

# -Financial Statements & Cash Flows

Goal is to learn how to estimate the future cash flows and discount rate of the firm.

## Financial statements

- The goal of the financial statements is to provide information to owners and creditors about the firm's financial status and historical performance. Investors need information on the profitability and financial status of the firm. Does the firm carry debt or equity on its books? This examination helps the firm set and work toward targets. The idea is more equity and less debt.

- Provide a convenient way to owners and creditors to set performance targets

- Provide a convenient template for financial planning

- Prepared according to GAAP (Generally Accepted Accounting Principles). All firms must follow GAAP and this creates an equal footing for comparison of firms based on financial statements.

- **Reported quarterly and annually**, the annual statements cover information from the entire preceding year and are more detailed.

We derive information on the firm's future cash flows from its financial statements.

## The Balance Sheet

- Summarizes the financial status of the firm at a particular date (**snapshot of 1 day**).

- The balance sheet identity:

$$\text{Assets} = \text{Liabilities} + \text{Stockholder's Equity}$$

The liabilities and equity constitute the **financial structure** of the firm.

- The assets are listed in a **liquidity order, easiest to convert to cash first**.

- Both assets and liabilities are divided into **current (less than one year)** and **long-term (longer than a year)** sections

- Amounts measured at historical values, not market values (historical values means the amount you paid for the asset). Balance sheet values based on **historical values**, what was paid for the asset, as opposed to the present value of the asset.

- The balance sheet omits economic significant intangible assets (e.g., R&D) and liabilities (e.g., pending lawsuits)

**CURRENT ASSETS** are those which will be converted to cash within the next year.

**LONG TERM ASSETS** will not be converted to cash within the coming year. Same idea applies to liabilities.

**INTANGIBLE ASSETS** do not appear on the balance sheet just as some liabilities do not.

## The Balance Sheet

**TABLE 2.1** The Balance Sheet of the U.S. Composite Corporation

U.S. COMPOSITE CORPORATION					
Balance Sheet					
20X2 and 20X1					
(in \$ millions)					
Assets	20X2	20X1	Liabilities (Debt) and Stockholders' Equity	20X2	20X1
Current assets:			Current liabilities:		
Cash and equivalents	\$ 140	\$ 107	Accounts payable	\$ 213	\$ 197
Accounts receivable	294	270	Notes payable	50	53
Inventories	269	280	Accrued expenses	223	205
Other	58	50	Total current liabilities	\$ 486	\$ 455
Total current assets	\$ 761	\$ 707	Long-term liabilities:		
Fixed assets:			Deferred taxes	\$ 117	\$ 104
Property, plant, and equipment	\$1,423	\$1,274	Long-term debt <sup>1</sup>	471	458
Less accumulated depreciation	(550)	(460)	Total long-term liabilities	\$ 588	\$ 562
Net property, plant, and equipment	873	814	Stockholders' equity:		
Intangible assets and others	245	221	Preferred stock	\$ 39	\$ 39
Total fixed assets	\$1,118	\$1,035	Common stock (\$1 par value)	55	32
			Capital surplus	347	327
			Accumulated retained earnings	390	347
			Less treasury stock <sup>2</sup>	(26)	(20)
			Total equity	\$ 805	\$ 725
Total assets	\$1,879	\$1,742	Total liabilities and stockholders' equity <sup>3</sup>	\$1,879	\$1,742

<sup>1</sup>Long-term debt rose by \$471 million – \$458 million = \$13 million. This is the difference between \$86 million new debt and \$73 million in retirement of old debt.

<sup>2</sup>Treasury stock rose by \$6 million. This reflects the repurchase of \$6 million of U.S. Composite's company stock.

<sup>3</sup>U.S. Composite reports \$43 million in new equity. The company issued 23 million shares at a price of \$1.87. The par value of common stock increased by \$23 million, and capital surplus increased by \$20 million.

## The Income Statements

- Summarizes the profitability of the firm during a time period
- The accounting definition of income:

$$\text{Income} = \text{Revenue} - \text{Expenses}$$

- Breaks the income into different types
  - gross income
  - operating income
  - taxable income
  - net income

- The matching principal of GAAP dictates that revenues be matched with expenses. Thus, income is reported when it is earned, even though no cash flow may have occurred

- Not all of the items in the income statements represent actual cash flows (e.g. depreciation, deferred taxes)

GAAP says to match revenue to cost even though you may not have received the cash yet.

Some items on the Income Statement are not cash, depreciation for example, but these items still effect earnings, not as a cash outflow but as an expense.

## The Income Statement

U.S. COMPOSITE CORPORATION Income Statement 20X2 (in \$ millions)	
Total operating revenues	\$2,262
Cost of goods sold	- 1,655
Selling, general, and administrative expenses	- 327
Depreciation	- 90
Operating income	\$190
Other income	29
Earnings before interest and taxes	\$219
Interest expense	- 49
Pretax income	\$170
Taxes	- 84
Current: \$71	
Deferred: \$13	
Net income	\$86
Retained earnings:	\$43
Dividends:	\$43

The non-operating section of the income statement includes all financing costs, such as interest expense.

Usually a separate section reports as a separate item the amount of taxes levied on income.

Net income is the “bottom line”.

**Cost of Goods Sold:** cost to produce the product:

$$\text{Gross Income} = \text{Revenue} - \text{COGS}$$

**Sales, General, and Administrative (SGA):** marketing, building, etc.

**Other Income:** all other income from activities other than primary income.

**Interest Expense:** coupon payments to bond holders.

**Deferred:** taxes expected to be paid in the future.

Matching Principle: All revenues must match all expenses. SoCF must follow this rule. This means that when you recognize revenue for certain products you must at the same time (the same report) recognize all the expenses that you paid for that work. Without this principle of GAAP a firm could manipulate cash flows and create deceiving financial statements. Matching **REVENUE** to **COST**. It may be necessary to log entries for cash not yet received because you must match **COST** (of an item sold for instance) to revenues (for payments not yet received).

We will use this principle in our analysis in order to remove entries for payments not yet received because we are interested in CASH FLOWS not in what is owed to us in the future. We are interested in CASH and not in earnings. Also, there are often items in the income statement which are not cash at all, we must remove these as well. Depreciation (an expense) is an example, not a cash item but it affects the earnings and income statement.

## The Statement of Cash Flow

- Shows **only the cash items** during the last quarter or last year.
- Shows the cash that flowed into and from the firm during a time period

Getting “cash from operating activities” from the income statement but only the cash items.

This is past cash but **we want to know an estimate of the FUTURE CASH FLOWS**. We are not interested in past cash! Statement of Cash Flows will give us the cash flows of the past, not what we want. We will first find the future earnings and then derive the future cash flows.

### 3 Sources of Cash Flows:

**Total cash flow = cash from operating activities +  
cash from investing activities +  
cash from financing activities**

**Cash from Operating Activities:** takes into account only the cash items whereas the income statement takes into account cash and non-cash items. To derive CfOA from income statement we must extract only the cash items.

**Example:**

		Cash	Non-Cash
Revenue	100	70	30
Expense	80	55	25
Net Income	<u>20</u>	<u>15</u>	

net income = 20 - 30 + 25 = 15

net cash flow from operating activities

Here we see that not all of the revenue and expenses are cash items. The income statement will say that the net income is 20 whereas CfOA will be 15. Another way to calculate the 15 is to start with the net income and subtract the non-cash revenue and add the non-cash expenses. Here we have started with the net income and undone all the non-cash items.

**Cash from Investing Activities:** buying and selling assets required by the business.

**Cash from Financing Activities:** issuing stocks and bonds, dividends, retiring bonds, all cash inflows are related to financing activities.

**Cash from investing and cash from financing** are listed in the conventional ways (does not use the “matching principle”). These are only cash items.

- **Much less sensitive to accounting methods than the balance sheet and the income statement**

**EXAM**

- Cash versus earnings: A firm may be profitable and short of cash

Need to know current then estimate future cash flows.

Example: Get cash from operations by reviewing income statement for cash items only.

This is actually done by starting with Net Income and undoing all non-cash items.

Cash from financing: (?)

## The Statement of Cash Flow

U.S. COMPOSITE CORPORATION	
Statement of Cash Flows	
20X2	
(in \$ millions)	
<b>Operations</b>	
Net income	\$ 86
Depreciation	90
Deferred taxes	13
Changes in assets and liabilities	
Accounts receivable	(24)
Inventories	11
Accounts payable	16
Accrued expenses	18
Notes payable	(3)
Other	(8)
<b>Total cash flow from operations</b>	<b>\$ 199</b>
<b>Investing activities</b>	
Acquisition of fixed assets	\$(198)
Sales of fixed assets	25
<b>Total cash flow from investing activities</b>	<b>\$(173)</b>
<b>Financing activities</b>	
Retirement of debt (including notes)	\$ (73)
Proceeds of long-term debt	86
Dividends	(43)
Repurchase of stock	(6)
Proceeds from new stock issues	43
<b>Total cash flow from financing activities</b>	<b>\$ 7</b>
<b>Change in cash (on the balance sheet)</b>	<b>\$ 33</b>

Net change in cash flow during the period.

Remember that cash flow is very different from earnings. May have a lot of cash flow in a period but very little earnings! Likewise, the firm can be very profitable at one point but have very little cash flow. Income statement is an earnings based statement.

Taxes are paid based on earnings. - The **IRS uses accounting income to compute tax**, so **accounting rules have a second order effect on cash flows** through taxes. Future tax based on future earnings. So we see why it is so important to have estimates of future income statement and future cash flows, because future taxes will be based on these future earnings.

## Learning from Financial Statements

**FINANCIAL RATIOS ANALYSIS** is a common way to use information from financial statements to evaluate a firm's financial health and performance. They allow us to extract the information we need. A financial ratio is one number which captures information of the aspect we are interested in.

- **Financial leverage**

$$\text{Debt Ratio} = \frac{\text{Total Debt}}{\text{Total Assets}} \quad (\text{liability situation})$$

- **Liquidity**

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}} \quad (\text{want this ration } > 1, \text{ very important, want at least 2!})$$

Need liquidity to make sure the company can meet it's liabilities and take advantage of growth opportunities. Most important to meet liabilities though. Current assets means all the cash that we will have in the next year. Current liabilities is all the cash we will have to pay next year. If the current ratio is lower than 1 the firm is in real trouble, it will not be able to pay it's liabilities.

- **Profitability**

$$\text{Profit Margin} = \frac{\text{Net Income}}{\text{Sales}}$$

Most useful method, 50% is very good, tells us of the firms profitability.

- **Efficiency**    turning assets into revenue

$$\text{Asset Turnover} = \frac{\text{Sales}}{\text{Total Assets}} \quad \text{Is the firm efficient at turning assets into income?}$$

A ratio of 1 is not very efficient, bigger is better.

- **Market value**

$$\text{Market-to-Book} = \frac{\text{Price per Share}}{\text{Book Value per Share}}$$

Higher means the company has more investment opportunities, growth potential.

# Accounting Statements and Cash Flow

Chapter 2 reviews the basic financial statements of a firm and shows how information from these statements can be used to determine cash flow. The balance sheet provides a snapshot of the firm's assets, liabilities, and shareholders' equity on the last day of the fiscal year. The income statement and statement of financial cash flow provide a view of the firm's activities over the preceding fiscal year. Financial statements report values based on historical cost and income based on accrued revenues and expenses. The chapter emphasizes, however, that financial managers are concerned about the market values of the firm's assets and liabilities and the firm's cash flow, which ultimately determines these values. The chapter demonstrates how financial managers and others can use information in financial statements to derive cash flows going to the firm, to creditors, and to stockholders. Appendix A reviews financial ratios used to assess the health and vitality of the firm and Appendix B concludes with a discussion of current tax rates.

The major concepts discussed in Chapter 2 are outlined below.

- **Balance Sheet**
  - accounting liquidity
  - debt versus equity
  - value versus cost
- **Income Statement**
  - GAAP
  - noncash items
  - time and costs
  - fixed versus variable costs
  - product versus period costs
- **Net Working Capital**
  - changes in net working capital
- **Financial Cash Flow**
  - to the firm

- to creditors
- to shareholders
- total cash flow
- operating cash flow
- **Statement of Cash Flow**

## Chapter Summary

Besides introducing you to corporate accounting, the purpose of this chapter has been to teach you how to determine cash flow from the accounting statements of a typical company.

1. Cash flow is generated by the firm and paid to creditors and shareholders. It can be classified as:
  - a. Cash flow from operations.
  - b. Cash flow from changes in fixed assets.
  - c. Cash flow from changes in working capital.
2. Calculations of cash flow are not difficult, but they require care and particular attention to detail in properly accounting for noncash expenses such as depreciation and deferred taxes. It is especially important that you do not confuse cash flow with changes in net working capital and net income.

# Identifying the Relevant Cash Flows

## What to discount?

Firm will generate future cash flows. What do we expect to get from the firm? How much in terms of cash? If they generate \$10 million we know the investors will not receive it all. The firm has a certain retention ratio which it uses for reinvestment. The cash flow free to distribute to the investors will be the income minus the investment.

- **Free Cash Flow** is defined as cash flow generated by the business that is not retained and reinvested; *i.e.*, the cash available to distribute to investors

Need to know retention ratio to figure out what is returned to investors. Investors get the Free Cash Flow.

- In its simplest form:

$$\text{Free Cash Flows} = \text{Revenues} - \text{Costs} - \text{Investment}$$

- When financial statements are used to estimate cash flows, accounting adjustments or accruals must be undone to recapture cash flows

- Revenues and costs are recorded when “earned” or “incurred”, rather than when cash is received or paid

Undo the effects of non-cash items, then we are left with only cash.

We will predict the future performance of the firm in terms of revenue, expenses, salaries, depreciation, everything. Based on these predictions we will build the future income statements of the firm, will predict the future earnings.

We begin with the income statement but we know it is effected by non-cash items. We will derive the cash flow from this statement by undoing all the accounting adjustments (accruals), limit the effect of all the non-cash items. At this point we will be left with only the free cash flows.

## What to discount?

- When analyzing an investment in specific projects, three types of cash flows should be considered

### 3 types of cash flows

**1. Initial Outlay**: cash flows resulting initially from the project (typically negative). Paid before project even starts. Buy machines, rent space, etc.

**2. Operating (Differential) Cash Flows**: cash in-flows and out-flows generated by the project during its operation. Revenues, production costs, salaries, taxes, etc. Usually positive because we want the project to be profitable.

Differential cash flow of the project during its operation should be positive to indicate an overall positive cash flow.

**3. Terminal Cash Flows**: cash flows resulting from the disposition of the project (typically positive). Assets we sell after the project has completed.

Each project is characterized by these three types of cash flows. Separate relevant cash flows from non-relevant cash flows. Want to identify only relevant cash flows. What affects this distinction?

Regardless of whether the cash flow is coming from initial outlay or terminal, to identify the relevant cash flow we need to look only at cash flows that are related to the project (results of taking the project) and ignore all other cash flows that may appear in the same time of the project and may look like they are related to the project but in fact they have nothing to do with the project.

Our task will be to distinguish between the relevant cash flow and the non-relevant cash flow and to take into consideration only the relevant cash flows.

To do this we will first talk about the major factors which effect this distinction. This will help us make the right call about which items we want to identify as cash flow.

## What to discount?

- When estimating free cash flows, we should consider the following factors:

## INCREMENTAL CASH FLOWS

Incremental Cash Flows will occur ONLY if the project is accepted. Does not include all the cash flows that occur anyway regardless of taking the project. Only Incremental cash flows should be estimated;

$$\text{Incremental CF} = [\text{CF with Project}] - [\text{CF without Project}]$$

(CF = Cash Flow)

So why is incremental cash flow the relevant cash flow? Because our goal is to make an investment decision, so cash flows that will happen regardless should not effect our decision.

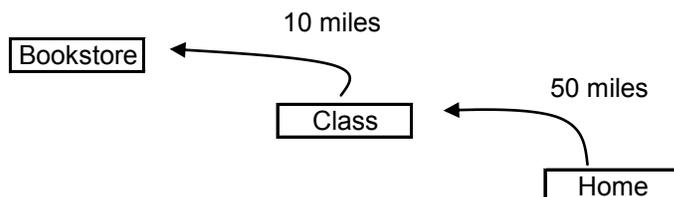
### Example:

Suppose a machine is generating positive cash flows of \$50,000. If you buy another machine, the cash flows will increase to \$125,000. What are the relevant cash flows to making the investment decision?

This principle allows to evaluate each project separately.

We have 50,000 in any event so  $125,000 - 50,000 = 75,000$  is the incremental cash flow.

### Example



Gas = \$0.10 per mile      **\$2 incremental cost (20 extra miles)**  
 Only marginal / differential should effect our decision, only this is relevant.

## Factors affecting the incremental Cash Flows

[The following are the major costs.]

### OPPORTUNITY COSTS

#### **Example:**

An empty warehouse could be used to store a new product under consideration or could be sold for \$10 million.

Should any “cost” for using the warehouse be included in NPV analysis for the new product under consideration?

Yes, we would consider these. If we do not take the project we have the opportunity to make \$10 million. Consider the project and warehouse to be mutually exclusive.

We want whichever has the higher Present Value, project or selling the warehouse. Only consider things we lose if we take the project.

**OPPORTUNITY COST SHOULD ALWAYS BE CONSIDERED!**

Opportunity: the other things we can do (earn) if we do not take the project.

## **SUNK COSTS**

### **Example:**

You spent \$100,000 last year on a marketing study to estimate the demand for a new product, and found that the product is likely to be well-received (i.e. high demand).

Today, you are trying to decide whether to continue the development of the product. Should the \$100,000 spent on the marketing study be included in your capital budgeting analysis?

**No!** This cost is not dependent on whether or not we take the project.

**Sunk Cost cannot be recovered.**

**Do not consider this cost in analysis of the project!**

Don't go in the wrong direction with a project just because you've spent some money.

## **SIDE EFFECTS**

### **Example:**

Coca-Cola is considering an introduction of caffeine-free, toasted marshmallow, crystal coke. The brand manager for this potential product is confident that it will decrease the demand for other Coca-Cola products.

Should this expected reduction be taken into account in the new product decision?

Yes consider. We only incur this cost if we take the project.

**Synergy and Erosion are always considered!**

## **ALLOCATED COSTS**

### **Example:**

Consider the Coca-Cola new product introduction from the previous example.

If the new product could be produced using one of the current machines of Coca-Cola. should the cost of the machine be taken into account in the decision?

**NO!** We would not take into account the value of the machine. It is already standing there! We only consider incremental costs.

## What to discount? (This is beyond incremental)

- When estimating free cash flows, we should consider the following factors:

## NET WORKING CAPITAL CHANGES

Net working capital is the difference between current assets and current liabilities

$$\text{Net Working Capital} = \text{Current Assets} - \text{Current Liabilities}$$

- **An increase in net working capital is a cash outflow**  
We are investing in the current assets (example, making a payment against a liability (reduction)).
- **A decrease in net working capital is a cash inflow**  
example, increase in current assets (?)

Have to look at how the transaction effected NWC. Could be an increase in assets that increased NWC (therefore a cash outflow by definition) or did it increase liabilities which reduced NWC (therefore a cash inflow). Find the overall effect on NWC and then apply the definitions above to find if it's inflow or outflow.

Why is estimating the change in NWC important in estimating cash flows? If a project requires more current assets we know there will be less free cash for the stock holders or in other words, we would like to invest in these current assets but we will not get back from current liabilities.

### Example

A project requires cash, accounts receivables and inventories of \$100,000 more than the accounts payable. Is this a cash inflow or an outflow? But on the other hand we will not have to purchase supplies on credit, so the accounts payable will not increase. So this means we will be short on cash, we will need to invest in this project. This difference between current assets and current liabilities is called WORKING CAPITAL. If this difference increases as a result of taking the project, if we have positive net change in working capital, it means cash outflow (we are investing in the project). If we have negative change in NWC it means cash inflow because we have more liabilities than current assets. **This would be a cash outflow!** It is an increase in current assets by \$100,000 which increases Net Working Capital.

Difference between current assets and current liabilities. More capital required to move the business.

## What to discount?

- When estimating free cash flows, we should consider the following factors:

- **FINANCING COSTS: NOT INCLUDED**

Do not include financing costs in your cash flows, since they should be reflected in the **discount rate**. High financial costs indicate high risk which is reflected in the discount rate,  $r$ .

- **INFLATION: should be reflected in discount rate  $r$ .**

It does not matter whether you use real or nominal cash flows in your analysis. The only important thing is that you are **consistent**. Nominal cash flows must be discounted at the nominal rate, while real cash flows must be discounted at the real rate. We do not spend too much time considering the effects of inflation.

### Example

-1000      \$600      \$650      with  $r = 14\%$  and inflation = 5%

Must know if your  $r$  takes into account inflation. If not adjust  $r$  by the rate of inflation.

- **TAXES**

Cash flows should be estimated on after-tax basis. If it is an outflow it effects the cash situation of the firm and must be accounted for.

### Example

$$NPV = -1000 + \frac{600}{(1.14)(1.05)} + \frac{650}{[(1.14)(1.05)]^2}$$

Here we are incorporating the effects of inflation on the cash flows. We are saying NPV of project must compensate for inflation (inflation was not considered in the discount rate).

**MUST BE CONSISTENT IN YOUR CALCULATIONS!**

## Example

- Which of the following are relevant cash flows when evaluating the NPV of an introduction of a new product?

- R&D costs of \$2M in the last 3 years

**NO, this is a sunk cost!**

- The new product will be produced in a warehouse that can be leased for \$0.1M per year

**YES, opportunity cost**

- The new product is very risky, and therefore will increase the firm's financing costs

**NO, already accounted for in discount rate,  $r$ .**

- The new product requires a new machine that costs \$1M

**YES, outlay investment.**

- If the new product will be introduced, the sales of the firm's other products will increase by \$2M per year

**YES, synergy side effect.**

- The new product requires a purchase of new inventory

**YES, change in working capital.**

## Deriving free cash flow from Earnings

- Note that **Earnings before interest and taxes (EBIT)** is
  - Reduced by depreciation and amortization
  - Not affected by investment in working capital  
(yes cash, relevant balance sheet item, take into account)
  - Not affected by the purchase or sale of capital assets  
IT'S CASH, WE BUY A MACHINE WITH CASH. W We do not see it in the EBIT so we need to add these changes as well.
  - Computed before taxes  
EBIT is before taxes so it is not effected by taxes but taxes are cash flows.  
Capital gains and income taxes.

### Income Statement

Revenue

Expense

•

•

•

EBIT

•

•

•

Net Income

← EBIT has the effects of non-cash items at this point.  
Look above EBIT and undo any non-cash items.

Some things below EBIT which are important but not included in EBIT, so we ADD cash below EBIT and SUBTRACT non-cash (below EBIT).

Add depreciation, subtract the change in working capital, add the working capital investment, add the taxes. This is the basic form. If we have side effect opportunity cost it should be added. (see next page for the basic form we should always follow)

## Deriving free cash flow from Earnings

**Free cash flow = EBIT**

- + Depreciation and amortization**
- Change in working capital**
- Net capital investment**
- Net capital gains \* tax rate**
- EBIT \* tax rate**

**This is the basic form of the equation, may have other items to account for.**

### **Example**

- Assume that a firm faces a project that will generate cash flows in the next 4 years

- The project requires a purchase of an asset that costs \$40,000,000. The salvage value of the asset after 4 years is \$10,000,000, and it is depreciated using a linear schedule

- EBIT is expected to be \$3,000,000 in the first year, and to increase by \$1,000,000 per year

- The project requires an immediate working capital of \$2,000,000. The working capital is expected to increase by \$1,000,000 per year, and to be recovered in full after 4 years (everything we invested in we will sell and recover at end of project).

- Taxes are paid at a constant rate of 34%

40 – 10 = \$30 Mil., **value reduction over 4 years.**

$$\frac{30 \text{ mil}}{4 \text{ yeras}} = \$7.5 \text{ Mil depreciation per year}$$

We get back all of the investment at the end of the project.

continued

### Example

- Calculate the free cash flows associated with this project
- Find the project's NPV, given a discount rate of 9%

Add back depreciation because EBIT reduced by it previously.

in (000s)	0	1	2	3	4
EBIT		3 mil	4 mil	5 mil	6 mil
Depreciation		7.5 mil	7.5 mil	7.5 mil	7.5 mil
Change in W.C.	-2 mil	-1 mil	-1 mil	-1 mil	5 mil
Capital investment	40 mil				10 mil
Capital gains*tax rate	0 (sold	at the	salvage	value)	
Taxes * EBIT		-1,020	-1,360	-1,700	-2,040
<b>Free Cash Flow</b>	-42,000	8,480	9,140	9,800	26,460



How are we finding the free cash flow? The sum of EBIT through Taxes\*EBIT.

$$NPV = -42,000 + \frac{8480}{1.09} + \frac{9140}{1.09^2} + \frac{9800}{1.09^3} + \frac{26,460}{1.09^4} = -214.9 \text{ BAD PROJECT !}$$

all investment recovered at end

(Change in WC is 1 mil. WC will increase, change will be constant.)

### Example

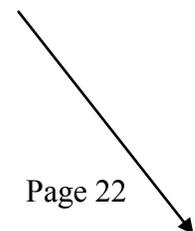
- GAP is considering buying an online cash register software from IBM, so it can effectively deal with its retail sales. It spent \$200,000 in the recent year to evaluate the efficiency of the software

SUNK COST

- The marketing department predicts that using the software will allow additional sales of \$600,000 per year for the next 3 years, after which the market will cease to exist

- Costs of goods sold and operating expenses are predicted to be 25% of sales

continued



### Example

- The software package costs \$750,000 and will be depreciated down to zero using the straight-line method over its five-year economic life (150,000 per year)
- After 3 years the software can be sold for \$40,000
- GAP also needs to add working capital of \$25,000 immediately. The additional working capital will be recovered in full at the end of the project life
- GAP's corporate tax rate is 35%
- The appropriate discount rate is 17%

**- Determine the NPV of the new software**

What is new in this example compared to the first example? Here we are not given the EBIT, we must calculate it. Then we can use the basic formula.

in (000s)	0	1	2	3
Revenues		600	600	600
Expenses		-150	-150	-150
EBITDA		450	450	450
Depreciation		-150	-150	-150
EBIT		300	300	300
Depreciation		150	150	150
Change in W.C.	-25	0	0	-25
Capital investment	-750			40
Capital gains*tax rate				91
Taxes (35%*EBIT)		-105	-105	-105
<b>Free Cash Flow (=)</b>	-775	345	345	501

← subtract out depreciation  
 ← add depreciation back in after we have EBIT



EBITDA: EBIT Depreciation and Appreciation

750, 600, 450, 300. Sold at 40 which is a loss of 260.  
 (300 – 40) \* .35 = 91 refund for capital loss from IRS

Compare “price sold at” to price / value based on IRS value. Salvage value is not always equal to the market value.

**NPV = \$84.7 GOOD PROJECT**

**Capital Loss:** when you sell something at a price lower than what the IRS thinks it should be.

**Capital Gain:** you sell something at a higher price than the IRS thinks it should be.

In this example what is the IRS price of the machine after 3 years? It's the initial value minus the : the price of the machine will be 300, we sell it at 40, we have a loss of 260. So we have  $(300-40) \cdot .35 = 91$  this is the amount we will receive from the IRS for capital loss. **Always compare the actual sale price to the price based on the depreciation.** Also, salvage value (IRS) is not always the market value.

## Example

- Tiny Air, Inc. is a small profitable one-jet airline that flies four commuter flights daily between Houston and Dallas
- Tiny Air is considering a purchase of an additional jet that costs \$1,000,000. Tiny Air believes that there is a short-lived opportunity that will last exactly six years to provide service between Houston and San Antonio. (At the end of year 6, all major airlines will begin flying that route, making it unprofitable for Tiny Air.)
- For tax purposes, the jet can be depreciated over a ten year life by the straight-line method. The CFO of Tiny Air is sure that the plane will be worth \$700,000 at the end of sixth year

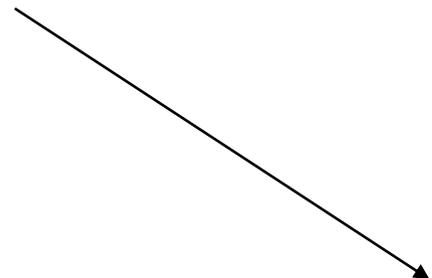
## 6 year project

- The new jet will be stored and maintained in a separate hangar, which is owned by Tiny Air, and is currently leased to Little Air, Inc. However, since the lease contract is expiring this year, Tiny Air has decided to keep the hangar only if it will purchase the new jet, and to sell it otherwise. The value of the hangar is \$80,000 and is expected to remain constant in the coming years.
- The new jet requires a working capital of \$40,000, which will be recovered in full at the end of year 6
- The tax rate for all taxes that Tiny Air pays is 40%

## In this example we have \$80,000 Opportunity Cost, 6 yrs out

- Running a small airline is a risky business, so Tiny Air uses 20% as its cost of capital
- Revenues associated with operating the route will be \$900,000 per year in the first two years, and then will grow at a constant rate of 10%
- The operating expenses (crew, fuel, etc.) will be \$550,000 in the first year, and then 60% of the revenues

## - Should Tiny Air purchase the additional jet?



## Tiny Air Example

$$\text{Depreciation} = \frac{1,000,000 - 0}{10} = 100,000$$

Airplane price according to the IRS =  $1,000,000 - 6 * 100,000 = 400,000$

Then  $(400 - 700) * .4 = 120$

Capital Gain: Actual price compared to IRS price (?)

in (000s)	0	1	2	3	4	5	6
Revenues		900	900	990	1089	1197.9	1317.7
Expenses		-550	-540	-594	-653.4	-7187	-7906
EBITDA		350	360	396	435.6	479.2	527.1
Depreciation		-100	-100	-100	-100	-100	-100
EBIT		250	260	296	335.6	379.2	427.1
Depreciation		100	100	100	100	100	100
Change in W.C.	-40						40
Capital investment	1,000						700
Opportunity Cost	-80						80
Capital gains*tax rate							-120
Taxes		-100	-104	-118.4	-134.2	-151.7	-170.8
<b>Free Cash Flow (=)</b>	<b>-1120</b>	<b>250</b>	<b>256</b>	<b>277.6</b>	<b>301.4</b>	<b>327.5</b>	<b>1056.2</b>

**NPV<sub>20%</sub> = \$57.4 > 0 GOOD PROJECT**

In this example we lose the Time Value

## Practice questions

# 7.1, 7.3, 7.6, 7.11

## **Net Present Value and Capital Budgeting**

The purpose of Chapter 7 is to illustrate, through worked out examples, how the concepts of discounted cash flow and net present value are used in practice to evaluate capital budgeting decisions. The practical problems of identifying the relevant incremental cash flows are discussed. The affects of inflation on interest rates and cash flows are described. The proper method of evaluating mutually exclusive projects with different lives is analyzed. An appendix discusses depreciation.

The key concepts discussed in Chapter 7 are outlined below.

- Incremental cash flows
  - sunk costs
  - opportunity costs
  - side effects
  - investment and salvage
  - net working capital
  - taxes
- Inflation and capital budgeting
  - interest rates and inflation
  - cash flow and inflation
  - discounting real and nominal cash flows
- Investments of unequal lives
  - replacement chains
  - equivalent annual cost
  - replacement decisions

## Chapter Summary

This chapter discusses a number of practical applications of capital budgeting.

1. Capital budgeting must be placed on an incremental basis. This means that sunk costs must be ignored, while both opportunity costs and side effects must be considered.
2. In the Baldwin case, we computed NPV using the following two steps:
  - a. Calculate the net cash flow from all sources for each period.
  - b. Calculate the NPV using the cash flows calculated above.
3. Inflation must be handled consistently. One approach is to express both cash flows and the discount rate in nominal terms. The other approach is to express both cash flow and the discount rate in real terms. Because either approach yields the same NPV calculation, the simpler method should be used. The simpler method will generally depend on the type of capital budgeting problem.
4. A firm should use the equivalent annual cost approach when choosing between two machines of unequal lives.