

# *The role of wholesalers in the medicines supply chain*

*Healthcare Distribution  
Association*

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# Executive summary

## Introduction

The Healthcare Distribution Association (HDA) have commissioned two analyses from PwC:

1. **Distribution cost analysis** to assess the impact of wholesaling on the cost of medicines distribution in the UK. This question will help the HDA and its membership to understand the cost efficiencies that wholesalers have delivered to the supply chain to the ultimate benefit of the NHS and its patients.
2. **Profitability analysis** to assess whether the returns achieved by wholesalers are consistent with those of a competitive market.

Our analysis covers the activities of the seven full or core members of the HDA.

## Context

Demand for medicines by the NHS is set to continue to rise – for example, due to the ageing population and the growing number of patients with long term co-morbidities. However, the NHS Five-Year Forward View identified a potential £30bn gap between the likely resources available and those required to prevent a diminution of patient service levels by 2020/2021.

As a consequence, all parts of the medicines supply chain face pressure to reduce their costs:

- In 2015, the Carter Review of Operational Productivity in NHS providers identified potential target savings of £700m on annual procurement budgets at acute hospitals.

- In October 2016, the Government imposed a two-year funding package on community pharmacy, with a £113 million reduction in funding in 2016/17.
- The Health Service Medical Supplies (Costs) Act provides powers for the Government to control the price paid by the NHS for generic medicines.

## Distribution cost analysis

To understand the cost efficiencies delivered by wholesalers, our analysis models the total supply chain costs of:

- the current wholesale model
- two alternative distribution systems where manufacturers deliver their own products on either a twice daily or a weekly basis.

Our analysis includes the broader medicine supply chain, capturing the costs which are incurred by manufacturers and healthcare providers (including community pharmacies) as well as by wholesalers. Total supply chain costs are divided into 13 separate elements which reflect the key activities of the supply chain. We have identified specific cost drivers for each element of cost which we then flex to model the total costs under the two scenarios where manufacturers would deliver their own products.

### Our findings

#### **Wholesale costs represent just 2.6% of NHS spending on medicines in the UK**

The cost of medicines distribution in the current distribution model amounts to £864m. Of this, only £477m are incurred by wholesalers – currently they are 2.6% of total NHS spending on medicines. Wholesalers face competition which means they are under significant pressure to minimise their costs.

#### **Without the efficient delivery model enabled by wholesalers, costs could rise by 45% (£389m per annum)**

Total supply chain costs would increase by 45% to £1.25bn per annum if wholesalers cease to exist and manufacturers are responsible for delivering their medicines on a twice daily basis.

#### **Even a major diminution in service levels (weekly delivery) would not deliver the cost efficiency offered by wholesalers**

In the manufacturer weekly delivery scenario, total supply chain costs are estimated to increase by around 9% to £938m per annum. Even with the significant reduction in service levels (and value) that would accompany such a change, the costs facing the supply chain would still be greater than those of the current distribution model.

The two alternative manufacturer distribution models are designed to highlight the benefits of the current wholesale distribution model. They are not intended to suggest possible or desirable ways the industry could be organised.

Our analysis highlights that wholesalers enable cost efficiencies to be realised. They are able to offer economies of scale by aggregating deliveries and inventory to distribute high volumes of products efficiently to a highly atomised downstream market.



## Profitability analysis

Our profitability analysis is intended to help the HDA and its members consider whether and how they can contribute to cost reduction in the NHS.

To assess this question, we undertook a profitability assessment of the HDA's members. In particular, we compared their actual profitability with that which would be expected in a fully competitive market. The assessment includes the activities of the seven full or core members of the HDA. It does not include the activities of the associate members.

We consider the returns achieved by the members over the last five years in terms of the return on capital employed (ROCE) and compare them to the sector's weighted average cost of capital (WACC) which allows us to conclude whether or not the levels of profit are consistent with those of a competitive industry given the level of investment in the industry.

### Our findings

Our key results are shown in Table 1 below using two different methodologies for calculating the value of the intangible assets deployed by wholesalers.

In a perfectly competitive market we would expect the ROCE in the pharmaceutical wholesale sector to equal the WACC. A higher return would suggest lower levels of competition whilst a ROCE below the WACC could indicate a vulnerable, unsustainable business which may struggle to attract future investment.

**Table 1: Profitability (ROCE less WACC), weighted average of the HDA core members**

	2011	2012	2013	2014	2015	Average
Tobin's Q approach	-5.8%	-3.1%	-1.9%	2.2%	1.3%	-1.5%
Transactions data approach	-5.3%	-2.3%	-0.9%	3.7%	2.8%	-0.4%
Average	-5.5%	-2.7%	-1.4%	2.9%	2.1%	-0.9%

Source: PwC analysis

The results and their key implications are as follows:

#### **HDA members have achieved negative economic returns over the cycle**

On average over the economic cycle, HDA members achieved returns that were slightly below the cost of capital. However, the value is not significantly different from zero. The result is broadly the same using both methods and is consistent with a competitive market, where firms are struggling to earn sufficient revenue to justify reinvestment.

#### **Returns prior to 2013 were unsustainable and gave no incentive for investors to replace assets**

From 2011 to 2013, as the UK gradually recovered from recession, the returns achieved on invested capital were

significantly less than the minimum return required to compensate investors.

#### **As the economy has recovered, returns have moved to a sustainable level**

Since 2014, there has been evidence of recovery as returns have been marginally higher than the cost of capital.

#### **The market remains fragile**

Given that the ROCE has been slightly below the WACC over the five year period, any market reforms which threaten to reduce profitability could damage the sustainability of the wholesale business model in the UK.



## Introduction

*In 2015, PwC LLP conducted a scoping study for the British Association of Pharmaceutical Wholesalers (BAPW), the predecessor of the HDA, to identify and assess how it could evidence the current and future value of pharmaceutical wholesaling.*

*Following the scoping study, we were commissioned to undertake:*

- *a distribution cost analysis*
- *a profitability analysis.*

### **Distribution cost analysis**

The distribution cost analysis considers the current costs of delivering medicines to community pharmacies, hospitals and dispensing doctors. It then examines how the costs facing the supply chain would change under an alternative distribution model where different pharmaceutical manufacturers were directly responsible for distribution of their products to healthcare providers across the UK (and could not rely on wholesalers).

The purpose of this work is to understand the cost efficiencies delivered by the presence of a wholesale function in the medicine supply chain to aggregate orders and deliveries.

### **Profitability analysis**

The profitability analysis considers the economic (rather than the accounting) returns achieved by HDA members over the last five years. These are measured in terms of the return on capital employed (ROCE) which is then compared to the sector's weighted average cost of capital (WACC).

This allows us to infer whether or not the returns:

- appear excessive in light of the level of investment in the industry
- are consistent with those of a competitive market.



## ***Scope of analysis***

Our analysis covers medicine deliveries undertaken by the seven full members of the HDA. It does not include the activities of the associate members or non-HDA members.

The HDA's full members are AAH Pharmaceuticals Ltd, Alliance Healthcare (Distribution) Ltd, Lexon UK Ltd, Sangers (NI) Ltd, Sangers (Maidstone) Ltd, Phoenix Healthcare Distribution Ltd and Mawdsley-Brooks & Co. Ltd.

## ***Report structure***

The remainder of our report is structured in four further sections:

- Section 3 describes the relevant background and context.
- Section 4 sets out our distribution cost analysis.
- Section 5 presents our profitability analysis.

# Context

## Budgetary pressure on the medicines supply chain

The NHS faces unprecedented budgetary pressure. The five-year forward view identified a potential £30bn gap between likely resources and those required to prevent a diminution of patient service levels by 2020/21<sup>1</sup>.

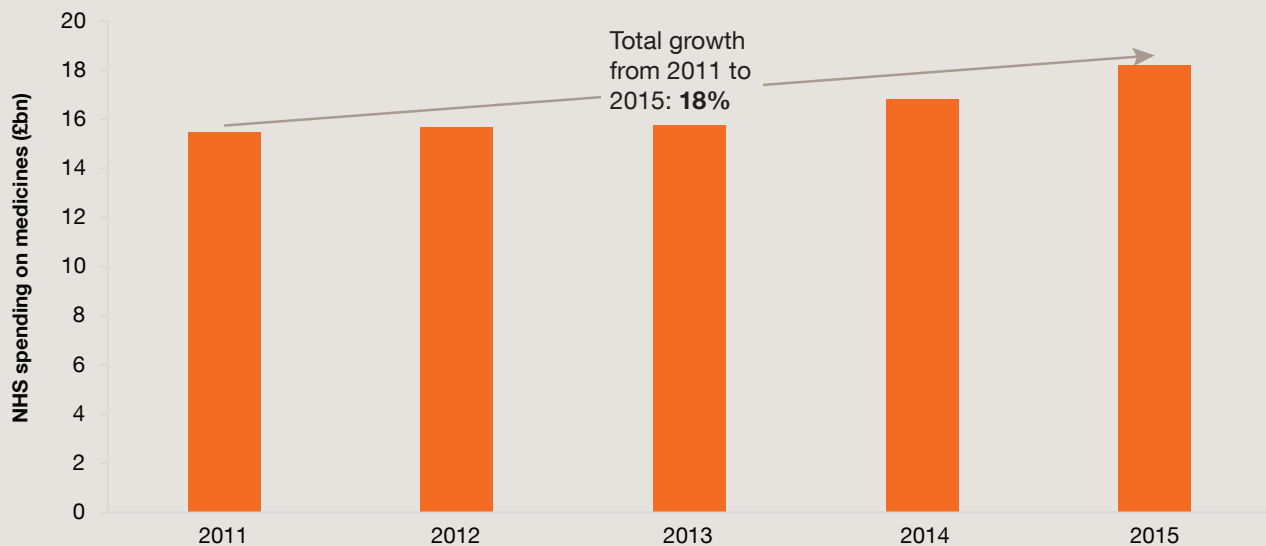
NHS spending on medicines in the UK accounts for £18.2bn a year<sup>2</sup>, so this is an area which is likely to be considered when looking at potential cost savings. Moreover, spend on medicines has been increasing and is likely to continue to rise over time as a result of the ageing population and increasing number of patients with long term co-morbidities. NHS spending on medicines in the UK has increased by 18% from 2011 to 2015 as illustrated in Figure 1. The rise in the number of medicines dispensed has been even more stark. The total number of prescriptions fulfilled in the UK (excluding dressings and appliances) has increased by almost 60% over the last decade<sup>3</sup>.

In recognition of these challenges, the Carter Review of Operational Productivity in NHS providers was commissioned by the Department of Health (DH) in 2015. It analysed NHS medicine spend and procurement practices and highlighted significant differences in hospital efficiency in inventory management and the prices paid for consumables, medicines and medical devices. On this basis, the final report identified potential target savings of £700m on annual procurement budgets at acute hospitals<sup>4</sup>.

The growing pressure on the NHS's budget increases the vulnerability of wholesalers' position in the supply chain which is already experiencing pressure to reduce costs. For example, the Health Service Medical Supplies (Costs) Act provides powers for Government to control the prices paid by the NHS for branded and generic medicines. The Bill also changes the application of the Pharmaceutical Price Regulation Scheme.

The community pharmacy sector also faces increased pressure to reduce its costs. In October 2016, the Government imposed a two-year funding package on community pharmacy, with a £113 million reduction in funding in 2016/17.

Figure 1: NHS spending on medicines in the UK



Source: HSCIC, Primary Care Services Wales, ISD Scotland, Business Services Organisation Northern Ireland

- 1 NHS five year forward view <https://www.england.nhs.uk/wp-content/uploads/2014/10/5yfv-web.pdf>
- 2 Source: HSCIC, Primary Care Services Wales, ISD Scotland, Business Services Organisation Northern Ireland
- 3 Source: ABPI
- 4 The Carter Review Final Report, <https://www.gov.uk/government/publications/productivity-in-nhs-hospitals>



## New regulatory requirements

The pharmaceutical wholesale sector is subject to new regulatory requirements which are aimed at ensuring safe access to medicines of a guaranteed quality to all patients. Wholesalers have made significant investments to ensure compliance with these regulations.

The regulatory compliance costs are increasing with the recent Delegated Regulation of the Falsified Medicines Directive which came into force in February 2016. The UK medicines supply chain has until 2019 to introduce two mandatory safety features on the packaging of medicines that will allow medicines to be verified and authenticated throughout the legitimate supply chain. These requirements demand substantial investment in infrastructure and on-going costs to enable them to work which will have significant cost implications for wholesalers and consequently may impact their return on capital. If their returns fall below the minimum required to attract investment in the sector, it could damage the long term sustainability of the wholesale business model.

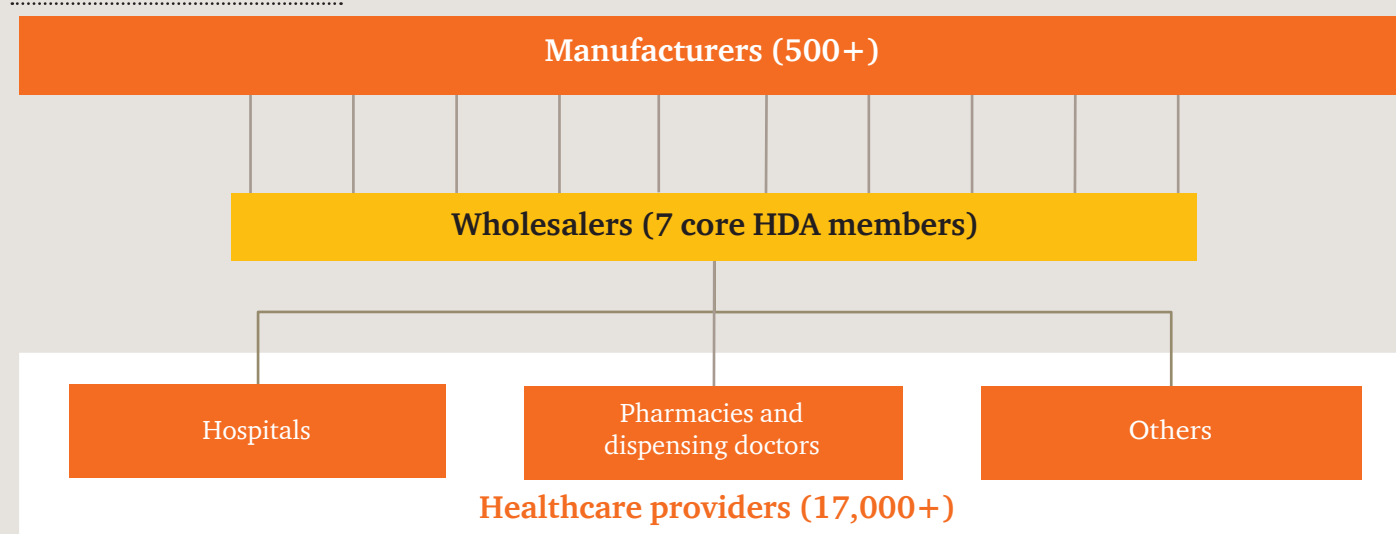
## Role of wholesalers

The physical operations of pharmaceutical wholesalers sit between medicines manufacturers and healthcare providers. As illustrated in Figure 2, wholesalers aggregate the products of hundreds of manufacturers of both branded and generic medicines which supply the UK market. They then work to supply more than 17,000 healthcare providers around the UK, including hospitals, community pharmacies and dispensing doctors<sup>5</sup>. The HDA members included in our analysis deliver around 90% of all medicines to healthcare providers in the UK<sup>6</sup>.

HDA members offer twice daily delivery of medicines across the UK so if a patient visits a community pharmacy in the morning and the medicine is not in stock, they should be able to return and collect it in the afternoon. However, not all medicines are distributed through the traditional wholesale model as the past decade has seen the emergence and increasing prevalence of alternative distribution methods such as Direct-to-Pharmacy (DTP), solus arrangements and reduced wholesaler model.

Over the past few years, wholesalers have sought to improve their efficiency by investing in technology and adopting lean operating practices. In addition to their core distribution activities, they have made significant investments in value added services intended to improve efficiency across the value chain. These include providing inventory management, IT systems, training, financial management and support with regulatory compliance to their supply chain partners. In this way, wholesalers enable other players in the value chain to focus on their core activities.

Figure 2: Flow of medicines



Source: PwC analysis

5 Source: HSCIC, Community Pharmacy Services in Wales, Dispensing Doctors' Association, Business Services Organisation, PwC analysis, HDA members

6 Healthcare Distribution Association

# Distribution cost analysis

## Introduction

Our distribution cost analysis assesses the impact of wholesaling on the current cost of medicines distribution in the UK covering the activities of the seven full or core members of the HDA. The analysis estimates the cost efficiencies delivered by wholesalers by determining the total supply chain costs of:

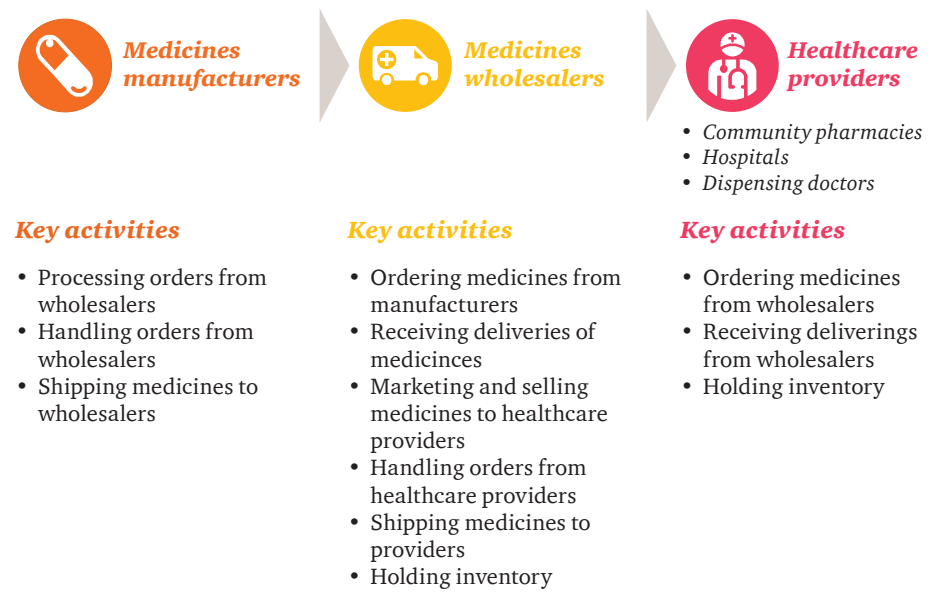
- the current wholesale model
- two alternative distribution systems where manufacturers deliver their own products on either a twice daily or weekly basis.

This section first discusses the activities within the medicines supply chain included in the scope of our analysis. We then set out in detail the key features of the scenarios that we assess and follow this with a discussion of our approach to undertaking the distribution cost modelling. Finally, we present the results of our analysis and the results of our sensitivity analysis where we flex some of the fundamental assumptions that we rely upon in the analysis.

## Activities within the medicines supply chain

The medicines distribution supply chain consists of medicines manufacturers, wholesalers and healthcare providers (i.e. hospitals, community pharmacies and dispensing doctors). In order to estimate the total supply chain costs of medicines distribution, we identified the key activities associated with medicines distribution at each stage of the supply chain. Figure 3 illustrates the activities included in our analysis: it includes the activities of medicines manufacturers and healthcare providers, not just the activities of HDA members<sup>7</sup>.

Figure 3: Key activities within the medicines supply chain



We identified 13 distinct (groups of) activities undertaken within the supply chain (see Table 2). We have, therefore, segmented the total supply chain costs into these 13 cost elements which include all of the main costs faced by wholesalers. For manufacturers and healthcare providers we only include selected activities directly linked to the supply chain, such as order processing and shipping.

Under the two manufacturer delivery scenarios, we envisage that manufacturers would undertake the activities that wholesalers currently perform (i.e. activities 4 – 10). We have labelled the costs borne by manufacturers as the costs incurred at the production centres and the costs of wholesalers as the costs borne at the distribution centres. Under the two scenarios where manufacturers undertake the activities of wholesalers, the costs at the production and distribution centres are borne by manufacturers.

We have identified specific cost drivers for each element of distribution costs as shown in Table 3. In order to model the total costs under alternative scenarios where manufacturers deliver their own products, we flex the relevant costs drivers in each cost element. Our segmentation of the costs enables us to combine costs with common and identifiable drivers which can be varied between the different scenarios.

<sup>7</sup> We note inventory held by manufacturers has been treated as production inventory and, hence, has been excluded from the cost of medicines distribution.

**Table 2: Cost elements associated with medicines distribution**

Manufacturers	Wholesalers	Healthcare providers
<ul style="list-style-type: none"> <li>Processing orders from wholesalers</li> <li>Handling orders from wholesalers</li> <li>Shipping medicines to wholesalers</li> </ul>	<ul style="list-style-type: none"> <li>Ordering medicines from manufacturers</li> <li>Receiving deliveries of medicines</li> <li>Marketing and selling medicines to providers</li> <li>Handling orders from healthcare providers</li> <li>Shipping medicines to providers</li> <li>Holding inventory</li> <li>Overheads</li> </ul>	<ul style="list-style-type: none"> <li>Ordering medicines from wholesalers</li> <li>Receiving deliveries from wholesalers</li> <li>Holding inventory</li> </ul>

Source: PwC analysis

**Table 3: Key activities and cost drivers for each cost element**

Cost segment	Description of key activities	Key cost driver(s)
1. Manufacturer shipping costs (at production centres)	The costs incurred by manufacturers to ship medicines to distribution centres	<ul style="list-style-type: none"> <li>Volume of medicines shipped</li> <li>Type of delivery vehicles</li> </ul>
2. Manufacturer order processing costs (at production centres)	The costs incurred by manufacturers to process orders for medicines at the production centres	<ul style="list-style-type: none"> <li>Number of orders received</li> </ul>
3. Manufacturer order handling costs (at production centres)	The costs incurred by manufacturers to handle orders of medicines and load delivery trucks at the production centres	<ul style="list-style-type: none"> <li>Volume of medicines shipped</li> <li>Type of delivery vehicles</li> </ul>
4. Wholesaler/manufacturers purchase order receipt costs (at distribution centres)	The costs incurred by wholesaler/manufacturers to physically receive and handle orders for medicines from production centres	<ul style="list-style-type: none"> <li>Volume of medicines received</li> <li>Type of delivery vehicles</li> </ul>
5. Wholesaler/manufacturers purchase cost (at distribution centres)	The administrative costs incurred by wholesalers/manufacturers to place orders with the production centres	<ul style="list-style-type: none"> <li>Number of orders made</li> </ul>
6. Wholesaler/manufacturers sales costs	The administrative costs incurred by wholesalers/manufacturers to market and sell medicines to healthcare providers	<ul style="list-style-type: none"> <li>Number of healthcare providers served</li> </ul>
7. Wholesaler/manufacturers sales order handling costs	The costs incurred by wholesalers/manufacturers to physically process and handle orders for medicines from healthcare providers	<ul style="list-style-type: none"> <li>Volume of medicines shipped</li> <li>Number and scale of facilities</li> </ul>
8. Wholesaler/manufacturers shipping costs (at distribution centres)	The costs incurred by wholesalers/manufacturers to deliver medicines from distribution centres to the healthcare providers	<ul style="list-style-type: none"> <li>Volume of medicines shipped</li> <li>Frequency of deliveries</li> </ul>
9. Wholesaler/manufacturers inventory costs (at distribution centres)	The cost of capital associated with the inventory held at the distribution centres	<ul style="list-style-type: none"> <li>Value of inventory held</li> </ul>
10. Wholesaler/manufacturers overheads (at distribution centres)	Other costs that cannot be solely attributed to any of the preceding cost elements (includes costs such as warehousing costs, utilities, cost of back office functions)	<ul style="list-style-type: none"> <li>Number and scale of facilities</li> </ul>
11. Healthcare provider order processing costs	The costs incurred by providers to place orders for medicines from wholesalers/manufacturers	<ul style="list-style-type: none"> <li>Number of orders made</li> </ul>
12. Healthcare provider order handling costs	The costs incurred by providers to physically receive and handle orders from wholesalers/manufacturers	<ul style="list-style-type: none"> <li>Number of deliveries received</li> </ul>
13. Healthcare provider inventory storage costs	The cost of capital associated with the inventory held by healthcare providers	<ul style="list-style-type: none"> <li>Value of inventory held</li> </ul>

Source: PwC analysis

## Distribution cost scenarios

Our distribution cost analysis aims to highlight the contribution that wholesalers make to the medicines value chain by acting as an aggregator of transactions between hundreds of manufacturers and tens of thousands of healthcare providers. This aggregation allows the realisation of significant economies of scale and enables deliveries to be consolidated into a smaller number of individual shipments. To understand the value that wholesalers deliver in terms of cost efficiency (allied to the quality of service), our analysis:

- identifies the costs in the current model of wholesale: data from the HDA's core members allow us to quantify the distribution costs at each stage of the medicines supply chain
- compares these costs to those in two alternative distribution scenarios where manufacturers deliver their own products (with different frequencies) because they are unable to access a wholesaling function and are responsible for distributing products themselves.

The two alternative distribution systems are designed to highlight the benefits of the current wholesale distribution model. They are *not* intended to suggest possible or desirable ways that the industry could be organised.

We summarise the key features of the three scenarios:

- **Scenario 1 (The current distribution model)** which reflects the system-wide cost-to-serve under the current model where wholesalers undertake twice daily delivery of medicines.
- **Scenario 2 (Twice daily delivery by manufacturers)** which estimates distribution costs if manufacturers are

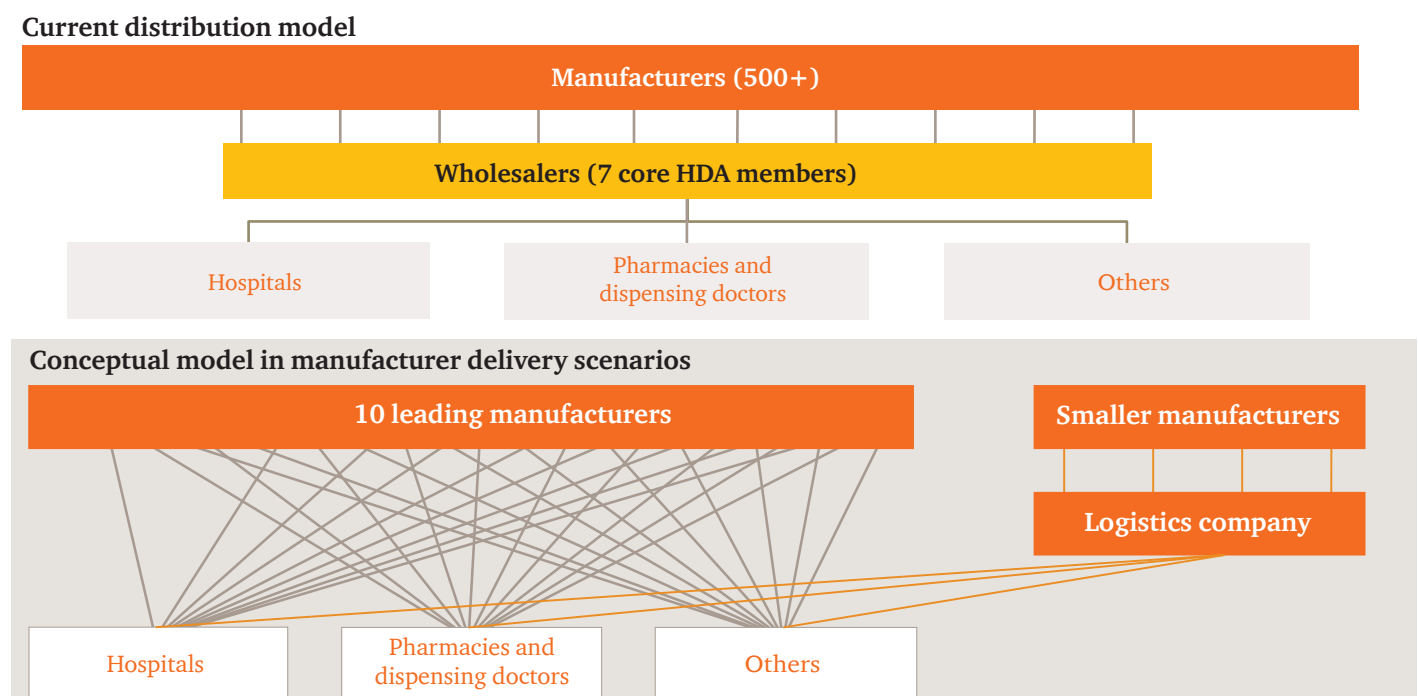
responsible for distribution and maintain current service levels (i.e. twice daily delivery).

- **Scenario 3 (Weekly delivery by manufacturers)** which simulates the total supply chain costs if manufacturers reduce service levels to healthcare providers by offering weekly deliveries and assuming that the supply chain structure otherwise remains the same as in the second scenario.

In the current distribution model, the majority of medicines are physically distributed through wholesalers who then deliver them to healthcare providers. In the manufacturer delivery scenarios, we assume that the 10 largest pharmaceutical manufacturers in the UK deliver their medicines themselves (i.e. by each setting up a distribution network capable of providing nationwide coverage). These networks will be capable of performing a twice daily delivery to providers to maintain service quality at its current level. Hundreds of manufacturers serve the UK market so it would be impractical for the smaller companies to also set up their own distribution networks. So we assume that smaller companies (i.e. those outside the ten largest) would collaborate to work with a single logistics company to deliver their medicines (so the logistics company effectively mimics the activities of a wholesaler).

The purpose of these scenarios is to estimate the scale of the cost efficiencies provided by the current wholesale model. Figure 4 illustrates the core differences in logistics assumed in the current distribution model and the two manufacturer delivery scenarios.

**Figure 4: Key differences in logistics under the three scenarios**



Source: PwC analysis



## Approach

Our approach involved developing a model with which we can simulate the expected costs of medicines distribution under different scenarios. It consisted of three key stages.

### Stage 1 – Data collection

To estimate the total supply chain costs, we required costs and operational data for the thirteen key activities undertaken within the supply chain to distribute medicines. Our analysis relied upon the provision of confidential data from the HDA's core members. This was done through a bespoke data request.

We then held a workshop with each HDA member to discuss the data request and develop a consistent understanding of our requirements. Our analysis also uses third party data where data are not available from the HDA members. These include data relating to manufacturers and healthcare providers and have been obtained from sources such as the Association for British Pharmaceutical Industries, the Pharmaceutical Services Negotiating Committee, the British Generic Manufacturers Association and Freight Transport Association.

### Stage 2 – Data aggregation

On receipt of the completed data requests, we undertook benchmarking and ratio analysis across the companies to assess the reliability of the data. Where outliers or other data issues were identified, we followed up with members to test the reliability and consistency of the underlying data. To protect confidentiality, all data were then aggregated to an industry level (i.e. across the HDA's seven core members). All results in our analysis are presented at this industry level.

### Stage 3 – Analysis and modelling

The final stage was the analysis and modelling required to generate the results. This involved estimating the current industry supply chain costs and the costs under the two manufacturer delivery scenarios. To arrive at the total costs, we estimated the costs for each of the thirteen cost elements. Importantly, when assessing the scenarios we ignore any transition costs. This means that our estimates represent the potential costs in a steady state environment.

Our analysis relied upon a set of assumptions for the two manufacturer delivery scenarios. We held discussions with the HDA's core members to test and confirm these assumptions. We also tested the results of our analysis to the key assumptions using sensitivity analysis where we flex some of the key assumptions. The results of our sensitivity analysis are presented in this chapter.

## Results

Below, we set out the results from our analysis of distribution costs under:

- the current wholesale model of distributing medicines in the UK
- the manufacturer twice daily delivery scenario
- the manufacturer weekly delivery scenario.

We also present the results of our sensitivity analysis where we flex some of the key assumptions that we rely upon in our modelling. The aim of the sensitivity analysis is to illustrate how the costs change if some of the assumptions are altered.

### Current wholesale model

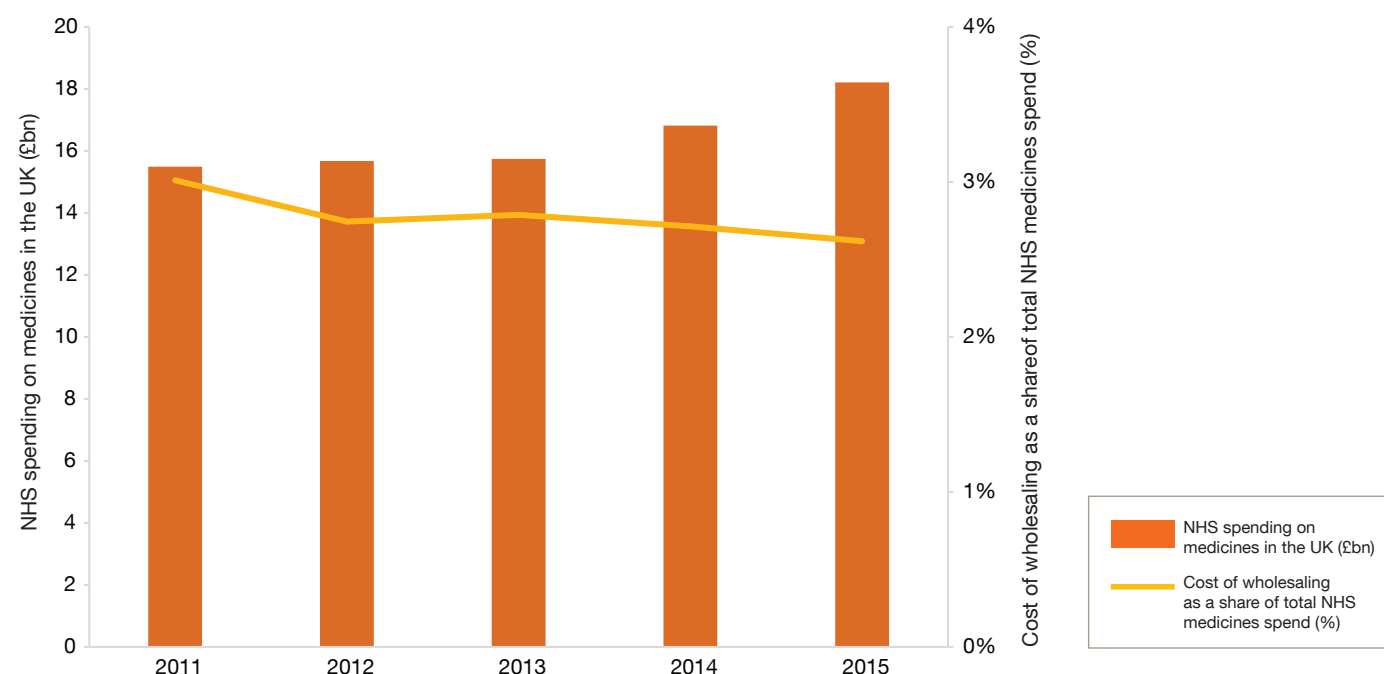
We estimate that the costs of distributing medicines under the current model of wholesale distribution is £864m per annum. Figure 6 illustrates the breakdown of costs of the current wholesale model. The total costs include those borne at manufacturers and healthcare providers.

We estimate that:

- around 11% (£91m) of these costs are incurred by manufacturers
- 55% (£477m) of the costs are incurred by wholesalers
- 34% (£297m) of the costs accrue to healthcare providers.

The estimated wholesale costs (i.e. £477m) can be compared with total NHS spending on medicines in 2015 (£18.2bn). This shows that the wholesale function, including all costs and any profits made, accounts for 2.6% of spending on medicines, having fallen from 3% in 2011 (see Figure 5). We estimate that the average cost per item delivered by HDA members over the five year period is 30p<sup>8</sup>.

Figure 5: Cost of wholesaling as a share of NHS medicines spend in the UK (2011-2015)



Source: HSCIC, Primary Care Services Wales, ISD Scotland, Business Services Organisation Northern Ireland, Statutory annual accounts of HDA members

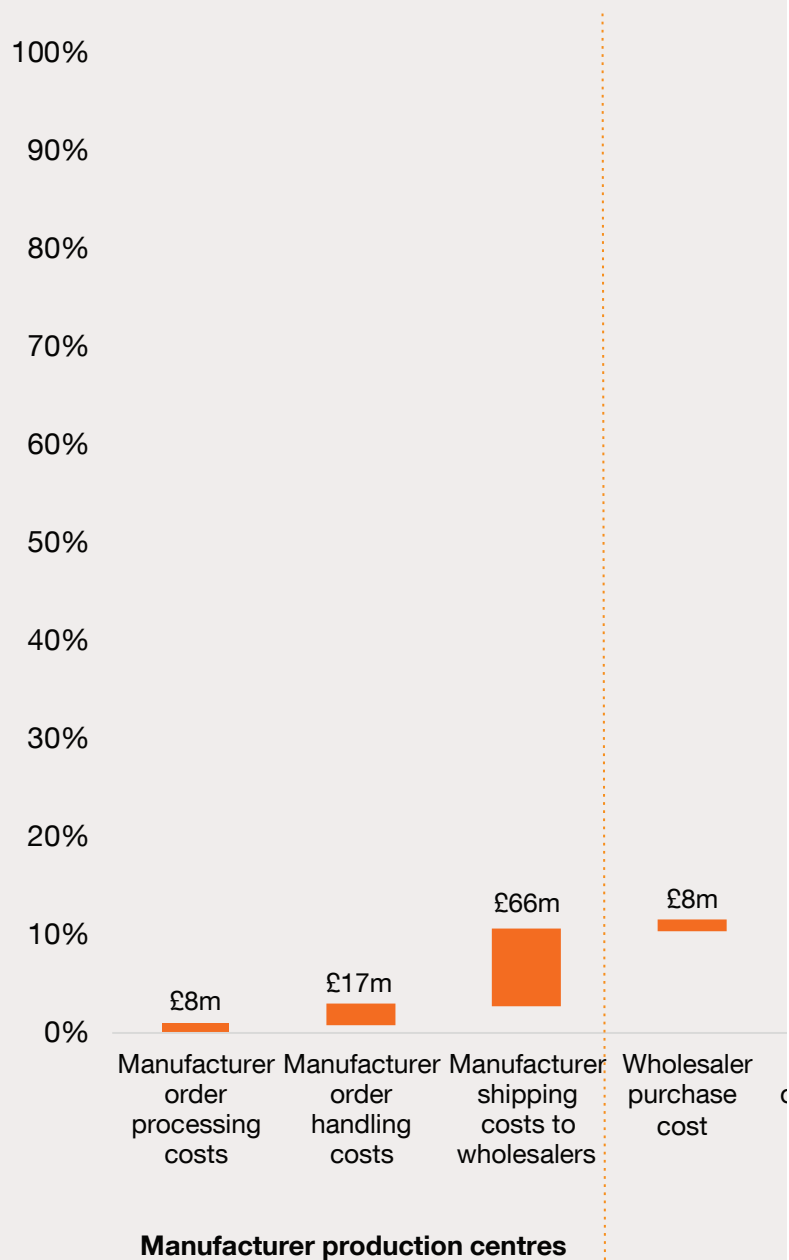
8 Estimated based on IMS volume data



A more detailed breakdown of distribution costs across the supply chain shows that:

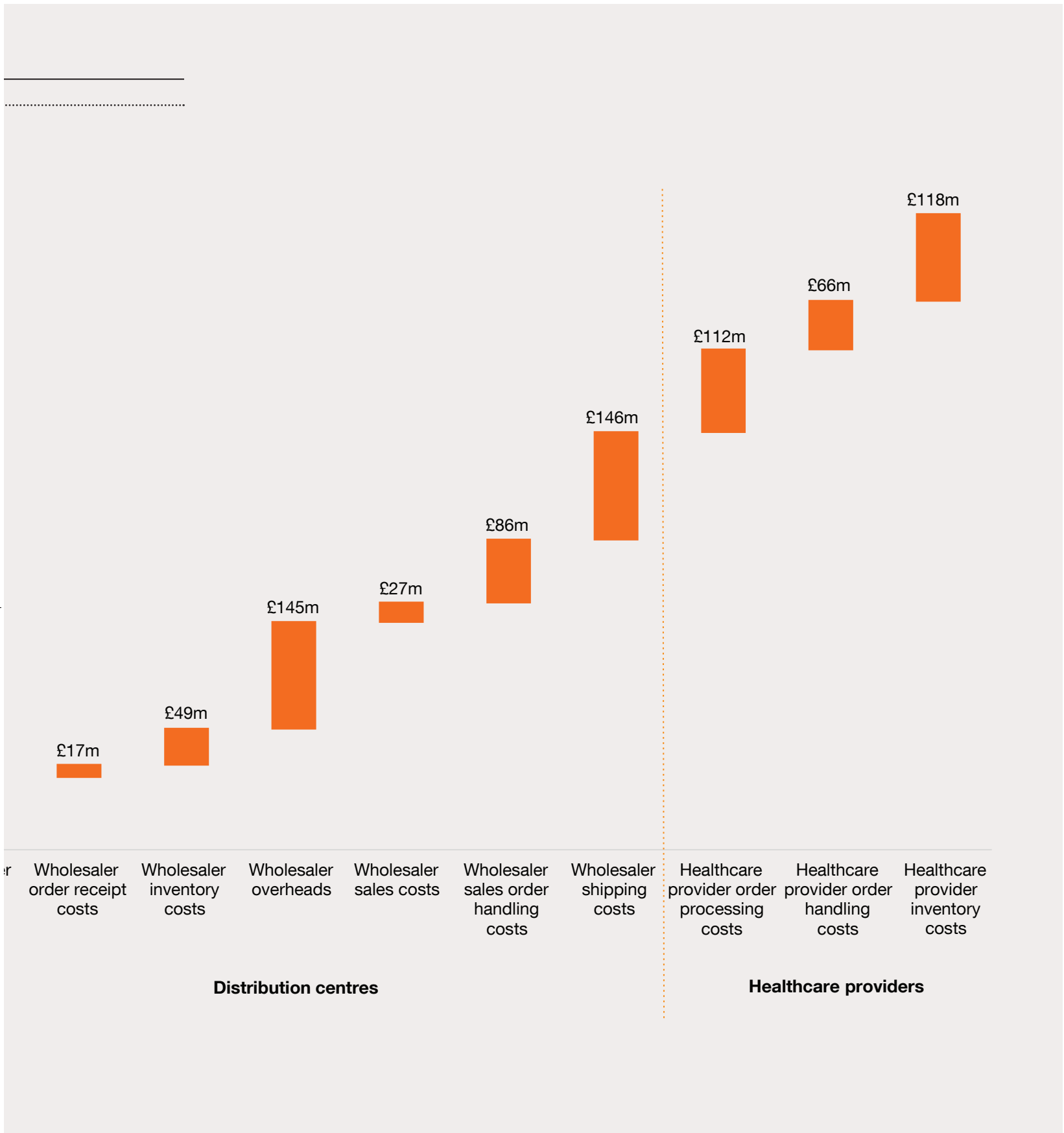
- **Shipping costs (i.e. the cost of physically moving medicines)** represent around 24% of total costs at £212m per annum. 8% of the costs (£66m) are incurred when transporting items from manufacturers to wholesalers and a further 17% (£146m) is through transportation from wholesalers to providers.
- **Costs of loading and unloading shipments** account for an estimated 21% of the total costs (£185m). The largest component is the cost of handling orders at the distribution centres which amounts to around £86m per annum.
- **Inventory holding costs** account for 19% of the total costs at £167m. Significant inventory must be kept within the system in order deliver the high levels of service and get medicines to patients quickly. These inventory costs purely represent the cost of working capital held in inventory; they exclude the physical storage costs, which are captured in our estimate of overheads.
- **Overheads at wholesalers** are the final significant cost amounting to 17% of the total (£145m). These costs include rent on property, utilities, corporate functions and regulatory compliance costs. We exclude overheads at manufacturers and healthcare providers as we do not see these costs as wholly attributable to distribution of medicines.

**Figure 6: Distribution costs under the current wholesale model**



Source: PwC analysis





### Manufacturer twice daily delivery

Our next set of results describes the supply chain costs in the scenario where leading manufacturers would deliver their own products (i.e. they do not have access to a wholesale function).

In this scenario we assume that service levels would be maintained through twice daily delivery and provision of value added services like training and working capital to providers. The cost of providing these value added services is captured in our total cost estimate. We assume that the 10 largest pharmaceutical manufacturers in the UK would each develop their own distribution networks which only distribute their own products. We also assume that the smaller manufacturers would collaborate and work with a single logistics company to distribute their products. This market structure would result in a larger number of smaller distribution centres. The scenario is designed to quantify the cost efficiencies enabled by the wholesaler function – through aggregating deliveries in the most efficient way.

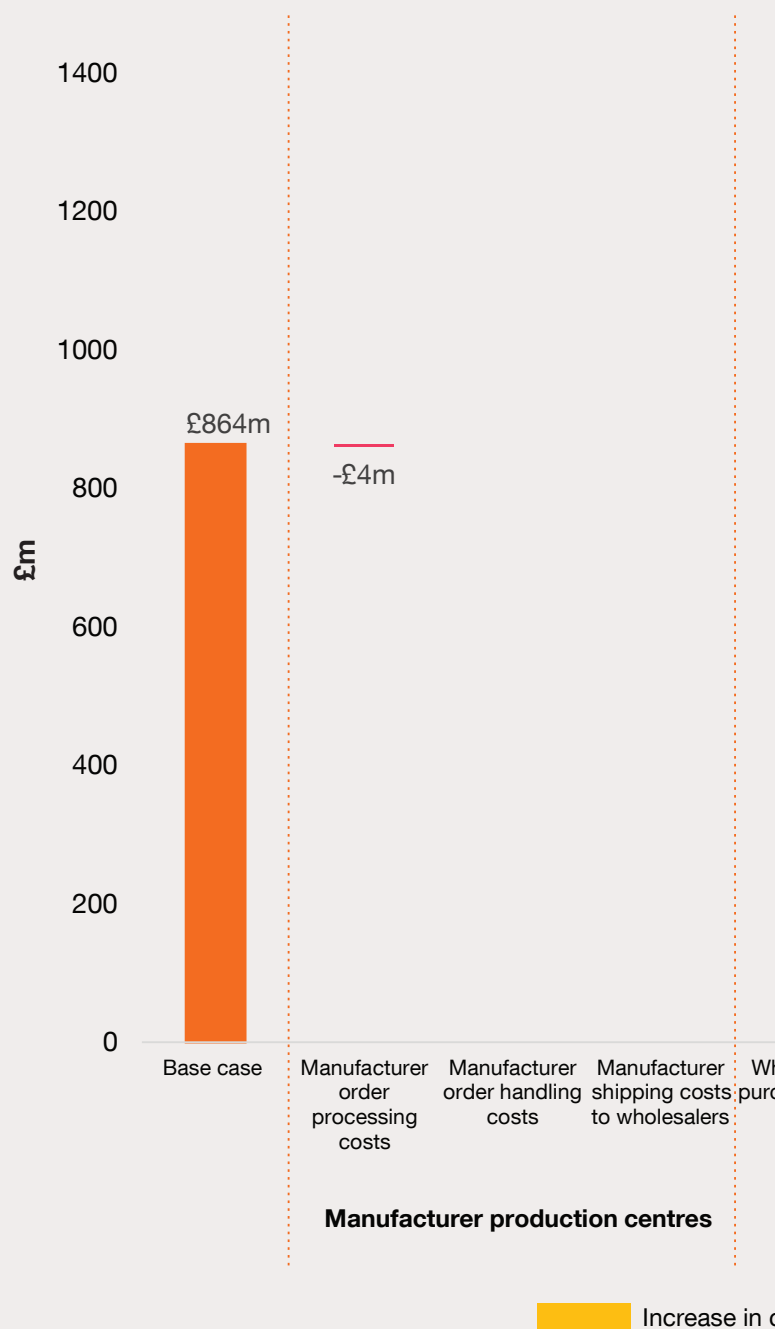
Our results show that the costs of distributing medicines could be around 45% higher in the absence of wholesalers. Total distribution costs are estimated to rise from £864m in the current distribution model to £1.25bn in the manufacturer daily delivery scenario.

The key areas where we expect costs to increase are:

- **Healthcare provider order processing and handling costs** which we estimate would increase from £179m in the current distribution model to £303m as the number of deliveries received by providers increases significantly if each manufacturer is delivering its own products.
- **Shipping costs (at distribution centres)** which we expect to increase by around 70% from £146m in the current distribution model to £248m as delivery vehicles only carry a single manufacturer’s products and this leads to more deliveries and less efficient routing.
- **Sales costs** which we estimate would increase by £80m as the cost of maintaining relationships and supporting providers in product ordering increases due to the duplication of distributor networks.
- **Overheads (at distribution centres)** which we expect to rise by £58m as a proliferation of smaller warehouses increases costs overall as economies of scale are lost and fixed costs are duplicated.

Figure 7 shows how we expect costs to change relative to the current distribution model; those cost elements that remain unchanged appear as blanks.

Figure 7: Differences in cost between the current wholesale model



Source: PwC analysis

Model and manufacturer twice daily delivery scenario, £m



### Manufacturer weekly delivery

The final scenario we consider is where manufacturers are responsible for delivery but service levels are reduced from twice daily delivery of medicines to providers to weekly delivery to limit any increase in the cost of delivery. The rationale for this scenario is to explore what change in service level might be needed to compensate for the higher costs if manufacturers are responsible for distribution to healthcare providers.

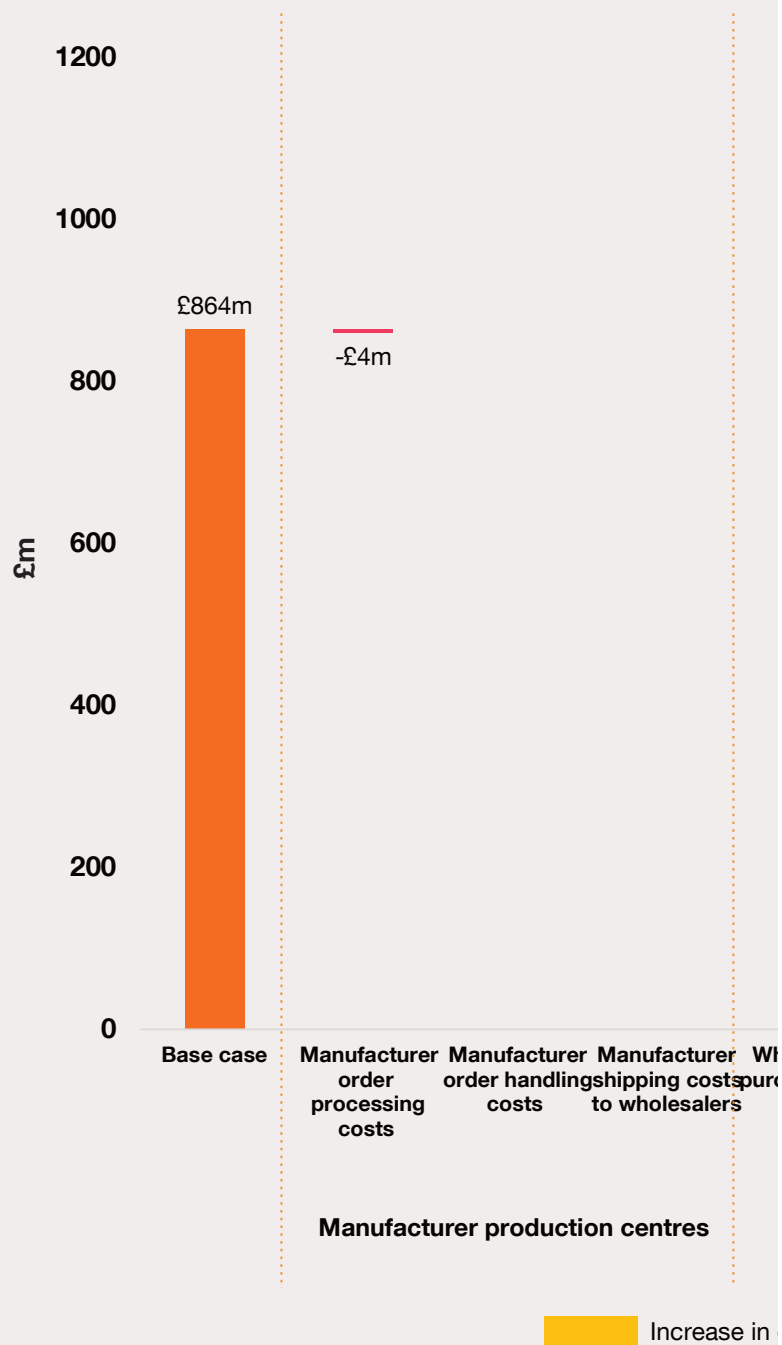
In doing this, we recognise that in practice this scenario is unlikely to be desirable. Without substantial changes elsewhere in the distribution system (e.g. the inventory held by pharmacies), it would reduce the speed with which patients could access medicines from healthcare providers. This could potentially lead to adverse health outcomes and/or increase pressure on other (more expensive) parts of the healthcare system (e.g. GPs and hospital A&E departments). We have not quantified the impact of this scenario in this report.

We estimate that total supply chain costs would be £938m in this scenario compared to £864m in the current distribution model. This means that costs would not fall to the level under the current distribution model, where wholesalers are able to aggregate deliveries and provide twice daily delivery.

The key differences in costs relative to the current distribution model are:

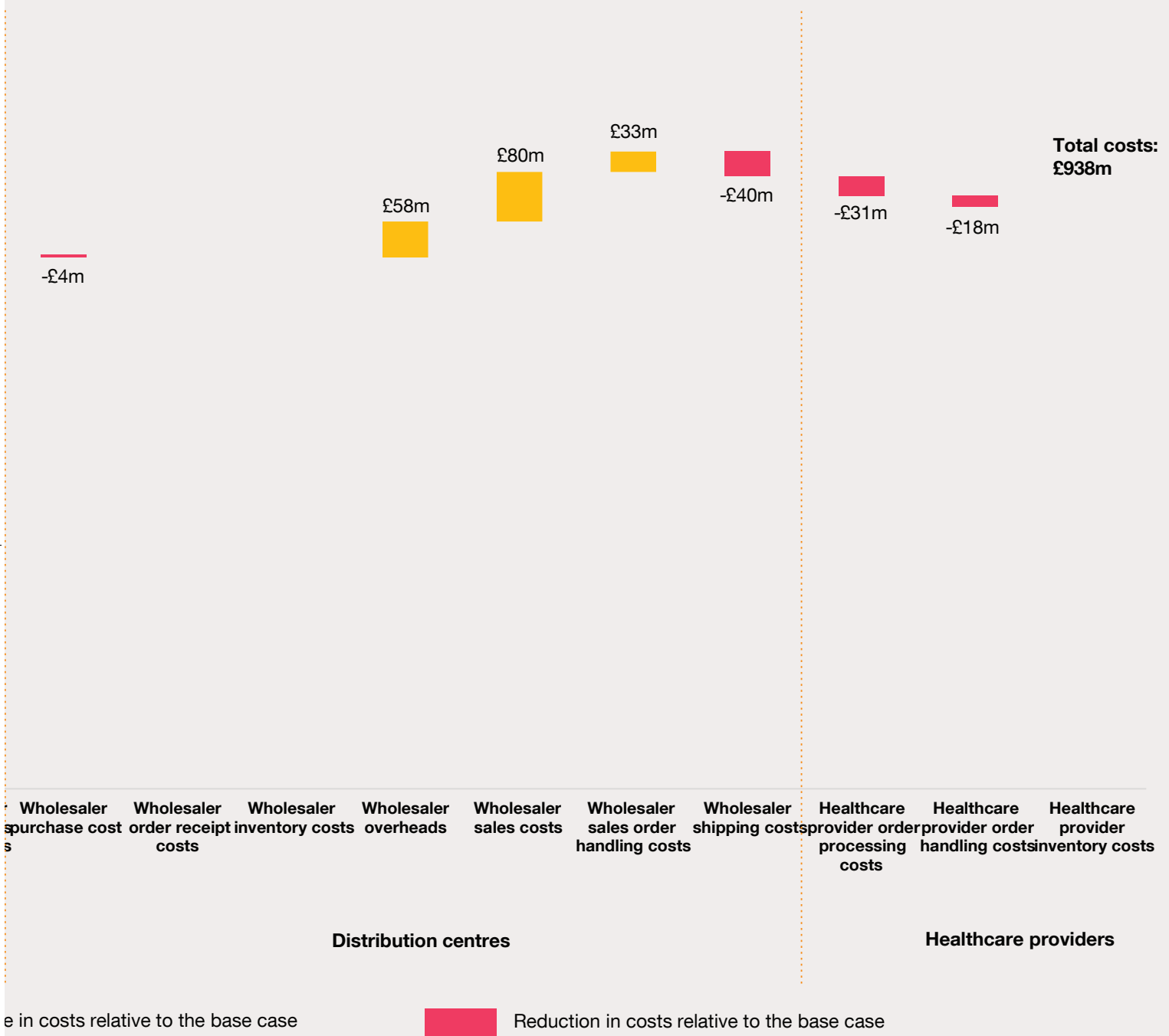
- **Sales costs** are estimated to increase by £80m compared to the current distribution model. The cost of maintaining relationships and supporting providers in product ordering would rise due to the duplication of distributor networks.
- **Overhead (at distribution centres)** are expected to be £58m higher as this scenario would also lead to a duplication of distributor networks as each of the ten largest manufacturers would be delivering direct.
- **Shipping costs (at distribution centres)** would be expected to fall by £40m as shipments could be consolidated into larger vehicles making fewer drops per delivery run. This would increase travel time but would lead to more effective utilisation. However, we note, that some community pharmacies may not be able to receive larger delivery vehicles due to capacity constraints at their location. We, therefore suggest that the £40m cost reduction reflects the upper bound.
- **Healthcare providers' order processing costs** would also be lower by £31m due to making fewer orders.

Figure 8: Differences in costs between the current wholesale mode



Source: PwC analysis

Model and manufacturer weekly delivery scenario, £m



## Summary of results

We present below a more detailed analysis of how the costs change across the supply chain in the two manufacturer delivery scenarios. Looking at the breakdown of the difference in costs between the scenarios in more detail, several areas stand out:

- Manufacturers incur 47% and 22% more costs in the twice daily and weekly delivery scenarios respectively, compared to the current wholesale model. Under these two scenarios, manufacturers undertake some of the activities of wholesalers as each manufacturer is responsible for the distribution of its own products.
- Healthcare providers are expected to face a 42% increase in costs (£124m) in the manufacturer twice daily delivery scenario as they deal with more distribution networks compared to the current model. In the manufacturer weekly delivery scenario, provider costs are expected to fall by 17% driven by the reduction in the number of deliveries they have to deal with.

**Table 4: Differences in costs between the three scenarios**

Cost segment	Current costs (£m)	Manufacturer – twice daily delivery		Manufacturer – weekly delivery	
		Change in costs (£m)	Change in costs (%)	Change in costs (£m)	Change in costs (%)
Manufacturers	91	+264	+47	+123	+22
Wholesalers	477				
Healthcare providers	297	+124	+42	-49	-17
<b>Total</b>	<b>864</b>	<b>+389</b>	<b>+45</b>	<b>+74</b>	<b>+9</b>

Source: PwC analysis

We also assess the differences in costs across different groups of activities (see Table 5). The following activities stand out:

- Purchasing and order receipt costs** would increase by 59% (£120 million) in the manufacturer twice daily delivery scenario as providers deal with a greater number of manufacturers in the absence of wholesalers. This is partially offset by the reduction in costs incurred by manufacturers at the distribution centres to make and receive orders from their own production centres. In the weekly delivery scenario, these costs to fall by 26% as there would be fewer deliveries to providers.
- Sales costs** would increase by £76 million under the two manufacturer delivery scenarios because, in the absence of wholesalers, each manufacturer would incur costs maintaining their relationships with healthcare providers and assisting them with ordering and product queries.
- Order handling costs** at production and distribution centres would increase by 32% (£33m). The increase in costs would arise at the distribution centres as each manufacturer would set up its own order handling capabilities at its own distribution centres.
- Shipping costs** are the costs of transporting medicines from manufacturers' production centres to their distribution centres and from these distribution centres to healthcare providers. These costs are estimated to increase by 48% in the manufacturer twice daily delivery scenario. This is driven entirely by the increase in the number of delivery vehicles distributing medicines to providers. The manufacturer weekly deliver scenario leads to a 19% reduction in shipping costs driven by the decrease in delivery frequency.
- Inventory costs** remain unchanged in the manufacturer twice daily and weekly delivery scenarios. We would expect the healthcare providers to increase their inventory holdings in the weekly delivery scenario however, capacity constraints inhibit their ability to do so.
- Overheads** at distribution centres would increase by 40% from £145m to £203m in the two manufacturer direct delivery scenarios. The additional costs would include rent on property, utilities, corporate functions and regulatory compliance costs. The duplication of delivery networks by each manufacturer leads to higher system costs.

**Table 5: Breakdown of the difference in costs across different groups of activities**

Cost segment	Current costs (£m)	Manufacturer – twice daily delivery		Manufacturer – weekly delivery	
		Change in costs (£m)	Change in costs (%)	Change in costs (£m)	Change in costs (%)
Purchasing and order receipt	203	+120	+59	-53	-26
Sales	35	+76	+218	+76	+218
Order handling	102	+33	+32	+33	+32
Shipping	212	+102	+48	-40	-19
Inventory	164	0	0	0	0
Overheads	145	+58	+40	+58	+40
<b>Total</b>	<b>864</b>	<b>+389</b>	<b>+45</b>	<b>+74</b>	<b>+9</b>

Source: PwC analysis

Table 6 illustrates the breakdown of costs in the current wholesale model and the two manufacturer delivery scenarios. The total supply chain costs are estimated to increase by 45% and 9% in the manufacturer twice daily and weekly scenarios, respectively.

**Table 6: Breakdown of distribution costs across the three scenarios**

Cost segment	Current costs (£m)	Manufacturer twice daily delivery		Manufacturer weekly delivery	
		£m	% change relative to current model	£m	% change relative to current model
Manufacturer shipping costs (at production centres)	66	66	0	66	0
Manufacturer order processing costs (at production centres)	8	4	-50	4	-50
Manufacturer order handling costs (at production centres)	17	17	0	17	0
Wholesaler/manufacturer purchase order receipt costs (at distribution centres)	17	17	0	17	0
Wholesaler/manufacturer purchase cost (at distribution centres)	8	4	-50	4	-50
Wholesaler/manufacturer sales costs	27	106	300	106	300
Wholesaler/manufacturer sales order handling costs	86	119	39	119	39
Wholesaler/manufacturer shipping costs (at distribution centres)	146	248	70	106	-27
Wholesaler/manufacturer inventory costs (at distribution centres)	49	49	0	49	0
Overheads (at distribution centres)	145	203	40	203	40
Healthcare provider order processing costs	112	191	70	191	-27
Healthcare provider order handling costs	66	112	70	112	-27
Healthcare provider inventory storage costs	118	118	0	118	0
<b>Total</b>	<b>864</b>	<b>1,253</b>	<b>45</b>	<b>938</b>	<b>9</b>

Source: PwC analysis

## Sensitivity analysis

Our analysis relies upon flexing a set of key assumptions to simulate the distribution costs under the two manufacturer delivery scenarios. We make some key assumptions in our estimation of the following cost elements:

- Sales order handling costs (10% of current estimated costs).
- Sales costs (3% of current estimated costs).
- Overheads (17% of current estimated costs).
- Healthcare provider order processing and handling (21% of current estimated costs).
- Healthcare provider inventory costs (14% of current estimated costs).

We have conducted a number of sensitivities for each assumption. However, we only present the sensitivities for the costs elements that reflect the material cost areas. The sensitivity analysis shows how total distribution costs under the three scenarios vary if key assumptions are flexed. In our current estimates, the difference between the manufacturer twice delivery scenario and the current model is £389m: the difference between the manufacturer weekly delivery and the current model is £74m.

The results of the sensitivity analysis indicate that varying our key assumptions does not lead to significant changes in the costs between the scenarios. The sensitivity analysis helps validate the robustness of our distribution cost analysis. The remainder of this section presents the results of our sensitivity analysis where we flex the key assumptions for the five cost elements listed above.

### Sales order processing and handling costs

The sales order handling costs are the costs of physically processing and handling orders from healthcare providers. It includes labour, equipment (e.g. A-frame packing machines) and packaging costs. Under the two manufacturer delivery scenarios where manufacturers set up their own distribution network, there would be a duplication of fixed costs. We have assumed that the equipment costs are fixed costs. Equipment costs as a share of sales order handling costs are 13% under the current distribution model.

Our sensitivity analysis illustrates how the total distribution costs changes if we flex our assumption on share of fixed costs. The table below sets out the results of increasing the fixed costs share of sales order handling costs from 13% to 40% and reducing the fixed cost share from 13% to 5%, respectively.

**Table 7: Changes in costs as a result of flexing the fixed cost share of sales order processing and handling costs (£m)**

	Current distribution model	Manufacturer twice daily delivery scenario	Manufacturer weekly delivery scenario
Total distribution costs – current estimates	864	1,253	938
Total distribution costs using 40% fixed cost share assumption	864	1,322	1,007
Change in costs relative to our current estimates	0	70	70
<b>Change in costs relative to the current distribution model</b>	<b>0</b>	<b>458</b>	<b>143</b>
Total distribution costs using 5% fixed cost share assumption	864	1,232	938
Change in costs relative to our current estimates	0	-20	-20
<b>Change in costs relative to the current distribution model</b>	<b>0</b>	<b>368</b>	<b>53</b>

Source: PwC analysis



## Sales costs

In our current estimates, we have assumed that the sales costs are fixed costs as relationship teams are required to sustain service levels, including value added services offered to healthcare providers, irrespective of the frequency of delivery. This implies that fixed costs will increase if manufacturers

deliver their own products as each manufacturer would have to maintain separate sales teams. Our sensitivity analysis aims to illustrate how the total distribution costs changes if we assume that only 50% of the sales costs are fixed costs. Table 8 sets out the total distribution costs if we assume that only 50% of the sales costs are fixed costs.

**Table 8: Changes in costs as a result of flexing the fixed cost share of sales costs (£m)**

	Current distribution model	Manufacturer twice daily delivery scenario	Manufacturer weekly delivery scenario
Total distribution costs – current estimates	864	1,253	938
Total distribution costs using 50% fixed cost assumption	864	1,199	884
Change in costs relative to our current estimates	0	-53	-53
<b>Change in costs relative to the current distribution model</b>	<b>0</b>	<b>336</b>	<b>21</b>

Source: PwC analysis

## Overheads

The overheads cost element includes costs such as rent on property, utilities, corporate functions and regulatory compliance costs. In the two scenarios where manufacturers are responsible for the distribution of their products, there would be a proliferation of a greater number of smaller distribution centres, leading to lost economies of scale and a duplication of fixed costs.

In order to estimate the costs of overheads in the two manufacturer delivery scenarios, we have assumed that the

fixed cost share of overheads currently borne by wholesalers is 40%. These costs will be replicated in the manufacturer delivery scenario driven by the increase in the number of distribution networks.

Our sensitivity analysis illustrates how the total distribution costs changes if we flex our assumption on the share of fixed costs. The table below present the results of increasing the fixed costs share of overheads from 40% to 70% and reducing the fixed cost share from 40% to 20%, respectively.

**Table 9: Changes in costs as a result of flexing the fixed cost share of overheads (£m)**

	Current distribution model	Manufacturer twice daily delivery scenario	Manufacturer weekly delivery scenario
Total distribution costs – current estimates	864	1,253	938
Total distribution costs using 70% fixed cost share assumption	864	1,296	981
Change in costs relative to our current estimates	0	43	43
<b>Change in costs relative to the current distribution model</b>	<b>0</b>	<b>432</b>	<b>117</b>
Total distribution costs using 20% fixed cost share assumption	864	1,224	909
Change in costs relative to our current estimates	0	-29	-29
<b>Change in costs relative to the current distribution model</b>	<b>0</b>	<b>360</b>	<b>45</b>

Source: PwC analysis

### Provider order processing and handling costs

The methodology that we have employed relies upon data on the number of orders/deliveries and the time taken to make/receive an order. The costs are calculated by multiplying the time taken by healthcare providers to make and receive orders by the time cost of a community pharmacist.

This could be replaced with an alternative methodology that utilises the reported time per day to make and receive orders, the number of working days per annum and the total number of providers. The costs under this methodology are estimated by multiplying the total time taken to make and receive orders per year by all healthcare providers by the time costs of a community pharmacist. Table 10 presents the total distribution costs if we employed the alternative calculation methodology.

**Table 10: Changes in costs under an alternative calculation methodology for provider order processing and handling costs (£m)**

	Current distribution model	Manufacturer twice daily delivery scenario	Manufacturer weekly delivery scenario
Total distribution costs – current estimates	864	1,253	938
Total distribution costs using alternative calculation methodology	824	1,185	909
Change in costs relative to our current estimates	-40	-68	-29
<b>Change in costs relative to the current distribution model</b>	<b>0</b>	<b>361</b>	<b>85</b>

Source: PwC analysis

### Value of time of a community pharmacist

In our current estimates, we have assumed that the value of time of a community pharmacist is £15 per hour based on yearly earnings of £22,500 and an uplift of 24% to reflect non-wage costs such as employers' social contributions. The yearly earnings that we have used in our analysis is the starting salary for a community pharmacist in training. The value of time of a community pharmacist is used to

estimate the healthcare provider order processing and handling costs. If we flex the yearly earnings to reflect the average salary of a community pharmacist in training and an experienced community pharmacist, the value of time of a community pharmacist increases from £15/hour to £20/hour. Table 11 presents the total distribution costs if we increase the value of time of a community pharmacist to £20/hour.

**Table 11: Changes in cost if the value of time of a community pharmacist is altered (£m)**

	Current distribution model	Manufacturer twice daily delivery scenario	Manufacturer weekly delivery scenario
Total distribution costs – current estimates	864	1,253	938
Total distribution costs using the value of time of £20/hour	913	1,337	974
Change in costs relative to our current estimates	50	84	36
<b>Change in costs relative to the current distribution model</b>	<b>0</b>	<b>423</b>	<b>60</b>

Source: PwC analysis



## Conclusions

Our analysis set out to address the question of whether the current model of healthcare distribution in the UK allows medicines to be distributed efficiently. The total cost of distributing medicines in the current distribution model is estimated to amount to £864m per annum. HDA members face intense competition which means they are under significant pressure to minimise their costs. The costs incurred by wholesalers to distribute medicines are £477m.

The current distribution model allows significant economies of scale to be realised and in the absence of wholesalers, costs could be:

- £389 million higher than they are now if manufacturers delivered their own products on a twice daily basis
- around £74m higher if manufacturers reduced the service level and delivered their products on a weekly basis.

The weekly delivery by manufacturers scenario shows that even with a significant reduction in service levels, the costs facing the supply chain will be greater than the current wholesale model. This suggests that wholesalers provide efficient distribution by offering scale for shipping high volume products to a multitude of customers. Wholesalers also have the capabilities to manage logistics for products with specialised distribution characteristics.

Additionally, wholesalers' service levels enable healthcare providers to generate important benefits for patients and the NHS over and above those associated with use of the medicines:

- Twice daily delivery of medicines to their customers across the UK means that if a patient visits a community

pharmacy in the morning and the medicine they need is not in stock, then they should still be able to collect it later that day.

- Wholesalers pre-finance the medicines supply chain, ensuring the guaranteed supply of medicines to all healthcare providers.
- They hold significant inventory in order to get medicines to patients quickly and efficiently.
- They enable community pharmacies to provide services to their patients which avoid significant costs for the NHS and improve patients' wellbeing – for example, our work for PSNC estimated the value of this in England in 2015 was £2.8bn.
- They provide safe access to medicines of a guaranteed quality to all patients.
- They provide value added services to healthcare providers which enable them to improve efficiency across the value chain, for example by providing inventory and financial management, IT systems and skills development training and support with regulatory compliance.
- They are innovative and have delivered year on year efficiency improvements.

# Profitability analysis

## Introduction

This section sets out our approach to estimating the profitability of core HDA members. The approach we have undertaken considers the returns achieved over the last five years in terms of return on capital employed (ROCE). These returns are compared with the sector's weighted average cost of capital (WACC). We then present the results of our profitability analysis and the implications of these results on the financial sustainability of the sector.

## Approach

Our broad approach to assessing the profitability of core HDA members involved three key stages. We describe each in turn.

### **Stage 1 – Data collection**

Our analysis relies upon the provision of confidential data from the HDA's core members. This was done through a bespoke data request. We then meet with each HDA member to discuss the data request and develop a consistent understanding of the requirements.

### **Stage 2 – Data aggregation**

On receipt of the completed data requests, we undertook benchmarking and ratio analysis across the companies to validate the reliability of the data. Where outliers or other data issues were identified, we held follow up discussions with members to test the reliability and consistency of the underlying data. To protect confidentiality, all data were then aggregated to an industry level (defined as HDA activity undertaken by the seven core members). All results in our analysis are presented at this industry level.

### **Stage 3 – Analysis and modelling**

The final stage was the analysis and modelling required to generate the results. Our profitability assessment of the core HDA members considers the returns achieved over the last five years in terms of return on capital employed (ROCE). These returns are compared with the sector's weighted average cost of capital (WACC).

This type of analysis is commonly used by regulators and competition authorities when assessing whether a market is effectively competitive. The presence of excess returns (i.e. where ROCE significantly exceeds WACC) is an indication of an uncompetitive market. Returns that are persistently below the cost of capital are an indication of a vulnerable, unsustainable market where firms lack the incentive to invest in replacing their assets. In a well-functioning competitive market we would expect ROCE and WACC to be similar.

## Results

### **Financial performance of HDA members**

Our profitability assessment is based on the aggregate financial performance of the seven core HDA members. We have summarised their financial performance based on statutory financial accounts in Table 12. Several figures stand out:

- The seven core members of the HDA had combined revenues of £8.2bn relating to their wholesaling functions in the most recent financial year. Revenues have been rising by around 4% per annum.
- Whilst these are large businesses by revenue, their cost of sales (purchasing medicines from manufacturers) are almost as high as the revenues they raise from selling medicines to healthcare providers.
- The remainder, the gross profit, is required to fund all operating costs, depreciation and any return on capital.

This financial model is common across wholesale businesses in different sectors of the economy.

**Table 12: Aggregated financial performance of HDA core members (£bn)**

	2010/11	2011/12	2012/13	2013/14	2014/15
Revenue	7.0	7.1	7.5	7.8	8.2
Cost of sales	(6.4)	(6.5)	(6.8)	(7.1)	(7.4)
Gross profit (excluding operating costs and depreciation)	0.6	0.6	0.7	0.7	0.8
Earnings before interest and tax (EBIT)	0.2	0.3	0.3	0.2	0.3

Source: PwC analysis

### Return on capital employed

The financial data enable us to calculate the earnings of the core HDA members in terms of ROCE. This measure is calculated as Earnings Before Interest and Taxation (EBIT) expressed as a percentage of the total capital employed in the business. The capital base includes both tangible and intangible assets.

One challenge with this type of assessment is that companies do not always fully reflect the value of intangible assets in their accounts. Certain intangible assets, such as customer and supplier relationships, are not recognised by current accounting standards. In addition, where UK operations are part of a broader group of entities, intangible assets will often be captured at the group level.

To overcome this we have used two different methods to estimate the value of intangible assets:

- Tobin's Q approach: estimates the value of intangible assets by comparing the market capitalisation and the equity book value of healthcare wholesale companies around the world.
- Transactions data approach: compares the price paid in mergers and acquisitions to the tangible book value of healthcare wholesale companies.

Both approaches enable us to estimate the value of intangibles based on the ratio of market value to tangible book value. The table presents our estimates of ROCE between 2011 to 2015. Returns in the sector were below 5% in 2011, as the UK economy was still emerging from recession, but have subsequently risen to over 10%.

**Table 13: ROCE (weighted average of the HDA members)**

	2011	2012	2013	2014	2015	Average
Tobin's Q approach	4.3%	6.6%	7.2%	11.1%	9.8%	7.8%
Transactions data approach	4.8%	7.4%	8.2%	12.7%	11.3%	8.9%

Source: PwC analysis



### Weighted average cost of capital

The other component of the profitability assessment is the WACC.

Our measure of profitability is derived by comparing ROCE to the WACC for the membership. The WACC represents the minimum rate of return a company needs to earn on its invested capital in order to provide sufficient returns to the investors who finance the business. This approach is based on economic theory. In a fully or perfectly competitive market, firms are unable to raise prices to a level where they earn a return in excess of that strictly needed to provide the minimum reward required by investors.

We present our estimates of the WACC for the seven core members (based on a revenue weighted average) in Table 14.

The WACC has declined over the last five years, largely due to market wide factors. Specifically, we have been in a low interest rate environment following the global financial crisis and the returns that can be achieved on risk-free investments (e.g. UK government bonds) has declined. This has led to a reduction in both the cost of equity and the cost of debt. The average WACC across the five years is 9.2%.

**Table 14: WACC (pre-tax, nominal, weighted average)**

	2011	2012	2013	2014	2015	Average
WACC	10.1%	9.7%	9.1%	8.9%	8.5%	9.2%

Source: PwC analysis

### Profitability of HDA core members (ROCE less WACC)

The profitability of the HDA members is calculated as the difference between the ROCE and the WACC. Below we present the results of our assessment based on both methods for estimating the value of intangible assets (a component of ROCE).

The profitability varies across the five year period that we have assessed. During the period 2011 to 2013, the returns that wholesalers achieved on their invested capital was less than the minimum return required to compensate investors. This period coincides with a level of market volatility and uncertainty following the financial crisis and a weak economic environment.

The period 2014-2015 presents evidence of recovery as the returns achieved by wholesalers are marginally higher than the minimum required return an investor would expect to

achieve in a competitive market. This is partially driven by the lower WACC in recent years due to the low interest rate environment following the financial crisis. Looking at the two components of ROCE in more detail, we found that the EBIT has been increasing over the five year period whereas capital employed has decreased in recent years.

However, over the course of the five years, the average profitability still remains below the minimum required return. This provides evidence that the wholesale sector is under significant pressure and its role in the value chain is fragile. If wholesalers are to be incentivised to reinvest in their businesses, it is imperative that they earn at least the minimum required return. A key implication of this result, therefore, is that any market reforms which reduce profitability could damage the long term sustainability of the wholesale business model in the UK.

**Table 15: Profitability (ROCE less WACC)**

	2011	2012	2013	2014	2015	Average
Tobin's Q approach	-5.8%	-3.1%	-1.9%	2.2%	1.3%	-1.5%
Transactions data approach	-5.2%	-2.3%	-0.9%	3.7%	2.8%	-0.4%
Average	-5.5%	-2.7%	-1.4%	2.9%	2.1%	-0.9%

Source: PwC analysis











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