

EFR summary

Intermediate Accounting, FEB12007X
2023–2024



Lectures 1 to 10
Weeks 1 to 6

Details

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Intermediate accounting – IBEB – FA Lecture 1 – Intro & Recap lecture

Introduction and basic concepts

The purpose of a company is to make profit by transforming resources according to their value proposition into something that cultivates demand. Accounting is the language of business and is thus needed for both decision-making inside the company and for external shareholders. Therefore, we can say that the two main purposes of accounting are to:

- Support decision-making in daily operations
- Measure and report how much value is created

There are three steps to the accounting procedure:

1. Identification of transactions
2. Classification of transactions into accounts
3. Communication and reporting

Financial statements

There are four main financial statements:

1. Balance sheet: snapshot of a firm's financial position at a given point in time
2. Income statement: statement on how net assets have changed between two dates
3. Cash flow statement: statement on how the cash account has changed between two dates
4. Shareholders' equity statement

Also, of interest to external parties are:

- Notes to all the statements
- The opinion of a certified public accountant that is independent from the corporation

Accounting for accruals

Activities that generate income happen continuously throughout the accounting year, yet financial reports are prepared only at certain times. This raises the question of when to identify revenues and expenses.

In the accrual basis of accounting, expenses follow revenues and are identified in the period that the economic activity occurs. Assets are used to generate revenues, and so their outflow can be regarded as an expense.

However, they are only recognized as expenses when there is a corresponding revenue that is associated with the expense. This has the advantage of better measuring performance and avoid certain timing and matching problems. However, the revenue matching principle (accrual accounting) does require more assumptions to be met than cash accounting (where we recognize revenues and expenses in the period that money is paid or received).

There exist two types of situations when the recognition of economic activity does not correspond to the transfer of cash:

1. Deferrals

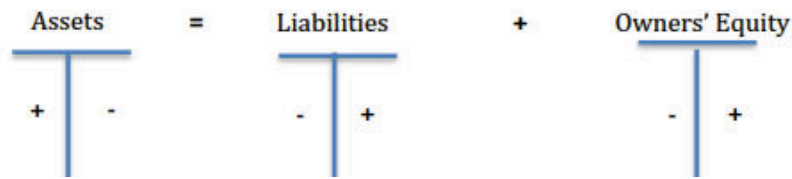
- Prepaid Expenses: expenses that have been paid by the company before they are consumed, (e.g. prepaid insurance). These are assets
- Unearned Revenues: cash that has been received before the company's obligations in the transaction have been fulfilled (e.g. payment in advance for year-long gym membership). These are liabilities.

2. Accruals

- Accrued Revenues: a product or service has been successfully delivered, but payment has not yet been received. These are assets
- Accrued Expenses: resources that have been used but not yet paid for. These are liabilities

Debit and credit

Conventional accounting is done with T-accounts, where the left side is called debit and the right side is called credit.



(Lecture 1, slide 101)

Every debit must have a corresponding credit in another account, since all t-accounts must balance in the general ledger.

Intermediate Accounting – IBEB – FA Lecture 2, week 1 – Cash Flow

Cash flow statement and analysis

Cash equivalents are short-term, highly liquid investments that are both:

- readily convertible to known amounts of cash.
- near their maturity that they present insignificant risk of changes in value (e.g., due to changes in interest rates)

Generally, investments with original maturities of three months or less qualify under this definition.

Timing and matching problems

Cash flows suffer from “timing” and “matching” problems because the benefits and costs of doing business are often:

- measured in the wrong period (“timing” problem)
- not matched with each other in the same period

Net income (an accrual accounting measure of performance) is more informative than operating cash flow because it alleviates “timing” and “matching” problems. However, accrual accounting also has its downsides:

- More room for manipulation

- Because accrual accounting allows a company (managers) to shift the recognition of cash flows over time, some companies (managers) use accruals for “earnings management” purposes.

Purpose of the cashflow statement

- to provide information about a company’s cash receipts and cash payments during a period.
- to provide cash-basis information about the company’s operating, investing, and financing activities

Cash flow statement provides information to assess:

- a company’s ability to generate future cash flows.
- a company’s ability to pay dividends and meet obligations.
- reasons for the difference between net income and net cash flow generated from operating activities.
- the cash and non-cash investing and financing transactions during the period

Classification of cashflows

Operating activities:

- derived from the main or core revenue-producing activities of the enterprise.
- key indicator whether the operations of the company have generated enough cash flows to keep it afloat.

Investing activities:

- buying and selling of fixed assets (physical, intangible or equity)
- ‘The extent to which expenditures have been made for resources intended to generate future income and cash flows.

Financing activities:

- obtaining funds from shareholders and dividend payments
- obtaining long-term loans or funds through bond issues

Preparation of the cash flow statement

The three sources of information are the balance sheet, the income statement and selected transaction data. Additionally, there are 3 major steps that you need to take in order to create the cash flow statement:

Step 1. Determine change in cash.

Step 2. Determine net cash flow from operating activities.

Step 3. Determine net cash flows from investing and financing activities.

In regard to Step 2.:

- Net income \neq Cash Flow from Operating Activities because of accrual accounting
- eliminate the effects of income statement transactions that do not result in an increase or decrease in cash.
- adjust net income to determine a 'potential cash flow'.

There are two ways of calculating potential cash flow of OPERATING ACTIVITIES.

1. **DIRECT METHOD:** Potential cash flow = Cash revenues - Cash expenses
2. **INDIRECT METHOD:** Potential cash flow = Net income + non-cash expenses
non-cash revenues

First possibility refers to direct method and the second possibility refers to indirect method.

Indirect method

Net income = cash flow (from operating act.) + accruals

Cash flow (from operating act.) = Net income - accruals

Accruals =

- Non-current (long-term) accruals:

Depreciation

Deferred income tax

- Current accruals: changes in current operating assets and liabilities:

Accounts receivables

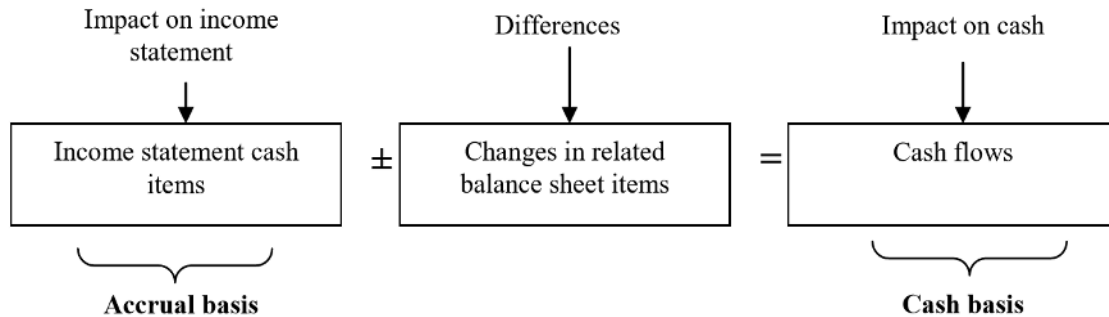
Prepaid expenses

Inventory

Accounts payable

Direct method

It can be illustrated through the following equation:



Cashflow comparison

Comparing cash flows between companies gives additional insights:

- Relative performance: Is company A doing better than company B?
- Are the changes in inventories, payables, and receivables "normal" compared to similar companies?
- Which companies shows sign of running into cash flow problems?

Intermediate Accounting – IBEB – MA Lecture 1, week 2

Cost terms & Absorption vs Variable Costing Systems

Cost Terms and Concepts

Managerial Accounting

Managerial accounting is used for internal decision making and is forward-looking, so there are no regulatory requirements for layout or content. The main aim is to understand how value is created in a company in order to make better decisions.

Financial Accounting

Financial accounting is used for external communication and is backward-looking. This type of communication is needed because ownership and control in corporations is separate. Separation of ownership and control can lead to **agency problems**, which is why investors and other creditors need to possess the same information as the managers. Ensuring that third parties have full information also helps to combat **adverse selection** and **moral hazard** problems.

Cost Object

Anything for which costs can be measured, such as the cost of a department of the firm, or a project, product, or service.

Cost Allocation System

This process consists of two stages:

1. **Cost Accumulation/Classifying:** first collected (journalised) into a general account, and then assigned to separate cost objects.
2. **Cost Assignment:** there are two types of costs, direct costs and indirect costs. Direct costs can be traced to a cost object easily, e.g. the wood used to make a chair. Indirect costs are related to a cost object but cannot be strictly traced to it and usually are not of substantial relative economic significance in monetary terms. For instance, the cost of lighting used in the factory to manufacture chairs would be considered an indirect cost.

Categories

Behaviour: cost reaction to activity level

1. Variable costs: change with the total level of activity or volume of operations
2. Fixed costs: remain constant regardless of the size of operations
3. Semi-fixed costs (step-fixed costs): Fixed within specific activity levels, for example being fixed only over a relevant range.
4. Semi-variable costs: mixed costs that are composed of both fixed and variable costs.

Note: in the long run ALL costs are variable but they are fixed when looking at a specific time frame.

Traceability: how easily/accurately costs can be allocated

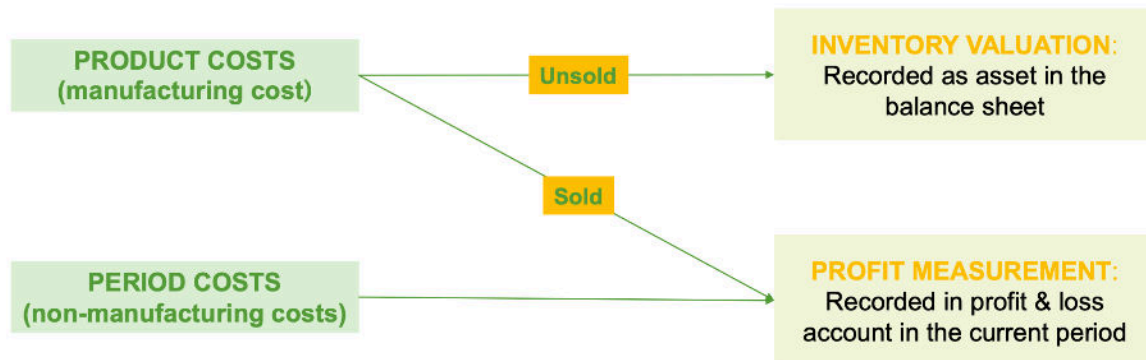
1. Direct costs: can be accurately traced back to one object
 - Golden rule: it is a direct cost when you can physically observe the amount of material and labour used.
2. Indirect costs: we would have to estimate costs when assigning to cost objects and so is called cost allocation process.

Function: the extent to which the cost is relevant for **profit measurement or inventory valuation.**

1. Period Costs: Costs that are booked in the period in which they are incurred but are not related to manufacturing or the main operations of the firm. This sets them apart from revenue costs.
 - Examples of period costs include marketing costs, office rent (not production facility rent), and administrative expenses. Every business has period costs, even if NO production takes place.
 - Administrative overhead
 - Marketing overhead

2. Product Costs: Direct costs that can be traced to the product being manufactured. When booked, product costs are treated as inventory and thus are not visible on the income statement.
 - Direct material, direct labour, manufacturing overhead

Note: fixed manufacturing overhead can be both product and period costs depending on the costing system.



RECAP + Absorption and Variable Costing, Lecture MA 1 (slide 25)

Costs/Revenue Relevance: The extent to which costs are relevant for making a particular decision.

1. Relevant vs Irrelevant Costs: Future costs and revenues that will be changed by a decision
 - Keep in mind that NOT all future costs are relevant but all relevant costs are future costs.
2. Sunk Costs: Costs that have already occurred and cannot be changed by any decision
3. Opportunity Costs (choosing vs losing): measures the benefits that are lost or sacrificed when a certain action is chosen, and an alternative course of action is given up.

Assume that Tesla must decide between producing electric car batteries themselves or buying them from another supplier firm. Based on the following annual figures, what should Tesla decide?

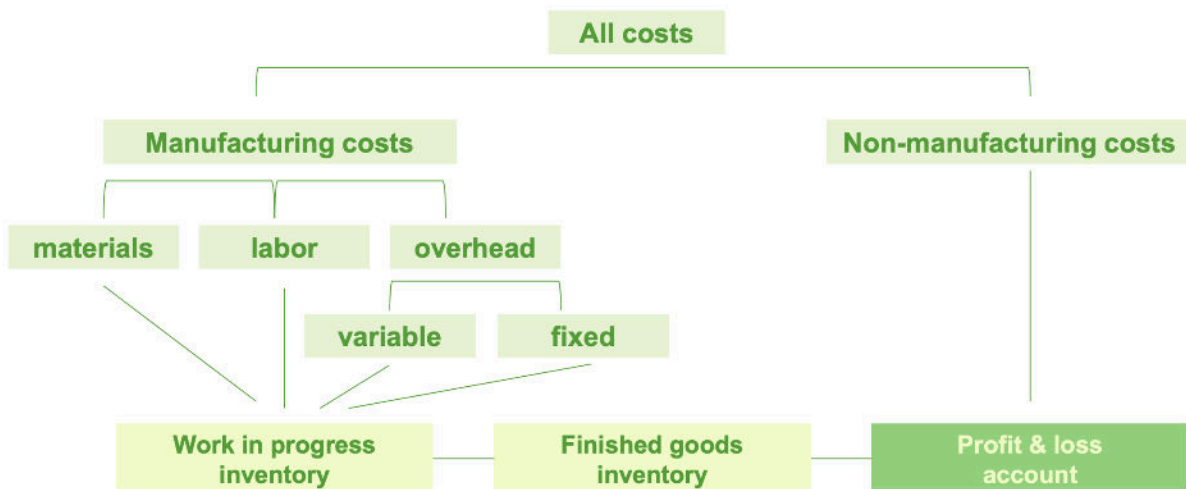
	MAKE	BUY	
Variable manufacturing costs	5,000,000 EUR	0 EUR	relevant
Fixed costs	10,000,000 EUR	10,000,000 EUR	irrelevant
Purchase price	0 EUR	25,000,000 EUR	relevant
Total relevant costs	-5,000,000 EUR	-25,000,000 EUR	

RECAP + Absorption and Variable Costing, Lecture MA 1 (slide 28)

Absorption vs Variable Costing System

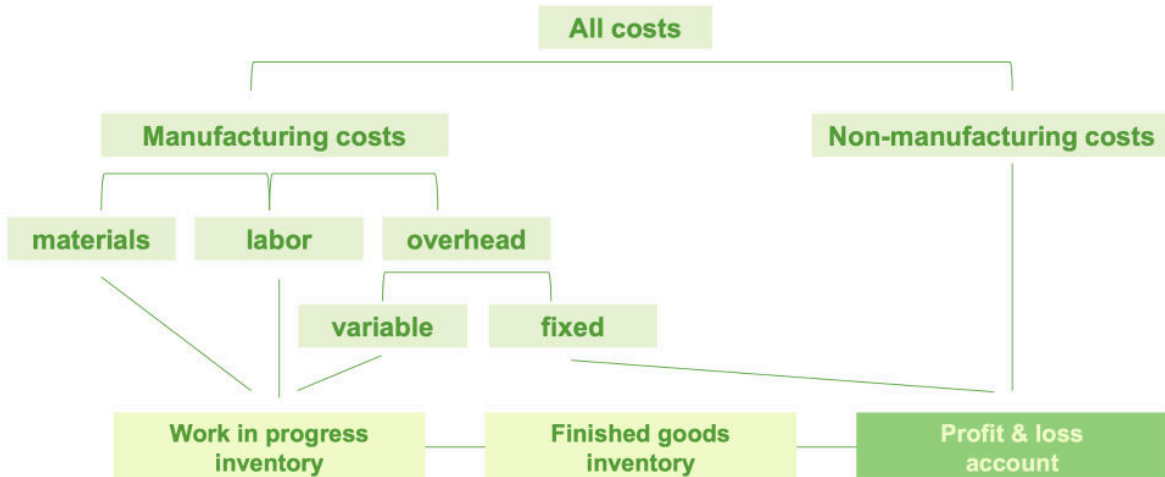
There are two different methods: variable costing and absorption costing. The only way in which they differ is in the treatment of fixed manufacturing overhead costs in **COGS** which leads to different **profits**.

Absorption or Full Costing



RECAP + Absorption and Variable Costing, Lecture MA 1 (slide 33)

Variable or Direct Costing



RECAP + Absorption and Variable Costing, Lecture MA 1 (slide 34)

With variable costing, only variable expenses are recorded as inventory costs, thus they are expensed with revenues as the cost of goods sold. This means that fixed costs are expensed as period costs, similarly to salary and administrative expenses: they are recorded in the period in which they were incurred and do not follow revenues. With absorption costing, both variable and fixed costs are recorded as inventory costs. This means that fixed costs can also be booked as assets until the goods are actually sold.

The difference between variable and fixed costs is of central importance in variable costing, whereas most weight is placed on the difference between manufacturing and non-manufacturing costs in absorption costing. Because of this, variable costing uses a contribution margin whereas absorption costing uses a gross margin in the income statement.

Absorption costing has the downside that it can steer managers to increase production and lead to stock build-up without regarding the long-run consequences of having a large inventory to sell. However, it enables a more precise measure of net profitability than variable costing, because both fixed and variable costs are included. Variable costing has the advantage of making comparison of one product over another easier than with absorption costing, because it only considers costs that are strictly associated with production of the specific good. On the other hand, it makes deciding on the price of a good more difficult, as fixed costs are not considered in COGS.

Example:

Hello Knitty Factory produces and sells a single type of scarves. The following figures are available:



(in units)	PERIOD 1	PERIOD 2	PERIOD 3
Opening inventory	0	0	1,000
Production	1,000	3,000	1,000
Sales	1,000	2,000	2,000
Closing inventory	0	1,000	0

	EUR	
Unit selling price	50	
Manufacturing costs		
▪ Variable manufacturing costs per unit produced	20	
Direct materials	11	
Direct labor	6	
Variable manufacturing overhead	3	
▪ 12,000 EUR fixed manufacturing overhead per period (for a normal capacity of 1,000 units)	12	fixed overhead rate
Non-manufacturing costs		
▪ Variable selling & administrative expenses per unit sold	4	$\frac{12,000}{1,000}$
▪ Fixed selling & administrative expenses per period	7,000	



(in units)	PERIOD 1	PERIOD 2	PERIOD 3
Opening inventory	0	0	1,000
Production	1,000	3,000	1,000
Sales	1,000	2,000	2,000
Closing inventory	0	1,000	0

(1) Profit and loss (P&L) account based on **VARIABLE COSTING**:

	PERIOD 1	PERIOD 2	PERIOD 3
sales	50,000 (1,000 x 50)	100,000 (2,000 x 50)	100,000 (2,000 x 50)
– variable COGS	20,000 (1,000 x 20)	40,000 (2,000 x 20)	40,000 (2,000 x 20)
opening inventory	0	0	20,000 (1,000 x 20)
production	20,000 (1,000 x 20)	60,000 (3,000 x 20)	20,000 (1,000 x 20)
– ending inventory	0	20,000 (1,000 x 20)	0
– variable non-manufacturing costs	4,000 (1,000 x 4)	8,000 (2,000 x 4)	8,000 (2,000 x 4)
= contribution margin	26,000	52,000	52,000
– fixed manufacturing overhead	12,000	12,000	12,000
– fixed non-manufacturing costs	7,000	7,000	7,000
= net operating income	7,000	33,000	33,000



(in units)	PERIOD 1	PERIOD 2	PERIOD 3
Opening inventory	0	0	1,000
Production	1,000	3,000	1,000
Sales	1,000	2,000	2,000
Closing inventory	0	1,000	0

(1) Profit and loss (P&L) account based on **ABSORPTION COSTING**:

	PERIOD 1	PERIOD 2	PERIOD 3
sales	50,000 (1,000 x 50)	100,000 (2,000 x 50)	100,000 (2,000 x 50)
– COGS	32,000 (1,000 x 32)	64,000 (2,000 x 32)	64,000 (2,000 x 32)
opening inventory	0	0	32,000 (1,000 x 32)
production	32,000 (1,000 x (20+12))	96,000 (3,000 x 32)	32,000 (1,000 x 32)
– ending inventory	0	32,000 (1,000 x 32)	0
–/+ under- or over-absorption of fixed overhead	/	24,000 ((3,000 – 1,000) x 12)	/
= gross margin	18,000	60,000	36,000
– non-manufacturing costs	11,000 (4 x 1,000 + 7,000)	15,000 (4 x 2,000 + 7,000)	15,000 (4 x 2,000 + 7,000)
= net operating income	7,000	45,000	21,000



Variable manufacturing costs + fixed manufacturing overhead rate!

RECAP + Absorption and Variable Costing, Lecture MA 1 (slides 36–38)

Operating Profit

The two costing methods lead to different operating profit figures due to different treatment of variable and fixed costs. As a result, we see that when:

Production > Sales: profit absorption costing > profit variable costing (inventories increase)

Production < Sales: profit absorption costing < profit variable costing (inventories decrease)

Production = sales: profit absorption costing = profit variable costing (NO change in inventories)

Let us examine why this is the case. If production exceeds sales and variable costing records all of the fixed costs as period costs, then unsold inventory will be treated as an expense on the income statement. Hence, profit will be lower in comparison with absorption costing, where only the fixed costs associated with sold goods are recorded as expenses. Similarly, this explains why profit from absorption costing is less than variable costing when sales exceed production. When sales exceed production, more of the fixed costs are expensed under absorption costing than with variable costing because variable costing would again record the produced goods.

So, absorption costing sometimes incentivises managers to build stock in the hope of increasing operating profit in the short run (because, under absorption costing, fixed costs of manufacturing are not expensed as period costs). This behaviour has three negative aspects:

1. Deterioration of goods: products may go bad before they are sold, or become obsolete and without demand.
2. Storage costs rise due to labour needed in organising stock and an increase in insurance premiums.
3. Plant managers may not perform enough maintenance since stock builds so rapidly.

To prevent this behaviour, critics suggest careful budgeting and planning of stock, and even reducing of the freedom to build stock. Other solutions would be to implement a charge for maintaining stock, or to switch to variable costing.

Absorption Costing: Four Denominator Levels

Under absorption costing, it requires an estimation of fixed overhead rates to assign per unit. Thus, it requires an allocation base to help estimate these costs:

1. **Theoretical capacity (maximum):** this means production which is at full speed of what is physically possible, all the time.
2. **Practical capacity:** production at maximum capacity, but considering unavoidable disruptions, holidays, maintenance time etc.

3. **Normal capacity:** satisfies what customers on average demand over multiple time periods.
4. **Master-budget capacity:** most expected capacity utilisation that will occur in the next budget period.



Hello Knitty Factory provides us with the following figures concerning their different capacity levels:

CAPACITY LEVELS	(in units)
Theoretical capacity	4,000
Practical capacity	3,000
Normal capacity	1,000
Budgeted capacity	1,500

Assume that actual activity and actual fixed manufacturing overhead equal 1,000 units and 12,000 EUR, respectively

	FIXED MANUFACTURING OVERHEAD RATE (EUR/unit)	ALLOCATED TO PRODUCTS (EUR)	UNDER- OR OVER- ABSORPTION OF FIXED OVERHEAD (EUR) (cost of unused capacity)	F/ A	TOTAL (EUR)
Theoretical capacity	$(12,000 / 4,000) = 3$	$(3 \times 1,000) = 3,000$	$((4,000 - 1,000) \times 3) = 9,000$	A	12,000
Practical capacity	$(12,000 / 3,000) = 4$	$(4 \times 1,000) = 4,000$	$((3,000 - 1,000) \times 4) = 8,000$	A	12,000
Normal capacity	$(12,000 / 1,000) = 12$	$(12 \times 1,000) = 12,000$	$((1,000 - 1,000) \times 12) = 0$	/	12,000
Budgeted capacity	$(12,000 / 1,500) = 8$	$(8 \times 1,000) = 8,000$	$((1,500 - 1,000) \times 8) = 4,000$	A	12,000

RECAP + Absorption and Variable Costing, Lecture MA 1 (slide 41)

Budgeted Overhead Rates

In reality, actual overhead rates cannot be obtained before the end of the accounting period. Therefore, this requires an estimation of the overhead costs for the current accounting period. This can be done by dividing the estimated overhead (based on previous years) by the estimated activity for the current accounting period.

However, given that they are simply estimated, these numbers can be either higher or lower than the actual overhead that will be determined at the end of the accounting period. The differences in overheads are treated as period costs which means they will be filed under expenses. The differences can either be an “under-absorption” meaning that the estimated was lower than the actual overhead costs and results in an increase in expenses or an “over-absorption” wherein the estimated was higher than the actual and results in a decrease in expenses.

Intermediate Accounting – IBEB – MA Lecture 2, week 2 – Cost Allocation

Stage 2: Cost Assignment

The first part of stage 2 of the cost collection system involves direct costs. However, since these are easily traced back to the cost objects, it is relatively straightforward.

Job Costing

This is when firms offer unique individual products or at least small batches of unique products to their customers. Usually these products are tailored to meet the specific need of each customer. This means that they will have their own characteristic and costs, thus must assign costs for each product individually.

Example: Erasmus university wants to order chocolates for their students to wish them good luck with their exams. They will place a custom order.

Process Costing

This is when large volumes of similar products are produced. Thus these products are identical and the costs will be the same.

For example: Tony's Chocolonely produces the salted caramel chocolate bar. It is produced in mass production and on a continuous basis. There is no need to assign costs individually as they have identical characteristics and costs.

Hybrid Costing Systems

The system in between job and process costing and they are most common in practice. For this lecture, we will focus more on job costing.

Direct Tracing vs Cost Allocations

Direct Costs

These costs include direct labour and material and can be accurately and immediately linked (directly traced) to an individual cost object. Remember that you can physically observe exactly how much direct material or labour is needed.

Indirect costs

Indirect costs are costs related to a cost object but that cannot be traced to it. We cannot use direct measures. For example, electricity costs or heating costs of the factory, we do not know exactly the quantity and the costs that are associated with the specific quantity that is consumed by each object manufactured. Therefore, we need a cost allocation process, where surrogate/alternative measures are used.

For example: assume that the longer production employees work on manufacturing a specific cost object, the more lighting/heating costs are needed to finish the object. Thus labour hours is a good cost driver only if we assume that there is a direct link between hours and the mentioned indirect costs.

Remember that costs are first treated as assets because we do expect that these costs will be used as future revenue within the firm. They are first registered as work in progress or finished goods. It is only when a product is sold that it is treated as an expense in the profit/loss account.

Cost Drivers or Cost Allocation Basis

Any factor that causes a change in the cost of manufacturing products or offering services.

1. **Volume-related:** depend on the number of units manufactured (labour/machine hours, labour costs)
2. **Non-volume-related:** do NOT depend directly on units manufactured (number of setups, number of inspections)

Note: for accurate cost assignment, cost drivers should be significant determinants of costs. There should be a **causal relationship** between the cost driver and the size of the costs.

Allocation of Indirect Costs to Cost Objects

There are two ways to allocate indirect costs:

1. **Traditional Costing System - Arbitrary Allocations:** cost drivers are NOT always a significant determinant of cost. Less accurate cost assignment but are still very popular in practice.
2. **Activity-Based Costing System - Cause & effect Allocations:** focus on cost drivers that significantly determine the amount of costs so that we have an accurate cost assignment.

Note that under a traditional costing system the accuracy of cost assignment will be lower but it is a less expensive system. This is because higher accuracy requires gathering information and keeping information up to date which is more costly (higher operating costs).

Apply the rule: **marginal benefit > marginal cost of making the system more accurate.**

Factors Impacting Benefit-Cost Tradeoff:

- **Size of the indirect cost:** if indirect cost are low compared to toilet cost then a traditional costing system can still be very accurate.
- **Cost of gathering information:** if the cost of gathering/keeping information is low, then it is best to work with the activity-based costing system.
- **Product diversity:** if more different products are manufactured, they will consume costs in different ways. Thus, activity-based costing is better suited.
- **Why do we need cost allocation?**
 - If we need it for managerial decision-making purposes => activity-based costing
 - If we need it to capture the value of inventory/COGS => traditional costing

Traditional Costing System

Assume that Tony Chocolonely produces **two unique types of chocolate bars (standard vs. premium chocolate bar)** made to Erasmus School of Economics' specifications. The following budgeted figures are available:



	STANDARD	PREMIUM	TOTAL
Production and sales	10,000	5,000	15,000
Direct materials (EUR)	2	4	40,000
Direct labor hours (hours)*	0.2	0.5	4,500
Direct labor costs (EUR)	1.6	4	36,000
Machine hours X	0.5	1.5	12,500
Machine hours Y	1.0	1.0	15,000
Indirect costs or manufacturing overhead (EUR)			225,000



Cost Allocation, MA Lecture 2 (slide 9)

Plant-wide (Blanket) Overhead Rate

The use of a single budgeted overhead rate for the organization as a whole. An overhead rate tells us how overhead costs are charge based on the chosen cost driver, thus it is calculates as follows:

$$\text{Budgeted Overhead Rate} = \frac{\text{total budgeted manufacturing overhead}}{\text{total budgeted amount of the cost driver}}$$

The overhead rate is used for the factory as a whole which leads to multiple disadvantages because within an organizision products often pass through many different departments. Thus by using a single rate you assume that all products go through these department in a similar way (**assume that product diversity is low**). This does not coincide with reality, therefore it is not commonly used in practice.

Example:



Cost assignment of 225,000 EUR manufacturing overhead using direct labor hours as cost driver:

Budgeted plant-wide overhead rate:

$$= \frac{225,000 \text{ EUR manufacturing overhead}}{4,500 \text{ direct labor hours}}$$
$$= \mathbf{50 \text{ EUR}} \text{ per direct labor hour}$$

	STANDARD	PREMIUM
Direct materials	2	4
Direct labor costs	1.6	4
Manufacturing overhead	10 (0.2 x 50)	25 (0.5 x 50)
TOTAL COSTS PER UNIT	13.6	33
TOTAL COSTS	136,000	165,000

Cost Allocation, MA Lecture 2 (slide 12)

Most likely premium bars use departmental resources in different ways, in the sense that it requires to go through more departments (needs more processing). Thus we must look at other systems.

2-Stage Allocation Process: Traditional

This works best when product diversity is high. This is when cost objects will consume overhead costs in different ways. The difference from this process to others is how we treat manufacturing overhead.

1st Stage: assign manufacturing overhead to production cost centers/pools (typically departments).

- Some are first allocated to a service cost center that render essential support in the production process but they are not directly related to production (these costs are reallocated to production centers).

2nd Stage: compute separate overhead rates for each production cost centre, then use cost drivers to allocate all the costs assigned to different production cost centres (1st Stage) to the cost objects.

- Traditional costing system: typically volume-based cost drivers (hours)

Example:

1st Stage

Allocate 225,000 EUR manufacturing overhead to production centres (i.e., production, packaging and quality department) (**STEP 1**):



	MANUFACTURING OVERHEAD	COST DRIVER TO PRODUCTION COST CENTRES	AREA (SQ. METRES)
Indirect wages and supervision production department	10,000	Direct	280,000
packaging department	10,000	Direct	80,000
quality department	5,000	Direct	40,000
Lighting and heating	200,000	Area	

BUDGETED OVERHEAD RATE

$$= \frac{200,000}{280,000 + 80,000 + 40,000}$$

$$= 0.50 \text{ EUR per sq. metre}$$

PRODUCTION COST CENTRES OVERHEAD

PRODUCTION	150,000 (10,000 + 280,000 x 0.50)
PACKAGING	50,000 (10,000 + 80,000 x 0.50)
QUALITY	25,000 (5,000 + 40,000 x 0.50)
	225,000

Cost Allocation, MA Lecture 2 (slide 15)

Note that indirect wages are direct for departments but indirect for cost objects. We know how much wage we have paid in each department but we do not know how much labour from each department was used for each cost object.

2nd Stage



Allocate overhead in production centres to cost objects (**STEP 2**):

	PRODUCTION COST CENTRES OVERHEAD (1)	COST DRIVER TO COST OBJECTS (2)	BUDGETED PRODUCTION COST CENTRE OVERHEAD RATES (3) = (1) / (2)
PRODUCTION	150,000	Machine hours X	12 EUR per machine hour
PACKAGING	50,000	Machine hours Y	3.33 EUR per machine hour
QUALITY	25,000	Direct labor hours	5.56 EUR per labor hour

	STANDARD	PREMIUM
Direct materials	2	4
Direct labor costs	1.6	4
Production	6 (12 x 0.5)	18 (12 x 1.5)
Packaging	3.33 (3.33 x 1.0)	3.33 (3.33 x 1.0)
Quality	1.11 (5.56 x 0.2)	2.78 (5.56 x 0.5)
COST PER UNIT	14.04	32.11
TOTAL COSTS	140,400	160,550

Cost Allocation, MA Lecture 2 (slide 16)

We can see that a premium chocolate bar consumer more overheads in the production and the quality department. This is not observable when using only one overhead to allocate all manufacturing overhead to our cost objects.

2-Stage Allocation Process: Activity-Based Costing Systems (ABC)

In this process overheads are allocated to each major activity related to manufacturing a cost object, which are called activity cost centers.

Activities are defined as the aggregation of many different tasks that share the same goal and cause the consumption of resources. Example: purchasing components, schedule production, set-up machines, quality inspection

The main difference is that ABC systems usually have more cost centers/pools than the traditional costing systems. This is because within a specific department multiple activity can be performed resulting in more activity cost centers than production cost centers under a traditional costing system.

1st Stage: identify activities with a reasonable level of aggregation based on cost-benefit criterion and then use **resource cost drivers** to allocate each cost object to the activity cost centers.

- resource cost drivers: measure the quantity of resources consumed by an activity.

2nd Stage: use **activity cost drivers** to assign the cost within each activity cost center to different cost objects.

- Activity cost drivers: can be both volume or non-volume based
- Results in a more accurate assignment of costs.

Example:

1st Stage:



Assume that **budgeted overhead of 225,000 EUR** is caused by the following **activities (Step 1)** and activities have the following activity cost drivers:

	OVERHEAD IN ACTIVITY COST CENTRES	ACTIVITY COST DRIVERS
PURCHASING	30,000	Number of purchase orders
MACHINE SET-UP	100,000	Number of set-ups
MAINTENANCE	20,000	Machine hours X
PACKAGING	50,000	Machine hours Y
QUALITY INSPECTION	25,000	Number of first item inspections
	225,000	

2nd Stage:



The following figures are also known:

	STANDARD	PREMIUM	TOTAL
Production and sales	10,000	5,000	15,000
Number of purchase orders	2	4	40,000
Number of set-ups	1	6	40,000
Machine hours X	0.5	1.5	12,500
Machine hours Y	1.0	1.0	15,000
Number of first item inspections	4	10	90,000

Allocate overhead in activity centres to cost objects (**STEP 2**):

	ACTIVITY COST CENTRE OVERHEAD (1)	TOTAL AMOUNT OF ACTIVITY COST DRIVER (2)	BUDGETED ACTIVITY COST DRIVER RATES (3) = (1) / (2)
PURCHASING	30,000	40,000	0.75 EUR per purchasing order
MACHINE SET-UP	100,000	40,000	2.5 EUR per set-up
MAINTENANCE	20,000	12,500	1.6 EUR per machine hour X
PACKAGING	50,000	15,000	3.33 EUR per machine hour Y
QUALITY INSPECTION	25,000	90,000	0.28 EUR per inspection



BUDGETED ACTIVITY COST DRIVER RATES (3) = (1) / (2)
0.75 EUR per purchasing order
2.5 EUR per set-up
1.6 EUR per machine hour X
3.33 EUR per machine hour Y
0.28 EUR per inspection

	STANDARD	PREMIUM
Direct materials	2	4
Direct labor costs	1.6	4
Purchasing	1.5 (0.75 x 2)	3 (0.75 x 4)
Machine set-up	2.5 (2.5 x 1)	15 (2.5 x 6)
Maintenance	0.80 (1.6 x 0.5)	2.40 (1.6 x 1.5)
Packaging	3.33 (3.33 x 1)	3.33 (3.33 x 1)
Quality controls	1.12 (0.28 x 4)	2.80 (0.28 x 10)
TOTAL COSTS PER UNIT	12.85	34.53
TOTAL COSTS	128,500	172,650

Cost Allocation, MA Lecture 2 (slides 21-23)

Note that the premium chocolate bar is more complex and the costs associated with the complexity is better captured by ABC system as it shows which activities are the most cost intensive.

Activity hierarchies

- **Facility-sustaining activities:** support the organization as a whole
 - Unavoidable & irrelevant => do NOT allocate to products
- **Product-sustaining activities:** support an entire product line
- **Batch-level activities:** performed each time a batch of goods is produced

- **Unit-level (volume-based) activities:** performed each time a unit of the product/service is produced



Cost Allocation, MA Lecture 2 (slides 27)

Over/Under Absorption of manufacturing overheads

Before the accounting period: budgeted overhead rates are based on budgeted overhead costs and budgeted amount of the cost driver.

During the accounting period: actual overhead costs and actual amount of the cost driver are known.

under/over absorption arises if allocated overhead \neq actual overhead.

Why do we not wait for accounting period? For decision-making purposes it is not possible to wait because you have to make some choice before the accounting period ends.

Intermediate Accounting – IBEB –

FA Lecture 3, week 3 – Equity

Initial Public Offering (IPO)

For a firm to become publicly owned, it raises capital by issuing shares in an initial public offering (IPO). After the IPO, shares are able to be traded freely in the open market. The capital it earns is part of contributed capital and does not need to ever be paid back to investors in the IPO.

Advantages:

- Raise capital
- Monetize investments of early private investors
- Become a traded enterprise

Disadvantages:

- Greater costs
- Disclosure requirements
- Stronger agency problems

Equity

Share Types

Shares represent residual corporate interest that:

- They bear the risks of losses
- Receive the benefits of success
- There are NO guaranteed dividends/assets upon dissolution

1. **Ordinary Shares (Class A)** – represents the basic ownership interest. Each share has rights/privileges:
 - Sharing profits and losses in proportion to ownership (the number of shares owned)
 - Sharing proportionately in management of the firm (voting rights)

- Sharing proportionately in the assets that the firm owns, in case it has to be liquidated (assets have to be sold to satisfy creditors)
 - Sharing proportionately the issuing of any new shares of the same class (called the pre-emptive right)
2. **Preference Shares (Class B)** - sacrifice certain basic rights in return for other special rights:
- Preferred dividends (cumulative/non-cumulative)
 - NO voting rights (NOT always)
 - Alternatively more voting rights per share
 - Convertible into ordinary shares
 - Callable by firm: this means that the company can hold back the shares for a specific price.

It is important to note that within a given class of shares, each share exactly equals every other share. Additionally, dual shares (a mix of both types of shares) are NOT always allowed.

Key Components of Equity

Equity = Assets - Liabilities = residual interest in the firm's assets after deducting all liabilities.

Primary Sources of Equity:

1. Contributed Capital => ordinary/preference shares accounts => share premium
2. Retained Earnings Account
3. Treasury Shares Account - consider this in case the company bought back its own shares and have to park the shares at the face of the balance sheet and it will decrease the equity account.

Key Steps to Issue Shares

1. The applicable governmental agency must authorize the share issuance/IPO
 - Keep in mind that local rules may differ in terms of allowing/restricting certain types of share issuance
2. The company hires investment banks (underwriters and legal consulting firms) to get guidance for the process.

- Contact institutional investors
 - Helps with road shows and disclosure requirements
3. Underwriters have to determine the IPO price based on the demand from institutional investors.
 - Sets the first trading price
 4. On the day of the IPO, the shares are traded at the stock exchange.
 - As a private investor you may then start trading shares in the secondary market.

Share Value

The first step is to determine the value of the shares in order to make the right accounting treatment.

1. **Par Value Shares** - the company had to maintain 2 separate accounts for preference and ordinary shares:
 - **Share Capital Account** = nominal share capital = par-value of shares = the product of the number of shares multiplied by the par value of the shares
 - **Share Premium Account** = the excess over par value
 - The par value has NO relation with the fair value of the shares and is usually a very low amount.
2. **Non-Par Value Shares** - main difference is the number of accounts necessary to reflect a transaction:
 - In many countries no-par shares are also allowed (stated value)
 - Company maintains just one account (share capital)

Example: journal entries for a 0.01 euro par-value of 1,000,000 ordinary shares at 20 euros.

Debit

Cash - the full value (price * shares) = 20,000,000

Credit

Share capital - ordinary account = par-value * number of shares = 10,000

Share premium - ordinary account = remaining amount = 19,990,000

Note that if there was no-par value then you would just credit the full amount to the share capital - ordinary account.

Costs of Issuing Shares:

- Direct costs: must be directly linked otherwise they cannot be treated as costs.
 - Underwriting costs, accounting/legal fees, printing costs, taxes, ...
- Reduction of the amounts paid-in => debit to Share Premium
 - NO recording of expenses in the profit/loss account
 - It does decrease equity

Lump-Sum Sales

When two or more classes of securities are issued for a single payment.

1. **Proportional Method:** allocate lump sum on a proportional basis of fair values.

E.g., shares issued for lump sum of \$30,000 – 1,000 ordinary shares (\$10 par value, \$20 fair value) and 1,000 preference shares (\$10 par value, \$12 fair value)

FV ordinary shares (1,000 x \$20)	=	\$20,000
FV pref. shares (1,000 x \$12)	=	<u>\$12,000</u>
Total	=	\$32,000

Allocation to:

Ordinary shares = $20/32$ (or 62.5%) x \$30,000 = **\$18,750**

Pref. shares = $12/32$ (or 37.5%) x \$30,000 = **\$11,250**

Equity, FA Lecture 3 (slide 14)

	Debit	Credit
Cash	30,000	
Share Capital—Ordinary		10,000
Share Premium—Ordinary		8,750
Share Capital—Preference		10,000
Share Premium—Preference		1,250

2. **Incremental Method:** allocate first to securities with known fair value, then the rest to the class without fair value.

Lump-sum receipt = \$30,000

Ordinary (1,000 x \$20) = \$20,000

Balance = \$10,000

→ Balance is allocated to preference shares

Equity, FA Lecture 3 (slide 16)

	Debit	Credit
Cash	30,000	
Share Capital—Ordinary		10,000
Share Premium—Ordinary		10,000
Share Capital—Preference		10,000
Share Premium—Preference		0

Non-Cash Transactions

Shares non-cash transactions are issued in exchange for services or property. Some important notes to know:

- Records shares at fair value of goods/services
- **If fair value cannot be measured reliably, record at the fair value of shares**
- If both are unavailable: use alternative valuation method (example: market data/discount cash flow approach)
 - Avoid using book/par/stated values

	Debit	Credit
Goods	Fair Value	
Share Capital		Par-value
Share Premium		FV - (par-value)

Share Buybacks

Buybacks mean that once shares have been issued a company can re-acquire them.

Benefits/Incentives:

- To provide tax-efficient distributions of excess cash to shareholders
- To increase earnings per share and return on equity
- To provide shares for employee compensation contracts or to meet potential merger needs
- To better fight hostile takeover attempts or to reduce the number of shareholders
- To make a market in the shares

After re-acquiring:

- Retire the shares
 - Cancellation
 - Reduction in the number of issued shares
 - Technically have the status of all authorized and issued shares (company does NOT need to seek approval from its shareholders)
- Hold the shares in the treasury account
- Treasury shares be re-issued

Keep in mind that Treasury shares are NOT an asset!

- Reduction in assets and equity because a company cannot own itself
- No voting right
- The same as unissued ordinary shares

Treasury Shares

There are two methods to record them: **Cost Method** and **Par-Value Method** but most require the first one.

1. **Cost Method:** account for the cost of buying back the shares
 - Purchase cost define the accounting value
 - Debit treasury shares account
 - Credit cash account

- Report treasury shares account – **contra-equity** account as a deduction from equity on the balance sheet

Selling treasury Shares

When selling treasury shares, accounting depends on price:

1. Selling price = cost of the re-acquisition
2. Selling price > cost of re-acquisition
3. Selling price < cost of re-acquisition

At cost:	Cash (BS)	X	
		Treasury shares (BS)	X
Above cost (X+Y):	Cash (BS)	X+Y	
		Treasury shares (BS)	X
		Share Premium - Treasury (BS)	Y
Below cost (X-Y):	Cash (BS)	X-Y	
	Share Premium - Treasury (BS)*	Y	
		Treasury shares (BS)	X

[*Only if there is a credit balance in “Share Premium – Treasury”. Otherwise: debit any additional excess of cost over selling price to the “Retained Earnings”.]

Equity, FA Lecture 3 (slides 25)

Example 1: Sale of treasury above cost

Pacific acquired 10,000 treasury shares at \$11 per share. It now sells 1,000 shares at \$15 per share on March 10. Pacific records the entry as follows:

	Debit	Credit
Cash	15,000	
Treasury Shares		11,000
Share Premium- Treasury		4,000

Example 2: Sale of treasury shares below cost

Pacific sells an additional 1,000 treasury shares on March 21 at \$8 per share, it records the sale as follows:

	Debit	Credit
Cash	8,000	
Share Premium - Treasury*	3,000	
Treasury Shares		11,000

*** ONLY if there is a credit balance in "Share Premium - Treasury," otherwise debit any additional excess of cost over selling price to Retained Earnings.**

Dividends

Companies want to share their profits with the shareholders through dividends. Only a few companies pay dividends in amounts = legally available retained earnings:

- Maintain agreements with creditors (debt covenants)
- Finance growth/expansion
- Smooth out dividend payments
- Build up a cushion against possible losses

Additionally, companies may voluntarily NOT pay a dividend. A reason for this could be that they want to internally finance their growth and expansion strategy. In exchange, dividend shareholders expect an even stronger share price performance to compensate for the lack of dividends.

Types of Dividends

Dividends reduce retained earnings by the same amount

- Total equity is reduced proportionally
- Part of the firm's value is distributed among the owners

1. Cash Dividends:

- Declaration Date: create (current) liability against retained earnings

	Debit	Credit
Retained Earnings	x	
Dividends Payable		x

- Record Date: there is no journal entry, you only record the transaction
- Payment Date: pay cash and reduce liability

	Debit	Credit
Dividends Payable	x	
Cash		x

Remember that a firm can issue preference shares together/in stead if ordinary shares. Companies usually issues preference shares with a par value (dividend preference as a percentage of the par value).

2. Property Dividends:

Example: Firm A declares a property dividen and transfers ewuity investments to shareholders. The fair value (FV) of the equity investment is 2 million and the book value (BV) is 1.25 million.

- Declaration Date

	Debit	Credit
Equity Investment	750,000	
Unrealized Holding Gain/Loss - Income		750,000
Retained Earnings	2m	
Property Dividends Payable		2m

- Payment Date

	Debit	Credit
Property Dividends Payable	2m	
Equity Investments		2m

3. Liquidating Dividends:

- Key difference to cash/property dividends:
 - NOT based on retained earnings
 - Reduce share premium/capital accounts

Example: Firm B issues liquidating dividends (X), half = income (Retained Earnings) and half = return on capital (Share Premium).

- Declaration Date

	Debit	Credit
Retained Earnings	$\frac{1}{2} X$	
Share Premium	$\frac{1}{2} X$	
Dividend Payable		X

- Payment Date

	Debit	Credit
Dividends Payable	X	
Cash		X

4. Share Dividends:

- Distribute its own shares proportionally to stake what shareholders already have (ONLY par-value method)
- **Book value of equity remains unchanged** => shifting between Retained Earnings (decrease) and Share Capital (increase)
- Declaration Date

	Debit	Credit
Retained Earnings	Par value	
Share Dividend Distributable (EQ)		Par value

- Payment Date

	Debit	Credit
Share Dividend Distributable (EQ)	Par value	
Share Capital		Par value

It is important to note that in the end of the day, the total value of equity remains unchanged!

Share Splits

Assume that a company does not pay any dividends, instead increases its retained earnings, and used the funds for its growth strategy. In this situation the share price is reflecting the growth, sales, and earnings over time. This may cause the share price to become less accessible to investors. This is when share splits are useful.

Share split: split already existing shares to have more shares at a lower price.

Example: 4-for-1 split of 100,000 shares at 100 euros => 400,000 shares at 25 euros.

- There are NO journal entries
- Just a note to record increased number of shares and the change in the par value per share

Share Split vs Share Dividends

- Share dividends also increase the number of shares outstanding
- It does NOT decrease par value per share but does increase the total par value of shares.
- Only with the cash dividend is the company able to reduce the total equity.

Equity Presentation

Statement of Changes in Equity

For each component of equity make a reconciliation between carrying the amount at the beginning and at the end of the period. Separately disclosing changes from:

- profit/loss
- Each item of "other comprehensive income"
- Transaction with shareholders

OCI = other comprehensive income

- Income that does NOT go through P&L, but directly to equity
- NO effect on net income and retained earnings
- $CI = \text{comprehensive income} = \text{net income} + OCI$

Intermediate accounting – IBEB –

FA Lecture 4, week 4 – Dilutive Securities & EPS

Terminology & Definitions

Liabilities:

- An obligation arising from past events, with settlement that is expected to result in outflow of resources.
- Non-current: not payable within a year (bonds)
- Current: payable within a year (accounts payable)

Bonds:

- Past event – firm issues bonds to raise money (debt financing)
- Obligation/outflow: bondholders in return expect payments of
 - Principal at a designed maturity date (face/par/maturity value)
 - Period interest at specified rate (interest/stated/coupon rate)

Valuation of bonds at issuance: this is the tricky part

- Present Value approach to assess what bondholders are willing to pay
 - Considers the time value of money
 - Discount the principal and interest payment
 - Discount rate: market rate of interest reflects the interest rate on similar bonds in the market, and thus the opportunity bondholders have besides the purchase of the bond they are focused on.
- Default case: *Market rate = interest rate \Rightarrow PV = Face value \Rightarrow bonds issued at par value.*

Example: Bonds Issued at Par (Face) Value

- **Company ABC:** Issues **3-year** bonds with face value of **€3,000,000**
 - Interest (stated) rate = **5%**; Market rate of interest (discount factor) = **5%**
 - Principal is repaid at maturity; interest is payable annually at year-end

- **PV (bond)** = PV of principal + PV of interest = **€3,000,000**

$$\frac{€3,000,000}{(1+0.05)^3} = €2,591,512.8$$

$$\frac{(150,000/1.05) + (150,000/1.05^2) + (150,000/1.05^3)}{= €408,487.2}$$

* Interest payment = 150,000 = 3,000,000 * 0.05

- **Journal entry at time of issuance:**

Cash (proceeds) 3,000,000
Bonds payable (PV of bond) 3,000,000

- **Journal entry at year-end (end of year 1/2):***

Interest expense 150,000
Cash 150,000

- **Journal entry at maturity (end of year 3):**

Interest expense 150,000
Cash 150,000
Bonds payable 3,000,000
Cash 3,000,000

* If interest payment is not at year-end but (at beginning of) next year: "Debit Interest expense X, Credit Interest payable X" at year-end and "Debit Interest payable X, Credit Cash X" next year!

NB: We will discount cash flows directly in lecture, tutorials, and exam (we don't use "PV factors" as in textbook)

Dilutive Securities & EPS, FA Lecture4 (Slide 6)

*Cash (proceeds) of the bond issuance will be 3m euros as bondholders will NOT agree to anything above this given the opportunities in the market, and the issuing firm will NOT agree to receive anything below this amount given the precedents of the market.

Example: Bonds Issued at Discount

- **Bonds sell** at Par, below (at discount), or above (at premium)
 - At Par (or at face value) → Market rate = Interest rate → PV = Face value
 - Below (at **discount**) → Market rate > Interest rate → PV < Face value
 - Above (at **premium**) → Market rate < Interest rate → PV > Face value
- **Example Company ABC:**
 - Same as before, but: Interest rate = **5%**; Market rate of interest = **6%**
- **PV (bond)** = PV of principal + PV of interest = **€2,919,809.64**

$$\frac{€3,000,000}{(1+0.06)^3} = €2,518,857.85$$

$$\frac{(150,000/1.06) + (150,000/1.06^2) + (150,000/1.06^3)}{= €400,951.79}$$

* 150,000 = 3,000,000 * 0.05

- **Journal entry at time of issuance**

Cash (proceeds) 2,919,809.64
Bonds payable (PV of bond) 2,919,809.64

- **Journal entry at year-end?**

- **Effective-Interest Method** to amortize difference in PV vs. Face value
 - Amortization of **discount** → bond interest expenses ↑
 - Amortization of **premium** → bond interest expenses ↓

<div> <div>Based on Principal: 3,000,000 x 5%</div> <div>Schedule of bond amortization: Effective-interest method to amortize discount (3-year, 5% bonds sold to yield 6%)</div> <div>Present value of bond (t0): PV (Principal) + PV(Interest)</div> </div>				
Date	Cash paid	Interest expense	Discount amortized	Carrying amount
1/1/2023			2,919,809.64 x 6%	€ 2,919,809.64
12/31/2023	€ 150,000	€ 175,188.58	€ 25,188.58	€ 2,944,998.22
12/31/2024	€ 150,000	€ 176,699.89	€ 26,699.89	€ 2,971,689.11
12/31/2025	€ 150,000	€ 178,301.89	€ 28,301.89	€ 3,000,000
	€ 450,000	€ 530,190.36	€ 80,190.36	

▪ **Journal entry at year-end (Dec. 31, 2023):**

Interest expense	175,188.58	
Cash		150,000
Bonds payable		25,188.58

▪ **Journal entry at maturity (Dec. 31, 2025):**

Interest expense	178,310.89	
Cash		150,000
Bonds payable		28,301.89
Bonds payable	3,000,000	
Cash		3,000,000

Dilutive Securities & EPS, FA Lecture4 (Slides 7&8)

*The present value of the bond is lower than the face value. The 2.9m euros reflects the amount the bondholders are willing to pay given that the market rate is higher than its stated interest rate and that they could earn the 6% in an alternative investment with similar risk profile.

*The tricky part is that you need to account for the fact that the present value of the bond and hence the proceeds at issuance differ from the face value of the bond. This is why you use the **Effective-Interest Method**.

- The company promises to pay back 3m euros at the end of the 3 years, thus, at maturity, when dissolving the bonds payable accounts that it reflects the bonds at their face value.

Economic Intuition for Slides 7&8: Effective-Interest Method and Schedule of Bond Amortization

- Bondholders pay less than Principal (or face) value of a bond, but still demand to be paid the Principal value at maturity
- This means that effectively, real interest expenses are higher than cash payments made to bondholders
- Firm itself compensates for this over time by calculating real interest expenses (market rate * carrying value of the bond)

- Difference between these real interest expenses and actual interest payments are added to the carrying value of bond on balance sheet
- This ensures that the firm takes into account the real interest costs of bonds, and that bond's carrying value is adjusted to its face value at maturity

Convertible Bonds: Issuance

Bonds (debt) that can be changed into other corporate securities (shares/equity).

Reasons for Investors to Buy:

- Benefit of bonds = guaranteed interest and principal
- Holder has the option to change it for shares

Reasons for Corporations to Issue:

- Raise equity capital without giving up more ownership control than necessary
- Obtain debt financing at cheaper rates
- Tax advantages (interest expense lowers taxable income)

Accounting Treatment:

- Cannot simply use accounting rules that were used to recognize bonds, must come up with a method that also considers the conversion rate.
- To value compound instruments, companies use the **"with-and-without"** method
 - Convertible debt is treated as a compound instrument

With and without Method

Splits the total FV of convertible bonds into two components: liability and equity (reflects the conversion rate) with the help of three key steps at the date of issuance:

$$\text{FV of convertible bond} - \text{FV of liability component} = \text{FV of equity component}$$

1. Determine total **FV of convertible bond** = proceeds received upon issuance
2. Determine **FV of liability component** by computing net present value of all contractual future cash flows discounted at the market rate of interest (the rate the company would pay on a similar non-convertible bond).

3. Subtract FV of liability component from FV of convertible bond to arrive at the **equity component**

Example: Issuance of Convertible Bond

- **Example:** Bayer issues **2,000 convertible bonds** at Jan 1, 2019
 - Bonds have 4-year term with **interest rate of 6%** (payable annually on Dec. 31) and are issued **at par** with **face value of €1,000** per bond
 - **Market rate of interest** on similar non-convertible debt is **9%**
 - Each bond is convertible into **250 ordinary shares** with €1 par value
- **Step 1: FV convertible bond** (proceeds) = $2,000 * €1,000 = €2 \text{ Mio.}$
- **Step 2: PV liability component** = PV of principal + PV of interest

$$\begin{aligned} & \downarrow \\ & \frac{€2,000,000}{(1+0.09)^4} \\ & = \mathbf{€1,416,860} \end{aligned}$$

$$\begin{aligned} & \downarrow \\ & \begin{aligned} & 120,000 / 1.09 \\ & 120,000 / 1.09^2 \\ & 120,000 / 1.09^3 \\ & 120,000 / 1.09^4 \\ & = \mathbf{€ 388,766} \end{aligned} \end{aligned}$$

→ PV of liability component = €1,416,860 + € 388,766 = **€1,805,626***

*Note: PV of liability component is below face value of €2 million (because interest rate of bond is lower than market rate-related discount factor: 6% < 9%). Discount reflects conversion right attached to bond (= equity component).

- **Step 3: FV equity** = FV convertible bond - PV liability component
= €2,000,000 - €1,805,626 = **194,374**
- **Journal entry** at time of issuance:

Cash	2,000,000	
Bonds Payable*		1,805,626
Share Premium—Conversion Equity		194,374

* Due to amortization of discount each reporting period, at maturity, bonds payable = €2,000,000

- **Share premium – conversion equity:**
 - Does not represent ownership (e.g., voting rights) for bond holders
 - Represents what bondholders are willing to pay for option to convert
 - Assume: Bayer Group issued their convertible bonds with a face value of \$1,000 per bond **at 99% (instead of “at par-value”)**:
 - Total proceeds: $2,000 * €1,000 * 0.99 = €1,980,000$
 - FV of liability component same
 - FV equity component: $€1,980,000 - €1,805,626 = €174,374$

<div> <div>based on face value: 2,000,000 x 6%</div> <div> SCHEDULE OF BOND AMORTIZATION EFFECTIVE-INTEREST METHOD 6% BOND DISCOUNTED AT 9% </div> <div>discount bond: 6% < 9% 1,805,626 → 2,000,000</div> </div>				
Date	Cash Paid	Interest Expense	Discount Amortized	Carrying Amount of Bonds
1/1/19				€1,805,626
12/31/19	€120,000	€162,506	€42,506	1,848,132
12/31/20	120,000	166,332	46,332	1,894,464
12/31/21	120,000	170,502	50,502	1,944,966
12/31/22	120,000	175,034*	55,034	2,000,000
*€13 difference due to rounding.		based on carrying value: 1,805,626 x 9%		

Note that interest on the bond is 6%, while market rate is 9%. Bond is selling for a **discount** (less than face value), amortized over time. Recall the effective interest method (video 1).

Journal entry **December 31, 2019:**

Interest expense	162,506	
Cash		120,000
Bonds payable		42,506

Dilutive Securities & EPS, FA Lecture4 (Slides 13–15)

Convertible Bonds: Settlement

4 scenarios:

1. Repurchase at maturity

- Bondholders do NOT have any intent to convert
- Conversion option has NO value to bondholder anymore
- You do NOT have to pay them for giving up conversion option
- Amount originally allocated to equity as Share Premium – Conversion Equity does NOT disappear.
 - It is transferred to Share Premium – Ordinary account (but it can also remain)

Bayer Example (same as previous)

Bonds Payable	2m	
Cash		2m
Share Premium – Conversion Equity	194,374	

Share Premium - Ordinary		194,374
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2. Conversion at maturity

Bayer Example

Bonds Payable	2m	
Share Capital - Ordinary		0.5m (2000 bonds * 250 shares * €1 par)
Share Premium - Ordinary		1.5m (2m - 0.5m)

*Note: the amount originally allocated to equity of 194,374 euros is transferred to Share Premium - Ordinary account (this is a shift within equity).

3. Conversion before maturity

- Assume that Bayer converts its bonds into ordinary shares on December 31, 2020 (2 years after the issuance), thus we need to determine the carrying value of the bond:

SCHEDULE OF BOND AMORTIZATION EFFECTIVE-INTEREST METHOD 6% BOND DISCOUNTED AT 9%				
Date	Cash Paid	Interest Expense	Discount Amortized	Carrying Amount of Bonds
1/1/19				€1,805,626
12/31/19	€120,000	€162,506	€42,506	1,848,132
12/31/20	120,000	166,332	46,332	1,894,464
12/31/21	120,000	170,502	50,502	1,944,966
12/31/22	120,000	175,034*	55,034	2,000,000

*€13 difference due to rounding.

Dilutive Securities & EPS, FA Lecture4 (Slide 20)

Transaction for Issuing Shares:

Bonds Payable	1,894,464	
Share Capital - Ordinary		0.5m
Share Premium - Ordinary		1,394,464

Shift the Value of Equity:

Share Premium - Conversion Equity	194,374	
Share Premium - Ordinary		194,374

In case Bayer pays bondholders 50,000 euros to induce conversion (they may do this if they want to reduce interest costs or approve some debt to equity ratios). This is often called a **sweetener** to induce conversion and can be in the form of additional shares or cash.

Conversion Expense	50,000	
Cash		50,000

4. Repurchase before maturity

- A bit more complex than the previous cases so really know what information is needed for calculations.
 1. Determine **fair value of the (entire) convertible debt instrument** => price for which the instrument is bought back (market prices at December 31, 2020) = A
 - From example: A = 1,965,000
 2. Determine **fair value of the liability component** on the repurchase day => PV of similar non-convertible bond with 2-year term = B
 - From example: B = 1,904,900
 3. Get **book (carrying) value of liability component** = C
 - From example: C = 1,894,464
 4. Determine **gain/loss on sale** = D = B - C
 - From example: D (loss on sale) = 1,904,900 - 1,894,464 = 10,436
 - If the difference is **negative = gain** (MV of liability < BV of liability)
 - If the difference is **positive = loss** (MV of liability > BV of liability)
 5. Determine the **fair value of the equity component** = E = A - B
 - E = 1,965,00 - 1,904,900 = 60,100

Bonds Payable	1,894,464	
Share Premium - Conversion Equity	60,100	
Loss on Repurchase	10,436	
Cash		1,965,000

Convertible Preference Shares

These type of shares include the option to convert preference into ordinary shares. This is more interesting for risk-averse investors who would prefer more fixed and stable income stream and would like to have the possibility to become actually an ordinary shareholder to benefit from the upside potential of the company.

Accounting Treatment:

- Reported as part of equity
- Unless mandatory redemption exists: investors can require issuing firm to repurchase shares at stated price
- Redeemable (callable): issuing firm can repurchase shares at stated price
- Shift within equity from Share Premium/Capital - conversion equity/preference to Share Premium/Capital - ordinary
- Upon conversion/repurchase the company does NOT need to record gain/loss because there are no gains or losses when considering transactions between existing shareholders.

Example: Morse issues 1,000 convertible and callable preference shares. Issue price per share = \$200. Par value per share = \$1. Each share can be converted into 25 ordinary shares (with \$2 par value) that have a total fair value of \$410,000.

Upon Issuance:

Cash	200,000 (1,000*200)	
Share Capital - preference		1,000
Share Premium - conversion equity		199,000

Upon Conversion: FV ord ordinary shares are irrelevant here

Share Capital - preference	1,000	
Share Premium - conversion equity	199,000	
Share Capital - ordinary		50,000
Share Premium - ordinary		150,000

Upon Call: NO gain/losses

Share Capital - preference	1,000	
Share Premium - conversion equity	199,000	
Retained Earnings	210,000	
Cash		410,000

*The company has to balance any difference between the BV of the converted preference and MV of the ordinary shares through the Retained Earnings account.

Warrants, Options, and Restricted Shares

Dilutive Securities

Warrant:

- Give holder the right to acquire shares at a certain price within stated period (conversion privilege)
- Similar to convertible securities, except that upon exercise of warrant holder has to pay to obtain shares
- Issued with bonds and treat them as a component instrument
 - Make certain types of securities more attractive ("**equity-quicker**" for more risky bonds)
 - Use "**with and without**" method to separate equity and liability components
- Part of compensation plans
 - Provide compensation to executives and employees
 - Recognize FV of warrants granted to employees as an expense in P&L

1. Warrants Issued with Bonds

Example AT&T: 10,000 bonds each with one detachable warrant that provides option to buy one ordinary share (par value \$5) at \$25.

- FV of compound instrument (selling price) = for \$10.2 million
- FV of liability component (PV of principal + interest) = \$9,707,852
- FV of equity component = \$492,148 (\$10.2 Mio. – \$9,707,852)

Issuance: with-and-without

Cash	10,200,000	
Bonds Payable		9,707,852
Share Premium - Share warrants		492,148

Exercise all 10,000 warrants at 25 euros per share (with par value of 5 euros)

Cash	250,000	
Share Premium - Share warrants	492,148	
Share Capital - ordinary		50,000
Share Premium - ordinary		692,148

No warrants exercised

Share Premium - Share warrants	492,148	
Share Premium - Expired Share warrant		492,148

2. Employee Stock Option (ESO)

(technically it is the same as warrants)

- Components of compensation: fixed, bonus, long-term
- Motivate, reward for performance, and maximize employee's after-tax benefits
- Controversial: does it lead to excessive risk taking?
- 1990s, #1 source of compensation to employees around the globe

- Partly explained by old accounting rules which did NOT require recognition of cost of ESO in P&L

IFRS 2: firms must recognize the FV of options grants as compensation expense in their income statement

General Issues:

1. How to determine compensation expense:
 - **Intrinsic Value Method:** excess of market price over exercise price at grant date is compensation cost => cost usually = 0 (NO excess)
 - **Fair Value Method** (required by IFRS): FV of share options at grant date based on acceptable option-pricing model
2. Over what periods to allocate compensation expense:
 - Immediately recognize everything at grant date
 - Match it to service period (required by IFRS): unless otherwise specified, service period = vesting period

Example AXA S.A.: Grants its CEO options to purchase 1 Mio. shares (par value €1 per ordinary shares) on Jan.1, 2019.

- CEO may exercise options at any time within next 10 years and service period is two years, starting with grant date
- Option exercise price per share = €60
- Market price per share at the date of grant = €70
- Total comp. expense (based on FV option pricing model) = €22,000,000

Issuance and Allocation of Expenses:

Compensation Expense	11m (22m/2 years)	
Share Premium - Share Options		11m

Exercise of 0.2m (20%) of the 1m options on June 1, 2022

Cash	12m	
Share Premium - Share Options	4.4m (0.2*€22m)	
Share Capital - Ordinary		0.2m (0.2m*€1)
Share Premium - Ordinary		16.2m

Expiration of options (if CEO fails to exercise remaining share options before their expiration date):

Share Premium - Share Options	17.6m (0.8*22m)	
Share Premium - Expired Share Options		17.6m

Service conditions: suppose CEO violates service period and leaves firm after on year (must reverse last year's expenses)

Share Premium - Share Options	11m	
Compensation Expense		11m

Market conditions: when vesting (exercisability) of share options depend on performance condition

- If market conditions are violated => NO adjustments to compensation expense because they are already reflected in the determination of the FV of the option at the grant date.

3. Restricted Shares

This is an alternative to ESO for compensation and they cannot be sold/transferred until vesting has happened.

Advantages:

- Never become completely worthless (ESO is worthless if share price < exercise price after vesting period)
- Less dilution to existing shareholders if stock price increases in the future (restricted shares are usually 0.5 or 0.33 the size of share options)
- Better align incentives => induces more long-term shareholder focus

Accounting Treatment:

- Same approach as with ESO
 - **FV method:** market price of shares (no pricing model needed)
 - **Match it to service period:** expensed over the vesting/service period
- Difference to ESO:

- Shares are issued directly at the date of grant rather than the date of exercise

Example AXA S.A.: Issues 1,000 restricted shares to its CEO (par value of €1 and FV of €20 per ordinary shares) on Jan.1, 2019: – Service period = 5 years (no separate vesting period, vesting after 5y)

Recognition and Expense Allocation: Grant Date

Unearned Compensation	20,000	
Share Capital - ordinary		1,000
Share Premium - ordinary		19,000

***Unearned Compensation:** cost of services yet to be performed, which is contra equity account

Recognition and Expense Allocation: at the end of the service period

Compensation Expense	4,000 $(1,000 * 20 * 1/5)$	
Unearned Compensation		4,000

Service Condition: CEO leaves after 2 years

Service Capital - ordinary	1,000	
Share Premium - ordinary	19,000	
Compensation Expense		8,000 $(4,000 * 2)$
Unearned Compensation		12,000

***Compensation Expense:** reverse expense from first two years and dissolve Unearned Compensation since it is NOT needed anymore.

EPS – Simple Capital Structure

Earning per Share (EPS)

Indicated the net income earned by each ordinary share = $\frac{\text{Net Income}}{\text{number of ordinary shares}}$

Why?

- Financial press reports EPS data and shareholders/financial analysts use it when evaluating firms' probability
- IFRS standard on EPS: IAS 33 EPS
 - Disclosure Requirement: public companies must report EPS in income statement
- Computation is tricky due to firm's capital structure
 - **Simple capital structure** only considers existing ordinary shares and NOT potential shares due to conversion/exercise of dilutive securities at a later point that could dilute EPS => **basic EPS**
 - **Complex capital structure** include dilutive securities that may increase number shares => **Diluted EPS**

Basic EPS

$$EPS = \frac{\text{Net Income} - \text{Preference Dividends}}{\text{Weighted-Average Ordinary Shares Outstanding}}$$

Weighted-average:

- Based on monthly fraction for year
- Companies issue/purchase shares during the year which affect outstanding amount
- Off-set effects of share dividends/splits to allow for proper EPS comparison over time.

Preference Dividends:

- NOT all NI is available for ordinary shareholders
- Share dividends do not affect net assets

Example:

Date	Share Changes	Shares Outstanding
January 1	Beginning balance	100,000
March 1	Issued 20,000 shares for cash	20,000
		120,000
June 1	60,000 additional shares (50% share dividend)	60,000
		180,000
November 1	Issued 30,000 shares for cash	30,000
December 31	Ending balance	210,000

Firm issued 50% share dividend:

- Adjust since it not changes the amounts of net assets (shareholders' total investment) in current year
- Adjustment ensures proper comparison of EPS over time
- Same for share splits: E.g., share split of "2 for 1" results in restatement factor of 2

Dates Outstanding	(A) Shares Outstanding	(B) Restatement	(C) Fraction of Year	(D) Weighted Shares (A × B × C)
Jan. 1–Mar. 1	100,000	1.50	2/12	25,000 = 100,000 * 1.5 * 2/12
Mar. 1–June 1	120,000	1.50	3/12	45,000 = 120,000 * 1.5 * 3/12
June 1–Nov. 1	180,000		5/12	75,000 = 180,000 * 1.0 * 5/12
Nov. 1–Dec. 31	210,000		2/12	35,000 = 210,000 * 1.0 * 2/12
Weighted-average number of shares outstanding				180,000

Dilutive Securities & EPS, FA Lecture4 (Slide 39)

Diluted EPS – Complex Capital Structure

To find Dilutive EPS, you start with Basic EPS and then adjust for each instrument individually. Keep in mind that antidilutive securities are excluded from calculations because this would increase EPS and we are only interest in worst-case scenarios.

$$EPS = \frac{NI - \text{Preference Dividends}}{\text{Weighted-Average Shares Outstanding}}$$

– Impact of Convertibles – Impact of Options, Warrants, and Other Dilutive Securities

Methods to measure dilutive effect of potential conversion:

1. If-Converted Method for Convertible Bonds

Conversion at beginning period if bonds issued in previous period

- Affects **denominator** because it increases the amount of shares outstanding

Elimination of bond-related interest expenses

- Net of tax: if you assume conversion of bond => also assume that company stops paying interest expense
- Affect **numerator** as it would increase NI

Example Mayfield Corp.: Compute basic & diluted EPS! – NI = £210,000; Weighted-average ordinary shares outstanding = 100,000– Tax rate = 40% and two convertible bond issues outstanding:

1. A 6% issue sold at 100 (total £1,000,000) in a prior year and convertible into 20,000 ordinary shares (interest expense for current year related to liability component of this convertible bond is £62,000)
2. A 7% issue sold at 100 (total £1,000,000) on April 1 of current year and convertible into 32,000 ordinary shares (interest expense for current year related to liability component of this convertible bond is £80,000) The tax rate is 40%.

Basic EPS:
$$\frac{\text{NI} - \text{Pref. Div.} = £210,000 - 0}{\text{Weighted-average shares} = 100,000} = £2.10$$

Diluted EPS: Start with Basic EPS and adjust per instrument

- Adjust **denominator** for new shares due to conversion
- Adjust **numerator** for interest expense effect due to conversion:

6% Bond Issue	7% Bond Issue	
£37,200	£36,000	
$\frac{£210,000}{100,000} + \frac{£37,200}{20,000} + \frac{£36,000}{24,000} = \frac{£283,200}{144,000}$	$+ \frac{£36,000}{24,000}$	$= \frac{£283,200}{144,000}$
$= \frac{£210,000}{100,000}$	$+ \frac{£37,200}{20,000}$	$= \frac{£283,200}{144,000}$
Basic EPS = £2.10	Effect on EPS = £1.86	Effect on EPS = £1.50
		Diluted EPS = £1.97

* Timing of the bond issuance: Second bond issued on April 1 of the *current* year, hence times 9/12.

** Tax effects: bond conversion → no interest expense anymore → higher taxable NI → higher tax expenses → lower NI

Dilutive Securities & EPS, FA Lecture4 (Slide 43)

2. If-Converted Method for Convertible Preference Shares

Conversion is the same as for bonds.

Add back preference dividends

- NO tax effect
- Affect **numerator**

Example: Example Lindsey Corp.: Compute basic & diluted EPS!

- NI = \$240,000; Weighted-average ordinary shares outstanding = 100,000
- Tax rate = 40% and cumulative convertible preference shares outstanding
- Issued \$1,000,000 of 6% cumulative convertible preference shares
- Each \$100 preference share is convertible into 5 ordinary shares

Basic EPS:
$$\frac{\text{NI} - \text{Pref. Div} = \$240,000 - \$60,000^* = \$180,000}{\text{Weighted-average shares} = 100,000} = \$1.80$$

* 6% cumulative convertible preference shares → \$1,000,000 × 6% = \$60,000 preference dividends

Diluted EPS: Start with Basic EPS and adjust per instrument

- Adjust **denominator** for news shares due to conversion
- Adjust **numerator** for preference dividends due to conversion

$\frac{\$240,000 - \$60,000}{100,000}$	+	$\frac{\$60,000^*}{50,000 (= 10,000 \times 5)^{**}}$	=	$\frac{\$240,000}{150,000}$
Basic EPS = \$1.80		Conv. Pref. Shares Effect on EPS = \$1.20		Diluted EPS = \$1.60

Diluted EPS: Assume 1:3 (instead of 1:5) conversion ratio

$\frac{\$240,000 - \$60,000}{100,000}$	+	$\frac{\$60,000^*}{30,000 (= 10,000 \times 3)^{**}}$	=	$\frac{\$180,000}{100,000}$
Basic EPS = \$1.80		Effect on EPS = \$2.00		Diluted EPS = \$1.80

* Add back preference dividends (= \$1,000,000 × 0.06) because preference shares are now ordinary shares

** Each preference share is convertible into 5 ordinary shares.

Dilutive Securities & EPS, FA Lecture4 (Slide 45)

*It does NOT make sense if the Basic EPS < Diluted EPS, thus, do NOT included this

3. Treasury-Share Method for Options and Warrants

Exercised at the beginning of period if issued in previous period or at the time of issuance, if issued during the period.

- Will affect the **denominator**

Purchase ordinary shares with proceeds.

- Will affect the **denominator**

Important: adjust for options/warrants ONLY if exercise price < FV of share

- If exercise price > FV: instrument is antidilutive (you can buy back more than you have to issue => decreases shares outstanding and increases EPS)
- Exercise price = fair value: NO net effect on denominator & EPS

Example Kubitz Inc.: Compute basic & diluted EPS!

- NI = \$220,000; Weighted-aver. ordinary shares outstanding = 100,000
- Options outstanding (issued in t-1) give right to acquire 5,000 shares so Exercise price of \$20 per share; FV (market price) per share of \$28

Basic EPS:
$$\frac{\text{NI} - \text{Pref. Div} = \$220,000 - 0 = \$220,000}{\text{Weighted-average shares} = 100,000} = \$2.20$$

Diluted EPS: Start with Basic EPS and adjust per instrument

- Adjust **denominator** for new shares due to exercise of options
- Adjust **denominator** for new shares due to purchase of treasury shares

$\frac{\$220,000}{100,000}$	+	$\frac{0}{1,429 (= 5,000^* - 3,571^{**})}$	=	$\frac{\$220,000}{101,429}$
Basic EPS = \$2.20		Options Effect on EPS = Increase in shares outstanding! Exercise price (\$20) < FV of share (\$28)		Diluted EPS = \$2.17

Dilutive Securities & EPS, FA Lecture4 (Slide 47)

EPS Disclosure

Disclosure Requirement: public companies must report EPS in income statement due to its importance

- If dilutive instruments exist, Basic EPS will fail to recognize potential impact of dilutive securities

IAS 33 Requirements:

1. Amounts used as numerator in calculating basic / diluted EPS, and reconciliation* of those amounts to NI / loss
2. Weighted-average ordinary shares used as denominator in calculating basic/diluted EPS, and reconciliation* of these denominators to each other
3. Instruments that could potentially dilute basic EPS in future but were not included in calculation of diluted EPS because they are antidilutive for the period(s) presented

4. Description of (potential) ordinary share transactions that occur after the reporting period and that would have significantly changed number of (potential) ordinary shares at the end of the period (if they had occurred before)

Intermediate accounting – IBEB – – FA Lecture 5, week 5– Tax

Income Taxes

Book vs Tax Reporting

The income that companies state in their financial accounting based on IFRS is not the same income that tax authorities use. This creates a difference between pre-tax financial income and taxable income. The income tax that companies actually need to pay is called income tax payable, and the one they report is called income tax expense.

The difference essentially comes from the fact that IFRS requires accrual accounting, whereas tax codes resemble cash accounting.

Temporary Difference:

Difference between tax basis of an asset or liability and its GAAP basis that will reverse in future years.

It is important to note that it leads to either deferred tax liability or deferred tax assets, thus it has an immediate accounting implication.

Permanent Difference:

The difference between tax basis of an asset or liability and its reported amount in financial statements that will NEVER reverse in future years.

Temporary Differences

Deferred Tax Liability (DTL)

If the **book amount of the tax is higher than the tax payable**, the difference will result in higher taxes payable in future years. This is because the tax effect arrives only once cash has been transferred, but e.g., revenue is recognised immediately when performance obligations have been satisfied. Therefore, in the case of tax liability the financial income outweighs taxable and thus income tax expense exceeds income tax payable.

Think about this in 4 steps:

1. Temporary book-tax differences in current year: **financial income > taxable income**
2. Deferred tax liability accounts for the increase in future tax payable = deferred tax consequences attributable to taxable temporary differences at the end of the current year = *Cumulative temp. differences at the end the year * tax rate*
3. Income tax expense is based on current tax expense and deferred tax expense (ΔDTL)
 - a. *Income tax expense = current tax expense + deferred tax expense* (if there is an increase in DTL, otherwise subtract)
4. Journal entries to record income tax in current and future years

Such an entry would be recognised as follows:

Income Tax Expense (IS)	$Z = (X + Y)$
Income Tax Payable (BS)	X
Deferred Tax Liability (BS)	Y

Deferred Tax Asset (DTA)

Deferred tax assets result when the **book value of the tax is lower than tax payable**. This means that the company is paying more than it owes based on its income. An example would be unearned revenue. The money is received and thus taxed (because the tax code resembles cash accounting), but the revenue is not booked

yet as income. Therefore, in the case of tax asset the taxable income outweighs the financial income and thus the income tax payable exceeds income tax expense.

Think about this in 4 steps:

1. Temporary book-tax differences in current year: **financial income < taxable income**
2. Deferred tax asset accounts for the decrease in future taxes payable
3. Income tax expense is based on current tax expense and deferred tax expense (ΔDTA) = current tax expense - deferred tax benefit (if there is an increase in DTA, otherwise add)
4. Journal entries

Such an entry would be recognised as follows:

Income Tax Expense (IS)	X
Deferred Tax Asset (BS)	Y
Income Tax Payable (BS)	Z=(X+Y)

Non-Recognition of DTA

Sometimes, DTA are NOT recognised. A company should reduce a DTA if it is probable that it will NOT realize some portion or all of the DTA.

- "Probable" = more than 50%
- Example: litigation expense or warranty liabilities turn out to be lower than initially estimated
- The DTA should be corrected for any changes in its expected value

Example: ABC Inc. has a deductible temporary difference of €1,000,000 at the end of its first year of operations. Its tax rate is 40%.

- Deferred tax asset: €1,000,000 * 40% = €400,000
- Assuming €900,000 of income taxes payable

Journal Entry:

Income tax expense	500,000	
DTA	400,000	
Income tax payable		900,000

- ABC Inc. determines that it will not realize €100,000 of this deferred tax asset.*
Recording of the reduction in asset value:

Income tax expense	100,000	
DTA		100,000

*Note that this implies a deductible temporary difference of only 750,000 and that tax expenses of 500,000 in this year are too low:

- **Deferred tax asset:** $750,000 * 40\% = 300,000$ (with: $(400,000 - 100,000) * 100 / 40 = 750,000$)
- **Income tax expense:** income tax payable – increase in DTA = $900,000 - 300,000 = 600,000$ (instead of 500,000)

Note that the reverse can also happen, then you would debit DTA and credit income tax expense and that tax expense would be too high.

Changes in Future Tax Rates

EXAMPLE: DTL AND CHANGE IN TAX RATE II

EG Corporation has one temporary difference at the end of 2019 that will reverse and cause taxable amounts of \$40,000 in 2020, \$55,000 in 2021, and \$65,000 in 2022. EG's pretax financial income since 2018 is \$500,000, **and the tax rate is 30% for 2019, and 40% thereafter.** There are no deferred taxes at the beginning of 2019.

	2019	2020	2021	2022
Fin. Income (GAAP)	500,000	500,000	500,000	500,000
Temporary Diff.	-160,000	40,000	55,000	65,000
Taxable income	340,000	540,000	555,000	565,000
Tax rate	30%	40%	40%	40%
Income tax payable	102,000	216,000	222,000	226,000
Income tax expense	166,000	200,000	200,000	200,000
Increase DTL	64,000	(16,000)	(22,000)	(26,000)

EG Corporation has one temporary difference at the end of 2019 that will reverse and cause taxable amounts of \$40,000 in 2020, \$55,000 in 2021, and \$65,000 in 2022. EG's pretax financial income since 2018 is \$500,000, **and the tax rate is 30% for 2019, and 40% thereafter.** There are no deferred taxes at the beginning of 2019.

Journal entry end of 2019

Income tax expense (IS)	\$166,000	
Income tax payable (BS)		\$102,000
Deferred tax liability (BS)		\$64,000

Journal entry end of 2020

Income tax expense (IS)	\$200,000	
Deferred tax liability (BS)	\$16,000	
Income tax payable (BS)		\$216,000

Tax Accounting, FA Lecture 5 (Slides 36&38)

Permanent Differences

Permanent differences result from items that:

1. Enter into pretax financial income but never into taxable income
 - Example: charitable donations recognized as expense but sometimes not deductible for tax purposes
2. Enter into taxable income but never into pretax financial income
 - Example: "percentage depletion" of natural resources in excess of their cost

Accounting Treatment:

- Permanent differences affect only the period in which they occur
- They do NOT give rise to future tax/deductible amounts
- Do NOT recognize deferred tax consequences

If the tax rate is known for certain to be different in the future, the new tax rate can be used in calculating deferred tax assets/liabilities.

*Permanent differences between GAAP income and Tax income are NOT explicitly reflected in the journal entry. However, you can spot the permanent differences when

comparing the statutory tax rate of 30% with the effective tax rate of the company. If future tax rates do not change and both numbers differ, the company is facing permanent differences.

Accounting for Losses

If a company fails to make a profit, it incurs a net operating loss (NOL). this means that **tax-deductible expenses > taxable revenues**. It would be unfair if companies did not get money back from the tax authorities if they have paid income taxes in profitable years. Loss carrybacks and loss carryforwards facilitate this.

Loss Carrybacks

A company making a loss in the current period can use the amount of the loss to reduce taxable income from the previous two years, thus getting a refund. They are NOT permitted in all countries.

The journal entry is as follows:

Income tax refund receivable	X	
Benefit due to loss carryback		X

Loss Carryforward

Possible scenarios:

1. Companies may carry any remaining NOLs forward (often for 20 years) to offset future taxable income = fails to absorb a loss
2. Companies may elect to forgo loss carryback and carry forward full amount of NOLs forward to offset future taxable income = chooses NOT to carry back
3. Companies may NOT be permitted to use loss carryback and carryforward full amount of NOL forward to offset future taxable income = NOT allowed to carry back

Of course, these will only be realised if there are earnings in the future. If the company predicts that the future also contains only losses, it is not allowed to book the loss carryforward asset in the current year.

Accounting Treatment:

- Tax effect of a loss carryforward represents future tax savings
- Realization of future tax benefit depends on future earnings (uncertain)

Non-Recognition and Write Downs

In order to become profitable in the future, companies need to recognize the loss carryforward, however, if it is probable that a firm may NOT realize it, it is NOT allowed to recognize a DTA in the current period. Or if the deferred tax asset has already been recognized, it could also be necessary to write down the deferred tax asset in case it will become probable that the carryforward will NOT be realized.

Accounting for loss carryforward is **controversial**:

- High uncertainty
- Subjective: probable?
- Gives companies the opportunity to “manage” the numbers

Intermediate accounting – IBEB – FA Lecture 6, week 5 – Revenue Recognition

Baseline: Revenue Recognition

Most revenue transactions pose some problems for recognition because most companies initiate and complete transactions at the same time.

IFRS 15

relatively new

Key Objective: recognize revenue to depict the transfer of goods/services to customers in an amount that reflects the consideration that the company receives, or expects to receive, in exchange for these goods/services.

Steps for Process of Recognition:

1. Identification of contract.
2. Identification of separate obligations within the contract.
3. Determination of transaction price.
4. Allocation of transaction price to separate performance obligations.
5. Recognition of revenue when performance obligations are satisfied.

Step	Description
(1) Identify the contract with customers	Contract = agreement that creates enforceable rights or obligation
(2) Identify the separate performance obligations in the contract	Performance obligation = promise in contract to provide product/service to customer.
(3) Determine the transaction price	Consideration expected to be received from customer in exchange for service/good.
(4) Allocate the transaction price to the separate performance obligations	Use relative fair values when there are multiple performance obligations
(5) Recognize revenue when each performance obligation is satisfied	<i>Critical aspect:</i> customer obtains control over the asset.

FA Lecture 6 – Revenue Recognition, Slide 38

Revenue Recognition Principle: recognize revenue in the accounting period when the performance obligation is satisfied.

Step 1: Identify Contract

Definition: an agreement between two or more parties that creates enforceable right/obligations.

- Can be oral, written, or implied by business practice
1. Contract has commercial substance (impact on CF)
 2. Parties to the contract have approved the contract and are committed to perform their respective obligations

3. Company can identify each party's rights regarding goods or services to be transferred
4. Company can identify payment terms for goods and services to be transferred
5. It is probable that the company will collect the consideration to which it will be entitled

Asset-liability approach:

- Revenue cannot be recognized without a valid contract
- Company has the right to receive consideration (asset) and assumes obligation to transfer good/services (liability)
- Contract between two parties is NOT recorded and does NOT lead to any immediate journal entries until one/both of the parties perform under the contract
- Disregard revenue recognition if contract is fully underperformed or if each party can unilaterally terminate contract without compensation

Contract Modification:

1. New Contract Conditions:

- Promised goods/service are distinct
- The price reflects the standalone selling price of the promised goods/services

2. Prospective Modification

Example: ABC AG has a contract to sell 100 products to a customer for €10,000 (€100 per product) at various points in time over a 6-month period. After 60 products have been delivered, ABC modifies the contract by promising to deliver 20 more products for an additional €1,900, or €95 per product (which is the product's standalone selling price at the time of contract modification). ABC regularly sells the products separately.

1. If **separate performance obligation** (distinct products, standalone selling price)
 - Recognize the 20 new units at €95 as separate performance obligation
 - Total revenue = $€100 \times 100 + €95 \times 20 = €11,900$
 - Revenue recognized prior to (after) modification = €6,000 (€5,900)
2. If there is **no separate performance obligation**

- Calculate blended price for future sales: $(€100*40+€95*20)/60 = €98.33$ (40 products which are still needed to be delivered)
- Total revenue = $€100*60 + €98.33*60 = €11,900$
- Revenue recognized prior to (after) modification = €6,000 (€5,900)

Step 2: Performance Obligation

Definition: promise in contract to provide distinct product/service to customers

- Can be explicit, implicit, customer business practices
- Distinct = when a customer is able to benefit from it

Multiple vs. Combined PO in one Contract:

- Determine whether a company's promise is to transfer distinct goods/services to the customer or transfer combined items for which distinct goods/services are inputs.
- Only in the first case would you classify the contract as having many POs
- Multiple POs often include products with a service that can also be sold separately (**distinct and NOT interdependent**)
 - Eg: cars sold with navigation services that are also offered separately

Step 3: Determine Transaction Price

Definition: the amount of consideration that a company expects to receive from a customer in exchange for transferring good/services.

- Easily determined as customers agree to often pay a fixed amount

Complex Contracts:

1. **Variable Consideration:** discounts, rebated, credits, bonuses, penalties, or royalties from customers.
 - Price is dependent on future events
 - Note that a company should only allocate variable consideration if it is reasonably assured that it will be entitled to the amount.

Approaches:

1. **Expected Value:** probability-weighted amount in a range of possible consideration outcomes.

- Appropriate if a company has a large number of contracts with similar characteristics
- Based on limited discrete outcomes/probabilities

2. **Most Likely Amount:** single most likely amount in a range of possible consideration outcomes.

- Appropriate if the contract has only two possible outcomes

2. **Time Value of Money:** if payment occurs later than product/service delivery at face value, then the company provides financing to customers.

- Note that the company only accounts for the time value of money if the payment occurs later than 1 year or the contract involves a significant financing component.
- Process: determine the fair value by measuring the consideration received or discount the payment using an imputed interest rate.

Revenue Components:

- Sales revenue = fair value of services
- Interest revenue = fair value of note – fair value of services

Example: On July 1, 2019, SEK Inc. sold goods to Grant Inc. for \$900,000 in exchange for a 4-year, zero-interest-bearing note with a face amount of \$1,416,163. The goods' inventory costs are \$590,000.

How much revenue should SEK record on July 1, 2019?

Notes Receivables	900,000	
Sales Revenue		900,000
COGS	590,000	
Inventory		590,000

How much revenue should SEK record on December 31, 2019?

Notes Receivables	54,000	
Interest Revenue		54,000 (12%*900,000*0.5)

Impound interest rate: $\left(\frac{1416163}{900000}\right)^{\frac{1}{4}} = 1,12$

Note that the contract was only for half a year from July to December 2019, thus 0.5 represents the interest for only half a year.

3. **Non-Cash Consideration:** company received goods, service, or other non-cash consideration

Approaches:

1. Recognize the fair value of the **received** consideration as revenue.
2. If this can NOT be estimated, then recognize the fair value of the **sold** good/merchandise/performed services

4. **Consideration Paid or Payable to Customers:** companies make payments to customers as part of a revenue arrangement.

- Includes coupons, free products, discounts, volume rebates, or services
- Reduce the consideration received and the revenue to be recognized

Step 4: Allocate Transaction Price

Definition: allocation of transaction price to various performance obligations should be based on their relative fair values.

- Use standalone selling prices
- If NOT available, then use best estimate of what the good/service might sell for as a standalone unit.

Example: Erasmus University decides to purchase a new SAP system for € 500,000 from ABC Company. The fair value (FV) of the system itself is also € 500,000. The purchase also includes an installation service (worth € 5,000) and training services for the IT and finance departments (worth € 8,000). Erasmus can choose to install this system itself and obtain training elsewhere, but decides they want these services included.

- a) How many separate performance obligations do we have?
Equipment, installation, and training are three separate products/services because they each have a standalone selling price, and they are not interdependent, thus three performance obligations.
- b) How do we allocate the transaction price and hence apply the relative fair value approach?

Component	Fair value	Relative FV		Revenue
1. SAP system	500,000	500/513	* 500,000 =	487,329.43
2. Installation	5,000	5/513	* 500,000 =	4,873.29
3. Training	8,000	8/513	* 500,000 =	7,797.27
	513,000			~500,000

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- c) How much revenue should ABC Company recognize at the point of delivery of the SAP system?

Cash	500,000	
Sales Revenue		487,329.43
Service Revenue (installation)		4,873.29
Unearned Service Revenue		7,797.27

Watch out and record service revenues from training when training is provided and hence the short performance obligation is fulfilled but the last one is not fulfilled, thus we cannot book the revenues. Instead, we have to come up with this unearned service revenue account.

Step 5: Recognize Revenue

Definition: recognize allocated revenue when the corresponding performance obligation is satisfied.

- Often the case when the customer obtains **control** of the good/service.
Control indicators:
 - Right to payment for the asset
 - Transferred legal title to the asset
 - Transferred physical possession of the asset
 - Significant risks/rewards of ownership
 - Accepted the asset
- Note that NOT ALL of these indicators need to be fulfilled for management to conclude that control has transferred.

Disclosure Requirements: qualitative and quantitative information which are designed to help financial statement users understand the nature, timing, and uncertainty of revenue and cash flows arising from contracts.

Contracts with customers:

- Disaggregation of revenue
- Presentation of opening and closing balances A&L
- Significant information related to performance obligations

Significant judgments:

- Judgements and changes in judgements that affect determination of transaction price
- Allocation of transaction price
- Determination of revenue timing

Assets recognized from cost incurred to fulfill a contract:

- Include closing balance of assets recognized to obtain/fulfill a contract
- Amount of amortization recognized
- Method used for amortization

Special Issues

Right of Return

Definition: sales returns and allowances.

- Customer return products for partial refund of the paid consideration, credit, or for another products.

Principle: only recognize revenue in the amount of consideration that is reasonable assured

- Recognize gross amount upon date of sale and adjust records at the end of the accounting period

Example: Suppose that on Jan. 2, 2019, I bought in cash 800 copies of Kieso et al. for this class for free distribution, at a price per book of €65. Studystore agrees to take back any books that I have left over, as they are able to resell these books for the

same price next year. There are no costs to recovering these books. Based on prior year's experience with student dropout rates, Studystore expects 50 books to be returned. In reality, only 40 books are returned on May 1, 2019. The cost per book is €40.

Jan 2, 2019 - 800 books sold in cash:

Cash	52,000 (800*65)	
Sales Revenue		52,000
COGS	32,000 (800*40)	
Inventory		32,000

If sold on credit, use accounts receivable.

May 1, 2019 - 40 books are returned:

Sales Returns (contra account to sales revenue)	2,600 (40*65)	
Refund Liability		2,600
Returned Inventory (separate inventory account)	1,600 (40*40)	
COGS		1,600

End of year (remaining 10 books):

- If it is unlikely that someone will return more books then the right of return has expired and you do NOT record anything.
- If you are still expecting the 10 book to be returned then:

Sales Returns	650 (10*65)	
Refund Liability		650
Estimated Inventory Retruns	400 (40*10)	
COGS		400

Warranties

1. **Assurance-Type Warranty:** assures that product will meet agree-upon specifications.
 - Quality guarantee, included in the sales price (**1 PO**)
 - Record warranty expense as warranty costs are incurred and record future expected warranty costs as liability at the end of the reporting period
2. **Service-Type Warranty:** additional service beyond assurance warranty
 - NOT included in sales price (standalone selling price)
 - Record as **separate PO** (unearned warranty revenue) and recognize revenue in period the service warranty is in effect

Example: Maverick Inc. sold 1,000 Rollomatics on Oct 1, 2019 at a total price of \$6 Mio. with a warranty guarantee that the product was free of any defects. The cost of Rollomatics sold is \$4 Mio. The term of the assurance warranty is two years, with an estimated cost of \$80,000. In addition, Maverick sold extended service warranties related to 400 Rollomatics for 3 years beyond the 2-year period for \$18,000. On November 22, 2019, Maverick incurred labor costs of \$3,000 and part costs of \$25,000 related to the assurance warranties. Maverick prepares financial statements on December 31, 2019. It estimates that its future assurance warranty costs will total \$44,000 at December 31, 2019.

Oct 1, 2019: sale & related service warranty

Cash	6,018,000	
Sales Revenue		6,000,000
Unearned Warranty Revenue		18,000
COGS	4,000,000	
Inventory		4,000,000

Nov 22, 2019: warranty costs incurred

Warranty Expense	28,000	
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Salaries and Wages Payable		3,00
Inventory		25,000

Dec 31, 2019: adjusting entry for assurance warranty

Warranty Expense	44,000	
Warranty Liability		44,000

Consignment

Consignee (Agent):

- Accepts merchandise and agrees to exercise due diligence in caring for and selling it
- **Remits** to consignor **cash received** from customers, after deducting a **sales commission** and chargeable expenses
- Does **not record merchandise as asset** on its books
- Upon sale of the merchandise, it has a **liability for the net amount due** vis-à-vis the consignor

Consignor (Principal):

- Carries merchandise as inventory throughout consignment, separately classified as **Inventory (consignments)**
- Periodically receives report from consignee called **account sales** that shows: merchandise received, merchandise sold, expenses chargeable to the consignment, and cash remitted
- Uses a modified version of the point-of-sale basis of **revenue recognition** (recognizes revenue only after receiving notification of the sale)

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Principal agent relationship: the agent facilitates the sale between the principal and the customer and usually is the one that collects the payment on behalf of the principal.

- The principal/manufacturer delivers goods to dealer, who acts as an agent when selling goods
- Principal retains title of goods until they are sold

Revenues:

- Manufacturer makes profit on sale
- Dealer makes commission on sale

Note: freight costs increase the book value of the consignments for the consignor and that sales result in a liability for the consignee.

Non-Refundable Upfront Fee

Definition: Firms may receive payments from customers before they deliver a product or perform a service.

- Fees paid for membership
- Often payments for **future** period products NOT current

Repurchase Agreement

If the company repurchases the asset for a price greater/equal to its selling price, then it is a financing transaction and NOT a sale.

- If $\text{price} < \text{original selling price} \Rightarrow \text{lease}$ (Advanced, NOT in this course)

If the customer has an option to require seller to repurchase, we must determine if the customer has an economic incentive to do so.

- If there is an economic incentive and the fair value of the asset $<$ repurchase price, then this is a financing transaction
- If there is NO economic incentive, then it is a sale with right of return

Bill-and-Hold Agreement

Definition: sales contract where a customer has been billed for a product, but the seller retains physical possession of the product until it is transferred to customer in the future.

- Example: delays in buyer's production schedule

Revenue can only be booked at the time of the billing when:

- Reason for bill-and-hold is substantive
- Product is identified separately as belonging to the buyer
- Product is currently ready for physical transfer to buyer
- Seller is NOT able to use product or direct it to another buyer

Long-Term Contracts

Common in construction business and often allow seller to bill purchase at intervals. Additionally, revenue recognition over time is more appropriate as it provides a more realistic revenue picture.

Criteria: ONLY one needs to be met for **recognition over time** to be applicable

- Customer simultaneously receives and consumes benefits of seller's performance
- Seller creates/enhances an asset the customer controls
- Seller does NOT create an asset with an alternative use
 - Another seller would NOT need to re-perform
 - Seller has an enforceable right to payment for its performance completed to date

Percentage of Completion (POC)

Definition: if one of the criteria is met and if it can reasonably estimate its progress towards satisfaction of its POs, then the company recognizes revenues and gross profits each period based on the progress of construction.

Measuring Progress:

- Input measures (costs, hours worked): measure efforts devoted
 - Rely on sticky relation between input unit and productivity
- Output measures (units delivered): measure results
 - Require units to be comparable in time

Steps:

1. Company accumulates construction costs + gross profit in an inventory account (CIP)
 - Construction costs = direct material and labour, and project-related overhead
 - Note that administrative/general expenses are charged as incurred (NOT in CIP)
2. Company accumulates progress billings in contra inventory account (Billings on Construction in Process)

Cost-to-cost Basis: Most popular approach

Steps:

1. Compute progress based on costs incurred & estimated total costs

$$\frac{\text{costs incurred to date}}{\text{most recent estimate of total costs}} = \text{percent complete}$$

2. Apply the progress to revenues and gross profit

$$\text{percent complete} * \text{estimated revenue/GP} = \text{revenue/GP to be recognized to date}$$

3. Compute current period revenue and gross profit

$$\text{revenue/GP to be recognized to date} - \text{revenue/GP recognized in prior periods} = \text{current period revenue}$$

It is important to understand that the roll of the **Construction in Process account** is to accumulate all the costs incurred (+recognized GP) and it is an inventory/asset account. While, the roll of the **Billings on Construction in Process account** avoids double counting of the accounts receivable/ cash and inventory, it accounts what amount was already billed, and it is a contra-inventory account.

Cost Recovery Method (CRM)

Apply this method if NONE of the following criteria are fulfilled:

- Customer simultaneously receives and consumes benefits
- Customer controls asset as it is created/enhanced
- NO alternative use

Then the seller recognizes revenues when contract is completed at a point in time.

- Contract revenue is recognize over time only to the extent of costs incurred that are expect to be reocverable
- Recognize GP after all costs have been recognized (completed contract)

Biggest difference compared to POC Method: NO recognition of GP over time.

Contract Loss

1. Loss in current period on a still profitable contract
 - Increase in estimate total costs but contract is still profitable
 - Increase requires to recognize a loss in the current period
 - ONLY applies to POC
2. Loss on an unprofitable contract
 - Increase in estimated total costs => indicates an overall loss on completion of entire contract
 - Under both POC and CRM, recognize the entire expected contract loss

Note that accounting is consistent with accounting **conservatism**= the accounting custom of anticipating foreseeable losses to avoid overstatement of current and future income.

Intermediate accounting – IBEB – MA Lecture 3, week 6 Cost Estimation

Cost Estimation and Cost Behaviour

Cost Estimation: process of collecting and analyzing historical data to predict future costs. Steps:

1. Estimate past relationship between costs and the level of an activity
2. Use estimates to make more accurate future cost predictions

Important for **planning, decision making, and control**. Here are some examples of benefits:

- Enable realistic and achievable budgets which allows managers to control expenses and allocate resources efficiently
- Result in informed decisions about pricing strategies
- Allow for the evaluation of the organization performance by comparing predicted vs actual costs

To obtain accurate cost estimates we must distinguish between fixed and variable costs within the relevant range of an activity in a specific time period.

Remember the type of costs:

1. Fixed costs remain constant across different activity levels (e.g rent)
2. Variable costs change when units produced change (e.g packaging)
3. Step-Fixed costs remain constant for a certain level of activity, but once this threshold is surpassed, the costs will change in a step-like manner.
4. Mixed costs have a fixed and variable component

Criteria to classify costs into fixed/variable costs:

1. Cost object
2. Time horizon (all costs become variable in the long run)
3. Relevant range: the activity level at which an organization expects to be operating in the short run
 - If a firm's activity declines/increases to unexpected levels outside the relevant range, take action to change fixed costs accordingly.

Cost Function: mathematical expression describing past relationship between costs and changes in the level of an activity (activity measure/cost driver).

Linear regression: $y = a + b_1x_1 + \dots + b_nx_n$

y = total costs for the period

x = volume of activity levels/cost drivers

a = total fixed costs (intercept)

b = average variable cost per unit of activity (slope)

Cost functions are used in order to estimate future costs. This is done by using historical costs.

There are two assumptions for cost-behaviour estimation that must be fulfilled to create a cost function:

1. Changes in total costs can be explained by changes in single (few) activity
 - E.g. machine hours
2. The cost function must be linear in the relevant range of the activity (with total cost on the y-axis and the level of a single activity on the x-axis)
 - A linear function closely approximates the non-linear function but ONLY within the relevant range.

Cost Estimation Methods

Account analysis starts with classifying costs into fixed, variable, and mixed. This distinction allows the creation of a direct cost function. The decision as to which costs are fixed and variable has to be made based on prior experience. For this, it is important to use a large enough sample of data, to account for possible seasonal variation. Namely, the production schedule may be different in different seasons, and cause under/overestimation if a small set of data is used.

Inspection of the Accounts Method

The departmental manager and the accountant inspect each item of expenditure within the accounts for a particular period:

- Classifying each item of expense as a fixed, variable or a semi-variable cost
- Computing a single average unit cost for the items that are categorized as variable
- Computing a single total cost for the items that are categorized as fixed
- Final cost estimation function: $y = a + bx$

Advantages:

- Easy to use and useful when a quick cost forecast is required

Disadvantages:

- The method is highly subjective as different managers will classify some costs differently
- Cost information are normally based on the latest data and this data may not be typical of future cost behaviour

Graphical or Scatterplot Method

Plotting on a graph the total costs for each activity level.

- The total cost is represented on the vertical Y axis
- The activity levels are recorded on the horizontal X axis
- A straight line is fitted to the scatter of plotted points by visual approximation

Advantages:

- Simple to use

- Providing useful visual indication of any lack of correlation of costs and the cost driver

Disadvantages:

- Vague method
- Determination of the straight line is subjective
 - Use least-squares method to define best fit mathematically

$$\text{Unit variable cost (slope)} = \frac{\text{difference in costs}}{\text{difference in activity}}$$

High-Low Method

To estimate the cost function using this method, first the highest and lowest values of the cost driver (e.g. service hours) are chosen.

Calculations:

1. Use the unit variable cost equation again
2. Then use fixed costs (intercept, a) = total costs – variable costs (=unit variable cost*units)

Advantages:

- Easy to split Fixed Costs and Variable Costs

Disadvantages:

- Assumes linear relationship between cost and cost driver
- Chooses two extreme ranges of observation (which can be solved by the least squares method)
- Ignores cost observations at 'normal' activity levels, therefore it is NOT recommended!

Least Squares Method

A regression equation shows the average change in the dependent variable(Y) that is due to a one-unit increase in the independent variable(X). This is done by using all the available data, and not just the highest/lowest observations such as with the high-low method.

The data is fitted with a regression line with the least-squares technique (minimizing the difference between actual points and points on the line). This is more accurate than the High-Low method.

Cost drivers (X) should be chosen based on their economic plausibility, goodness-of-fit (R-squared of the regression equation: this indicates how much of the driver explains the variation in the dependent variable), and slope of the regression line. A steep slope shows that there is a strong relationship between the costs and the cost driver.

***Note that the smaller the differences between the actual costs and predicted costs, the more reliable the estimated cost function.**

Test of Cost Driver Reliability

How reliable are potential cost drivers in predicting costs?

Reliability indicates whether the regression reflects an actual relationship among the variables. An indication of whether the regression model is likely to continue to predict cost accurately in the future.

1. Economic plausibility
2. Plotting the data for each potential cost driver and examine distance from the regression line obtained by the scatterplot or least-squares method
3. Goodness of fit statistics
 - Indicate how well predicted costs (y) based on the chosen cost driver (x) matches the actual costs (observed data)
 - Correlation coefficient (r): the extent to which total costs change when the cost driver changes
 - Coefficient of determination (r^2): the percentage of variation in total costs that is explained by the cost driver
 - Values closer to 1 = stronger relationship between the cost driver and costs

Engineering Method

Analysis of the relationship between inputs and outputs in physical terms. Using data mainly derived from evaluations and opinions of industrial engineers with experience in the business:

- Close study of the product itself: Direct observations/repetitive processes of the underlying physical quantities required for an activity and converting the final results into cost estimates

Advantages:

- Estimating costs for a new product with no prior experience
- Estimating costs that are difficult to associate directly with individual units of output (e.g. overhead costs)
- Can provide reliable cost estimation for repetitive processes where input–output relationships are clearly defined

Disadvantages

- No separation of semi-variable costs into their fixed and variable elements
- Complex, time intensive, and costly analysis of the product and its production process
- Detailed technical knowledge needed

Intermediate accounting – IBEB – MA Lecture 4, week 6

Measuring Relevant Costs and Revenues for Decision-Making

5-Step Managerial Decision-Making Process

1. Identify the problem and uncertainties
2. Obtain information

3. Make prediction about the future
4. Make decision by choosing among alternatives
5. Implement the decision, evaluate performance and learn

It is important to remember the definition of relevant and irrelevant costs/revenues from chapter 2:

Relevant Costs/Revenues:

- Future costs/revenues that will be **changed** by a decision
- Future qualitative or non-financial factors that will be **changed** by a decision

Irrelevant Costs/Revenues:

- Past costs and sunk costs
- Future costs that do NOT differ between alternatives (e.g common fixed costs)

Decision Cases

1. Special Pricing Decisions

Special pricing decisions are pricing decisions outside the main market. Typically, they involve:

- One-time-only orders
- Orders at a price below the prevailing market price

Remember to avoid using fixed cost per unit in the calculations and instead include the total fixed costs, which remain constant over activity levels, because otherwise you could get faulty results.

Example: there are two ways you can calculate if you should accept or reject the special order and both give the same result. The first one is to calculate all the costs/revenues with the units of special order and the second method is to only consider the relevant (differential) cost/revenues. If the profit calculated is positive, then we can conclude that we should accept the special order.

Considerations before recommending the management to accept the special order:

- Normal selling price will not be affected in the long-term

- No better opportunities will be available during the period under consideration
- The company's fixed costs cannot be reduced and are unavoidable for the period under consideration
- Assumes no alternative uses for the idle capacity (otherwise you have an opportunity cost)

2. Outsourcing and Make-or-Buy Decisions

These decisions are very prevalent in reality. Insourcing is the conventional way in which organisations produce goods by themselves in their own facilities. In contrast to this, outsourcing occurs when organisations buy goods or services that they need from an external provider. Decisions on whether or not to outsource are called make-or-buy decisions.

Advantages of Outsourcing

- Cost saving and quality improvements
 - Lower cost of labour in overseas countries
- Enables companies to focus on their core activities and provide high quality goods
- Best suited for **non-core activities**

Disadvantages of Outsourcing

- Loss of control of operations which can result in reduced quality and failure to achieve on-time deliveries
 - Leads to reputational damage
- Other qualitative factors (e.g competitive advantage)

Example: starbucks management faced two alternatives:

1. Make coffee mugs and not make phone cases
2. Buy the coffee mugs (outsource) and make phone cases

*Take into consideration the best alternative use of the resources

Option 1: compare the total net cost of each alternative and then select the one with the lowest total costs.

- In this example the cost of making is the same as buying so you have to consider it in both calculations

- In the second alternative you also make phone cases thus you gain revenue from that which decreases the total costs

Option 2: focus on the relevant costs and revenues.

- This is the difference in the costs between alternative 1 and alternative 2

3. Decisions on Replacement of Equipment

Should managers replace current equipment with more efficient and cheaper ones?

Irrelevance of Past Costs Principles:

- An important example of an **irrelevant cost is the book value** (original cost - accumulated depreciation) of current equipment because it is a sunk cost since you cannot change what the company has already spent.
 - If we decide to NOT replace the current equipment then the book value is written off periodically (e.g yearly)
 - If we decide to replace the current equipment then the book value is written off as a lump sum (immediately)

$$\text{straight line depreciation} = \frac{\text{original cost} - \text{salvage value}}{\text{useful life}}$$

(Salvage value = terminal disposal value)

Example: the firm has two possible alternatives:

1. Keep old machine and NOT buy a new one
2. Buy new machine and sell old one

Option 1: compare the total net costs of both alternatives

- Keep in mind that when buying a new machine you need to consider the disposal value of the old machine, which you receive, and the purchase of the new machine, which you pay.
- Choose the alternative with the lowest costs.

Option 2: consider only relevant costs

- The current disposal value of the old machine is relevant because if the company replaces the machine then they can sell the old one for this amount of money and the cost of the new machine is also relevant because it is the cost incurred of making the decision.
- The difference in operating costs is also relevant

- If total costs are positive then that means that if we keep the old machine we will incur higher costs.

4. Product Mix Decisions: Capacity Constraints

Example: how should Ryanair decide which of the many flights to cancel when facing pilot shortages?

- Flights should be canceled such that Ryanair's profit is maximized and customer demand is satisfied
- Cost and qualitative considerations

Which products/services should be sold and in which quantities to maximize profit in the context of capacity constraints?

- Select products with the highest contribution margin per unit of the limiting factor

Short-term Capacity Constraints Caused by scarce resources or limiting factors:

- Shortage of skilled labour
- Shortage of raw materials
- Limited equipment or space

Capacity constraints that exist in the short run but can be resolved or relaxed in the long run. These limiting factors can cause demand to be in excess of our current capacity.

When sales demand > a company's productive capacity:

Identification of the resources (=limiting factors) is responsible for limiting the output

- In the short term: Profit is maximized when the greatest possible contribution to profit is obtained each time the limiting factor is used
- In the long-term: Acquiring additional resources if the contribution from the extra capacity exceeds the cost of acquisition

Conclusion: prioritize the production of the good that has the highest contribution margin per unit of the limiting sector = contribution margin (**=revenue - variable cost**)*units per time period

*Total profit can be calculated by deducting fixed cost from the fixed contribution margin

5. Discontinuation Decisions

Most organizations periodically analyse profits by one or more cost objects to identify unprofitable cost objects. Cost objects can be: products, services, customers etc. This can highlight which business activities are unprofitable and whether it should be discontinued.

Unprofitable = total revenue < total costs

Steps to Consider:

1. Verify whether the contribution margin is positive or negative
 - Positive = the product still produces enough revenue to cover the total variable costs associated with that product
2. Verify whether any of the fixed costs can be avoided by discontinuation
 - Distinguish between direct and common/indirect (irrelevant) fixed costs

Examples:

- Salary of supervisor = avoidable direct fixed cost
- Depreciation = unavoidable direct fixed cost
- Factory rent = unavoidable common fixed cost

*Note that it is important to also consider:

3. opportunity costs. Think about if there are possibilities of alternative use for the resources if we discontinue the production of a good.

If discontinuing will have effects on the sale of other products.

References

- Lehmann, N. (2024). FA Intro & Recap Lecture [PowerPoint slides]. Retrieved from: <https://canvas.eur.nl/courses/44056/files/94511737>
- Lehmann, N. (2024). FA Lecture 2 [PowerPoint slides]. Retrieved from: <https://canvas.eur.nl/courses/44056/files/94511740>
- Voermans, E. (2024). MA Lecture 1 [PowerPoint slides]. Retrieved from: <https://canvas.eur.nl/courses/44056/files/94511745>
- Voermans, E. (2024). MA Lecture 2 [PowerPoint slides]. Retrieved from: <https://canvas.eur.nl/courses/44056/files/94511746>
- Lehmann, N. (2024). FA Lecture 3 [PowerPoint slides]. Retrieved from: <https://canvas.eur.nl/courses/44056/files/94511741>
- Lehmann, N. (2024). FA Lecture 4 [PowerPoint slides]. Retrieved from: <https://canvas.eur.nl/courses/44056/files/94511750>
- Lehmann, N. (2024). FA Lecture 5 [PowerPoint slides]. Retrieved from: <https://canvas.eur.nl/courses/44056/files/94511756>
- Lehmann, N. (2024). FA Lecture 6 [PowerPoint slides]. Retrieved from: <https://canvas.eur.nl/courses/44056/files/94511759>
- Voermans, E. (2024). MA Lecture 3 [PowerPoint slides]. Retrieved from: <https://canvas.eur.nl/courses/44056/files/95217374>
- Voermans, E. (2024). MA Lecture 4 [PowerPoint slides]. Retrieved from: <https://canvas.eur.nl/courses/44056/files/95217415>