

# EFR summary

Intermediate Accounting, FEB12007X  
2025-2026



Lectures 1 to 6  
Weeks 1 to 7

**Deloitte.**

DeNederlandscheBank  
EUROSYSTEM

## Details

**Subject:** Intermediate Accounting IBEB 2025-2026

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

## Introduction and basic concepts

Accounting is the language of business. There are three central steps in the accounting process:

1. **To account** for something = acknowledge existence and describe it (identify economic transactions / events).
2. **To count** = to measure, to quantify (classify and accumulate transactions / events).
3. **To be accountable** = to explain what one has done and to take responsibility for consequences (communicate / report)

Accounting has two key missions:

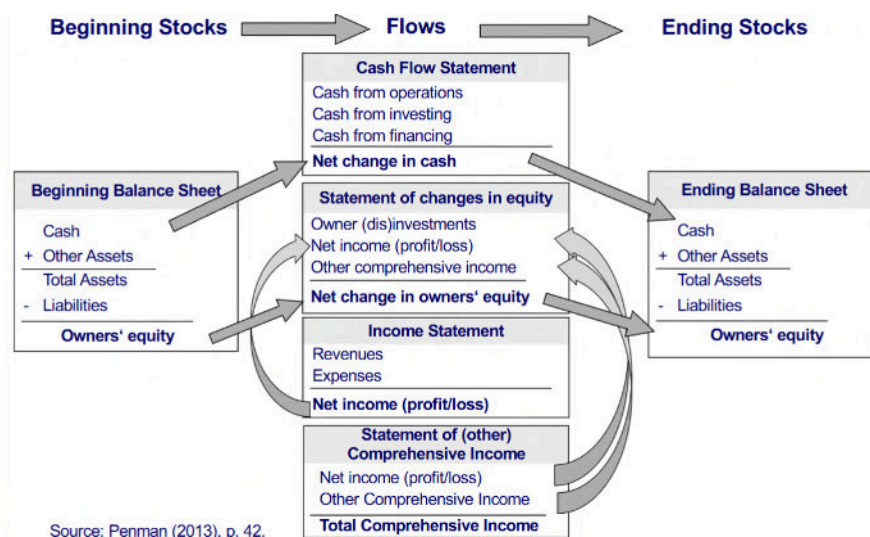
- **Facilitate value creation by** supporting decision-making (internal for daily operations and strategy; external for financing).
- **Facilitate stewardship** by measuring and reporting the amount of value created (holding management responsible).
- Helps solve the **"Information" and "Agency" problems** caused by the separation of ownership and control
  - o Such as adverse selection & Moral hazard

Two Types of Accounting

- **Management accounting:** Directed to internal use. Used for cost accounting, budgeting, and performance evaluation.
- **Financial accounting:** Directed to external use. Regulated externally (e.g., by auditors), relies on historical/aggregated data, and is periodic (quarterly, yearly).

## Types of financial statements

1. **Balance sheet:** snapshot of a firm's assets and liabilities at a given point in time
2. **Income statement:** statement on the firm's revenue and expenses over time
3. **Cash flow statement:** statement on how the cash account has changed between two dates
4. **Shareholders' equity statement**



## Accrual-based accounting

In the accrual basis of accounting, expenses follow revenues and are identified in the period when the economic activity occurs.

Accrual perspective:  $\text{Earnings} = \text{Cash flow} + \text{accruals}$

**Revenue Recognition Principle:** Recognize revenue when the firm has performed all (substantial) services and cash receipt is likely certain, not just when cash is received.

**Matching Principle:** Expenses are recognized when the corresponding revenue is generated (expenses follow revenues), not when cash flows out of the firm.

**Accrual accounting** is used because it provides a better measurement of short-term performance by fixing timing problems. Evaluating based on cash flows can be misleading because cash inflows and outflows often occur in different

periods ("the wrong year") than the actual economic substance (value creation or consumption)

Types of Accruals and Deferrals:

### Deferrals

- **Prepaid Expenses:** expenses that have been paid by the company before they are consumed (e.g., prepaid insurance). These are assets
  - Asset (Cash) decreases, Asset (Prepaid Account) increases, with time prepaid account and expenses decreases
- **Unearned Revenues:** cash that has been received before the company's obligations in the transaction have been fulfilled (e.g., payment in advance for a year-long gym membership). These are liabilities.
  - Asset (Cash) increases, Liability (Unearned Revenue) increases, with time unearned revenue decreases and revenue increases

### Accruals

- **Accrued Revenues:** a product or service has been successfully delivered, but payment has not yet been received. These are assets
  - Asset (Receivable) increases, Equity (Revenue) increases, with time account receivable decrease and cash increases
- **Accrued Expenses:** resources that have been used but not yet paid for. These are liabilities
  - Liability (Payable) increases, Equity (Expense) decreases, with time account payable and cash decreases

## Debit and credit

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

- **Debit (Dr):** The left side of an account.
- **Credit (Cr):** The right side of an account.

Every transaction must have at least one debit and one credit, and total debits must equal total credits in the general ledger.

## Super T-account

Assets	Liabilities & Shareholders' Equity																				
<table style="margin: auto; border-collapse: collapse;"> <tr> <td colspan="2" style="border-top: 1px solid black; border-bottom: 1px solid black; padding: 5px;">Assets</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">Dr.</td> <td style="padding: 5px;">Cr.</td> </tr> <tr> <td style="border-right: 1px solid black; text-align: center; padding: 5px;">+</td> <td style="text-align: center; padding: 5px;">-</td> </tr> </table>	Assets		Dr.	Cr.	+	-	<table style="margin: auto; border-collapse: collapse;"> <tr> <td colspan="2" style="border-top: 1px solid black; border-bottom: 1px solid black; padding: 5px;">Liabilities</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">Dr.</td> <td style="padding: 5px;">Cr.</td> </tr> <tr> <td style="border-right: 1px solid black; text-align: center; padding: 5px;">-</td> <td style="text-align: center; padding: 5px;">+</td> </tr> </table>	Liabilities		Dr.	Cr.	-	+	<table style="margin: auto; border-collapse: collapse;"> <tr> <td colspan="2" style="border-top: 1px solid black; border-bottom: 1px solid black; padding: 5px;">Contributed Capital</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">Dr.</td> <td style="padding: 5px;">Cr.</td> </tr> <tr> <td style="border-right: 1px solid black; text-align: center; padding: 5px;">-</td> <td style="text-align: center; padding: 5px;">+</td> </tr> </table>		Contributed Capital		Dr.	Cr.	-	+
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### Examples:

– *Share issuing (ordinary shares, USD 15K in cash):*

**Debit** Cash 15,000 USD

**Credit** Share Capital – Ordinary 15,000 USD

– *Buying Computer Equipment (USD 7K in cash):*

**Debit** Computer Equipment 7,000 USD

**Credit** Cash 7,000 USD

# Intermediate Accounting – IBEB – FA Lecture 2, week 2 Cash Flow Statement

## Cash flow statement

The basis for the statement of cash flows is:

- **Cash:** includes cash in hand and checking accounts
- **Cash equivalents:** short-term, highly liquid investments that are both:
  - Readily convertible to known amounts of cash.
  - So near their maturity that they present an 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.

## Purpose of cash flow statement

The Balance Sheet provides a static view, and the Income Statement provides a dynamic view of business activity, but neither shows **how cash has evolved over time**

- Provide information about a company's cash receipts and cash payments during a period
- Provide cash-basis information about the company's operating, investing, and financing activities

It mainly provides information to:

- Assess a company's ability to generate future cash flows.
- Assess a company's ability to pay dividends and meet contractual obligations (survival).
- Assess the reasons for the difference between net income and net cash flow from operating activities (understanding the reliability of Net Income).
- Assess the cash and non-cash investing and financing transactions during the period.

**Note on Cash vs. Accrual:** A business can be highly profitable on the income statement (accrual) but still faces a dangerous cash situation if customers pay late and suppliers must be paid early.

## Types of cash flow

The **cash flow statement** is divided into three basic firm activities:

$$\text{Change in cash} = \text{Cash from operations} + \text{Cash from investments} + \text{Cash from financing}$$

**Operating activities** (involve income statement items):

- Derived from the main business activities
- Cash receipts from sales or cash payments to suppliers and employees
- Returns from loan (interest) and equity securities (dividends)

**Investing activities** (Involves changes in investments and non-current asset items):

- Buying and selling of fixed assets (PPE)
- Purchase or sale of debt/equity securities from other entities

**Financing activities** (Involves changes in equity and non-current liability items):

- Share capital and dividends
- Long-term loans and bond issues

Some items can be ambiguous. The course convention applies the following rules consistently:

Convention in our course:	Interest paid	Interest received	Dividends paid	Dividends received	Taxes paid
	OPE	OPE	FIN	OPE	OPE

## Preparation of the cash flow statement

Three sources of information are needed: **Balance sheet, Income statement, and Selected transactions**. The following steps are taken:

1. Determine change in cash.
2. Determine net cash flow from operating activities.

- Determine net cash flows from investing and financing activities.

## Indirect method

### Example

Tax Consultants Inc. started on January 2, 2019, when it issued 60,000 shares of \$1 par value common stock for \$60,000 cash:

- The company rented its office space, furniture, and equipment.
- The company performed tax consulting services throughout the first year.

TAX CONSULTANTS INC. INCOME STATEMENT FOR THE YEAR ENDED DECEMBER 31, 2019		TAX CONSULTANTS INC. COMPARATIVE STATEMENTS OF FINANCIAL POSITION		
Revenues	\$125,000	<b>Assets</b>		
Operating expenses	85,000	Dec. 31, 2019	Jan. 1, 2019	
Income before income taxes	40,000	Accounts receivable	\$36,000	\$-0-
Income tax expense	6,000	Cash	49,000	-0-
Net income	\$ 34,000	Total	\$85,000	\$-0-
		<b>Equity and Liabilities</b>		
		Ordinary shares (\$1 par)	\$60,000	\$-0-
		Retained earnings	20,000	-0-
		Accounts payable	5,000	-0-
		Total	\$85,000	\$-0-

**Additional information:**  
Examination of selected data indicates that a dividend of \$14,000 was declared and paid during the year.

TAX CONSULTANTS INC. COMPARATIVE STATEMENTS OF FINANCIAL POSITION			
<b>Assets</b>	Dec. 31, 2019	Jan. 1, 2019	Change Increase/Decrease
Accounts receivable	\$36,000	\$-0-	\$36,000 Increase
Cash	49,000	-0-	49,000 Increase
Total	\$85,000	\$-0-	
<b>Equity and Liabilities</b>			
Ordinary shares (\$1 par)	\$60,000	\$-0-	\$60,000 Increase
Retained earnings	20,000	-0-	20,000 Increase
Accounts payable	5,000	-0-	5,000 Increase
Total	\$85,000	\$-0-	

### Step 1: Determine change in cash.

- We can see from the balance sheet, Change in cash = Increase of \$49,000

### Step 2: Determine net cash flow from operating activities.

Net income (NI)  $\neq$  cash flow from operating activities (CFO) because of accrual accounting

- We must eliminate the effects of income statement transactions that do not result in an increase or decrease in cash

There are two ways of calculating potential cash flow from operating activities:

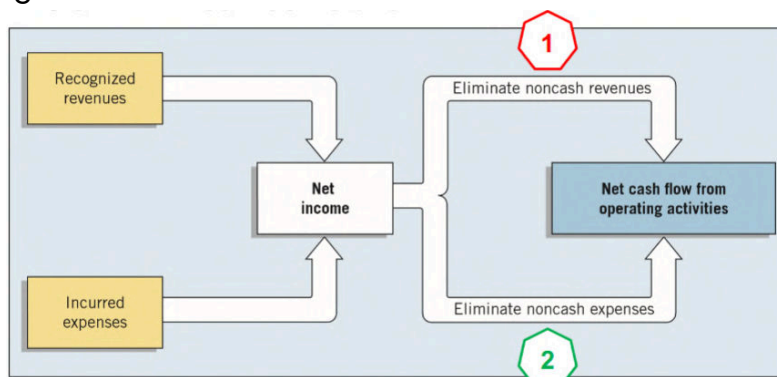
1. **Direct:**

$$\text{CFO} = \text{Cash revenues} - \text{Cash expenses}$$

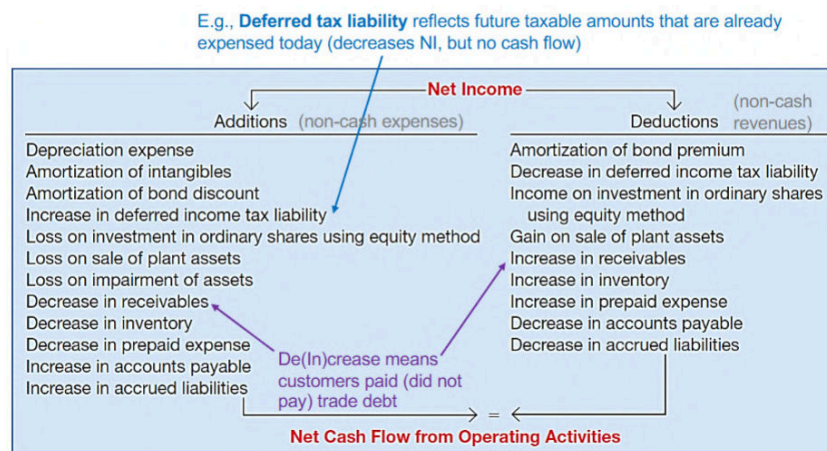
2. **Indirect** (the one in this example):

$$\text{CFO} = \text{Net income} + \text{non-cash expenses} - \text{non-cash revenues}$$

The following 2 diagrams shows how the logic of the indirect method works and also whether a change in a certain account will add or deduct the Net income



1. ...**deduct** non-cash revenues from NI
2. ...**add back** non-cash expenses to NI



Back to our example:

- Start with Net Income (\$34,000)
- Deduct increase in Accounts Receivable (\$36,000)

- Add increase in Accounts Payable (\$5,000).
- CFO = \$3,000

Net income		\$ 34,000
Adjustments to reconcile net income to net cash provided by operating activities:		
Increase in accounts receivable	\$(36,000)	
Increase in accounts payable	<u>5,000</u>	<u>(31,000)</u>
<b>Net cash provided by operating activities</b>		<b><u>\$ 3,000</u></b>

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

- CFI = \$0 (no long-term assets).
- CFF = Issuance of stock (\$60,000) - Dividends paid (\$14,000) = \$46,000.
- Total Change in Cash = \$3,000 + \$0 + \$46,000 = \$49,000

Cash flows from operating activities		
Net income		\$ 34,000
Adjustments to reconcile net income to net cash provided by operating activities:		
Increase in accounts receivable	\$(36,000)	
Increase in accounts payable	<u>5,000</u>	<u>(31,000)</u>
Net cash provided by operating activities		3,000
Cash flows from financing activities		
Issuance of ordinary shares	60,000	
Payment of cash dividends	<u>(14,000)</u>	
Net cash provided by financing activities		<u>46,000</u>
Net increase in cash		49,000
Cash, January 1, 2019		<u>-0-</u>
Cash, December 31, 2019		<u><u>\$ 49,000</u></u>

## Direct method

Calculates CFO by directly adjusting each income statement line item to its cash basis.

$$\text{CFO} = \text{Cash revenues} - \text{Cash expenses}$$

It can be illustrated through the following equation:



# Intermediate Accounting – IBEB – MA Lecture 1, week 3

## Cost terms & Absorption versus 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 are 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 Allocation System

#### Cost Object

**Cost Object:** Any activity for which a separate measurement of cost is required (e.g., a product, service, department, or project).

A cost collection system accounts for costs in two broad stages:

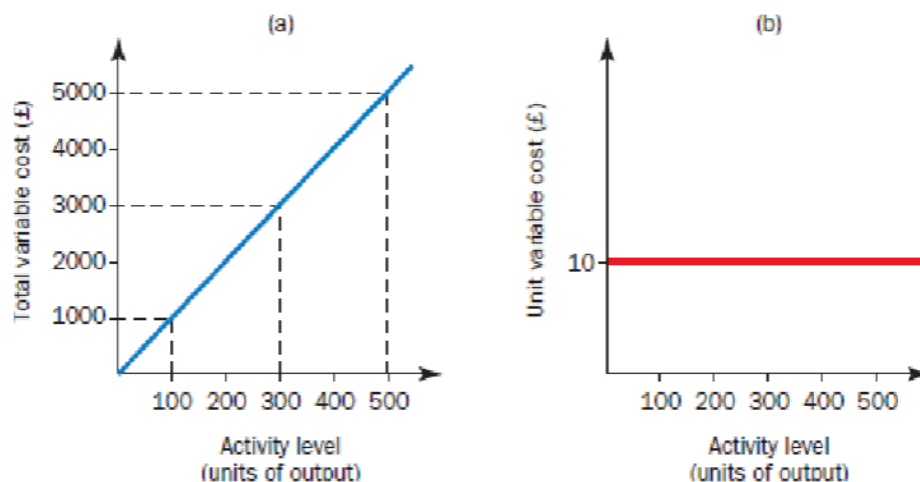
1. **Classifying costs** into categories (Behavior, Traceability, Function, Relevance).
2. **Assigning costs** to cost objects (Direct tracing vs. Cost allocation).

In this lecture we mainly focus on classifying costs

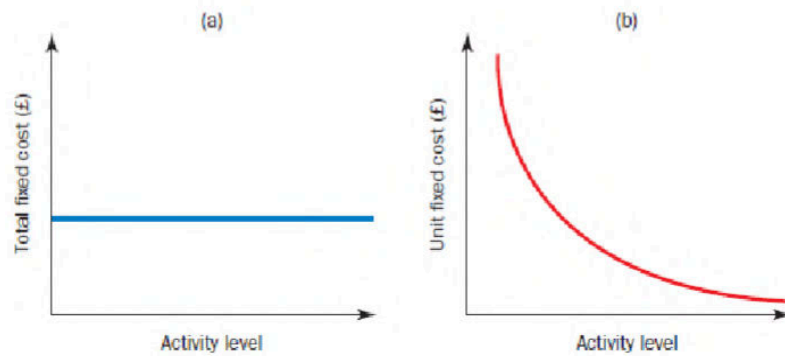
## Categories

**Behavior:** How total costs react to changes in activity level within a relevant activity and time range.

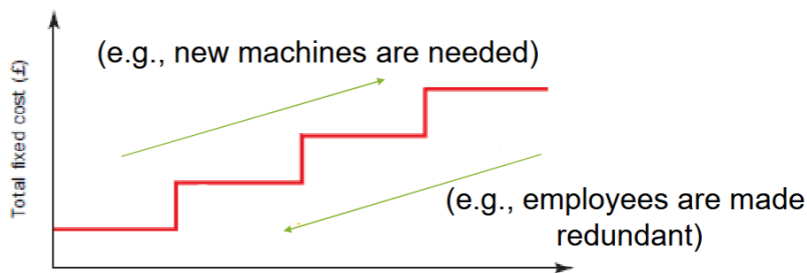
- **Note:** in the long run, ALL costs are variable, but they are fixed when looking at a specific time frame.
- **Variable costs:** Change in direct proportion with the total level of activity or volume (e.g., materials).



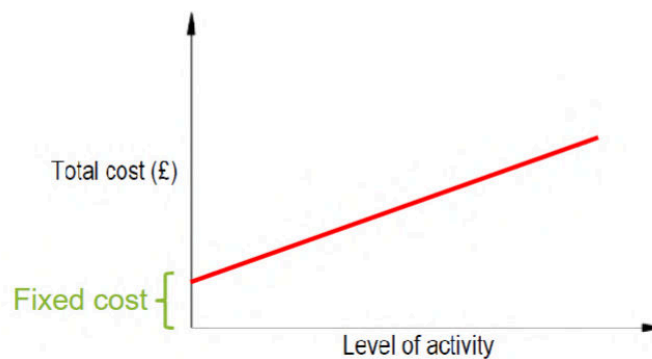
- **Fixed costs:** Remain constant over wide ranges of activity for a specified time period (e.g., rent, depreciation). For internal decision-making, it is often better to focus on total fixed costs.



- **Semi-fixed (Step-fixed) costs:** Constant within specific activity levels, but subject to step increases/decreases by a constant amount at critical activity levels (e.g., needing new machines or hiring/firing employees).



- **Semi-variable (Mixed) costs:** Include both a fixed component and a variable component (e.g., labor cost with a fixed wage and a variable bonus).



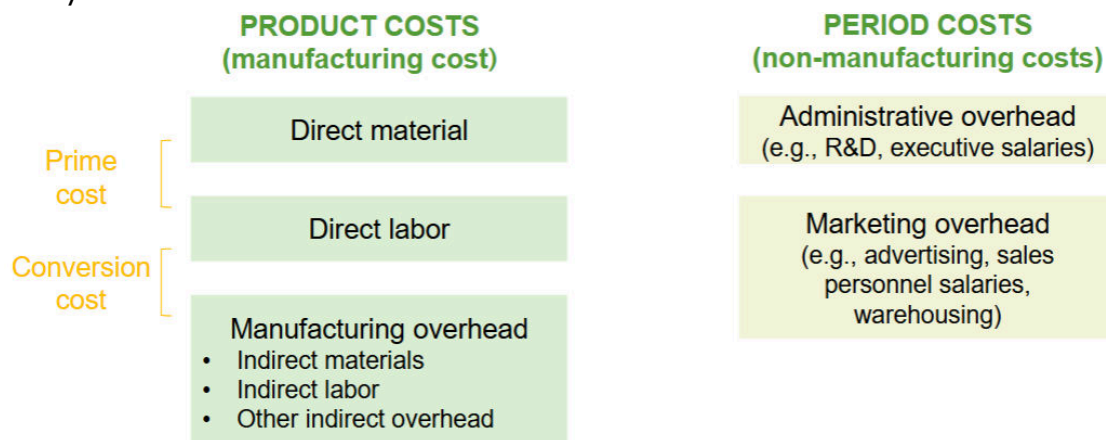
**Traceability:** how easily and accurately costs can be allocated to a cost object.

1. **Direct costs:** costs incurred for one cost object and can be accurately traced back (Golden rule: you can physically observe the amount of material and labour used).
  - Direct material cost
  - Direct labor cost (production employees)
  
2. **Indirect costs:** costs incurred for more than one cost object. A cost allocation process is needed.
  - Indirect material costs (cleaning or repair material)
  - Indirect labor costs (administration or maintenance)
  - Other expenses (factory rent)

Distinction:

- Sometimes, direct costs are treated as indirect since it's not cost effective to trace costs directly (e.g: the number of nails used in a desk, as the cost is likely insignificant)
- The distinction also depends on the cost object. A cost can be treated as direct for one cost object but indirect for another.

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



**Product / Manufacturing Costs:**

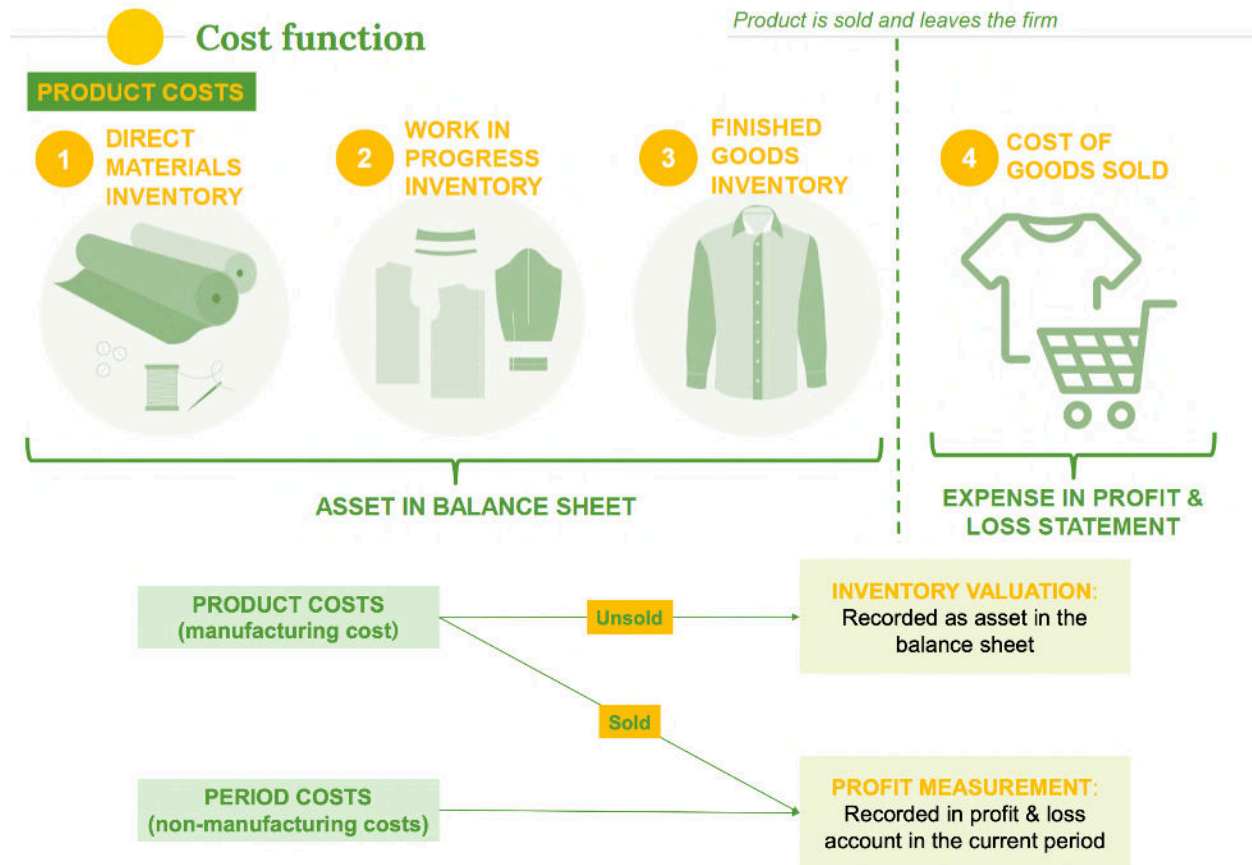
- Prime Cost: Direct material + Direct labor.
- Conversion Cost: Direct labor + Manufacturing overhead (MOH).

**Period / Non-manufacturing cost:**

- Administrative overhead
- Marketing overhead
- Office rent (not factory rent)

**Note:** Fixed manufacturing overhead can be regarded as product or period costs depending on the costing system in place

The following diagram shows us the pipeline of the costs of a product from entering as raw materials to being sold and recorded as cost of goods sold



**Product cost recorded when:**

- Unsold: They are treated as inventory on the balance sheet (matching principle: costs should be recorded as assets if they are expected to bring future economic benefits).
- Sold: They become cost of goods sold in the income statement (matching principle: product costs are matched with revenues when the product is sold).

**Period / Non-manufacturing Costs:** included in profit measurement, always treated as expenses in the income statement in the period they are incurred.

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

1. **Relevant revenue/costs:** Future costs and revenues that will be changed by a decision
2. **Sunk Costs:** Costs that have already occurred and cannot be changed by any decision. Sunk costs are always irrelevant!
3. **Opportunity Costs:** measures the benefits that are lost or sacrificed when a certain action is chosen and an alternative action is given up. They are relevant costs

Note: NOT all future costs are relevant, but all relevant costs are future costs.

### Example

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
<b>Total relevant costs</b>	<b>-5,000,000 EUR</b>	<b>-25,000,000 EUR</b>	

Tesla must decide between producing batteries (Make) or buying them (Buy).

- Variable manufacturing costs: €5,000,000 (Make) vs. €0 (Buy). -> Relevant (it changes).
- Fixed costs: €10,000,000 (Make) vs. €10,000,000 (Buy). -> Irrelevant (it doesn't change).
- Purchase price: €0 (Make) vs. €25,000,000 (Buy). -> Relevant (it changes).
- Total relevant costs: -€5,000,000 for Make vs. -€25,000,000 for Buy. Make is the better option.

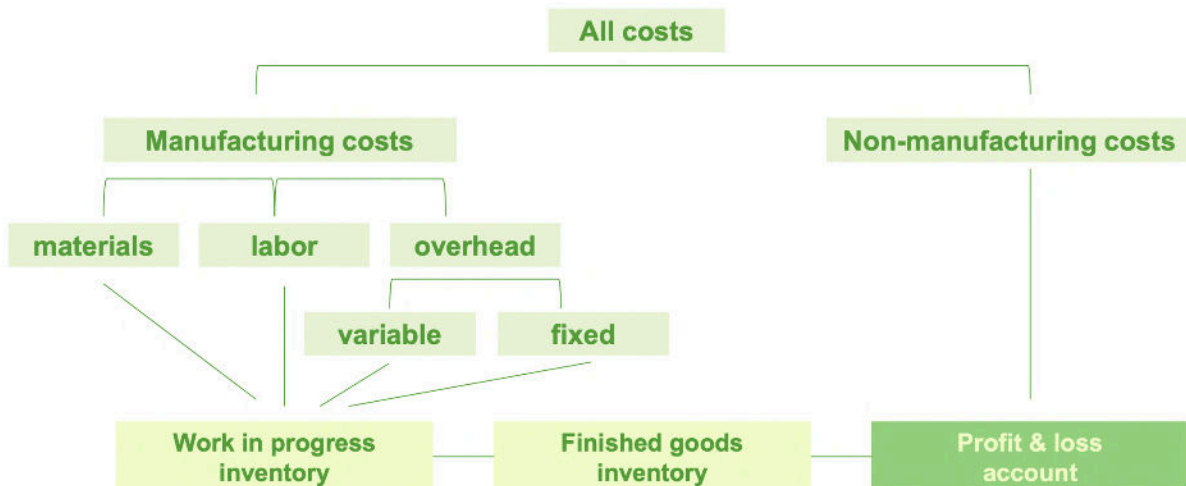
# Absorption vs Variable Costing System

These two systems differ purely in how they handle **Fixed Manufacturing Overhead (MOH)**. This difference impacts inventory valuation and reported profits.

## Absorption / Full Costing

Required for external reporting (GAAP).

- ALL manufacturing costs (variable AND fixed) are treated as product costs (Inventory).
- Fixed manufacturing overhead is "absorbed" into the cost of the product and only expensed (as COGS) when the product is eventually sold.

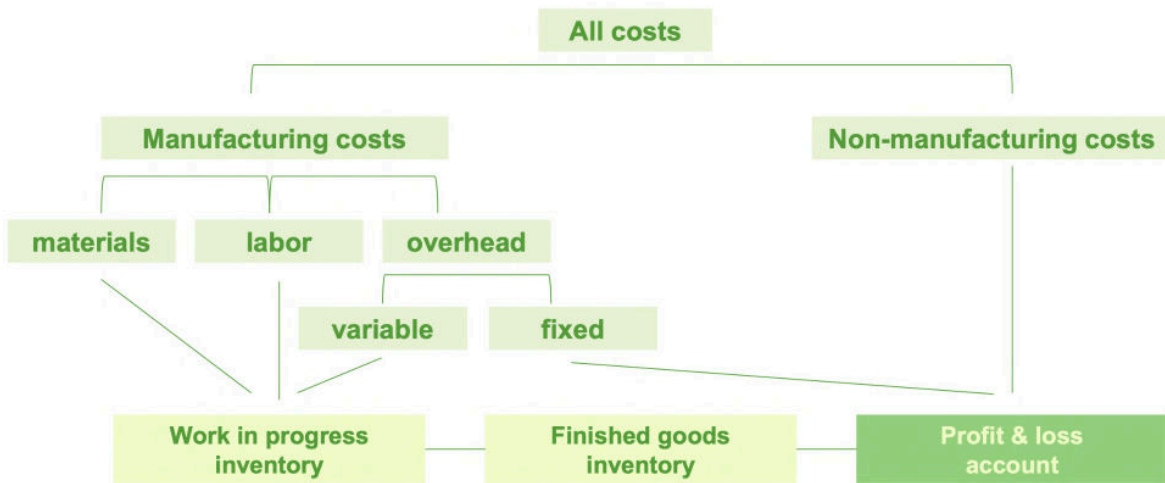


## Variable / Direct Costing

Useful for internal decision making.

- Only variable manufacturing costs (materials, variable labor, variable overhead) are treated as product costs (Inventory).

- Fixed manufacturing overhead is treated as a Period Expense immediately on the Profit & Loss statement



### Summary

	<u>Absorption Costing</u>	<u>Variable Costing</u>
Included in product cost	- Direct materials - Direct labour - Variable and fixed MOH	- Direct materials - Direct labour - Variable MOH only
Fixed MOH treatment	Treated as part of the inventory cost	Treated as period cost
COGS includes	Variable + Fixed MOH	Only variable costs
Impact on profit if inventory changes	Profit is higher when inventory increases, as some fixed costs are deferred in inventory	Profit is lower when inventory increases, as all fixed costs are expensed immediately

**Note:** Variable costing uses a contribution margin, whereas absorption costing uses a gross margin in the income statement.

## Example

In this example we will look at how the 2 costing method differs

- The important number is the Fixed manufacturing overhead =  $12,000/1,000 = \text{€}12$  per unit

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
<i>Direct materials</i>	11
<i>Direct labor</i>	6
<i>Variable manufacturing overhead</i>	3
▪ 12,000 EUR fixed manufacturing overhead per period (for a normal capacity of 1,000 units)	12 = <small>fixed overhead rate</small>
Non-manufacturing costs	
▪ Variable selling & administrative expenses per unit sold	4 <small><math>\frac{12,000}{1,000}</math></small>
▪ Fixed selling & administrative expenses per period	7,000 <small>1,000</small>



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

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

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

	PERIOD 1	PERIOD 2	PERIOD 3
<b>sales</b>	<b>50,000</b> (1,000 x 50)	<b>100,000</b> (2,000 x 50)	<b>100,000</b> (2,000 x 50)
<b>– COGS</b>	<b>32,000</b> (1000 x 32)	<b>64,000</b> (2,000 x 32)	<b>64,000</b> (2,000 x 32)
<i>opening inventory</i>	0	0	32,000 (1,000 x 32)
<i>production</i>	32,000 (1,000 x (20+12))	96,000 (3,000 x 32)	32,000 (1,000 x 32)
<i>- ending inventory</i>	0	32,000 (1,000 x 32)	0
<b>–/+ under- or over-absorption of fixed overhead</b>	/	<b>24,000</b> ((3,000 – 1,000) x 12)	/
<b>= gross margin</b>	<b>18,000</b>	<b>60,000</b>	<b>36,000</b>
<b>– non-manufacturing costs</b>	<b>11,000</b> (4 x 1,000 + 7,000)	<b>15,000</b> (4 x 2,000 + 7,000)	<b>15,000</b> (4 x 2,000 + 7,000)
<b>= net operating income</b>	<b>7,000</b>	<b>45,000</b>	<b>21,000</b>

Of the 2 types of costing methods you see above there are a few differences:

- In the variable costing, we separate the costs into variable and fixed, first deducting the variable COGS and then the fixed part
- In the absorption costing, we separate the costs into manufacturing and non-manufacturing
- Furthermore, in absorption costing we also take into account the under/over absorption of fixed overhead

## 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:

$$\text{FIXED MANUFACTURING OVERHEAD RATE} = \frac{\text{budgeted fixed manufacturing overhead costs}}{\text{denominator activity level}}$$

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:** the most expected capacity utilisation that will occur in the next budget period.

### Under- or Over-Absorption of Fixed Overhead

Under absorption costing, we use a predetermined rate to assign fixed costs to products.

$$\text{Fixed MOH Rate} = (\text{Budgeted Fixed Overhead}) / (\text{Denominator Activity Level})$$

Because this rate relies on an estimated denominator (capacity level), the amount of fixed overhead we "allocate" to products almost always differs from the "actual" fixed overhead incurred.

- Allocated Overhead = Actual Units Produced × Fixed MOH Rate
- If Allocated Overhead < Actual Overhead, we have Under-absorption. This represents the cost of unused capacity. We didn't produce enough units to "absorb" the real fixed costs. The shortfall is typically charged as an expense against profit.
- If Allocated Overhead > Actual Overhead, we have Over-absorption. We produced more than expected, applying too much fixed cost to products. This overcharge is credited back to increase profit.

In our example we assumed 1,000 unit but in period 2 we had 3,000 units that is why we have over-absorption

### Example based on different capacity levels

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

## Profit comparison

**Variable costing:** Profit is a function of sales volume only

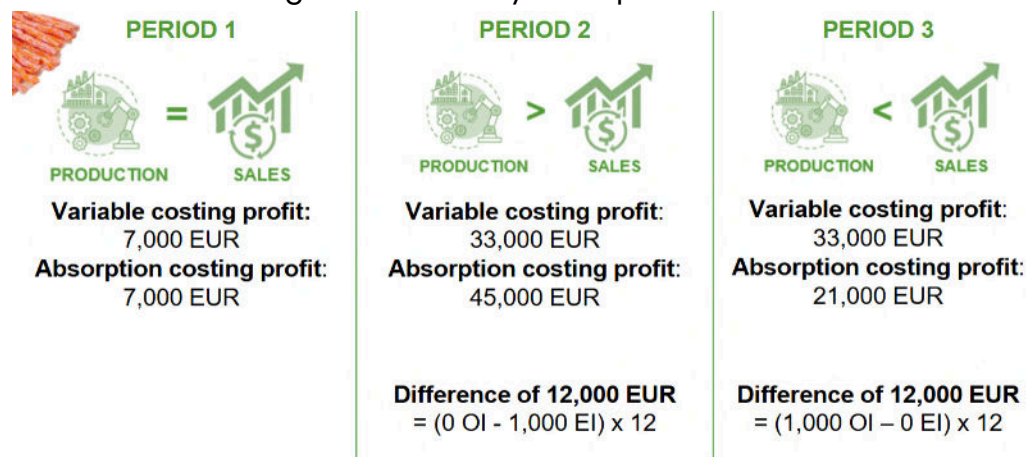
**Absorption costing:** Profit is a function of sales and production volume

- **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)

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, 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.

This can be illustrated using the Hello knitty example

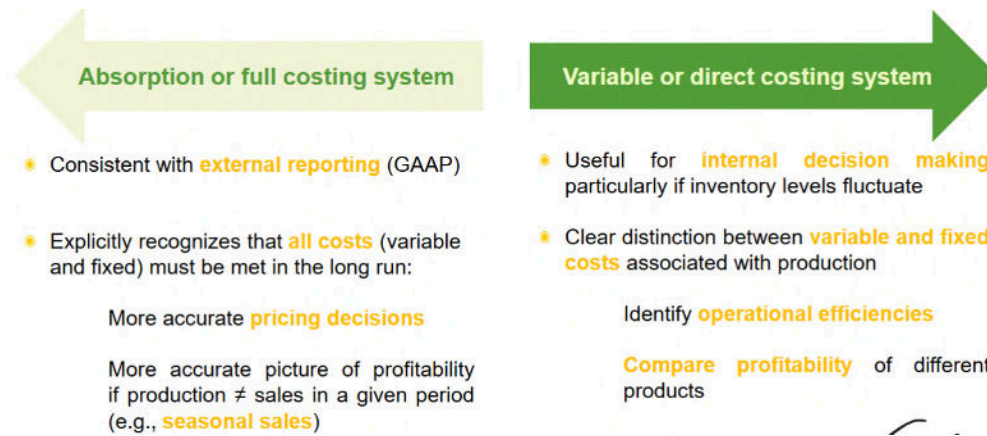


**Period 2:** Profits under Absorption (€45,000) is higher than Variable (€33,000) by €12,000. Under Absorption costing, 1,000 unsold units went into ending inventory, carrying 1,000 x €12 = €12,000 of fixed overhead with them onto the balance sheet.

- Variable costing expensed that €12,000 immediately.

**Period 3:** Profit under Absorption (€21,000) is lower than Variable (€33,000) by €12,000. The 1,000 units stored in inventory from Period 2 are now sold. The €12,000 of fixed overhead attached to them is finally released from the balance sheet into the income statement as an expense.

In the table below you can see the argument for each type of costing



# Intermediate Accounting – IBEB – MA Lecture 2, week 3 Cost Allocation

## Cost Assignment

### 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 needs of each customer. This means that they will have their own characteristics 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

**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.

## Direct Tracing vs Cost Allocations

We have already seen that a cost collection system involves 2 stages, **classifying and assigning costs**, in the previous lecture we have seen classification of costs in detail, for this lecture we will look at how costs are assigned

### 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.

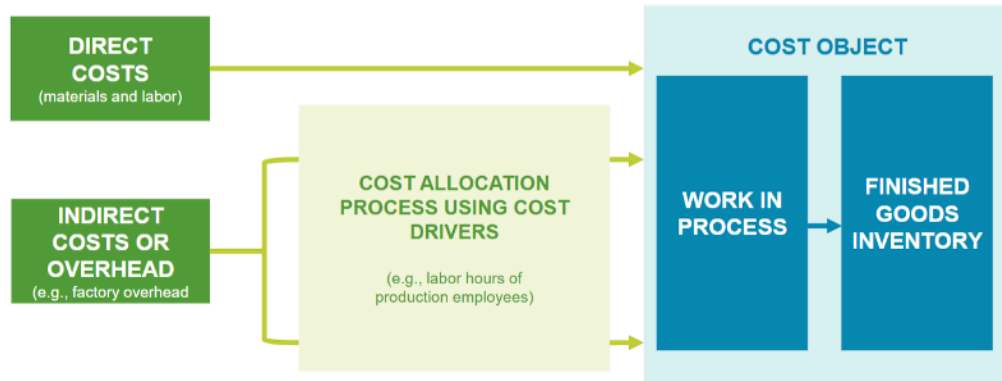
### Indirect costs

Indirect costs are costs related to a cost object but that cannot be traced to it. We cannot use direct measures.

**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.

**Note:** costs are first treated as assets because we expect that these costs will generate future revenue. 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

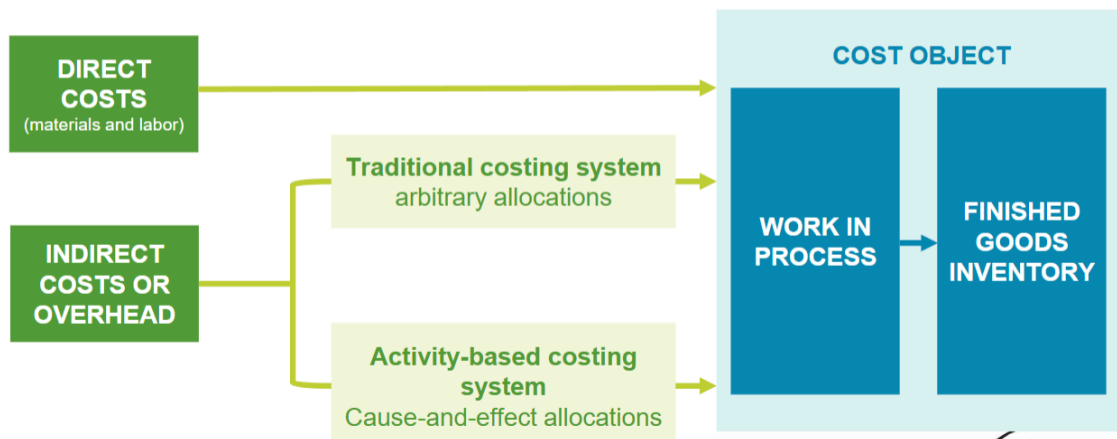


Any factor that causes a change in the cost of manufacturing products or offering services.

1. **Volume-related:** depends 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:** 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 costs 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?**
  - o If we need it for managerial decision-making purposes => activity-based costing
  - o 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



## 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 charged based on the chosen cost driver; thus, it is calculated 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 organization products often pass through many different departments.

- Thus by using a single rate you assume that all products go through these departments 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:**

$$\begin{aligned} \text{Budgeted plant-wide overhead rate:} &= \frac{225,000 \text{ EUR manufacturing overhead}}{4,500 \text{ direct labor hours}} \\ &= \mathbf{50 \text{ EUR}} \text{ per direct labor hour} \end{aligned}$$

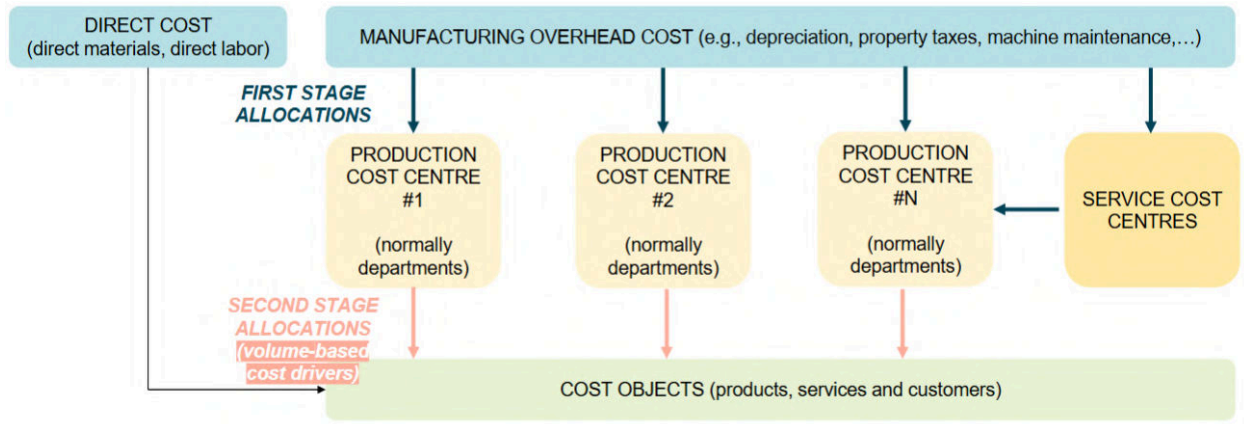
	STANDARD	PREMIUM
Direct materials	2	4
Direct labor costs	1.6	4
Manufacturing overhead	10 (0.2 x 50)	25 (0.5 x 50)
<b>TOTAL COSTS PER UNIT</b>	13.6	33
<b>TOTAL COSTS</b>	136,000	165,000

In this example our chosen cost driver is direct labor hours. However, most likely, premium bars use departmental resources in different ways, in the sense that it requires going through more departments (needs more processing). Thus, we must look at other systems.

## 2-Stage Allocation Process: Traditional

Traditional systems typically use volume-based drivers.

**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.

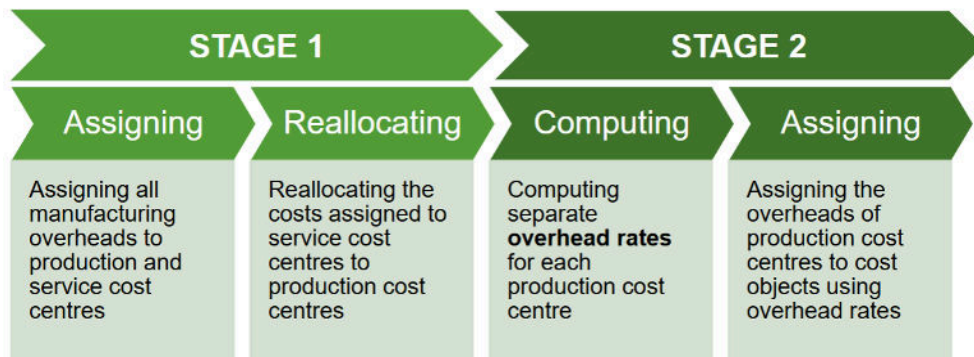


**1st Stage:** assign manufacturing overhead to production cost centers/pools (typically departments).

- Some are first allocated to a service cost center that renders 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**

<b>PRODUCTION</b>	150,000 (10,000 + 280,000 x 0.50)
<b>PACKAGING</b>	50,000 (10,000 + 80,000 x 0.50)
<b>QUALITY</b>	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)
<b>PRODUCTION</b>	150,000	Machine hours X 12,500	12 EUR per machine hour
<b>PACKAGING</b>	50,000	Machine hours Y 15,000	3.33 EUR per machine hour
<b>QUALITY</b>	25,000	Direct labor hours 4,500	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)
<b>COST PER UNIT</b>	14.04	32.11
<b>TOTAL COSTS</b>	140,400	160,550

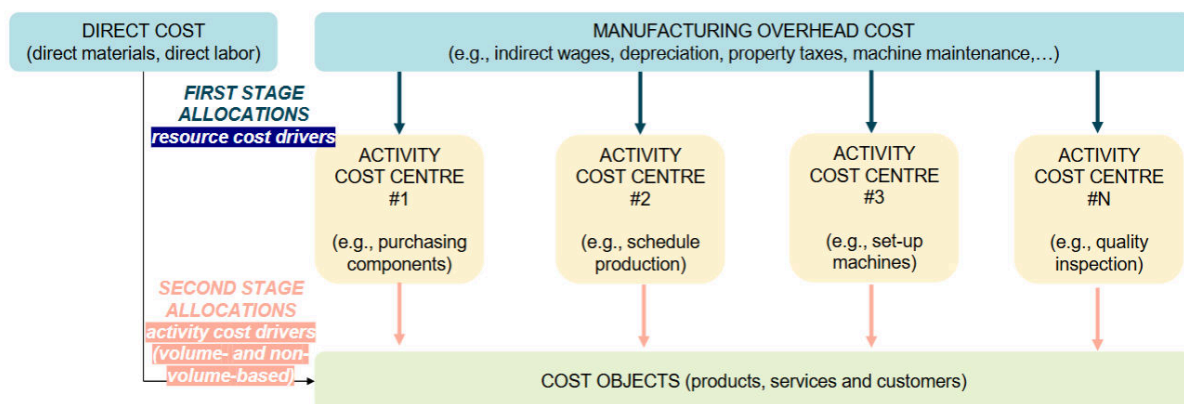
We can see that a premium chocolate bar consumes more overhead in the production and the quality department. This is not observable when using only one overhead to allocate all manufacturing overhead to our cost objects.

## 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 is called activity cost center.

Activities are defined as the aggregation of many different tasks that share the same goal and cause the consumption of resources. Example: purchasing components, scheduling 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 activities can be performed resulting in more activity cost centers than production cost centers under a traditional costing system.

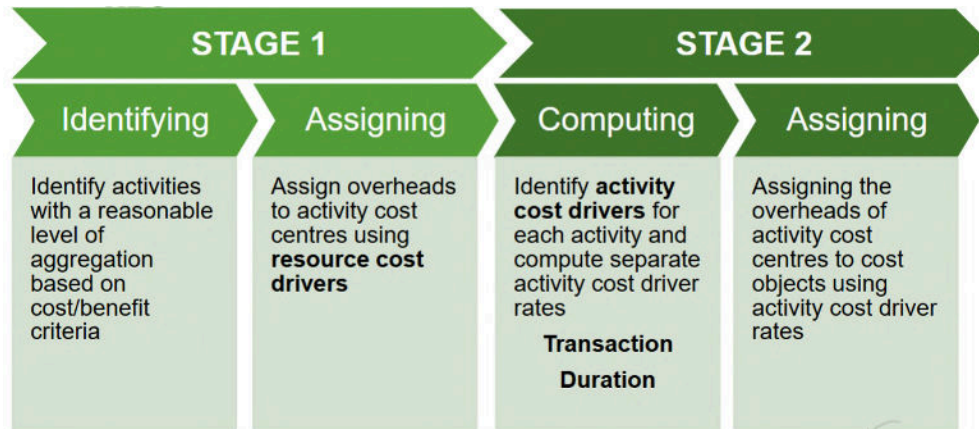


**1st Stage:** identify activities with a reasonable level of aggregation based on cost-benefit criteria and then use **resource cost drivers** to allocate each cost object to the activity cost centers.

- 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 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	

We have identified the different activity cost centers and their respective cost drivers

## 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

Now using the activity cost centre overhead and the total amount of activity cost centre we can get the budgeted activity cost driver rates, to finally get the total cost per unit of a standard and premium chocolate bar



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

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

## Activity hierarchies

ABC recognizes that not all activities happen at the unit level. Costs belong to a hierarchy:

1. **Facility-sustaining activities:** Support the entire organization. DO NOT allocate to products.
  - Example: Facility Cleaning.
2. **Product-sustaining activities:** Support an entire product line, regardless of batches or units.
  - Example: Taste Testing.
3. **Batch-level activities:** Performed each time a batch of goods is produced, regardless of how many units are in the batch.
  - Examples: Purchasing, Machine Set-up, Quality Inspection.
4. **Unit-level (volume-based) activities:** Performed each time a single unit is produced.
  - Examples: Direct Materials, Machine Maintenance, Packaging.



## Over/Under Absorption of Manufacturing Overheads

Overhead rates are estimated at the beginning of the year based on budgeted costs and budgeted activity. At the end of the month/year, the actual costs and activity are known.

- If Allocated Overhead < Actual Overhead = Under-absorption
- If Allocated Overhead > Actual Overhead = Over-absorption

**Note:** This difference is always treated as a period cost (expensed immediately in the P&L).

**Example:**

Yankee Candle produces a unique Christmas candle. The firm uses **direct labor cost to allocate manufacturing overhead**. On November 1, total **budgeted direct labor cost** for November is **6,000 EUR**, the **budgeted manufacturing overhead** is **12,000 EUR**.

On November 30, **actual direct labor costs** and **actual manufacturing overhead** are known. Consider the following two scenarios:

	Actual direct labor cost	Actual manufacturing overhead
SCENARIO 1	5,500 EUR	12,000 EUR
SCENARIO 2	7,500 EUR	14,000 EUR

Determine the under- or over-absorption of manufacturing overhead for each scenario.

- Budget: Direct Labor Cost = €6,000. Manufacturing Overhead = €12,000.
- Budgeted Overhead Rate: €12,000 / €6,000 = 200% of direct labor cost.

At the end of November, actuals are known. We apply the 200% rate to the actual direct labor to find the allocated overhead, and compare it to the actual overhead bills.

	Actual direct labor cost (1)	Allocated Overhead (2) = 200% of (1)	Actual overhead (3)	Amount of under- or over-absorption (4) = (3) - (2)
SCENARIO 1	5,500	11,000	12,000	1,000 under-absorption
SCENARIO 2	7,500	15,000	14,000	1,000 over-absorption

**Scenario 1:**

- Actual Direct Labor = €5,500. Actual Overhead bills = €12,000.
- Allocated Overhead = €5,500 × 200% = €11,000.
- We allocated €11,000, but bills were €12,000.
- Result: €1,000 Under-absorption. (We didn't allocate enough).

**Scenario 2:**

- Actual Direct Labor = €7,500. Actual Overhead bills = €14,000.
- Allocated Overhead = €7,500 × 200% = €15,000.
- We allocated €15,000, but bills were only €14,000.
- Result: €1,000 Over-absorption. (We allocated too much).

## Comparing Cost System Designs (Traditional vs ABC)

Choosing a system involves a cost-benefit trade-off between the accuracy of the cost data and the cost of gathering that information.

### **Traditional Costing System:**

- Indirect costs are a smaller part of total costs.
- Uses volume-based, arbitrary allocations.
- Low information-gathering costs.
- Suited for low product diversity and low competition environments.

### **Activity-Based Costing (ABC) System:**

- Indirect costs are dominant.
- Uses cause-and-effect allocations (both volume and non-volume drivers).
- Highly accurate for managerial decision-making.
- High information-gathering costs.
- Suited for high product diversity and high competition, as it tracks the cost of complexity.

# Intermediate Accounting – IBEB – FA Lecture 3, week 4 – 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

Companies can offer two or more classes of shares to appeal to different investors. Within a specific class, every share is exactly equal. Shares represent a residual corporate interest, meaning shareholders bear the ultimate risks of losses but also receive the ultimate benefits of success. There are no guaranteed dividends or assets upon dissolution

Some companies offer two or more classes of shares (dual shares):

1. **Ordinary Shares (Class A)** - represent 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 in 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, which can be cumulative (unpaid dividends carry over to the next year) or non-cumulative.
  - Often have no voting rights, or alternatively, more voting rights per share.
  - Can sometimes be convertible into ordinary shares or callable by the firm.

**Note:** Within a given class of shares, each share exactly equals every other share. 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

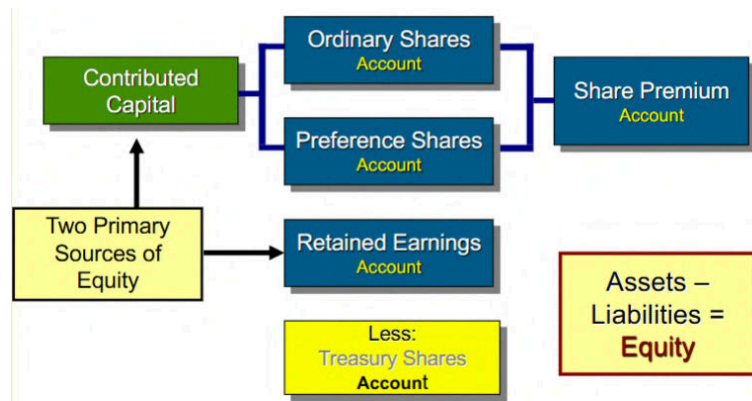
- Ordinary shares account: The par or nominal value of common stock issued.
- Preference shares account: For preferred stock, if issued.
- Share Premium: Any amount paid by shareholders above the nominal value of the shares.

#### 2. Retained Earnings Account

#### 3. Treasury Shares Account:

- This account reflects the shares the company has repurchased
- Treasury shares are held by the company and do not receive dividends or voting rights.

- They are recorded as a negative number in equity, reducing total shareholders' equity.



## Shares issuing

Key steps for a firm to issue shares in an IPO process

1. The applicable governmental agency must authorize the share issuance/IPO
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.
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.

## Par/Non-par value shares

Shares can be issued with a "par value" or "no-par value".

**Par Value Shares** – Company has to maintain 2 separate accounts for both preference and ordinary shares:

- **Share Capital Account** = nominal share capital = par-value of shares = no. of shares x par value
- **Share Premium Account** = the excess over par value

The par value has no relation to the fair value and is usually a very low amount.

## Non-Par Value Shares – Company maintains just one account (share capital)

Journal entries for a EUR 0.01 **par-value** issue of 1,000,000 ordinary shares at EUR 20:

Cash (BS)	20,000,000	
Share capital – ordinary (BS)		10,000
Share premium – ordinary (BS)		19,990,000

**No-par** value share issue:

Cash (BS)	20,000,000	
Share capital – ordinary (BS)		20,000,000

**Costs of Issuing Shares:** Direct costs e.g, underwriting costs, accounting/legal fees, printing costs, taxes, ...

- These costs reduce the total equity raised, so they are debited from the share premium account, instead of being recorded as expenses in the income statement.

## Lump-Sum Sales

**Lump-sum sale:** When two or more classes of securities are issued for a single payment.

### 1. Proportional Method (used when fair values of all securities are known)

- 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**

	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 (used when the fair value of one security is unknown)

- Allocate first to securities with known fair value, then the rest to the class without fair value.

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, NO fair value)

Lump-sum receipt	=	\$30,000
Ordinary (1,000 x \$20)	=	<u>\$20,000</u>
Balance	=	\$10,000

→ Balance is allocated to preference shares

	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 in non-cash transactions are issued in exchange for services or property.

- 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 methods (example: market data/discounted 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 & Treasury shares

**Share buybacks:** once shares have been issued a company can re-acquire them to:

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

**After re-acquiring:**

- Retire the shares
  - o Cancellation
  - o Reduction in the number of issued shares
  - o 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 may be re-issued

**Treasury shares are NOT an asset!**

- Reduction in assets and equity because a company cannot own itself
- No voting rights
- 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:** we account for the cost of buying back the shares, reporting "Treasury shares" account as a deduction from equity on the balance sheet

**Example:** Pacific has 100,000 shares, \$1 par value, issued at \$10 per share; retained earnings of \$300,00

Equity	
Share capital—ordinary, \$1 par, 100,000 shares issued and outstanding	\$ 100,000
Share premium—ordinary	900,000
Retained earnings	300,000
<b>Total equity</b>	<b><u>\$1,300,000</u></b>

Jan. 20, 2019, Pacific acquires 10,000 of its shares at \$11 per share:

Treasury shares (BS)	110,000
Cash (BS)	110,000

Result: total assets and equity go down

Equity	
Share capital—ordinary, \$1 par value, 100,000 shares issued and 90,000 outstanding	\$ 100,000
Share premium—ordinary	900,000
Retained earnings	300,000
Less: Cost of treasury shares (10,000 shares)	110,000
<b>Total equity</b>	<b><u>\$1,190,000</u></b>

## 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

<b>At cost:</b>	Cash (BS)	X	
		Treasury shares (BS)	X
<b>Above cost (X+Y):</b>	Cash (BS)	X+Y	
		Treasury shares (BS)	X
		Share Premium - Treasury (BS)	Y
<b>Below cost (X-Y):</b>	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".]

**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

\* The missing \$3,000 must be debited to "Share Premium - Treasury" (if there is a sufficient balance from previous sales). If that account is empty, the loss is debited to Retained Earnings.

## Types of Dividends

Companies share their profits with the shareholders through dividends. Only few companies pay dividends in amounts = legally available retained earnings, because they need to:

- 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 dividends. 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.

\$X 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

**Note:** a firm can issue preference shares together/instead of ordinary shares. Companies usually issue preference shares with a par value (dividend preference as a percentage of the par value), e.g. 8% of \$100 par value preference shares

## 2. Property Dividends

Distributing assets (like investments) instead of cash.

**Example:** Firm A declares a property dividend and transfers equity 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:** restate at fair value, then entry to record dividend

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

## Payment Date

	Debit	Credit
Property Dividends Payable	2,000,000	
Equity Investments		2,000,000

## 3. Liquidating Dividends:

These are a return of capital, not a distribution of profits. They reduce the Share Premium or Share Capital accounts rather than Retained Earnings.

- **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:

Distributing additional shares proportionally to existing shareholders.

This does NOT change the total book value of equity; it simply shifts amounts from Retained Earnings to Share Capital.

- 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)

**Example:** A firm has 100,000 shares outstanding (5 EUR par, 8 EUR fair value) and declares a 10% share dividend.

- 10% of 100,000 = 10,000 new shares. Using the par-value method, the total amount transferred is 10,000 shares \* 5 EUR par value = 50,000 EUR.

### 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

**Note:** At 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 uses the funds for its growth strategy. In this situation, the share price reflects 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 the increased number of shares and the change in the par value per share

## Share Split vs Share Dividends

A share split:

- Increases number of shares outstanding
- Decreases par value per share

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.

	Declaration	Payment	Declaration and Payment	
Effect on:	Cash Dividends	Cash Dividends	Share Dividends	Share Splits
Retained earnings	Decrease	-	Decrease	-
Share capital	-	-	Increase	-
Share premium	-	-	-	-
Total equity	Decrease	-	-	-
Working capital	Decrease	-	-	-
Total assets	-	Decrease	-	-
# shares outstand.	-	-	Increase	Increase
Par-value	-	-	-	Decrease

## 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 = comprehensive income = net income + OCI

# Intermediate accounting – IBEB – FA Lecture 4, week 5 – Dilutive Securities & EPS

## Recap: Introduction to bonds

### 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
  - o Principal at a designed maturity date (face/par/maturity value)
  - o 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
  - o Considers the time value of money
  - o Discount the principal and interest payment
  - o 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 => PV = Face value => 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)

\*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

Previously is the easy scenario where market rate = interest rate, so PV = Face value, however due to timing differences in real world the interest rate might differ from the market rate, making accounting a bit more complicated

- **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**

$$\begin{aligned} & \downarrow & \downarrow \\ & \boxed{\begin{aligned} & \text{€}3,000,000 / (1+0.06)^3 \\ & = \text{€}2,518,857.85 \end{aligned}} & \boxed{\begin{aligned} & (150,000/1.06) + (150,000/1.06^2) + (150,000/1.06^3) \\ & = \text{€}400,951.79 \end{aligned}} \\ & & * 150,000 = 3,000,000 * 0.05 \end{aligned}$$

- **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 ↓

<b>Schedule of bond amortization:</b>				
Effective-interest method to amortize <b>discount</b> (3-year, 5% bonds sold to yield 6%)				
Date	Cash paid	Interest expense	Discount amortized	Carrying amount
<b>1/1/2023</b>			2,919,809.64 x 6%	<b>€ 2,919,809.64</b>
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	<b>€ 3,000,000</b>
	€ 450,000	€ 530,190.36	<b>€ 80,190.36</b>	

- **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

\*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 a 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: 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)
  - o 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 is tax-deductible, lowering taxable income)

### **Accounting Treatment:**

- Convertible bond is treated as **compound instrument** (part debt, part equity). The components must be separated at issuance
- 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**

## 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\*€1000 = **€2 Mio.**
- **Step 2:** **PV liability component** = PV of principal + PV of interest

$$\begin{array}{l} \downarrow \\ \boxed{\begin{array}{l} \text{€2,000,000} / (1+0.09)^4 \\ = \text{€1,416,860} \end{array}} \end{array}$$

$$\begin{array}{l} \downarrow \\ \boxed{\begin{array}{l} 120,000 / 1.09 \\ 120,000 / 1.09^2 \\ 120,000 / 1.09^3 \\ 120,000 / 1.09^4 \\ \hline = \text{€ 388,766} \end{array}} \end{array}$$

$$\rightarrow \text{PV of liability component} = \text{€1,416,860} + = \text{€ 388,766} = \text{€1,805,626}^*$$

\*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 \* €1000 \* 0.99 = **€1,980,000**
    - FV of liability component same
    - FV equity component: €1,980,000 – €1,805,626 = **€174,374**

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.

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

# Convertible Bonds: Settlement

**Settlement** of a convertible bond simply refers to how the bond ends, which happens when the company either pays the investor back in **cash** (repurchasing the bond like a normal loan) or gives the investor **shares** of stock instead of cash (conversion). This final resolution can happen right on schedule at the end of the bond's term, or early if the company or investor decides to act before the maturity date.

- Giving us 4 different scenarios to analyse

## 1. Repurchase at maturity

- Bondholders do NOT have any intent to convert
- The conversion option has NO value to bondholders 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.
  - o It is transferred to Share Premium - Ordinary account (but it can also remain)

Bayer Example (same as lecture 3)

Bonds Payable	2m	
Cash		2m

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

**2. Conversion at maturity:** Bonds are converted into ordinary shares.

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

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

**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 = €1,894,464

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.

#### 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 you should know what information is needed for calculations.

- 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
- 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
- Get **book (carrying) value of liability component** = C
  - From example: C = 1,894,464
- 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)
- 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 types of shares include the option to convert preference into ordinary shares.

- More appealing to risk-averse investors who prefer a more fixed and stable income stream and would like to have the possibility to become 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 firms can repurchase shares at stated price
- Shift within equity from Share Premium/Capital - conversion equity/preference to Share Premium/Capital - ordinary
- Upon 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.

## Issuance:

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

## Conversion: FV of 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

**Call:** No gain/losses

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

**Note:** 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.

## Compensation (Warrants, Options, and Restricted Shares)

### Warrants

#### Warrants:

- Gives the holder the **right (not obligation)** to acquire shares at a certain price within a stated period.
- Similar to convertible securities, except that upon exercise the holder must PAY cash to obtain the shares.
- Used as an "equity kicker" to make riskier bonds more attractive.

#### Warrants Issued with Bonds:

- Accounted for using the "**With-and-Without**" method (same as convertible bonds) to separate equity and liability components. The warrant's value is credited to "Share Premium - Share Warrants".

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

- FV of compound instrument (selling price) = for \$10.2 million
- FV of liability component = \$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 (par value = 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

## Employee stock options (ESO)

Components of compensation include fixed salary, bonus, and long-term incentives (like ESOs).

ESOs are expected to:

- motivate via interest alignment,
- reward long-term performance,
- maximize employee's after-tax benefits.

Use FV of warrants granted to employees as an expense in P&L

**IFRS 2 requires:** Recognize the FV of options granted as compensation expense in the income statement. However, there are 2 issues

### 1. How to determine compensation expense:

- **Intrinsic Value Method:** excess of market price over exercise price at grant date = compensation cost (usually 0 because exercise price is set at or above market price at grant date).
- **Fair Value Method** (REQUIRED by IFRS): FV of share options at grant date based on an acceptable option-pricing model (e.g., Black-Scholes).

### 2. Over what period to allocate:

- Recognize everything immediately at grant date, OR
- **Match it to service period** (REQUIRED by IFRS): unless otherwise specified, service period = vesting period.

**Example:** Grants its CEO options to purchase 1m 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 2 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 compensation expense allocation

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
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**Service conditions:** suppose CEO violates service period and leaves firm after 1 year (all compensation is foregone and the expenses must be reversed)

Share Premium - Share Options (BS)	11m	
Compensation Expense (IS)		11m

**Market conditions:** when exercisability of share options depends on performance conditions (e.g. stock price target).

- If market conditions are violated, no adjustments to compensation expense because they are already reflected in the FV of the option at the grant date.

## Restricted Shares

An alternative to ESO for compensation and they cannot be sold or transferred until vesting happens.

### Advantages:

- Never become completely worthless (ESO is worthless if share price < exercise price after vesting period)
- Less dilution to existing shareholders (fewer shares - restricted shares are usually 0.5 or 0.33 the size of share options)
- Better align incentives (employees receive actual shares and not just the right to buy them)

**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 grant date rather than exercise date

**Example:** 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 (20*1,000)	
Share Capital - ordinary		1,000 (1*1,000)
Share Premium - ordinary		19,000

\*Unearned Compensation: cost of services yet to be performed (contra equity)

**Recognition and expense allocation: end of each 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 (4,000*3)

\*Compensation Expense: reverse expense from first 2 years and dissolve "Unearned Compensation" since it is not needed anymore.

## Earnings per share

**EPS:** net income earned by each ordinary share =  $\frac{\text{Net Income}}{\text{number of ordinary shares}}$

- Computation is tricky due to firm's capital structure

**Basic EPS:** 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.

**Diluted EPS:** Complex capital structure includes dilutive securities that may increase number shares and hence dilute EPS.

# Basic EPS – Simple capital structure

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

## Weighted average:

- Companies issue/purchase shares during the year which affect outstanding amount
- Based on monthly fraction of year (e.g if a company issues shares halfway through the year, those shares only count for 6/12)
- Stock dividends and stock splits increase the number of shares, but they don't actually affect a company's real value => to make EPS comparable over time, we need to offset effects of share dividends/splits.

**Preference Dividends:** Not all NI is available for ordinary shareholders

**Example:** Calculating the weighted-average number of shares outstanding for EPS when stock dividends or stock splits occur.

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

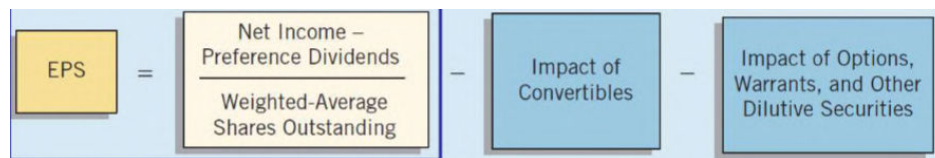
  

Dates Outstanding	(A) Shares Outstanding	(B) Restatement	(C) Fraction of Year	(D) Weighted Shares (A × B × C)
Jan. 1–Mar. 1	100,000	1.50	2/12	25,000 = 100,000 × 1.5 × 2/12
Mar. 1–June 1	120,000	1.50	3/12	45,000 = 120,000 × 1.5 × 3/12
June 1–Nov. 1	180,000		5/12	75,000 = 180,000 × 1.0 × 5/12
Nov. 1–Dec.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

# Diluted EPS – Complex Capital Structure

Companies with complex capital structures must report Diluted EPS in addition to Basic EPS. Diluted EPS shows the **worst-case scenario**: what EPS would be if all convertible securities and options were converted/exercised.

- 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 interested in worst-case scenarios.



Methods to measure dilutive effect of potential conversion:

## If-converted method:

- For convertible bond
- For (cumulative) convertible preference shares

## Treasury-share method:

- For options and warrants

## If-converted method

### For convertible bonds

Assumptions

- Conversion at beginning of period if bonds issued in *previous* period, and at the time of issuance if bonds issued *during* the period => **affect denominator**
- Elimination of bond-related interest, **net of tax** (assume conversion of bond so stops paying interest expense) => **affect numerator** as it would increase NI
- **Numerator adjustment:** + Interest expense saved \* (1 - Tax rate).
- **Denominator adjustment:** + New shares from conversion (weighted for fraction of year if issued mid-year).

**Example:** Compute basic & diluted EPS

NI = \$210,000, WA ordinary shares outstanding = 100,000

Tax rate = 40%, 2 convertible bonds outstanding:

- 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 = £62,000)
- 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 = £80,000)

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

**Diluted EPS:** Start with Basic EPS and adjust per instrument

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

6% Bond Issue		7% Bond Issue		
£210,000	+ (£37,200 = £62,000 × (1-0.40**))	+ (£36,000 = £80,000 × (1-0.40**) × 9/12*)	=	£283,200
100,000	+ 20,000	+ 24,000 (= 32,000 × 9/12)*	=	144,000
<b>Basic EPS</b> = £2.10	Effect on EPS = £1.86	Effect on EPS = £1.50		<b>Diluted EPS</b> = £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 interests expense anymore → higher taxable NI → higher tax expenses → lower NI

## For convertible preference shares

Assumptions

- Conversion at beginning of period if bonds issued in *previous* period, and at the time of issuance if bonds issued *during* the period => **affect denominator**
- **Add back preference dividends, no tax effect** (preference dividends are not tax deductible) => **affect numerator**
- **Numerator adjustment:** + Preference dividends that were subtracted in Basic EPS.
- **Denominator adjustment:** + New shares from conversion.

**Example:** Compute basic & diluted EPS!

- NI = \$240,000, WA 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 convertible preference share is convertible into 5 ordinary shares => New shares after conversion = \$1,000,000/\$100 = 10,000

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

\* 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 new 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

**Antidilutive!**

\* 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.

### Important!!

- Not possible that Basic EPS < Diluted EPS!!
- Convertible debt is antidilutive if effect on EPS > basic EPS
- Should exclude securities that are antidilutive

In the example, the component is antidilutive because the effect on EPS (\$2) > Basic EPS (\$1.8) => The component is excluded and diluted EPS = basic EPS = \$1.8

## Treasury share method for options and warrants

### Assumptions

- Options/warrants exercised at beginning of period (or at issuance date if issued during the year).
- Proceeds from exercise are used to buy back (repurchase) ordinary shares at the current market price (treasury shares).

**Only the denominator is affected (no numerator adjustment).**

- Shares issued upon exercise - Treasury shares bought back = Net increase in denominator.
- Treasury shares = Proceeds / Market price

Adjust for options/warrants only if **Exercise price < FV of share**

- **Exercise price > FV:** instrument is antidilutive (you can buy back more than you have to issue => ↓ shares outstanding hence ↑ EPS)
- **Exercise price = fair value:** no net effect on shares outstanding & EPS

**Example:** Compute basic & diluted EPS

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

In the example, the component is antidilutive since exercise price (\$20) < FV (\$28), and since the denominator is negative (shares issued < shares repurchased)

**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

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

**Diluted EPS: Assume exercise price of \$30 (instead of \$20)**

$\frac{\$220,000}{100,000}$	+	$\frac{0}{-357 (= 5,000 - 5,357)}$	=	$\frac{\$220,000}{100,000}$
<b>Basic EPS = \$2.20</b>		<b>Antidilutive!</b>		<b>Diluted EPS = \$2.20</b>

\* Number of ordinary shares issued upon exercise of options

\*\* Treasury shares: \$100,000 / \$28 = 3,571 (proceeds from exercise = \$20 \* 5,000 shares = \$100,000)

# 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 requires to disclose:**

1. Amounts used as numerator in calculating basic and diluted EPS, and reconciliation of those amounts to net income or loss
2. WA ordinary shares used as denominator, and reconciliation of these denominators to each other
3. Instruments that could dilute basic EPS in future but were not included in calculation of diluted EPS because they are antidilutive for the period presented
4. Description of ordinary share transactions that occur after the reporting period that would have significantly changed the number of ordinary shares at the end of the period.

# Intermediate accounting – IBEB – – FA Lecture 5, week 6 – Tax

## Income Taxes

### Book vs Tax Reporting

Firms must file tax returns following the rules of the tax authority. As a result they end up computing two different profit figures

- **Pretax financial income** ("book income", "income before taxes"): computed under IFRS / US-GAAP. This drives **income tax expense** on the income statement.
- **Taxable income**: computed under the tax code. This drives **income taxes payable**.

Because the two systems have different definitions of profit, the tax **expense** you report will usually differ from the tax **payable** you owe:

- For financial reporting (book) purposes, companies use **accrual accounting** (e.g., following IFRS)
- For tax purposes, the reporting is more like (modified) **cash accounting**



### Example

Company A buys PPE for 100, 10-year life, no residual value.

- Book: **straight-line depreciation** ->  $100/10 = 10$  per year, every year.

- Tax: **accelerated (declining balance) depreciation** at 20% of the remaining book value each year.
- Tax rate = 30%.

First financial report follows book balance using straight line depreciation to compute tax expense, while the second financial report follows accelerated depreciation to compute taxes payable.

- In early years, taxes payable (24) are **lower** than tax expense (27). The firm defers tax: it pays the authority less now.
- This **reverses** in later years (Year 6: payable 28.03 > expense 27)

	Year 1	Year 6
Income before depreciation and tax	100	100
Linear depreciation expense	10	10
<b>Income before tax</b>	<b>90</b>	<b>90</b>
<b>Tax expense (30%)</b>	<b>27</b>	<b>27</b>
<b>≠</b> Net Income	<b>63</b>	<b>63</b>
Income before depreciation	100	100
20% acc. depreciation expense	20	6.55
<b>Taxable income</b>	<b>80</b>	<b>93.45</b>
<b>Taxes payable (30%)</b>	<b>24</b>	<b>28.03</b>
Net Income	56	65.42

### Temporary Difference:

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

- Current year: book income is **not equal** to tax income
- Future years: the difference reverses

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

- **Deferred tax Liability (DTL):**
  - o Current year: Book income > tax income
  - o Reversal -> future taxable amounts -> increase in DTL
  - o Intuition: you are paying less tax now than your book income implies, so you owe it later -> a liability
- **Deferred tax assets (DTA):**
  - o Current year: Book income < tax income

- Reversal -> future deductible amounts -> increase in DTA
- Intuition: you are paying more tax now than your book income implies, so you get relief later -> an asset.

### **Permanent Difference:**

The difference between the 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 ( $\Delta DTL$ )
  - 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

### **Example**

Chelsea, Inc. reported **US-GAAP-based revenues** and **expenses** as follows:

US-GAAP Reporting	2019	2020	2021	Total
Revenues	\$130,000*	\$130,000	\$130,000	\$390,000
Expenses	60,000	60,000	60,000	180,000

For **tax purposes**, revenues and expenses as follows:

Tax Reporting	2019	2020	2021	Total
Revenues	\$100,000*	\$150,000	\$140,000	\$390,000
Expenses	60,000	60,000	60,000	180,000

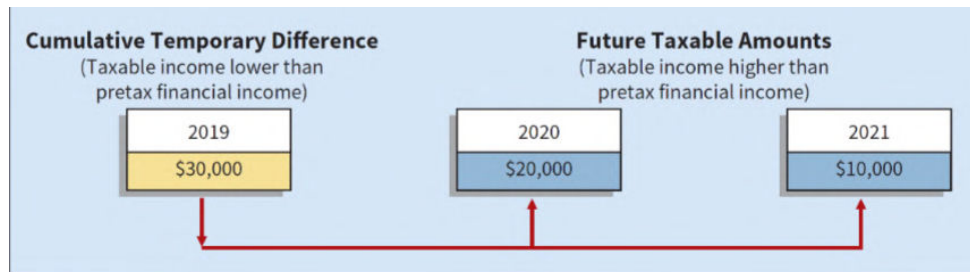
**Note:** In 2019, GAAP revenue (130,000) exceeds tax revenue (100,000) by 30,000. This 30,000 is an account receivable: revenue earned and recognised for book purposes in 2019, but not yet taxed because the cash is collected later - 20,000 in 2020 and 10,000 in 2021. statutory tax rate = 40%.

**Step 1:** explain the temporary difference & future taxable amounts

Per the balance sheet at 31/12/2019:

- Per Books: Accounts receivable = 30,000
- Per Tax Return: Accounts receivable = 0

Financial revenue 130,000 > tax revenue 100,000 -> financial income > taxable income (the DTL case). **Reversal:** Chelsea will collect 20,000 of the AR in 2020 and 10,000 in 2021, so those amounts become taxable in the future, 20,000 in 2020 and 10,000 in 2021.



**Step 2:** Estimate the deferred tax liability at the end of 2019

The DTL is the deferred tax consequence of the AR-related revenue already booked in the 2019 financial statements

- DTL = cumulative temporary difference at year-end x tax rate.
- DTL (end 2019) = (20,000 x 40%) + (10,000 x 40%) = 8,000 + 4,000 = 12,000.

You can also compute DTL by preparing a schedule that indicates future taxable amounts due to existing temp. differences

	Future Years		
	2020	2021	Total
Future taxable amounts	\$20,000	\$10,000	\$30,000
Tax rate	x 40%	x 40%	
<b>Deferred tax liability at the end of 2019</b>	<b>\$ 8,000</b>	<b>\$ 4,000</b>	<b>\$12,000</b>

**Step 3:** Estimate the total income tax expense for 2019

Total **income tax expense** for 2019:

**Income tax expense =**

1. Current tax expense (amount of income taxes payable for period) +
2. Deferred tax expense (annual increase in **deferred tax liability**)  
 (– Deferred tax expense (annual decrease in **deferred tax liability**))

- **Current tax expense** = taxable income in 2019 (\$100,000 - \$60,000 = \$40,000) \* tax rate in 2019 (40%) = \$16,000
- **Deferred tax expense** = Change in DTL = \$12,000 - \$0\*

Deferred tax liability at end of 2019	\$12,000
Deferred tax liability at beginning of 2019	–0–
	<hr/>
Deferred tax expense for 2019	12,000
Current tax expense for 2019 (income taxes payable)	16,000
	<hr/>
<b>Income tax expense (total) for 2019</b>	<b>\$28,000</b>

**Note:** Because it is the first year of operations for Chelsea, there is no deferred tax liability at the beginning of the year.

**Step 4:** Provide the journal entries for 2019–2021 to record income taxes

Chelsea makes the following **journal entry** at the end of the **current** year **2019** to record income taxes:

Income Tax Expense (IS)	\$28,000	
Income Tax Payable (BS)		\$16,000
Deferred Tax Liability (BS)		\$12,000
<div style="display: flex; align-items: center;"> <div style="border-left: 1px solid black; border-bottom: 1px solid black; width: 15px; height: 15px; margin-right: 5px;"></div> <div style="margin-right: 5px;">→</div> <div style="margin-right: 5px;">Deferred Tax Liability: Taxes payable in future years</div> </div>		
<div style="display: flex; align-items: center;"> <div style="border-left: 1px solid black; border-bottom: 1px solid black; width: 15px; height: 15px; margin-right: 5px;"></div> <div style="margin-right: 5px;">→</div> <div style="margin-right: 5px;">Income Tax Payable: Current tax expense</div> </div>		

Chelsea makes the following **journal entry** at the end of the year **2020** to record income taxes:

Income Tax Expense (IS)	\$28,000	
Deferred Tax Liability (BS)	\$8,000	
Income Tax Payable (BS)		\$36,000

Chelsea makes the following **journal entry** at the end of the year **2021** to record income taxes:

Income Tax Expense (IS)	\$28,000	
Deferred Tax Liability (BS)	\$4,000	
Income Tax Payable (BS)		\$32,000

DTL account after reversal (at the end of 2021):

Deferred Tax Liability			
2020	8,000	2019	12,000
2021	4,000		

## 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 assets the taxable income outweighs the financial income and thus the income tax payable exceeds income tax expense.

Think about this in 4 steps:

- Temporary book-tax differences in current year:
  - financial income < taxable income**
  - The **reversal** of temporary differences will lead to future deductible amounts (decrease in taxable income in future years) and to lower future taxes payable
- Deferred tax asset** accounts for the decrease in future taxes payable
- Income **tax expense** is based on current tax expense and deferred tax expense ( $\Delta DTA$ ) = current tax expense - deferred tax benefit (if there is an increase in DTA, otherwise add)
- Finally, **journal entries** to record income tax in current year and in future years

Hunt, Co. reported **US-GAAP-based revenues and expenses** as follows:

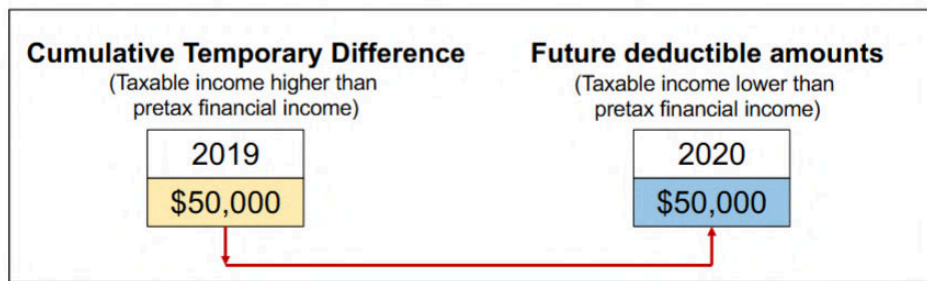
<b>US-GAAP Reporting</b>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>Total</u>
Revenues	\$900,000	\$900,000	\$900,000	\$2,700,000
Expenses	<u>450,000*</u>	<u>400,000</u>	<u>400,000</u>	<u>1,250,000</u>

For **tax purposes, revenues and expenses** as follows:

<b>Tax Reporting</b>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>Total</u>
Revenues	\$900,000	\$900,000	\$900,000	\$ 2,700,000
Expenses	<u>400,000*</u>	<u>450,000</u>	<u>400,000</u>	<u>1,250,000</u>

\*The difference between US-GAAP expenses and tax expenses in 2019 (\$50,000) relates to **litigation expenses** because of a pending litigation. Hence, Hunt, Co. accrued a loss and the related liability of \$50,000 in 2019 for financial (book) purposes. However, Hunt, Co. cannot deduct this amount for tax purposes until the period it pays the liability, expected in 2020. The statutory tax rate is 40%.

**Step 1:** Explain the temporary difference and the future taxable amounts.



**Step 2:** Estimate the deferred tax asset at the end of 2019.

	<b>Future Years</b>		
	<u>2020</u>	<u>2021</u>	<u>Total</u>
Future deductible amounts	\$50,000	\$0	\$50,000
Tax rate	<u>*40%</u>	<u>*40%</u>	
<b>Deferred tax asset at the end of 2019</b>	<b><u>\$20,000</u></b>	<b><u>\$0</u></b>	<b><u>\$20,000</u></b>

**Step 3:** Estimate the total income tax expense for 2019

Total **income tax expense** for 2019:

**Income tax expense =**

1. Current tax expense (amount of income taxes payable for period) -
2. Deferred tax benefit (annual increase in **deferred tax asset**)  
(+ *Deferred tax expense (annual decrease in deferred tax asset)*)

- **Current tax expense** = taxable income in 2019 (\$500,000) \* tax rate in 2019 (40%) = \$200,000
- **Deferred tax benefit** = Change in DTA = \$20,000 - \$0\*

Deferred tax asset at end of 2019	\$ 20,000
Deferred tax asset at beginning of 2019	-0-
Deferred tax expense (benefit) for 2019	(20,000)
Current tax expense for 2019 (income taxes payable)	200,000
<b>Income tax expense (total) for 2019</b>	<b><u>180,000</u></b>

**Note:** Because it is the first year of operations for Hunt, there is no deferred tax asset at the beginning of the year.

**Step 4:** Provide the journal entries for 2019–2021 to record income taxes.

Hunt makes the following **journal entry** at the end of the **current year 2019** to record income taxes:

Income Tax Expense (IS)	\$180,000
Deferred Tax Asset (BS)	\$20,000
Income Tax Payable (BS)	\$200,000

→ Income Tax Payable: **Current tax expense**  
 → Deferred Tax Asset: **Taxes deductible in future years**

HUNT COMPANY INCOME STATEMENT FOR THE YEAR ENDING DECEMBER 31, 2019		
Revenues	\$900,000	
Expenses (operating)	400,000	
Litigation loss	50,000	
Income before income taxes	450,000	
Income tax expense		
Current	\$200,000	
Deferred	20,000	180,000
Net income		<u>\$270,000</u>

Assume again that litigation expense of \$50,000 is fully paid in 2020. Income tax (total) expense in 2020 is as follows:

Deferred tax asset at the end of 2020	\$ -0-	
Deferred tax asset at the beginning of 2020	20,000	Deferred tax expense: Decrease in DTA of 20,000
Deferred tax expense (benefit) for 2020	20,000	
Current tax expense for 2020 (income taxes payable)	180,000	Current tax expense: taxable income (450,000) * tax rate (40%) = 180,000
<b>Income tax expense (total) for 2020</b>	<b>\$200,000</b>	

**Income tax expense** = Current tax expense + **annual decrease in deferred tax asset**

Hunt makes the following **journal entry** at the end of the year **2020** to record income taxes:

Income Tax Expense (IS)	\$200,000	
Deferred Tax Asset (BS)		\$20,000
Income Tax Payable (BS)		\$180,000

## 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

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:



**Example:** DTL and change in tax rate

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 all years. 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%	30%	30%	30%
Income tax payable	102,000	162,000	166,500	169,500
Income tax expense	150,000	150,000	150,000	150,000
Increase DTL	48,000	(12,000)	(16,500)	(19,500)

**Note:** The term “cause taxable amounts” refers to deferred tax liability! This means that taxable income is lower (higher) this year (in future years) than financial income

**1a) Temporary difference (2019) = - (40,000 + 55,000 + 65,000) = -160,000**

Temp. diff. (2020) = 40,000; Temp. diff. (2021) = 55,000; Temp. diff. (2021) = 65,000

**1b) Taxable income (2019) = 500,000 – 160,000 = 340,000**

**1c) Income tax payable (2019) = 340,000 \* 30% = 102,000**

**1d) Income tax expense (2019) = Income tax payable (2019) + Increase in DTL (2019)**

**1e) Deferred tax liability (2019) = (40,000\*30%) + (55,000\*30%) + (65,000\*30%) = 48,000**

	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%	30%	30%	30%
Income tax payable	102,000	162,000	166,500	169,500
Income tax expense	150,000	150,000	150,000	150,000
Increase DTL	48,000	(12,000)	(16,500)	(19,500)

**Recall income tax expense at the end of 2019:**

$$\begin{aligned}
 \text{Income tax expense} &= \text{income tax payable} + \text{increase in deferred tax liability} \\
 150,000 &= 102,000 + 48,000 \\
 &\quad \text{Income tax payable} = \quad \quad \quad \text{Deferred tax liability} = \\
 &\quad \quad \quad 30\% * 340,000 \quad \quad \quad 30\% * 40,000 + \\
 &\quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 30\% * 55,000 + \\
 &\quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 30\% * 65,000
 \end{aligned}$$

**Journal entry end of 2019:**

Income tax expense (IS) \$150,000  
 Income tax payable (BS) \$102,000  
 Deferred tax liability (BS) \$48,000

**Journal entry end of 2020:**

Income tax expense (IS) \$150,000  
 Deferred tax liability (BS) \$12,000  
 Income tax payable (BS) \$162,000

**Now change the rate**

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.

**Note:**  
 If it is virtually certain that tax rates for future years ("substantially enacted") will be different, you need to use those tax rates to calculate deferred taxes.

- Income tax payable (2019) = 340,000 \* 30% = 102,000 (as before!)
- Deferred tax liability (2019) = (40,000\*40%) + (55,000\*40%) + (65,000\*40%) = 64,000
- Deferred tax liability (2020) = 40,000\*40% = 16,000
- Deferred tax liability (2021) = 55,000\*40% = 22,000
- Deferred tax liability (2022) = 65,000\*40% = 26,000
- Income tax expense (2019) = Income tax payable + increase in DTL = 166,000!

	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
<b>Increase DTL</b>	<b>64,000</b>	<b>(16,000)</b>	<b>(22,000)</b>	<b>(26,000)</b>

#### 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

## Permanent Differences

Permanent differences arise from items that:

- enter **book** (pretax financial) income **but never taxable income**, or
- enter **taxable income but never book income**.

Because they affect only the period, they occur in, they **do not** create future taxable or deductible amounts. Therefore: NO deferred tax consequences (no DTA, no DTL). They affect only the current income tax PAYABLE.

Recognized for BOOK but NOT for tax:

1. Interest received on certain government obligations (tax-exempt).
2. Expenses incurred in obtaining tax-exempt income.
3. Fines and expenses from violating the law.
4. Charitable donations expensed for book but sometimes not tax-deductible.

Recognized for TAX but NOT for book:

1. "Percentage depletion" of natural resources in excess of their cost.
2. The deduction for dividends received from other corporations (sometimes treated as tax-exempt)

### Example

Pretax financial income = 80,000 for 2019. Three items make taxable income differ from book income:

1. Tax-return depreciation exceeds income-statement depreciation by 16,000.
2. Rent collected on the tax return exceeds rent earned on the income statement by 27,000 (prepaid rent: taxed when received, earned later).
3. Fines for pollution of 11,000 appear as an expense on the income statement.

Tax rate = 30%. Taxable income expected in all future years. No opening deferred taxes.

**Q1.** What are the tax accounting consequences of the three items?

Accelerated tax depreciation vs straight-line book depreciation: 16,000 MORE depreciation for tax now.

- Taxable income **reduced** by 16,000 now.
- Will reverse and create future taxable income -> **DEFERRED TAX LIABILITY.**

Rent collected (prepaid) is 27,000 more on tax return than earned in books:

- Taxable income **increased** by 27,000 now (taxed on cash received).
- Will reverse into future deductible amounts -> **DEFERRED TAX ASSET.**

Pollution fines of 11,000 reduce book income but are NOT tax-deductible:

- Taxable income **increased** by 11,000 now (add the fine back).
- Will **never** reverse -> **PERMANENT DIFFERENCE** (no deferred tax).

**Q2.** What are the taxable income and the total income tax expense?

**Taxable income** = 80,000 - 16,000 + 27,000 + 11,000 = 102,000.

- subtract 16,000 (extra tax depreciation lowers tax income), add 27,000 (rent taxed early raises tax income); add 11,000 (non-deductible fine raises tax income).

**Difference between book and taxable income** = 80,000 - 102,000 = -22,000.

- 22,000 = 11,000 (permanent) + 27,000 (DTA) - 16,000 (DTL)

**Deferred accounts:**

- Deferred tax LIABILITY = 16,000 x 30% = 4,800.
- Deferred tax ASSET = 27,000 x 30% = 8,100.

**Note:** No deferred tax account for the 11,000 permanent fine.

- **Taxes payable** (use CURRENT rate): 102,000 x 30% = 30,600.
- Total tax expense = taxes payable + DTL increase - DTA increase = 30,600 + 4,800 - 8,100 = 27,300.

**Q3.** What is the corresponding journal entry for 2019?

	Current Yr. 2019	Deferred Asset	Deferred Liability
Financial income (GAAP)	€ 80,000		
Excess tax depreciation	(16,000)		€ 16,000
Excess rent collected	27,000	(€ 27,000)	
Fines (permanent)	11,000		
Taxable income (IRS)	102,000	(27,000)	16,000
Tax rate	30%	30%	30%
Income tax payable	€ 30,600	(€ 8,100)	€ 4,800

Income tax expense	27,300
Deferred tax asset	8,100
Deferred tax liability	4,800
Income tax payable	30,600

### Spotting permanent differences via the effective tax rate

- Permanent differences are NOT shown as a separate line in the journal entry.
- But you can detect them by comparing the STATUTORY rate (30%) with the effective rate (total tax expense / pretax book income).
- Effective tax rate =  $27,300 / 80,000 = 34.13\%$ , which is HIGHER than 30%.
- WHY higher? The 11,000 fine is taxed but never reduces book income, so it adds  $11,000 \times 30\% = 3,300$  of "extra" tax that book income alone does not explain:  $80,000 \times 30\% = 24,000$ , plus 3,300 = 27,300. Equivalently,  $27,300 = 30\% \times (80,000 + 11,000) = 30\% \times 91,000$ .
- If future tax rates are unchanged yet the effective rate differs from the statutory rate, the gap is caused by permanent differences.

## Accounting for Losses

What happens to tax expense / taxes payable when a firm makes a LOSS?

- A NET OPERATING LOSS (NOL) occurs for tax purposes when tax-deductible EXPENSES exceed taxable REVENUES in a year.
- Tax law lets firms use a loss in one year to offset profits in other years ("income-averaging"). Without this, it would be unfair to tax firms heavily in good years and give no relief in bad years.
- Two mechanisms:
  - o CARRYBACK of the NOL (offset PAST profits -> cash refund)
  - o CARRYFORWARD of the NOL (offset FUTURE profits -> future tax saving)

### Loss Carrybacks

Carry the NOL back (commonly 2 years) and receive refunds of taxes paid in those past years.

- Must apply the loss to the earliest permitted year first (then move forward).
- They are NOT permitted in all countries.

### Example

Intuition: only 2 years back, so 2018's loss is applied to 2016 first then 2017 (earliest-first within the window).

- It wipes out 100,000 of 2016 profit (refund 100,000 x 30% = 30,000) and 200,000 of 2017 profit (refund 200,000 x 40% = 80,000).
- 2015 is OUTSIDE the 2-year window, so its 50,000 stays taxed.
- Total refund = 30,000 + 80,000 = 110,000.

Of the 500,000 loss, 300,000 is "used up" by the carryback, leaving 200,000 still unused

**Groh Inc.** has no temporary or permanent differences. Groh experiences the following.

Year	Taxable Income of Loss	Tax Rate	Tax Paid
2015	\$ 50,000	35%	\$ 17,500
2016	100,000	30%	30,000
2017	200,000	40%	80,000
2018	(500,000)		0

#### Net operating loss (NOL) schedule:

NOL schedule	2015	2016	2017	2018
Taxable income	\$ 50,000	\$ 100,000	\$ 200,000	\$ (500,000)
Carryback		(100,000)	(200,000)	300,000
Taxable income	50,000	-	-	(200,000)
Rate	35%	30%	40%	0%
Income tax (revised)	\$ 17,500	\$ -	\$ -	\$ -
Refund		\$ 30,000	\$ 80,000	

#### Journal Entry for 2018:

Income Tax Refund Receivable (BS)	110,000	
Income Tax Expense (Loss Carryback) (IS)		110,000

#### Profit & Loss effect in 2018:

GROH INC.	
INCOME STATEMENT (PARTIAL) FOR 2018	
Operating loss before income taxes	\$(500,000)
Income tax benefit	
Income tax expense (LCB)	110,000
Net loss	<u>\$(390,000)</u>

Without the carryback the loss would be 500,000; the 110,000 refund benefit shrinks the reported net loss to 390,000.

- Income Tax Expense (LCB) is a **contra-expense account** reflecting an income tax benefit.

## 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)

### Example 1

After the carryback used 300,000, the remaining 200,000 NOL is carried forward

### Back to our earlier example (NOL schedule):

NOL schedule	2015	2016	2017	2018
Taxable income	\$ 50,000	\$ 100,000	\$ 200,000	\$ (500,000)
Carryback		(100,000)	(200,000)	300,000
Taxable income	50,000	-	-	(200,000)
Rate	35%	30%	40%	40%
Income tax (revised)	\$ 17,500	\$ -	\$ -	\$ (80,000)





The 200,000 carryforward offsets 250,000 of 2019 profit, leaving only 50,000 actually taxable. Tax actually payable = 50,000 x 40% = 20,000. The 80,000 DTA recorded in 2018 is now used up

### Profit & Loss effect for 2019:

GROH INC.			
INCOME STATEMENT (PARTIAL) FOR 2019			
Income before income taxes			\$250,000
Income tax expense			
Current (=income tax payable)	\$20,000		
Deferred (=decrease in DTA)	80,000	100,000	
Net income			<u>\$150,000</u>

Total expense 100,000 = 250,000 x 40% (the "normal" full tax on book income).

- The 2019 statement does NOT separately re-show the carryback/carryforward effects, because Groh already reported both in 2018. (No double counting.)

## Non-Recognition and Write Downs

Company needs to assume to become profitable in the future in order to recognize the **loss carryforward**

- However, if it is "probable" the carryforward will NOT be realized, the firm may NOT recognize the DTA in the current period.
- If a DTA was already recognized and it later becomes probable it won't be realized, the firm must write down the DTA.
- Controversial: high uncertainty; "probable" is very subjective; it gives management room to "manage"/manipulate reported numbers (earnings management).

### Example 1

2018 assumption: it is **more likely than not** that groh will **not** realise the entire NOL carryforward in future years. Treatment in 2018:

- Groh does NOT recognise a DTA for the carryforward (probable non-realisation).
- Hence NO journal entry for the carryforward (the 80,000 entry is removed).

- Net loss in 2018 becomes 390,000 instead of 310,000 (the income statement loses the 80,000 LCF benefit; only the 110,000 carryback benefit remains). On the income statement, the "Income tax expense (LCF) 80,000" line is struck out, total benefit drops from 190,000 to 110,000, and net loss rises from (310,000) back to (390,000)

GROH INC.			
INCOME STATEMENT (PARTIAL) FOR 2018			
Operating loss before income taxes			\$(500,000)
Income tax benefit			
Income tax expense (LCB)	\$110,000		
<del>Income tax expense (LCF)</del>	<del>80,000</del>	<del>190,000</del>	
Net loss			<u><u>\$(310,000)</u></u>
			<u><u>\$110,000</u></u>
			<u><u>\$390,000</u></u>

### Example 2

2019 assumption: Groh now actually has 250,000 taxable income (before carryforward), rate 40%. The benefit it did NOT book in 2018 can be recognised NOW that profits have arrived

#### Accounting treatment in 2019:

- Groh realizes the deferred tax asset:

Deferred Tax Asset	80,000	
Income Tax Expense (Loss Carryforward)		80,000

- Groh records total *Income Tax Expense* for 2019:

Income Tax Expense	100,000	
Deferred Tax Asset		80,000
Income Taxes Payable		20,000

- Groh reports *Benefit due to LCF* on 2019 income statement:

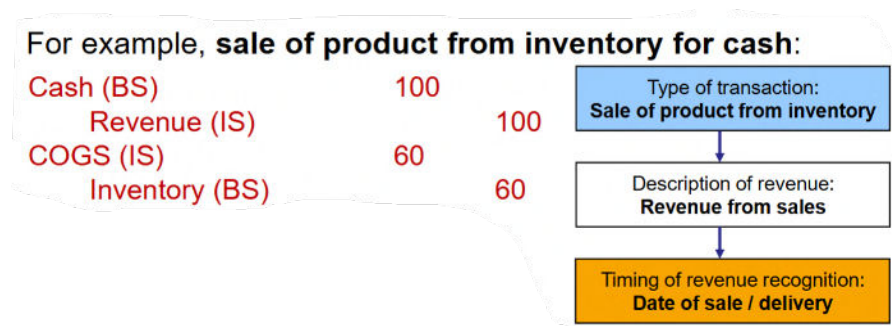
You can also report only one line for *total* income tax expense of \$20,000 on the face of the income statement and disclose the components of income tax expense in the notes.

Groh Inc.: Income Statement (Partial) for 2019			
Income before income taxes			\$250,000
Income tax expense			
Current (=income tax payable)	\$20,000		
Deferred (=decrease in DTA)	80,000	-100,000	
Income tax benefits (income tax expense LCF)			
Deferred (=increase in DTA)	80,000	+80,000	
Net income			\$230,000

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

## IFRS 15: Overview and 5-step process

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



But revenue gets complicated when delivery and payment separate in time or when one contract bundles several promises:

- Gym club subscription (service delivered over time)
- Long-term construction (revenue earned across years)
- Apple selling iPhones (a good) bundled with future software upgrades (a service)

**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 (customer gains control over the asset).

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

## Step 1: Identify the Contract

**A contract is** an agreement between two or more parties that creates enforceable rights/obligations (can be oral, written, or implied by business practice).

5 criterias for a **valid contract**

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)
  - o Contract asset example: Accounts receivable
  - o Contract liability example: Unearned (deferred) sales revenue
- 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**

When a contract is later changed, account for it in one of two ways:

1. **New Contract** if following 2 conditions hold
  - Promised goods/service are distinct

- The price reflects the standalone selling price of the promised goods/services
2. **Prospective Modification:** You change the contract going forward, and apply the new terms only from the date of the change onward. You do not change the revenue already recognized under the old contract terms.

### Example

- ABC contract to sell 100 products for € 10,000 EUR (€ 100 / product)
  - After delivery of 60 products: 20 more for € 1,900 (€ 95 / product)
  - ABC regularly sells the products separately.
1. **New contract:** If separate performance obligation (distinct products, standalone selling price)
- Recognize the 20 new units at €95 as separate performance obligation
  - Total revenue = €100\*100 + €95\*20 = €11,900
  - Revenue recognized prior to (after) modification = €6,000 (€5,900)
2. **Prospective modification:** 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

**Performance obligation** is a 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 (single) PO in one contract - determine whether the company's promise is:

- to transfer **distinct** goods/services -> **multiple** performance obligations, OR
- to transfer a **combined** item for which the distinct goods/services are merely INPUTS -> a **single** performance obligation.

Multiple POs often arise where a product comes with a service that can also be sold separately (the items are distinct and NOT interdependent).

- E.g. a car sold with navigation/diagnostics services also offered separately.

## Step 3: Determine Transaction Price

**Transaction price** is the amount of consideration that a company expects to receive from a customer in exchange for transferring products.

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

**In complex contracts, consider:**

**1. Variable Consideration:** discounts, rebated, credits, bonuses, penalties, or royalties from customers.

Two approaches to adjust transaction price:

- a) **Expected Value:** probability-weighted amount in a range of possible consideration outcomes.
  - o Appropriate for companies with a large number of contracts with similar characteristics and when there's a limited number of discrete outcomes.
- b) **Most Likely Amount:** single most likely amount in a range of possible outcomes.
  - o Appropriate if the contract has only two possible outcomes

**Example:** Revenue for completing a construction project for 1.5 million. Bonus amount depends on when the project is completed. Bonus is 100,000 when completed on the agreed-upon date (chance = 70%), 50,000 two weeks later (20%) and 30,000 four weeks later (10%) => adjust base transaction price of 1.5m.

- **Expected value** =  $70\% * (1,500,000 + 100,000) + 20\% * (1,500,000 + 50,000) + 10\% * (1,500,000 + 30,000) = 1,583,000$
- **Most likely amount** = 1.5 million + 100,000 = 1.6 million => 100,000 is the most likely outcome with 70%.

## 2. Time Value of Money

The company only accounts for the time value of money if:

- The payment occurs later than 1 year
- The contract involves a significant financing component (e.g exchange product for a bond)

To account for the time value of money, the company either

- a) Determines the fair value by measuring the consideration received (e.g bond)
- b) discounts the payment using an imputed interest rate.

2 Revenue Components:

- Sales revenue = fair value of services
- Interest revenue = fair value of bond - 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.

- Finding the **imputed rate x**: Fair value =  $1,416,163 / (1+x)^4 = 900,000$
- $1 + x = (1,416,163 / 900,000)^{(1/4)} = 1.12$ , so  $x = 12\%$ .

How much revenue should SEK record on **July 1, 2019** (exchange date)?

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

How much revenue should SEK record on **December 31, 2019** (note maturity date)?

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

**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

When a company receives goods, services, or other non-cash items instead of cash:

- Recognize the fair value of the **received** consideration as revenue.
- If this can't be estimated, then recognize the fair value of the **sold product**
  - **Approach 1:** Recognize the **fair value of the received consideration** as revenue, e.g., in case of shares\*:



\* Note: Share prices are usually available – company recognizes revenue as the fair value of the shares.

- **Approach 2:** If this can't be estimated, recognize the **fair value of the sold goods/merchandise/performed services**:



**4. Consideration Paid or Payable to Customers:** discounts, volume rebates, coupons, free products => These reduce the consideration received and the revenue to be recognized

**Example:** Volume discount

Samsung offers a 3% discount if sales exceed \$2 million. In Q1 2019, Samsung delivers \$700,000 worth of products to customer A and expects purchases of \$3 million.

How much **revenue** should Samsung recognize for Q1 2019?

$$A/R \quad \quad \quad 0.97(700,000) = 679,000$$

$$\text{Sales revenue} \quad \quad \quad 679,000$$

If customer A ends up purchasing nothing in the remaining 3 quarters, Samsung recognize 21,000 as **“sales discounts forfeited”**

$$\text{Cash} \quad \quad \quad 700,000$$

$$A/R \quad \quad \quad 679,000$$

Sales discount forfeited (IS)

21,000

## Step 4: Allocate Transaction Price

**Definition:** allocate transaction price to various performance obligations based on their relative fair values.

- Use standalone selling prices
- If this is not available, use the best estimate of what the product might sell for as a standalone unit.

### Best estimates

1. **Adjusted market assessment approach:** Evaluate the market in which it sells products and estimate the price that customers in that market are willing to pay, or refer to prices from competitors and adjust them to reflect the company's costs and margins.
2. **Expected cost plus a margin approach:** Forecast expected costs of satisfying a performance obligation and add an appropriate margin.
3. **Residual approach:** Refer to the total transaction price less the sum of observable standalone selling prices of other products in the contract.

**Example:** Erasmus University purchases 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 (worth € 8,000).

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, (can be performed separately) => 3 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

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

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

**Note:** We only recognize revenue when we fulfill a performance obligation. In this case, the training hasn't been done => Record unearned revenue instead of revenue.

## Step 5: Recognize Revenue

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

Collective indicators for when customer obtains product control

- Company has right to payment for the asset
- Company has transferred legal title to the asset
- Company has transferred physical possession of the asset
- Customer has significant risks/rewards of ownership
- Customer has accepted the asset

Not all indicators must be met; management uses judgement on whether, taken together, the factors show the customer has obtained control.

**Disclosure Requirements:** Companies disclose qualitative and quantitative information:

- **Contracts with customers** (disaggregation of revenue; opening/closing balances of contract assets and liabilities; info on performance obligations).
- **Significant judgments** (affecting transaction price, allocation, and timing).
- **Assets recognised from costs to obtain/fulfil a contract** (balances, amortisation amount, and amortisation method).

**Purpose:** help users understand the nature, amount, timing, and uncertainty of revenue and cash flows from contracts with customers.

# Special Issues

## 1. Right of Return (sale returns and allowances)

**Right of return** = the customer may return the product for a (partial) refund, credit, or a replacement.

- only recognize revenue in the amount of consideration that is reasonably assured.
- In practice: recognize the gross amount at the date of sale, then adjust at period end for expected returns.

### Example:

- Jan 2, 2019, 800 copies of Kieso are bought at €65 per book by A
- Studystore agrees to take back any books that A have left over, as they are able to resell these books for the same price next year. There're no costs to recover these books.
- Based on experience, Studystore expects 50 books to be returned. In reality, only 40 books will be 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

**Note:** 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 Returns 400 (40\*10)

COGS 400

## 2. Warranties

**1. Assurance-Type Warranty:** assures that product will meet agreed-upon specifications (quality guarantee)

- Included in sales price, so the product + assurance warranty = 1 single PO
- Record warranty expense when warranty costs are incurred, and record future expected warranty costs as liability at the end of 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 sold 1,000 Rollomatics on Oct 1, 2019 at a total price of \$6m with a warranty guarantee that the product was free of any defects (assurance).
- The cost of Rollomatics sold is \$4m
- The term of the assurance warranty is 2 years, with an estimated cost of \$80,000.

- 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.

**Sale & related service warranty** - Oct 1, 2019

Cash	6,018,000	
Sales Revenue (product + warranty)		6,000,000
Unearned warranty revenue		18,000
COGS	4,000,000	
Inventory		4,000,000

**Warranty costs incurred** - Nov 22, 2019

Warranty Expense	28,000 (3,000 + 25,000)	
Salaries and Wages Payable		3,000
Inventory		25,000

**Adjusting entry for assurance warranty** - Dec 31, 2019

Warranty Expense	44,000	
Warranty Liability		44,000

**Reduce warranty liability** as **actual warranty costs are incurred** in 2020

Warranty liability	x	
Cost accounts		x

**Recognize fulfilled service revenue** over the period that **extends beyond the assurance warranty** (3 years)

Unearned warranty revenue	1,500 (18,000/36*3)	
---------------------------	---------------------	--

Warranty revenue 1,500

**Incurred expense costs** associated with **service warranty**

Warranty Expense x

Cost account x

### 3. Consignment

**A principal-agent relationship:**

- the manufacturer (consignor / principal) ships goods to a dealer (consignee / agent) who sells them on the principal's behalf.
- the manufacturer retains title until the goods are sold.

**Revenue:**

- Consignor (principal): makes the profit on the sale; its po is to provide the goods/services to the end customer.
- Consignee (agent): earns a commission; its po is to arrange for the principal to provide the goods/services.

Note

- **Freight costs increase book value of the consignments** for the **consignor**
- **Sales result in a liability** for the **consignee**.
- **Inventory (consignments) is not an asset** for the **consignee**

**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)

## 4. Non-Refundable Upfront Fee

Firms may receive payments (**upfront fees**) from customers before they deliver a product or perform a service (e.g membership fee)

**Example:** fees paid for 1 year membership

- \$200 upfront fee + \$50 monthly fee
- Contract length = 3 years
  - ⇒ Total transaction price =  $200 + (36 \text{ months} \times 50) = \$2,000$
  - ⇒ Revenue recognized each period =  $2000/36 = \$55.56$

## 5. Repurchase Agreement

1. If the company **sell an asset** to customer but have an **unconditional obligation or right to buy this asset back**

- If **repurchase price > original selling price** => **Financing transaction** (not a sale)
- If **repurchase price < original selling price** => **lease**

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

- If there's an **economic incentive** (asset fair value < repurchase price) => **Financing transaction**
- If there's **no economic incentive** => **Sale with right of return**

## 6. Bill-and-Hold Agreement

**Bill and hold agreement:** 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 the customer in the future

**Example:** Buyer lacks space to accommodate the product or has more than sufficient inventory

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

Long-term contracts (common in construction) often let the seller bill the buyer **at intervals**. Recognizing revenue **over time** gives a more realistic picture.

Recognize over time if any one of these criteria is met:

1. the customer simultaneously receives and consumes the benefits as the seller performs, or
2. the seller creates/enhances an asset (e.g. work-in-process) that the customer controls as it is created, or
3. the seller does not create an asset with an alternative use, and either:
  - a. another seller would not need to substantially re-perform the work done to date, or
  - b. the seller has an enforceable right to payment for performance completed to date and expects to fulfil the contract.

## LT contracts: Percentage of Completion (POC)

**Percentage of completion:** If one of the criteria is met and if it can reasonably estimate its progress, the company recognizes revenues and gross profits each period based on the progress of construction.

Measure of progress

- **Input measures** (costs, hours worked) => Rely on productivity
- **Output measures** (units delivered) => Require units to be comparable in time, effort or cost
  - o Most popular approach to estimate progress: **Cost-to-cost basis**

2 accounts for POC

1. **Construction in Process (CiP)** - Inventory account: DL, DM and project-related overhead (charged as incurred and not allocated to CiP)
2. **Billings on Construction in Process** - Contra inventory account: Accumulation of progress billings (continuous sale occurs as the work progresses)

## Cost-to-cost basis

### 1. Compute progress (% complete) based on costs incurred & estimated total costs

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

### 2. Apply % complete 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

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

**Example:** Hardhat Construction has a contract to construct a £4,500,000 bridge at an cost of £4,000,000. The contract is to start in July 2019, and the bridge is to be completed in October 2021.

	2019	2020	2021
Costs to date	£1,000,000	£2,916,000	£4,050,000
Estimated costs to complete	3,000,000	1,134,000	—
Progress billings during the year	900,000	2,400,000	1,200,000
Cash collected during the year	750,000	1,750,000	2,000,000

**Journal entries are required until 2021**

$2,916,000 - 1,000,000 = 1,916,000$

	2019	2020	2021
Costs to date	£1,000,000	£2,916,000	£4,050,000
Estimated costs to complete	3,000,000	1,134,000	—
Progress billings during the year	900,000	2,400,000	1,200,000
Cash collected during the year	750,000	1,750,000	2,000,000

- Given the data above, Hardhat makes the **journal entries** to record (1) costs of construction, (2) progress billings, and (3) collections.

	2019	2020	2021
<b>To record costs of construction:</b>			
Construction in Process	1,000,000	1,916,000	1,134,000
Materials, Cash, Payables, etc.	1,000,000	1,916,000	1,134,000
<b>To record progress billings:</b>			
Accounts Receivable	900,000	2,400,000	1,200,000
Billings on Construction in Process	900,000	2,400,000	1,200,000
<b>To record collections:</b>			
Cash	750,000	1,750,000	2,000,000
Accounts Receivable	750,000	1,750,000	2,000,000

- “Construction in Process”:** “Inventory” (asset) account
  - CiP account maintains record of total costs incurred (+ recognized GP)
- “Billings on Construction in Process”:** contra-inventory account
  - Billings on CiP account records what amount was already billed
  - Avoids double counting of inventory + receivable
    - Normally: recognition of AR from sale reduces inventory (via COGS)
    - But selling firm cannot remove inventory until contract completion and transfer to buyer

	2019	2020	2021
<b>To record costs of construction:</b>			
Construction in Process	1,000,000	1,916,000	1,134,000
Materials, Cash, Payables, etc.	1,000,000	1,916,000	1,134,000
<b>To record progress billings:</b>			
Accounts Receivable	900,000	2,400,000	1,200,000
Billings on Construction in Process	900,000	2,400,000	1,200,000
<b>To record collections:</b>			
Cash	750,000	1,750,000	2,000,000
Accounts Receivable	750,000	1,750,000	2,000,000

**Next:** Apply the **three steps** pursuant the **cost-to-cost method**

- (1) Compute **progress (percent complete)** based on **costs incurred** and **estimated total costs**
- (2) Apply the **progress (percent complete)** to **revenues** and gross profit
- (3) Compute **current period** revenue and gross profit

	2019	2020	2021
Contract price	£4,500,000	£4,500,000	£4,500,000
Less estimated cost:			
Costs to date	1,000,000	2,916,000	4,050,000
Estimated costs to complete	3,000,000	1,134,000	—
Estimated total costs	4,000,000	4,050,000	4,050,000
Estimated total gross profit	£ 500,000	£ 450,000	£ 450,000
<b>Percent complete</b>	<b>25%</b>	<b>72%</b>	<b>100%</b>
	$\left( \frac{£1,000,000}{£4,000,000} \right)$	$\left( \frac{£2,916,000}{£4,050,000} \right)$	$\left( \frac{£4,050,000}{£4,050,000} \right)$

**Next: Journal entries** to reflect allocation of revenues and GP

Input from cost-to-cost approach (see previous two slides)	Recognized in Current Year		Recognized in Current Year		Recognized in Current Year	
	2019	2020	2020	2021	2021	2021
	£1,125,000	£2,115,000	£2,115,000	£1,260,000	£1,260,000	£1,260,000
	1,000,000	1,916,000	1,916,000	1,134,000	1,134,000	1,134,000
	<u>£ 125,000</u>	<u>£ 199,000</u>	<u>£ 199,000</u>	<u>£ 126,000</u>	<u>£ 126,000</u>	<u>£ 126,000</u>

	2019	2020	2021
<b>To recognize revenue and gross profit:</b>			
Construction in Process (gross profit)	125,000	199,000	126,000
Construction Expenses	1,000,000	1,916,000	1,134,000
Revenue from Long-Term Contracts	1,125,000	2,115,000	1,260,000
<b>To record completion of the contract:</b>			
Billings on Construction in Process			4,500,000
Construction in Process			4,500,000

**Next: Apply the three steps** pursuant the cost-to-cost method

- (1) ...
- (2) Apply the **progress** (percent complete) to **revenues** and gross profit
- (3) Compute **current period** revenue and gross profit

	To Date	Recognized in Prior Years	Recognized in Current Year
<b>2019</b>			
Revenues (£4,500,000 × 25%)	£1,125,000		£1,125,000
Costs	1,000,000		1,000,000
Gross profit	<u>£ 125,000</u>		<u>£ 125,000</u>
<b>2020</b>			
Revenues (£4,500,000 × 72%)	£3,240,000	£1,125,000	£2,115,000
Costs	2,916,000	1,000,000	1,916,000
Gross profit	<u>£ 324,000</u>	<u>£ 125,000</u>	<u>£ 199,000</u>
<b>2021</b>			
Revenues (£4,500,000 × 100%)	£4,500,000	£3,240,000	£1,260,000
Costs	4,050,000	2,916,000	1,134,000
Gross profit	<u>£ 450,000</u>	<u>£ 324,000</u>	<u>£ 126,000</u>

Construction in Process			
2019 construction costs	£1,000,000	12/31/21	to close
2019 recognized gross profit	125,000		completed
2020 construction costs	1,916,000		project
2020 recognized gross profit	199,000		£4,500,000
2021 construction costs	1,134,000		
2021 recognized gross profit	126,000		
Total	<u>£4,500,000</u>	Total	<u>£4,500,000</u>

**Note** that Hardhat cannot remove inventory costs (+ GP) until construction is completed and transferred to new owner

# LT contracts: 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 the contract is completed at a point in time.

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

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

**Example:** Following Hardhat construction example

- The following data pertain to the construction period:

	2019	2020	2021
Costs to date	£1,000,000	£2,916,000	£4,050,000
Estimated costs to complete	3,000,000	1,134,000	—
Progress billings during the year	900,000	2,400,000	1,200,000
Cash collected during the year	750,000	1,750,000	2,000,000

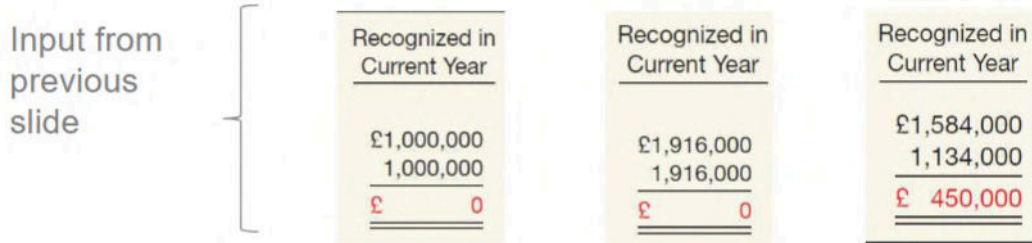
- Given the data above, Hardhat makes the same journal entries!

	2019	2020	2021
<b>To record costs of construction:</b>			
Construction in Process	1,000,000	1,916,000	1,134,000
Materials, Cash, Payables, etc.	1,000,000	1,916,000	1,134,000
<b>To record progress billings:</b>			
Accounts Receivable	900,000	2,400,000	1,200,000
Billings on Construction in Process	900,000	2,400,000	1,200,000
<b>To record collections:</b>			
Cash	750,000	1,750,000	2,000,000
Accounts Receivable	750,000	1,750,000	2,000,000

Next: Only **costs incurred** are recognized as revenue:

	To Date	Recognized in Prior Years	Recognized in Current Year
<b>2019</b>			
Revenues (costs incurred)	£1,000,000		£1,000,000
Costs	1,000,000		1,000,000
Gross profit	£ 0		£ 0
<b>2020</b>			
Revenues (costs incurred)	£2,916,000	£1,000,000	£1,916,000
Costs	2,916,000	1,000,000	1,916,000
Gross profit	£ 0	£ 0	£ 0
<b>2021</b>			
Revenues (£4,500,000 × 100%)	£4,500,000	£2,916,000	£1,584,000
Costs	4,050,000	2,916,000	1,134,000
Gross profit	£ 450,000	£ 0	£ 450,000

Recognize **gross profit** after all costs have been recognized (when contract is completed)



	2019	2020	2021
Construction Expenses	1,000,000	1,916,000	
Revenue from Long-Term Contracts (To recognize costs and related expenses)	1,000,000	1,916,000	
Construction in Process (Gross Profit)			450,000
Construction Expenses			1,134,000
Revenue from Long-Term Contracts (To recognize costs and related expenses)			1,584,000
Billings on Construction in Process			4,500,000
Construction in Process (To record completion of the contract)			4,500,000

## LT contracts: Contract Loss

1. Loss in current period as 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 7 Cost Estimation

## Cost Estimation and Cost Behaviour

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

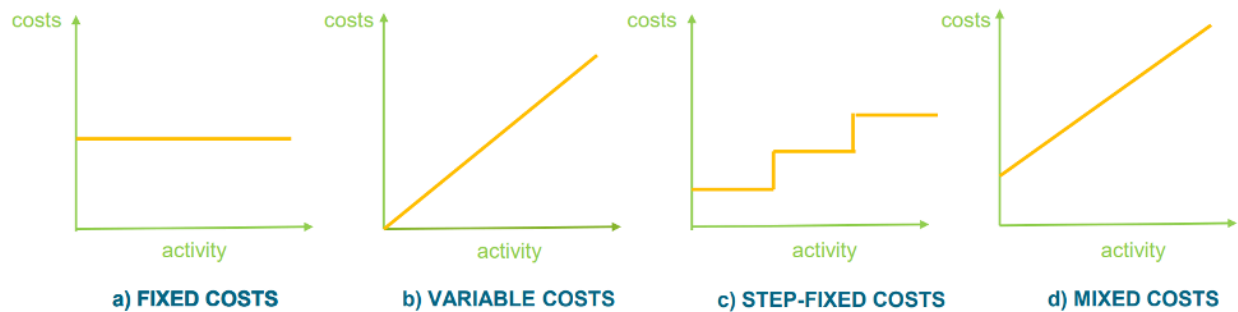
Steps:

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

To get accurate estimates for a cost object, we must split costs into fixed and variable components, but only within the **relevant range of an activity and for a specific time length**.

**Types of cost:**

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.

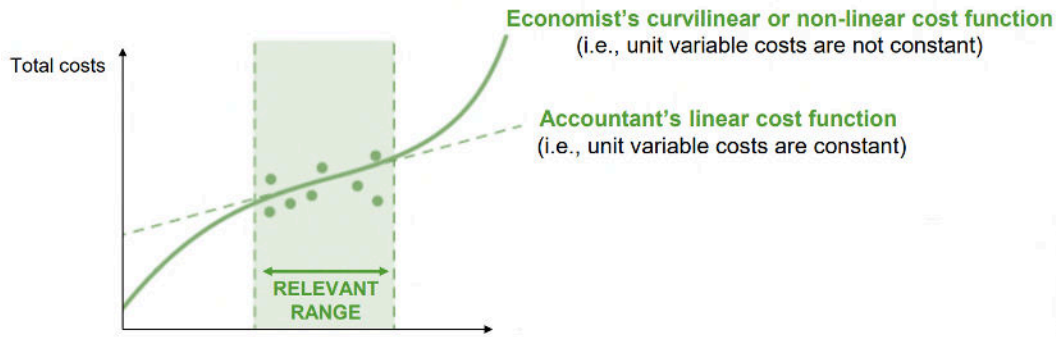
**Cost Function**: mathematical expression describing past relationship between costs and changes in the level of an activity (activity measure/cost driver).

$$y = a + b_1x_1 + \dots + b_nx_n$$

- 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)

**2 assumptions** of cost function:

1. Changes in total costs can be explained by changes in the levels of a single (or a few) activity (e.g. machine hours)
2. Cost behavior approximated by a linear function of activity level within the **relevant range**
  - o Relevant range: the level of output/activity within which the company is expected to operate.
  - o Linear function closely approximates the nonlinear function only within the relevant range.



## Cost Estimation Methods

Account analysis starts with classifying costs into fixed, variable, and mixed to create a direct cost function.

Need to use a large enough data sample, to account for possible seasonal variation in production schedule.

### 5 methods

1. Inspection of accounts method
2. Graphical or scatterplot method
3. High-low method
4. Least square method
5. Engineering method

## 1. Inspection of the Accounts Method

Classifying each expense as a fixed, variable or a semi-variable cost, using the manager's/accountant's experience and judgement.

Disadvantages:

- Highly **subjective** depending on the manager
- Cost estimates might be based on an outlier, and use past costs

### Example

L'Oréal lipstick department: 2022 production = 75,000 lipsticks; next year expected = 82,000. Split each account into its fixed and variable portions (the % variable is given)

Expenditure Account	EUR	Fixed costs	Variable costs
Direct material (variable)	300,000		300,000
Direct labor (variable)	22,500		22,500
Power (variable)	37,500		37,500
Supervision (20% variable)	56,250	45,000	11,250
Material movement (50% variable)	60,000	30,000	30,000
Maintenance (40% variable)	75,000	45,000	30,000
Depreciation (fixed)	95,000	95,000	
Rent (fixed)	100,000	100,000	
		Total fixed costs 315,000	Total variable costs 431,250 Unit variable costs 431,250/75,000 = 5.75

How the splits work: e.g. Supervision is 20% variable → 56,250 x 0.20 = 11,250 variable, the rest 45,000 fixed.

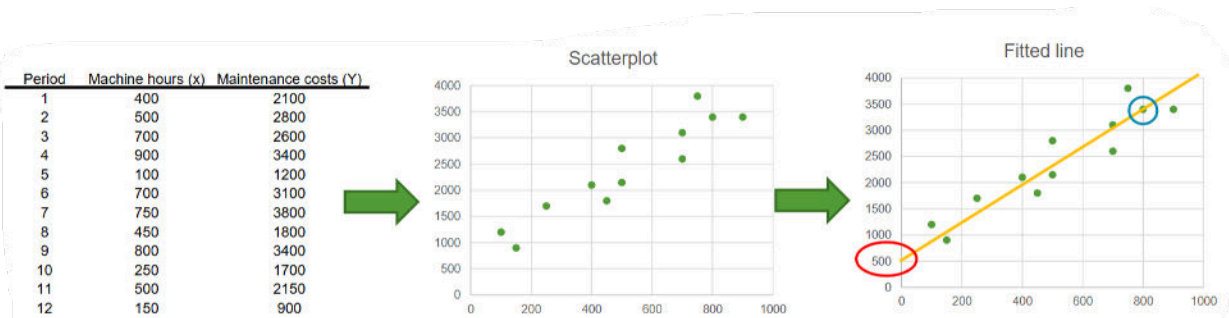
- **Cost function:**  $y = 315,000 + 5.75x$
- Estimate for 82,000 units:  $315,000 + 5.75 \times 82,000 = \text{€}786,500$ .

## 2. Graphical or Scatterplot Method

Cost estimation function developed by fitting a straight line to a scatterplot of past cost observations (y-axis) against their activity level (x-axis).

- Simple to use and provide visual representation
- However, determination of the straight line is subjective (based on visual approximation) => solution: use least-squares method to define best fit

### Example



**Cost function ( $y = a + bx$ ):**

fixed costs (intercept,  $a$ ) = 500

unit variable cost (slope,  $b$ ) =  $\frac{\text{difference in costs}}{\text{difference in activity}} = \frac{3400 - 500}{800 - 0} = 3.63$

**$y = 500 + 3.63x$**

### 3. High-Low Method

Estimate the cost function using the highest and lowest activity levels and compare changes in cost

- **Advantages:** Easy to split Fixed Costs and Variable Costs
- **Disadvantages:** Ignores cost observations at 'normal' activity levels, therefore it is NOT recommended!

Period	Machine hours (x)	Maintenance costs (Y)
1	400	2100
2	500	2800
3	700	2600
4	900	3400
5	100	1200
6	700	3100
7	750	3800
8	450	1800
9	800	3400
10	250	1700
11	500	2150
12	150	900

**Cost function (y = a + bx):**

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

$$= \frac{3400 - 1200}{900 - 100} = 2.75$$

fixed costs (intercept, a) = total costs – variable costs

$$= 1200 - 2.75 \cdot 100$$

$$= 925$$

$$y = 925 + 2.75 x$$

### 4. 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.

Period	Machine hours (x)	Maintenance costs (y)	x <sup>2</sup>	y <sup>2</sup>	xy
1	400	2100	160000	4410000	840000
2	500	2800	250000	7840000	1400000
3	700	2600	490000	6760000	1820000
4	900	3400	810000	11560000	3060000
5	100	1200	10000	1440000	120000
6	700	3100	490000	9610000	2170000
7	750	3800	562500	14440000	2850000
8	450	1800	202500	3240000	810000
9	800	3400	640000	11560000	2720000
10	250	1700	62500	2890000	425000
11	500	2150	250000	4622500	1075000
12	150	900	22500	810000	135000
	<b>6200</b>	<b>28950</b>	<b>3950000</b>	<b>79182500</b>	<b>17425000</b>

**Cost function (y = a + bx):**

$$\text{Unit variable cost (slope, } b) = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - (\sum x)^2}$$

$$= \frac{(12 \cdot 17,425,000) - (6,200 \cdot 28,950)}{(12 \cdot 3,950,000) - (6,200)^2}$$

$$= 3.30$$

$$\text{Fixed cost (intercept, } a) = \frac{\sum y}{n} - \frac{b \sum x}{n}$$

$$= \frac{28,950}{12} - \frac{3.30 \cdot 6,200}{12}$$

$$= 707.5$$

$$y = 707.5 + 3.30x$$

### Test of cost driver reliability

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<sup>2</sup>):** 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

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

## 5. 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

## **Steps in estimating cost functions**

1. Select the cost(s) to be predicted ( $y$ ).
2. Select potential cost drivers / activity bases ( $x$ ).
3. Collect sufficient data.
4. Plot the observations and exclude outliers.
5. Estimate the cost function, using one of:
  - Engineering method
  - Inspection of accounts method
  - Scatterplot method
  - High-low method
  - Least-squares method
6. Test the reliability of the cost function ( $r, r^2$ ).

# Intermediate accounting – IBEB – MA Lecture 4, week 7

## Relevant costs and revenue

### Relevant vs Irrelevant costs and revenues

#### 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 learning

What you learn in step 5 flows back to refine steps 1-4 next time. Decision-making is iterative, not one-shot

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

**Question:** should managers accept a one-time-only special order at a price below

the normal market price, when there is idle capacity and the order has no long-run implications?

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

**Question:** should managers acquire goods/services from outside suppliers (buy) or produce them internally (make)?

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**

- Cost saving and quality improvements
  - o 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**

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

\*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

**Question:** Should managers replace current equipment with more efficient, cheaper-to-run equipment?

### **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.
  - o If we decide to NOT replace the current equipment then the book value is written off periodically (e.g yearly)
  - o If we decide to replace the current equipment then the book value is written off as a lump sum (immediately)

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

**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 for.
- 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

**Question:** Which products/services should be made, and in what quantities, to maximize profit when a scarce resource (limiting factor) constrains output?

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

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

Select the product(s) with the **highest** contribution margin (= revenue - variable costs) **per unit of the limiting factor** (not per unit of product).

**Example**

KLI DESKS: Two desks, Executive and Standing. Only 172 painting hours/month. Fixed manufacturing cost €120,000/month.

- What is the optimal product mix that would maximize profit each month?

	EXECUTIVE	STANDING
Price	150	120
Variable manufacturing costs	70	30
<i>Contribution margin per desk (CM = revenue – VC)</i>	80	90
Desks per hour	4	3
<b><i>Contribution margin per limited factor (per hour)</i></b>	<b>320</b>	<b>270</b>

**Trap:** Standing desks have the higher cm per desk ( $\text{€}90 > \text{€}80$ ), so a naïve choice picks standing. but the scarce resource is painting hours, and executive desks earn more per hour ( $\text{€}320 > \text{€}270$ ) because they paint faster (4/hr vs 3/hr). Always rank by cm per unit of the limiting factor

**SCENARIO A:** make only 1 product.

1. Only Standing:  $172 \times 3 = 516$  desks  $\rightarrow$   $\text{CM} = 516 \times 90 = \text{€}46,440$ .
2. Only Executive:  $172 \times 4 = 688$  desks  $\rightarrow$   $\text{CM} = 688 \times 80 = \text{€}55,040$ .  $\leftarrow$  Better
  - Executive wins because it has the higher CM per scarce hour ( $\text{€}320$ ).

**SCENARIO B:** max demand 500 of each type, can't sell unlimited, so fill capacity in CM-per-hour order.

1. Make the priority product (Executive, highest CM/hr) up to its 500 limit:
  - Time used =  $500 / 4 = 125$  hours.  $\text{CM} = 500 \times 80 = \text{€}40,000$ .
2. Use the remaining hours for Standing:
  - o Remaining hours =  $172 - 125 = 47$  hours; desks =  $47 \times 3 = 141$ .
  - o  $\text{CM} = 141 \times 90 = \text{€}12,690$ .
3. Optimal mix: 500 Executive + 141 Standing  $\rightarrow$  total  $\text{CM} = 40,000 + 12,690 = \text{€}52,690$ .

**Note:** total CM here (52,690) is LOWER than the all-Executive scenario A (55,040), because the 500-unit demand cap forces some capacity onto the less efficient Standing desks. Demand limits change the answer.

## 5. Discontinuation Decisions

**Question:** should an unprofitable cost object (product, service, customer, or location) be discontinued?

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

1. Check whether the segment's contribution margin is positive or negative. (Positive CM means it covers its variable costs and contributes toward fixed costs.)
2. Check which fixed costs can be avoided by discontinuing:
  - Direct fixed costs -> may be avoidable (specific to that segment).
  - Indirect fixed costs -> Irrelevant (continue regardless).
3. Can any free capacity be used for another purpose? (opportunity cost)
4. Will discontinuing the segment adversely affect sales of other products?

**Note:** It's important to think about if there are possibilities of alternative use for the resources if we discontinue the production of a good (opportunity cost) and if discontinuing will have effects on the sale of other products.

# Intermediate accounting – IBEB – MA Lecture 5, week 7 The Budgeting Process

## Budgeting

A budget does the same job for a firm as for a household: plan ahead, control spending, manage debt, and stay financially stable.

- It fundamentally is a financial plan expressed in numbers for a future period.

Budgeting sits inside a wider planning-and-control cycle



A budget: clear and precise expectations for the upcoming year, serving 6 functions:

1. **Planning tool** for actual annual operations.
2. **Coordination tool** that aligns the activities of the whole organization.
3. **Communication tool** that informs managers what is expected of them.
4. **Motivation tool** that stimulates managers to strive to hit the budget goals.
5. **Control tool** that lets you identify deviations from expected results.
6. **Evaluation tool** as a basis for rewarding managers' performance.



$$\text{sales} = \text{Expected unit sales} \times \text{unit selling price for each product}$$

## Production Budget

The quantity of products that must be produced to meet sales demand and inventory requirements.

$$\text{production} = \text{sales} + \text{ending inventory} - \text{beginning inventory}$$

## Direct Material Budget

It is subdivided into two different budget

### 1. DM usage budget

- Costs of direct material required to meet production budget
- Costs of material to meet production in each production:
  - o Multiply the production budget by the amount of material in this department and the cost per unit
  - o To find the total add the result in each department

### 2. DM purchase budget

- Costs of direct materials purchased to meet materials usage budget and inventory requirements
- The reason for the different budgets is that different managers are responsible for the amount of direct material that are used and purchased from other suppliers.
- For the calculations, first find the purchase budget for each material then add the result to find the total purchase budget

$$\text{Purchase} = \text{material usage budget} + \text{ending inventory} - \text{beginning inventory}$$

## Direct Labour Budget

Costs of direct labour required to meet the production budget.

- Find the total budgeted hours by multiplying budgeted production by hours per unit.
- Find the total wages by multiplying total budgeted hours by wage per hour.

## Production Overhead Budget

Overhead costs required to meet the production budget.

### 1. Variable Overhead (controllable)

- o Allocated to each department according to the overhead rate

### 2. Fixed Overhead (non-controllable)

- o Calculated for each department separately

## Selling and Administration Budgets

Budget related to non-manufacturing costs.

Important to note that typically selling and administration budgets are separate budgets because there are different individuals responsible for each (sales manager and administrative officer).

Selling budget = all the expected selling expense

Administrative budget = all expected expenditures related to administration costs

## Departmental Budgets

Departmental managers are responsible for controlling ALL costs within the department.

The following budget establishes a target production cost for this year for the departmental manager which can be used to evaluate whether they have succeeded in controlling the costs within the departments by matching the actual costs to the budgeted ones.

- Direct labour budget
- Direct material usage budget
- Production overhead budget

## Master Budget

The master budget consolidates every sub-budget into a budgeted income statement.

$$\text{budgeted operating profit} = \text{gross profit} - \text{selling and administration}$$

$$\text{gross profit} = \text{sales} - \text{cost of goods sold}$$

$$\text{COGS} = \text{total manufacturing costs} + \text{opening stock of finished goods} - \text{closing stock of finished goods}$$

$$\text{total manufacturing costs} = \text{purchased DM} + \text{DM opening stock} - \text{DM closing stock} + \text{cost of DL} + \text{production overhead}$$



# Intermediate accounting – IBEB – MA Lecture 6, week 7 Standard Costing and Variance Analysis

## Standard Costing

### Standard vs Budgeted Cost

Both standard and budgeted cost are predetermined/target costs (future) that should be incurred under efficient operating conditions.

- **Standard cost** = target cost per unit of activity or output.
- **Budgeted cost** = target cost for an entire activity or output.

$$\text{standard cost} = \text{standard input} * \text{standard price per input}$$

### 3 Standard cost components

- Standard **direct material cost**
  - o Standard input: materials used to make a bike
  - o Standard price: unit cost of materials
- Standard **direct labor cost**
  - o Standard input: labor time used to make a bike
  - o Standard price: wage rate for an employee
- Standard **manufacturing overhead cost**

- Standard input: standard hours or output
- Standard price: overhead rate per hour or unit of output

**Note:** where different products are produced, standard hours should be used.

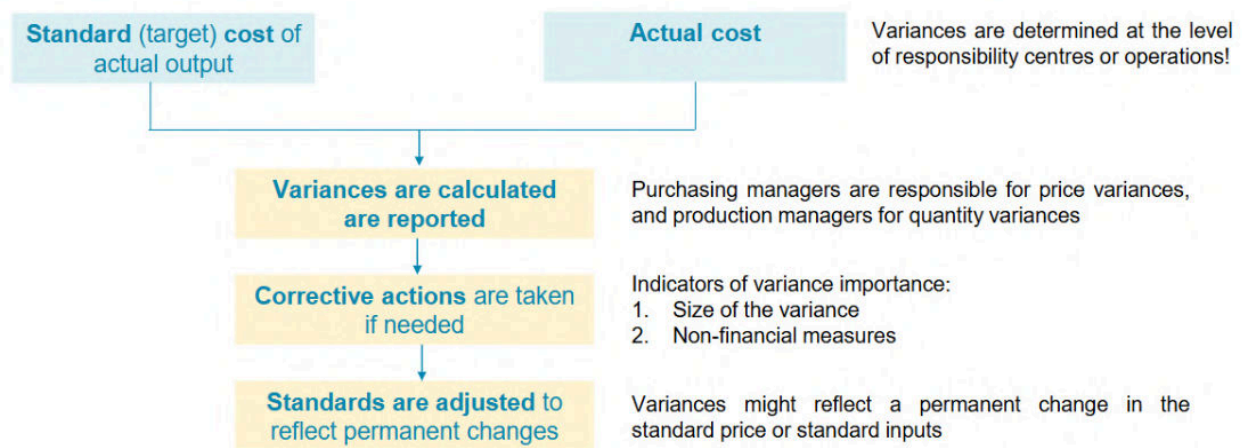
## Variance Analysis

We can identify inefficiencies by comparing both types of costs. This is called **variance** and can indicate when we performed better/worse than expected.

$$\text{variance} = \text{standard cost} - \text{actual cost}$$

This requires that:

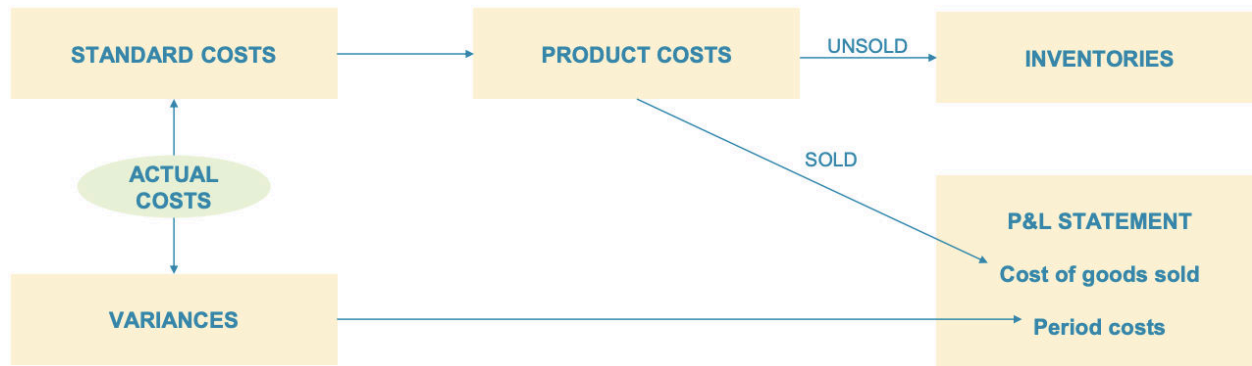
1. Activities that are repetitive
2. Output can be measured
3. Input can be specified



## Purpose of Standard Costing

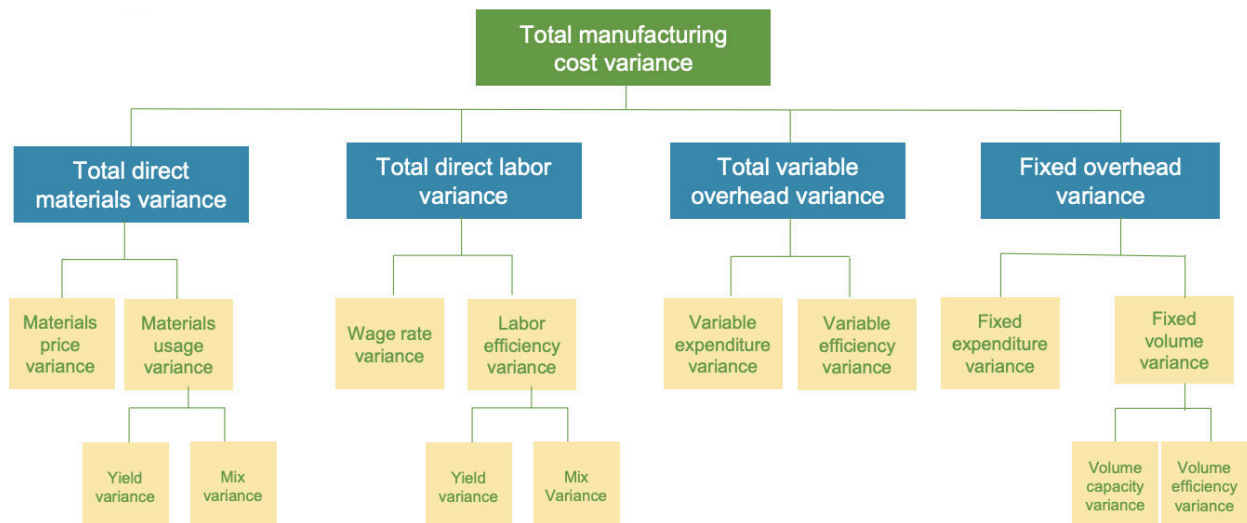
1. Provide prediction of future costs than can be used for decision-making
2. Provide challenging target to motivate employees
3. Assist in setting budgets and evaluating performance

4. Act as a control device by highlighting activities in need of corrective action
5. Simplify task of tracing costs to products for inventory valuation



**Note** that **variance is a period cost and can never be part of products costs** because they are never formulated at product level, they are always formulated at the level of the responsibility center or level of operations.

### Variance Analysis Overview



## Direct Material Variances

**Total Direct Material Variance:**

*total direct materials variance = standard material cost for actual output – actual material cost*

*total material variance = material price variance + material usage variance*

Standard cost > actual cost = favourable variance

- It means that the price we paid for our direct material was lower than what we expected to pay for them.

Standard cost < actual cost = adverse variance

- We pay more than we expected to pay for direct materials

We need these variances to understand why our standard costs for direct materials, which are our expected costs, were different from actual costs.

Reasons:

1. **Materials Price Variance** => standard price was different from the actual price

*material price variance = (standard unit price – actual unit price) \* actual quantity purchased*

**Note** that the larger the number of units/material purchased, the greater the consequence of the price variance and the price variance is reported in the period in which it is incurred.

Standard price < actual price = adverse variance (opposite case=favourable), does not directly mean that department was inefficient, some reasons could be

- Outside the direct control of the purchasing manager
  - o changes in market conditions
- Within the direct control of the purchasing manager
  - o Failure to seek best sources of supply
  - o Purchasing material of higher quality

2. **Materials Usage Variance** => the standard price = actual price but the difference comes from the standard quantity used vs the actual quantity used of direct material.

*material usage variance = (standard quantity for actual production – actual quantity) \* standard unit price*

$$\text{flexible budget} = \text{standard quantity for actual output} * \text{standard price}$$

**Note** that the evaluation is based on actual working conditions and price effects are removed. And we focus on the standard unit price because the purchasing department is responsible for the price variance which is the actual unit price.

Standard quantity < actual quantity = adverse variance (opposite case=favourable)  
reasons includes:

- Outside the direct control of the production department:
  - o Purchase of material of inferior quality
- Within the direct control of the production department
  - o Inappropriate low setting of material usage beforehand
  - o Theft or careless handling of materials by production personnel

## Direct Labour Variances

$$\text{total direct labour variance} = \text{standard labour cost for actual production} - \text{actual labour cost}$$

Standard cost > actual cost: favourable variance

Standard cost < actual cost: adverse variance

Reasons:

### 1. Wage Rate Variance

- Managers are not held accountable because they do not have much control over the wage rate.

$$\text{wage rate variance} = (\text{standard wage rate} - \text{actual wage rate}) * \text{actual labour hours}$$

Standard wage rate > actual wage rate = favorable

Standard wage rate < actual wage rate = adverse

### 2. Labour Efficiency Variance

$$\text{labour efficiency variance} = (\text{standard labour hours for actual production} - \text{actual labour hours}) * \text{standard wage rate}$$

$$\text{flexible budget} = \text{standard hours for actual output} * \text{standard wage rate}$$

Standard labour hours < actual labour hours = adverse (opposite case=favourable)

- Outside the direct control of the production department
  - o Change in quality standards
  - o Use of inferior quality materials
- Within the direct control of the production department
  - o Careless handling of machinery
  - o Introduction of new equipment
  - o Changes in production process

**Important remarks:** standard labour hours are used for actual production to ensure that the production manager is evaluated under actual working conditions. And we use the standard wage rate instead of the actual wage rate to remove any price effects because production managers should never be punished for increasing wage rates.

## Materials mix and Yield Variances

This can be done for both material and labour variances. For materials, nearly all production processes require a mix of multiple input materials. For labour, managers can decide to vary the mix of skilled , high-cost labour vs low-cost labour.

In many cases, input materials are substitutes:

- Expensive vs cheap input
- High quality vs low quality input
- Same input obtained from different supplier

**Standard Mix:** a mix of input materials that minimizes the cost per unit of output but meets quality requirements.

These variances are tools that help us understand that shifting labour mix to a high skill set (which is more expensive) is only worth it if the total time taken can be reduced (improve yield variance)

Deviation from standard mix: Can be a deliberate or conscious change

### 1. Material/Direct Labour Mix Variance

- Comparison between the cost of the standard mix and the cost of the actual mix.

*direct M/L mix variance = actual usage in standard mix proportions – (actual usage in actual proportions)*

Use cheaper materials/labour = favourable variance (opposite case=adverse)

This does not only impact price but also the quality (yield) of the product.

## 2. Materials/Direct Labour Yield Variance

- Comparison of the actual output obtained and the output expected to be obtained from the actual amount of direct materials used.

*direct M/L yield variance = (actual yield – standard yield from actual input of material) \* standard cost*

Actual yield < standard yield = adverse variance (opposite case=favourable)

- This means that we overestimated the amount of output we could get from our input
- Important to use **standard prices** in all calculations to remove price effects!

### Relation between material mix and yield variance:

The use of higher quality material may result in

- Adverse material mix variance
- A favourable yield variance (boost in output)

The use of lower quality material may result in

- A favourable materials mix variance
- An adverse yield variance (higher material wastage)

## Variable Overhead Variances

Indirect costs or overhead cannot be directly traced to a cost object and thus need to be allocated through a cost allocation process. First you must choose an allocation base/cost driver that significantly determines/causes overhead costs (such as direct labour or machine hours). Then you can use this to calculate the budgeted overhead rate:

$$\text{budgeted OH rate} = \frac{\text{budgeted total overhead}}{\text{budgeted total allocation base/cost driver}}$$

Lastly, multiply the overhead rate by the total amount of the cost driver consumer by the cost object to find the amount allocated.

$$\text{total variable OH variance} = \text{standard variable OH for actual production} - \text{actual variable OH}$$

Standard overhead > actual overhead = favourable (opposite case=adverse)

The total variable OH variance does NOT tell us much because we do NOT know what is driving the variance to happen.

Reasons:

1. **Expenditure Variance:** actual OH rate is different from the budgeted

$$\text{expenditure variance} = (\text{standard variable OH rate} - \text{actual variable OH}) * \text{actual input hours}$$

Standard overhead > actual overhead = favourable

Standard overhead < actual overhead = adverse

- Increase in variable OH costs is NOT fully offset by an increase in the OH allocation base
- Decrease in the OH allocation base is NOT fully offset by a decrease in variable OH costs

2. **Efficiency Variance:** actual amount of cost driver is different from the standard amount

$$\text{efficiency variance} = (\text{standard input hours for actual output} - \text{actual input hours}) * \text{standard variable}$$

$$\text{flexible budget} = \text{standard input hours for actual output} * \text{standard variable OH rate}$$

Standard input > actual input = favourable (opposite case=adverse)

- Workers are NOT skilled if cost driver = direct labor hours
- Machines are NOT in good operating conditions if cost drive = machine hours
- Production scheduler inefficiently scheduled jobs
- Standard input were set too tight

## Fixed Overhead Variances

### 1. Variable/direct Costing = **Expenditure Variance**

- Treats fixed manufacturing OH as period costs
- Immediately charges to the profit and loss account in the period it is incurred
- Assume that fixed OH costs remain unchanged in the short term

$$\text{expenditure variance} = \text{budgeted fixed OH} - \text{actual fixed OH}$$

Budgeted fixed OH > actual fixed OH = favourable

Budgeted fixed OH < actual fixed OH = adverse

### 2. Absorption/full Costing = **Volume Variance**

- Assigns all manufacturing OH to products
- Used for inventory valuation
- Make use of budgeted OH rate

$$\text{volume variance} = \text{standard fixed OH allocated to actual output} - \text{actual fixed OH}$$

This variance does NOT tell us much but may be caused by:

**1. Expenditure Variance:** difference between actual and budget fixed OH

$$\text{volume variance} = (\text{standard input hours actual production} - \text{standard input hours budgeted production})$$

Budgeted production < actual production = adverse (opposite case=favourable)

- Fixed overhead costs are spread over smaller number units

**2. Volume Variance:** difference between actual and budgeted production volume

$$\text{volume efficiency variance} = (\text{standard input hours for actual output} - \text{actual input hours}) * \text{standard}$$

Standard input hours > actual input hours = favourable (opposite case=adverse)

*volume capacity variance = (actual input hours – budgeted input hours) \* standard fixed OH rate*

Budgeted input hours > actual input hours = adverse (opposite case=favourable)

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