

The Key Financial Statements

TU-A1300 - Introduction to Industrial Engineering and Management

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This lecture introduces accounting concepts and constructs that are widely used to describe the financial performance of companies. They form the vocabulary that you will need if you want to follow and understand the discussion concerning business performance.

Within a single lecture, we can only scratch the surface of accounting issues. The lecture focuses on the fundamental structure and interdependence of the key financial statements.

Accounting is concerned with recording, analyzing and reporting financial information. The purpose is to assist various decision makers inside and outside the firm. Financial statements and their accompanying notes provide public information for everybody interested in the company. General standards for financial accounting and reporting regulate the preparation and disclosure of information in order to guarantee the reliability of the information. Management accounting provides additional non-public information for managers and decision makers inside the company. Management accounting provides more detailed information than financial accounting.

Learning Objectives

- Explain the main principles that separate periodic profit and cash flow
 - Revenue recognition, Accrual Basis, Matching principle
- Define the Free Cash Flow (FCF) with accounting terms
 - Net Profit versus FCF
- Articulate the main structure and key interdependencies of the financial statements
 - The Income Statement (a.k.a the profit and loss account)
 - The Balance Sheet
 - The Statement of Cash Flows
- Elementary capabilities to describe a company using financial ratios

It is important to understand the difference of cash flow and accounting profit. In the previous lecture, we introduced the concept of the free cash flow. This time, we shall use accounting terminology to define the free cash flow

The income statement, the balance sheet and the statement of cash flows are the primary financial statements. In detail, there are several formats to construct these statements although the key principles are the same. Accounting standards and regulations articulate the formats to use in practice but studying these standards is not your objective in this course. The formats that you should follow, for example in the group work, are given in the respective course material.

Although people often refer to financial statements and performance indicators separately, it is vitally important to understand how these statements are interconnected.

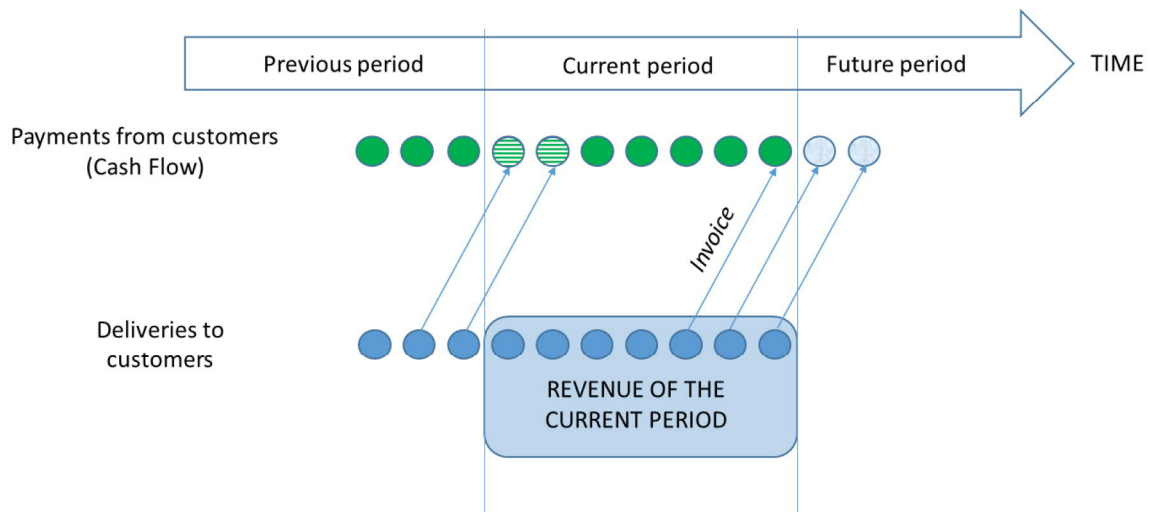
In the group assignment, you will prepare estimated financial statements for the forthcoming period. The net exercises will also support you to reach these learning objectives.

The Main Accounting Principles

Financial accounting, especially, is a rule-based system. There are many principles but we shall focus on those that explain accounting profit, i.e. profit or loss of the financial year.

In spite of the rules and principles, companies have significant freedom to decide how they apply certain rules. Furthermore, there are national and international financial accounting standards.

Revenue Recognition



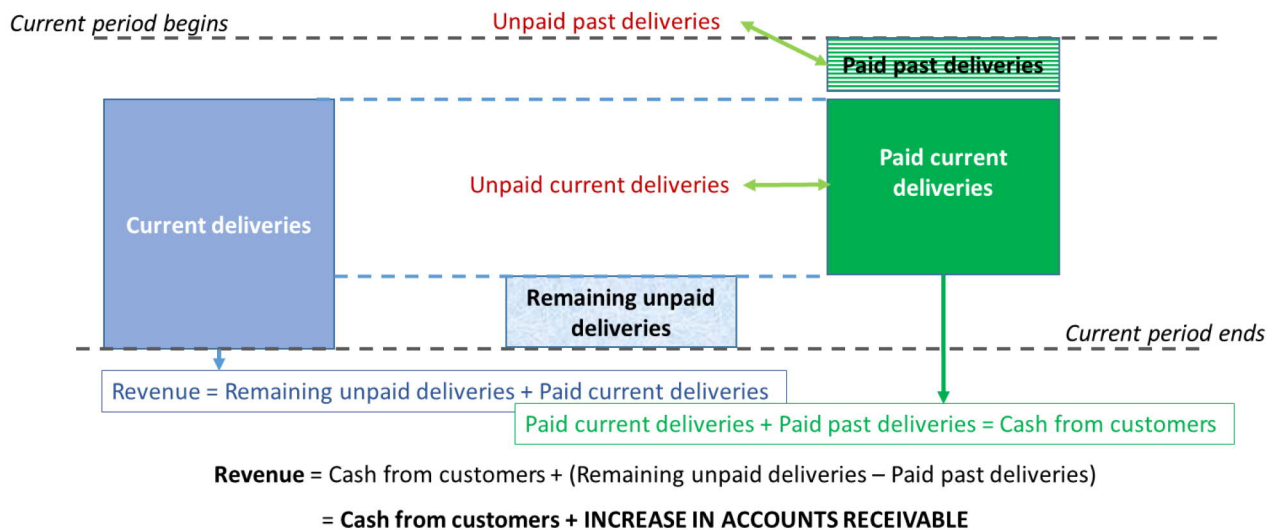
There are common principles that separate periodic profit from cash-based surplus.

The first principle concerns revenue recognition, i.e. the rule for determining the current period's revenue. Revenue is the starting point for calculating profit. Periodic revenue is related to the payments from customers but the payments received during the current period do not directly constitute the current period's revenue. The date of the payment does not indicate in which period it is recognized as revenue.

The timing of revenue depends on the delivery date. At that point, we have fulfilled our promise to the customer and may send an invoice. The customer can pay the invoice during this accounting period or during the next accounting period, depending on the terms agreed.

So, a part of the current period's revenue connects to the forthcoming payments from customers. Correspondingly, a part of the current period's incoming cash flow relates to deliveries made during the previous period.

Cash versus Accrual Basis

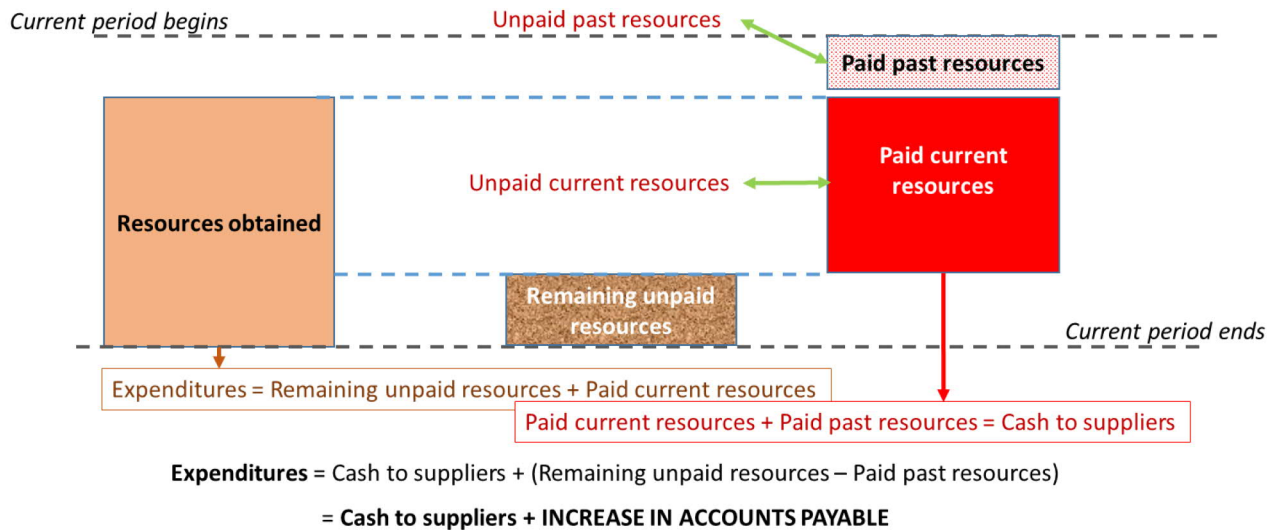


Revenue recognition is in congruence with the accrual basis in accounting. While accrual basis guides the recording of transactions in the bookkeeping system, revenue recognition rules the preparation of the profit and loss statement. Generally, the accrual basis means that a firm should enter an economic transaction in the accounting records at the time a product is delivered or a resource is obtained. So the accrual basis concerns both the revenues and the purchase costs of the firm.

From the time of delivery until the time of payment, the customer owes money to the company. This debt is called receivable in the company's accounting records. In order to keep track of customers' financial obligations, the company records the delivery transactions and respective cash transactions of each customer. Together, these records form the accounts receivable, which tell how much all the customers owe to the company at a specified moment, for example, in the beginning or end of a fiscal year.

The difference between periodic revenue and payments from customers is the increase (or decrease) in accounts receivable from the beginning of the year till the end of the year.

Expenditures

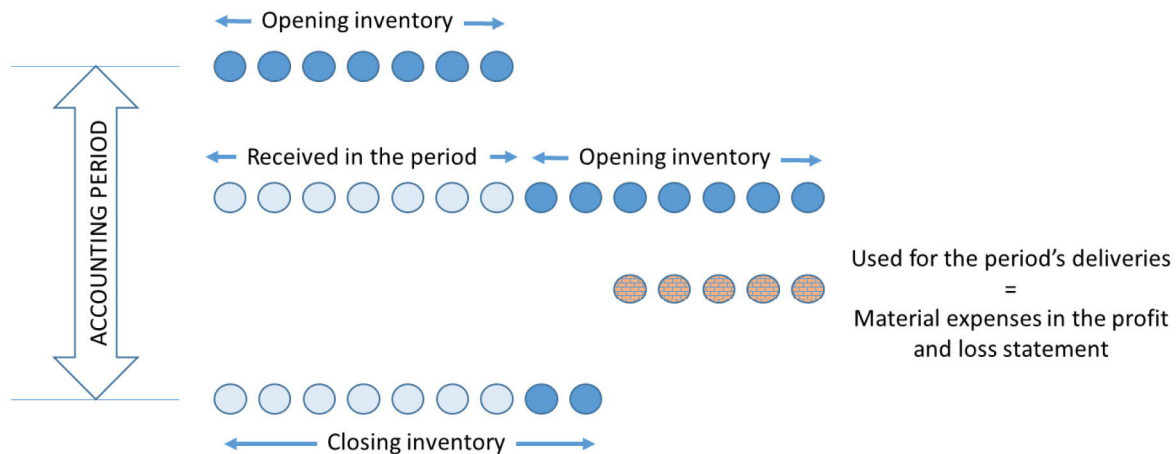


In order to make products, a company acquires various resources (material, people, equipment, utilities) and combines them in the production process. It must pay for the resources (pay an invoice, wages, rent). An expenditure is recorded at the time the resource is received. So, the accrual basis applies here, as well, and the flow of transactions resembles the one concerning revenue.

From the time of receiving until the time of payment, the company owes money to a supplier (a party providing the resource). This debt is called payable in the company's accounting records. In order to keep track of debt to suppliers, the company records the receiving transactions and respective cash transactions concerning each supplier. Together, these records form the accounts payable, which tell how much the company owes to its suppliers at a specified moment.

The difference between periodic expenditures and payments to suppliers is the increase (or decrease) in accounts payable from the beginning of the year till the end of the year.

Matching Material Purchases



Profit is not directly revenue less expenditures. The matching principle states that only the portion of a financial year's expenditures that is not likely to generate income in the future is deducted from revenue as an expense. The remaining portion of the expenditures, which is likely to generate further revenue, is capitalized in the balance sheet. Let us take material expenditures as an example.

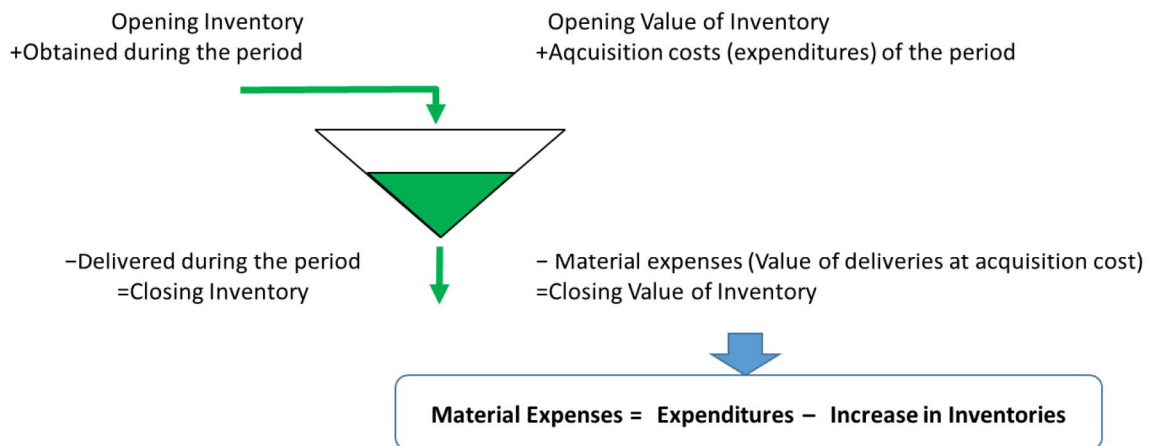
At the beginning of the period, a company has in its possession goods that it intends to sell during the period. That is the opening inventory. During the period, the company also purchases and receives new goods. The value of this lot is the period's material expenditure. The received materials plus the opening inventory express the maximum amount that the company is able to deliver during the period.

In order to find out the sum to be expensed, or in other words, deducted from the period's revenue, we should know the value of the material we have actually used for the period's deliveries. Of course, we can directly record the consumed amount and value of materials. We also reach the same figure by adding up the opening inventory and the received material, and finally subtracting the closing inventory.

The value of the closing inventory is the book value of inventory. The company intends to use it for forthcoming deliveries. In other words, it will generate revenue in the future.

Value of Inventories

MATERIAL BALANCE OF AN SKU → MEASURED AT THE ACQUISITION COST



Inventories include various items called stock-keeping units (SKU). One can formulate a material balance [in units] for each SKU.

Amount in the opening inventory + Amount received during the period
= Amount used during the period + Amount in the closing inventory

Multiplying the quantities by unit purchase price per unit, we transform an SKU's material balance into monetary terms. Now, we can add up the SKU-specific balances and write an equation for the value of inventories [€]:

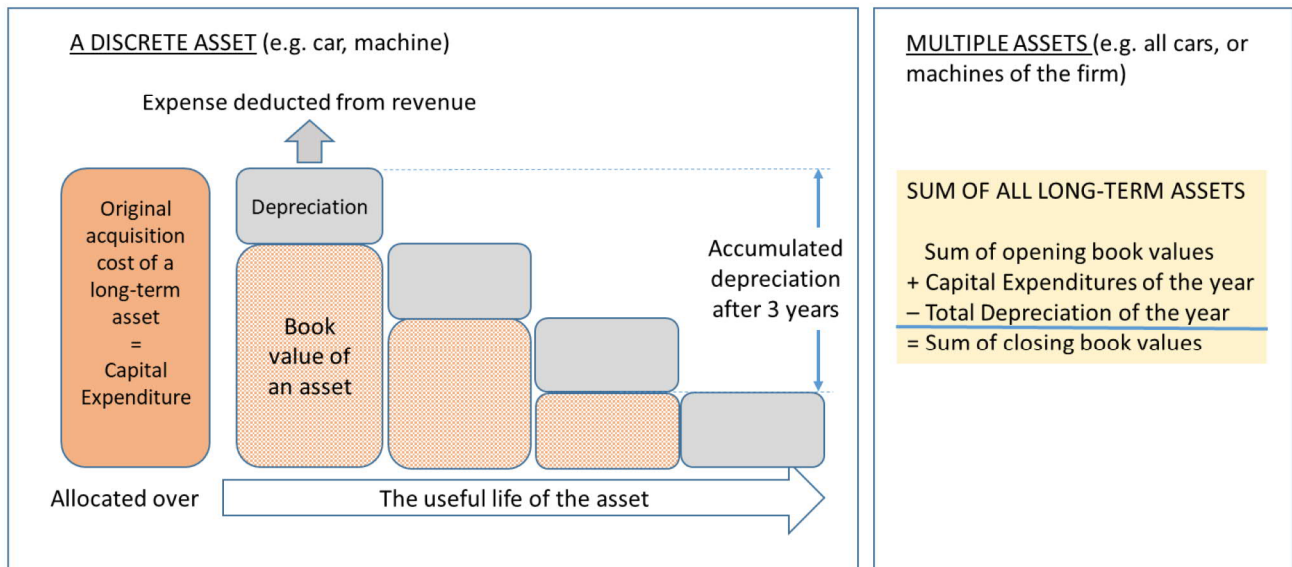
Opening inventories + Acquisition costs = Material expenses + Closing inventories.

Because Closing inventory – Opening inventory = Increase in Inventories,

Material expenses = Acquisition costs – Increase in Inventories

In accounting, inventories refer to material, components, finished product and unfinished products (work-in-progress).

Expenses & Matching of Capital Expenditures



Capital expenditures refer to the acquisition costs of long-term assets, i.e. tangible (or intangible) resources that provide benefit for more than one year. Note that the term investment can also refer to the acquisition cost of a long-term asset.

For example, a taxi company buys a new car, which will be in use and generate revenue during several years. The purchase price of the car is a capital expenditure. The company does not deduct the whole amount from the first year's revenue. Instead, it distributes the sum over the expected useful life of the car (4 years).

The portion of the capital expenditure deducted is depreciation. The portion to be deducted in the forthcoming years is the current book value of the asset.

There are various depreciation principles or methods. The easiest one is to divide the capital expenditure by the useful life (straight-line depreciation). If the useful life of a car is 4 years, the company has deducted 75 % of the acquisition cost after 3 years. The remaining 25 % is the book value of the car.

The taxi company has many cars of different age. They all contribute to this year's revenue and, accordingly, the depreciation related to each car is part of this year's expenses. To repeat the calculation year after year, the company needs to keep record of the acquisition cost and the accumulated depreciation of each car.

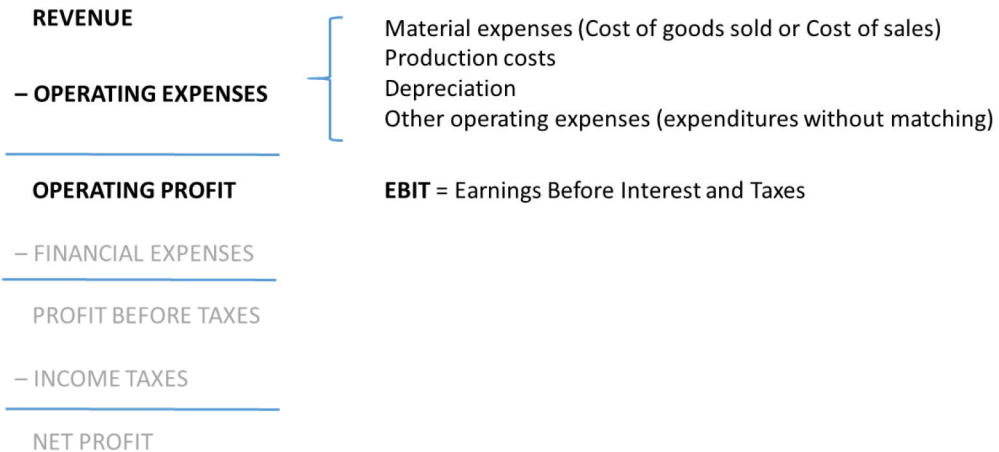
Net Profit versus FCF

By introducing the main principles in defining accounting profit, we have defined what is REVENUE and WHAT is an EXPENSE. Using accounting terms,

$$\text{PROFIT} = \text{REVENUE} - \text{EXPENSES}$$

Now, it is time to look at the structure of the income statement, i.e. the order of deducting expenses from revenue and typical subtotals.

Revenue – Expenses = Profit



Operating profit is sales revenue less operating expenses. Operating profit (or EBIT) indicates the profitability of the firm's ongoing business. It provides a basis for assessing the success of a company apart from its financing and investing activities and separate from tax considerations.

Revenue contains income obtained from the sale of goods and services. Revenue does not include value added tax and other taxes directly linked to the amount of sales, however. Revenue may also be called net sales because sales discounts and returns have been deducted from the gross sales income.

Typically, cost of sales is separated from other operating expenses. Cost of sales shows costs directly related to produce the goods and services sold, such as manufacturing costs. It consists of several cost elements (materials, personnel costs, rents, purchased services, depreciation). Gross profit is revenue less cost of sales. In addition to production expenses, there are other operating expenses related to the ordinary course of running the business (sales and marketing, administration, research and development). Mainly, these expenditures are expensed at the same financial year they occur.

There are several ways to categorize operating expenses in the official income statement and for internal use, companies use more detailed formats.

From EBIT to Earnings

REVENUE

– OPERATING EXPENSES

OPERATING PROFIT

EBIT = Earnings Before Interest and Taxes

– **FINANCIAL EXPENSES**

Interest

PROFIT BEFORE TAXES

≈ Taxable income of the firm

– **INCOME TAXES**

Apply corporate tax rate to Profit Before Taxes

NET PROFIT

Earnings

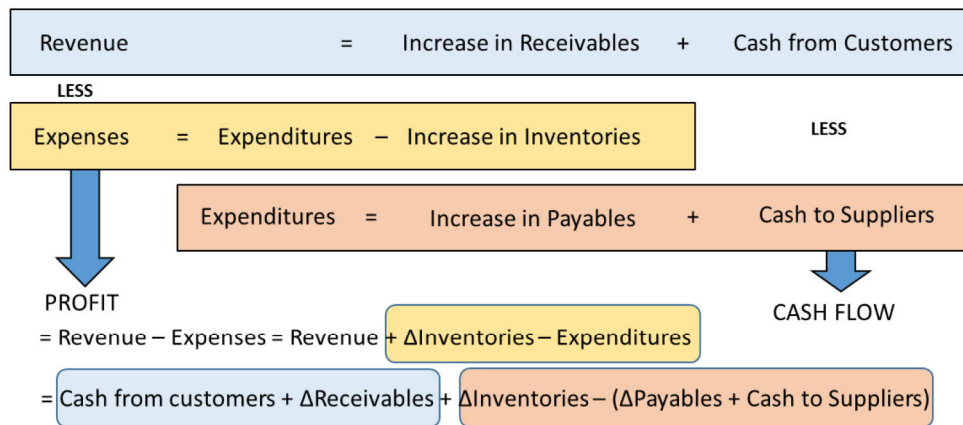
Interest expenses and income taxes are deducted after calculating operating profit. Therefore operating profit is also called Earnings Before Interest and Taxes (EBIT). Earnings refers to the sum that is left when all expenses are deducted. (How much the owners of the firm have earned in accounting terms.) To be precise, there are small differences between operating profit and EBIT but we shall use them as synonyms.

Interest paid on loans represents financial expenses. A company may also have financial income from financial (non-operating) investments. The course exercises do not include financial income.

The basis for income tax is profit (or earnings) before tax (PBT, EBT). In this course, we use a simple formula calculate income tax ($=PBT \times \text{tax rate}$)

The bottom line of the income statement shows the profit or loss of the financial year. It is also called net profit or net income or (net) earnings. In literature, terms income, earnings and profit are used interchangeably.

Working Capital



$$\text{PROFIT} = \text{CASH FLOW} + (\Delta\text{Receivables} + \Delta\text{Inventories} - \Delta\text{Payables}) = \text{CASH FLOW} + \Delta\text{WORKING CAPITAL}$$

For understanding why cash flow is not profit, it is important to remember three points: 1) Distinguish revenue from cash received from suppliers 2) Distinguish expenditures from cash paid to suppliers (accrual basis). 3) Identify expenditures that are not expensed immediately. Starting with the concept of Working Capital (WC), we use these constructs to explain the difference between profit and cash flow.

Working capital is a measure of a company's operational efficiency, i.e. how much money is needed to fund the daily operations.

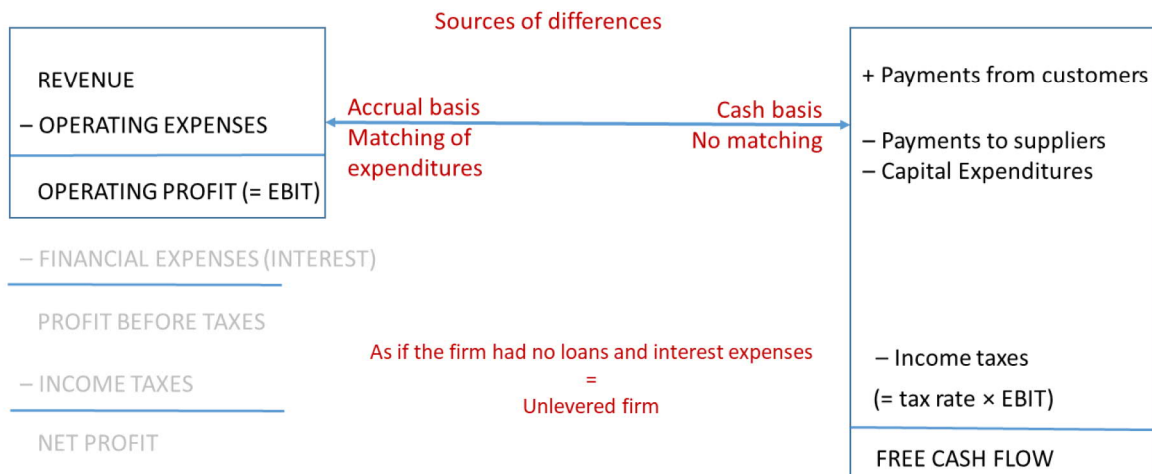
$$\text{Working capital} = \text{Accounts Receivable} + \text{Inventories} - \text{Accounts Payable}.$$

First, we need to fetch three equations defined in the first section of the lecture (top three rows). Knowing that profit, in general, is revenue less expenses, we get a group of equations. Rearranging the equations, we find out that the increase in working capital is one cause for the difference.

Increase (or change, Δ) in any element of the working capital is simply the difference between closing value and opening value.

Besides material expenditures the same principle of matching applies to all resources that generate revenue during multiple fiscal years (e.g. machines, equipment and other property that the company acquires less frequently).

Operating Profit versus Free Cash Flow



$$\text{EBIT} - \Delta \text{Working Capital} + \text{Depreciation} - \text{CapEx} - \text{EBIT} \cdot \tau = \text{FCF}$$

Operating profit is closely linked to the free cash flow because it considers only the revenues and expenses due to the business operations of the firm – and excludes funding transactions. The increase in working capital is not the only issue we need include in an equation that connects EBIT and FCF. Remember that operating expenses include depreciation, which is not cash flow. Instead, the capital expenditures are cash flow caused by investments. Therefore, we add depreciation and subtract capital expenditures from EBIT.

The last source of disparity concerns how we handle income taxes.

Because tax payments do not belong to those who have funded the company (shareholders & debtholders), income taxes are not free cash flow. We should deduct them.

On the other hand, Firms may deduct interest in taxation. The amount of income taxes depends on the taxable income of the company (profit before taxes). The complication is that interest represent cash flow to those who have funded the company by loans.

Only if we assume that the firm has no loans and pays no interest, we can calculate income taxes directly using EBIT and income tax rate (τ). Remember, that this is the principal assumption, when we calculate the free cash flow.

Why do we ignore the value-added taxes?

Transaction-level

Invoice / Receipt

Price without VAT	100,00	The amount to be recognized in revenue
Amount of VAT (24 %)	24,00	The amount that the firm collect for the tax authorities
Total price (to be paid)	124,00	The amount that the firm collects from the customer

Firm-level

VAT of purchases is deductible

$$\begin{aligned}
 &+ \text{Revenue} * \text{VAT}\% \\
 &- \text{Expenses} * \text{VAT}\% \\
 &= \text{Value added taxes to pay}
 \end{aligned}$$

Accounts receivable and payable related to VAT

Profit with VAT included

$$\begin{aligned}
 &+ (\text{Revenue} + \text{Revenue} * \text{VAT}\%) \\
 &- (\text{Expenses} + \text{Expenses} * \text{VAT}\%) \\
 &- (\text{Revenue} * \text{VAT}\% - \text{Expenses} * \text{VAT}\%) \\
 &= \text{Profit}
 \end{aligned}$$

EQUALS

Profit without VAT

$$\begin{aligned}
 &+ \text{Revenue} \\
 &- \text{Expenses} \\
 &= \text{Profit}
 \end{aligned}$$

Nice-to-know

If you look at your own receipts or invoices, you will see an item called the value-added tax (VAT). You may wonder, why we do not have VAT in our calculations. The basic reason is that VAT targets the final consumption and companies only collect VAT for the government. Companies may also deduct the VAT they have paid when purchasing resources. The margin is what the company must eventually pay.

You could calculate profit using figures that include VAT. In this case you should deduct the amount that the company is liable to pay to tax authorities. The result would eventually be the same if you had totally ignored VAT in your calculations. So it is easier and less error-prone to calculate profit without VAT.

(In fact, it is not so simple. However, the accounting systems can record transactions in a way that the decision-makers can ignore VAT.)

How Do the Key Financial Statements Interconnect?

We have shown the link from EBIT to FCF (from profit to cash flow). In the equation, we used items that are reported in the balance sheet (e.g. accounts receivable, accounts payable, value of inventories). Next, we shall study the main interdependencies between the income statement, the balance sheet and the statement of cash flows.

The Balance Sheet

The firm's financial position at the closing of the financial year

The Balance Sheet Equation

$$\text{ASSETS} = \text{LIABILITIES} + \text{SHAREHOLDER'S EQUITY}$$

- A resource (thing, item) owned by a firm
- has some future economic value
- can be used in current or future period to generate revenues

- The firm's obligations to creditors

- An accounting measure of the firm's net worth to its owners

The balance sheet is a statement of financial position at a given point of time (end of the financial year = beginning of the next financial year). The balance sheet equation states the elementary structure of the statement. An asset is a resource owned by a firm. It that has some economic value to the firm and can be used in a current or future period to generate revenues. Liabilities mean the firm's financial obligations to its creditors (suppliers, debt holders). Shareholders' equity is an accounting measure of the firm's net worth, i.e. how much of the firm's asset value belongs to the owners.

Understanding the fundamental difference between debt and equity is important . A firm that fails to make the required interest or principal payments on the debt is in default. Thereafter, debtholders get certain rights to the assets of the firm. In the extreme case, the debtholders take legal ownership of the firm's assets in a bankruptcy process. The firm's assets may be sold to take care of the obligations. The residual belongs to the owners. Therefore, we can also interpret equity as the difference between the firm's assets and liabilities.

Assets

- **NON-CURRENT ASSETS (Long-term assets)**

- Intangible Assets
- Tangible Assets (Fixed Assets)
- Other Non-Current Assets

THE BOOK VALUE OF ALL FIXED ASSETS

$$\begin{aligned} & \text{Sum of opening book values} \\ & + \text{Total Capital Expenditures of the year} \\ & - \text{Total Depreciation of the year} \\ \hline & = \text{Sum of closing book values} \end{aligned}$$

- **CURRENT ASSETS**

- Inventories
- Accounts Receivable
- Other Current Assets
- Cash

→ Elements of
**Working
Capital**

The principal categories are current assets and non-current assets. Current assets (short-term assets) can be converted into cash within one year (the next 12 months). Other assets are non-current or long-term assets. We can further divide non-current assets into tangible assets (plant, property, machinery), intangible assets (patents, licenses, trademarks and similar rights) and other non-current assets (long-term financial investments).

The book value of a tangible or intangible asset is the residue of the original acquisition cost that has not been reported as an expense (depreciated or amortized). Value of an asset category is naturally the sum of discrete asset values. New investments (capital expenditures) during the financial year increase the value whereas depreciation (or amortization) decreases it.

Inventories include raw materials as well as work-in-progress and finished goods.

Besides accounts receivable, a firm may have other short-term receivables. For example, if the firm has paid an insurance fee in advance, the insurance company owes the money for a while. It is not a short-term financial investment in the insurance company made by the firm.

Cash refers to the money in bank accounts and cash equivalents, i.e. short-term, low-risk financial investments that can be easily sold and converted to cash.

Liabilities

- **CURRENT LIABILITIES**

- Accounts Payable (*Non-Interest Bearing*)
- Other Current Liabilities (*Non-Interest Bearing*)
- Short-Term Debt

Element of
**Working
Capital**

- **LONG-TERM LIABILITIES**

- Long-Term Debt
- Other Long-Term Liabilities

Interest-
bearing **Debt**

Like asset, liabilities are divided into current (short-term) and non-current (long-term) liabilities. It is also important to distinguish non-interest bearing and interest-bearing liabilities (debt).

The firm must take care of current liabilities within one year. In addition to accounts payable, there are similar accrual items, such as salary or taxes, which the firm is obligated to pay but has not yet paid. These items are basically non-interest bearing liabilities. In contrast, short-term debt mean loans that must be repaid in the next year. Any repayment of non-current debt that will occur within the next year belongs here as current maturities of long-term debt.

Long-term debt is any loan or interest-bearing debt obligation with a maturity of more than a year. There can be other long-term liabilities but we do not consider them in this course.

Knowing short-term liabilities is important to estimate whether the firm has enough cash or current assets for future payments. Knowing interest-bearing debt is important to understand the return on capital invested in the firm.

Shareholder's Equity

- **SHAREHOLDERS' EQUITY**

- Shareholders' Capital
- Retained Earnings (closing value)
 - Retained Earnings (opening value less dividends)
 - Net Profit of the Financial Year \longleftrightarrow *Income Statement*

The main elements of the shareholders' equity (a.k.a. stockholders' equity or just equity) are share capital and retained earnings. Share capital (or shareholder's capital) refers to the money that owners give money to the company. This happens typically when companies sell new shares to investors. (Note that when owners trade their shares in a stock exchange with other investors, the firm that issued the shares does not receive any payment.)

Retained earnings show the sum a company has earned since its inception, less any payments made to shareholders in the form of dividends. Retained earnings is the link between the income statement and the balance sheet.

$$\text{Beginning retained earnings} - \text{Dividends} + \text{Net income} = \text{Ending retained earnings}$$

A common mistake is to confuse retained earnings and cash. A firm needs cash to pay dividend (distribute earnings) but retained earnings means all undistributed earnings that the firm has elected to reinvest in its operations.

If you study balance sheet formats, you will notice that equity contains other elements, too. To emphasize the primary learning target, we do not introduce them.

The Statement of Cash Flows

- Cash from operating activities (CF_{ops})
 - Includes income taxes and interest paid
- Cash from investing activities (CF_{inv})
 - Capital expenditures
- Cash from financing activities (CF_{fin})
 - Dividend paid (Div)
 - Increase in shareholders' capital ($\Delta Shares$)
 - Increase in borrowing ($\Delta Debt$)
- Change in cash ($\Delta Cash = CF_{ops} + CF_{inv} + CF_{fin}$)
 - $\Delta Cash = \text{Increase in cash} = \text{Cash in the end} - \text{Cash in the beginning}$

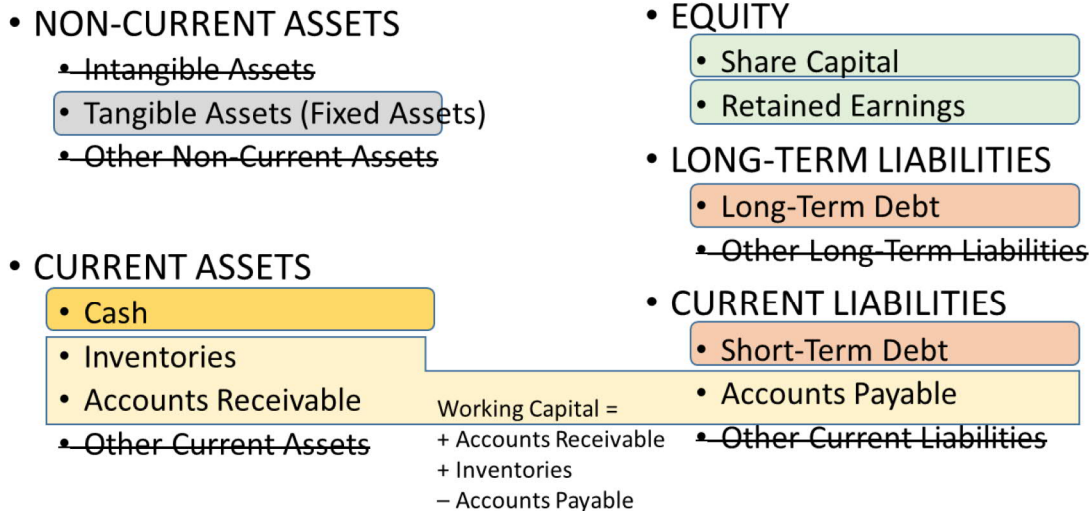
The statement of cash flow has three sections: operating activities, investing activities, and financing activities. Operating activities and investing activities do not exactly equal the Free Cash Flow (introduced in the previous lecture). There are two key differences by definition.

- First, cash from operating activities includes interest (whereas FCF unambiguously separated cash flows from business operations and cash flow needed to finance those operations).
- Second, it includes the income taxes actually paid during the period (whereas FCF used taxes estimated through EBIT and tax rate).

Increase in shareholders' capital means that the firm sells new shares to investors. Increase in borrowing is the difference of new debt raised and old debt paid back to debtholders.

The statement of cash flow utilizes the information from the income statement and balance sheet to determine how much cash the firm has generated and how it has allocated that cash. The sum of all cash flows equals change in cash and cash equivalents ($\Delta Cash$). This is the key link between the statement of cash flows and the balance sheet.

Modified Balance Sheet



To summarize the key interdependencies of the financial statements, we shall use a simplified and slightly modified form of the balance sheet.

Fixed assets denote the non-current assets. Current assets are divided into Working Capital*) and Cash. As defined earlier,

$$\text{Working Capital} = \text{Accounts Receivable} + \text{Inventories} - \text{Accounts Payable}$$

Only the interest-bearing debt (both short-term and long-term) remains in the liabilities.

Next, we shall see how the items of cash flow and income statement explain the changes in the values of balance sheet items.

In general, change is closing value (X_{t+1}) less opening value (X_t): $\Delta X = X_{t+1} - X_t$

Positive value means that the value of has increased during the period, and we may also call ΔX "Increase in X". Negative ΔX indicates decrease, of course.

*) Note that "Net Working Capital" refers to the augmentation of the working capital concept, in which Current liabilities are subtracted from Current assets.

Changes in the Balance Sheet Values

Balance Sheet 1.1.20xx	Income Statement	Cash Flow	Balance Sheet 31.12.20xx
Fixed Assets	-Depreciation	+Investments	= Fixed Assets
Working Capital		+ΔWC	= Working Capital
Cash		+ΔCash	= Cash
=			=
Debt		-Loan payments +New loans	= Debt
Retained Earnings	+Net Profit	-Dividends	= Retained Earnings
Share Capital		+ΔShare	= Share Capital

$$Cash = Debt + Share + Retained Earnings - Fixed Assets - WC$$

On the left, we have the opening balance sheet of the financial year, and on the right, the closing balance sheet. The items of the income statement and the statement of cash flow are in the mid-columns. Each row defines how items of income statement and cash flow explain the increase (or decrease) in a balance sheet item.

Notice that we have a group of equations. The balance sheet equation must hold and each row is an equation.

We can use the balance sheet equation to define

$$Cash = Debt + Share + Retained Earnings - Fixed Assets - WC$$

This is true for both closing and opening balance. Therefore it is also true to the changes in values

$$\Delta Cash = \Delta Debt + \Delta Share + \Delta Retained Earnings - \Delta Fixed Assets - \Delta WC$$

Solving Increase in Cash

$$\Delta Cash = \Delta Debt + \Delta Share + \Delta Retained Earnings - \Delta Fixed Assets - \Delta WC$$

$$\Delta Cash = \underbrace{\Delta Debt + \Delta Share - Dividend}_{CF_{fin}} + Net Profit - \Delta Fixed Assets - \Delta WC$$

$$\Delta Cash = CF_{fin} + Net Profit - \underbrace{Investments}_{CF_{inv}} + Depreciation - \Delta WC$$

$$\Delta Cash = CF_{fin} + CF_{inv} + \underbrace{Net Profit + Depreciation - \Delta WC}_{CF_{ops}}$$

$$\Delta Cash = CF_{fin} + CF_{inv} + CF_{ops}$$

Let us start with the equation of the increase in cash. First, we replace the increase in retained earnings with dividend and net profit. The increase in debt and shareholder's capital together with dividend payments formulate the cash flow from financing activities (see page 21).

Then we replace the increase in fixed assets with investments (capital expenditures) and depreciation. Investments formulate the cash flow from investments.

The remaining items (net profit, depreciation and increase in working capital) formulate the cash flow from operating activities.

We can also formulate CFops starting with EBIT.

$$CF_{ops} = (EBIT - Interest) * (1 - tax\ rate) + Depreciation - Increase\ in\ Working\ Capital$$

This equation better reveals how the free cash flow differs from the cash flow from operations.

From Financial Statements to Financial Ratios

The information in the financial statements can be packages to financial ratios. The most widely referred ratios combine items of the income statement and balance sheet. The literature defines numerous financial ratios, and different books may use different variants of the same indicator. The objective of this course is not to learn the formulas of ratios by heart. One can always use some "handbook" to check the formula. When firms report their success with financial ratios, they typically also articulate the formula they have used.

Financial Ratios

PROFITABILITY

$$ROE = \frac{\text{Net Income}}{\text{Equity}}$$

$$ROCE = \frac{EBIT}{\text{Equity} + \text{Debt}}$$

LIQUIDITY

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

$$\text{Quick Ratio} = \frac{\text{Cash} + \text{Accounts Receivable}}{\text{Current Liabilities}}$$

CAPITAL STRUCTURE

$$\text{Debt to Capital Ratio} = \frac{\text{Debt}}{\text{Equity} + \text{Debt}}$$

$$\text{Debt to Equity Ratio} = \frac{\text{Debt}}{\text{Equity}}$$

The financial ratios are indicators calculated from the data of the financial statements. They give a compressed view of the firm's financial condition in terms of profitability, liquidity and leverage.


Profitability ratios use the information of the income statement and balance sheet. Profit margin is just a ratio of some profit line to revenues (net sales). For example operating margin = EBIT/Sales [%]. The more elaborate ratios show how efficiently the firm has used debt and equity capital in earning profit. Return on equity is an important ratio for the owners. It is the ratio of net income to equity.

Liquidity ratios compare the firm's current liabilities and its current assets (or some part of current assets). Current liabilities cause cash payments during the next 12 months. Current assets convert into cash during the same period and are available for the payments.

Leverage means the firm's capital structure, i.e. the proportions of debt and equity. One can also use net debt, where cash reserves are deducted from debt because the firm may use cash to repay debt. Gearing is net debt to equity

The System of Financial Information

$$ROE = \frac{Net\ Income}{Equity}$$
$$= \frac{Net\ Income}{Revenue} \times \frac{Revenue}{Assets} \times \frac{Assets}{Equity}$$



Profit Margin Asset Turnover Capital Structure
(Assets = Equity + Debt)

In order to understand the financial condition or success of a firm, one needs to interpret several indicators. Relying on a single ratio may lead to poor decisions, whether you are a manager or an investor.

The above equation is known as the DuPont identity (named for the company that popularized its use). It expresses return on equity in terms of profitability (net profit margin), asset efficiency (asset turnover) and capital structure (equity multiplier). Asset turnover measures how efficiently the firm is using its assets to generate sales. Firms in highly competitive businesses may have to face low profit margins but such a firm may still be lucrative for investors, if it uses assets efficiently (small inventories, no excess capacity).

Equity multiplier is the reciprocal of equity-to-capital ratio ($=E/D+E$). The higher the firm's reliance on debt funding, the higher the equity multiplier will be. So, increasing the use of debt seems to improve the firm's ROE. This is numerically correct interpretation but investors may not be satisfied with the improved ROE. Increasing debt increased the risk for owners, and risk is reflected in the return that the investors expect to earn on their investment. ROE is higher but that it also what the investors expect.

Some examples

Company	Industry	ROCE	Gearing	Equity/Assets
Kesko	Wholesale	12 %	6 %	50 %
Oriola	Wholesale	12 %	56 %	22 %
Supercell	Consumer products	151 %	- 97 %	83 %
Rovio Entertainment	Consumer products	29 %	- 63 %	77 %

The figures were published in a Finnish business magazine (Talouselämä, No 21/2018)

It is not straightforward to set accurate reference levels for financial ratios. The official balance sheet does not recognize all the intangible assets of the company. Wholesalers run a huge logistic operation and have significant inventories and other tangible assets. Software companies have less tangible assets. Therefore, there are fundamental differences across industries.

Even companies classified in the same industry do not have identical operations. Supercell and Rovio sell their product to consumers, which justifies the unrefined industry class. Both companies are in mobile game business. Rovio is a mobile game developer whereas Rovio has two business units: games and brand licensing.

Supercell's financial success is undeniable and phenomenal but because the figures are based on book values, they do not tell the whole story. Using ROCE as a proxy for ROA (=Net income /Assets) and reciprocal of equity/asset as a proxy for equity multiplier, we can roughly estimate that ROE is 170 %.

The present majority owner (Tencent) bought 72 % of Supercell's shares at 6450 M€ in 2016, which indicates that the total market value of equity was close to 9000 M€. The book value of equity was close to 500 M€. For Tencent, 9 billion is the value of equity, which they expect return on.

(<http://www.largestcompanies.fi/yrittys/Supercell-Oy-1323371/tilinpaatos-ja-tunnusluvut>)

Understanding Financial Ratios

- Analyzing the trend of a single company (comparison to the past)
- Financial Statement Analysis
 - Comparing different companies (Supercell vs. Rovio vs. Kesko?)
 - Companies in the same industry
 - Comparability of financial disclosures
- Systemic structure
 - Financial leverage and ROE
 - Valuation of the balance sheet items
 - You can't fool a well-informed investor. Don't fool yourself!

Financial ratios can be used in two main ways. First, one can compare the firm with itself by analyzing how the firm has changed over time. Second, one can compare the firm to other similar firms.

Analyzing the recent development of a single firm is a simpler case, because annual reports (of listed companies) include key ratios from the current and recent years.

Even though financial reporting standards direct how financial statements are to be prepared, there are diverse options that firms may choose to apply. Therefore, the financial statements of two companies are not fully comparable. The purpose of the financial statement analysis is to adjust company-specific statements to make them more comparable. It is the indicators calculated using the adjusted figures that are used to compare firms.

Companies operate in diverse businesses and use different resources. It is not reasonable to compare companies from different industries. There may even be significant differences between firms in the same industry. Furthermore, accounting standards do not recognize all intangible asset that contribute to the actual market value of the firm. As a result, the book value of equity (the balance sheet value) may be much smaller than the market value of equity (= number of shares outstanding * current price of a share).