Chapter 5

Absorption costing and marginal costing

Real world case 5.1

This case study shows a typical situation in which management accounting can be helpful. Read the case study now but only attempt the discussion points after you have finished studying the chapter.

The costing of all services delivered by NHS providers should be governed by the following principles: costs (and income) should be: (a) calculated on a full absorption basis to identify the full cost of services delivered; (b) allocated and apportioned accurately by maximising direct charging and where this is not possible using standard methods of apportionment; and (c) matched to the services that generate them to avoid cross subsidisation. The costing process should also be transparent with a clear audit trail.

Where costs have not been directly attributed to the patient, costing pools should be constructed so that the costs included can be allocated or apportioned using the same method. Costing pools can be constructed in different ways dependent on the nature of the costs included in them. The manual gives examples. One absorption rate is calculated by dividing the combined fixed and semi-fixed costing pools for wards, theatres and outpatients by the appropriate activity units i.e. bed-days, theatre-hours or attendances.

Source, Department of Health, NHS Costing Manual 2008/09, http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_095890.

Discussion points

1 What problems might be faced in apportioning overhead costs?

2 Why might it be important that the costing process should be transparent with a clear audit trail?

Contents

Learning outcomes

After reading this chapter you should be able to:

- Define and explain absorption costing (full costing) and marginal costing (variable costing).
- Illustrate absorption (full) costing and marginal (variable) costing using a simple example.
- Explain and calculate the effect on profit of over-absorbed and under-absorbed fixed overheads.
- Compare profit based on absorption costing with profit based on marginal costing.
- Explain how absorption costing is applied in financial accounting.
- Explain the arguments in favour of absorption costing and marginal costing.
- Describe and discuss examples of research into full costing and marginal costing.

5.1 Introduction

Methods of apportioning (sharing) fixed production overhead costs were explained in detail in Chapter 4. Because of the problems that may arise because of apportionment, there are situations in management accounting where it is preferable to avoid the problem by allocating only variable costs to products. Fixed production overhead costs are regarded as costs of the period rather than costs of the product. The question to be addressed in this section is how the choice between **absorption costing** (which means absorbing all costs into products) and **marginal costing** (which means taking in only the variable costs of production) may be dependent on the purpose to which management accounting is being applied.

Definitions

In **absorption costing** (*full costing*), all production costs are absorbed into products. The unsold inventory is measured at total cost of production. Fixed production overhead costs are treated as a product cost.

In **marginal costing** (*variable costing*), only variable costs of production are allocated to products. The unsold inventory is measured at variable cost of production. Fixed production overhead costs are treated as a period cost of the period in which they are incurred.

5.2 A note on terminology: marginal or variable?

Some authorities on management accounting refer to 'marginal costing' while others refer to 'variable costing'. The strict interpretation of 'marginal cost' in economics is the additional cost of one more unit of output. From the economists' viewpoint that extra cost could include a stepped increase in fixed cost if capacity has to be expanded to produce one more unit of output or if a new employee is required. For this chapter we assume that the range of activity is narrow so that a marginal change in cost involves variable costs only.

5.3 Illustration of absorption and marginal costing

This example illustrates the application of absorption costing and marginal costing. It uses the same basic data for both illustrations.

5.3.1 Absorption costing

In **absorption costing** (*full costing*), all production costs are absorbed into products. The unsold inventory is measured at total cost of production. Fixed production overhead costs are treated as a product cost.

From the data in Exhibit 5.1, the **budgeted fixed overhead cost rate** is £3 per unit (calculated as £30,000/10,000 units).

The full cost of production per unit is £16 (calculated as variable cost £13 plus fixed cost £3).

The profit and loss statement for July, based on absorption costing is shown in Table 5.1.

Exhibit 5.1
Data for illustration: absorption and marginal costing

Mirror View Ltd produces freestanding magnifying mirrors for use in the home. The budgeted selling price and costs are as follows:

Budget for one unit:	£
Selling price	20
Direct materials	8
Direct labour	3
Variable production overhead	2
Total variable cost	13

The fixed production overhead cost for one month is budgeted as £30,000. The budgeted production volume is 10,000 units per month. Budgeted sales are expected to equal budgeted production volumes.

For the months of January to June the production and sales were 10,000 per month as budgeted. In the month of July the production was 10,000 but the sales were only 9,600 units, leaving 400 units in inventory (stock) as unsold goods. In the month of August the production was again 10,000 but the sales were 10,400 units. For the months of September to December the production and sales were again 10,000 units as budgeted.

Table 5.1
Profit and loss statement, month of July, based on absorption costing

Month of July	£	£
Sales (9,600 at £20)		192,000
Opening inventory	–	
Costs of production (10,000 at £16)	160,000	
Less closing inventory (400 at £16)	(6,400)	
Cost of goods sold		(153,600)
Profit		38,400

Comment

There is no opening inventory because until the end of June the sales and production were equal. The costs of production are recorded at the full cost of £16 to be absorbed by each unit. The closing inventory is valued at the full cost of production of £16 per unit.

5.3.2 Marginal costing

In **marginal costing** (*variable costing*), only variable costs of production are allocated to products in Table 5.2. The unsold inventory is measured at variable cost of production.

Table 5.2
Profit and loss statement, month of July, based on marginal costing

Month of July	£	£
Sales (9,600 at £20)		192,000
Opening inventory	–	
Costs of production (10,000 at £13)	130,000	
Less closing inventory (400 at £13)	(5,200)	
Variable cost of goods sold		(124,800)
Contribution to fixed overhead cost		67,200
Fixed overhead costs		(30,000)
		37,200

Fixed production overhead costs are treated as a period cost of the period in which they are incurred. The calculations are shown in Table 5.2.

Comment

As in the previous calculation, there is no opening inventory because until the end of June, the sales and production were equal. The costs of production are recorded at the variable cost of £13 to be absorbed by each unit. The closing inventory is valued at the variable cost of production of £13 per unit. Sales minus variable costs gives a contribution to fixed overhead costs. (Contribution is discussed in more detail in Chapter 9.) The fixed overhead costs of production are treated as a period cost and reported as a separate line in the profit and loss statement.

5.3.3 Explaining the difference

The difference in profit is £38,400 – £37,200 = £1,200. The profit based on absorption costing is higher in this example because the closing stock of 400 units carries £3 of fixed overhead per unit, as a product cost, to the next accounting period.

Activity 5.1

Now try for yourself to carry out the calculations using absorption costing and marginal costing for the month of August. In August there is an opening stock of 400 units but no closing stock. When you have tried this, check with the next section.

5.3.4 Inventory levels falling

Over the month of August the inventory falls from 400 units at the start of the month to nil at the end of the month (see Tables 5.3 and 5.4).

Table 5.3
Profit and loss statement, month of August, based on absorption costing

Month of August	£	£
Sales (10,400 at £20)		208,000
Opening inventory (400 at £16)	6,400	
Costs of production (10,000 at £16)	160,000	
Less closing inventory	–	
Cost of goods sold		(166,400)
Profit		41,600

Table 5.4
Profit and loss statement, month of August, based on marginal costing

Month of August	£	£
Sales (10,400 at £20)		208,000
Opening inventory (400 at £13)	5,200	
Costs of production (10,000 at £13)	130,000	
Less closing inventory	–	
Variable cost of goods sold		(135,200)
Contribution to fixed overhead cost		72,800
Fixed overhead costs		(30,000)
Profit		42,800

Comment

The difference in profit is £42,800 – £41,600 = £1,200. The profit based on absorption costing is lower in this example because the opening inventory of 400 units carries £3 of fixed overhead per unit, as a product cost, from the previous accounting period.

Activity 5.2

Work out how the answers in Tables 5.3 and 5.4 would change if the inventory levels were rising. Then check with the next section.

5.3.5 Inventory levels rising

Suppose that, over the month of August, the inventory rises from 400 units at the start of the month to 600 at the end of the month (see Tables 5.5 and 5.6). Assume the production remains the same at 10,000 units. The sales are therefore 9,800 units.

Table 5.5
Profit and loss statement, month of August, based on absorption costing

Month of August	£	£
Sales (9,800 at £20)		196,000
Opening inventory (400 at £16)	6,400	
Costs of production (10,000 at £16)	160,000	
Less closing inventory (600 at £16)	(9,600)	
Cost of goods sold		(156,800)
Profit		39,200

Table 5.6
Profit and loss statement, month of August, based on marginal costing

Month of August	£	£
Sales (9,800 at £20)		196,000
Opening inventory (400 at £13)	5,200	
Costs of production (10,000 at £13)	130,000	
Less closing inventory (600 at £13)	(7,800)	
Variable cost of goods sold		(127,400)
Contribution to fixed overhead cost		68,600
Fixed overhead costs		(30,000)
		38,600

Comment

The difference in profit is £39,200 – £38,600 = £600. The profit based on absorption costing is higher in this example because the closing inventory of 600 units carries £3 of fixed overhead per unit as product cost while the opening inventory of 400 units carries £3 of fixed overhead per unit, as a product cost, from the previous accounting period. The difference is an increase of 200 units carrying forward £3 of fixed cost per unit, which is £600 in total. This cost of £600 is carried forward to the next period with the unsold inventory.

5.4 Over- and under-absorbed fixed overheads

In Chapter 4 the calculation of over-recovery and under-recovery of fixed overhead costs is explained. This is also called over-absorbed and under-absorbed fixed

overheads. The adjustment of costs for over- and under-absorption is made in the cost of sales as shown in this section.

5.4.1 Over-absorbed fixed overhead

Now change the data in Exhibit 5.1 so that the level of production is different from that budgeted. In Exhibit 5.2 the actual production overhead level in July is higher at 10,100 than the budgeted level of 10,000. The actual production level in August is lower at 9,900 than the budgeted level of 10,000. Table 5.7 shows the absorption costing profit for July, while Table 5.8 shows the marginal costing profit for July.

Exhibit 5.2
Data for illustration: absorption and marginal costing

Mirror View Ltd produces freestanding magnifying mirrors for use in the home. The budgeted selling price and costs are as follows:

Budget for one unit:	£
Selling price	20
Direct materials	8
Direct labour	3
Variable production overhead	2
Total variable cost	13

The fixed production overhead cost for one month is budgeted as £30,000. The budgeted production volume is 10,000 units per month. Budgeted sales are expected to equal budgeted production volumes.

For the months of January to June the production and sales were 10,000 per month as budgeted. In the month of July the production was 10,100 but the sales were only 9,700 units, leaving 400 units in inventory (stock) as unsold goods. In the month of August the production was again 9,900 but the sales were 10,300 units. For the months of September to December the production and sales were again 10,000 units as budgeted.

Table 5.7
Profit and loss statement, month of July, based on absorption costing

Month of July	£	£
Sales (9,700 at £20)		194,000
Opening inventory	–	
Costs of production (10,100 at £16)	161,600	
Less over-absorbed overhead (100 at £3)	(300)	
Less closing inventory (400 at £16)	(6,400)	
Cost of goods sold		(154,900)
Profit		39,100

The over-absorbed overhead arises because the actual level of production was 100 units higher than expected. A total cost of £16 was charged to each of the additional units produced. The variable cost element of this charge, at £13 each, was justified because the additional units required additional variable costs of materials and labour. However, the fixed cost element of £3 per unit is not justified because the fixed cost does not increase with additional production. This part of the additional production cost charge must therefore be removed by deducting £300 (100 × £3).

Table 5.8
Profit and loss statement, month of July, based on marginal costing

Month of July	£	£
Sales (9,700 at £20)		194,000
Opening inventory	–	
Costs of production (10,100 at £13)	131,300	
Less closing inventory (400 at £13)	(5,200)	
Variable cost of goods sold		(126,100)
Contribution to fixed overhead cost		67,900
Fixed overhead costs		(30,000)
Profit		37,900

The absorption costing profit is greater than the marginal costing profit. The difference is £1,200 measured as 400 × £3 fixed overhead cost carried forward in closing inventory (with opening inventory nil).

5.4.2 Under-absorbed fixed overhead

For the month of August the information in Exhibit 5.2 shows that the sales are 10,300 units and the production is 9,900 units (see Tables 5.9 and 5.10).

Table 5.9
Profit and loss statement, month of August, based on absorption costing

Month of August	£	£
Sales (10,300 at £20)		206,000
Opening inventory (400 at £16)	6,400	
Costs of production (9,900 at £16)	158,400	
Add under-absorbed overhead (100 at £3)	300	
Less closing inventory	–	
Cost of goods sold		(165,100)
Profit		40,900

The under-absorbed overhead arises because the actual level of production was 100 units lower than expected. The lower variable cost is justified by the lower volume. However, the fixed cost element of £3 per unit must be charged on the expected basis of 10,000 units because fixed costs do not decrease when production volume decreases. This part of the production cost charge must therefore be included by adding £300 (100 × £3).

Table 5.10
Profit and loss statement, month of August, based on marginal costing

Month of July	£	£
Sales (10,300 at £20)		206,000
Opening inventory (400 at £13)	5,200	
Costs of production (9,900 at £13)	128,700	
Less closing inventory	–	
Variable cost of goods sold		(133,900)
Contribution to fixed overhead cost		72,100
Fixed overhead costs		(30,000)
Profit		42,100

The absorption costing profit is less than the marginal costing profit. The difference is £1,200 measured as 400 × £3 fixed overhead cost brought forward in the opening inventory with closing inventory nil.

5.5 Case study

This case study compares the effect of carrying fixed production overheads as a product cost or a period cost and also shows the effect of under-absorbed and over-absorbed fixed production overheads.

Casual Tables is a business that manufactures plastic tables for use in pavement cafés and bars. All tables are identical. The planning manager of Casual Tables is planning its operations for the next five months. Data regarding budgeted selling price, budgeted variable cost per unit and fixed production overheads are given in Table 5.11, together with budgeted volumes of production and sales over the next five months. The question to be answered is, 'How much profit is expected for each of the five months?'

Table 5.11
Data for comparing absorption costing and marginal costing

	£
Selling price per unit	20
Variable cost per unit	9
Fixed costs for each period	500

	Month 1 units	*Month 2 units*	*Month 3 units*	*Month 4 units*	*Month 5 units*
Produced	230	270	260	240	250
Sold	200	210	260	280	300
Held in stock at end of period	30	90	90	50	nil

Under absorption costing the first task is to decide how the fixed production costs for each month should be allocated to products. Where production volume is varying in the manner shown in Table 5.11, a common practice is to base the predetermined overhead cost rate on the **normal level of activity**. There is no precise definition for this, but it would take into account the budgeted level of activity in recent periods, the activity achieved in recent periods, and the expected output from normal working conditions. In this case, it might be reasonable to take a normal level of activity as the average production level, which is 250 units per month. The predetermined fixed overhead cost rate is therefore £2 per unit.

5.5.1 Absorption costing

Using absorption costing, the opening and closing stock is valued at total cost of £11 per unit, comprising variable cost per unit of £9 and fixed cost per unit of £2. Table 5.12 illustrates the absorption costing approach.

The line labelled 'under/(over) absorbed' reflects the absorption of overhead where the production of the months is above or below the base level of 250 units used to calculate the fixed overhead cost rate.

Table 5.12
Expected profit per month under absorption costing

	Month 1	*Month 2*	*Month 3*	*Month 4*	*Month 5*	*Total*
	£	£	£	£	£	£
Sales	4,000	4,200	5,200	5,600	6,000	25,000
Production units	230	270	260	240	250	
	£	£	£	£	£	£
Opening inventory at £11	nil	330	990	990	550	nil
Cost of production:						
At £11 per unit	2,530	2,970	2,860	2,640	2,750	13,750
Under/(over) absorbed	40	(40)	(20)	20	–	
Closing inventory at £11	(330)	(990)	(990)	(550)	nil	nil
Cost of goods sold	2,240	2,270	2,840	3,100	3,300	13,750
Profit	1,760	1,930	2,360	2,500	2,700	11,250

In month 1 the production, at 230 units, is 20 units less than the base level of 250. The cost absorbed by 230 units is £460 which is £40 less than the expected fixed overhead cost of £500 for the month. Another way of arriving at the same conclusion is to say that overhead is under-absorbed by £40 (multiplying 20 units by the fixed overhead cost rate of £2 each). In order to increase the absorbed cost of £460 to the expected (or actual) cost of £500, the £40 difference must be added to production cost in calculating the cost of sales.

In month 2 the production level is 270 units, which is 20 units higher than the base level of 250. This means that fixed overhead is over-absorbed by £40 (20 units at £2). The over-absorbed cost must be deducted from the cost of production to arrive at the cost of goods sold.

In month 3 the production level is 260 units, which is 10 units higher than the base level of 250. This means that fixed overhead is over-absorbed by £20 (10 units at £2). The over-absorbed cost is deducted from the cost of production.

In month 4 the production level is 240 units, which is 10 units less than the base level of 250. This means that fixed overhead is under-absorbed by £20 (10 units at £2). The under-absorbed cost is added to the cost of production.

In month 5 the production level is 250 units, equal to the base level. This means that exactly the correct amount of overhead cost is absorbed and no adjustment is needed.

Activity 5.3

Go back to the data of Table 5.11. Cover up the answer in Table 5.12 and then attempt to write out the profit calculation under absorption costing. Add a note of narrative explanation to each line as a means of helping understanding by yourself and others. Make sure that you understand the absorption costing approach fully.

Activity 5.4

Look back at the data of Table 5.11. Before turning to the answer in Table 5.13 attempt to write out the profit calculation under marginal costing. Add a note of narrative explanation to each line as a means of helping understanding by yourself and others.

5.5.2 Marginal costing

Using marginal costing, the stock of unsold output at the end of each month would be valued at the variable cost of £9 per unit. The fixed cost would be regarded as a cost of the month, without allocation to products. Table 5.13 illustrates the marginal costing approach.

Table 5.13
Expected profit per month under marginal costing

	Month 1	*Month 2*	*Month 3*	*Month 4*	*Month 5*	*Total*
	£	£	£	£	£	£
Sales	4,000	4,200	5,200	5,600	6,000	25,000
Production units	230	270	260	240	250	
	£	£	£	£	£	£
Opening inventory at £9	nil	270	810	810	450	Nil
Cost of production at £9	2,070	2,430	2,340	2,160	2,250	11,250
Closing inventory at £9	(270)	(810)	(810)	(450)	nil	nil
Variable cost of goods sold	1,800	1,890	2,340	2,520	2,700	11,250
Fixed costs of month	500	500	500	500	500	2,500
Total costs	2,300	2,390	2,840	3,020	3,200	13,750
Profit	1,700	1,810	2,360	2,580	2,800	11,250

Comparing Table 5.13 with Table 5.12, it may be seen that there is no under- or over-absorption in the marginal costing example because it treats fixed overhead cost of production as a period cost, not a product cost.

5.5.3 Comparison of profit under each approach

Table 5.14 compares the profit calculated under each approach.

Table 5.14
Comparison of profit, using absorption costing and marginal costing

	Month 1 £	*Month 2* £	*Month 3* £	*Month 4* £	*Month 5* £	*Total* £
Absorption costing	1,760	1,930	2,360	2,500	2,700	11,250
Variable costing	1,700	1,810	2,360	2,580	2,800	11,250
Difference	+60	+120	0	–80	–100	0

In month 1, the absorption costing profit is higher by £60, because there is an increase in inventory of 30 units, carrying a fixed overhead cost of £2 each. The increased inventory carries that cost forward to the next accounting period.

In month 2, the absorption costing profit is higher by £120, because there is an increase in inventory of 60 units, carrying a fixed overhead cost of £2 each.

In month 3, the absorption costing profit and the marginal costing profit are the same, because there is no change in inventory levels.

In month 4, the absorption costing profit is lower by £80, because there is a decrease in inventory of 40 units, bringing an additional fixed overhead of £2 each.

In month 5, absorption costing profit is lower by £100, because there is a decrease in inventory of 50 units, bringing an additional fixed overhead of £2 each.

Over the total period of five months the sales and production are equal, so absorption costing and marginal costing give the same total profit of £11,250.

Activity 5.5

Before reading the rest of this section, write a brief commentary on the most significant features of Table 5.14.

Points to note

1 Over the total period of time, where total production equals total sales, there is no difference in total profit (see Table 5.14). The difference between absorption costing and marginal costing is purely a result of timing of the matching of fixed overhead costs of production with sales.
2 In any period when stock levels are constant, both approaches give the same answer. During month 3, stock levels remain constant and therefore both approaches give the same answer.
3 The differences between the two profit calculations in any period are based entirely on the *change* in volume of stock during the month, multiplied by the fixed overhead cost rate of £2 per unit. During month 1, stock increases by 30 units over the month and, as a consequence, profit under absorption costing is £60 higher than under marginal costing. During month 2, stock increases by 60 units over the month and, as a consequence, profit under absorption costing is £120 higher. During month 4, stock levels decrease by 40 units so that profit under absorption costing is £80 lower. During month 5, stock levels decrease by 50 units and therefore profit under absorption costing is £100 lower.
4 The overall effect of the positive and negative differences over the business life is zero, provided the allocation process is applied consistently. Different allocation processes will cause costs to fall in different time months, but they cannot create or destroy costs in the total.
5 The effect of the change in stock levels may be understood using Table 5.14. Making a general statement from this specific example, it appears safe to say that when stock levels are increasing, profit under absorption costing is higher than it is under marginal costing. That is because a portion of the fixed production cost incurred in the month is carried forward to the next month as part of the closing stock valuation.
6 Generalising further from the analysis, it may be said that when stock levels are decreasing, profit under absorption costing is lower than it is under marginal costing. That is because fixed costs incurred in earlier months are brought to the current month as part of the opening stock, to be sold during the month.

5.6 Why is it necessary to understand the difference?

In Chapter 1 it was shown that management accounting has three major roles in directing attention, keeping the score and solving problems. The particular role which applies in any situation will depend upon the management function which is being served. That management function could relate to the formation of a judgement or to making a decision about a course of action. Chapter 2 showed that the classification of costs very much depends on which of the three management accounting roles is dominant in any specific situation and on the type of management function.

Where the management function relates to planning and control, the management accountant is carrying out a score-keeping function and it is usually necessary to account for fixed overhead costs of production as a part of the product cost. That means absorption costing is the appropriate approach. In this situation there is a strong overlap with financial accounting and with external reporting to stakeholders in a business. If the stakeholders are company shareholders, then the external reporting will be regulated by company law and accounting standards that require fixed costs of production to be treated as product costs and provide guidance on the allocation process. Where the stakeholders are the electorate, in the case of a public sector body, or partners in a business partnership, the rules may be more flexible, but in many cases they conventionally follow the practice recommended for companies.

Real world case 5.2

This extract from a newspaper article discusses the full cost of absorbing operating costs.

TRANSPORT group Go-Ahead expects a hit to profits from its bus business after failing to recover £2.5m of additional *fuel costs*, although the company expects overall group profits to be in line with expectations. The Newcastle firm, which with a fleet of 3,400 buses is one of the UK's biggest operators, said it was looking to cut costs. Some vacancies were not being filled. The company said fuel costs were likely to increase by £10m in the year to the end of June 2009 after this year's oil price spike at $145 a barrel. It has recovered £5m of the estimated £7.5m increase in the first half through fare rises and efficiency improvements, but the company said this still left £2.5m of unrecovered fuel costs.

In a trading update for the six months to the end of this month, the company said its performance should be in line with expectations for the full year to June, despite the ailing UK economy. Finance director Nick Swift said the company had been cost-cutting to weather the downturn and was also protected by regulated fare increases. 'We saw this coming, although we may not have seen it being as grim as it is . . . like-for-like costs are down a couple of per cent on a year ago.' Go-Ahead hedged its fuel for the year at 43p a litre, compared with 34p a litre in 2007/08. It has hedged 50% of the following year at 52p, but expects to hedge the rest of its requirements at a lower price.

Source: Peter McCusker, *The Journal*, 17 Dec. 2008 'Fuel cost hits bus profit – but passengers rise'. http://www.nebusiness.co.uk/business-news/latest-business-news/2008/12/17/fuel-cost-hits-bus-profit-but-passengers-rise-51140-22493338/.

Discussion points

1 What kinds of overhead costs are likely to be involved in bus operation?

2 The company uses hedging transactions (advance purchase) to eliminate the unpredictable nature of the cost of fuel. What other operating costs might have an element of unpredictability?

5.7 Absorption costing in financial accounting

In the valuation of inventory (stock), management accounting interacts with financial accounting. The accounting standards for inventory valuation set out rules which apply principles of absorption costing. This means that a portion of the fixed overheads must be allocated to inventory. If there was total freedom of choice in allocating fixed overheads, some managers would seek to allocate a *high proportion* of fixed overheads to inventory, in order to report the highest possible profit and so maintain stock market confidence, while other managers would seek to allocate a *low proportion* of fixed overheads to inventory, in order to report the lowest possible profit and so reduce the tax bill payable. In order to encourage confidence in the reliability of accounting information, and to reduce opportunities for earnings management, there must be *rules* on the manner of allocating fixed overhead costs of production. The financial reporting standards are also concerned with prudence – meaning that profits should not be overstated. The rules of the International Accounting Standards Board

Exhibit 5.3
Inventory valuation, IAS 2

9. Inventories shall be measured at the lower of cost and net realisable value.

10. The cost of inventories shall comprise all costs of purchase, costs of conversion and other costs incurred in bringing the inventories to their present location and condition.

11. The costs of purchase of inventories comprise the purchase price, import duties and other taxes (other than those subsequently recoverable by the entity from the taxing authorities), and transport, handling and other costs directly attributable to the acquisition of finished goods, materials and services. Trade discounts, rebates and other similar items are deducted in determining the costs of purchase.

Costs of conversion

12. The costs of conversion of inventories include costs directly related to the units of production, such as direct labour. They also include a *systematic allocation* of fixed and variable production overheads that are incurred in converting materials into finished goods. *Fixed production overheads* are those indirect costs of production that remain relatively constant regardless of the volume of production, such as depreciation and maintenance of factory buildings and equipment, and the cost of factory management and administration. *Variable production overheads* are those indirect costs of production that vary directly, or nearly directly, with the volume of production, such as indirect materials and indirect labour.

13. The allocation of fixed production overheads to the costs of conversion is based on the *normal capacity* of the production facilities. Normal capacity is the production expected to be achieved on average over a number of periods or seasons under normal circumstances, taking into account the loss of capacity resulting from planned maintenance. The actual level of production may be used if it approximates to normal capacity. The amount of fixed overhead allocated to each unit of production is not increased as a consequence of low production or idle plant. Unallocated overheads are recognised as an expense in the period in which they are incurred. In periods of *abnormally high production*, the amount of fixed overhead allocated to each unit of production is decreased so that inventories are not measured above cost. Variable production overheads are allocated to each unit of production on the basis of the actual use of the production facilities.

14. A production process may result in more than one product being produced simultaneously. This is the case, for example, when joint products are produced or when there is a main product and a by-product. When the costs of conversion of each product are not separately identifiable, they are allocated between the products on a rational and consistent basis. The allocation may be based, for example, on the relative sales value of each product either at the stage in the production process when the products become separately identifiable, or at the completion of production. Most by-products, by their nature, are immaterial. When this is the case, they are often measured at net realisable value and this value is deducted from the cost of the main product. As a result, the carrying amount of the main product is not materially different from its cost.

are set out in Exhibit 5.3, with added emphasis to bring out points of particular interest for absorption costing. The requirement for absorption costing is indicated by the wording of paragraph 10. The words '*systematic allocation*' in paragraph 12 are open to interpretation, giving scope for applying management accounting principles. Paragraph 12 also confirms that only production overheads are incorporated in the valuation of inventories, consistent with the condition in paragraph 9 of bringing *the inventories to their present condition and location* (i.e. produced and ready for sale).[1]

Similar principles are applied in the UK accounting standard SSAP 9 (1988) but it gives more detailed guidance on the meaning of 'normal activity'. SSAP 9 contains similar definitions in paragraphs 17 to 21. Appendix 1 'Further practical considerations' contains a section on 'The allocation of overheads' (paras 1 to 10) which gives detailed guidance on the application of absorption costing.

Exhibit 5.4
SSAP 9 and normal level of activity

> 8. The allocation of overheads included in the valuation of stocks and long-term contracts needs to be based on the company's normal level of activity, taking one year with another. The governing factor is that the cost of unused capacity should be written off in the current year. In determining what constitutes 'normal' the following factors need to be considered:
>
> (a) the volume of production which the production facilities are intended by their designers and by management to produce under the working conditions (e.g. single or double shift) prevailing during the year;
> (b) the budgeted level of activity for the year under review and for the ensuing year;
> (c) the level of activity achieved both in the year under review and in previous years.
>
> Source: Statement of Standard Accounting Practice SSAP 9 (1988). Stocks and Long-Term Contracts, Accounting Standards Board (UK). Appendix 1.

5.8 Arguments in favour of absorption costing

The arguments put forward in favour of absorption costing are:

1. Since all production costs are incurred with a view to creating a product for sale, all costs should attach to products until they are sold.
2. In the longer term, fixed overhead costs must be recovered through sales if the business is to survive. Setting the stock value by reference to full costs encourages a pricing policy which covers full cost.
3. If fixed production costs are treated as period costs (as happens in marginal costing) and there is a low level of sales activity in a period, then a relatively low profit or loss will be reported. If there is a high level of sales activity, there will be a relatively high profit. Absorption costing smooths out these fluctuations by carrying the fixed costs forward until the goods are sold.
4. Absorption costing helps the 'matching concept' of matching sales with the cost of sales of the same period
5. Where overhead costs are high in relation to direct costs, and fixed overheads are high in relation to variable costs, a marginal costing approach would bring out only a small portion of the total cost picture.
6. Absorption costing can be used in a 'cost plus profit' approach to pricing a contract for a customer.

5.9 Arguments in favour of marginal costing

Where the management accounting role is primarily that of directing attention and the management function is primarily one of decision making, it may be dangerous to regard fixed production costs as product costs. The attractions of using marginal costing in such a situation are as follows:

1. In the short term, relevant costs are required for decision making and fixed overheads are largely non-relevant because they cannot be avoided. They are best seen as a committed cost of the period.
2. Marginal costing avoids the arbitrary allocations of absorption costing, which may be misleading for short-term decision making.
3. Profit calculation is not dependent on changes in stock levels. The tables in this chapter illustrate the practical effect of disentangling fixed costs from stock values.

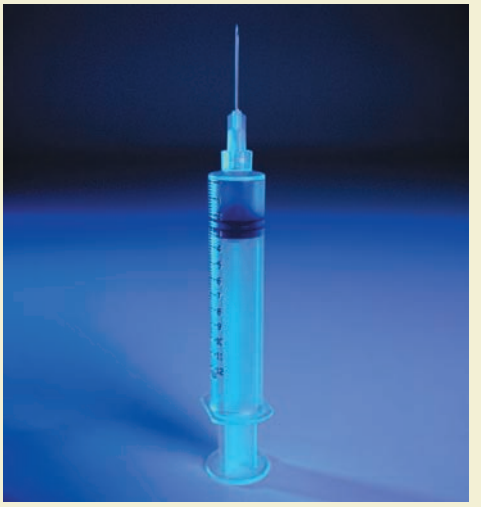
4 There is no risk of carrying forward in stock an element of fixed production overhead cost which may not be recovered through sales.
5 Allocating all production costs to products and then applying full-cost pricing may result in loss of sales which would have made a contribution to fixed production costs and profit.
6 Where sales volumes are declining but output is sustained, marginal costing provides the profit warning more rapidly than does absorption costing in a situation where attention needs to be drawn urgently to the profit implications.

Activity 5.6

Now that you understand the difference between marginal costing and absorption costing, write a short evaluation of the two approaches.

Real world case 5.3

The following extract discusses whether companies should give away their products free when the marginal cost of production is relatively high.



Giving products away free, from browsers to newspaper articles, is commonplace in the technology and media industries. The trend has now spread to vaccines.

Pharmaceuticals companies, scarred by years of losing the public relations battle to campaigners over the price of HIV/Aids drugs in Africa, are eager not to be caught out by swine flu. Andrew Witty, chief executive of GlaxoSmithKline, has offered to donate 50m doses of GSK's planned swine flu vaccine to the World Heath Organisation. He has caught the public mood: Margaret Chan, WHO director-general, has urged 'solidarity' with poor countries over the H1N1 flu virus. Mr Witty and Ms Chan have forced Daniel Vasella, chief executive of Novartis, to defend the profit motive. He told the *FT* this week that Novartis did not want to follow the GSK example by giving away doses of its planned vaccine because 'if you want to make production sustainable, you have to create financial incentives'.

. . . [*the article continues with a discussion of the arguments against free gift*] . . .

First, if developing countries do not pay for vaccines, there is a danger that drugs companies will stop producing enough of them. Vaccines have a high marginal cost of production because they have to be cultured in eggs, and stored and distributed carefully.

Second, while there is a benefit to one-off donations of vaccines against adult pandemics such as swine flu, there is no point in a developing country vaccinating children one year with a donation of free medicines if it cannot afford to carry on with the programme.

Source: John Gapper 'The hidden cost of giving away vaccines' *Financial Times*, 17 June 2009.

Discussion points

1 Can a company sustain making free gifts of its products when the marginal cost of production is relatively high?
2 What does the first company see as the risk of charging the full cost of vaccines to all countries?

5.10 What the researchers have found

5.10.1 Full costing in the NHS

Northcott and Llewellyn (2003) reported opinions on the UK national reference costing index as a measure of the 'ladder of success' in healthcare services. The Real world cases 5.1 and 5.3 in this chapter have given a brief insight into the depth of detail of the guidance given on recording costs in the NHS. Northcott and Llewellyn explored views on the way that these costs are aggregated to give a comparative index for hospital costs. They found problems in the absence of a standard against which to compare actual costs, in non-comparability of hospitals featured in the index, and in lack of standardisation of costing practices. The comments made by interviewees included concerns about the process of cost allocation.

Healthcare activities are categorised within healthcare resource groups (HRGs). The costs of these HRGs are calculated retrospectively based on actual costs incurred by hospital trusts. To calculate the HRG costs, the trusts produce 'costed care profiles'. There is no standard approach to working out these costs, so trusts can use different cost pools and different methods of apportionment. Tables are published with the intention that performance can be compared but if the processes are not standardised then the comparisons may not be valid.

The authors recommend separate reporting of direct and indirect costs, more careful definition of clusters of trusts having similar characteristics, target cost outcome for each cluster rather than judging all against the overall average, and a focus on selective comparison rather than coverage of all treatments. However, they also recognise that such changes are unlikely because making the indexes more meaningful could reduce the political power of a single index.

5.10.2 Full cost accounting and environmental resources

Bebbington *et al.* (2001) explained the problems of measuring the full cost of production when environmental costs are taken into account. If the full costs are not measured then it is not possible to say whether the activity is sustainable in the longer term. For this exercise 'full cost' has a very broad meaning. It starts with the direct and indirect costs usually associated with production, as explained in Chapters 3 and 4. It then looks for hidden costs of sustaining production, such as monitoring and safety costs. Next come the liabilities to make good environmental damage. Then there are costs and benefits associated with the reputation of the business as good or insensitive to the environment. Finally there are the costs that the organisation would incur if it had a positive attitude towards maintaining and improving the environment. The authors call for a full cost framework based on these ideas. There is no practical framework in place as yet but, given the continued political interest in matters of sustainability, it seems quite likely that the debate on 'full costing' will continue.

5.11 Summary

This chapter has explained the differences between absorption costing and marginal costing.

Key themes in this chapter are:

- In **absorption costing** (*full costing*), all production costs are absorbed into products. The unsold inventory is measured at total cost of production. Fixed production overhead costs are treated as a product cost.

- In **marginal costing** (*variable costing*), only variable costs of production are allocated to products. The unsold inventory is measured at variable cost of production. Fixed production overhead costs are treated as a period cost of the period in which they are incurred.
- Under-absorbed or over-absorbed fixed overhead cost may arise in absorption costing. It is reported in the profit and loss statement as an adjustment to cost of sales.
- Profit under absorption costing *differs* from profit under marginal costing *when inventory levels are changing*. If *total production equals total sales* there is *no difference* in total profit.
- When inventory levels are *falling*, profit under **absorption costing** is *lower* than profit under **marginal costing**. The difference is equal to the *decrease in inventory levels* multiplied by the *fixed overhead cost rate*.
- When inventory levels are *rising*, profit under **absorption costing** is *higher* than profit under **marginal costing**. The difference is equal to the *increase in inventory levels* multiplied by the *fixed overhead cost rate*.
- **Absorption costing** is usually required for inventory valuation in **financial accounting** standards or other regulations. Those using such financial statements need to be aware that reported profit can be affected by the change in the volume of inventory over the period.
- **Marginal costing** may be more useful for **decision making** because it treats fixed production overhead costs as a cost of the period. Reported profit is not affected by the changes in inventory held.

References and further reading

Bebbington, J., Gray, R., Hibbitt, C. and Kirk, E. (2001) *Full cost accounting: an agenda for action*. London: Association of Chartered Certified Accountants.

Northcott, D. and Llewellyn, S. (2003) 'The "ladder of success" in healthcare: the UK national reference costing index', *Management Accounting Research*, 14: 51–66.

QUESTIONS

The Questions section of each chapter has three types of question. '**Test your understanding**' questions to help you review your reading are in the 'A' series of questions. You will find the answer to these by reading and thinking about the material in the textbook. '**Application**' questions to test your ability to apply technical skills are in the 'B' series of questions. Questions requiring you to show skills in '**Problem solving and evaluation**' are in the 'C' series of questions. A symbol **[S]** means that there is a solution available at the end of the book.

A Test your understanding

A5.1 Define absorption costing (section 5.3.1).

A5.2 Define marginal costing (section 5.3.2).

A5.3 Explain why absorption costing and marginal costing may lead to different measures of profit in a period (section 5.3.3).

A5.4 When the volume of closing inventory is lower than the volume of opening inventory, which will show the greater profit, absorption costing or marginal costing (section 5.3.4)?

A5.5 When the volume of closing inventory is greater than the volume of opening inventory, which will show the greater profit, absorption costing or marginal costing (section 5.3.5)?

A5.6 When the volume of closing inventory is the same as the volume of opening inventory, which will show the greater profit, absorption costing or marginal costing (sections 5.3.4 and 5.3.5)?

A5.7 What are the requirements of financial reporting with regard to the absorption of fixed overhead costs of production (section 5.7)?

A5.8 Set out the arguments in favour of absorption costing (section 5.8).

A5.9 Set out the arguments in favour of marginal costing (section 5.9).

A5.10 What have researchers found about full costing in the NHS (section 5.10.1)?

A5.11 How is the idea of 'full costing' extended when long-term environmental costs are considered (section 5.10.2)?

B Application

B5.1 [S]

Bookcases Ltd produces packs of book shelves for self-assembly. The budgeted selling price and costs are as follows:

Budget for one unit:

	£
Selling price	60
Direct materials	36
Direct labour	5
Variable production overhead	3
Total variable cost	44

The fixed production overhead cost for one month is budgeted as £40,000. The budgeted production volume is 5,000 units per month.

In the month of February sales are lower than expected. At the start of March there are 200 unsold units in stock. Production is maintained at 5,000 units in the month of March.

Required

Calculate the profit for March under (a) absorption costing and (b) marginal costing for each of the following situations:

(1) Situation A: sales in March are 4,700 units
(2) Situation B: sales in March are 5,100 units

B5.2 [S]

Playtime Ltd produces jigsaws for sale in model shops. The following information relates to the sales and costs of producing the jigsaws.

Selling price per unit is £20
Variable cost per unit is £10
Fixed costs of the period are £800

Volumes of production and sales are as follows for periods 1, 2 and 3.

	Period 1 units	*Period 2 units*	*Period 3 units*
Produced	250	200	180
Sold	210	210	210
Held in stock at end of period	40	30	nil

Required

(a) Using absorption costing, what is the profit of Period 2?
(b) Using marginal costing what is the profit of Period 2?
(c) Compare the profit of Period 1 under absorption costing with that calculated under marginal costing and explain the difference.
(d) Using absorption costing, calculate the value of closing stock at the end of Period 1.
(e) Using marginal costing, calculate the value of closing stock at the end of Period 1.

B5.3

Resistor Ltd manufactures electrical units. All units are identical. The following information relates to June and July Year 5.

(a) Budgeted costs and selling prices were:

	June £	*July* £
Variable manufacturing cost per unit	2.00	2.20
Total fixed manufacturing costs (based on budgeted output of 25,000 units per month)	40,000	44,000
Total fixed marketing cost (based on budgeted sales of 25,000 units per month)	14,000	15,400
Selling price per unit	5.00	5.50

(b) Actual production and sales recorded were:

	Units	*Units*
Production	24,000	24,000
Sales	21,000	26,500

(c) There was no stock of finished goods at the start of June Year 5. There was no wastage or loss of finished goods during either June or July Year 5.
(d) Actual costs incurred corresponded to those budgeted for each month.

Required

Calculate the relative effects on the monthly operating profits of applying:

(a) absorption costing;
(b) marginal costing.

B5.4

(a) Explain what is meant by (i) absorption costing; and (ii) variable costing.
(b) Explain the arguments in favour of absorption costing and the arguments in favour of variable costing.

B5.5 [S] [CIMA question]

A company produces and sells one type of product. The details for last year were as follows:

Production and sales

	Budget	*Actual*
Production (units)	25,000	22,000
Sales (units)	23,000	20,000

There was no inventory at the start of the year.

Selling price and costs

	Budget $	*Actual* $
Selling price per unit	70	70
Variable costs per unit	55	55
Fixed production overhead	130,000	118,000
Fixed selling costs	75,000	75,000

Calculate the actual profit for the year that would be reported using:

(i) marginal costing;
(ii) absorption costing.

CIMA Paper P1 – Management Accounting – Performance Evaluation November 2008, Question 1.14

C Problem solving and evaluation

C5.1 [S]

The table below sets out data for the Mobile Phone Manufacturing Company for the four quarters of Year 1.

	£
Selling price per unit	120
Variable cost per unit	70
Fixed overhead production cost for each quarter	20,000

	Qtr 1 units	*Qtr 2 units*	*Qtr 3 units*	*Qtr 4 units*	*Total*
Planned production	1,000	1,000	1,000	1,000	4,000
Actual production	1,000	1,000	900	1,100	4,000
Actual sales	900	1,100	900	1,100	4,000

The fixed overhead production cost for each month is based on budgeted production of 1,000 units per quarter. The fixed overhead is absorbed into products on the basis of a predetermined overhead rate of £20 per unit.

Actual production fluctuates in quarters 3 and 4 due to labour problems. Actual sales fluctuate each quarter due to seasonal factors but the company meets its target for production and sales over the year as a whole.

Required

Prepare a statement of quarterly profit for each of the four quarters of Year 1 using:

(a) absorption costing; and
(b) marginal costing.

C5.2

The board of directors of Performance Ltd appointed a new manager to the Southern division of the company at the start of year 6. The expectation was that the manager would improve the gross profit as a percentage of sales, as compared with the results for year 4 and year 5.

Relevant information in respect of the Southern division for each year is as follows:

1. Sales and costs of the division were as follows:

	Year 4	*Year 5*	*Year 6*
Sales	10,000 units	11,000 units	12,000 units
Production	9,000 units	10,000 units	15,000 units
Variable cost of production	£5.00 per unit	£6.00 per unit	£7.00 per unit
Variable cost of selling	£2.00 per unit	£2.20 per unit	£2.40 per unit
Total fixed costs of production per annum	£210,000	£230,000	£390,000

2. Selling prices each year were based on full unit cost plus a percentage mark-up on cost:

   Year 4: Full unit cost plus 25 per cent of cost
   Year 5: Full unit cost plus 24 per cent of cost
   Year 6: Full unit cost plus 20 per cent of cost

3. There were 4,000 units of finished goods in stock at the start of Year 4. These were valued using costs identical to those incurred during Year 4.
4. The company policy is to value inventories (stocks) on a FIFO basis.

In year 4 and year 5 the company followed its previous practice of valuing inventories (stocks) at variable cost of production for management accounting purposes. The new manager of Southern division has insisted quite strongly that the inventories (stocks) should be valued on a full absorption costing basis, for consistency with external reporting standards.

Required
Prepare a report to the board of directors of Performance Ltd showing how the profit performance of the Southern division in Year 6 compares with that of Year 5 and Year 4 respectively.

Case studies

Real world cases

Prepare short answers to case studies **5.1**, **5.2** and **5.3**.

Case 5.4 (group case study)

As a group you are planning a garden renovation service to take advantage of the current popularity of television programmes dealing with garden design. Within the group, allocate the following roles:

- design skills
- labouring and building skills
- business planning skills
- marketing skills.

As a team discuss the approach you would take to estimating the cost of a job for quoting to an intending customer. Discuss also the proposal in a gardening advice magazine that those starting out in a new business should seek only to recover variable costs until their reputation is established. Report back to the rest of the class on:

- the costs to be recorded;
- the extent to which team members agree or disagree on costs to be included;
- your views on the suggestion that only variable costs should be recovered initially.

Note

1. The UK accounting standard SSAP 9 (1988) *Stocks and long-term contracts contracts* contains similar definitions in paragraphs 17 to 21. Appendix 1 'Further practical considerations' contains a section on 'The allocation of overheads' (paras 1 to 10) which gives detailed guidance on the application of absorption costing.