2024E	2025E	2026E	2027E
Sales	10,944.00	11,820.00	13,978.50	18,611.00	21,173.40	25,046.77	29,127.77	33,291.16	37,383.83	41,231.95
COGS	(5,914.80)	(6,540.20)	(7,181.30)	(8,802.00)	(10,473.30)	(12,899.62)	(14,853.22)	(16,687.42)	(18,645.57)	(20,777.74)
Gross Profit	5,029.20	5,279.80	6,797.20	9,809.00	10,700.10	12,147.15	14,274.55	16,603.74	18,738.26	20,454.21
R&D	(1,575.90)	(1,968.50)	(2,200.80)	(2,547.00)	(3,253.50)	(3,799.56)	(4,463.51)	(5,012.94)	(5,577.89)	(6,253.91)
SG&A	(488.00)	(520.50)	(544.90)	(725.60)	(945.90)	(1,058.32)	(1,230.76)	(1,406.68)	(1,579.61)	(1,742.21)
D&A	(422.70)	(448.50)	(490.80)	(471.00)	(583.60)					
Operating Income	2,542.60	2,342.30	3,560.70	6,065.40	5,917.10	7,289.27	8,580.28	10,184.12	11,580.75	12,458.09

Cash Flows from Operating Activities											
Net income		2,591.60	2,592.30	3,553.70	5,883.20	5,624.20	6,064.21	7,138.24	8,472.54	9,634.44	10,364.33
Operating adjustments:											
Depreciation and amortization		422.70	448.50	490.80	471.00	583.60					
Loss on disposal of property, plant and equipment		3.60	3.10	53.90	117.50	68.90					
Other operating adjustments		103.00	120.90	(2.40)	(518.30)	(231.10)					
Changes in assets and liabilities:											
Accounts receivable		212.40	(255.00)	507.50	(1,754.90)	(2,338.00)	1,336.66	(649.65)	(662.76)	(651.50)	(612.57)
Inventories, net		(515.70)	(404.70)	(706.70)	(483.20)	(2,080.90)	(736.33)	(1,201.89)	(1,128.43)	(1,204.68)	(1,311.74)
Other assets		(1,068.90)	(294.40)	(1,200.50)	320.10	(652.10)	(2,155.29)	(884.48)	(902.33)	(887.00)	(834.00)
Accounts payable		97.90	(12.10)	334.30	718.60	406.20	21.50	391.75	367.80	392.66	427.55
Accrued liabilities		237.70	82.10	47.50	347.60	439.70	226.40	318.39	298.93	319.13	347.49
Other liabilities		988.40	995.70	1,549.50	5,744.20	6,666.30	(4,119.57)	1,413.75	1,442.29	1,417.79	1,333.07
Net cash provided by operating activities		3,072.70	3,276.40	4,627.60	10,845.80	8,486.80	637.57	6526.1139	7888.0338	9020.826	9714.1278
<i>Check</i>		-	-	-	-	-					
Cash Flows from Investing Activities											
Purchase of property, plant and equipment		(574.00)	(766.60)	(962.00)	(900.70)	(1,281.80)					
Other investing activities		82.50	(390.90)	(390.20)	828.70	252.90					
Net cash used in investing activities		(491.50)	(1,157.50)	(1,352.20)	(72.00)	(1,028.90)	0	0	0	0	0

ASSETS											
Cash & cash equivalents		3,121.10	3,532.30	6,049.40	6,951.80	7,268.30	7,905.87	14,431.99	22,320.02	31,340.85	41,054.98
Accounts receivables		1,498.20	1,786.80	1,310.30	3,028.00	5,323.80	3,987.14	4,636.79	5,299.55	5,951.05	6,563.62
Inventories		3,439.50	3,809.20	4,569.40	5,179.20	7,199.70	7,936.03	9,137.92	10,266.35	11,471.03	12,782.77
Other current assets		2,472.60	3,002.80	4,000.90	3,031.20	3,273.10	5,428.39	6,312.87	7,215.20	8,102.20	8,936.21
Total current assets		10,531.40	12,131.10	15,930.00	18,190.20	23,064.90	25,257.44	34,519.56	45,101.11	56,865.13	69,337.57
PPE, net		1,589.50	1,999.30	2,470.30	2,982.70	3,944.20	3,944.20	3,944.20	3,944.20	3,944.20	3,944.20
Goodwill		4,541.10	4,541.10	4,629.10	4,555.60	4,555.60	4,555.60	4,555.60	4,555.60	4,555.60	4,555.60
Other non-current assets		3,474.90	3,958.10	4,238.00	4,502.50	4,735.70	4,735.70	4,735.70	4,735.70	4,735.70	4,735.70
Total non-current assets		9,605.50	10,498.50	11,337.40	12,040.80	13,235.50	13,235.50	13,235.50	13,235.50	13,235.50	13,235.50
Total assets		20,136.90	22,629.60	27,267.40	30,231.00	36,300.40	38,492.94	47,755.06	58,336.61	70,100.63	82,573.07

Basic Accounting Principles:

1. *Net PPE = Gross PPE - Accumulated Depreciation*
2. *Increase in Depreciation Expense (all other factors kept constant): Increase in Accumulated Depreciation; Decrease in Net PPE*
3. *Purchase of PPE (all other factors kept constant): Increase in Gross PPE, Increase in Net PPE*

For simplicity, we will only project the following items on the depreciation schedule:

Beginning PPE
(+/-) CapEx
(-) Depreciation
(-) Sales & Write-offs
Closing PPE

Assumptions

Capex as % of revenue	5.24%	6.49%	6.88%	4.84%	6.05%	5.90%	5.90%	5.90%	5.90%	5.90%
D&A as % of additions	73.64%	58.51%	51.02%	52.29%	45.53%	56%	56%	56%	56%	56%

Basic PPE Schedule

PPE Schedule						
Beginning PPE					3,944.20	4,591.63
More CapEx					1,478.06	1,718.88
Less Depreciation					(830.63)	(965.97)
Less sales and write-offs					0	0
Closing PPE					3,944.20	4,591.63
					5,344.54	6,205.07
					7,171.40	8,237.19
					2,206.09	2,433.17
					(1,239.77)	(1,367.38)

Income Statement Adjustments

Add Depreciation expense to D&A

R&D	(1,575.90)	(1,968.50)	(2,200.80)	(2,547.00)	(3,253.50)	(3,799.56)	(4,463.51)	(5,012.94)	(5,577.89)	(6,253.91)
SG&A	(488.00)	(520.50)	(544.90)	(725.60)	(945.90)	(1,058.32)	(1,230.76)	(1,406.68)	(1,579.61)	(1,742.21)
D&A	(422.70)	(448.50)	(490.80)	(471.00)	(583.60)	(830.63)	(965.97)	(1,104.04)	(1,239.77)	(1,367.38)
Operating Income	2,542.60	2,342.30	3,560.70	6,065.40	5,917.10	7,289.27	8,580.28	10,184.12	11,580.75	12,458.09

Balance Sheet Adjustments

Update PPE, net as shown below:

PPE, net	1,589.50	1,999.30	2,470.30	2,982.70	3,944.20	4,591.63	5,344.54	6,205.07	7,171.40	8,237.19
Goodwill	4,541.10	4,541.10	4,629.10	4,555.60	4,555.60	4,555.60	4,555.60	4,555.60	4,555.60	4,555.60
Other non-current assets	3,474.90	3,958.10	4,238.00	4,502.50	4,735.70	4,735.70	4,735.70	4,735.70	4,735.70	4,735.70

Cash Flow Statement Adjustments

Link cash flow statement to PPE schedule (Note: Numbers are color-coded green)

1. Add back Depreciation (non-cash expense)
2. Assumed no loss on disposal of PPE (PPE schedule does not account for this either)
3. Reduce cash flow by amount of CapEx

Depreciation and amortization	422.70	448.50	490.80	471.00	583.60	830.63	965.97	1,104.04	1,239.77	1,367.38
Loss on disposal of property, plant and equipment	3.60	3.10	53.90	117.50	68.90	0	0	0	0	0
Other operating adjustments	103.00	120.90	(2.40)	(518.30)	(231.10)					
Changes in assets and liabilities:										
Accounts receivable	212.40	(255.00)	507.50	(1,754.90)	(2,338.00)	1,336.66	(649.65)	(662.76)	(651.50)	(612.57)
Inventories, net	(515.70)	(404.70)	(706.70)	(483.20)	(2,080.90)	(736.33)	(1,201.89)	(1,128.43)	(1,204.68)	(1,311.74)
Other assets	(1,068.90)	(294.40)	(1,200.50)	320.10	(652.10)	(2,155.29)	(884.48)	(902.33)	(887.00)	(834.00)
Accounts payable	97.90	(12.10)	334.30	718.60	406.20	21.50	391.75	367.80	392.66	427.55
Accrued liabilities	237.70	82.10	47.50	347.60	439.70	226.40	318.39	298.93	319.13	347.49
Other liabilities	988.40	995.70	1,549.50	5,744.20	6,666.30	(4,119.57)	1,413.75	1,442.29	1,417.79	1,333.07
Net cash provided by operating activities	3,072.70	3,276.40	4,627.60	10,845.80	8,486.80	1,468.20	7492.0831	8992.0743	10260.592	11081.51
<i>Check</i>	-	-	-	-	-					
Cash Flows from Investing Activities										
Purchase of property, plant and equipment	(574.00)	(766.60)	(962.00)	(900.70)	(1,281.80)	(1,478.06)	(1,718.88)	(1,964.57)	(2,206.09)	(2,433.17)

V: Debt Schedule (Long-Term Debt)

Related Accounts

Interest	(28.30)	(25.00)	(34.90)	(44.60)	(44.60)					
Income before taxes	2,514.30	2,317.30	3,525.80	6,020.80	5,872.50	7,289.27	8,580.28	10,184.12	11,580.75	12,458.09
<i>Repayment of debt and finance lease obligations</i>										
<i>Net cash used in financing activities</i>										
<i>Current portion of long-term debt</i>										
<i>Other current liabilities</i>										
Total current liabilities										
<i>Long-term debt</i>										
<i>Other non-current liabilities</i>										
Total non-current liabilities										

Basic Accounting Principles

1. *Interest (income statement) = Cash interest - interest expense from debt*
2. *Repayment of debt & finance lease obligations = mandatory principle payments*
3. *Total long-term debt = Long-term debt + current portion of long-term debt, where current portion of long-term debt is debt maturing in a year or less*

For simplicity, we build the following line items on the debt schedule:

Long-term debt		4,260.40	3,514.20	3,514.20	2,514.20	1,514.20
Beginning Balance		(746.20)	-	(1,000.00)	(1,000.00)	(750.00)
(-) Mandatory Repayment						
Final Balance		3,514.20	3,514.20	2,514.20	1,514.20	764.20
Current portion of Long-term debt			-	1,000.00	1,000.00	750.00
Interest payment						-
Average debt balance		3,887.30	3,514.20	3,014.20	2,014.20	1,139.20
Effective interest rate		3.50%	3.50%	3.50%	3.50%	3.50%
Interest payment		(136.06)	(123.00)	(105.50)	(70.50)	(39.87)
Interest Income						
Average cash balance		6,862.22	9,330.40	15,237.90	21,860.00	29,504.17
Cash Interest		68.62	93.30	152.38	218.60	295.04
Interest (Income)		1.00%	1.00%	1.00%	1.00%	1.00%

Note: Much of the data such as mandatory repayments and effective interest rate would be available on the 10k.

Income Statement Adjustments

We combine both interest expense and interest income as shown below:

Interest	(28.30)	(25.00)	(34.90)	(44.60)	(44.60)	(37.46)	4.28	86.16	197.75	314.02
Income before taxes	2,514.30	2,317.30	3,525.80	6,020.80	5,872.50	7,251.81	8,584.56	10,270.28	11,778.50	12,772.11

Balance Sheet Adjustments

LIABILITIES & SHAREHOLDERS' EQUITY										
Account payable	964.00	1,062.20	1,377.90	2,116.30	2,565.20	2,586.70	2,978.45	3,346.25	3,738.91	4,166.46
Accrued liabilities	911.40	1,039.90	1,146.00	1,435.50	1,875.90	2,102.30	2,420.69	2,719.62	3,038.75	3,386.23
Current portion of long-term debt	-	-	15.40	509.10	746.20	-	1,000.00	1,000.00	750.00	-
Other current liabilities	1,916.50	2,592.00	4,064.20	8,237.10	12,796.30	8,676.73	10,090.47	11,532.76	12,950.54	14,283.61
Total current liabilities	3,791.90	4,694.10	6,603.50	12,298.00	17,983.60	13,365.73	16,489.61	18,598.63	20,478.20	21,836.31
Long-term debt	3,026.50	3,108.30	4,662.80	4,075.00	3,514.20	3,514.20	2,514.20	1,514.20	764.20	764.20
Other non-current liabilities	1,677.50	2,235.00	2,135.70	3,717.40	5,991.80	5,991.80	5,991.80	5,991.80	5,991.80	5,991.80
Total non-current liabilities	4,704.00	5,343.30	6,798.50	7,792.40	9,506.00	9,506.00	8,506.00	7,506.00	6,756.00	6,756.00

Cash Flow Statement Adjustments

Repayment of debt and finance lease obligations	(2.80)	(3.80)	(3.30)	(12.10)	(516.20)	(746.20)	-	(1,000.00)	(1,000.00)	(750.00)
Net cash used in financing activities	(1,724.30)	(1,712.30)	(753.00)	(9,891.70)	(7,138.30)	-746.2	0	-1000	-1000	-750

Part III: Valuations

I: DCF

PV of FCF

The enterprise value of a company is essentially the present value of all future operating cash flows available for all creditors and equity holders. As such, we ignore cash flow from financing activities. While the formula of a DCF is $NOPAT + D\&A - \text{Change in Net Working Capital} - \text{CapEx}$, we are conceptually trying to obtain operating cash flows by adding back *non-cash expenses*, adjusting *cash flows from working capital changes*, and deducting *investment expenses*.

As such, we can obtain the PV of FCF by applying the discount rate on the company's annual FCF:

Discounted Cash Flow									
Cash flow from operations	3,072.70	3,276.40	4,627.60	10,845.80	8,486.80	1,412.10	7,467.38	9,031.08	10,383.80
(-) CapEx	574.00	766.60	962.00	900.70	1,281.80	1,478.06	1,718.88	1,964.57	2,206.09
FCF	3,646.70	4,043.00	5,589.60	11,746.50	9,768.60	2,890.16	9,186.26	10,995.65	12,589.89
Discount Rate						0.91	0.83	0.76	0.69
PV of FCF						2,635.13	7,636.56	8,334.11	8,700.42
									8,649.12

Terminal Value - Gordon Growth Method

To get the cash flows of a company into perpetuity beyond the projection period, we simply apply the gordon growth method using the following formula:

$$\frac{\text{Final year cash flow } (1+g)}{\text{WACC} - g}$$

where g is the perpetual growth rate and WACC is the Weighted Average Cost of Capital

Discounting the terminal value to the present period would give us the present value of cash flows beyond the projection period.

Discount Rate

The discount rate is given by the Weighted Average Cost of Capital (WACC), which can be computed using the following formula:

$$\text{WACC} = \% \text{ Debt} * \text{Cost of debt} + \% \text{ Equity} * \text{Cost of equity}$$

Cost of debt	Credit Spread corresponding to Credit Rating of firm
Cost of equity	Risk free rate + β * Market Risk Premium

From the credit spread, we are able to obtain a cost of debt of 1.42%:

Credit Spread by rating	
D2/D	20.00%
C2/C	17.50%
Ca2/CC	15.78%
Caa/CCC	11.57%
B3/B-	7.37%
B2/B	5.26%
B1/B+	4.55%
Ba2/BB	3.13%
Ba1/BB+	2.42%
Baa2/BBB	2.00%
A3/A-	1.62%
A2/A	1.42%
A1/A+	1.23%
Aa2/AA	0.85%
Aaa/AAA	0.69%

We estimate the beta using a set of comparable companies:

Beta estimates					
Company	5Y Beta	Debt	Market Cap	D/E	Unlevered Beta
Analog Devices	1.15	6,730.00	90,907.00	0.07	1.08
Texas Instruments	1.14	11,200.00	154,200.00	0.07	1.07
Intel	1.21	49,040.00	153,320.00	0.32	0.95
Nvidia	1.75	11,890.00	1,200,000.00	0.01	1.74
AMD	1.61	2,860.00	176,840.00	0.02	1.59
Applied Materials	1.62	5,650.00	128,820.00	0.04	1.56
Qualcomm	1.29	15,400.00	128,770.00	0.12	1.17
Micron Technology	1.47	13,840.00	77,100.00	0.18	1.28
Lam Research Corp	1.62	5,003.00	93,020.00	0.05	1.55
Median Unlevered Beta					1.28

Because of diversified geographical exposure, we take the respective countries' risk free rates and risk premiums to obtain a weighted average cost of equity:

Cost of equity					
Region	2022 Net Sales	Exposure	Risk-free rate	Risk Premium	Cost of equity
Japan	1008.6	4.91%	0.68%	6.07%	8.42%
South Korea	6045.6	29.43%	3.78%	5.75%	11.11%
Singapore	475.5	2.31%	3.26%	5.00%	9.64%
Taiwan	8095.5	39.41%	1.15%	5.91%	8.69%
China	2916	14.20%	2.63%	6.07%	10.37%
Rest of Asia	7.7	0.04%			
Netherlands	9.2	0.04%	2.78%	5.00%	9.16%
EMEA	624.5	3.04%			
United States	1991.3	9.69%	4.18%	5.00%	10.56%
Aggregate	20541.7	100.00%			9.83%

Obtaining an implied share price

Implied EV = PV of FCF within projection period + Terminal value

EV = Market Cap + Debt - Cash

We can thus obtain the implied market capital of the company using the formulas above as shown below:

Implied Share Price	
Terminal Value	96,481.00
Total PV	35,931.95
Implied EV	132,412.95
(-) Debt	4,969.59
(+) Cash	4,751.83
Implied Market Cap	132,195.19
Diluted shares out.	392.68
Implied share price	336.65
Implied Ev/EBITDA	20.4x
Implied P/E	27.3x