Cost of Service Inquiry for Community Pharmacy

Appendices

July 2011

[1] PwC was commissioned by the Department of Health (DH). The independent research and analysis to estimate costs was, subject to the terms of the contract agreed between PwC and DH, undertaken on behalf of DH who brought the Pharmaceutical Services Negotiating Committee (PSNC) into the engagement. Both DH's and PSNC's insights to the subject matter have been taken into account by PwC in forming their views as set out in this report.

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OCS Code	

Cost of Service Inquiry for Community Pharmacy

Appendix A - Branch Questionnaire

PricewaterhouseCoopers (PwC) has been commissioned by the Department of Health (DH) and the Pharmaceutical Services Negotiating Committee (PSNC) to undertake an independent study into the costs incurred by pharmacies in England in providing community pharmacy services. This Cost of Service Inquiry is important as it will form the evidence base for negotiations for future funding.

The pharmacy branch [   ] has been selected to participate in this nationwide study using a carefully designed sampling procedure. Participation is essential to ensure high quality results for the Cost of Service Inquiry

Who should complete this survey?

This survey should be completed by the individual who is typically responsible for the day-to-day management of **the branch named above** (i.e. in charge of matters such as managing the staff, overseeing store operations and record-keeping). In answering some of the questions in this survey, it may be appropriate for this person to consult individuals who otherwise assist in managing this branch.

What will happen next?

You should have already been contacted by PwC to arrange a telephone appointment. During this telephone appointment the PwC interviewer will go through the questions in the enclosed questionnaire and record your responses.

If you have not yet been contacted by PwC, we would appreciate a call from you on: 028 9041 5491

We request that you look through the enclosed survey questions and consider gathering the necessary information in advance of the appointment. This will reduce the time required for the telephone interview and allow you to gather the information when most convenient for you.

The following list summarises the key information you will need to gather. Further detail is provided in the survey questions.

- Your most recent 12 months of financial information (we refer to these as the "Branch Accounts Referenced" during the survey)

- Personnel and salary figures

- Type and volumes of any services offered

- Branch floor space

- Asset register (if available)

- Stock valuation

✍   This symbol, shown throughout the survey, identifies information we suggest you try and gather in advance of the telephone interview.

Confidentiality

PricewaterhouseCoopers (PwC) has been appointed by the Department of Health and PSNC to conduct the inquiry. The Department of Health, PwC and PSNC acknowledge the commercial sensitivity of the information and have all committed to:

- confine access strictly to people who need to see it for the purposes of the inquiry;

- ensure that the information will not be used for any purpose other than this inquiry;

- destroy the information disclosing the identity of the contractors whose data are analysed as soon as the database has been quality assured and agreed between the PSNC and DH;

- maintain the confidentiality of an individual contractor's information in response to any requests for access to the database or any of its contents under the Freedom of Information Act;

- treat the identity of contractors from whom details are sought as confidential information.

Thank you in advance for your co-operation in this Cost of Service Inquiry.

Basic information

1   Please provide the address and the telephone number for this pharmacy branch.

Address 1   ………………………………………....

Address 2   ………………………………………....

Address 3   ………………………………………....

County   ………………………………………....

Postcode   ………………………………………....

Phone number   ………………………………………....

OCS number   …………………………………………

2   Please provide the name and contact details for the individual who is responsible for completing this questionnaire.

Principal contact name………………………………………....

Title   ………………………………………....

Address 1   ……………………………………….... **(if different from above)**

Address 2   ……………………………………….... **(if different from above)**

Address 3   ……………………………………….... **(if different from above)**

County   ……………………………………….... **(if different from above)**

Postcode   ……………………………………….... **(if different from above)**

Phone number ………………………………………..**(if different from above)**

Email   ………………………………………....

3   Is the pharmacy branch located within a GP practice or Health Centre?

Yes   /   No

4   Is the pharmacy branch located within a supermarket? Yes   /   No

  a   If yes, is the pharmacy owned by the supermarket?   Yes   /   No

5   Is this pharmacy a "100-hour" pharmacy (open under the 100-hour exemption)?

Yes   /   No

6   How many hours a week is this pharmacy branch open?

…………………hrs/week

7   Which of the following statements best describes your pharmacy? Please choose all that apply.

Description	✔
This pharmacy offers no internet or mail order services (no other options apply)	
This pharmacy is open under the exemption for <u>wholly internet / mail order</u> businesses (no other options apply)	
This pharmacy has a <u>store-front and offers NHS</u> internet / mail order services	
This pharmacy has a <u>store-front and offers internet / mail order services for retail</u> products (for example, non-prescription medicines, cosmetics, toiletries)	

8   Which of the following best describes your pharmacy? Please choose one.

Description	✓
a. This pharmacy has a standard <u>national pharmaceutical services contract only.</u>	
b. This pharmacy has an Essential Small Pharmacy Local Pharmaceutical Services <u>(ESPLPS)</u> contract with the PCT only	
c. This pharmacy has a Local Pharmaceutical Services (<u>LPS</u>) contract with the PCT only	
d. This pharmacy has <u>both</u> an LPS contract and a standard national pharmaceutical services contract	

9   Is your primary business supplying homecare products and/or specialist foods?

Yes   /   No

10   Has this branch been continuously operating since January 2009?

Yes   /   No

11   Has the ownership of this branch changed since January 2009? .

Yes   /   No

If yes, please provide brief details ………………………………………………………..

Note: Pharmacy branches are <u>*not*</u> required to complete remainder of this survey if:

- Answer "**Yes**" to **question 8c** – "Has an LPS contract"

- Answer "**Yes**" to **question 8d** – "Has both an LPS contract and a standard national pharmaceutical services contract"

- Answer "**Yes**" to **question 9** – "Primary business is supplying to Homecare Companies or Specialist Foods Companies"

- Answer "**No**" to **question 10** – "Have not been continuously open since January 2009"

- Answer "**Yes**" to **question 11** – "Ownership of branch has changed since January 2009"

Branch Accounts Referenced

We want to understand the types of costs you incur in the course of delivering NHS services at this branch. We would like to be able to combine survey responses with your most recent set of financial accounts. For this reason, in addition to answering the specific questions in this survey, we will ask you to send us a copy of these accounts. Many of the questions in the survey will refer to the period covered by these accounts.

  ☞   Throughout this survey we will refer to these accounts as your **Branch Accounts Referenced.**

The Branch Accounts Referenced are:
- **Accounts that cover the branch named on page 1 (individually if possible)**
- **Your most detailed set of accounts (ideally management accounts if available)**
- **For a recent 12 month period**
- **Accounts that you are able to send us a copy of .**

If you do not have management accounts, other financial spreadsheets or your statutory accounts are acceptable. **The accounts provided need not be audited accounts**. You may want to look ahead in this survey to review the type of information we require.

Please use the enclosed postage paid envelope (or email costofserviceinquiry@uk.pwc.com) to send us a copy of
- Your **Branch Accounts Referenced** in the postage paid envelope; **and**
- Your most recent **statutory accounts** in the postage paid envelope (if different to the Branch Accounts Referenced).

---

12   ☞   What type of accounts are the **Branch Accounts Referenced** that you are able to provide us with copies of (either by post or email)?

Type of accounts	Please tick one ✓
Management accounts	
Other tables and	
Statutory accounts	

13   ☞   Please specify the **closing** month and year of the **Branch Accounts Referenced**. Your most recent set are ideal.

Closing date: Month…………………………… Year……………………………………..

14   ☞   For the purposes of your statutory accounts, when is your financial year end?

Date………………………………………

Services offered

We would like to ensure we have an understanding of the services you offer in addition to the core business of NHS dispensing.

15   ✍   How many *private* prescriptions were dispensed in the most recent month for which you have data available?

<div style="border:1px solid blue; padding:20px; text-align:center;">

……………………

</div>

16   ✍   Please fill in the table below regarding the **NHS advanced and enhanced services** you offered during the year of the **Branch Accounts Referenced** that are specifically **remunerated by the PCT or the NHSBSA.**

NHS advanced or enhanced service	Offered? ✓		Approximately how many people did you see in connection with this service in a typical week during the period of the Branch Accounts Referenced?
	Yes	**No**	
Medicine Use Review (MUR)			
Anticoagulant Monitoring Service			
Care Home Support Service			
Disease Specific Medicines Management Service			
Home Delivery Service (PCT-funded)			
Emergency Hormonal Contraception			
Gluten Free Food Supply Service			
Independent Prescribing			
Language Access Service			
Medicines Assessment and Compliance Support Service			
Minor Ailment Scheme			
Needle and Syringe Exchange Service			
On Demand Availability of Specialist Drugs Service			
Out of Hours Service			
Patient Group Direction Service			
Prescriber Support Service			

NHS advanced or enhanced service	Offered? ✗ / ✓		Approximately how many people did you see in connection with this service in a typical week during the period of the Branch Accounts Referenced?
	Yes	No	
Schools Service			
Screening Service			
Stop Smoking Service			
Supervised Administration Service			
Supplementary Prescribing Service			
Other (please specify) 1 ……………………………………………			
Other (please specify) 2 ……………………………………………			
Other (please specify) 3 ……………………………………………			
Other (please specify) 4 ……………………………………………			

17   ☞   Please fill in the table below regarding the services you offered during the year
      of the **Branch Accounts Referenced** which are **<u>not specifically remunerated</u>**.

Service	Offered? ✗ / ✓		Approximately how many people did you see in connection with this service in a typical week during the period of the Branch Accounts Referenced?
	Yes	**No**	
Prescription Collection			
Prescription Delivery			
Daily Dosage Systems (DDS/MDS)			
Other 1 (please specify) …………………………………………..			
Other 2 (please specify) …………………………………………..			
Other 3 (please specify) …………………………………………..			

18   How often does your pharmacy undertake the following activities relating to Standard Operating Procedures (SOPS)?

Procedure	On a regular basis	When deficiency is recognised or requirements change	Never
Review of dispensing SOPs			
Review of waste disposal SOPs			
Review of controlled drug handling, storage and record keeping SOPs			
Staff refresh their knowledge of SOPs			

19   **If answered "on a regular basis" to the previous question,** please specify the frequency with which you carry out these procedures.

Procedure	Frequency
Review of dispensing SOPs	
Review of waste disposal SOPs	
Review of controlled drug handling, storage and record keeping SOPs	
Staff refresh their knowledge of SOPs	

Employees

20   ☞   For each employee, please specify the number of hours they worked in a typical week, their qualifications and their average gross wage or salary (hourly or monthly) during the period of the **Branch Accounts Referenced**. Attach a separate sheet as appropriate.

In answering this question please note that:

a   Other staff-related costs such as bonuses, employer National Insurance Contributions (NIC) and pension contributions should be **<u>excluded</u>** from the response in this section. When asked for total staff costs as part of question 28, please **<u>include</u>** these costs.

b   The table relates to **<u>staff working for this branch and excludes the owner</u>**. Please refer to separate Owner questionnaire for the owner and to the Head Office questionnaire for costs related to staff who do not work at this branch.

c   If this business has **<u>one pharmacy branch only</u>**, please include all employees (apart from the owner) employed by the business, using the "Other" category for staff not covered by the pre-defined categories where necessary.

Role	Each employee	Number of hours worked at this branch in a typical week	Qualification (e.g. NVQ Level 2 or None)	Average gross pay		
				Per month or per hour? (✓)		Amount (£)
				Month	Hour	
Pharmacists / Locums **(please list <u>non-owners</u> of the business – please refer to separate questionnaire on owner information)**	1		Not applicable			
	2		Not applicable			
	3		Not applicable			
	4		Not applicable			
	5		Not applicable			
Branch Managers	1					
	2					
	3					
Pre-reg Students	1		Not applicable			
	2		Not applicable			
	3		Not applicable			
	4		Not applicable			
Pharmacy Technicians	1					
	2					
	3					
	4					

Role	Each employee	Number of hours worked at this branch in a typical week	Qualification (e.g. NVQ Level 2 or None)	Average gross pay		
				Per month or per hour? (✓)		Amount (£)
				Month	Hour	
Dispensers / Dispensing Assistants	1					
	2					
	3					
	4					
	5					
Counter / Retail Assistants	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					

Role	Each employee	Number of hours worked at this branch in a typical week	Qualification (e.g. NVQ Level 2 or None)	Average gross pay		
				Per month or per hour? (✓)		Amount (£)
				Month	Hour	
Delivery / Drivers	1		Not applicable			
	2		Not applicable			
Administrative assistants (e.g. book-keepers, payroll, administration)	1		Not applicable			
	2		Not applicable			
Cleaners	1					
	2					
Other (please specify) .………………………..	1					
Other (please specify) .………………………..	2					
Other (please specify) .………………………..	3					

Please continue on separate page if required

21   ✍   For each staff type, please use the table below to provide an estimate of the proportion of their time spent on each of the following types of task. **If this information is best collected by another individual, please ask them to provide you with this information in advance of the telephone interview,**

- Proportion of time spent on NHS-related activities, split between:

  a   Providing NHS prescription services, other NHS services, and assisting with administrative tasks associated with dispensing and the provision of NHS services. Please include any time you spend on procuring prescription medicines in this category;

  b   Clinical Governance such as checking the error log, PCT audits, dealing with complaints and patient satisfaction;

- Proportion of time spent on non-NHS activities, split between:

  c   Healthcare-related activities such as advising customers on health issues (not part of the services listed previously), selling P-Meds and GSL medicines, and providing private healthcare services (e.g. private prescriptions and travel inoculations);

  d   Non-healthcare-related activities (for example, procuring and selling cosmetics, toiletries); and

- Activities common to all business activities (e.g. staff management, cleaning etc.).

Please note: The total of the percentages provided in each row should equal 100%.

Role	Proportion of time spent on NHS-related activities %		Proportion of time spent on non-NHS activities %		Activities common to all business activities %
	a) Dispensing and service provision	b) Clinical governance	c) Healthcare related (e.g. P-meds, GSL private healthcare)	d) Non-healthcare related (e.g. cosmetics, toiletries)	e) (e.g. administrative tasks)
Branch Manager Pharmacist					
Other Pharmacists / Locums					
Pre-reg Students					
Pharmacy Technicians					
Dispensers / Dispensing Assistants					
Counter / Retail Assistants					
Delivery / Drivers					
Accountants / Book Keepers					
Cleaners					
Other (please specify) ……………………….					
Other (please specify) ……………………….					
Other (please					

specify)					

22   What is your view on your pharmacy's staffing level? Please tick the appropriate option below and provide details where indicated.

Staff level	✓
The staffing level is about right	
I would like to hire additional staff or increase staff working hours *If yes, please provide details of role and number of additional staff working hours in the table below.*	
I would like to reduce the number of staff or staff working hours *If yes, please provide details of role and number of reduced staff working hours in the table below*	

| Staff role you would like to increase / reduce	Number of hours per week you would like to increase / reduce

Premises & Assets

23   ☞   Please choose the most appropriate option.

Option	✓
a) The premises occupied by this pharmacy are held on a leasehold basis Please specify the **annual** rent from the Branch Accounts Referenced	£…………………
b) The premises occupied by this pharmacy are held on a freehold basis (no need to pay rent) Please specify the approximate **annual** cost to rent an equivalent property in this area.	£…………………

24   ☞   Floor space measurements. Please provide an estimate of the floor space of your pharmacy branch. Please indicate whether these measurements are provided in square metres or square feet and provide an estimate of how this space is used.

Description	Answer
Total area occupied	
Area above given in square metres or square feet? (circle one)	m^2/ sq feet
Percentage of area used for NHS activities (i.e. the counter and everything behind the counter including the dispensary and any consultation room)	
Percentage of area used for non-NHS activities (including retail)	
Total area	100%

25   ✍   Please use the table below to estimate how much it would cost to replace each
     of the assets listed with a brand new equivalent.

Asset	Estimate of total replacement cost (£)
Dispensary **Please include the value of all fixtures and fittings as well as the labour costs involved in installing a dispensary**	
Consultation room **Please include the value of all fixtures and fittings as well as the labour costs involved in installing a consultation room**	
Counter area **Please include the value of all shelving, cashier equipment as well as the labour costs involved in installing a counter area**	
Retail shelving **Please include the value of all shelving used to display retail products in the shop front. Please include the labour cost involved in installing the shelving**	
IT equipment – NHS-related equipment **Please include the value of all IT equipment used exclusively for NHS-related purposes: for example, IT equipment in the dispensary and consultation room**	
IT equipment – non-NHS-related equipment **Please include the value of all IT equipment used exclusively for non-NHS-related purposes (including retail and private healthcare)**	
IT equipment – other IT equipment **Please include the value of all IT equipment which cannot be exclusively attributed either to NHS or non-NHS activities: for example, the till or computers used for administrative tasks**	
Motor vehicles **Provide estimate only if this branch has a dedicated vehicle used for services such as prescription collection delivery**	
All other assets **Please estimate values and useful lives for all other assets in this branch including: fixtures and fittings in shop front area (excluding retail shelving) storage areas, offices, WC etc.**	

26   How long is your planned refit cycle?

…………………years

Plans for the Future

27　Do you have plans to do any of the following within the next 12 months?

| Action	Action planned? ✗ / ✓	Please provide details of your plans
Start offering new NHS services (please specify which services) ………………………………… ………………………………… …………………………………………		Will additional staff be hired? If, so, how many? What type?
Purchase new equipment (please list equipment and use, e.g. IT equipment for EPS, a dispensing robot)? …………………………………. …………………………………. ………………………………….		Estimated costs for each:
Other NHS related investment? ……………………………….. ……………………………….. ………………………………..		Estimated costs for each:

Financial information

If your branch belongs to a group of pharmacies, then in answering Questions 28 – 34, please exclude any "head office" costs or any centralised costs that are incurred to the benefit of several branches.

28   ✑   Please provide as much of the following financial information from the **Branch Accounts Referenced** for this branch as possible.

Item	Amount during the year of the **Branch Accounts Referenced** (£)
Profit and loss items	
Total revenue	
Of which NHS-related revenue	
If available – NHS prescription revenue	
If available – NHS services revenue	
Of which non-NHS-related revenue	
If available – healthcare-related revenue (i.e. GSL, P-Meds etc)	
If available – non-healthcare-related revenue (i.e. cosmetics, toiletries etc)	
Total cost of goods sold (including goods sold and also any goods written off because it is not possible to sell them) - for both NHS and non-NHS goods	
If possible, please indicate what % of the above £ amount relates to *non-NHS* goods	
Staff costs (including wages, salaries, bonuses, pensions and NI contributions, excluding remuneration for pharmacy owners)	
Staff Training	
Business rates	
Utilities (including light and heat, telephone, internet access)	
Advertising and marketing costs	

Repairs and maintenance	
Professional fees (for example, accountants and legal advisors not employed by the business)	
Total professional body subscriptions	
Total depreciation (if available, please provide breakdown below)	
Of which property depreciation	
Of which fixtures and fittings	
Of which motor vehicles	
Other depreciation	
Other overheads **In the fields below please list any other costs incurred at this branch excluding costs of goods sold and amortisation:**	

Please continue on separate page if required

29   ✍   Were any significant costs incurred in the period of the Branch Accounts
       Referenced that could be considered extraordinary or non-recurring?

Extraordinary/ non-recurring Items (please specify)	Amount <u>incurred</u> during the period of the Branch Accounts Referenced (£)
………………………………………………..	
………………………………………………..	
………………………………………………..	
………………………………………………..	
………………………………………………..	

30   ☞   Are there any costs missing from the period of the Branch Accounts Referenced that would usually be incurred in a normal year?

| Cost not incurred (please specify)	Amount **missing** during the period of the Branch Accounts Referenced (£)
……………………………………………..	
……………………………………………..	
……………………………………………..	
……………………………………………..	
……………………………………………..	

31   ☞   Please use the table below to provide your most recent stock valuation.

	£
Dispensing (including NHS stock)	
OTC Medicines	
Other (including toiletries, baby goods, electrical, sundries)	
Total stock	

32   ☞   What was the date of the above stock valuation?

…………………………………………………………………

33   ✍   We want to check we have a full picture of the costs involved in running this pharmacy branch. Are there any other significant **branch costs** that are not captured in the Branch Accounts Referenced? Please use the table below to list these costs:

Costs related to:	£ in a typical month
Other (please specify)	
Other (please specify)	

34   ✍   Are there any *assets* that are used in the provision of community pharmacy services that are not captured in the accounts data (e.g. a staff member that uses their own vehicle to deliver prescriptions)? If so, please provide details below. Please provide an estimate of the value of the assets and how much they are used (for example, hours per week).

……………………………………………………………………..…………………………………………

……………………………………………………………………..…………………………………………

……………………………………………………………………..…………………………………………

……………………………………………………………………..…………………………………………

……………………………………………………………………..…………………………………………

Other

35   Would you be willing to be re-contacted by the research team if we have any follow-up questions for you?

      Yes   /   No

Next steps

☐ Please review any other documents that were sent to you with this questionnaire (e.g. If this pharmacy branch is part of a **group of pharmacies** you will be asked to answer questions regarding the group).

☛ Please send in the postage paid envelope provided or to costofserviceinquiry@uk.pwc.com:

☐ All completed questionnaires;

☐ A copy of the Accounts Referenced (both Branch and Head Office, if appropriate); **and**

☐ A copy of your statutory accounts

Thank you once again for your valuable participation in this Inquiry.

OCS Code(s)	

Cost of Service Inquiry for Community Pharmacy

Appendix B - Owner questionnaire

PricewaterhouseCoopers (PwC) has been commissioned by the Department of Health (DH) and the Pharmaceutical Services Negotiating Committee (PSNC) to undertake an independent study into the costs incurred by pharmacies in England in providing community pharmacy services. This Cost of Service Inquiry is important as it will form the evidence base for negotiations for future funding.

At least one of your pharmacy branches has been selected to participate in this nationwide study using a carefully designed sampling procedure. Participation is essential to ensure high quality results for the Cost of Service Inquiry.

Who should complete the Owner questionnaire?

This survey should be completed by the individual with the most significant ownership stake in the business. In answering some of the questions in this survey, it may be appropriate for this person to consult other individuals who also have significant ownership stakes in the pharmacy business.

What will happen next?

You will already have been contacted by PwC before this survey was sent to you to agree a telephone appointment.

If you have not already been contacted by PwC, we would appreciate a call from you on: 028 9041 5491

May we kindly request that you look at the survey and gather the information necessary to complete the survey in preparation for this appointment. This will save time over the telephone and allow you to gather the information when most convenient for you.

Information that you may need to collect in advance is marked with this symbol (✍) throughout the survey.

Confidentiality

PricewaterhouseCoopers (PwC) has been appointed by the Department of Health and PSNC to conduct the inquiry. The Department of Health, PwC and PSNC acknowledge the commercial sensitivity of the information and have all committed to:

- confine access strictly to people who need to see it for the purposes of the inquiry;

- ensure that the information will not be used for any purpose other than this inquiry;

- destroy the information disclosing the identity of the contractors whose data are analysed as soon as the database has been quality assured and agreed between the PSNC and DH;

- maintain the confidentiality of an individual contractor's information in response to any requests for access to the database or any of its contents under the Freedom of Information Act;

- treat the identity of contractors from whom details are sought as confidential information.

Thank you in advance for your co-operation in the Cost of Service Inquiry.

1   Please provide the name and contact details for the individual who is responsible for completing these questions.

Principal contact name………………………………………………....

Title   ………………………………………....

Address 1   ……………………………………….... **(if different from above)**

Address 2   ……………………………………….... **(if different from above)**

Address 3   ……………………………………….... **(if different from above)**

County   ……………………………………….... **(if different from above)**

Postcode   ……………………………………….... **(if different from above)**

Phone number ……………………………………………..**(if different from above)**

Email   ………………………………………....

Please answer the following questions with reference to the 12 month time period of the Branch Accounts Referenced (please see Branch Questionnaire for definition).

2   For each significant owner of this pharmacy business, please specify approximately how many hours per week are spent working for the pharmacy business and how that time is divided.

	Number of hours worked per week for pharmacy business (hours)	1. Proportion of time spent on activities specific to the branch(es) covered in this survey (%)	2. Proportion of time spent on activities specific to branch(es) NOT covered in this survey (%)	3. Proportion of time spent on activities not specific to ANY branch(es) (%)
		e.g. the time spent by an owner that works in one of the pharmacies covered in this survey	e.g. the time spent by an owner that works part-time in one of the branches not covered by this survey	e.g. the time spent by an owner that works at the head office level and whose services benefit multiple branches
Owner 1				
Owner 2				
Owner 3				
Owner 4				
Owner 5				

Please continue on separate page if required

3   In the table below, for each significant owner please specify how their time is spent on each of the following types of task:

1. **NHS-related activities, split between:**

   a   Providing NHS prescription services, other NHS services, and assisting with administrative tasks associated with dispensing and the provision of NHS services. Please include any time you spend on procuring prescription medicines in this category;

   b   Clinical Governance such as checking the error log, PCT audits, dealing with complaints and patient satisfaction;

2. **Non-NHS-related activities, split between:**

   a   Healthcare-related activities such as advising customers on health issues (that are not part of the NHS services listed previously), selling P-Meds and GSL medicines, and providing private healthcare services (e.g. private prescriptions and travel inoculations); and

   b   Non-healthcare-related activities (for example, procuring and selling cosmetics, toiletries); and

3. **Activities common to all business activities (e.g. staff management, cleaning etc.).**

Role	1. Proportion of time spent on <u>NHS-related activities</u> (%)		2. Proportion of time spent on <u>non-NHS-related activities</u> (%)		3. Activities <u>common</u> to all business activities (%)
	a) NHS dispensing and services provision	b) Clinical governance	a) Healthcare related (e.g. GSL, P-meds)	b) Non-healthcare related (e.g. cosmetics, toiletries)	(e.g. staff management)
Owner 1					
Owner 2					
Owner 3					
Owner 4					
Owner 5					

Please continue on separate page if required

4   ᏻ   In the table below, please specify approximately how much each owner was remunerated (by remuneration type) in the period of the Accounts Referenced:

Amount remunerated in the period of the Accounts Referenced (£)	Salary[1]	Dividends	Rental payment to owner[2]	Rental payment to owner's partner/ relative[3]	Other (please specify below)
Owner 1					
Owner 2					
Owner 3					
Owner 4					
Owner 5					

Please continue on separate page if required

If response is provided in "Other", please describe payment type:

………

[1] Including bonus payments, employer NIC payments and pension contributions

[2] This would apply if the owner personally owned the freehold on pharmacy property and the pharmacy business paid the owner rent

[3] This would apply if the owner's partner or relative owns the freehold on the property used by the pharmacy and the pharmacy business pays rent

Next steps

☛ Please send in the postage paid envelope provided or to costofserviceinquiry@uk.pwc.com:

☐ All completed questionnaires;

☐ A copy of the Accounts Referenced (as described in the branch and head office questionnaires); **and**

☐ A copy of your statutory accounts

Thank you once again for your valuable participation in this Inquiry.

OCS Code(s)	

Cost of Service Inquiry for Community Pharmacy

Appendix C - Head Office Questionnaire (no cost centres)

PricewaterhouseCoopers (PwC) has been commissioned by the Department of Health (DH) and the Pharmaceutical Services Negotiating Committee (PSNC) to undertake an independent study into the costs incurred by pharmacies in England in providing community pharmacy services. This Cost of Service Inquiry is important as it will form the evidence base for negotiations for future funding.

At least one of your pharmacy branches has been selected to participate in this nationwide study using a carefully designed sampling procedure. Participation is essential to ensure high quality results for the Cost of Service Inquiry.

Who should complete this survey?

This survey should be completed by the individual who is responsible for the financial and operational matters for this group of pharmacies. In answering some of the questions in this survey, it may be appropriate for this person to consult individuals with access to head office information.

What will happen next?

You will already have been contacted by PwC before this survey was sent to you to agree a telephone appointment.

If you have not already been contacted by PwC, we would appreciate a call from you on: 028 9041 5491

May we kindly request that you look at the survey and gather the information necessary to complete the survey in preparation for this appointment. This will save time over the telephone and allow you to gather the information when most convenient for you.

The following checklist identifies the type of information we expect you'll need to have to hand:

☐ Your most recent 12 months of financial information (the "Head Office Accounts Referenced")

☐ Personnel and salary information

☐ Asset register if available

☐ Stock valuation

This information is marked with this symbol (☞) throughout the survey.

Confidentiality

PricewaterhouseCoopers (PwC) has been appointed by the Department of Health and PSNC to conduct the inquiry. The Department of Health, PwC and PSNC acknowledge the commercial sensitivity of the information and have all committed to:

- confine access strictly to people who need to see it for the purposes of the inquiry;

- ensure that the information will not be used for any purpose other than this inquiry;

- destroy the information disclosing the identity of the contractors whose data are analysed as soon as the database has been quality assured and agreed between the PSNC and DH;

- maintain the confidentiality of an individual contractor's information in response to any requests for access to the database or any of its contents under the Freedom of Information Act;

- treat the identity of contractors from whom details are sought as confidential information.

Thank you in advance for your co-operation in the Cost of Service Inquiry.

Basic information

1   Please provide the name and contact details for the individual who is responsible for completing these questions.

Principal contact name…………………………………………………....

Title   …………………………………………....

Address 1   ……………………………………………....

Address 2   ……………………………………………....

Address 3   ……………………………………………....

County   ……………………………………………....

Postcode   ……………………………………………....

Phone number ……………………………………………..

Email   ……………………………………………....

Head Office Accounts Referenced

In the questions that follow, the term "head office" is used loosely to refer to any functions which benefit more than one branch. Head office may occupy dedicated premises or might be co-located with one of the pharmacy branches. Head office operations may include:

-    Regional management functions (which may be known, for example, as local area managers or regional managers); and

-    Any distribution centres and distribution fleets owned and / or operated by your group.

We want to understand the types of Head Office or centralised costs your pharmacy group incurs in the course of delivering NHS services. We would like to be able to combine survey responses with your most recent set of financial accounts. For this reason, in addition to answering the specific questions in this survey, we will ask you to send us a copy of these accounts. Many of the questions in the survey will refer to the period covered by these accounts.

✍   Throughout this survey we will refer to these accounts as your **Head Office Accounts Referenced.**

> **The Head Office Accounts Referenced are:**
> - **Accounts that cover any head office or centralised costs involved in running this group**
> - **Your most detailed set of accounts (ideally management accounts if available)**
> - **For a recent 12 month period**
> - **Accounts that you are able to send us a copy of .**

If you do not have management accounts, other financial spreadsheets or your statutory accounts are acceptable. **The accounts provided need not be audited accounts**. You may want to look ahead in this survey to review the type of information we require.

> Please use the enclosed postage paid envelope (or email costofserviceinquiry@uk.pwc.com) to send us a copy of
> - Your **Head Office Accounts Referenced** in the postage paid envelope; **and**
> - Your most recent **statutory accounts** in the postage paid envelope (if different to the Head Office Accounts Referenced).

2   What type of accounts are the **Head Office Accounts Referenced** that you are able to provide us with copies of (either by post or email)?

Type of accounts	Please tick one ✓
Management accounts	
Other tables and	
Statutory accounts	

3   Please specify the **closing** month and year of the **Head Office Accounts Referenced**. Your most recent set are ideal.

Closing date: Month…………………………… Year………………………………………..

4   For the purposes of your statutory accounts, when is your financial year end?

Date……………………………………………

> **Please answer the following questions with reference to the 12 month time period of the Accounts Referenced.**

General information

5   Does your head office occupy dedicated premises? Please tick the appropriate option.

	✓	
Yes		☛ Please proceed to **Question 7**.
No, head office shares premises with a pharmacy branch		

6   **If the answer to Question** Error! Reference source not found.**5 is "No"**, please provide an estimate of what proportion of the premises floor space is occupied by head office and what proportion is used by the pharmacy branch.

	Proportion of floor space
Head office	
Pharmacy branch	

7   ✍   Please use the table below to provide details of your pharmacy group.

Branch type	Number of branches
Total number of pharmacy branches in the UK at the end of Accounts Referenced period	
Total number of pharmacy branches in England at the end of Accounts Referenced period	

When completing this questionnaire, please **exclude** costs *exclusively* related to operations in Scotland, Northern Ireland and Wales e.g. salary costs for a regional manager who manages pharmacies only in Scotland. Please **include** all costs that cannot be exclusively related to operations in Scotland, Northern Ireland and Wales e.g. salary costs for a regional manager who manages pharmacies in both Scotland and England.

8   ⌒   Please use the table below to provide information on revenues for your group.

Profit and loss items	Amount during the year of the <u>Accounts Referenced</u> (£)
WHOLE GROUP	
Total revenue	
Of which NHS-related revenue	
If available – NHS prescription revenue	
If available – other NHS services revenue	
Of which Non-NHS-related revenue	
If available – healthcare-related revenue (i.e. sale of GSL, P-Meds etc, provision of private healthcare services)	
If available – non-healthcare-related revenue (i.e. sale of cosmetics and toiletries, wholesale to 3rd parties, sale of non-human medicines etc)	
Total cost of goods sold (including goods sold and also any goods written off because it is not possible to sell them) - for both NHS and non-NHS goods	
If possible, please indicate what % of the above £ amount relates to *non-NHS* goods	

Head office employees

9   *Go*   In this section we ask you about every person employed by your group of pharmacies, whose work benefits more than one branch. For each such employee, we ask you to provide their average gross pay (i.e. wage or salary), total number of hours they work for your group of pharmacies and the number of hours they work in their head office capacity (i.e. undertake tasks which benefit more than one branch) by completing the table below.

(In answering the questions that follow, please **exclude** costs *exclusively* related to operations in Scotland, Northern Ireland and Wales. Please also **exclude** all remuneration (salaries, dividends etc.) for people with a *significant ownership stake* in the pharmacy group. For example, the salary costs for a part-owner of the business who also works as a general manager should not included in this questionnaire. Costs related to the remuneration of these individuals should instead be provided in the separate "Owner" questionnaire.)

When providing average gross pay, other staff-related costs such as bonuses, employer National Insurance Contributions (NIC) and pension contributions should be **excluded** from the response in this section. When asked for total staff costs as part of question 11 or 19, please **include** these costs.

In addition, we ask you to specify for each employee what proportion of their time (while working in their head office capacity) is spent on:

- *NHS-related activities.* These may include, for example, procurement of prescription medicines, administration associated with claiming payments from NHS BSA, the PCTs, developing standard operating procedures (SOPs) for the branches and collecting / delivering prescriptions on behalf of the branches.

- *Non-NHS related activities.* For example, these may include:

    o *Non-NHS healthcare-related activities.* For example, procurement of non-prescription medicines and other healthcare-related retail products, and the recruitment of counter assistants.

    o *Non-healthcare related activities.* These are activities which your group of pharmacies undertakes but which are not typical for a community pharmacy. Examples of such activities would include sale of non-human medicines and wholesaling of products to 3rd parties.

- *Activities common to all business segments.* Many activities undertaken by head office staff may support all services offered by your pharmacy group and cannot be clearly ascribed to either NHS, or Non-NHS business segments. Examples may include basic book keeping, management of the overall group and administration.

Please note: The total of the percentages provided in each row should equal 100%.
Please continue on a separate sheet if required.

Please note: The total of the percentages provided in each row should equal 100%.

Each employee	Head office role	Average gross pay			Total hours worked	Hours worked for head office	As part of head office role, proportion of time spent on: (%)		
	Please provide a short job title for each staff member (e.g. general manager, warehouse assistant etc)	Per month or per hour? (✓)		Amount (£)	Per typical week	Per typical week	NHS-related activities	Non-NHS-related activities	Activities common to all business segments
		Month	Hour						
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									

Continued over page

Please note: The total of the percentages provided in each row should equal 100%.

Each employee	Head office role	Average gross pay		Total hours worked	Hours worked for head office	As part of head office role, proportion of time spent on: (%)		
	Please provide a short job title for each staff member (e.g. general manager, warehouse assistant etc)	Per month or per hour? (✓)	Amount (£)	Per typical week	Per typical week	NHS-related activities	Non-NHS-related activities	Activities common to all business segments
		Month	Hour						
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									

Other head office information

In your answer to Question 9 you provided information on the staff costs associated with head office functions. In this section, we ask you a series of questions to identify any other costs your group of pharmacies incurs to support its head office functions.

10   Please describe your Head Office financials:

Description	✓	
I keep separate accounts for "head office"		☛ Please proceed to **Question 11**.
I include "head office" costs in the accounts for one of my branches		☛ Please proceed to **Question 19**.

11   ✐   Please use the table below to provide basic financial information for your head office. Please exclude capital expenditure from the responses to the questions in this section. Capital expenditure will be addressed in a subsequent section.

Profit and loss items	Amount during the year of the Head Office Accounts Referenced (£)
HEAD OFFICE	
Staff costs **(including wages, salaries, bonuses, pensions and NI contributions, excluding remuneration for pharmacy owners)**	
Staff training	
Actual rental costs **(if head office occupies a leasehold property)**	
Estimated rental costs **(if your premises are owned on a freehold basis, please estimate the likely rental amount for the property)**	
Business rates	
Utilities **(including light and heat, telephone, internet access)**	
Advertising costs	
Repairs and maintenance	
Professional body subscriptions	
Total depreciation (if available, please provide breakdown below)	
Of which property depreciation	
Of which fixtures and fittings	
Of which motor vehicles	
Other depreciation	

Continued over page

Other overheads **In the fields below please list any other costs incurred at the head office excluding costs of goods sold and amortisation:**	

Please continue on separate page if required

12   ᏻ᠐   There may be costs which are related to head office but which are <u>not</u>
captured in head office financial statements. One example of such costs may be rent
and utilities if head office shares the same premises as a branch but the rental / utility
payments appear in branch, rather than head office financial statements. Another
example may be salary, if a person who has head office duties but is paid by one of
the branches.

Please use the table below to identify any such costs. If these costs relate to salary,
please identify all the relevant individuals using the row number of the staff identified
in the table used in Question 9.

Costs related to head office but not captured in head office financial statements	Amount <u>incurred</u> during the period of the Head Office Accounts Referenced (£)
…………………………………………………..	
…………………………………………………..	
…………………………………………………..	
…………………………………………………..	
…………………………………………………..	
…………………………………………………..	

13   ✍   Were any significant costs incurred in the period of the Head Office Accounts
Referenced that could be considered extraordinary or non-recurring?

Extraordinary/ non-recurring Items (please specify)	Amount incurred during the period of the Head Office Accounts Referenced (£)
………………………………………………………..	
………………………………………………………..	
………………………………………………………..	
………………………………………………………..	

14   ✍   Are there any costs missing from the period of the Head Office Accounts
Referenced that would usually be incurred?

Cost not incurred (please specify)	Amount missing during the period of the Head Office Accounts Referenced (£)
…………………………………………………….	
…………………………………………………….	
…………………………………………………….	
…………………………………………………….	

15   ✍ Please use the table below to provide the value of stock held at head office (including the stock held at all centralised warehouse facilities) as of your most recent stock valuation.

	£
Prescription medicines stock	
Non-prescription medicines stock (GSL, P-Meds)	
Other stock	
Total stock	

16   What was the date of the above stock valuation?

        ……………………………………………………………

17   ✍ Please use the table below to estimate how much it would cost to replace each of the assets used by the **head office** with a brand new equivalent.

Asset	Total Replacement cost (£)
IT equipment / software – NHS-related equipment **Please include the value of all NHS-related IT equipment at head office: for example, IT assets for dispensing related systems**	
IT equipment / software – Non-NHS-related equipment **Please include the value of all non-NHS-related equipment at head office: for example, IT assets for retail purchasing IT systems**	
IT equipment / software – other IT equipment **Please include the value of all IT equipment which cannot be clearly attributed either to NHS or retail activities: for example, computers used for administrative tasks**	
Motor vehicles **Provide if head office has dedicated vehicle(s) used for services such as stock delivery**	
Head office fixtures and fittings	

18   Are there any other significant head office assets which have not been specifically
     mentioned above? If so, use the table below to identify these assets.

Asset	Total Replacement cost (£)
....	
....	
....	
....	
....	

☛ **Please proceed to the <u>Next Steps section on page 21</u>.**

19 ✍ We understand that you do **not** have a set of financial statements relating specifically to head office. Using the table below could you please estimate the costs which could be considered as head office costs (i.e. incurred for the benefit of more than one branch) even if they are not recorded as such.

If head office shares the premises with one of the branches in your group, then for items such as rent, business rates and utilities, please provide the costs incurred for the whole property (i.e. including the pharmacy branch).

Please exclude capital expenditure from the responses to the questions in this section. Capital expenditure will be addressed in a subsequent section.

Profit and loss items	Amount during the year of the <u>Head Office Accounts Referenced</u> (£)
HEAD OFFICE	
Staff costs **(including wages, salaries, bonuses, pensions and NI contributions, excluding remuneration for pharmacy owners)**	
Staff training	
Actual rental costs **(if head office occupies a leasehold property)**	
Estimated rental costs **(if your premises are owned on a freehold basis, please estimate the likely rental amount for the property)**	
Business rates	
Utilities **(including light and heat, telephone, internet access)**	
Advertising costs	
Repairs and maintenance	
Professional body subscriptions	
Total depreciation (if available, please provide breakdown below)	
Of which property depreciation	
Of which fixtures and fittings	
Of which motor vehicles	
Other depreciation	

Other overheads

(note that this item should capture any other costs incurred at head office, excluding cost of goods sold and amortisation)

Please continue on separate page if required

20 ⤶ Please use the table below to provide the value of stock held at head office (including the stock held at all centralised warehouse facilities) as of your most recent stock valuation.

	£
Prescription medicines stock	
Non-prescription medicines stock (GSL, P-Meds)	
Other stock	
Total stock	

21 What was the date of the above stock valuation?

…………………………………………………………………

22 ⤶ Please use the table below to estimate how much it would cost to replace each of the assets used by the **head office** with a brand new equivalent.

Asset	Total Replacement cost (£)
IT equipment / software – NHS-related equipment **Please include the value of all NHS-related IT equipment at head office: for example, IT assets for dispensing related systems**	
IT equipment / software – Non-NHS-related equipment **Please include the value of all non-NHS-related equipment at head office: for example, IT assets for retail purchasing IT systems**	
IT equipment / software – other IT equipment **Please include the value of all IT equipment which cannot be clearly attributed either to NHS or retail activities: for example, computers used for administrative tasks**	
Motor vehicles **Provide if head office has dedicated vehicle(s) used for services such as stock delivery**	
Head office fixtures and fittings	

23   Are there any other significant head office assets which have not been specifically mentioned above? If so, use the table below to identify these assets.

Asset	Total Replacement cost (£)
…………………………………………………………...	
………………………………………………………….	
………………………………………………………….	
………………………………………………………….	
………………………………………………………….	

Next steps

☛ Please send in the postage paid envelope provided or to costofserviceinquiry@uk.pwc.com:

☐ All completed questionnaires

☐ A copy of the Accounts Referenced (both Branch and Head Office); **and**

☐ A copy of your statutory accounts

Thank you once again for your valuable participation in this Inquiry.

OCS Code(s)	

Cost of Service Inquiry for Community Pharmacy
Appendix D - Head office questionnaire (with cost centres)

PricewaterhouseCoopers (PwC) has been commissioned by the Department of Health (DH) and the Pharmaceutical Services Negotiating Committee (PSNC) to undertake an independent study into the costs incurred by pharmacies in England in providing community pharmacy services. This Cost of Service Inquiry is important as it will form the evidence base for negotiations for future funding.

At least one of your pharmacy branches has been selected to participate in this nationwide study using a carefully designed sampling procedure. Participation is essential to ensure high quality results for the Cost of Service Inquiry.

Who should complete this survey?

This survey should be completed by the individual who is responsible for the financial and operational matters of the group of pharmacies. In answering some of the questions in this survey, it may be appropriate for this person to consult individuals with access to head office information.

What will happen next?

You will already have been contacted by PwC before this survey was sent to you to agree a telephone appointment.

If you have not already been contacted by PwC, we would appreciate a call from you on: 028 9041 5491

May we kindly request that you look at the survey and gather the information necessary to complete the survey in preparation for this appointment. This will save time over the telephone and allow you to gather the information when most convenient for you.

The following checklist identifies the type of information we expect you'll need to have to hand:

☐ Your most recent 12 months of financial information (the "Head Office Accounts Referenced")

☐ Personnel and salary information

☐ Asset register if available

☐ Stock valuation

✆   This symbol, shown throughout the survey, identifies information you will likely need to collect in advance of the telephone interview.

Confidentiality

PricewaterhouseCoopers (PwC) has been appointed by the Department of Health and PSNC to conduct the inquiry. The Department of Health, PwC and PSNC acknowledge the commercial sensitivity of the information and have all committed to:

- confine access strictly to people who need to see it for the purposes of the inquiry;

- ensure that the information will not be used for any purpose other than this inquiry;

- destroy the information disclosing the identity of the contractors whose data are analysed as soon as the database has been quality assured and agreed between the PSNC and DH;

- maintain the confidentiality of an individual contractor's information in response to any requests for access to the database or any of its contents under the Freedom of Information Act;

- treat the identity of contractors from whom details are sought as confidential information.

Thank you in advance for your participation in the Cost of Service Inquiry.

Basic information

1   Please provide the name and contact details for the individual who is responsible for completing these questions.

Principal contact name…………………………………………....

Title   …………………………………………....

Address 1   ………………………………………....

Address 2   ………………………………………....

Address 3   ………………………………………....

County   ………………………………………....

Postcode   ………………………………………....

Phone number ………………………………………...

Email   ………………………………………....

Head Office Accounts Referenced

In the questions that follow, the term "head office" is used loosely to refer to any functions which are carried out outside of pharmacy branches. Head office operations include any functions physically located in your group's head office buildings but would also include:

-    Regional management functions (which may be known, for example, as local area managers or regional managers); and

-    Any distribution centres and distribution fleets owned and / or operated by your group.

We want to understand the types of Head Office or centralised costs your pharmacy group incurs in the course of delivering NHS services. We would like to be able to combine survey responses with your most recent set of financial accounts. For this reason, in addition to answering the specific questions in this survey, we will ask you to send us a copy of these accounts. Many of the questions in the survey will refer to the period covered by these accounts.

℘   Throughout this survey we will refer to these accounts as your **Head Office Accounts Referenced.**

The Head Office Accounts Referenced are:
- **Accounts that cover any head office or centralised costs involved in running this group**
- **Your most detailed set of accounts (ideally management accounts if available)**
- **For a recent 12 month period**
- **Accounts that you are able to send us a copy of .**

If you do not have management accounts, other financial spreadsheets or your statutory accounts are acceptable. **The accounts provided need not be audited accounts**. You may want to look ahead in this survey to review the type of information we require.

Please use the enclosed postage paid envelope (or email costofserviceinquiry@uk.pwc.com) to send us a copy of
- Your **Head Office Accounts Referenced** in the postage paid envelope; **and**
- Your most recent **statutory accounts** in the postage paid envelope (if different to the Head Office Accounts Referenced).

---

2   ☞   What type of accounts are the **Head Office Accounts Referenced** that you are able to provide us with copies of (either by post or email)?

Type of accounts	Please tick one ✓
Management accounts	
Other tables and	
Statutory accounts	

3   ☞   Please specify the **closing** month and year of the **Head Office Accounts Referenced**. Your most recent set are ideal.

Closing date: Month…………………………… Year……………………………………………..

4   ☞   For the purposes of your statutory accounts, when is your financial year end?

Date……………………………………………

Please answer the following questions with reference to the 12 month time period of the Accounts Referenced.

General information

5   ☜   Please use the table below to provide details of your pharmacy group.

Branch type	Number of branches
Total number of pharmacy branches in the UK at the end of Accounts Referenced period	
Total number of pharmacy branches in England at the end of Accounts Referenced period	

When completing this questionnaire, please **exclude** costs *exclusively* related to operations in Scotland, Northern Ireland and Wales e.g. salary costs for a regional manager who manages pharmacies only in Scotland. Please **include** all costs that cannot be exclusively related to operations in Scotland, Northern Ireland and Wales e.g. salary costs for a regional manager who manages pharmacies in both Scotland and England.

Head office costs

Please answer the following questions with reference to the 12 month time period of the Accounts Referenced.

In this section, we ask you about the costs associated with the following head office functions or departments:

- Buying / wholesale;
- Distribution;
- Professional services;
- Finance;
- Payroll;
- Advertising and marketing;
- Information technology; and
- Human resources.

We appreciate that the structure of head office operations for your group may not match the structure outlined above exactly. Nevertheless, please attempt to follow it as far as practicable. You can specify any costs which do not align to the structure above in response to Question 27 and Question 28.

For each head office function or department, we ask for personnel and non-personnel costs. Personnel costs should include all personnel-related costs for staff employed in the particular head office function or department, including wages, salaries, bonuses, employer National Insurance Contributions (NIC) and employer pension contributions. Non-personnel costs should include all costs that do not relate to staff (e.g. rent, utilities etc)

Please **exclude** all remuneration (salaries, dividends etc.) for people with a *significant ownership stake* in the pharmacy group. For example, the salary costs for a part-owner of the business who also works as a general manager should not included in this questionnaire. Costs related to the remuneration of these individuals should instead be provided in the separate "Owner" questionnaire.

Please also **exclude** capital expenditure from the responses to the questions in this section. Capital expenditure will be addressed in a subsequent section.

Buying / wholesale

6   ☞   Please use the table below to identify the operating costs associated with **buying / wholesale** head office functions.

Buying / wholesale division		
Number of employees	#	
Total operating costs associated with buying / wholesale head office functions	£	
Of which personnel costs	£	
Of which non-personnel costs	£	

7   Please use the table below to specify what proportion of employees and personnel and non-personnel operating costs associated with the buying / wholesale division are specifically associated with:

- NHS-related activities (for example, purchasing of prescription medicines);

- Non-NHS-related activities (for example, purchasing of non-prescription medicines and provision of non-NHS healthcare services, purchasing of toiletries and cosmetics, purchasing of non-human medicines, wholesale of medicines and retail products to third parties).

Please also indicate what proportion of buying / wholesale costs is common to all business activities and cannot be clearly attributed to any one category.

Buying/wholesale division	NHS activities	Non-NHS related activities	Common to all business activities
Number of employees (#)			
Personnel costs (%)			
Non-personnel costs (%)			

Distribution

8   Does your group of pharmacies have a dedicated distribution facility? (In other words, does your group of pharmacies have a distribution centre / warehouse and a fleet of distribution vehicles?) Please tick the appropriate option:

	✓
Yes	
No	

If the answer to this question is "No" please proceed to Question 15.

9   Does your distribution facility service only pharmacies within the group or does it also service 3rd parties? Please tick the appropriate option:

	✓
Pharmacies within the group only	
Pharmacies in the group and 3rd parties (e.g. other pharmacies, NHS, GPs) **(please indicate % of goods by value distributed to 3rd parties)**	……………………

10   Does your distribution facility service all of the pharmacies within the group or does it service just some of the pharmacies? Please tick the appropriate option:

	✓
All pharmacies within the group	
Only some of the pharmacies within the group **(please specify the number of pharmacies serviced by the distribution facility)**	…………………..

11 ✍ Please use the table below to indicate the mix of products handled by your distribution facility during the 12 month period of Accounts Referenced:

	Value
Total value of goods (£)	
Of which % prescription medicines	
Of which % non-prescription medicines (P-Meds, GSL)	
Of which % other products	

12 ✍ Please use the table below to indicate, approximately, what proportion of warehouse floor space is occupied by each of the following product types:

	% of floor space
Prescription medicines	
Non-prescription medicines (P-Meds, GSL)	
Other products	

13 ✍ Please use the table below to identify the operating costs associated with distribution head office functions.

Distribution		
Number of employees	#	
Total operating costs associated with distribution head office functions	£	
Of which personnel costs	£	
Of which non-personnel costs	£	

14   Please use the table below to specify what proportion of employees and personnel and non-personnel operating costs associated with the distribution division are specifically associated with:

- NHS-related activities (for example, (for example, staff responsible for managing parts of the distribution facility dealing with prescription medicines);

- Non-NHS-related activities (for example, distribution of non-prescription medicines, toiletries and cosmetics, non-human medicines, and distribution of products to third parties)

Please also indicate what proportion of distribution costs is common to all business activities and cannot be clearly attributed to any one category.

Distribution division	NHS activities	Non-NHS related activities	Common to all business activities
Number of employees (#)			
Personnel costs (%)			
Non-personnel costs (%)			

Professional services division

15   ✍   Please use the table below to identify the operating costs associated with **professional services** head office functions. The professional services division would typically be responsible for ensuring the delivery of NHS pharmacy contract services and developing the clinical governance agenda. The role of Superintendent Pharmacist is typically associated with the professional services division.

The activities of the professional services division are usually primarily related to the provision of NHS pharmacy and services.

Professional services division		
Number of employees	#	
Total operating costs associated with professional services head office functions	£	
Of which personnel costs	£	
Of which non-personnel costs	£	

16   Please use the table below to specify what proportion of employees and personnel and non-personnel operating costs associated with the professional services division are specifically associated with:

▪ NHS-related activities (for example, implementing clinical governance requirements, delivery of advanced and enhanced services); and
▪ Non-NHS-related activities

Please also indicate what proportion of professional services operating costs is common to all business activities and cannot be clearly attributed to any one category.

Professional services division	NHS activities	Non-NHS related activities	Common to all business activities
Number of employees (#)			
Personnel costs (%)			
Non-personnel costs (%)			

Finance division

17   ☞   Please use the table below to identify the operating costs associated with **finance** head office functions. Finance division is typically responsible for functions such as financial accounting, management and corporate reporting, transaction processing, planning and internal audit.

Finance division		
Number of employees	#	
Total operating costs associated with finance head office	£	
Of which personnel costs	£	
Of which non-personnel costs	£	

18   Please use the table below to specify what proportion of employees and personnel and non-personnel operating costs associated with finance division are specifically associated with:

- NHS-related activities (for example, maintaining and auditing financial records specifically related to NHS);
- Non-NHS-related activities (for example, maintaining reporting associated with the sale of retail products); and

Please also indicate what proportion of finance division operating costs is common to all business activities and cannot be clearly attributed to any one category.

Finance division	NHS activities	Non-NHS related activities	Common to all business activities
Number of employees (#)			
Personnel costs (%)			
Non-personnel costs (%)			

Payroll processing

19   ✍   Please use the table below to identify the operating costs associated with **payroll processing** head office functions. Payroll processing division is typically responsible for functions such as tracking hours worked, issuing pay cheques, withholding taxes / NI contributions and processing pension contributions.

Payroll processing		
Number of employees	#	
Total operating costs associated with payroll processing head office functions	£	
Of which personnel costs	£	
Of which non-personnel costs	£	

20   Please use the table below to specify what proportion of employees and personnel and non-personnel operating costs associated with payroll division are specifically associated with:

- NHS-related activities;
- Non-NHS-related activities; and

Please also indicate what proportion of payroll processing operating costs is common to all business activities and cannot be clearly attributed to any one category.

Payroll processing division	NHS activities	Non-NHS related activities	Common to all business activities
Number of employees (#)			
Personnel costs (%)			
Non-personnel costs (%)			

Advertising and marketing

21   ✍   Please use the table below to identify the operating costs associated with **advertising and marketing** head office functions. Advertising and marketing division is typically responsible for the preparation of materials for point of sale promotions and leaflets displayed in stores.

Advertising and marketing		
Number of employees	#	
Total operating costs associated with advertising and marketing head office functions	£	
Of which personnel costs	£	
Of which non-personnel costs	£	

22   Please use the table below to specify what proportion of employees and personnel and non-personnel operating costs associated with advertising and marketing division are specifically associated with:

- NHS-related activities (for example, promoting availability of NHS services);
- Non-NHS-related activities (for example, point of sale promotions, marketing of non-prescription medicines, advertising of wholesale services).

Please also indicate what proportion of advertising and marketing operating costs is common to all business activities and cannot be clearly attributed to any one category.

Advertising and marketing division	NHS activities	Non-NHS related activities	Common to all business activities
Number of employees (#)			
Personnel costs (%)			
Non-personnel costs (%)			

Information technology division

23   ✍   Please use the table below to identify the operating costs associated with **information technology** head office functions. Information technology division is typically responsible for functions such as developing and delivering IT systems and software (for example, EPoS and dispensary systems). This division also typically offers day-to-day IT support.

| Information technology division		
Number of employees	#	
Total operating costs associated with head office IT functions	£	
Of which personnel costs	£	
Of which non-personnel costs	£	

24   Please use the table below to specify what proportion of employees and personnel and non-personnel operating costs associated with information technology division are specifically associated with:

- NHS-related activities (for example, installing and maintaining dispensary IT systems); and
- Non-NHS-related activities (for example, installation and maintenance of a retail product purchasing system).

Please also indicate what proportion of information technology division operating costs is common to all business activities and cannot be clearly attributed to any one category (for example, installation and maintenance of general ledger systems or support for standard Microsoft Office applications).

Information technology division	NHS activities	Non-NHS related activities	Common to all business activities
Number of employees (#)			
Personnel costs (%)			
Non-personnel costs (%)			

Human resources

25　　✍　　Please use the table below to identify the operating costs associated with **human resources** head office functions. Human resources division is typically responsible for functions such as recruitment and staff training.

Human resources division		
Number of employees	#	
Total operating costs associated with human resources head	£	
Of which personnel costs	£	
Of which non-personnel costs	£	

26　　Please use the table below to specify what proportion of employees and personnel and non-personnel operating costs associated with the human resources division are specifically associated with:

- NHS-related activities (for example, recruitment and training of pharmacists, locums, dispensers and pre-registration students); and
- Non-NHS-related activities (for example, recruitment and training of retail assistants).

Please also indicate what proportion of human resources division operating costs is common to all business activities and cannot be clearly attributed to any one category.

Human resources division	NHS activities	Non-NHS related activities	Common to all business activities
Number of employees (#)			
Personnel costs (%)			
Non-personnel costs (%)			

Other central costs

27　　✍　　Please use the table below to identify any head office functions / divisions which have not been specifically mentioned above and provide the total operating costs associated with these divisions.

Division / Function	Brief description	Total cost (£)

*Please continue on a separate sheet if required*

28   Please use the table below to specify what proportion of operating costs associated with each of the divisions identified in response to question 27 are specifically associated with:

- NHS-related activities; and
- Non-NHS-related activities.

Please also indicate what proportion of operating costs associated with each division is common to all business activities and cannot be clearly attributed to any one category.

| Division	NHS activities %	Non-NHS-related activities %	Common to all business activities %

Financial information

29   ✍   Please use the table below to provide basic financial information for your group. Note that the sum of costs in the "Head Office Costs" section below should approximately equal the sum of costs provided in the breakdown of costs by division, as provided in the previous section.

Profit and loss items	Amount during the year of the <u>Accounts Referenced</u> (£)
WHOLE GROUP	
Total revenue	
Of which NHS-related revenue	
If available – NHS prescription revenue	
If available – NHS services revenue	
Of which non-NHS-related revenue	
If available – healthcare-related retail revenue (i.e. GSL, P-Meds, provision of private healthcare services)	
If available – non-healthcare-related revenue (i.e. sale of cosmetics, wholesale to 3rd parties, sale of non-human medicines etc.)	
Total cost of goods sold (including goods sold and also any goods written off because it is not possible to sell them) - for both NHS and non-NHS goods	
If possible, please indicate what % of the above £ amount relates to *non-NHS* goods	
HEAD OFFICE COSTS (this includes <u>all</u> head office sites, departments and functions)	
Staff costs (including wages, bonuses, pensions and NI contributions, excluding remuneration for pharmacy owners)	
Staff training	
Actual rental costs (if head office occupies a leasehold property)	
Estimated rental costs (if your premises are owned on a freehold basis, please	

estimate the likely rental amount for the property)	
Business rates (all head office functions)	
Utilities (including light and heat, telephone, internet access)	
Advertising costs (e.g. advertising on behalf of branches in GP surgeries)	
Repairs and maintenance	
Professional body subscriptions	
Total depreciation (if available, please provide breakdown below)	
Of which property depreciation	
Of which fixtures and fittings	
Of which motor vehicles	
Other depreciation	
Other overheads **In the fields below please list any other costs incurred at the head office excluding costs of goods sold and amortisation:**	

Please continue on separate page if required

30   ✍   Were any significant costs incurred in the period of the Accounts Referenced that could be considered extraordinary or non-recurring?

Extraordinary/ non-recurring Items (please specify)	Amount incurred during the period of the Accounts Referenced (£)
…………………………………………………..	
…………………………………………………..	
…………………………………………………..	
…………………………………………………..	
…………………………………………………..	

Please continue on separate page if required

31   Are there any costs missing from the period of the Accounts Referenced that would usually be incurred?

Cost not incurred (please specify)	Amount **missing** during the period of the Accounts Referenced (£)
………………………………………………..	
………………………………………………..	
………………………………………………..	
………………………………………………..	
………………………………………………..	

32   Please use the table below to provide the value of stock held at head office (including the stock held at all centralised warehouse facilities) as of your most recent stock valuation.

	£
Prescription medicines stock	
Non-prescription medicines stock (GSL, P-Meds)	
Other stock	
Total stock	

33   What was the date of the above stock valuation?

…………………………………………………………………

34   Please use the table below to estimate how much it would cost to replace each of the assets used by the **head office** with a brand new equivalent.

Asset	Total Replacement cost (£)
IT equipment / software – NHS-related equipment **Please include the value of all NHS-related IT equipment at head office: for example, IT assets for dispensing related systems**	
IT equipment / software – Non-NHS-related equipment **Please include the value of all non-NHS-related equipment at head office: for example, IT assets for retail purchasing IT systems**	
IT equipment / software – other IT equipment **Please include the value of all IT equipment which cannot be clearly attributed either to NHS or retail activities: for example, computers used for administrative tasks**	
Motor vehicles **Provide if head office has dedicated vehicle(s) used for services such as stock delivery**	
Head office fixtures and fittings	

35   Are there any other significant head office assets which have not been specifically mentioned above? If so, use the table below to identify these assets.

Asset	Total Replacement cost (£)
……………………………………………………………..	
…………………………………………………………….	
…………………………………………………………….	
…………………………………………………………….	
…………………………………………………………….	

Next steps

☛ Please send in the postage paid envelope provided or to
   costofserviceinquiry@uk.pwc.com:

☐ All completed questionnaires;

☐ A copy of the Accounts Referenced (both Branch and Head Office); **and**

☐ A copy of your statutory accounts

Thank you once again for your valuable participation in this Inquiry.

DH Pharmacy / PSNC
Cost of Service Inquiry for Community Pharmacy

APPENDIX E – SCREENER QUESTIONNAIRE

Background Sample Information

Pharmacy Entity Name	\<merge\>
Is Contact a Head Office or a Branch?	\<merge\>
Contact Address (best guess)	\<merge\>
Contact Telephone No. (best guess)	\<merge\>
Pharmacy type	\<merge\>

No.	Branch Name	OCS Code	Branch Address	Branch postcode	Branch Telephone Number	Items group	MUR group
1							
2							
3							
4							
5							
6							
7							
8							

Call Back	Date	Time	**Outcome –** Successful / Call back / Refusal *(why?)* / Non – effective / 5 or more calls made
1st			
2nd			
3rd			
4th			
5th			
6th			
7th			
8th			

INTRODUCTION:

IF MEMBER OF STAFF:

Hello, my name is… from PricewaterhouseCoopers International Survey Unit. May I speak with the pharmacy owner or manager of the pharmacy?

IF OWNER / MANAGER UNAVAILABLE SEEK ALTERNATIVE SENIOR STAFF MEMBER WHO MAY BE ABLE TO ASSIST

IF OWNER / MANAGER OR OTHER SENIOR STAFF MEMBER UNAVAILABLE CHECK WHAT DATE / TIME MIGHT BE BETTER AND UPDATE STATUS TABLE

IF OWNER/MANAGER/SENIOR MEMBER OF STAFF PROCEED BELOW

Hello, my name is… from PricewaterhouseCoopers International Survey Unit.

1. PricewaterhouseCoopers are working with the Pharmaceutical Services Negotiating Committee (PSNC) and the Department of Health on the Cost of Service Inquiry. You were sent a letter that we may be in touch. Did you receive this letter?

We have selected (your branch, one of your branches, x of your branches) as part of our survey sample. We would like to understand the costs involved in running this branch/these branches – and also any head office or centralised costs incurred.

2. Are you the most appropriate individual to provide information on these branches? IF YES, ASK BRANCH QUESTIONS If not, who should we contact instead?

3. Are you the most appropriate individual to provide information on any head office or centralised costs involved in running this branch/these branches? IF YES, ASK HEAD OFFICE QUESTIONS If not, who should we contact instead?

IF HAVE RECEIVED LETTER, CONTINUE TO SCREENING QUESTIONS

IF NOT RECEIVED LETTER, ARRANGE EMAIL / POSTAL OF LETTER TO APPROPRIATE INDIVIDUALS AND CALL BACK. UPDATE CALL BACK STATUS

4.	Can we arrange a time in the coming days when you would be able to participate in the study?	Yes	1	Proceed
		No	2	*Ask for reason why and record in status*

INTRO QUESTIONS

In order to check if your pharmacy is appropriate for taking part in the study can I ask…

5. What is the name of the individual or company that owns your group of pharmacies?

Please specify:………………………………..

| 6. | Can you confirm the total number of branches belonging to your group of pharmacies? (in England) | Record number …………………………….. | 1 | *Proceed* |

If they struggle to give precise answer, ask "Are there 5 or more branches in your group?"

BRANCH QUESTIONS

| 7. | Can you confirm whether the branches we have identified in our sample are all part of your group? (refer to list above) | Yes to some or all | 1 | *Proceed* |
| | | No to all | 2 | *Thank and close* |

| 8. | Has the branch/Have the branches been continuously operating since January 2009? | Yes to some or all | 1 | *Proceed* |
| | | No to all | 2 | *Thank and close* |

| 9. | Has the ownership of the branch(es) changed since January 2009? | Yes to all | 1 | *Record details. Thank and close – check with PwC London* |
| | | No to some or all | 2 | *Proceed* |

| 10. | Does the branch/Do the branches have an LPS contract? *Interviewer note: LPS - Local Pharmaceutical Services.* In addition to, or instead of, a standard national contract. Don't expect to pick up many of these. | Yes to all | 1 | *Thank and close* |
| | | No to some or all | 2 | *Proceed* |

| 11. | Is the branch/Are the branches a Home care company or Specialist Food company? | Yes to all | 1 | *Thank and close* |
| | | No to some or all | 2 | *Proceed* |

12.   Can I can confirm the postcode of this branch/these branches to be…. <merge>

Interviewer note: if incorrect, record postcode(s) _____

13.   Is this branch/Are these branches located in the following?

On the street	1	*Proceed*
In a supermarket	2	*Proceed*
In a GP surgery	3	*Proceed*
Internet only based	4	*Proceed*
Other (record verbatim) _____	5	*Proceed*

HEAD OFFICE QUESTIONS

In order to understand which questionnaire(s) we should send to you in advance of our call, can I ask…

14.   Do you have any form of centralised costs or head office function that benefits more than one branch?

Interviewer note: Expect that most groups of pharmacies with 2 or more branches will have some sort of centralised costs, even if it is not as formal as a Head Office

Yes	1	*Head Office questionnaire to be sent* *Proceed to Q15*
No	2	*Proceed to Q18*

15.   Is this head office function large enough to be organised into different cost centres?

Yes	1	*Head Office questionnaire with cost centres questionnaire to be sent* *Proceed to Q18*
No	2	*Proceed to Q16*

4

| 16. | Is the number of staff carrying out head office/centralised functions less than 30? | Yes | 1 | *Head Office questionnaire with no cost centres questionnaire to be sent*

Proceed to Q18 |
| | | No | 2 | *Proceed to Q17* |

| 17. | Would you find it easiest to fill in a questionnaire that asked about head office costs in terms of individual staff involved – or in terms of roles/functions? | Individual staff | 1 | *Head Office questionnaire with no cost centres questionnaire to be sent*

Proceed |
| | | Roles/Functions | 2 | *Head Office questionnaire with cost centres questionnaire to be sent*

Proceed |

FIELDWORK STRATEGY QUESTIONS

We would like to fill in a:

- Questionnaire on your head office/centralised costs (if appropriate)

- Questionnaire on each of the branches selected in our sample

- Questionnaire for the owner of the business

| 18. | Would you prefer us to send all these questionnaires to you, or are there alternative colleagues of yours we should send them to? | Yes, can source information and manage response on behalf of group | 1 | *Proceed* |
| | | No, no will require colleague's assistance | 2 | *Establish if copies of questionnaire should be sent to colleague(s)*

Proceed |

(if we have selected more than one branch in a group in our sample and/or we are talking to the head office rather than the branch itself, then ask (if not already covered in question18)…)

| 19. | Would you prefer us to send the branch questionnaire(s) to you – or directly to the individual | Send the branch questionnaire(s) to telephone contact | 1 | *Proceed to Q13* |

branches

Send the branch questionnaire(s) directly to the branch(es)	2	*(should ideally telephone branch before sending questionnaires in post)*
		Proceed to Q12

20. Record name, full address and telephone number of colleague.

_____

_____

_____

_____

_____

_____

21. Would you like to receive questionnaire information by post or via email?

By post	1	*Proceed*
By email	2	*Proceed*

22. Record name, full address, telephone number and email address of respondents.

Interviewer note: use sample information to confirm records if known. If different record new information below.

_____

_____

_____

_____

_____

23. Record date and time of interview

_____ / _____ / _____   ____:____ am / pm

Thank and close.

Appendix F – Details of pilot study

1.1. Introduction

PricewaterhouseCoopers ('PwC') was commissioned by the Department of Health to undertake independent analysis on behalf of DH and in collaboration with the Pharmaceutical Services Negotiating Committee (PSNC) to estimate the costs incurred by pharmacies in England in providing the community pharmacy services defined under the national NHS community pharmacy contractual framework.

Ahead of deploying a nationwide survey of community pharmacies and their costs we undertook a pilot survey of a small number of community pharmacies and head offices. This took the form of a number of site visits.

The purpose of this pilot was to:

- Gain a qualitative understanding of the nature of the pharmacy business
- Understand the different staff roles and who will be best placed to respond to our survey
- Present potential survey questions and obtain feedback on the wording of questions and how straightforward they are to answer
- Gain an understanding of accounting practices and obtain examples of their accounts. Understand what sort of information is easy for them to provide and what is more difficult.
- Find out what outside costs we might need to seek to understand (e.g. a head office of any sort)
- Discuss whether, in the pharmacist's view, our proposed questions will provide a fair reflection of their costs and whether there are there things we are missing
- Discuss how we could improve the survey methodology or tools to make it more straightforward or attractive for the pharmacists to respond
- Discuss any other relevant issues or assumptions

The pilot visits provided a basis for the development and refinement of the survey tools proposed for the main survey.

In addition to holding conversations with pharmacists, we used these site visits to collect certain other measures e.g. measuring shop floor space and estimating the proportion of floor space used for different purposes, and estimating the amount of time staff spend on different types of activities. The purpose of this was to gain an indication of the activities undertaken in pharmacies and their associated costs (e.g. Activity Based Costing).

The pilot survey involved visiting 13 different pharmacy branches and 5 head offices. 2 PwC staff were present at each visit. Each visit lasted approximately 2 hours. The PwC staff members interviewed a senior member of pharmacy staff, ideally the pharmacist or store manager, and also collected the range of other measures described. On the basis of these visits, the PwC team developed the draft questionnaire to be used for the main fieldwork.

Following the pilot visits and sign-off of the main fieldwork questionnaire by the project team, our fieldwork team carried out a "soft start" to the fieldwork to check that the questionnaire flowed correctly and was the appropriate length.

The remainder of this note is structured as follows:

- A description of the LRIC approach to cost allocation which we discussed with pilot respondents to assess whether it would be possible for them to answer questions relating to allocating costs using LRIC.

- Questions we asked a senior member of staff at each pharmacy branch (these were refined during the course of the pilot)
- The other measures that we looked collect for each pharmacy branch visited during the pilot.
- Questions we asked during the head office/central cost entity interviews (these were refined during the course of the pilot)
- Annex A – Some further details of the branches and head offices included in the pilot

1.2.   Costing approach (as described in the pilot)

Our approach to estimating costs is based on long-run incremental cost ("LRIC") analysis which is recognised in competition and regulatory practice.

LRIC analysis asks the question, starting from a hypothetical situation in which there was only a retail business (comprised of your existing branch network and retail sales including P-Meds), what additional or incremental costs would you need to incur in the long-run to add on your NHS pharmacy business. By long-run, we refer to a time period in which all your costs become variable. This increment is the LRIC of the NHS business (Step 1 in the diagram below). Likewise, starting from a hypothetical situation in which you just had a NHS business, what additional costs would you need to incur to add on a retail business (comprising your existing retail sales spread across your existing branch network)? This additional cost is the LRIC of retail (Step 2). When the LRIC of NHS and the LRIC of retail are deducted from total costs, the remainder of costs are common (Step 3).

Figure 1: LRIC approach
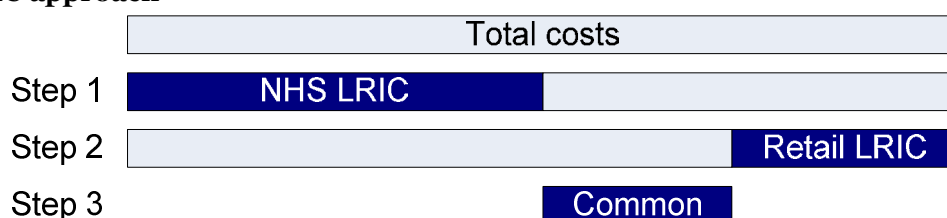
So, for example, if there are three staff in a pharmacy, it may be reasonable to assume that in the long-run it would be possible to remove one staff if only operating a NHS business (so one is the LRIC retail) and one staff only operating a retail business (so one is the LRIC NHS). Therefore one would be common.

In practice we have found that framing the LRIC approach in a slightly different way makes it easier to implement. Specifically, it is possible to re-phrase the question and ask what costs would you avoid (in the long-run) if you decided to close down your NHS business but continued to operate the retail business. This would be the avoidable costs for the NHS business. Likewise, the same question can be asked with respect to the retail business. When the avoidable cost for your NHS pharmacy and retail business is deducted from total costs, the remaining costs are common. As this approach starts from your existing business (rather than a hypothetical scenario of a NHS or retail only business) we believe that this approach will be more straightforward than asking what additional costs would be incurred.

Clearly, in practice you may not continue to operate a retail only business as it would most probably be loss-making. Nonetheless, we would ask survey participants to assume that the retail-only business is a going concern for the purpose of this analysis.

We are focussing on both operating and capital costs, but are excluding the costs of goods sold. We are looking to analyse the most recent financial year for which data is available and are analysing both branch and any "central entity" (e.g. head office) costs.

1.3.   Discussion guide for branch pilot visits

In the following section we detail the questions we hope to ask a senior member of staff at each pharmacy that we visit during the pilot survey. Some questions are quite detailed and we expect that respondents may have to look up certain pieces of information before being able to respond fully.

The purpose of the pilot visits is to gain as full an understanding as possible of the pharmacy business and its costs. For this reason there are many questions that we intend to cover. We envisage that the questions for the main fieldwork will be a simplified set drawn from this long list of questions, selected and refined as appropriate based on our pilot conversations.

We envisage introducing these pilot discussions using wording such as: "Thank you for being willing to speak to me today. We are part of a team working with the DH/PSNC to design and carry out a survey to understand the true cost of delivering community pharmacy services. We are in the early stages of developing the questionnaire and conversations such as the one we are having with you today will help us to phrase our questions appropriately and ensure we are covering all relevant aspects of your pharmacy business and costs. We are very interested in your views – so please let me know if you think there are things we should change to improve how this survey will work."

Basic information

1. Which individual is best placed to answer a series of questions on the operations of this branch and the costs involved? [want to ensure we speak to the most appropriate person]
2. Please provide the following contact information:

    –   Trading name of pharmacy
    –   Address 1
    –   Address 2
    –   Address 3
    –   County
    –   Postcode
    –   Phone number
    –   Email
    –   Principal contact name
    –   Title

3. Indicate branch location

    –   Urban: High Street
    –   Urban: Residential
    –   Rural
    –   Other (please specify)

    [We can make a formal distinction between urban/rural using ONS postcode data. Is the High Street/Residential distinction important?]

4. Is the pharmacy located within a GP practice? Yes/No
5. Is the pharmacy located within a supermarket? Yes/No
6. (If yes to previous question) Is the pharmacy owned by the supermarket?
7. Indicate the ownership structure of this pharmacy:

    –   Independent (single branch)
    –   Independent (2-4 branches)
    –   Small multiple (5-[x] branches)
    –   Medium multiple ([x]-[y] branches)
    –   Large multiple (>[y] branches)

[Guidance on values of x and y would be helpful.]

8. Who is the ultimate owner or manager of this branch? We would be grateful if you could provide their contact details as we would like to interview them separately to ensure we have a full picture of the costs involved in running this branch.

- – Address 1
- – Address 2
- – Address 3
- – County
- – Postcode
- – Phone number
- – Email
- – Principal contact name
- – Title

9. For what 12-month period do you have the most recent set of complete financial accounts available?

    Unless otherwise noted, we would like all the answers and data you provide to the following questions to align to the same 12-month period as is covered by your most recent set of financial accounts.

10. How many staff did you employ at each staff grade in the last financial year for which you have accounts? (pharmacist, retail assistant, manager, locum etc.))?
11. How many full-time equivalents (FTEs) did you employ in each staff grade?
12. Are dispensing staff and counter staff all qualified? If not does the pharmacy have systems to ensure that all permanent staff working in the professional area undertake training?

Services offered and Quality measures

13. Does this pharmacy offer Advanced services (i.e. Medicine Use Reviews (MURs))? If so, how many were completed in the 12-month period for which you have the most recent complete set of financial accounts? How much revenue was received for the provision of these services? [We may source this using PPD data]
14. Does this pharmacy offer any Locally Enhanced Services (LES) in the last financial year? If yes, please indicate which services below:

    - – Anticoagulant Monitoring Service
    - – Care Home Support Service
    - – Disease Specific Medicines Management Service
    - – Gluten Free Food Supply Service
    - – Home Delivery Service
    - – Independent Prescribing
    - – Language Access Service
    - – Medication Review Service
    - – Medicines Assessment and Compliance Support Service
    - – Minor Ailment Schemes
    - – Needle and Syringe Exchange Service
    - – On Demand Availability of Specialist Drugs Service
    - – Out Of Hours Service
    - – Patient Group Direction Service
    - – Prescriber Support Service
    - – Schools Service
    - – Screening Service
    - – Stop Smoking Service
    - – Supervised Administration Service
    - – Supplementary Prescribing Service

15. Does this pharmacy have a Local Pharmacy Services (LPS) contract with the local PCT? If yes, is this an Essential Small Pharmacies LPS (ESPLPS) contract?
16. Does this pharmacy offer any type of internet or mail-order service? If yes, please indicate below the services offered.

    - – Physical presence with ability to submit prescriptions via internet
    - – Physical presence with ability to submit prescriptions via mail

     –   Exclusive internet pharmacy

17. Does this pharmacy offer non-remunerated services such as prescription delivery service or pillpacks? If yes, please briefly describe the services offered.
18. Have you begun to offer any additional services (enhanced, advanced or non-remunerated) services since the last financial year? Do you have any plans in place to begin offering any? Which services? What changes to staffing, premises or equipment do you envisage will be necessary to achieve this?

     –   Recruit new staff
     –   Increase current staff hours
     –   Move to new premises
     –   Install a consulting room
     –   Purchase new equipment
     –   Other

19. What additional services (enhanced, advanced or goodwill) would you consider offering if they were commissioned by your local PCT? [provide list]
20. Procedures: does your pharmacy have SOPs for: a) dispensing, b) waste disposal; c) controlled drug handling, storage record keeping; d) handling dispensing errors?
21. Stock handling: do you keep records of refrigerator temperatures; date checking of stock?
22. Service quality: does your pharmacy have a) a complaints log; b) owing log; c) RP record system?
23. Premises: does your pharmacy have: a) a consultation area suitable for providing MURs; b) disabled access or a bell for assistance
24. Locums: – does your pharmacy have a locum manual (if you use locums)

Operational information

25. Transactional data for the period covered by the most recent financial accounts for NHS dispensed. [We may source this using PPD data]
26. Branch floor space (specify whether responses given in sq/ft or sq/m), if possible split by:

     –   sales floor
     –   dispensary
     –   consultation room
     –   storage space for prescription medicines
     –   storage space for non-prescription medicines (healthcare related retail [need to define])
     –   storage space for other retail stock [need to define]
     –   other back office areas (office, staff room, WC etc)

Financial information

27. What period does the pharmacy's financial year run between?
28. Are the pharmacy's finances (payroll, accounts etc.) managed by a central entity or an external accountant? If so, who are they managed by?
29. Please provide as much of the following financial information as possible for the most recent 12-months for which a full set of financial accounts are available [for the main survey we will ask for financial information to be provided by post or email]:

     –   Statutory financial statements for the pharmacy and, if not covered by these accounts, any other central cost entity (e.g. head office)
     –   Detailed management accounts for the pharmacy and, if not covered by these accounts, any other central cost entity (e.g. head office)
     –   A breakdown of total revenue by NHS and retail revenue [need to provide definition of what is included in NHS and retail]
     –   A breakdown of total payments to staff by type (pharmacist, retail assistant, manager, locum etc.) for the pharmacy (including salary, bonuses, NIC, pension contributions)
     –   A breakdown of depreciation by type (e.g. property, fixtures and fittings, vehicles)

- A fixed asset register that details the fixed assets employed in the running of the pharmacy, including estimates of their original cost, current depreciated value and useful economic lives.
- An estimate of the average value of the stock of prescription medicines kept in the pharmacy.

30. Is the property the pharmacy is located in rented or freeheld? If it is freeheld, are you able to estimate an approximate cost of renting an equivalent property?
31. Does the pharmacy have any significant "intangible" assets? e.g. brand value etc.
32. Are there any significant costs in the accounts for the financial year provided that could be considered extraordinary or non-recurring? Alternatively, are there any costs missing from the accounts for the financial year provided that would usually be incurred? Has there been any of either of these types of costs in the previous three years?
33. Are there any significant costs that are not captured in the accounts data? What are these? e.g.

- Unpaid work by a company director for an independent pharmacy,
- Other admin and paperwork
- Staff training

34. Are you able to provide an estimate the value of this time?
35. Have you designated a lead for Clinical Governance?
36. Approximately how much time per week do your staff spend on clinical governance (e.g. reviewing lessons learnt from errors, disseminating information from or taking actions required by NICE or NPSA, patient survey, patient leaflet).
37. Are there any assets that are used in the provision of community pharmacy services that are not captured in the accounts data? e.g. a staff member that uses their own vehicle to deliver prescriptions

Cost allocation

38. For each non-staff-cost-related cost line identified in the most detailed level of accounts provided:

- Which costs would you avoid in the long run if you decided to close the NHS business?
- Which costs would you avoid if you decided to close the retail business?

39. For each staff-cost-related cost line identified in the most detailed level of accounts provided:

- Which staff would you not continue to employ if you decided to close the NHS business at this branch?
- Which staff would you not continue to employ if you decided to close the retail business at this branch?

40. For each fixed asset identified in the fixed asset register:

- Which assets would you not be required to hold if you decided to close the NHS business at this branch?
- Which assets would you not be required to hold if you decided to close the retail business at this branch?

41. For each staff type, what percentage of their time is spent on:

- NHS-related activities?
- Retail activities?
- Other activities? (e.g. admin, cleaning)

[Discuss level of breakdown e.g. break NHS into Essential, Enhanced and Advanced? Break retail into OTC, other healthcare, other retail etc]

Other

42. Do you have any additional comments that you feel would be helpful?
43. Would you be willing to be re-contacted with follow-up questions?

1.4. Other measures to collect during site visits

While one member of the PwC team is asking a senior pharmacy staff member the questions outlined in the previous section, another member of staff will be collecting a variety of other pieces of information. We outline the metrics we hope to collect below.

44. Floor space measurements. Floor space will be measured for the following areas:

- – sales floor
- – dispensary
- – consultation room
- – storage space for prescription medicines
- – storage space for non-prescription medicines and other retail stock
- – other back office areas (office, staff room, WC etc)

It should be noted that this is also a question that we will ask the senior pharmacy representative. We plan on measuring floor space only if this information is not available from the representative.

45. Breakdown of time spent by different staff members. We hope to observe staff members at each grade and measure how their time is spent e.g. serving NHS-related customers or purely retail functions. This will involve both measuring transaction times and discussing with staff members the detail of individual transactions (e.g. did the customer both receive a prescription and purchase an OTC medicine?). We will also discuss with staff their own view of how their time is divided between NHS and retail activities.

1.5. Discussion guide for head office pilot visits

We are aware that there are different sorts of central cost entities that may exist. We plan to interview a number of different types of these during the pilot.

The purpose of interviewing head offices (and other sorts of central cost entities) in the main fieldwork is to ensure we get a full picture of all the costs involved in running the branches includes in our sample. The purpose of including them in the pilot is to ensure that we design our survey tools and methodology appropriately and that the questionnaire we develop is relevant for different types of central cost entity.

We will also use the pilot to explore who within these entities will be the most appropriate individual to respond to the survey. We anticipate that in some cases it may be necessary to talk to more than one person at the head office to gather required information, although where possible we will aim to indentify a single respondent.

Example questions [to be completed]

1. Which individual is best placed to answer a series of questions on the operations of this business and the costs involved?
2. Who is the ultimate owner or manager of this business? We would be grateful if you could provide their contact details as we would like to interview them to ensure we have a full picture of the costs involved in running this branch.

- – Address 1
- – Address 2
- – Address 3
- – County
- – Postcode
- – Phone number
- – Email
- – Principal contact name
- – Title

3. Indicate the ownership structure of this pharmacy business:

- – Independent (2-4 branches)
- – Small multiple (5-[x] branches)
- – Medium multiple ([x]-[y] branches)
- – Large multiple (>[y] branches)
- – [Guidance on values of x and y would be helpful.]

4. For what 12-month period do you have the most recent set of complete financial accounts available? Unless otherwise noted, we would like all the answers and data you provide to align to the same 12-month period as is covered by your most recent set of financial accounts.
5. How many branches is this office responsible for?
6. What roles does this office fulfil on behalf of these branches?
7. Would you be willing to provide copies of accounts for the branches in the sample for which you have responsibility?
8. Would you be willing to provide copies of your own head office accounts for the financial year 2008/9? (or provide specific cost information via an postal survey).

- – Information of interest would include:

  - • All costs that have some relationship to branches
  - • How any of the above have changed since the previous financial year
  - • Information to inform a judgement of the extent to which there is a relationship between different types of head office costs and the number of branches the office is responsible for

9. For each staff-cost-related cost line identified in the most detailed level of accounts provided:

- – Which staff would you not continue to employ at this office if you decided to close the NHS business?
- – Which staff would you not continue to employ if you decided to close the retail business?

10. For each fixed asset identified in the fixed asset register:

- – Which assets would you not be required to hold if you decided to close the NHS business, by branch and at head office?
- – Which assets would you not be required to hold if you decided to close the retail business?

11. Would you be willing to be re-contacted with follow-up questions?

Annex A – The branches and head offices included in the pilot

Branches

When choosing the sample pharmacies for the pilot survey, we were aiming for a mixture of pharmacies with the following characteristics:

- London/non-London
- Street/Supermarket/GP/Internet
- High street/Residential/Rural
- Independent with 1 branch/Independent with 2 - 5 branches/Small multiple/Large multiple
- Range of item volumes
- Range of services offered
- At least one LPS and one extended hours pharmacy

Our initial suggestion of pharmacy types for the pilot survey was:

Table 1: Plan for pilot branches

#	Location	Category	Type	Ownership
1	Greater London	Supermarket		
2	Greater London	GP		
3	Greater London	Street	High street	Independent
4	Greater London	Street	Residential	Independent
5	Greater London	Street	High street	Large multiple
6	Greater London	Street	Residential	Small multiple
7	Location 2	Supermarket		
8	Location 2	GP		
9	Location 2	Street	High street	Independent
10	Location 2	Street	High street	Large multiple
11	Location 2	Street	Residential	Independent
12	Location 2	Street	Rural	Independent
13	Location 3	Street	High street	Independent
14	Location 3	Street	High street	Independent
15	Location 3	Street	Residential	Independent
16	Location 3	Street	Rural	Small multiple
17	n/a	Internet only pharmacy		

Furthermore, we aimed to include pharmacies with the following characteristics:

- At least one Supermarket pharmacy to be owned by the supermarket and at least one to be separately owned
- Independents to be a mix of those with only 1 branch and those with 2 – 5 branches
- At least one pharmacy with branch and internet presence
- At least one pharmacy with funding under the LPS
- At least one extended hours pharmacy
- A mix in terms of volumes of prescriptions processed and enhanced and advanced services offered

Head offices

3 – 5 visits selected from:

- Large vertically-integrated chain near Nottingham
- Medium-sized chain near Nottingham
- Independent pharmacy near Nottingham
- Independent pharmacy near Leeds/York
- Large non vertically-integrated chain near Rochdale
- Supermarket

Visits

In total, the pilot visits covered 13 pharmacy branches and 5 pharmacy head offices.

Appendix G – Sampling and Weighting Methodology

1.1. Introduction

This paper discusses the approach we used to select the target sample and also to reweight the final achieved sample to calculate costs for the population of pharmacies as a whole (or sub-groups in the population).

1.2. Sampling

1.2.1. Defining the sampling frame

We selected the sample for the fieldwork by:

- Starting from the list of 10,633 pharmacy branches included in NHSBSA's MIS report for August 2009 (most recent data available) and then excluding:

    - 405 branches with 3 more consecutive months of £0 basic dispensing fee payments in the period Sept 08 – Aug 09
    - 63 branches with LPS contracts
    - 3 Specialist Foods branches

There was a degree of overlap among these excluded branches. Taken together, the exclusions represent 4.1% (436) of the total population of 10,633 branches.

These branches were excluded because it was felt that:

- Their costs may include some extraordinary costs
- Including these branches would necessitate special tailoring of the survey questionnaire.

This resulted in a sampling frame of 10,197 branches.

1.2.2. Stratification

We have stratified the sampling frame of 10,197 branches by:

- Pharmacy type ($i = 1, 2, 3$)

    - Independents – 5 branches or fewer (based on contractor_type variable provided by NHSBSA)
    - Smaller Multiples – More than 5 branches (but not the largest multiples) (based on contractor_type variable provided by NHSBSA)
    - Larger Multiples & Supermarkets: Boots, Lloyds, Coop, Rowlands, Day Lewis, Superdrug, Asda, Tesco, Sainsburys, Morrisons (based on contractor_type variable provided by NHSBSA and also on interrogation of branch owner_names)

- Item volumes (Low, Medium, High) ($j = 1, 2, 3$)

- MUR volumes (None, Lower, Higher) ($k = 1, 2, 3$)

Details of how branches in the sampling frame were assigned to each stratum are provided in Annex A.

The numbers of branches in sampling frame of 10,197 assigned to each stratum are shown in Table 1 below.

Table 1: Sampling frame – by strata

Independents

		MURs		
		Lower volumes of MURs (< median of non-zero MUR volume)	Higher volumes of MURs (> median of non-zero MUR volume)	
Items		Zero MURs			**Total**
	Low volume (<20th percentile)	311	234	233	**778**
	Medium volume (20th-60th percentile)	452	554	550	**1,556**
	Higher volume (> 60th percentile)	407	580	569	**1,556**
	Total	**1,170**	**1,368**	**1,352**	**3,890**

Smaller Multiples

		MURs		
		Lower volumes of MURs (< median of non-zero MUR volume)	Higher volumes of MURs (> median of non-zero MUR volume)	
Items		Zero MURs			**Total**
	Low volume (<20th percentile)	38	81	80	**199**
	Medium volume (20th-60th percentile)	57	171	171	**399**
	Higher volume (> 60th percentile)	44	178	177	**399**
	Total	**139**	**430**	**428**	**997**

Larger Multiples & Supermarkets

		MURs		
		Lower volumes of MURs (< median of non-zero MUR volume)	Higher volumes of MURs (> median of non-zero MUR volume)	
Items		Zero MURs			**Total**
	Low volume (<20th percentile)	93	486	483	**1,062**
	Medium volume (20th-60th percentile)	133	999	992	**2,124**
	Higher volume (> 60th percentile)	127	1,001	996	**2,124**
	Total	**353**	**2,486**	**2,471**	**5,310**

Notation:

Let P_{ijk} be the number of the branches in the sampling frame assigned (in advance of the sample selection) to pharmacy type i, item volume category j and MUR volume category k. Let P be the total number of branches in the sampling frame – i.e. 10,197.

1.2.3.   Sample sizes

Power allocation was used to allocate the target sample size of 500 among the resulting 27 strata.

Table 2 shows the target sample sizes in each stratum. These are calculated based on a power allocation of a total sample size of 500, based on the sampling frame analysis as described above (and in Annex A).

Table 2: Target numbers of completed interviews – by strata

Independents

	MURs			
	Zero MURs	Lower volumes of MURs (< median of non-zero MUR volume)	Higher volumes of MURs (> median of non-zero MUR volume)	**Total**
Low volume (<20th percentile)	18	16	16	**50**
Medium volume (20th-60th percentile)	22	25	25	**71**
Higher volume (> 60th percentile)	21	25	25	**71**
Total	**62**	**66**	**65**	**193**

Smaller Multiples

	MURs			
	Zero MURs	Lower volumes of MURs (< median of non-zero MUR volume)	Higher volumes of MURs (> median of non-zero MUR volume)	**Total**
Low volume (<20th percentile)	6	9	9	**25**
Medium volume (20th-60th percentile)	8	14	14	**35**
Higher volume (> 60th percentile)	7	14	14	**35**
Total	**21**	**37**	**37**	**95**

Larger Multiples & Supermarkets

	MURs			
	Zero MURs	Lower volumes of MURs (< median of non-zero MUR volume)	Higher volumes of MURs (> median of non-zero MUR volume)	**Total**
Low volume (<20th percentile)	10	23	23	**56**
Medium volume (20th-60th percentile)	12	33	33	**78**
Higher volume (> 60th percentile)	12	33	33	**78**
Total	**34**	**89**	**89**	**212**

The sample was drawn in 2 waves because of initial uncertainty regarding response rates.

Sample sizes – Wave 1 (January 2010)

Table 3 shows the size of the sample drawn in each stratum in the Wave 1 sample. Different response rates were expected for each of the 3 pharmacy types (50% for Independents, 70% for Smaller Multiples and 90% for Larger Multiples & Supermarkets).

In cleaning the contact data for the branches in our sample we identified a number of branches that had been misclassified by the NHSBSA pharmacy type variable. Annex C provides further details of the sample branches that were reclassified following contact detail cleaning.

Table 3: Sample sizes (drawn in Wave 1)

Independents	Zero MURs	Lower volumes of MURs (< median of non-zero MUR volume)	Higher volumes of MURs (> median of non-zero MUR volume)	Total
Low volume (<20th percentile)	36	32	33	**101**
Medium volume (20th - 60th percentile)	44	50	50	**144**
High volume (>60th percentile)	42	51	50	**143**
Total	**122**	**133**	**133**	**388**

Smaller Multiples	Zero MURs	Lower volumes of MURs (< median of non-zero MUR volume)	Higher volumes of MURs (> median of non-zero MUR volume)	Total
Low volume (<20th percentile)	9	12	13	**34**
Medium volume (20th - 60th percentile)	11	19	20	**50**
High volume (>60th percentile)	10	19	19	**48**
Total	**30**	**50**	**52**	**132**

Large Multiples & Supermarkets	Zero MURs	Lower volumes of MURs (< median of non-zero MUR volume)	Higher volumes of MURs (> median of non-zero MUR volume)	Total
Low volume (<20th percentile)	11	26	26	**63**
Medium volume (20th - 60th percentile)	13	38	37	**88**
High volume (>60th percentile)	13	37	38	**88**
Total	**37**	**101**	**101**	**239**

Sample sizes – Wave 2 (February 2010)

Due to revised projected response rates, additional sample for Independents and Smaller Multiples was drawn part way through the fieldwork on 1st March. These sample sizes were allocated across strata in the same proportions as the original sample of 759. The total sizes of these additional samples were:

- Independents – 554 branches
- Smaller multiples – 119 branches

Within each stratum, the additional branches were the next branches consecutively based on the random priority order assigned to each member of the population. Branches were contacted in the order they appeared in the list.

Notation:

Let n_{ijk} be the sample size drawn (across both waves of sampling) of pharmacy type i, item volume category j and MUR volume category k. Let n be the total number of branches drawn – i.e. 1432.

1.2.4. Actual numbers of completes

We define r_{ijk} as the actual number of respondents (i.e. completed interviews) in stratum ijk. This means that

the response rate for a given stratum can be defined as $\dfrac{r_{ijk}}{n_{ijk}}$ and is a value between 0 and 100% and may be

greater or less than the response rate initially assumed for the purposes of drawing the initial sample).

1.3. Weighting the sample

The sample weights are scaled to sum to the size of the sampling frame, rather than the full population (based on August 2009 data).

The calculation of weights has 3 parts:

- Design weight
- Non-response weight (theta weight)

- Adjusting for non-response bias (using GREG estimation as described below)

We calculate an initial weight (design weight and non-response weight) for each stratum as follows:

- Define the design weight as the number of branches in the sampling frame in that stratum divided by the sample size(P_{ijk} / n_{ijk})
- Define the theta weight (or non-response weight) as the number of completed interviews in that stratum divided by the sample size (r_{ijk} / n_{ijk})
- Then calculate initial weights for each stratum as follows:

$$Initial\ Weight = Design\ Weight\ x\ (1/Theta\ weight)$$
$$= (P_{ijk} / n_{ijk})\ x\ (n_{ijk} / r_{ijk})$$
$$= (P_{ijk} / r_{ijk})$$

- This means that the initial weight calculated is effectively the number of branches in the sampling frame in this stratum divided by number of complete responses in this stratum (P_{ijk} / r_{ijk}).

Annexes D and E show the results of analysis carried out at the time decisions on weighting were being discussed by the project team (based on the sample of 511 completed interviews available as at 10th May 2010).

Annex D shows the profile of the sample of completes weighted up to the sampling frame based on the sample design and response rates by stratum (i.e. the design weight divided by the theta weight as described above).

Annex E shows the profile of the sample of completes where, in addition to applying the weights described in Annex D, an additional adjustment has been calculated to simultaneously ensure that:

- The number of London branches in the weighted sample exactly matches the sampling frame.
- The sum of the item volumes for the weighted sample exactly match the sum of the item volumes for the sampling frame.
- The sum of the MUR volumes for the weighted sample exactly matches the sum of the MUR volumes for the sampling frame.

These adjustments have been calculated separately for each of the 3 pharmacy types using GREG estimation. On the advice of the team's statistical experts the pharmacy type data used for reweighting is the same data used for drawing the sample, however for the purposes of reporting analysis results in the main report we have used cleaned pharmacy type variables – which includes the reclassifications made following cleaning of the sample contact data (as described in Annex C).

The decisions regarding the appropriate weighting adjustments to make for non-response bias were made following review of the profile analysis presented in Annex D which was based on the 511 completes as at 11th May 2010. Some discrepancy was observed for the 3 variables listed, and it was felt that adjusting for these discrepancies would help ensure that any cost analysis conducted would be more representative of the full sampling frame.

The weighting adjustments (g) are calculated for each member of the sample using the 2-phase GREG estimation formula:

$$g_i = 1 + \left(\sum_U x_i - \sum_r d_i \theta_i^{-1} x_i \right) \left(\sum_r d_i \theta_i^{-1} x_i x_i \right)^{-1} x_i$$

Where x is the sample characteristic (such as item volumes), U is all members of the sampling frame, r is the members of the sample of completed interviews and d and theta are the initial design weight and theta weights calculated as described above.

Summary statistics for these Annex E weighting adjustments (g_i) are shown in the table below.

Table 4: Summary statistics of "GREG" adjustments calculated

	Minimum	Q1	Median	Mean	Q3	Maximum	CV (s.d/ mean)
Independents	0.857	0.960	0.974	0.999	0.993	1.137	0.064
Smaller Multiples	0.767	0.906	0.977	0.997	1.067	1.438	0.144
Large Multiples & Supermarkets	0.658	0.948	0.993	1.004	1.028	1.428	0.113

The goal is for the weighting adjustments to be close to 1. Values too small (e.g. less than 0.2) or too large (e.g more than 5) indicate that the adjustments may be rather extreme and we may need to reconsider which variables or categories to adjust for. However, as shown in the table above, the g weights calculated based on the sample of 511 all lie between 0.658 and 1.438.

The final weights (wi) used in the cost analysis are calculated using the methodology as described for Annex E but based on the final sample of 573 completes. This final weighted sample profile is shown in Annex F.

$$w_i = d_i \theta_i^{-1} g_i$$

Annex A – Assigning population members to the 27 strata

Pharmacy Type

Each sampling frame member was assigned to one of the 3 pharmacy types (Independents, Smaller Multiples, Larger Multiples & Supermarkets)

These mappings were based on 2 variables provided by NHSBSA:

- New multi/indep indicator = contractor_type variable provided to PwC on 23/12/09
- Old mult/indep indicator = Multiple/indep variable provided to PwC on 03/12/09

The mappings were carried out as follows:

- If new mult/indep indicator ="BOOTS" or "CO-OP" then pharmacy_type="Large multiples & Supermarkets"
- In addition, we have also categorised 108 additional pharmacies as Coop (and therefore part of Larger Multiples & Supermarkets) where the new mult/indep indicator variable does not classify them as Coop, but where the Trading Name (rather than the Owner Name) does include the string "Coop" or "Co-op" (Cooperative Healthcare) suggesting they are part of the Coop group. In addition we found that when we look at the Owner Names for these 108 pharmacies - or at least for most of them - their owner names are names of Coop subsidiaries (p williams and PCTA). Our assumption is that these are branches that have been acquired by Coop more recently than their pharmacy type information was updated (this issue was flagged to NHSBSA in an email dated 06/01/10)
- If owner name is LLOYDS, ROWLANDS, DAY LEWIS, SUPERDRUG, ASDA, SAINSBURYS, MORRISON,/SAFEWAY or TESCO then pharmacy_type = "Larger multiples & Supermarkets". This is basically all multiples with excess of 100 branches (except Morrisons which only has c80 branches but which is counted as "large" because is well-known supermarket that we will want to approach directly).
- If new mult/indep indicator = "SINGLE CONTRACTOR" then pharmacy_type="Independent"
- If new mult/indep indicator = "MORE THAN 5 SHOPS" and owner name is not one of the large multiples outlined above then pharmacy_type="Smaller multiple".
- If new mult/indep indicator = "PHARMACY IN HEALTH CENTRE" and old mult/indep indicator="I", then pharmacy_type="Independent".
- If new mult/indep indicator = "PHARMACY IN HEALTH CENTRE" and old mult/indep indicator="M", then pharmacy_type=" Smaller multiple".
- If new mult/indep indicator = "" and old mult/indep indicator="I", then pharmacy_type="Independent".
- If new mult/indep indicator = "" and old mult/indep indicator="M", then pharmacy_type=" Smaller multiple".

In summary:

- (i=1) Independent should primarily be pharmacies in a group of <5 pharmacies
- (i=2) Smaller multiples should primarily be pharmacies in a group of 5-99 pharmacies
- (i=3) Larger multiples & Supermarkets should primarily be pharmacies in a group of >100 pharmacies

Item Volumes

For each pharmacy type, we looked at the distribution of average number of items dispensed per month (based on data from September 2008 – August 2009). The 3 item volume categories were defined as follows:

- (j = 1) Low volume (<20th percentile)
- (j = 2) Medium volume (20th-60th percentile)
- (j = 3) High volume (> 60th percentile)

For reference, the cut-off points for the 3 pharmacy types are shown in the table below:

PricewaterhouseCoopers LLP

Table 5: Item volume strata - cut-offs between Low/Medium and Medium/High

(number of items)	20th percentile (threshold between Low and Medium)	60th percentile (threshold between Medium and High)
Independents	3,237	6,037
Smaller Multiples	4,082	7,166
Larger Multiples & Supermarkets	3,791	7,024

MUR Volumes

For each pharmacy type/Item Volume category (i.e. 9 categories in total) looked at the distribution of average number of MURs carried out per month (based on data from September 2008 – August 2009). The 3 MUR volume categories were defined as follows:

- (k = 1) Zero MURs
- (k = 2) Lower volumes of MURs (< median of non-zero MUR volume)
- (k = 3) Higher volumes of MURs (> median of non-zero MUR volume)

For reference, the cut-off points between Lower and Higher for the 9 pharmacy types/item volume categories are shown in the table below:

Table 6: MUR volume strata – cut-offs between Lower and Higher volume

(number of MURs)	Low Item Volume	Medium Item Volume	High Item Volume
Independents	4	6	6
Smaller Multiples	6	8	9
Larger Multiples & Supermarkets	10	14	21

Annex B – Accuracy of the population classifications

The NHSBSA variable "contractor_type" used to classify branches as Independents, Smaller Multiples or Larger Multiples & Supermarkets is not accurate and up-to-date in all cases.

The mapping used for the sampling frame is described at the beginning of Annex A.

There are theoretically additional checks that could have been carried out to validate the pharmacy type classifications in advance of assigning members of the sampling frame to a sampling stratum.

Possible additional checks on the population data could have potentially included:

1. Count how many branches are listed under each specific owner_name
2. Count how many branches are listed under each "similar – presumed the same" owner_name. Where the total number of branches is 5 or more – ensure that all branches are categorised as Smaller Multiple or Larger Multiple & Supermarkets. What constitutes "similar – presumed the same" would need to be decided on a case by case basis, but examples from the sample include:

    – Use of both "Limited" and "Ltd"
    – Use of both "and" and "&"
    – Abbreviations used, such as CHTS for CHEMISTS
    – Owner name sometimes stored as, e.g. MK PETTIGREW and sometimes as PETTIGREW MK
    – Different owner names but known to be part of the same group, e.g. BOOTS UK LTD and BOOTS THE CHEMIST LTD

3. Count how many branches are listed under the same or similar trading_names and consider whether this is an indication that they are in fact part of the same group
4. Count how many branches are listed with the same correspondence_address and consider whether this may be an indication that they are in fact part of the same group
5. Carry out desk research to try and obtain lists of pharmacy companies that are part of the same group or are subsidiaries of the same company – and assess whether any branches need to be reclassified in light of these findings.
6. Present any proposals for reclassification to NHSBSA for their review (e.g. we would propose to look at all entities where the total number of branches is 5 or more – and ensure that all these branches are categorised as Smaller Multiple or Larger Multiple & Supermarket rather than Independents) - Where discrepancies are noted, is it possible that the NHSBSA data actual reflects the most recent ownership structure?

What effect might a reclassification exercise as described above have on the accuracy of final results? This will depend on the difference in costs incurred by independents versus multiples.

Example:

Based on NHSBSA data, the sampling frame of 10,197 pharmacy branches in August 2009 was 38% independent and 62% multiples.

As a result of our data cleaning on our sample, 22 of the sample of 386 independent were reclassified as multiples – i.e. 5.7% of the independents sample were reclassified as multiples (further detail is provided in Annex C).

If we assume that a thorough data cleaning exercise on the full population dataset would result in the same proportion of branches being reclassified, then this would lead to the overall split becoming 35.8% independents/64.2% multiples (rather than 38%/62%).

The 2003 Cost inquiry reported average annual NHS costs of £111,000 for Independent branches and £138,000 for Multiples.

If these same average branch costs were applied to the 38%/62% split of the sampling frame, we would calculate an average branch cost of £127.7K.

If, alternatively, these average branch costs were applied to the 35.8%/64.2% split, we would calculate an average branch cost of £128.3K. This is a difference of £600 per branch.

In this example, the effect of reclassification is quite small – because the effect of reclassification on the proportions is relatively small, and also the costs incurred by Independents and Multiples are assumed to be relatively close.

More generally, the formula for the difference in average branch cost is:

$$\rho\alpha\left(C_I - C_M\right)$$

Where:

α is the adjustment made to the independents proportion as a result of data cleaning (in the above example $\alpha = -5.7\%$)

ρ is the independents proportion based on the existing data (in the above example $\rho = 38\%$).

C_I and C_M are the average branch costs for Independents and Multiples respectively.

Given that the impact on overall results is likely to be small (as illustrated by the example above), and the exercise of checking the classification data for the full population would be a significant undertaking in terms of time required, the decision was taken not to carry out additional checks on the full population data. We received statistical advice that this would not cause an issue with sampling provided that the classifications used at the time of calculating weights were the same as the original classifications used for drawing the sample (to ensure consistency).

Annex C – Sample branches that were reclassified following contact data cleaning

Reasons for 20+ branches being reallocated:

- Independents being found to be part of Smaller Multiples
- Independents being found to have more 5 branches in the population – sometimes only picked up as a result of manually observing more than one format for recording the owner name in the population data.
- 2 branches that had been classified as Co-op and therefore part of Larger Multiples & Supermarkets but we subsequently found to be part of smaller co-operatives separate from the main Co-op group.

The table below shows the changes in numbers of branches assigned to each stratum following the cleaning of the data relating to the 759 branches drawn in the Wave 1 sample. As a result of this cleaning, 22 Independent branches were reclassified as multiple branches. This represents 2.8% of the total sample drawn.

Table 7: Details of reclassification of Wave 1 sample branches

Independents

		MURs		
		Zero MURs	Lower volumes of MURs (< median of non-zero MUR volume)	Higher volumes of MURs (> median of non-zero MUR volume)	**Total**
Items	Low volume (<20th percentile)	0	-1	-5	**-6**
	Medium volume (20th-60th percentile)	-2	-2	-4	**-8**
	Higher volume (> 60th percentile)	-1	-4	-3	**-8**
	Total	**-3**	**-7**	**-12**	**-22**

Smaller Multiples

		MURs		
		Zero MURs	Lower volumes of MURs (< median of non-zero MUR volume)	Higher volumes of MURs (> median of non-zero MUR volume)	**Total**
Items	Low volume (<20th percentile)	0	3	3	**6**
	Medium volume (20th-60th percentile)	2	6	0	**8**
	Higher volume (> 60th percentile)	1	3	2	**6**
	Total	**3**	**12**	**5**	**20**

Larger Multiples & Supermarkets

		MURs		
		Zero MURs	Lower volumes of MURs (< median of non-zero MUR volume)	Higher volumes of MURs (> median of non-zero MUR volume)	**Total**
Items	Low volume (<20th percentile)	0	1	0	**1**
	Medium volume (20th-60th percentile)	0	-1	2	**1**
	Higher volume (> 60th percentile)	0	0	0	**0**
	Total	**0**	**0**	**2**	**2**

Annex D – Profile of weighted sample (based on design and initial non-response weights only) (based on latest data as at 10th May 2010)
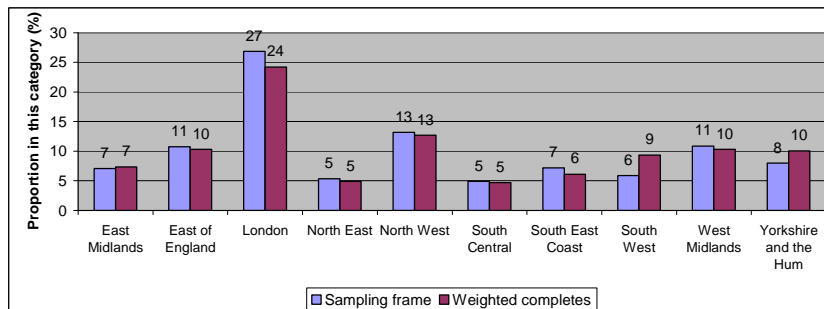
Independents

These charts are based on the 247 completes as at 10th May. The final number of completed independent interviews was 261.
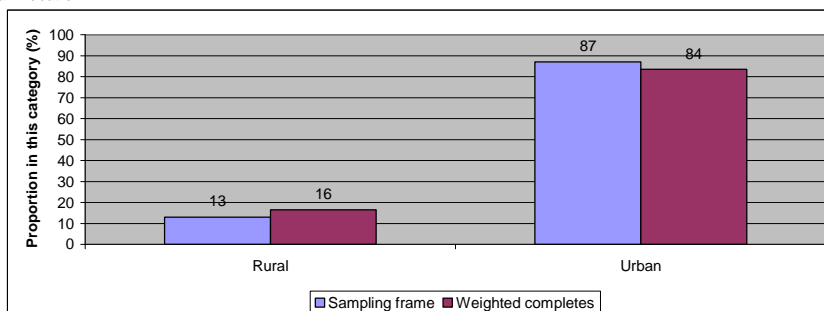
Independent profile
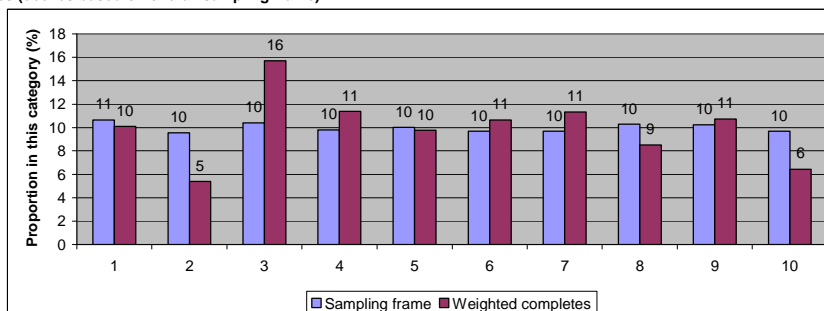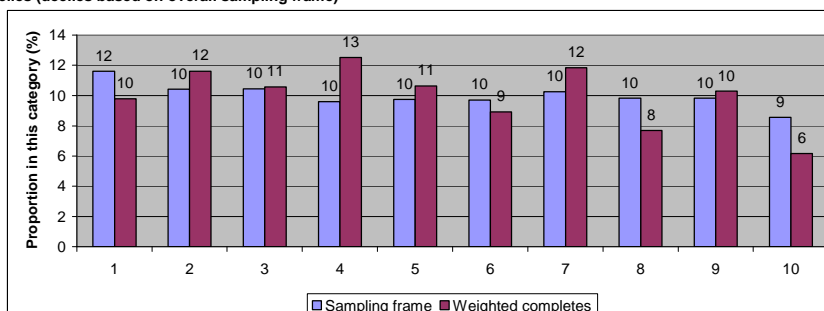*Initial weighted applied to sample but no adjustments made for response bias*

SHA Region

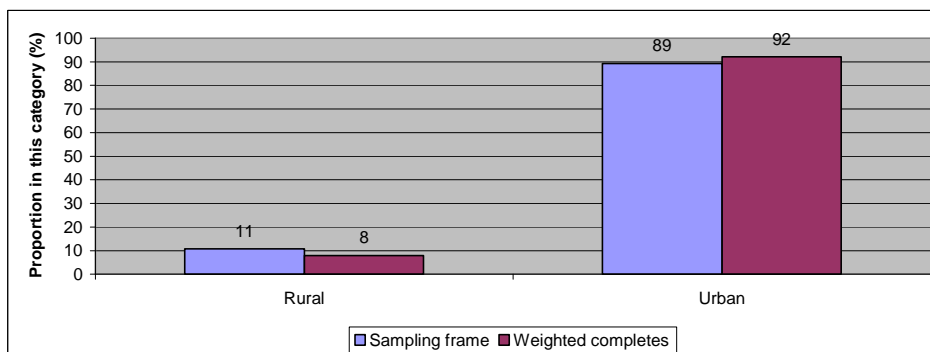**Rural/Urban Location**

IMD Deciles (deciles based on overall sampling frame)

Health Deciles (deciles based on overall sampling frame)

Item volumes (percentiles)
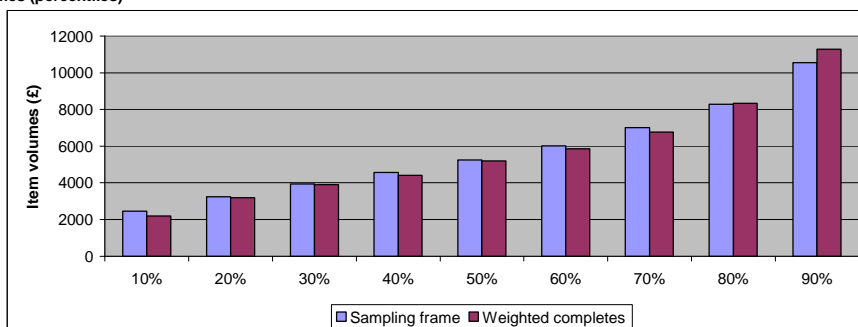
Mean	
Sampling frame	6039
Weighted completes	6160

MUR volumes (percentiles)
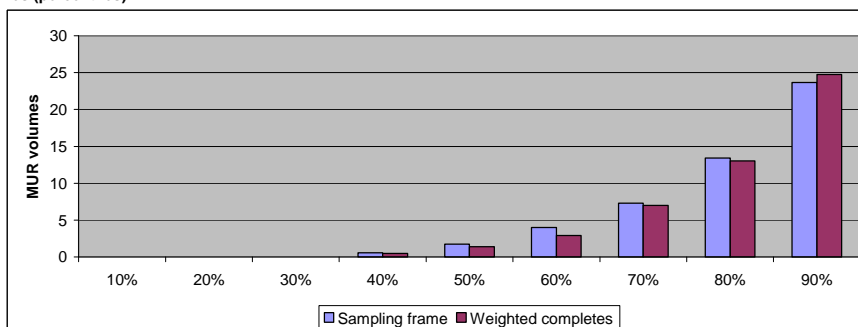
Mean	
Sampling frame	7.04
Weighted completes	6.93

NHS Payments
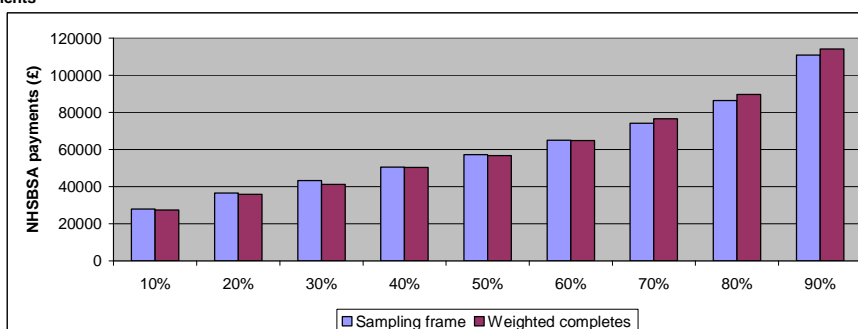
Mean	
Sampling frame	65804
Weighted completes	64912

NHS Payments (excluding cost of drugs)
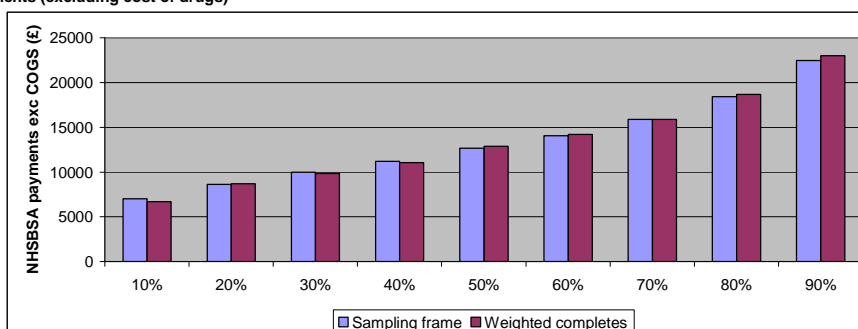
Mean	
Sampling frame	13956
Weighted completes	13936

Smaller Multiples

These charts are based on the 91 completes as at 10th May. The final number of completed Smaller Multiple interviews was 88 (following some corrections to the classifications)

Smaller multiple profile
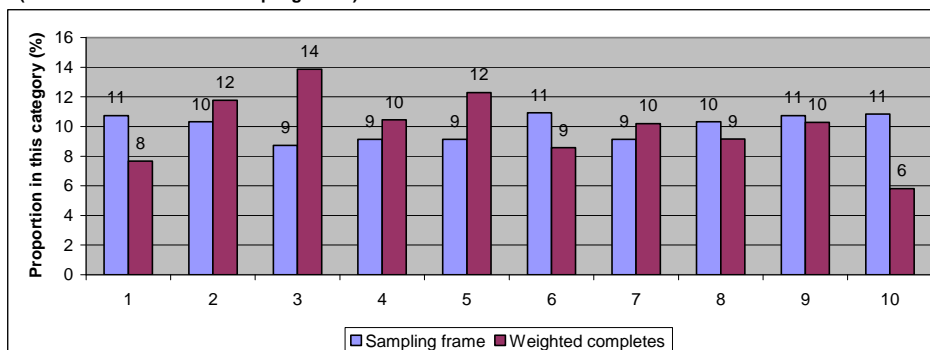*Initial weighted applied to sample but no adjustments made for response bias*

SHA Region
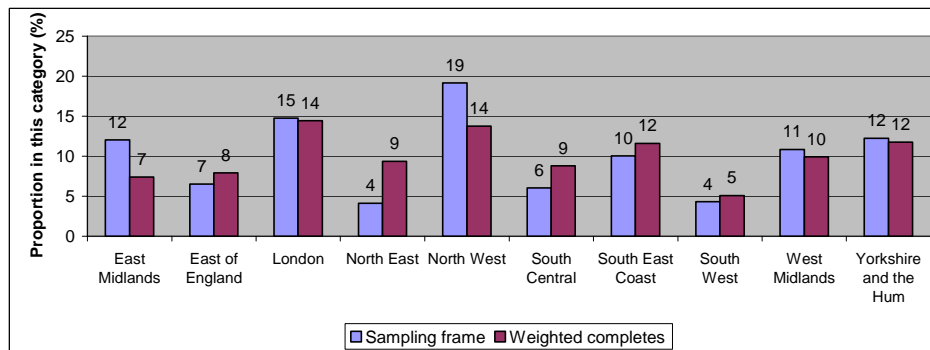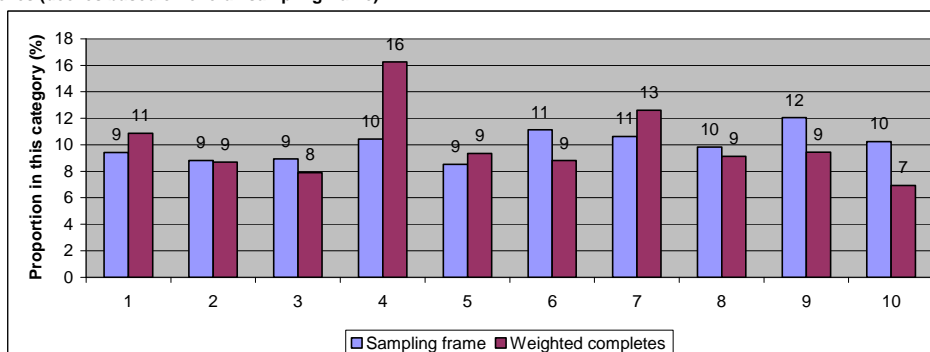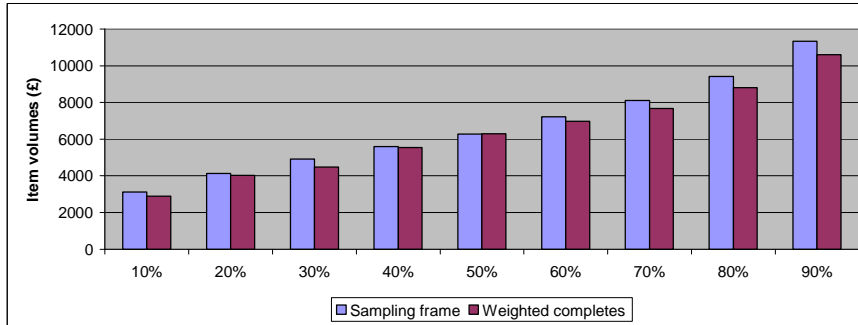

Rural/Urban Location

IMD Deciles (deciles based on overall sampling frame)

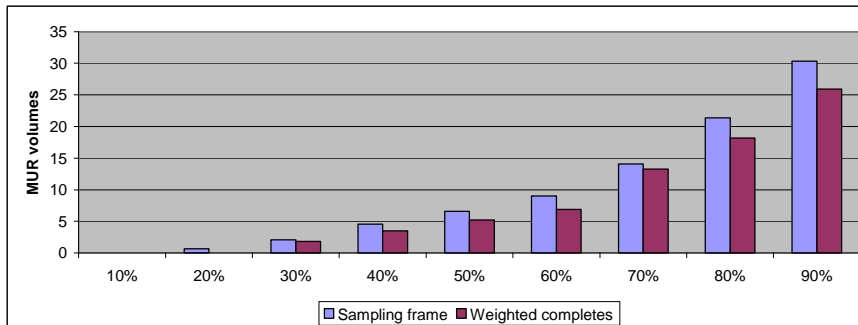
Health Deciles (deciles based on overall sampling frame)
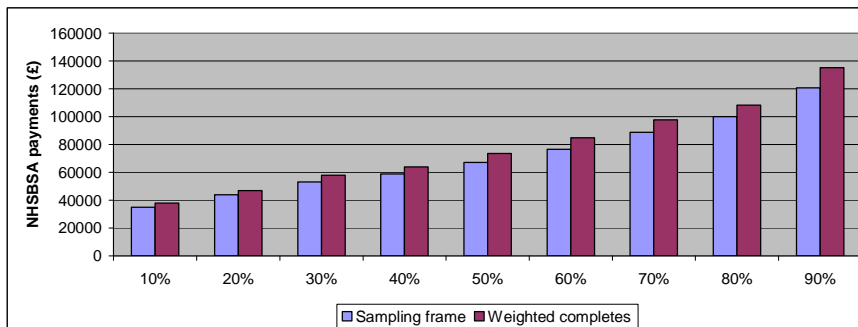
Item volumes (percentiles)

Mean	
Sampling frame	6909
Weighted completes	6573

MUR volumes (percentiles)

Mean	
Sampling frame	11.00
Weighted completes	9.77

NHS Payments

Mean	
Sampling frame	73922
Weighted completes	81845

NHS Payments (excluding cost of drugs)
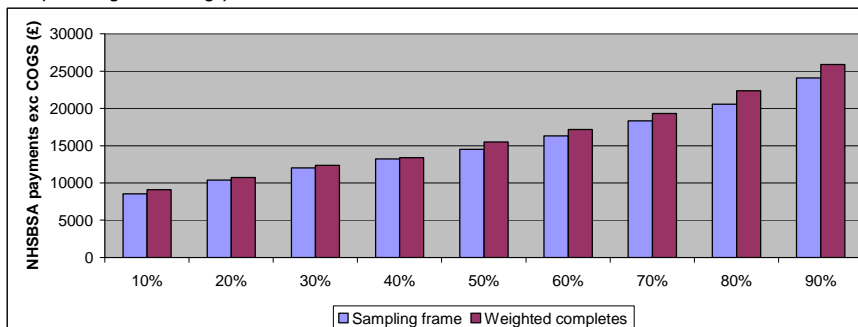
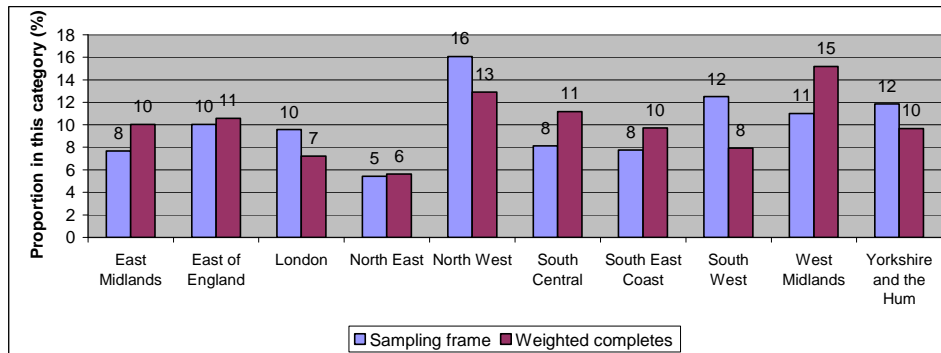| Mean	
Sampling frame	15795
Weighted completes	16833

Large Multiples & Supermarkets

These charts are based on the 176 completes as at 10th May. The final number of completed Large Multiple interviews was 224.
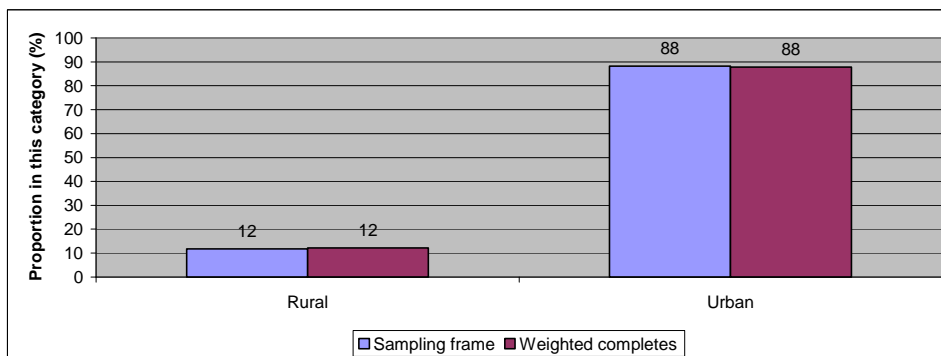
Large multiple profile
Initial weighted applied to sample but no adjustments made for response bias

SHA Region

Rural/Urban Location

IMD Deciles (deciles based on overall sampling frame)

Health Deciles (deciles based on overall sampling frame)

Item volumes (percentiles)

Mean
Sampling frame   6795
Weighted completes   7050

MUR volumes (percentiles)

Mean
Sampling frame   16.16
Weighted completes   16.04

NHS Payments
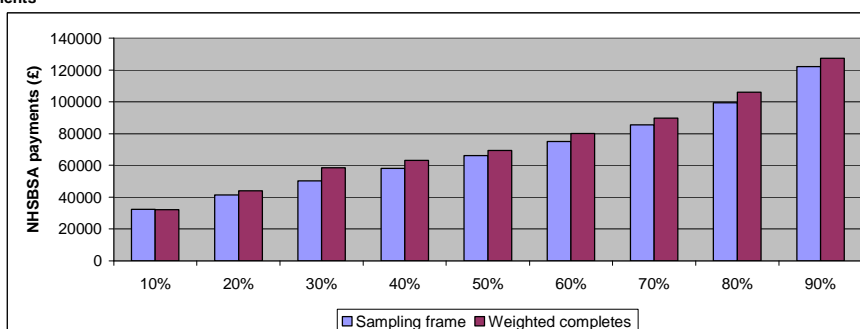
Mean
Sampling frame   72983
Weighted completes   77705

NHS Payments (excluding cost of drugs)
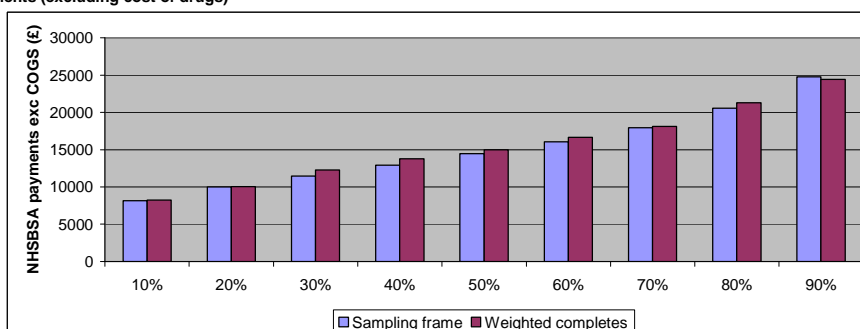
Mean
Sampling frame   15587
Weighted completes   16374

Overall

These charts are based on the 511 completes as at 10th May. The final number of completed interviews was 573.

Overall profile
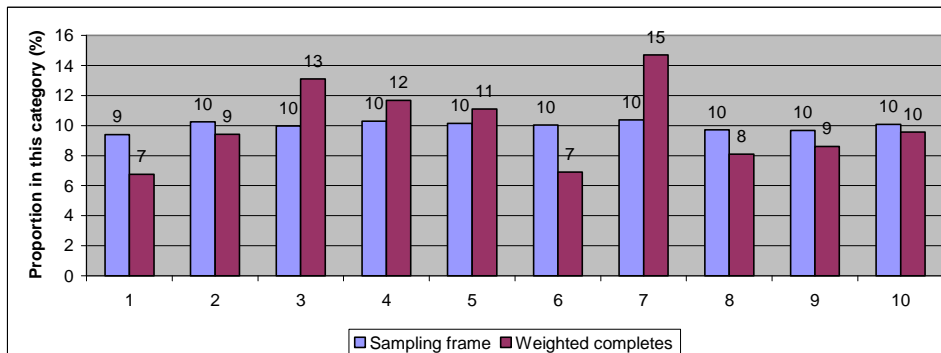*Initial weighted applied to sample but no adjustments made for response bias*
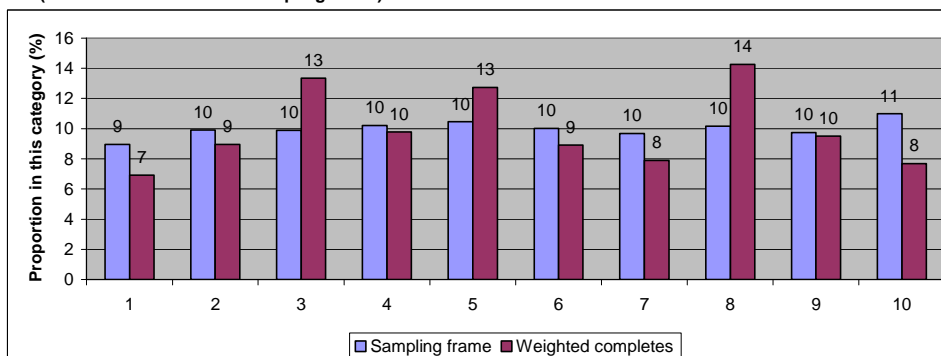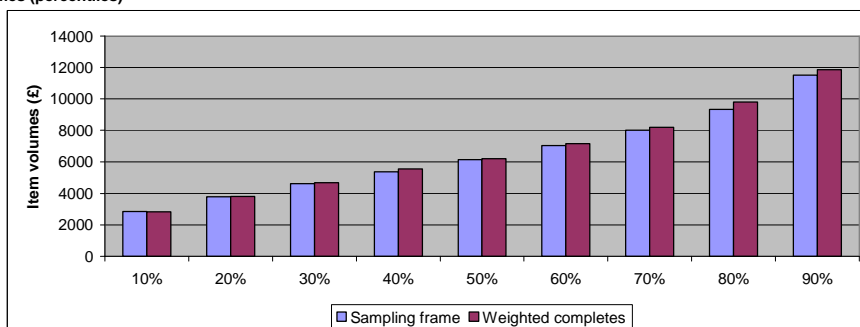
SHA Region
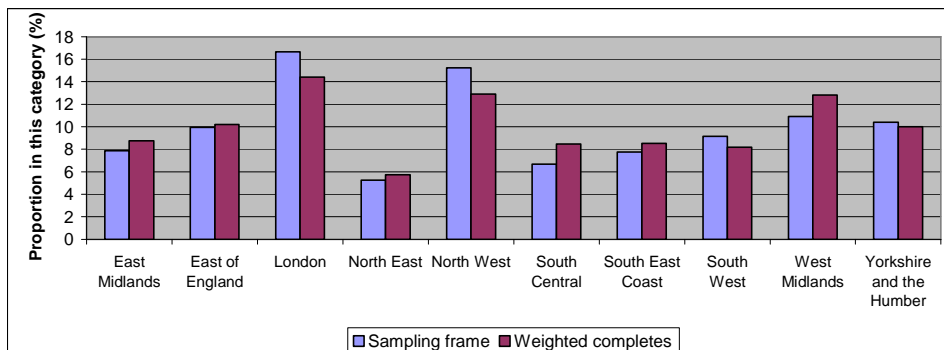
Rural/Urban Location
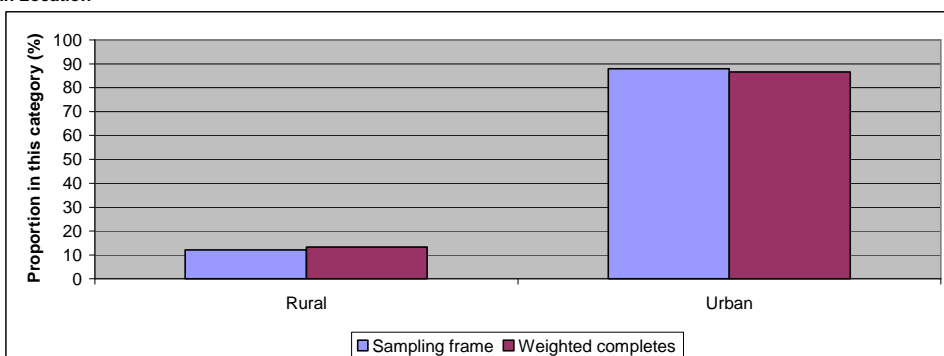
IMD Deciles (deciles based on overall sampling frame)

Health Deciles (deciles based on overall sampling frame)
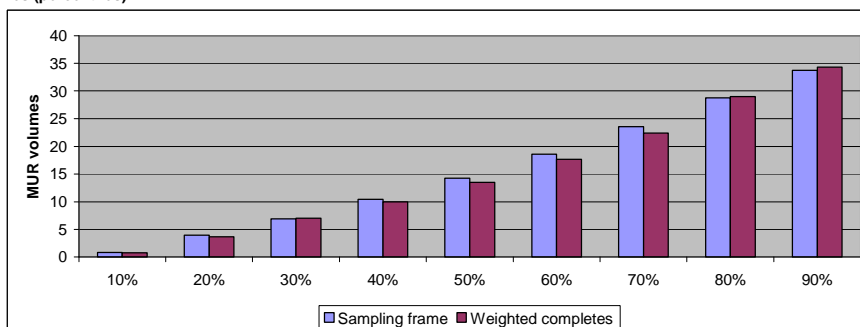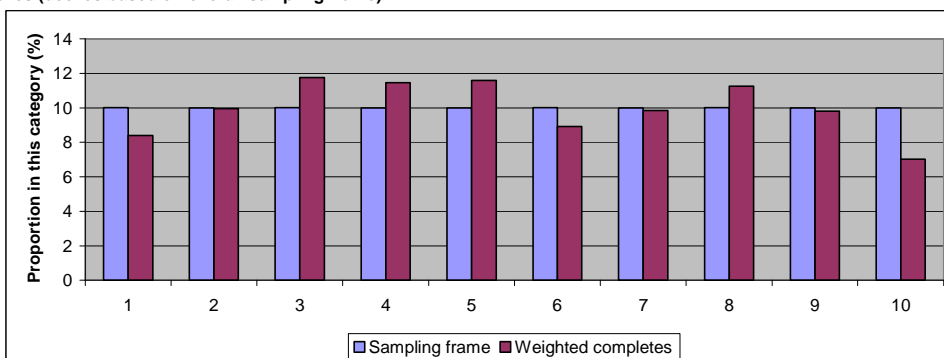
Item volumes (percentiles)
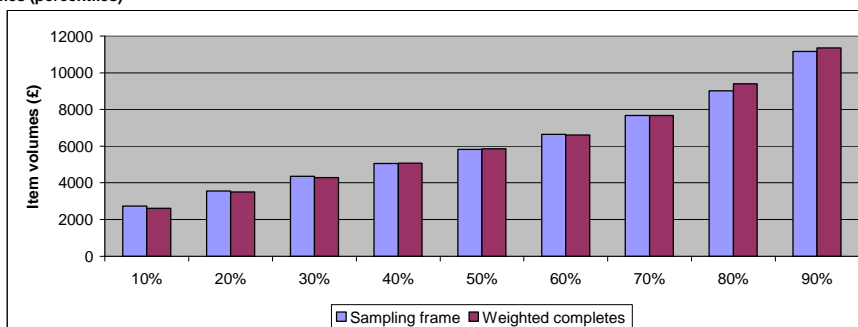
Mean
Sampling frame   6517.49
Weighted completes 6664.002

MUR volumes (percentiles)
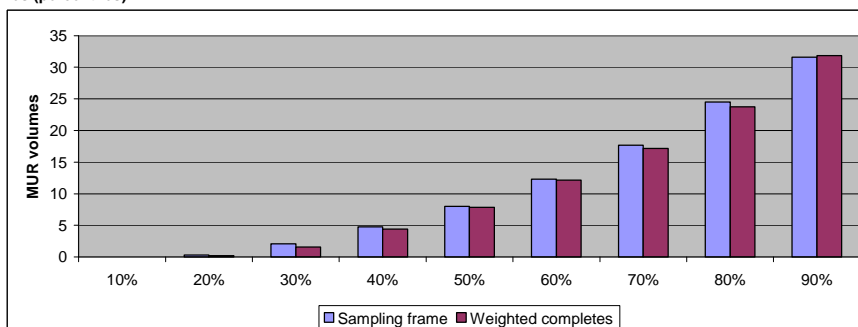
Mean
Sampling frame   12.17368
Weighted completes 11.95023

NHS Payments
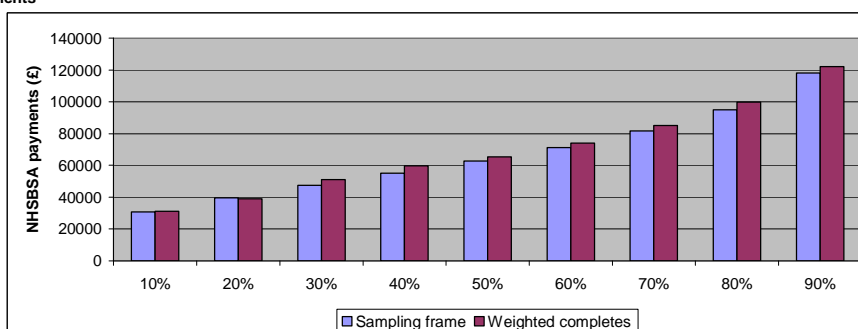
Mean
Sampling frame   70336.33
Weighted completes 73229.55

NHS Payments (excluding cost of drugs)
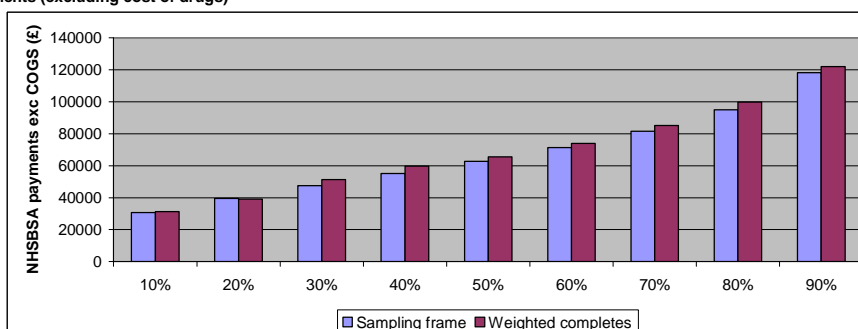
Mean
Sampling frame   14985.39
Weighted completes 15488.5

Annex E –Analysis that incorporates weights adjusted for London/non London bias, Item volumes and MUR volumes (based on same dataset as Annex D)

Independents

These charts are based on the 247 completes as at 10th May. The final number of completed Independent interviews was 261.Figure 1: [..]

Independent profile
Weights adjusted for London/non London, Item totals and MUR totals
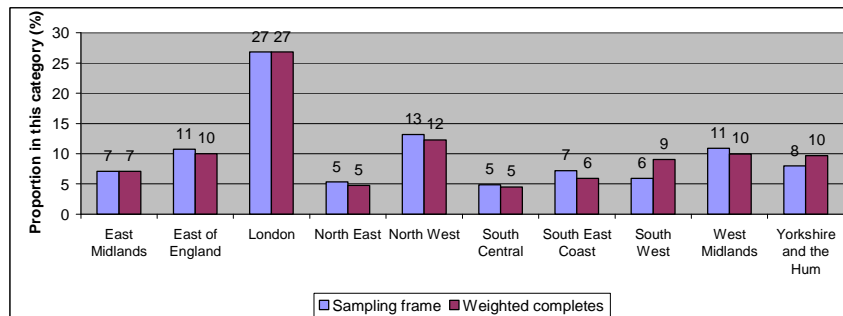
SHA Region

Rural/Urban Location

IMD Deciles (deciles based on overall sampling frame)
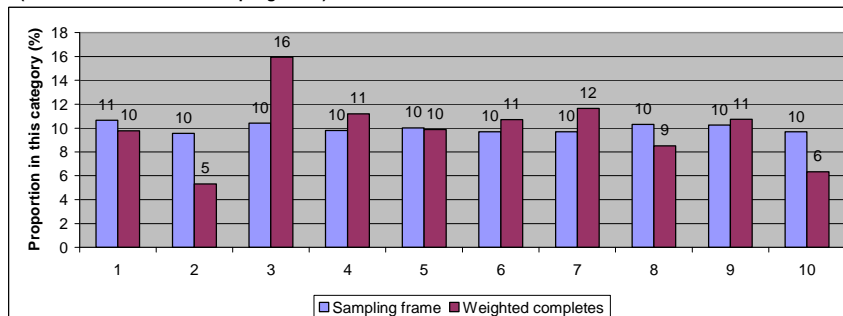
Health Deciles (deciles based on overall sampling frame)
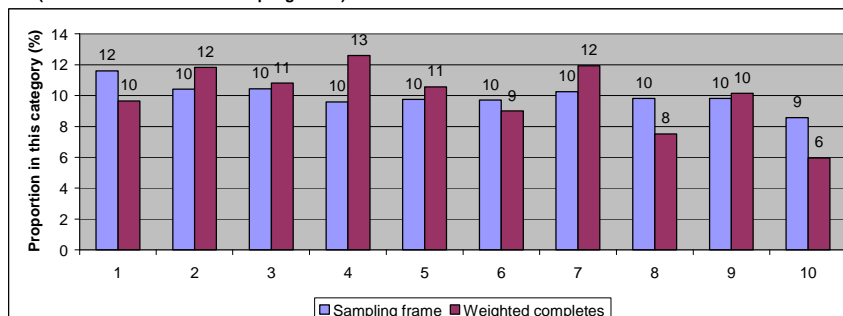
Item volumes (percentiles)

Mean	
Sampling frame	6039
Weighted completes	6039

MUR volumes (percentiles)

Mean	
Sampling frame	7.04
Weighted completes	7.04

NHS Payments

Mean	
Sampling frame	65804
Weighted completes	64238

NHS Payments (excluding cost of drugs)
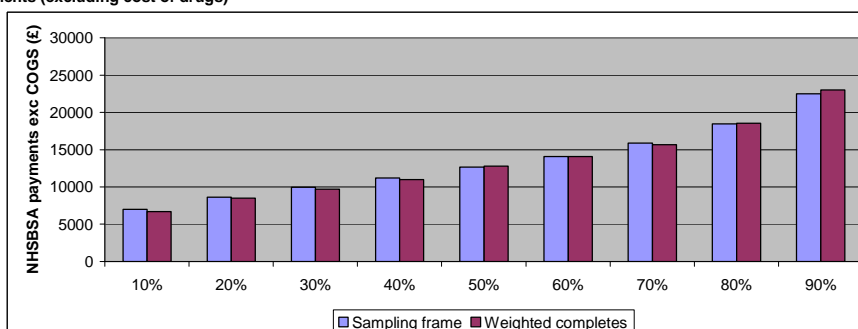
Mean	
Sampling frame	13956
Weighted completes	13807

Smaller multiples

These charts are based on the 91 completes as at 10th May. The final number of completed Smaller Multiple interviews was 88 (following some corrections to the classifications).

Smaller multiple profile
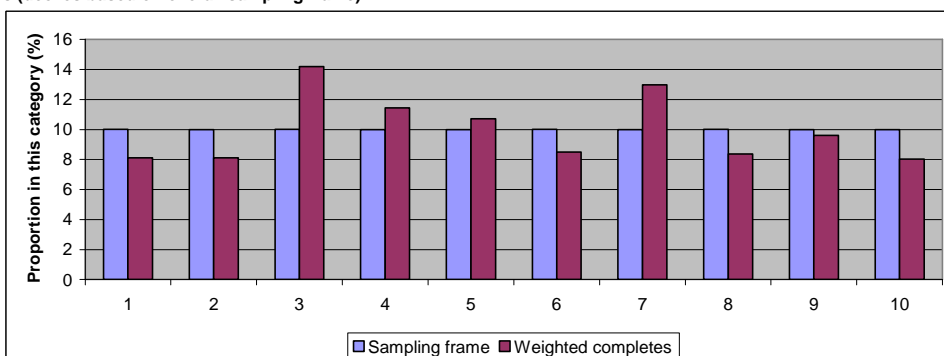*Weights adjusted for London/non London, Item totals and MUR totals*
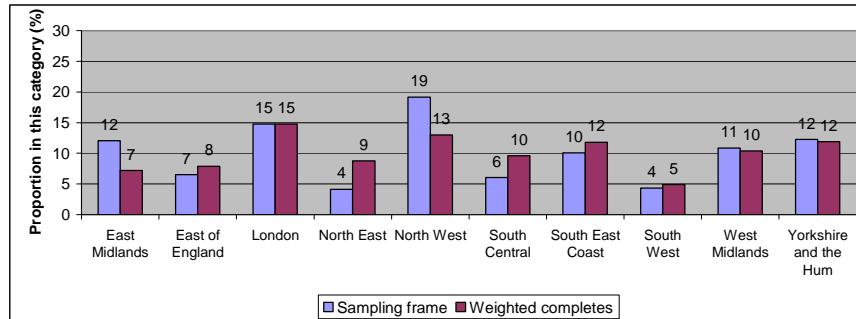
SHA Region

Rural/Urban Location

IMD Deciles (deciles based on overall sampling frame)
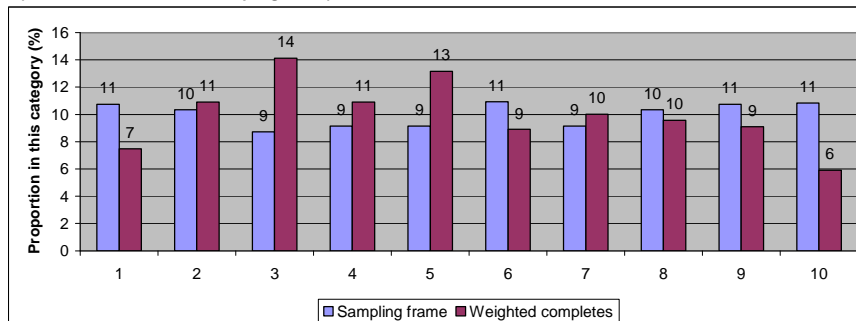
Health Deciles (deciles based on overall sampling frame)
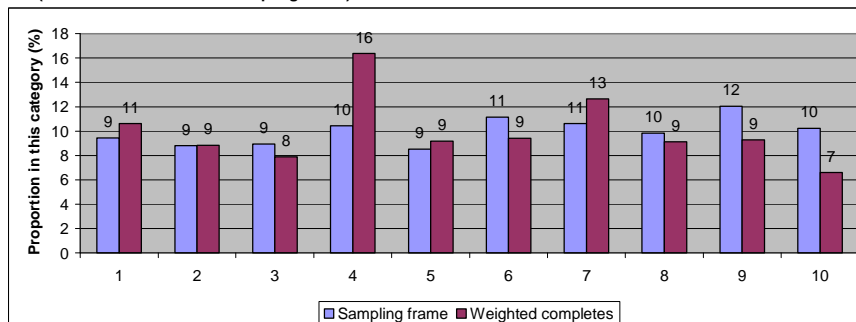
Item volumes (percentiles)
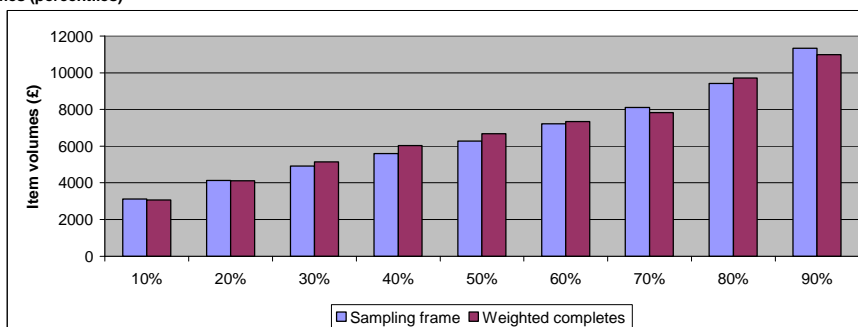
Mean	
Sampling frame	6909
Weighted completes	6909

MUR volumes (percentiles)
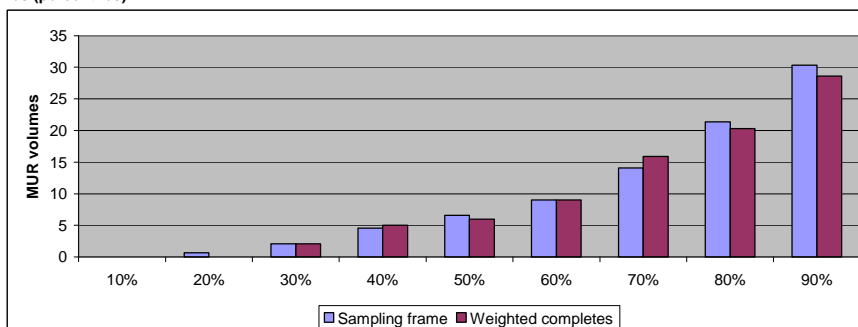
Mean	
Sampling frame	11.00
Weighted completes	11.00
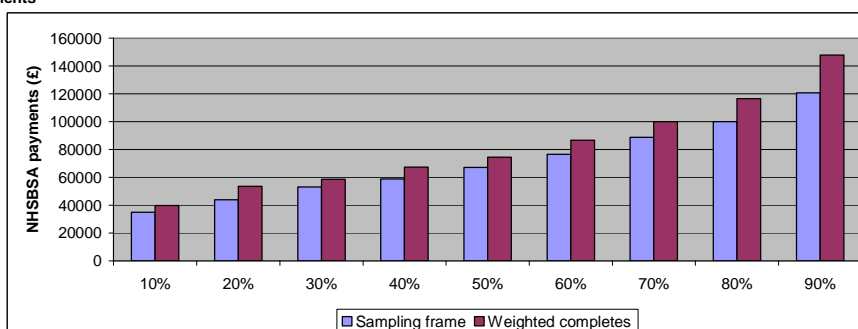
NHS Payments

Mean	
Sampling frame	73922
Weighted completes	84937

NHS Payments (excluding cost of drugs)
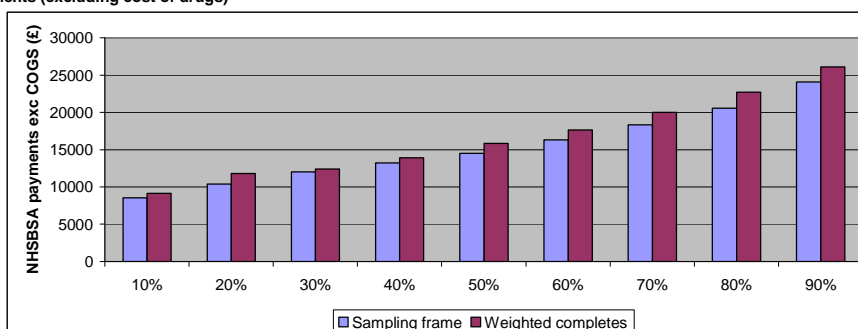
Mean	
Sampling frame	15795
Weighted completes	17371

Large multiples & supermarkets

These charts are based on the 176 completes as at 10th May. The final number of completed Large Multiple interviews was 224.

Large multiple profile
Initial weighted applied to sample but no adjustments made for response bias

SHA Region
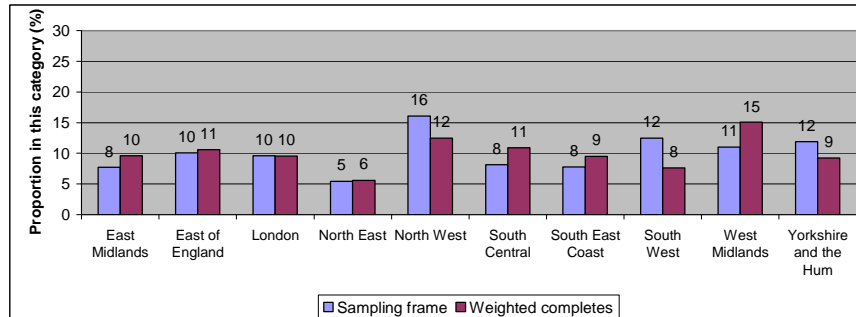
Rural/Urban Location
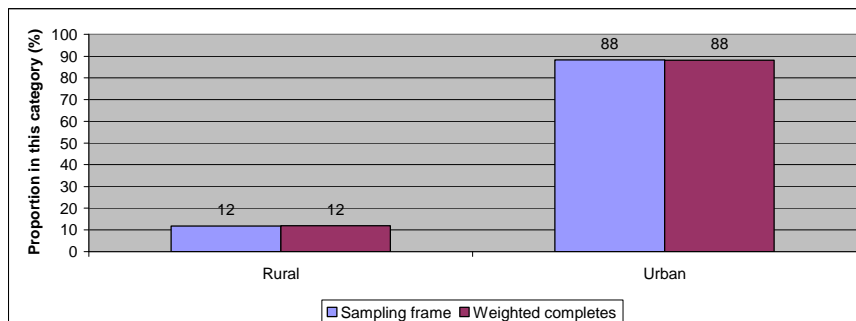
IMD Deciles (deciles based on overall sampling frame)
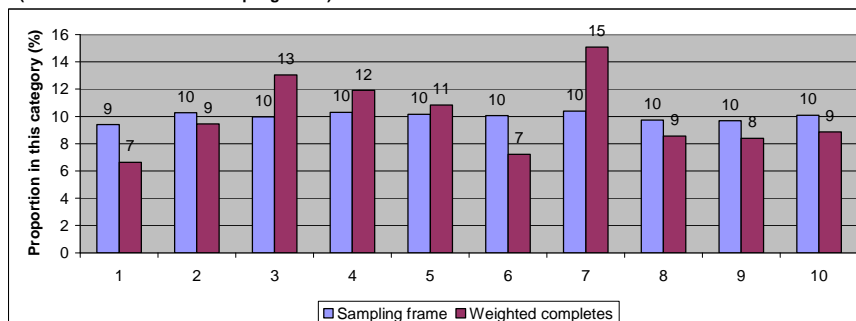

Health Deciles (deciles based on overall sampling frame)

Item volumes (percentiles)

Mean	
Sampling frame	6795
Weighted completes	6795

MUR volumes (percentiles)
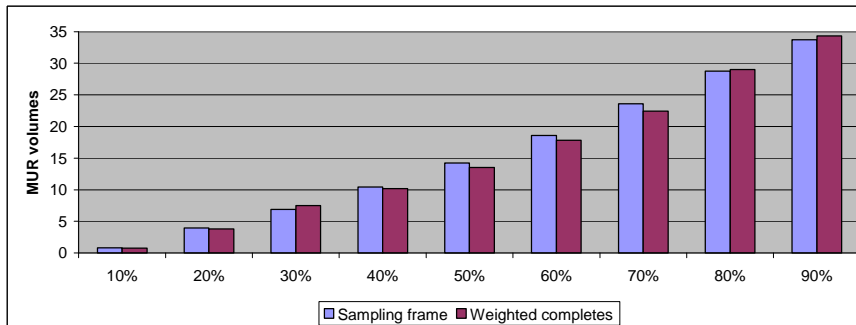
Mean	
Sampling frame	16.16
Weighted completes	16.15

NHS Payments
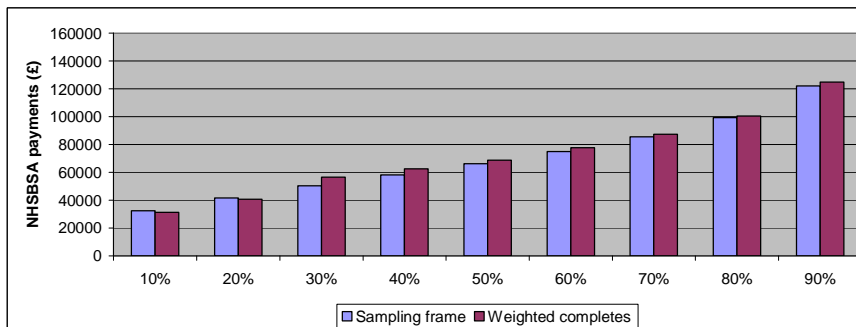
Mean	
Sampling frame	72983
Weighted completes	75422

NHS Payments (excluding cost of drugs)
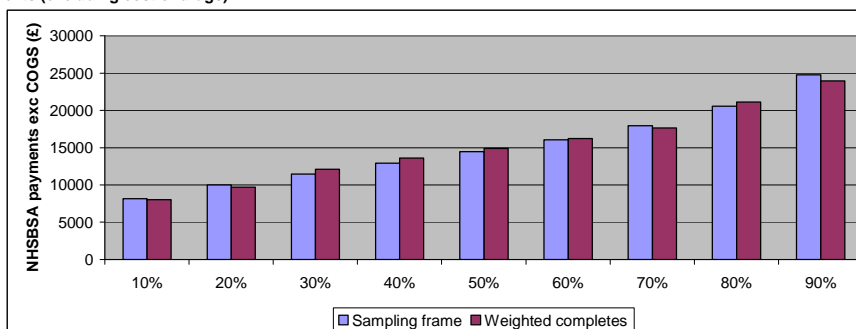
Mean	
Sampling frame	15587
Weighted completes	15906

Overall

These charts are based on the 511 completes as at 10th May. The final number of completed interviews was 573.

Overall profile
Weights adjusted for London/non London, Item totals and MUR totals
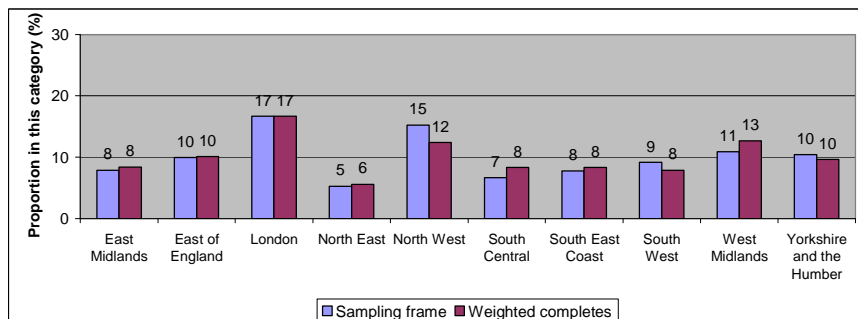
SHA Region

Rural/Urban Location
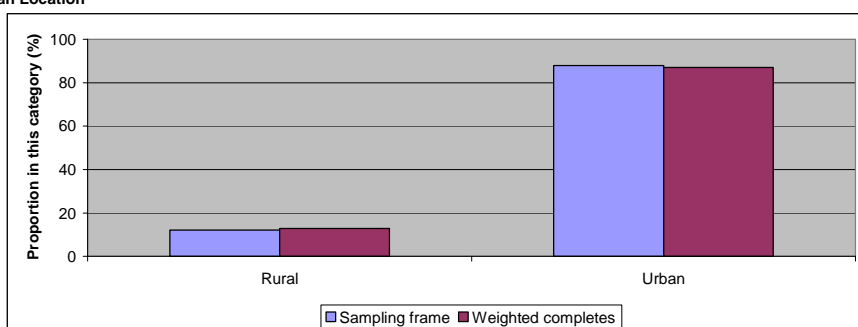
IMD Deciles (deciles based on overall sampling frame)
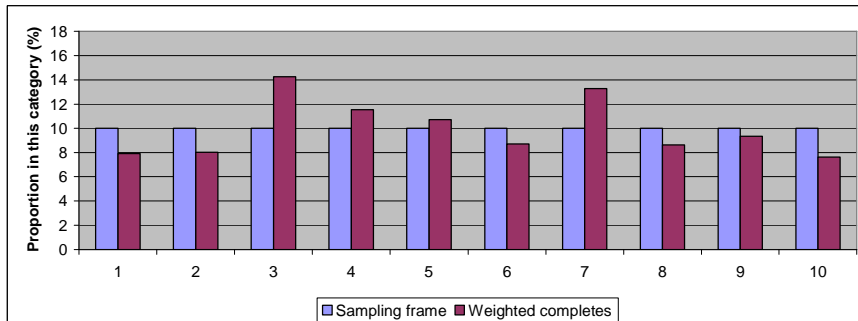
Sampling frame (%)
Proportion 1-5   50
Proportion 6-10   50

Weighted completes (%)
Proportion 1-5   52
Proportion 6-10   48

Health Deciles (deciles based on overall sampling frame)
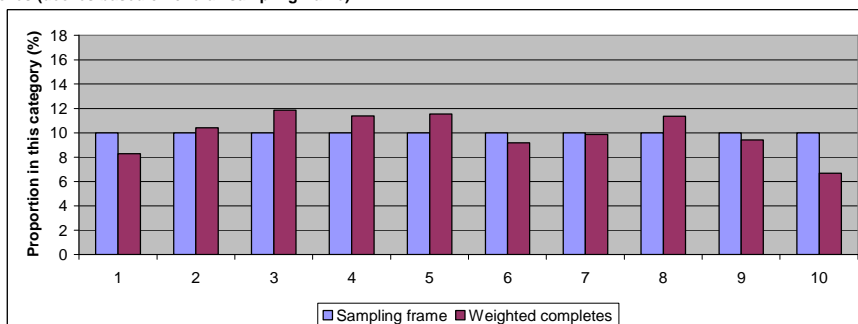
Sampling frame (%)
Proportion 1-5   50
Proportion 6-10   50

Weighted completes (%)
Proportion 1-5   53
Proportion 6-10   47

Item volumes (percentiles)
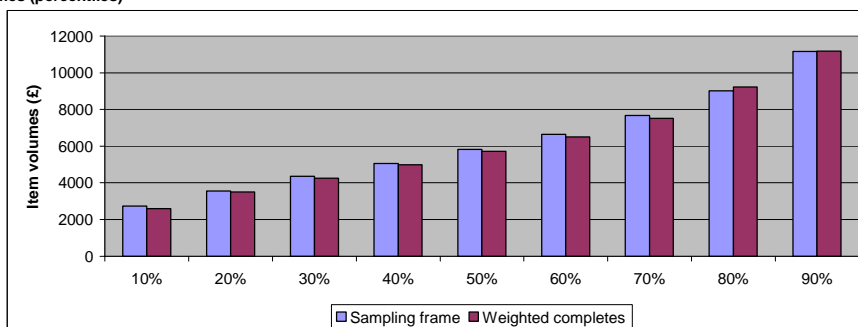
Mean	
Sampling frame	6517.49
Weighted completes	6517.49

MUR volumes (percentiles)
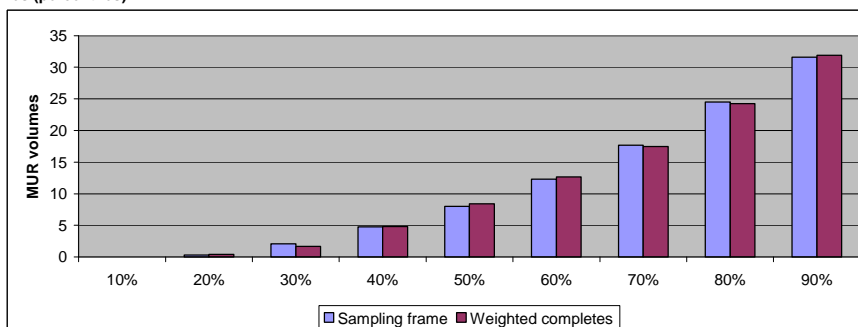
Mean	
Sampling frame	12.17368
Weighted completes	12.17358

NHS Payments
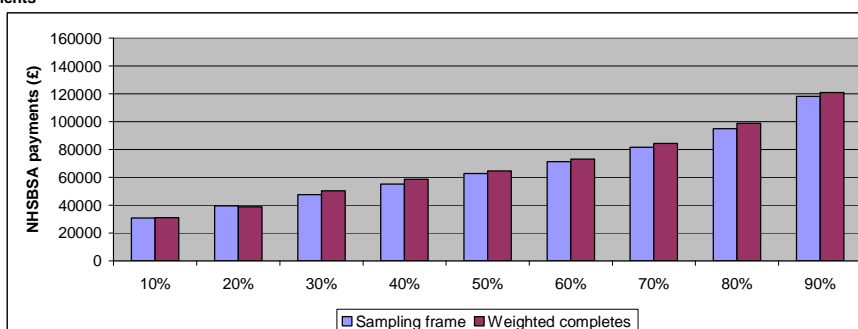
Mean	
Sampling frame	70336.33
Weighted completes	72085.99

NHS Payments (excluding cost of drugs)
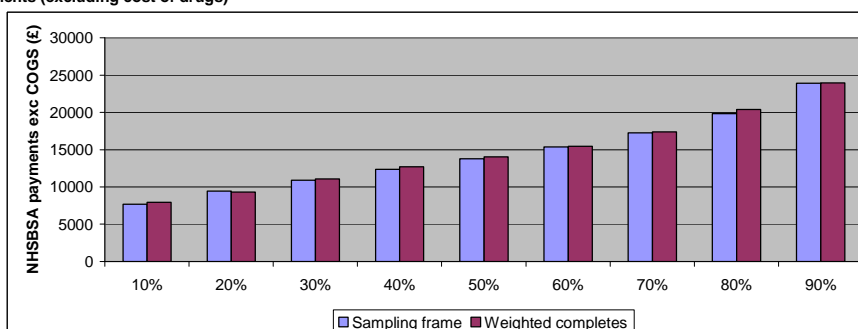
Mean	
Sampling frame	14985.39
Weighted completes	15248.74

Annex F –Analysis that incorporates final weights used in analysis (i.e adjusted for London/non London bias, Item volumes and MUR volumes (based on the final dataset of 573 completes)

Independents

These charts are based on the final sample of 261 completes.

Independent profile (261 completes)
Weights adjusted for London/non London, Item totals and MUR totals
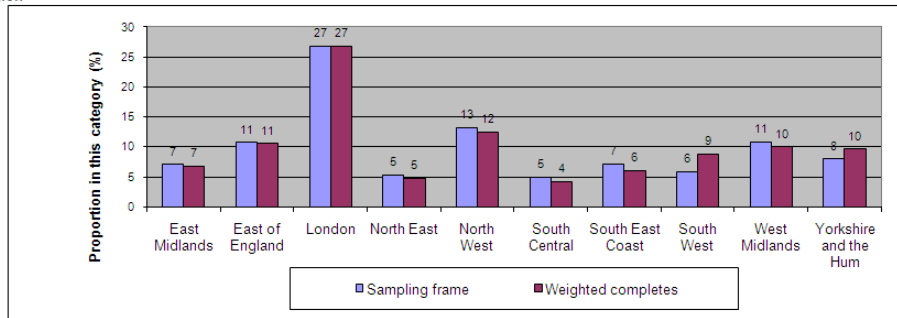
SHA Region

Rural/Urban Location
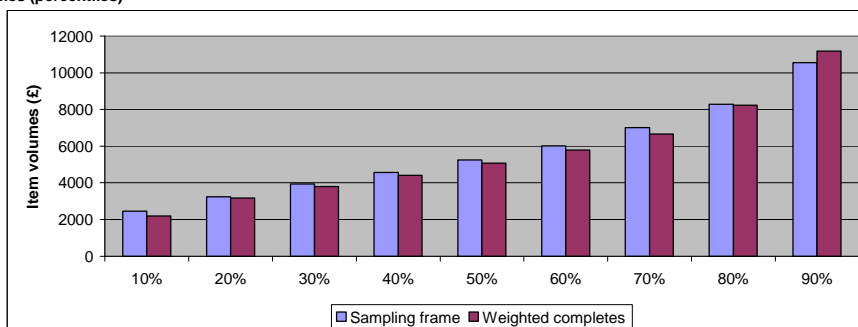

IMD Deciles (deciles based on overall sampling frame)
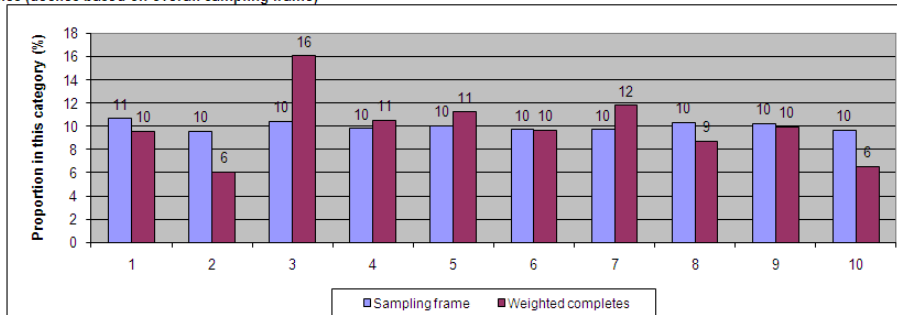
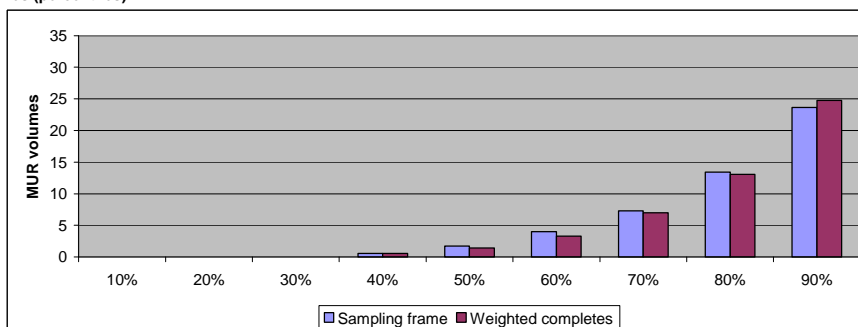
Health Deciles (deciles based on overall sampling frame)
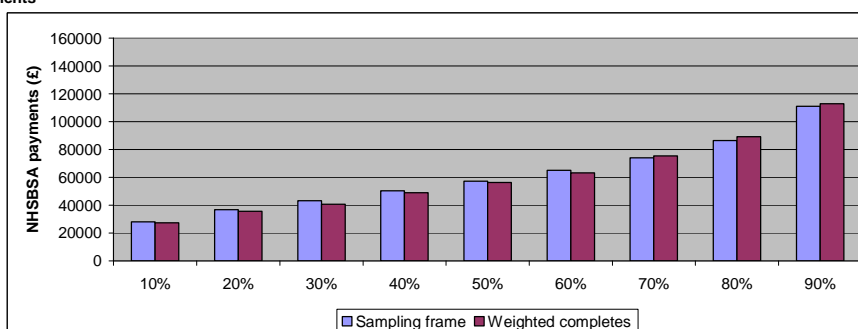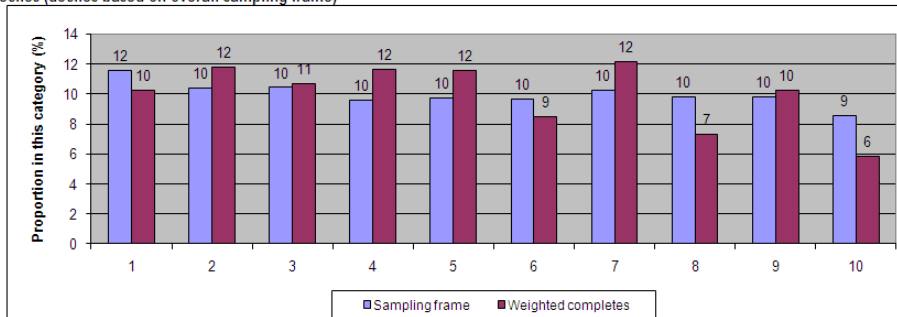
Item volumes (percentiles)
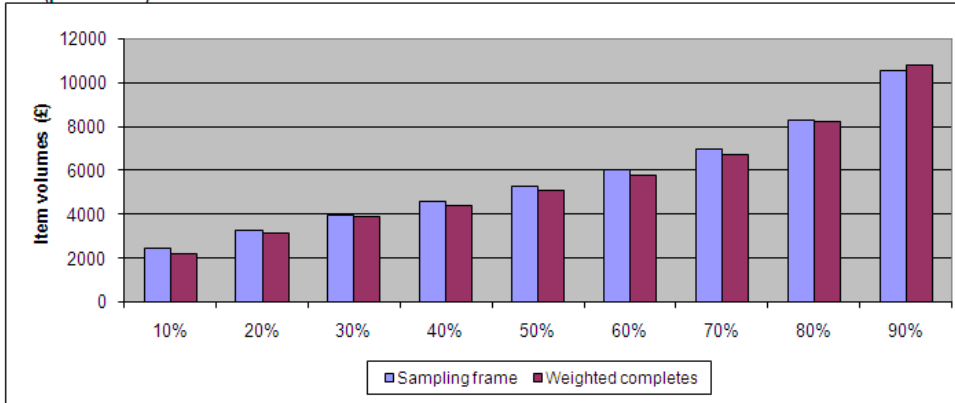
Mean	
Sampling frame	6039
Weighted completes	6039

MUR volumes (percentiles)
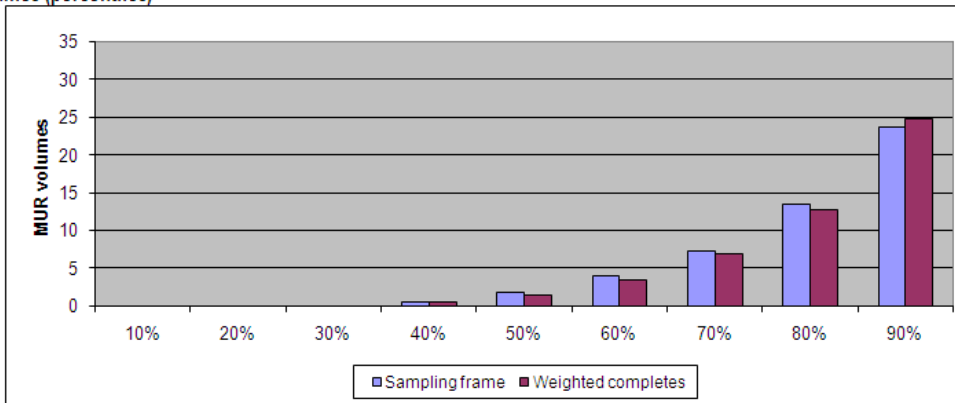
Mean	
Sampling frame	7.04
Weighted completes	7.04
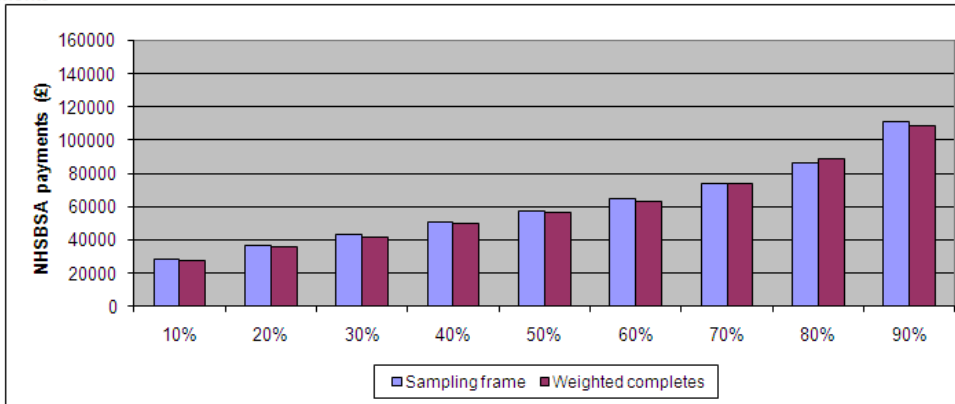
NHS Payments

Mean	
Sampling frame	65804
Weighted completes	63558
Annual	
Sampling frame	789646.9
Weighted completes	762690.2

NHS Payments (excluding cost of drugs)
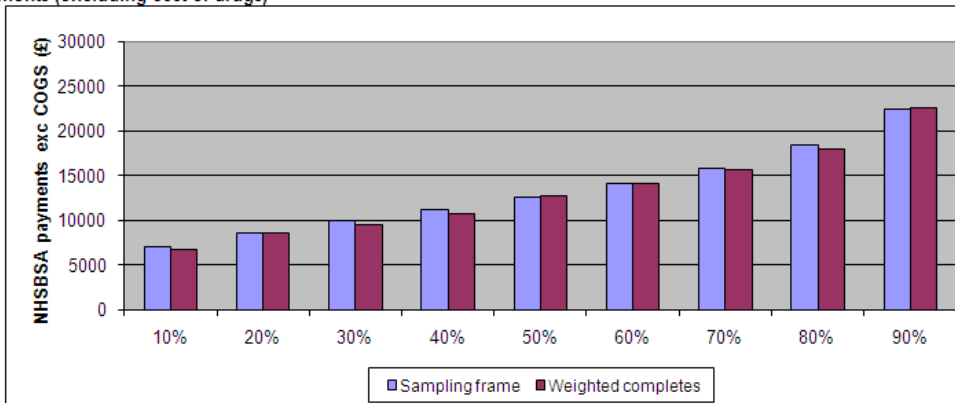
Mean	
Sampling frame	13956
Weighted completes	13668
Annual	
Sampling frame	167474.3
Weighted completes	164010.5

Smaller multiples

These charts are based on the final sample of 88 completes.

Smaller multiple profile (88 completes)
Weights adjusted for London/non London, Item totals and MUR totals
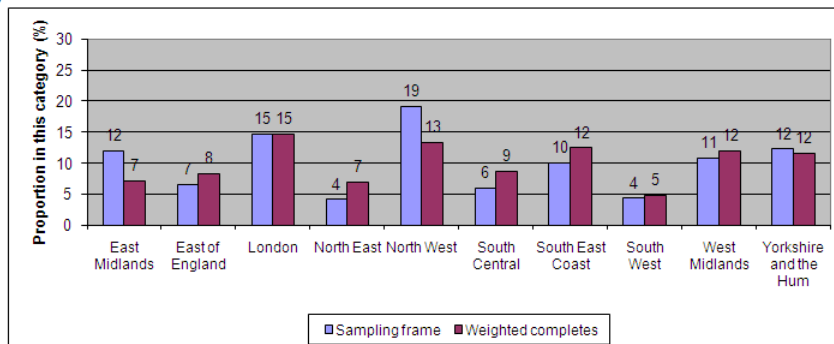
SHA Region

Rural/Urban Location

IMD Deciles (deciles based on overall sampling frame)
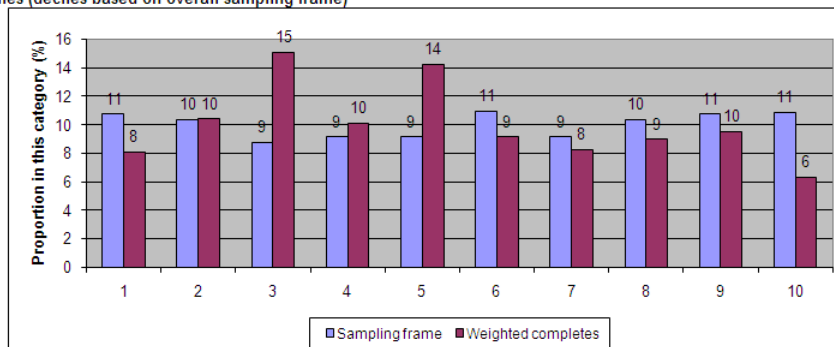
Health Deciles (deciles based on overall sampling frame)
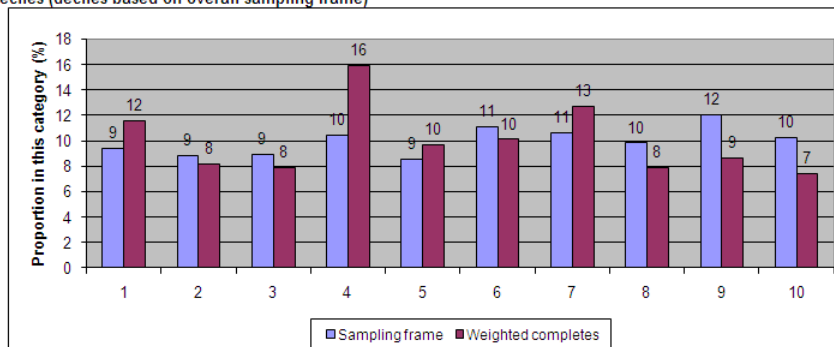
Item volumes (percentiles)
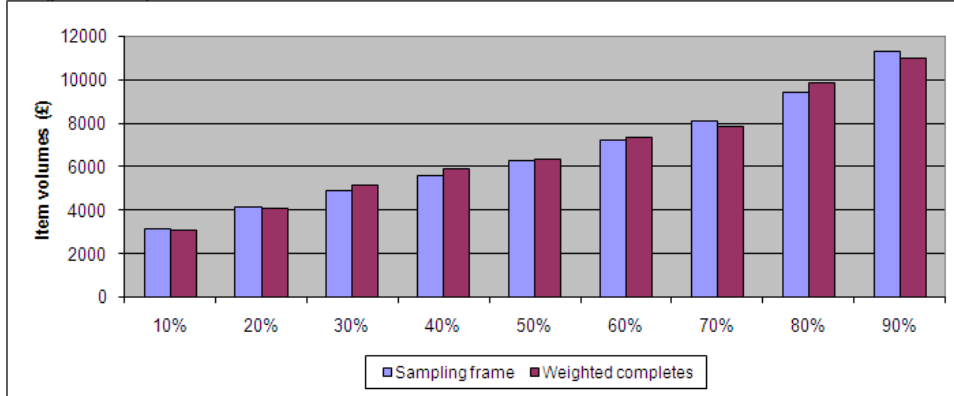
Mean	
Sampling frame	6909
Weighted completes	6909

MUR volumes (percentiles)
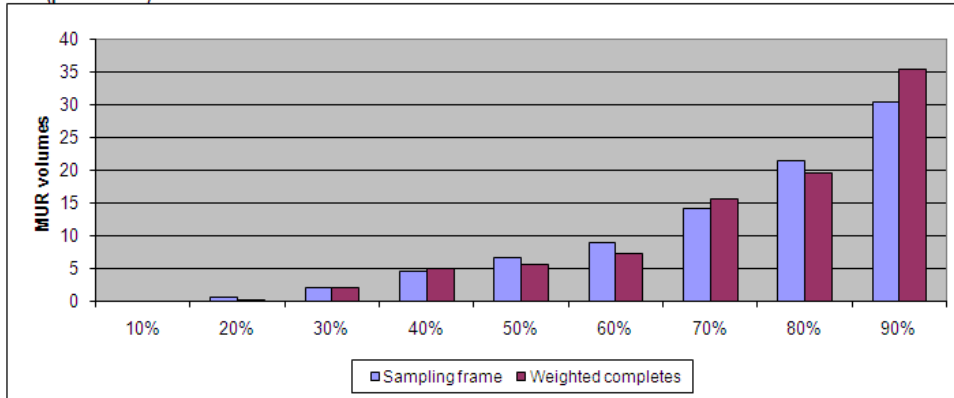
Mean	
Sampling frame	11.00
Weighted completes	11.00
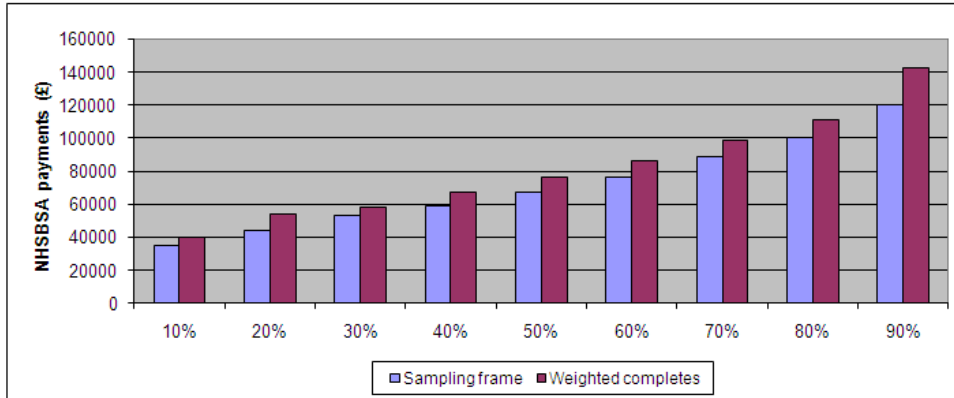
NHS Payments

Mean	
Sampling frame	73922
Weighted completes	84333
Annual	
Sampling frame	887064
Weighted completes	1011999

NHS Payments (excluding cost of drugs)
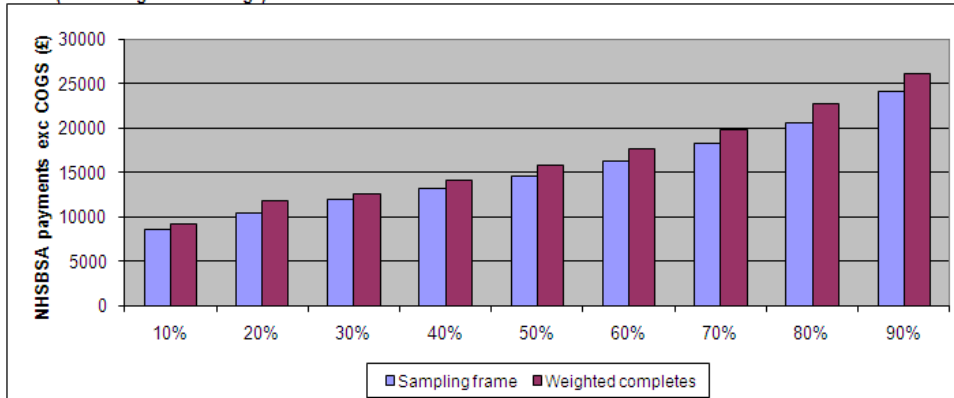
Mean	
Sampling frame	15795
Weighted completes	17389
Annual	
Sampling frame	189537
Weighted completes	208672

Large multiples & supermarkets

These charts are based on the final sample of 224 completes.

Large multiple profile (224 completes)
*Weights adjusted for London/non London, Item totals and MUR totals*
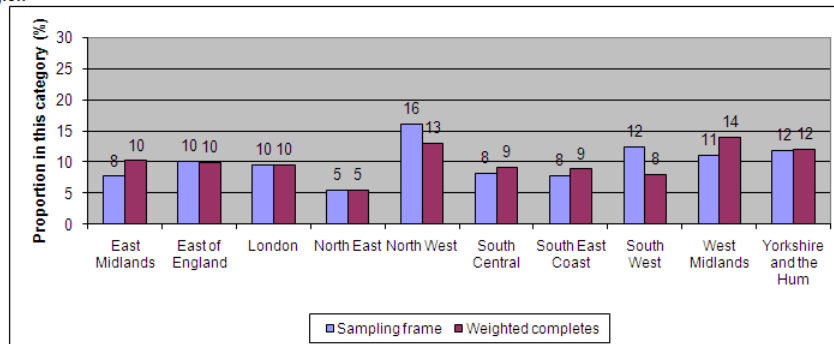
SHA Region

Rural/Urban Location

IMD Deciles (deciles based on overall sampling frame)

Health Deciles (deciles based on overall sampling frame)

PricewaterhouseCoopers LLP
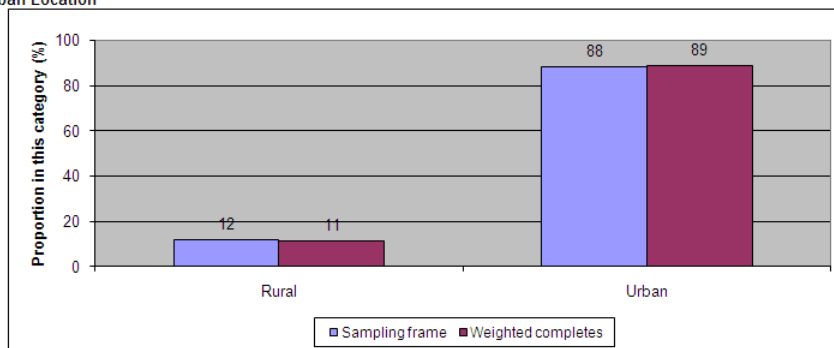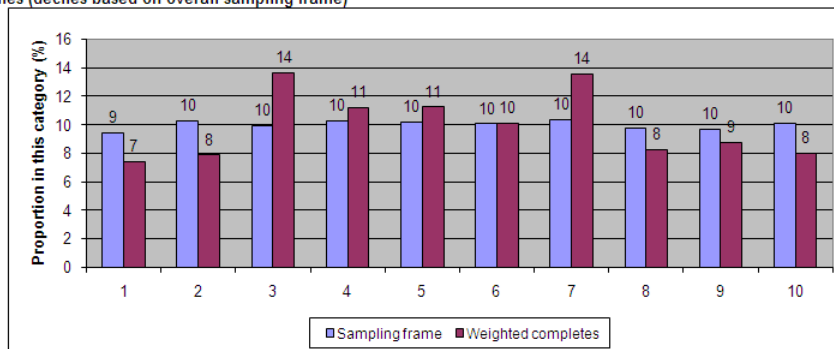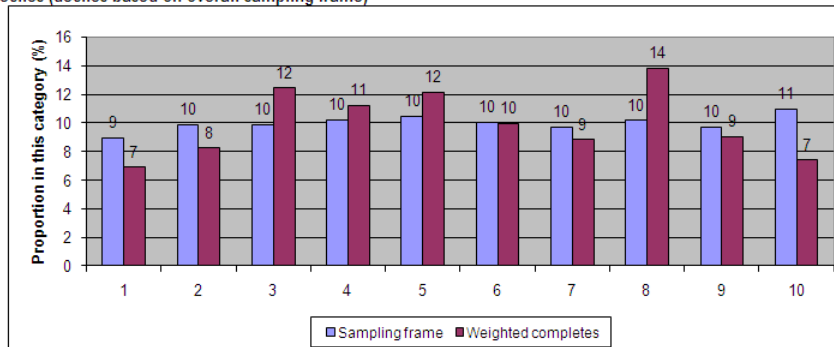
Item volumes (percentiles)
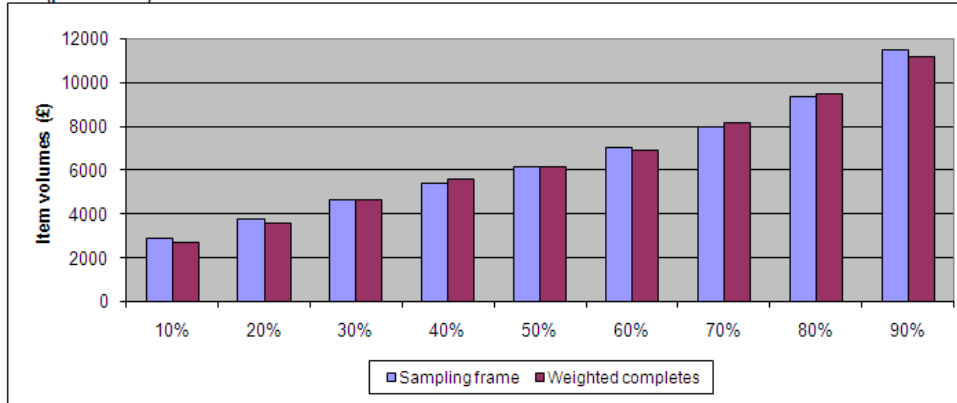
Mean	
Sampling frame	6795
Weighted completes	6795

MUR volumes (percentiles)
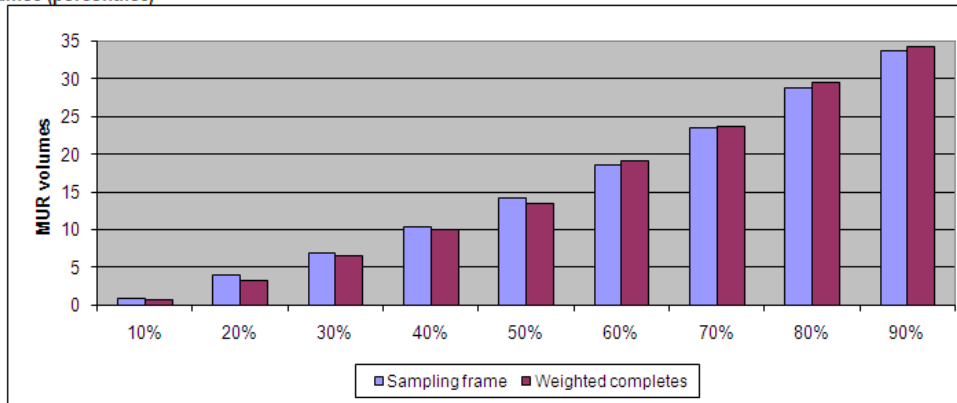
Mean	
Sampling frame	16.16
Weighted completes	16.16

NHS Payments
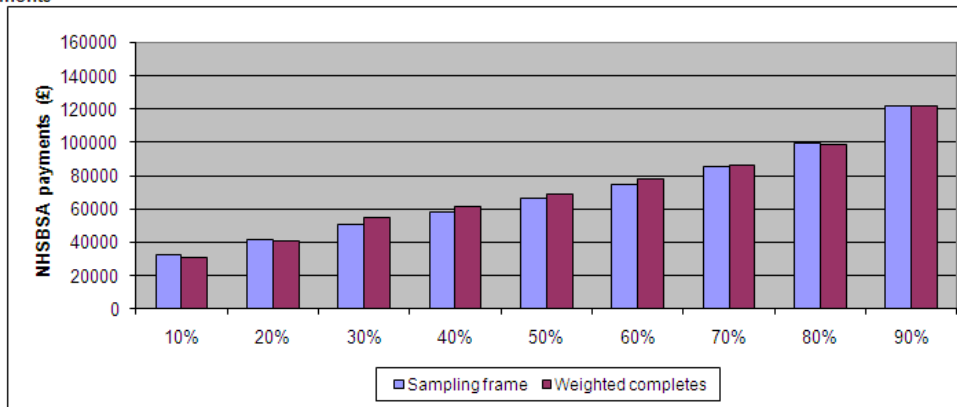
Mean	
Sampling frame	72983
Weighted completes	74034
Annual	
Sampling frame	875802
Weighted completes	888412

NHS Payments (excluding cost of drugs)
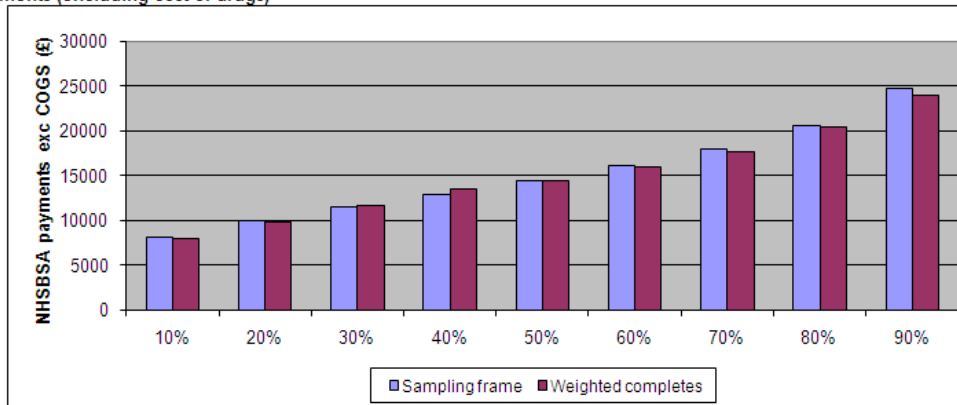
Mean	
Sampling frame	15587
Weighted completes	15626
Annual	
Sampling frame	187049
Weighted completes	187514

Overall

These charts are based on the final sample of 573 completes.

Overall profile (543 completes)
Weights adjusted for London/non London, Item totals and MUR totals
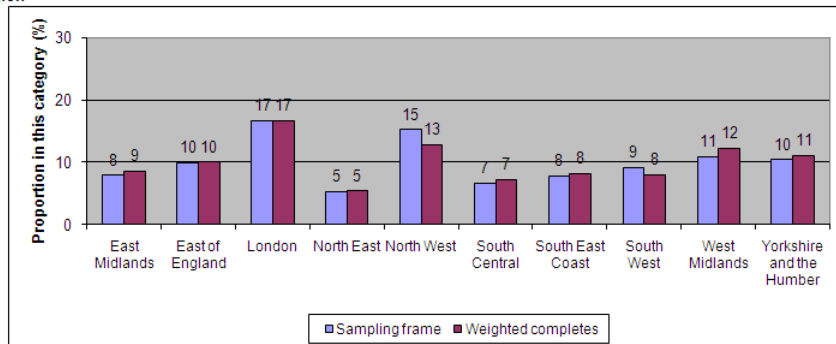
SHA Region

Rural/Urban Location
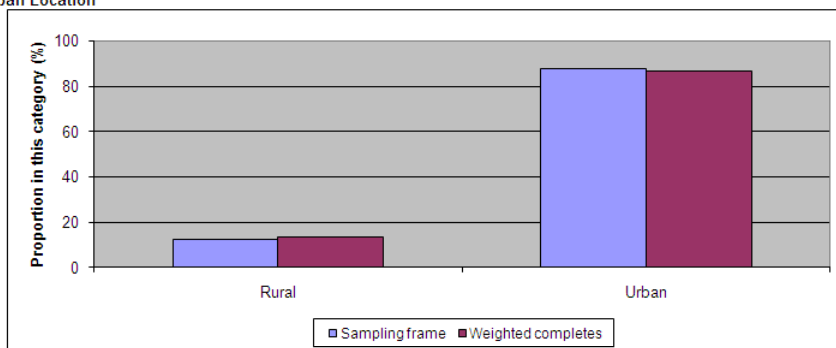
IMD Deciles (deciles based on overall sampling frame)
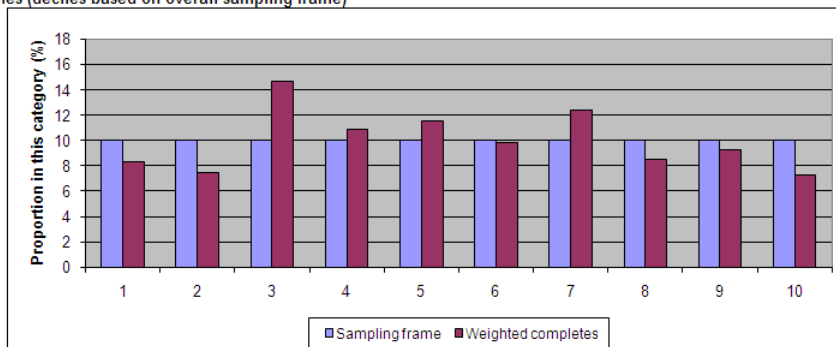
Sampling frame (%)	
Proportion 1-5	50
Proportion 6-10	50
Weighted completes (%)	
Proportion 1-5	53
Proportion 6-10	47

Health Deciles (deciles based on overall sampling frame)
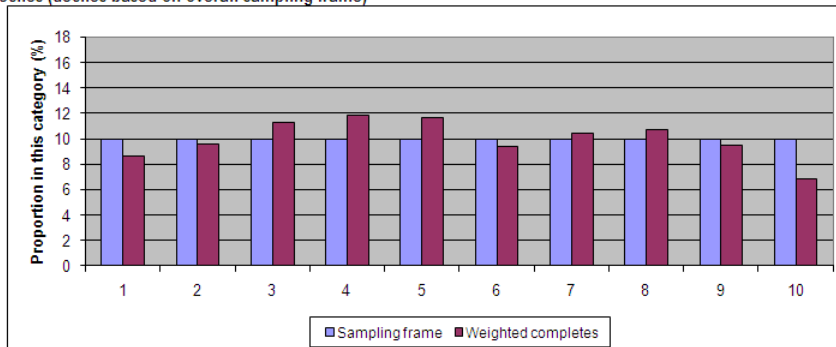
Sampling frame (%)	
Proportion 1-5	50
Proportion 6-10	50
Weighted completes (%)	
Proportion 1-5	53
Proportion 6-10	47

Item volumes (percentiles)
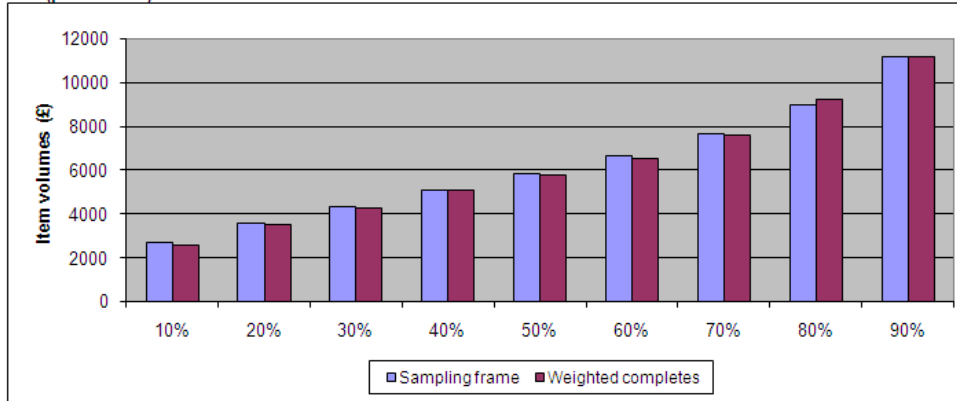
Mean	
Sampling frame	6517
Weighted completes	6517

MUR volumes (percentiles)
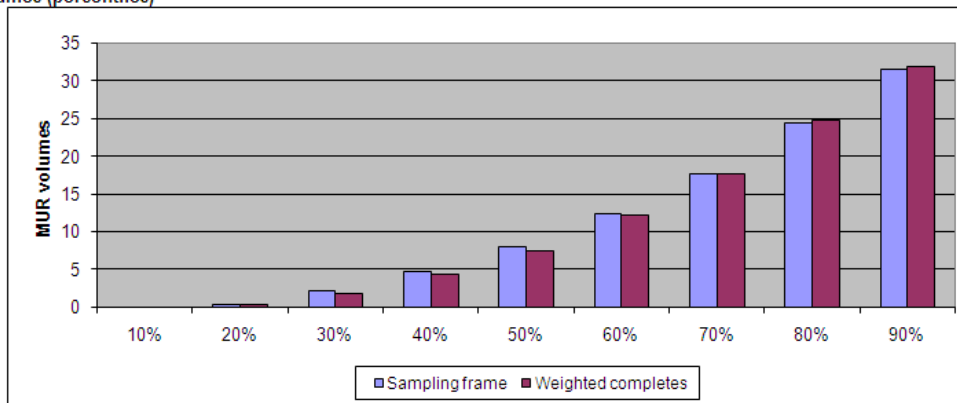
Mean	
Sampling frame	12.17
Weighted completes	12.17

NHS Payments
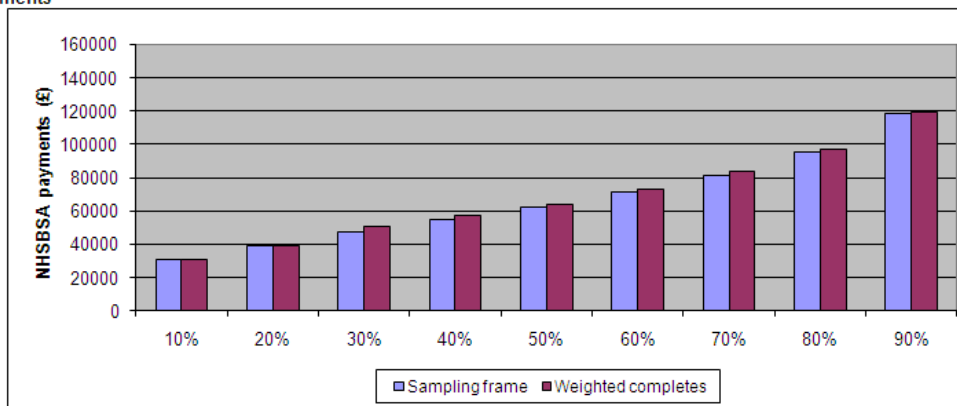
Mean	
Sampling frame	70336
Weighted completes	71045
Annual	
Sampling frame	844036
Weighted completes	852534

NHS Payments (excluding cost of drugs)
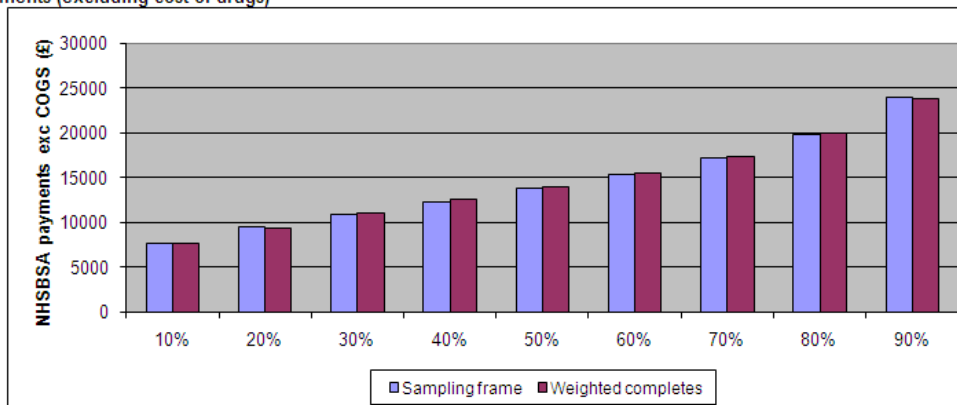
Mean	
Sampling frame	14985
Weighted completes	15051
Annual	
Sampling frame	179825
Weighted completes	180616

Appendix H – Fieldwork Methodology

1.1.   Purpose of this Document

This document sets out the details of how the main fieldwork was conducted.

1.2.   Sampling

The sampling method used for the main fieldwork was stratified random sampling of pharmacy branches from the full population of community pharmacy branches in England.

The working target was 500 completed surveys of pharmacy branches. However, the exact final sample size – and the fieldwork processes adopted - was dependent on the survey response rates which could not be precisely predicted in advance.

A sample of pharmacies branches was randomly selected within each of the strata. The final sample constituted a total of 1432 branches drawn in two sampling waves.

The sampling was achieved by:

- Dividing the population of pharmacy branches into the proposed 27 different strata (3 x 3 x 3).
- Randomly selecting a number of pharmacies within each stratum. The number drawn from each stratum was based on the overall target sample size of 500, a power allocation approach and the expected response rates.
- Randomly sorting the entities in each sample list and using this random ordering to guide priorities for chasing responses.

1.3.   Collecting data

As well as collecting data on individual branches and their costs, we also collected data on any associated head office or central cost entity. There were challenges associated with designing a survey to adequately capture costs from such a diverse range of pharmacy organisations. There were concerns around the ability of such a survey to fully capture the costs incurred by some pharmacy types, such as independent pharmacy businesses, as certain types of costs may not be formally recorded by these entities. It was also anticipated that there could be some 0ver-reporting of costs, for instance where respondents had to make estimates not based on actual data.

From the pilot, we concluded that three distinct groups of survey information were required.

1. Branch information. This list of questions concerned costs specific to the branches drawn in our sample.
2. Head office information. The head office survey asked questions regarding head office costs only. We did not anticipate that this information would be known by branch personnel.
3. Owner-pharmacist information. There were specific questions that we needed to ask owner-pharmacists of small operations as all of their costs would not be easily ascertained from accounts information. We also did not anticipate that the branch manager would necessarily be aware of this information.

Due to the variability of types of businesses within the community pharmacy community and based on the pilot findings, we collected data in two ways.

1. Postal/telephone interview for single branches and small chains.
2. Data request and telephone/face-to-face discussion for large companies, for example, Boots, Superdrug and supermarkets. For those businesses providing information on many branches, it seemed more

appropriate for some data to be supplied electronically. In addition, due to the complexity of the allocation of head office costs, we conducted visits and a number of phone calls with these entities.

When collecting the data, all branch data (within the sample) for a given head office was requested at one time regardless of where within the sequence of the sample the branch was listed. This minimised the need to go back to the same head office for additional branch data at a later data.

1.4. Fieldwork process

1.4.1. Identifying head office contact details

To get access to branch information, we first identifed and approached head offices. Branches were identified by OCS number.

1.4.2. Initial introduction from DH/PSNC

A number of communications to LPCs, pharmacies and other stakeholders were used:

- A letter from DH/PSNC to all LPCs to say that pharmacies in their area would be contacted
- A letter from DH/PSNC sent to all head offices corresponding to the sample selected to say that they may be contacted as part of the study
- A letter from DH/PSNC sent to all branches selected as part of the sample that were:

    – Independent/single branches, or
    – Of unknown ownership structure, or
    – For whom head office/central cost entity contact details were not known

Letters were DH/PSNC branded but the printing and sending of letters was carried out by PwC and invoiced as an expense.

These introductory letters from DH/PSNC covered:

- Purpose of the inquiry
- Study methodology
- High-level description of what survey would cover
- The fact that pharmacists/head offices/central cost entities would be asked to provide cost information and to send in copies of their most recent accounts
- The fact that their data would be kept confidential and that DH/PSNC would not be able to attribute specific pieces of financial information to specific pharmacies
- Details of any incentives being offered

1.4.3. Starting the survey

Starting from the top of the sampling lists and working down, PwC phoned all DH/PSNC letter addresses (i.e. head offices or branches as appropriate) to:

- Carry out a brief screening questionnaire.
- Ask them to participate in the survey
- Check that the respondent did not refuse to take part in the survey (despite encouragement and reassurances). The number of people refusing at this point was closely monitored.
- Ask whether they expected to be able to provide detailed information on the individual branches included in the sample. If not, agree protocol for approaching branches directly.
- Check that all their branches selected as part of the sample had been in business for a full financial year.
- Inform them that a questionnaire would be arriving in the post/by email (if preferred).
- Clarify contact details and branch details if agreed
- Schedule a time for the interview (whether face-to-face or telephone)

If the appropriate respondent was not available to speak to:

- PwC checked what time might be better
- PwC called back later
- If still not available, but colleague providesd some assurance that the respondent was a valid respondent, the survey questions were put in the post anyway.
- If no meaningful contact had been made after 3 calls made at different times of day, the branch was classed as a non-response.

1.4.4. Sending questionnaires/making data requests

PwC sent questionnaires/data requests to head offices and branches as agreed. The cover letter:

- Reiterated the importance of the study
- Explained they should collect information asked for
- Reassured respondents of confidentiality of data provided
- Indicated the latest date by which PwC would like to have completed the interview with them (3 weeks after posting date)
- Provided a hotline number that the respondent could call with any questions. This line had an answerphone for 24 hour service.
- A stamped addressed envelope for returning copies of accounts was be enclosed where the questionnaire was posted to participants (except where we expected to obtain accounts electronically from a head office).

1.4.5. Telephone interviews with single branches and small chains

PwC offered to take each respondent through the data request/questions at a time convenient to the respondent (evenings if necessary). PwC called back if the respondent required additional time to collect certain pieces of information. In reality, many respondents felt most comfortable filling in the paper version of the questionnaire in their own time rather than providing the information over the telephone. PwC encouraged the respondent to send in copies of most recent financial accounts, both for the central entity and also for the branches selected as part of the sample, and obtained an indication of whether the respondent intends to do this.

1.4.6. Data requests and face-to-face interviews with larger companies

As mentioned earlier, we anticipated that companies with many branches would find it easier to provide certain information electronically rather than over the telephone. In addition, it was expected that due to complex head office structures, face-to-face discussion of costs related to pharmacy and retail would be required. This was indeed the case.

1.4.7. Chasing outstanding information

Where respondents requested to complete and return a postal/email survey (and gave permission for PwC to follow-up with the respondent once received), PwC called back respondents who had not sent in a completed questionnaire by the agreed date.

The priority order for these callbacks was determined by the random sampling lists.

PwC reviewed financial accounts submitted and followed up with questions to certain responding entities as appropriate.

PwC monitored the hotline and any answerphone messages and responded to them on a case-by-case basis, discussing with DH/PSNC as required.

1.4.8. Non-response

If the respondent refused to schedule an interview, PwC asked if they would be willing to complete and return the data request in an alternative format and reminded them of the date for completion mentioned in the original cover letter. If they were not willing to complete the data request in any format, then they were classed as non-response.

If there was no progress after 3 calls by PwC (made at different times of day) towards scheduling an interview, or towards obtaining a commitment to complete the questionnaire, then the branch was classed as a non-response.

1.4.9.   End of fieldwork

- Overall fieldwork finished when the final deadline for fieldwork completion was passed (the cut off date set was end of April 2010)

- Within particular strata, fieldwork efforts also concluded once target numbers of completed interviews had been completed in each stratum and cost information had been received from all corresponding head offices/central cost entities or when all pharmacy branches had been contacted (either directly or via their head office/central cost entity) and had either completed an interview or had been classed as a non-response

Appendix I – Data validation checks

1.1.   Introduction

This appendix describes data validation checks that were carried out on two specific parts of the dataset used for the COSI analysis. These were as follows:

- Staff costs – we compared survey data with accounts and compared aggregate and disaggregate measures of staff costs provided in the survey; and
- Supermarket data – we analysed the sensitivity of the overall cost estimates to supermarket rent assumptions

Unless specified, the data presented here relates to the raw dataset before imputation has taken place.

We note that the analysis contained in this paper is based on the dataset as at the date of analysis. This analysis was conducted to validate the data before embarking on full analysis. Therefore the numbers shown are not based on the final dataset in all cases.

1.2.   Staff Costs - Comparison of total staff cost survey data and accounts data

When pharmacies returned the survey, they were asked to provide the accounts relating to the same period as the survey responses. A number of Independents and Smaller Multiples were able to provide accounts for their individual branches. Table 1 below shows the average total staff costs across the 155 pharmacies where these individual branch account data are available.

Table 1: Comparison of total staff costs (survey vs accounts)

£ per branch p.a.	Overall (138 Independents and 17 Small Multiples)
Average staff costs in survey (weighted)	£88,096
Average staff costs in accounts (weighted)	£91,017
% difference	3.3%

PwC Analysis

As shown, overall the average staff costs reported in the accounts and the survey are similar. The chart below shows the distribution of these points. A large proportion of the data points lie close to the 45% degree, i.e. for 120 of the 155 branches, the accounting staff costs are within +/- 15% of the survey staff costs). We note however that there ar e a number of branches for which the accounting staff costs are furtheraway from the survey staff costs. For those branches where the accounting costs are larger than the survey costs we suggest this may be because the accounts provided refer to multiple branches but that do not make this explicitly clear. Alternatively this may be due to the staff costs in the accounts including costs that have been reported elsewhere in the survey respons (e.g. owner costs). For those branches where the accounting costs are smaller than the survey costs we suggest this may be because the costs reported in the survey include director or owner costs not explicitly itemised in the accounts. Except in a few cases where comparison with the accounts revealed obvious typos or mistakes in the survey costs reported, we have used the survey costs for the purposes of analysis.

Figure 1: Comparison of accounting and survey staff costs reported
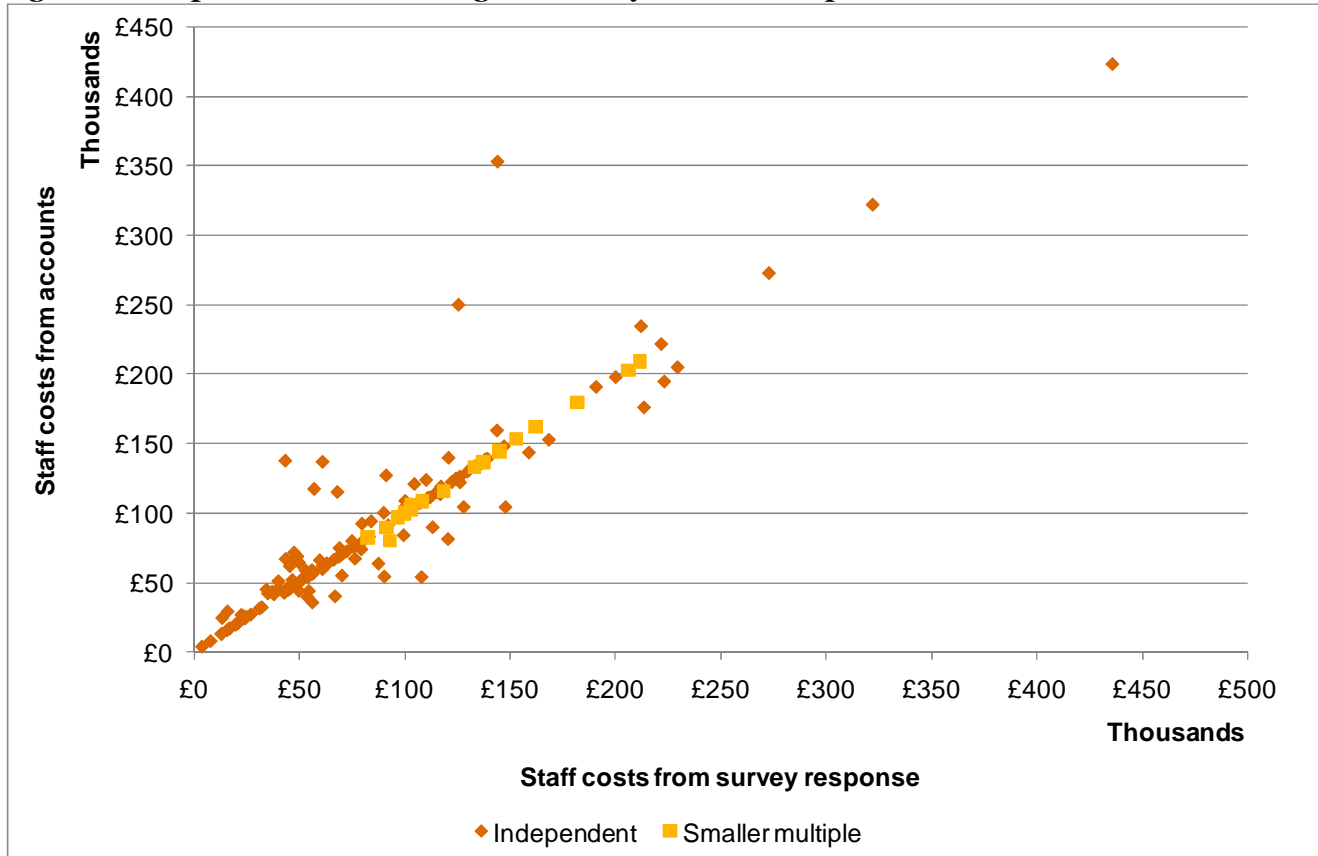
1.3. *Staff Costs - Comparison of aggregate and disaggregate staff costs*

The survey collected data on aggregate staff costs, where the respondent was asked how much they spend in total on staffing, including salaries, bonuses, National Insurance contributions and pensions. The survey also collected disaggregated data detailing the salary costs for each individual employee. We have totalled these disaggregated costs to provide an alternative estimate of the wage bill for each branch.

We would expect to see a discrepancy between the aggregate staff cost and the sum of the disaggregate numbers for the following reasons:

- The disaggregate costs only include salaries and not items such as bonuses, National Insurance contributions and pensions.
- Although the disaggregate question asks for the data to be from the same accounting period as the aggregate question, it is likely that it will not fully capture the same annual figure because it is asking for a monthly or hourly salary but does not take account of those employees who did not work for the entire year of the most recent accounting period.

Figure 2 shows the relationship between the aggregate and disaggregate staff cost measures before any imputation takes place. Aggregate costs are shown on the x-axis and disaggregate costs on the y-axis.

Figure 2: Aggregate vs. disaggregate staff costs (before imputation)
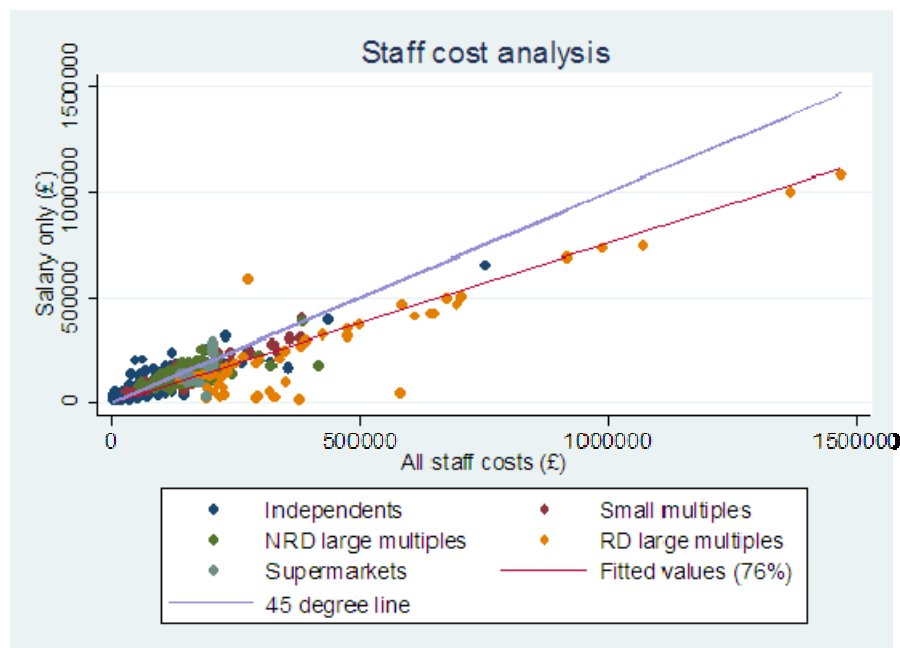
Source: PwC Analysis

The chart above shows that the majority of respondents are contained within a corridor around the '45 degree' line as would be expected (with some variation around this for the reasons described above). The graph also shows that, on average, the disaggregate costs are approximately 24% less than the total staff costs (this analysis is based on unweighted data). This is to be expected given that the disaggregate costs exclude bonuses and other employer-paid staff costs.

The Retail Driven Large Multiples in the graph above are outliers in terms of the size of their staff costs. Figure 3 below focuses in on the lower left quadrant of Figure 2 looking only at those branches with aggregate staff costs of less than £400,000. Even in this graph, however, the disaggregate costs are still approximately 24% less than the aggregate staff costs (again based on unweighted data). This shows that the regression result showing that disaggregated costs are less than aggregate costs is driven by the sample as a whole, rather than just by the Retail Driven Large Multiples.

Figure 3: Aggregate vs. disaggregate staff costs (before imputation) (<£400k)
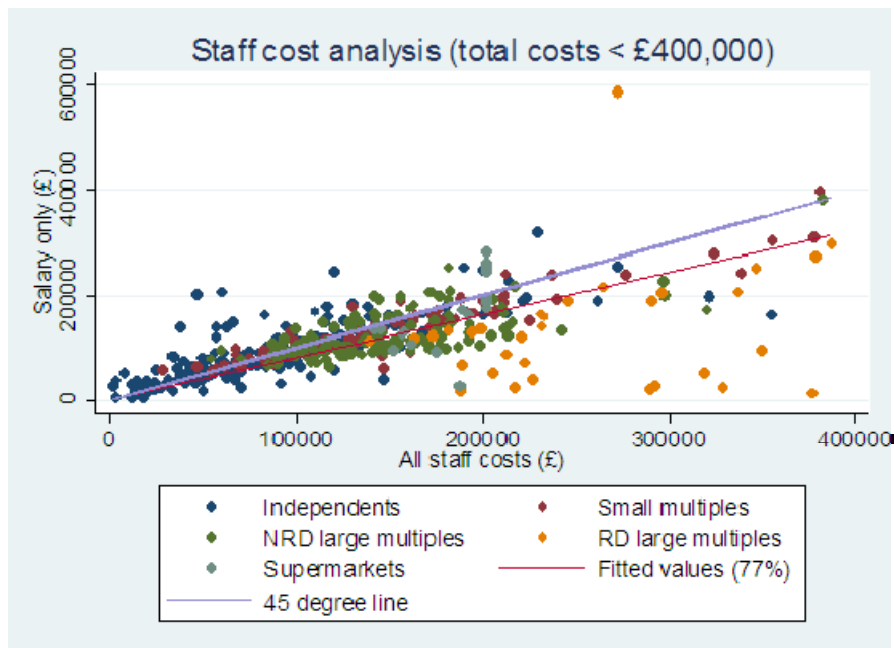
Source: PwC Analysis

Figure 2 and Figure 3 show comparisons of aggregate and disaggregate staff costs before carrying out any imputation. Figure 4 below shows a similar comparison after imputation has been carried out. The majority of the major changes during imputation occur in the same area as shown in Figure 3 (i.e. pharmacies with staff costs of less than £400K). As a result, in Figure 4**Error! Reference source not found.**, when looking at the relationship between aggregate and disaggregate costs after imputation, we look at this same subset of pharmacies.

Figure 4: Aggregate vs. disaggregate staff costs (after imputation) (<£400K)

Source: PwC Analysis

PricewaterhouseCoopers LLP
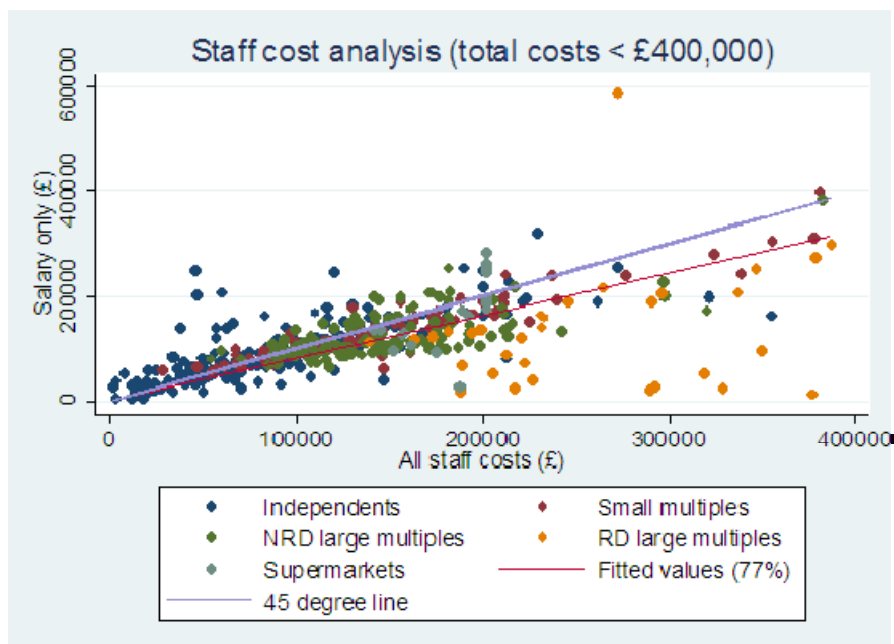
As would be expected, imputation does not significantly affect the gradient of the fitted values line, which still implies that disaggregate costs are, on average, 23% less than the aggregate staff costs (based on unweighted data).

1.4. Supermarket rent - Analysis of the sensitivity of the overall cost estimates to this input

It has been noted that property costs for Supermarkets are far lower than those of other pharmacy types. Two possible reasons for this have been put forward:

- Space in Supermarkets may not be rented out at market rates as the pharmacy is part of the larger entity and as a result the rent for the whole Supermarket has just been pro-rated for the pharmacy resulting in a much lower rent per metre squared than the other pharmacy types; or
- The area reported by Supermarkets for their pharmacies is lower relative to other pharmacies in our sample.

The table below shows the reported rents per metre squared and floor from our survey, by pharmacy type:

Table 2: Reported rent and floor area

Pharmacy type	Mean rent per metre squared	Mean floor area (metres squared)
Independent	£258	101
Small multiple	£197	109
Non-retail driven large multiple	£228	105
Retail driven large multiple	£370	619
Supermarket	£170	49

Source: PwC Analysis

This table suggests that, while the average rent per metre squared for Supermarkets is below the other pharmacy types, it is not significantly so and the biggest driver of lower property costs is that the floor area is far smaller than the other comparable ones (i.e. for all pharmacy types apart from Retail Driven Large Multiples).

The floor areas reported by supermarkets are consistently lower than those of other pharmacy types, ranging between 33m² and 66m². The distribution around these points is reasonably even as shown by the histogram below.

Figure 5: Histogram of supermarket pharmacy floor space
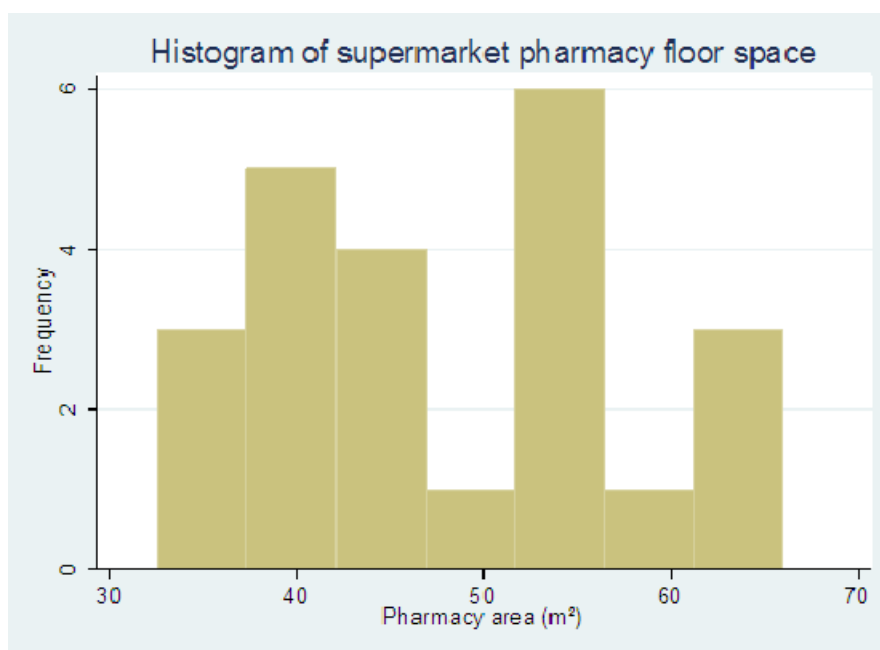
When calculating pharmacy rents, the supermarkets told us that, in all cases, they simply scaled their store rents by the proportion of the supermarket area taken up by the pharmacy. On average this is just under 0.5% of the total supermarket floor area (ranging between 1,702m² and 27,446m²) with no pharmacy taking up more than 1.9% of the total floor space. The following graph shows a scatter plot of store area versus pharmacy area.

Figure 6: Relationship between supermarket store area and pharmacy area
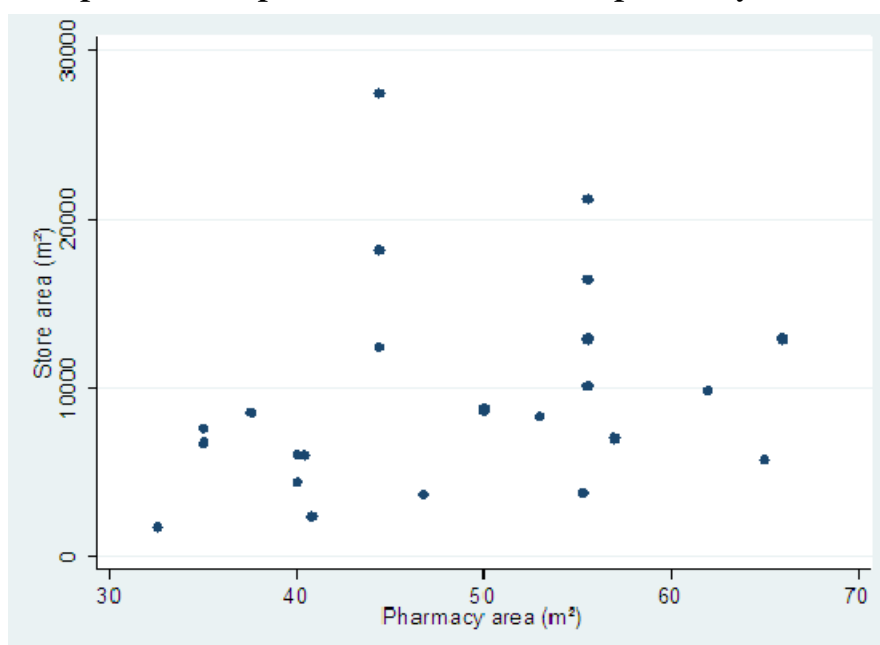
Appendix J – Imputation Methodology

1.1.   Introduction

The purpose of this is note is to set out the current approach to imputing missing costs. Costs are only imputed when the data has not been provided in the survey and it has not been possible to fill in this data from the hard copy accounts.

We have primarily used two different methods of imputation. A nearest neighbour donor based approach has been used for all missing cost lines. A mean based approach has been used to impute employee level questions (such as hours worked and split of time between NHS and non-NHS activities), which in turn are used for the FAC allocation of staff costs in each pharmacy. A third different approach has been used when imputing supermarket property costs.

We note that the analysis contained in this paper is based on the dataset as at the date of analysis. This analysis was conducted to test the imputation methodology. Therefore the numbers shown are not based on the final dataset in all cases.

1.2.   Which data points are relevant

Before imputing values, it is important to consider whether imputation is appropriate. In particular we considered the appropriateness of imputation for missing values and also outlier values.

Values may be missing because the respondent simply did not complete the questionnaire fully or because they intended a missing value to be equivalent to zero. Imputing missing values inappropriately may therefore artificially inflate costs.

There are some variables where we would definitely not expect any zero values and there are some variables where missing values could feasibly be zeros. For example, variables where missing values could feasibly be zero include training, advertising and repair costs.

We also considered the appropriateness of imputing values that are outliers. Certain survey responses seem unintuitive because they are far larger or smaller than the other responses to a given question. One approach would be to select those values that are outside of a certain number of standard deviations of the mean value for each question and define these as outliers. However, given the very large range of values for some cost and revenue categories, the standard deviations are considerably larger than the mean values in some cases.

We also considered whether it might be better to identify those values sitting outside the 5th and 95th percentiles as being possibly incorrect. In the first instance these values would be checked against the accounts. If it was possible from the accounts to identify whether the values are correct or not, we would impute new values unless a note has been made to explain exceptional costs within the category.

However, in the final analysis imputation has not been carried out to replace outlier results because, given the degree of variation we observe in survey responses, there is no definitive basis for concluding that extreme values are not reasonable costs.

1.3.   Methodology: Non-allocation questions

1.3.1.   Variables

The variables we impute where missing are listed below. These are variables we would not expect to be zero, and indeed we observe that these variables were generally already quite well populated in the survey data:

- Staff costs (total unallocated staff costs);

- Property costs (total unallocated property costs);
- Depreciation (total unallocated depreciation);
- Dispensing stock;
- Over the counter stock;
- Total stock;
- Dispensary refit cost;
- Counter refit cost;
- Shelving refit cost;
- NHS IT refit cost; and
- Refit cycle.

No imputation has been carried out to replace data that is unusually small or large as this was felt to be too subjective and would potentially suppress natural variation in the data.

1.3.2.   Donor based imputation

The main approach to imputation we have used is called donor-based imputation. Each pharmacy that has data missing from one of the variables listed in 1.3.1 (the "recipients") receives data from one of the pharmacies that has complete data on all the variables listed (the "donors"). Using this method, the donor that is most similar to the recipient on a number of characteristics is chosen. This method leads to costs that are likely to be close to the actual missing data, while still maintaining a degree of variation in the data. The crucial part of this methodology is that the same donor is used for each missing data point that the recipient pharmacy has. This ensures that the relationships between variables in the data are preserved by virtue of selecting all data for a recipient from the same donor pharmacy.

Alternatives to donor based imputation that we considered included:

- No imputation - This would ensure that the econometric analysis and its results are not driven by the imputation methodology selected, however, this would significantly reduce the size of the dataset as branches with even a single missing data point would have to be dropped.

- Use of (conditional) mean/median values – a simple method of imputation is to use conditional means or medians (e.g. mean or median values within pharmacy types for a revenue or cost category) and replace missing and/or implausible values with these values. This method has the advantage of being easily explained and audited, however, from an econometric point of view this technique has the effect of artificially reducing the variation in the dataset and thereby reduces confidence in the results.

- Multiple-imputation - this works by estimating an econometric model many times based on a random conditional distribution, each time with a slightly different imputed value. This method improves on mean/median value imputation because the imputation variation is explicitly modelled and accounted for in the regression analysis. However, having used this method, there will no longer be a single dataset from which the results of the econometric analysis can easily be replicated. Instead a distribution of imputed values will be needed to replicate the results of the analysis.

In this case, donor based imputation was agreed to be the most appropriate imputation method to use for key cost variables that are missing. Further details on how this approach was implemented are provided in the remainder of this paper.

1.3.3.   Selection of the donor

The first criterion for the selection of the donor is that it is from the same pharmacy type. This aims to control for key structural differences between pharmacy types.

Within a given pharmacy type a donor is selected that is 'similar' to each recipient pharmacy. The characteristics we used to determine this similarity are:

- NHS revenue;

- Non-NHS revenue; and
- Number of fee items.

The donor with the minimum least squares difference on the basis of these three variables was selected. That is the donor (i) that minimizes the following equation for recipient (j):

$$\min_{i \in \text{Type}} \begin{array}{c} \left(\dfrac{\text{NHS Revenue}_i - \text{NHS Revenue}_j}{\text{SD}_{\text{NHS Revenue}}}\right)^2 + \\[2em] \left(\dfrac{\text{Non-NHS Revenue}_i - \text{Non-NHS Revenue}_j}{\text{SD}_{\text{Non-NHS Revenue}}}\right)^2 + \left(\dfrac{\text{Fee Items}_i - \text{Fee Items}_j}{\text{SD}_{\text{Fee Items}}}\right)^2 \end{array}$$

(where SD_x indicates the standard deviation of the variable x).

1.3.4.   Results

The three sets of figures and tables below summarize the results of this donor based imputation.

Figure 1 shows the number of pharmacies within each pharmacy type that had the complete data for the variables listed above (donors) and how many had at least one point of imputed data (recipients). The figure shows that donors exceed recipients for all types except small multiples, for which we still consider the split (60 vs. 57) to be reasonable for this type of imputation.

Figure 1: Numbers of donors and recipients by pharmacy type
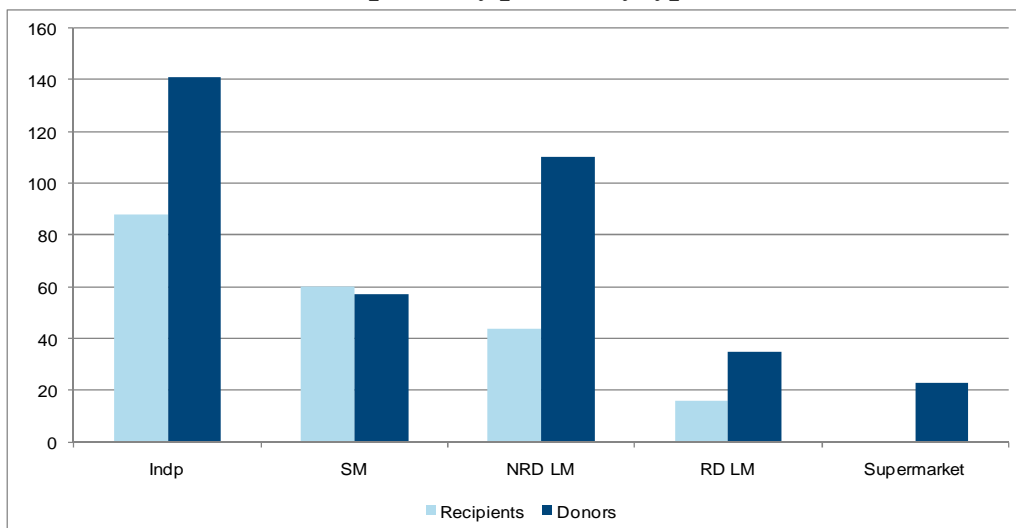
Figure 2 shows the percentage of variables that are imputed, presented by pharmacy type. This figure shows that there is no systematic pattern in the variables imputed within each pharmacy. Generally the variables are imputed most among independents and non-retail driven large multiples. However depreciation (for small multiples) and OTC stock and refit cycle (for retail driven large multiples) have the highest levels of imputation at around 30% of observations.

The relatively high levels of refit cost imputation for non-retail driven large multiples shown in this figure (consistently over 15%) are driven by a single entity, which did not provide refit estimates for any of its branches.

Figure 2: Percentage of records imputed by pharmacy type and variable
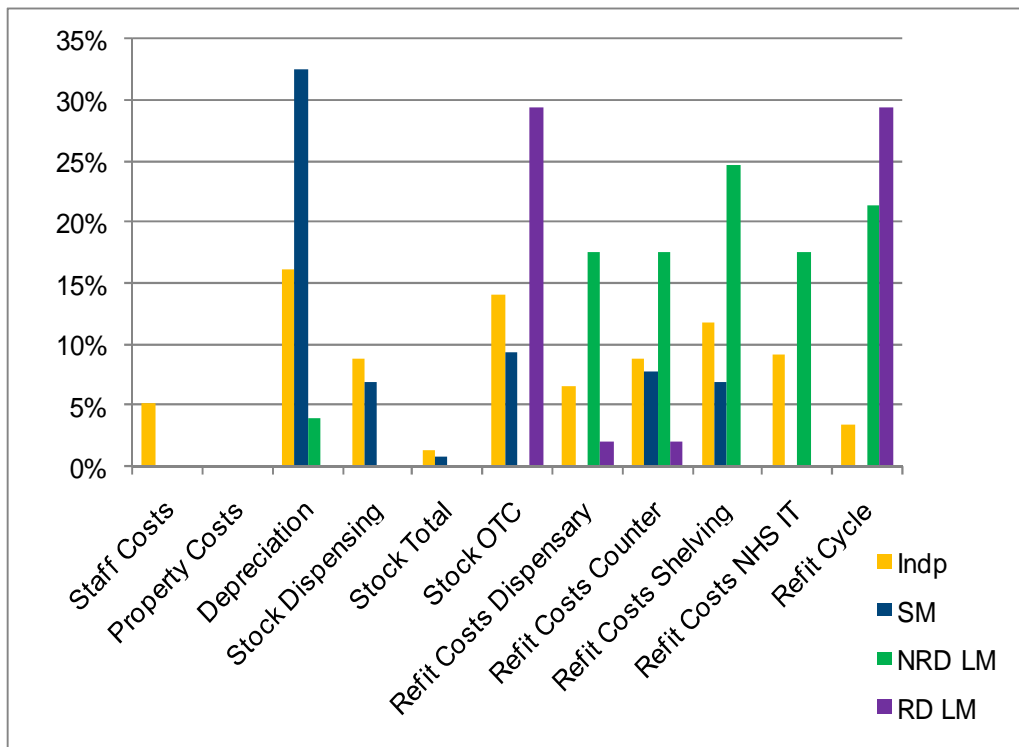
Figure 3 shows how often each donor is used to impute. If a donor was used many times we would worry that any characteristics in this donor could be exaggerated. However, as the figure shows, no donor is used more than five times, which is quite reasonable in this type of imputation.

Figure 3: Frequency distribution of donor use by pharmacy type
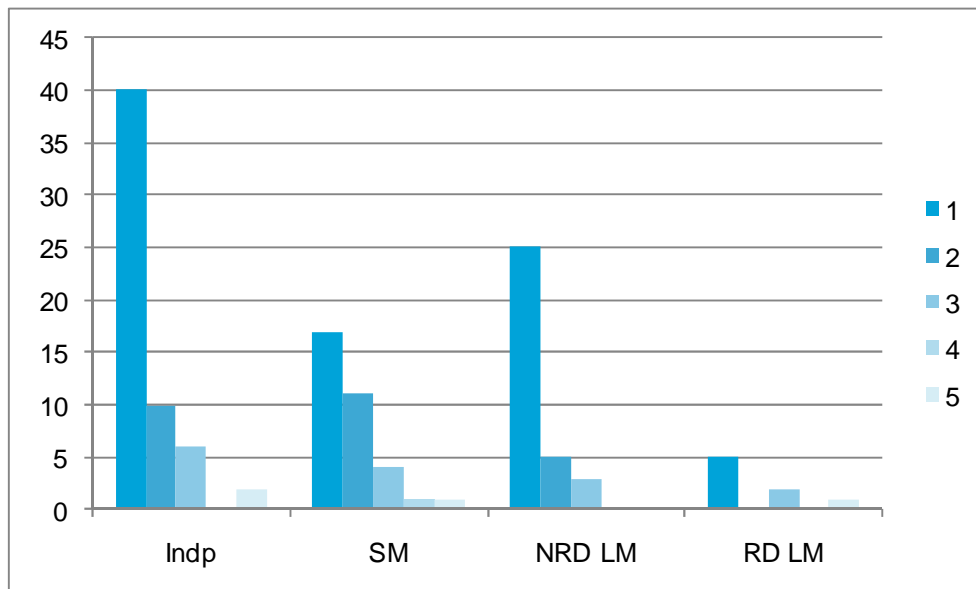
The data used to draw Figures 1, 2 and 3 is included in Tables 1, 2 and 3.

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Table 1: Numbers of donors and recipients by pharmacy type

	Recipients	Donors
Independent	88	141
SM	60	57
NRD LM	44	110
RD LM	16	35
Supermarket	0	23

Source: PwC Analysis

Table 2: Percentage of records imputed by pharmacy type and variable

	Independent	SM	NRD LM	RD LM
Staff costs	5%	0%	0%	0%
Property costs	0%	3%	1%	0%
Depreciation	16%	32%	4%	0%
Dispensing stock	9%	7%	0%	0%
OTC stock	1%	1%	0%	0%
Total stock	14%	9%	0%	29%
Dispensary refit cost	7%	0%	18%	2%
Counter refit cost	9%	8%	18%	2%
Shelving refit cost	12%	7%	25%	0%
NHS IT refit cost	9%	0%	18%	0%
Refit cycle	3%	0%	21%	29%

Source: PwC Analysis

Table 3: Frequency distribution of donor use by pharmacy type

Frequency	Independent	SM	NRD LM	RD LM
1	40	17	25	5
2	10	11	5	0
3	6	4	3	2
4	0	1	0	0
5	2	1	0	1

Source: PwC Analysis

1.4.   Methodology: Supermarket property costs

1.4.1.   Approach

Unfortunately donor-based imputation was not an appropriate method to impute supermarket property costs as there were not enough donors to populate all of the recipients.

Our discussions with the supermarkets that had provided rent data indicated that these costs were strongly linked to the floor areas of the pharmacies. As a result we decided to apply the observed relationship between floor areas and rents to all supermarket pharmacies in the sample. This relationship was estimated, through a linear regression model, to be as follows:

Rent (£ per branch p.a.) = 3396 + 100 * Property size (in m²)

This change was applied to 11 out of 23 pharmacy branches.

1.5. Methodology: Staff cost allocation questions

1.5.1. Variables

The raw survey data for the variables used to allocate staff costs were generally well-populated; however the following variables have been imputed where missing:

- Hours worked (where staff salaries were provided);
- Staff wages (where staff hours were provided); and
- Percentage of time allocated to NHS, non-NHS and common (when these did not add up to 100%[2]).

1.5.2. Mean based imputation

For missing data on staff cost allocation variables we have used mean based imputation. This method replaces the missing data item with the average of all available data points in the imputation class or group and the imputation is applied to the individual employee level record rather than to the branch as a whole. The imputation classes are created based on the following criteria:

- The imputation class must only contains branches from the same pharmacy type as the branch that has the missing data (e.g. independent, small multiple, etc);

- The imputation class must only contains data from employees of the same job type (e.g. pharmacist, counter assistant, etc);

- The imputation class must only contain employees from branches with at least as many employees having the particular job role for which data is being imputed. For example, in cases where there is missing data for the weekly hours worked for a pharmacist who is one of three pharmacists employed in a pharmacy, then the imputation class for this recipient only contains pharmacists working in pharmacies that have at least three pharmacists. This criterion has been included in part to deal with any scale effects but also because of the simplicity of imputation, which is important given the low proportion of observations to be imputed.

Using mean based imputation does lead to a final dataset with less variation than if a full donor based imputation method had been used. However we consider this acceptable because:

- There is no obvious method of selecting a donor based on a variable that is driving hours, wages or allocations of time at the individual staff group level;

- There are only about 140 missing data points out of all employees data provided (about 5000 possible data points) in the dataset.

Results

For independents and small multiples (from the data collected by PwC's international survey unit) 110 replacements of mean hours or salary or missing allocation percentages have been made.

For the small and large multiples (from the data collected directly by PwC's analysis team) 5 replacements have been made on missing wages and 24 allocation percentages (between NHS, non-NHS and common activities) were made.

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[2] Where allocation percentages were provided that did not sum to exactly 100% but summed to values close to 100% (i.e. between 80% and 120%) then the percentages provided were scaled to sum to to 100%. In all other cases, imputation was used as described in the text.

1.6. Summary

1.6.1. Imputation results

Overall imputation did not have a large effect on our average cost allocations as one would expect because the imputed values will, by definition, not be outliers. Overall imputation increased the average allocated NHS cost per branch by 0.33%.

The table below shows the absolute and percentage impacts, by pharmacy type, of imputing costs using the methods described above:

Table 4: Impact of imputation

	Indep	SM	NRD LM	RD LM	Smkt	Overall
Total costs	1,971	3,899	270	220	6,474	-296
	(0.86%)	(1.37%)	(0.08%)	(0.02%)	(2.10%)	(-0.08%)
Allocated NHS costs	1,681	3,323	211	210	6,642	789
	(0.88%)	(1.31%)	(0.09%)	(0.06%)	(2.70%)	(0.33%)

PwC Analysis

This table shows a counterintuitive result of the average costs per branch going up in all pharmacy types but the overall cost per branch going down. This is because the imputation led to 9 independent branches (representing 134 branches in the sampling frame), which otherwise would have been dropped from the dataset because of lack of data, being used in the analysis and lowering the average.

The graph below shows the impact of these changes on allocated NHS costs.

Figure 4: Impact of imputation by pharmacy type
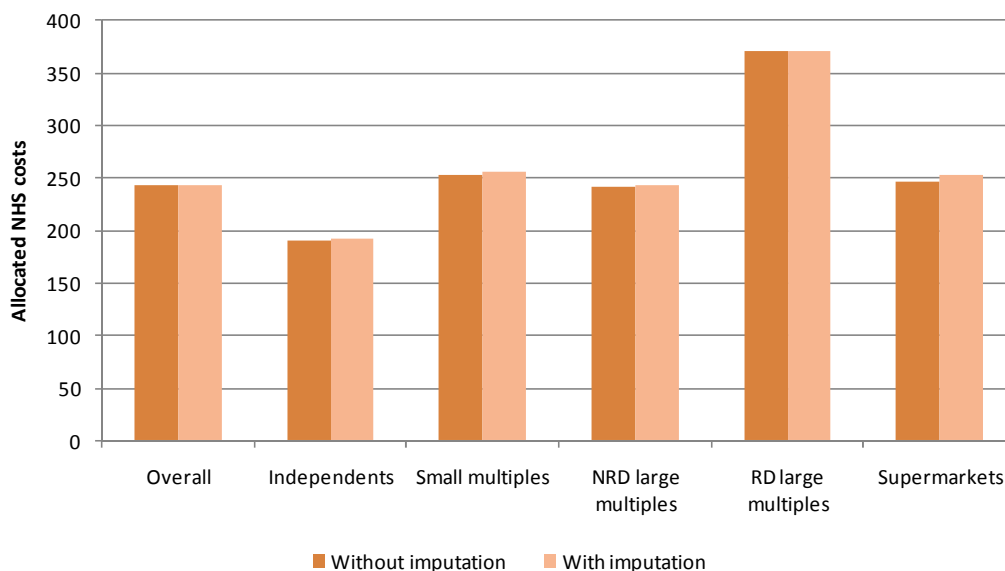
PwC Analysis

Appendix K – Cost Allocation Methodology

1.1.   Introduction

This paper discusses the overall framework we employ to allocate the costs which community pharmacies incur between NHS, retail and common cost categories. It also describes how this allocation framework differs between types of pharmacy provider. The paper is split into the following allocation issues:

- General allocation approaches;
- Allocation of branch costs divided into the following subsections:
  - Staff costs;
  - Property costs;
  - Depreciation costs; and
  - Other branch costs;
- Allocation of head office costs; and
- Approaches to dealing with common costs.

The focus of this paper is describing an appropriate method for the allocation of pharmacy costs. The question as to the extent to which NHS should pay for the different categories of cost is outside the scope of PwC's work and may be a matter for further negotiation.

1.2.   General allocation approaches

We have considered two main approaches to allocating costs between NHS, retail (otherwise described as non-NHS) and common categories as follows:

- FAC: a fully-allocated cost approach, which involves allocating cost in proportion to drivers such as stated percent of time spent on different roles, split of floor-space etc.

  - FAC has the advantage that the allocation can be based on the branch-specific data collected during the costs survey.

- LRIC: a long-run incremental cost approach, which is based on the concept of avoidable costs.

  - LRIC allocation has a strong base in economic theory and is used by regulators and competition authorities.
  - LRIC requires a complex thought exercise to identify costs on the basis of hypothetical counterfactual situations where different activities are assumed not to exist. We were not able to collect detailed information on appropriate LRIC allocations during the costs survey.

The FAC and LRIC approaches are described in further detail below. Annex A also provides details of an econometric approach to cost allocation that was considered in the course of the project.

1.2.1.   Description of FAC approach

The FAC methodology allocates common costs in proportion to various input, output and value drivers associated with NHS and non-NHS pharmacy activities. Examples of input drivers include the share of full-time equivalent staff or the share of the floor space required to support various pharmacy activities. Output drivers could include share of transaction volumes or revenues. Value drivers such as revenue (or account balances) can be problematic because there is an inherent circularity in that activities with a higher share of revenue will automatically have a higher share of costs allocated to them. Care has to be taken in using this approach, particularly with regards to common costs, which are by definition not driven by incremental output drivers associated with particular services.

On the basis of our pilot survey, we found that the FAC approach was intuitive for pharmacist. For this reason we included questions in the questionnaires regarding proportions of time and other input drivers relating to many of our costs.

1.2.2. Description of LRIC approach

The LRIC of NHS pharmacy is calculated as the additional costs that would be required to add the NHS pharmacy services to an existing non-NHS/retail only business, consisting of the same branch network and retail sales as the pharmacy provider concerned. Within LRIC, 'long-run' refers to a time period over which all costs, including deprecation (and therefore assets), are variable, or can be optimised to match the requirements of the business.

Similarly, the LRIC of the non-NHS business is calculated as the additional operating costs that would be incurred in adding the non-NHS business to an existing NHS only pharmacy business, comprising the same branch network and NHS sales as the pharmacy provider concerned.

Some proportion of costs incurred by community pharmacies cannot be clearly attributed incrementally to either NHS or non-NHS services but support both sets of activities. These common costs can be calculated by subtracting NHS and non-NHS LRICs from the total costs. Although by definition common costs are not incrementally associated with NHS or non-NHS business, they are incurred by pharmacy contractors and need to be reflected in NHS services remuneration and retail prices if the community pharmacy sector is to remain financially viable in the long run. Several approaches are available to determine how these common costs should be recovered from each the business segments, which we discuss later in this appendix.

A difficulty in assessing LRIC (and common costs), in practice, is that the starting point for the analysis is a hypothetical business in which there are either no NHS or no non-NHS sales. Effectively, the incremental cost of some activity is assessed by hypothesising that the activity is no longer performed, and considering what cost would be avoided (or not incurred). So the LRIC of non-NHS activities can be estimated by considering which costs would be avoided in the long run in a hypothetical scenario where a pharmacy stopped selling all non-NHS products and services. Similarly, NHS LRIC can be quantified by considering which costs would no longer be incurred if a pharmacy stopped offering all NHS services and retained only the non-NHS activities.

Figure 1: Long-run incremental cost allocation approach
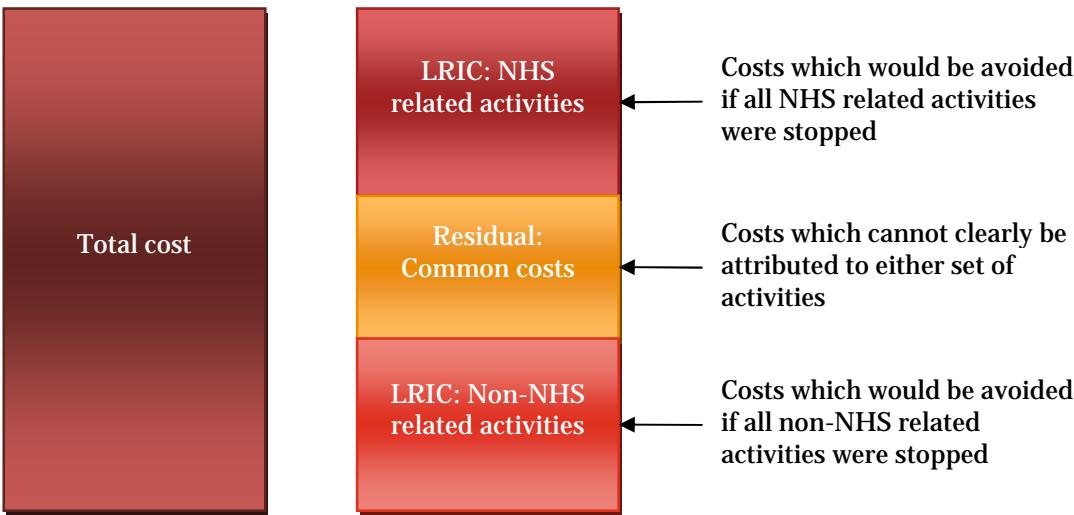
PwC Analysis

The pilot survey showed that respondents found it difficult to answer questions which required them to estimate the costs which would be avoided in various hypothetical scenarios. Accordingly, questions which seek to elicit direct LRIC responses have been excluded from the main survey and replaced with a series of questions about the proportional allocation of resources between NHS and non-NHS activities.

1.3. Approach to allocating branch costs

1.3.1. Introduction

The survey questionnaire collected data on the following types of branch operating costs:

- Staff costs (respondents were asked to identify separately the costs associated with employing pharmacists, dispensers, counter assistants etc.);
- Staff training;
- Rent (actual or imputed);
- Business rates;
- Utilities;
- Repairs and maintenance;
- Advertising and marketing costs;
- Professional fees;
- Professional body subscriptions;
- Depreciation (split between property, fixtures and fittings, motor vehicles and other depreciation categories); and
- Other branch costs.

In the following sections we outline our approach to applying the FAC and LRIC methodologies in relation to each of the main cost items. In summary, when calculating NHS costs, we use 2 alternative methods for cost allocation as follows:

- Allocation method 1:
  - ➢ Staff costs are allocated using a FAC approach based on the splits of staff time (between NHS, non-NHS and Common) reported in the survey for each type of staff.
  - ➢ Property costs are allocated using a FAC approach based on the split of revenue between NHS and non-NHS activities (apart from supermarkets pharmacies which are allocated fully to NHS).
  - ➢ Depreciation costs are allocated using a LRIC approach based on the estimated value of NHS, non-NHS and Common branch assets
  - ➢ Other costs are allocated based on a LRIC or FAC approach depending on the cost type – and informed by how other branch costs are allocated, e.g. staff training costs are allocated in the same proportions as staff costs and utilities are allocated in the same proportions as property costs.

- Allocation method 2:
  - ➢ Staff costs are allocated using a LRIC approach based on categorisation of each staff type as NHS, non-NHS or Common.
  - ➢ Property, Depreciation and Other Costs are allocated in the same way as for Allocation method 1

We note that the key difference between these two allocation methods is the treatment of staff costs. This difference leads to a slight difference in the proportion of overall costs originally allocated to NHS and non-NHS. This in turn has an affect on the proportion of Common costs allocated back to NHS and non-NHS[2] in each of the different cost categories, not just staff costs.

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[2] An Equi-Proportional Mark-Up (EMPU) approach has been used to allocate Common Costs. Under this approach Common Costs are allocated to NHS and non-NHS in the same proportion as the costs already allocated to NHS and non-NHS. The allocation of Common Costs is discussed further in 1.5.

1.3.2.   Approach to branch staff cost allocation
Allocation Method 1 - Fully allocated cost (FAC)

In the survey, we asked respondents to report the proportion of time spent working on NHS, non-NHS and common activities by job type. When the common time is allocated using an equi-proportional mark-up (EPMU) approach back to NHS and non-NHS, the proportion of time spent on NHS activities for each job type and pharmacy type is as shown in Table 1. Table 1 also shows the overall proportion of staff costs allocated to each job type. In the cases marked with N/A, there are no employees in a particular job category for the given pharmacy type.

Table 1: Proportions of staff costs allocated to the NHS under Allocation Method 1 (i.e. using FAC methodology for staff costs)

	Proportion of overall staff costs	Indp	SM	NRD LM	RD LM	Spmkt	Overall
Pharmacists	36%	91%	95%	87%	96%	87%	**91%**
Branch managers	13%	89%	91%	88%	38%	85%	**79%**
Pre-registration students	1%	87%	94%	82%	24%	72%	**83%**
Technicians	35%	89%	95%	92%	96%	95%	**93%**
Counter assistants	6%	25%	53%	21%	9%	22%	**20%**
Delivery and distribution staff	6%	93%	98%	97%	98%	N/A	**97%**
Accountants	1%	79%	70%	N/A	20%	77%	**71%**
Cleaners	<1%	71%	66%	64%	N/A	77%	**71%**
Other	2%	63%	83%	92%	5%	N/A	**13%**
Total	100%	**74%**	**87%**	**77%**	**49%**	**70%**	**69%**

A number of the proportions shown in the table above stand out as different to the others and are discussed further below.

Branch managers in retail driven large multiples

As shown in Table 1 above, branch managers in retail driven large multiples have a far lower proportion of NHS costs than branch managers at the other pharmacy types. This fits our expectations because, in smaller pharmacies, this role is more likely to be filled by a qualified pharmacist who is able to dedicate a large portion of their time to NHS activities. The branch manager in retail driven large multiples is unlikely to be qualified to undertake as much NHS activity as one in other pharmacy types. Even when retail driven large multiples do have a qualified pharmacist as the branch manager, the competing demands of the retail side of the business will be much higher so their time is more likely to be common.

Pre-reg students in retail driven large multiples

The low proportion of pre-reg student time allocated to NHS in retail driven large multiples is not a significant issue as they were only present in one RDLM branch included in our sample and overall only account for staff costs of £205 per branch.

Counter assistants in small multiples

Counter assistants in small multiples appear to spend far longer on NHS activities than those in other pharmacy types. This difference is driven by the fact that one individual entity has reported very high proportions of NHS time for its counter assistants in comparison to all other entities in the survey. This could be due to the following reasons:

- Technicians have been categorised as counter assistants: It is difficult to tell whether this is the case because the qualifications of these staff have not been recorded in the survey;

- There is an error in the counter assistant NHS time reported in the submission by this particular entity; or

- Counter assistants have a fundamentally different role in this entity: This is unlikely as their average salary is similar to that of counter assistants in other entities.

Without more data, it is not possible to confirm which of these explanations is correct but the following information which we can extract from the survey provides further insight into this observation:

Table 2: Counter assistants in small multiples

	Individual entity	All other small multiples
Counter assistant FTEs per branch (# per branch p.a.)	3.5	1.6
Average counter assistant FTE staff cost (£ p.a.)	12,721	15,116
Proportion of counter assistant time allocated to NHS (%)	83%	46%
Technician FTEs per branch (# per branch p.a.)	2.9	2.4
Average technician FTE staff cost (£ p.a.)	12,340	17,178
Proportion of technician time allocated to NHS (%)	96%	95%

For the purposes of analysis, we use the data as provided by smaller multiples in their survey responses.

Other staff

The "Other" staff category covers all other staff types not falling into one of the previous categories. The percentage of staff costs allocated to NHS for Other staff is much lower for RDLM than for other pharmacy types. This percentage is based on the time allocations reported by survey respondents for these staff. We note that RDLM have a greater number of staff categorised as Other than other pharmacy types (even when volume effects have been taken into account). On average RDLM branches in our survey reported more than six Other staff full time equivalents per branch while other pharmacy types reported less than one. This suggests that, in RDLM, the type of staff being categorised as Other are more likely to be associated with the retail side of the business than in the other pharmacy types.

Allocation Method 2 - Long run incremental cost (LRIC)

NHS LRIC

As explained above, the identification of long run incremental staff costs associated with the provision of NHS services involves an assessment of which staff roles would be avoided in a hypothetical scenario where all NHS activities ceased and the store sold only retail products. In this hypothetical situation, the costs associated with employing staff such as pre-registration students, pharmacy technicians, dispensers and drivers (who are typically employed to collect and deliver prescriptions) would be avoided, suggesting that these costs should be apportioned to NHS LRIC. The retained store employees would likely include a store manager or supervisor (a role which may currently be fulfilled by a pharmacist), a number of full or part-time counter / retail assistants and, for the larger stores, a number of support staff such as administrative assistants, book-keepers and cleaners.

Non-NHS LRIC

To identify the non-NHS LRIC, the exercise is reversed and the staff costs associated with running an NHS pharmacy with a comparable level of NHS activity is estimated. In this hypothetical scenario, the staff whose roles are critical to the provision of NHS services (e.g. pharmacists, pre-registration students, pharmacy technicians) would continue to be employed by the business, potentially supported by a dedicated store manager in bigger stores, a number of counter assistants and staff such as administrative assistants, book keepers and cleaners. It is possible to envisage that in the scenario where all non-NHS activities ceased, it would no longer be necessary to employ as many counter assistants. This is particularly likely to be true for pharmacy branches which are located in the larger 'health and beauty' stores where the responsibilities of some counter assistants relate exclusively to the retail activities of the store.

Common costs

Common staff costs are calculated as the difference between total branch staff costs and the sum of NHS staff LRIC and non-NHS staff LRIC. At a more intuitive level, the members of staff whose salaries are allocated to the common costs are those who would continue to be employed by the business both in a scenario where all non-NHS activities are ceased and in a scenario where all NHS activities are ceased.

For staff costs we implement the above by allocating all of the costs for a given staff type to one of NHS, non-NHS or common. We use the following allocations:

Table 3: Proportions of staff costs allocated to the NHS under Allocation Method 2 (i.e. using LRIC methodology for staff costs)

	Category	**Overall allocated to NHS**
Pharmacists	NHS	100%
Branch managers	NHS for all except RD LMs Common for RD LMs	90%
Pre-registration students	NHS	100%
Technicians	NHS	100%
Counter assistants	Retail	0%
Delivery and distribution staff	NHS	100%
Accountants	Common	74%
Cleaners	Common	82%
Other	Common for all except RD LMs Retail for RD LMs	10%
Total		**70%**

Comparison of FAC and LRIC

Figure 2 shows average NHS staff costs calculated using the FAC and LRIC methodologies as described above. Typically costs are expected to be higher when allocated using the LRIC methodology in comparison to those allocated using a FAC approach. This is because the relatively high cost staff types, such as pharmacists and technicians, are fully allocated to the NHS while the relatively low cost staff types, such as counter assistants, are fully allocated to the non-NHS category. The pharmacy types where the FAC allocation exceeds the LRIC one are highlighted below. Broadly the results of the FAC and LRIC allocations are very similar, with a difference of £2,043 per branch between the two methodologies on average.

Figure 2: Comparison of FAC and LRIC approaches to allocating staff and owner costs to NHS
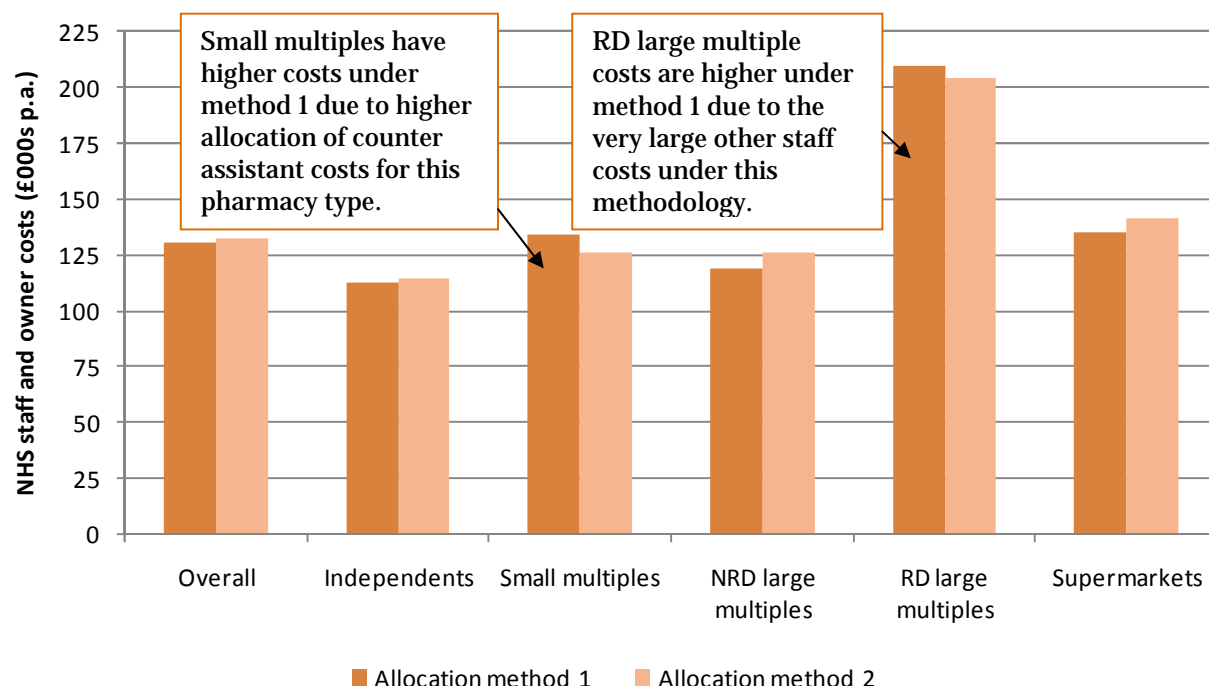
1.3.3. Approach to branch property cost allocation

The survey asked all pharmacies to report actual rent paid on the property if the premises were occupied on a leasehold basis or to provide an estimate of notional rent if the premises were occupied on a freehold basis. The property costs also include the cost of utilities and business rates as reported in the survey.

The LRIC approach focuses on costs in the long run, i.e. over a sufficiently long period of time for the business to be able optimise all of its assets, including property. So under the LRIC approach, if it were theoretically possible for a given pharmacy to relocate to smaller premises in a similar location in the absence of non-NHS activities, then the associated hypothetical reduction in rental costs would be classified as the LRIC rental cost (or avoidable rental cost) of the non-NHS business. Similarly, in a hypothetical situation in which the NHS pharmacy service was discontinued, any theoretical reduction in rent would represent the LRIC property cost of the NHS pharmacy service. Any remaining rental costs should be treated as common.

Ideally, the allocation of rental costs between NHS LRIC, non-NHS LRIC and common costs for pharmacies would be informed by examining the rental values of properties in the vicinity of each of the pharmacy branches of different sizes and being used for different purposes. However, given the sample size used for the survey we suggest that it is more practical to use a different method of apportioning rental costs. In our cost allocations we use the ratios of NHS and retail revenue for each branch (as provided in the survey) to allocate property costs between NHS and non-NHS cost categories. In addition we have also considered the fact that for many independent and smaller multiple branches, the size of their property is influenced more by the standard size of properties in a given geographical area and the property that is available to rent at any given point in time – rather than a detailed assessment of the exact floor space required to offer NHS services.

An exception to this is the supermarket branches in the sample. For supermarket branch rental costs, we use the estimates of notional rent attributable to the pharmacy unit produced by the supermarket group for business planning purposes. Since this is the rent estimated specifically for the pharmacy area (i.e. the dispensary, counter area and any consultation room), we allocate 100% of this rent to NHS. In addition, we add on a proportion of rent equivalent to 6m² to cover the area directly in front of the pharmacy counter where pharmacy customers stand when waiting for prescriptions etc.

In summary, we use a single FAC approach to property cost allocation which is used for both Allocation Method 1 and Allocation Method 2 calculations. Using the allocation method described above, allocated NHS costs as a proportion of total costs are shown in the graph below.

Figure 3: Property cost allocations
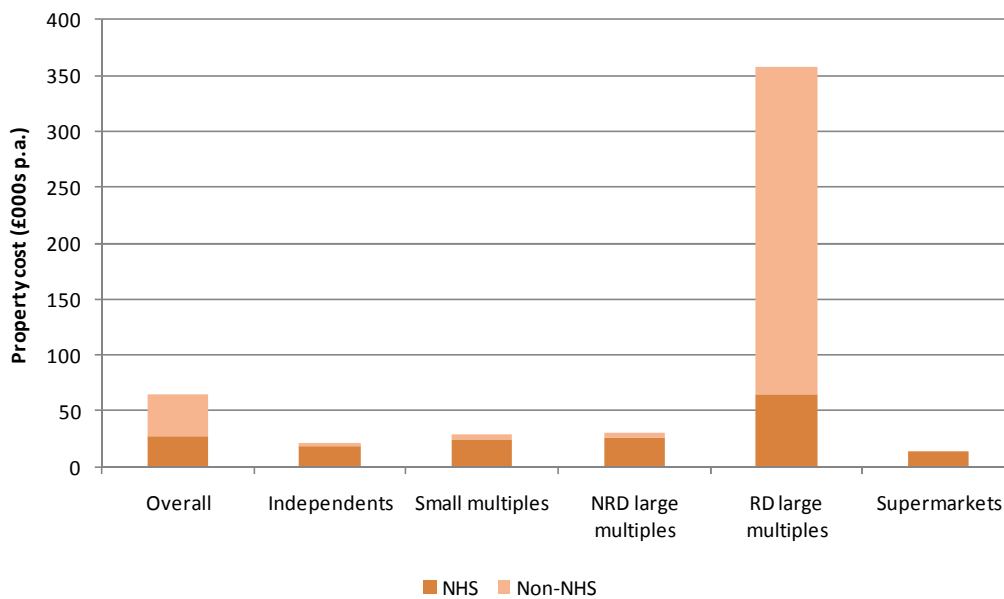
1.3.4. *Approach to branch depreciation cost allocation*

Accounting methodology

In the survey, pharmacies reported total accounting depreciation figures. This total was not, however, split between into NHS, non-NHS and common segments. One possible allocation approach is to assume that all of this depreciation is a common cost then allocate this to NHS and non-NHS cost categories using an EPMU approach.

The advantage of this approach is that it uses depreciation values provided by pharmacies without the need to make assumptions about the replacement cost of assets and the life of assets.

The important disadvantage of this approach is that it assumes that the cost of depreciation to a pharmacy is allocated between the NHS and non-NHS parts of the business in the same proportion as other costs. In practice, this results in the allocation of depreciation largely reflecting the allocation of staff costs, which is the largest element of pharmacy cost.

Economic methodology

An alternative approach to allocating depreciation is to develop our own measure of economic depreciation based on the value of assets and assumptions about their useful economic life. Using assumptions about the life of assets and how they depreciate over time (we assume straight line depreciation) we can estimate our own measure of economic depreciation.

In the survey pharmacies were asked to estimate the cost of replacing each of the following branch assets listed with a brand new equivalent:

- Dispensary;
- Consultation room;
- Counter area;
- Retail shelving;
- NHS related IT equipment;
- Non-NHS related IT equipment;
- Other IT equipment;
- Motor vehicles; and

- All other assets.

These average refit estimates, by pharmacy type, are shown in Table 4 below.

Table 4: Average refit estimates

Average refit cost per branch	Indeps	Small multiples	Large multiples	Overall
Implied shop refit estimate (including dispensary, counter area and retail shelving)	£59,851	£62,953	£57,542	£58,968
Consultation room refit estimates	£6,237	£6,107	£7,656	£6,967
IT refit estimates	£11,792	£11,673	£22,678	£17,514
Other refit estimates (including motor vehicles and capped other assets)	£13,375	£17,502	£64,585	£40,937
Total refit estimates	£90,984	£98,235	£152,461	£124,386

Pharmacies were also asked for an estimate of their overall planned refit cycle for all types of assets. In reality it is unlikely all assets will be replaced with the same frequency, or that survey respondents were able to give an accurate estimate of the average weighted asset life for the pharmacies assets. For this reason, we decided to make assumptions for the life cycles for different asset types. These life cycle assumptions can then be used to calculate an estimate of annual depreciation based on the asset refit estimates provided.

This approach means that depreciation can be estimated for individual assets based on their own useful economic life. It is then possible to allocate depreciation between NHS and non-NHS activities by making assumptions about whether an asset relates to one part of the business or another. In principle, this means that allocation of depreciation based on economic depreciation estimates should closely reflect the asset base in each pharmacy and in each element of the business (ie. NHS or non-NHS).

As economic depreciation is closely related to the value of the underlying assets, an allocation formula for depreciation costs can be obtained by considering which assets would be avoided in a hypothetical scenario where either NHS or retail pharmacy activities were to cease. Given that the assets used by community pharmacies are relatively standard, in our view a theoretically robust apportionment of the asset base can be calculated by treating assets of the same type (e.g. dispensary) in the same way for all pharmacies (all dispensary-related assets can be avoided if no NHS services are provided). The table below summarises the categorisation of various asset groups.

Table 5: Asset categorisations used for economic depreciation calculations (and also tangible asset analysis)

Asset type	Avoided if no NHS activities?	Avoided if no retail activities?	LRIC treatment
Dispensary	✓	✗	NHS LRIC
Consultation room	✓	✗	NHS LRIC
Counter area	✗	✗	Common
Retail shelving	✗	✓	Non-NHS LRIC
IT equipment – NHS-related	✓	✗	NHS LRIC
IT equipment – non-NHS-related	✗	✓	Non-NHS LRIC
IT equipment – other	✗	✗	Common

Motor vehicles	✓	✗	NHS LRIC
Other assets	✗	✗	Common

Asset life assumptions have been made such that the economic depreciation across all branches reconciles with the uplifted accounting depreciation (inflated as appropriate to ensure consistency). The resulting asset lives calculated are shown in the table below.   For the majority of assets it is possible to define a reasonable asset life. However some, suchas the "other asset" category, are not as easy as this could contain a range of different types of assets, for example escalators, floors, walls and external doors[3]. The allocation of depreciation costs is sensitive to these asset life assumptions.

Table 6: Asset categories and lives

	Category	Refit cycle
Dispensary	NHS	8 years
Consultation room	NHS	10 years
Counter area	Common	10 years
Retail shelving	Non-NHS	10 years
NHS related IT equipment	NHS	3 years
Non-NHS related IT equipment	Non-NHS	3 years
Other IT equipment	Common	3 years
Motor vehicles	NHS	5 years
All other assets	Common	8 years

Using these allocation criteria we are able to derive what proportion of the asset value should be directly attributed to NHS and non-NHS activities and which are used to support all business activities individually for each pharmacy. The depreciation cost for each contractor is then allocated in proportion to the values of NHS, non-NHS and common assets.

Preferred methodology (Economic methodology)

In summary therefore, our preferred methodology, and the methodology that has been employed in the calculations, is to use the accounting depreciation to give a measure of the overall quantum of depreciation, but allocating this between NHS and non-NHS activities on the basis of calculated economic depreciation. The steps are set out below:

1. We categorise each asset as NHS/Non-NHS/Common and make an assumption about a reasonable average asset life for each (as shown in Table 5).
2. For the Other Asset Category, we choose the asset life that ensures that the sum of the total economic depreciation for each pharmacy is equal to the sum of the total accounting depreciation.
3. We then calculate economic deprecation using these PwC asset life assumptions, the All Other Assets category asset life (calculated in 2.) and the refit estimates from the survey.
4. This gives branch depreciation for each of NHS, Non-NHS and Common categories. We then apply an EPMU approach at the branch depreciation level to allocate the Common category which gives an allocated NHS and Non-NHS depreciation.

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[3] We have applied a cap of £150K per branch on the refit estimates for "Other asset" estimates as a small number of branches provided very large refit estimates that were biasing the average results.

We note that the asset life assumptions required to ensure that total economic depreciation reconciles with total accounting depreciation are very close to initial hypotheses of the project team regarding how long assets would typically be expected to last.

In summary, we use a single approach to depreciation cost allocation. The Preferred methodology to calculating NHS depreciation is arguably a LRIC-based approach and is used for both Allocation Method 1 and Allocation Method 2.

We note that an equivalent methodology is also used for valuing tangible assets and allocating asset value between NHS and non-NHS. Further details of the comparison between depreciation and tangible asset calculations are provided in section 1.5.1 of Appendix M. Depreciation reflects the return *of* the investment made in assets. Fair return on tangible assets reflects the return *on* this investment.

Additional detail on the calculations

Inflating the depreciation figures

We have used accounting depreciation reported in the survey as an estimate of the overall quantum of depreciation. It is important to note that the accounting depreciation reported in the survey is based on historical asset prices. Therefore, to estimate what the depreciation would be if assets were purchased today, we apply an uplift factor. This uplift factor is calculated as the CPIY inflation for half of the weighted average asset life of all assets within a branch. We assume that, on average, assets will be midway through their current lives.

The weighted average asset life is calculated by using the asset lives assumed in Table 6 above, weighted by the refit estimates of each of the assets provided by pharmacies in the survey. Across all branches and assets, the average life is assumed to be 7.7 years. This implies an inflation uplift of 12.4% to give an uplifted accounting depreciation equivalent to the depreciation if similar purchases were made today. This uplift is applied to the accounting depreciation estimates before step 1 of the "Preferred Methodology" outlined above and ensures that the depreciation calculations are comparable with the refit estimates provided by survey respondents.

Capping the other asset refit estimate

Some branches have provided "Other asset" refit estimates that are much higher than those provided by the majority of branches. This is particularly the case for Retail Driven Large Multiple branches. We suggest that this may be because some Retail Driven Large Multiples approached this question differently to other entities and have included refit of items such as escalators, floors, walls and external doors in the "Other asset" estimate even though in reality one would expect these to be covered by rental payments. To reduce the impact on the results, we have applied a cap of £150K per branch on the value of "Other asset" estimate. The cap is applied to one independent, five non-retail driven large multiple and thirty-five retail driven large multiple branches. This cap on "Other assets" has reduces the sensitivity of the results to the asset life assumed for "Other assets".

Comparison of accounting and preferred methodologies

Figure 4 compares the total average depreciation costs based on the raw accounting depreciation data (uplifted by 12.4% to account for inflation) with the total average depreciation costs implied by the preferred economic methodology described above. As would be expected, the total depreciation is the same under both the Accounting and the 'Preferred' methodology, as is shown by the "Overall" columns to the right of Figure 4.

Figure 4: Total depreciation under different methodologies
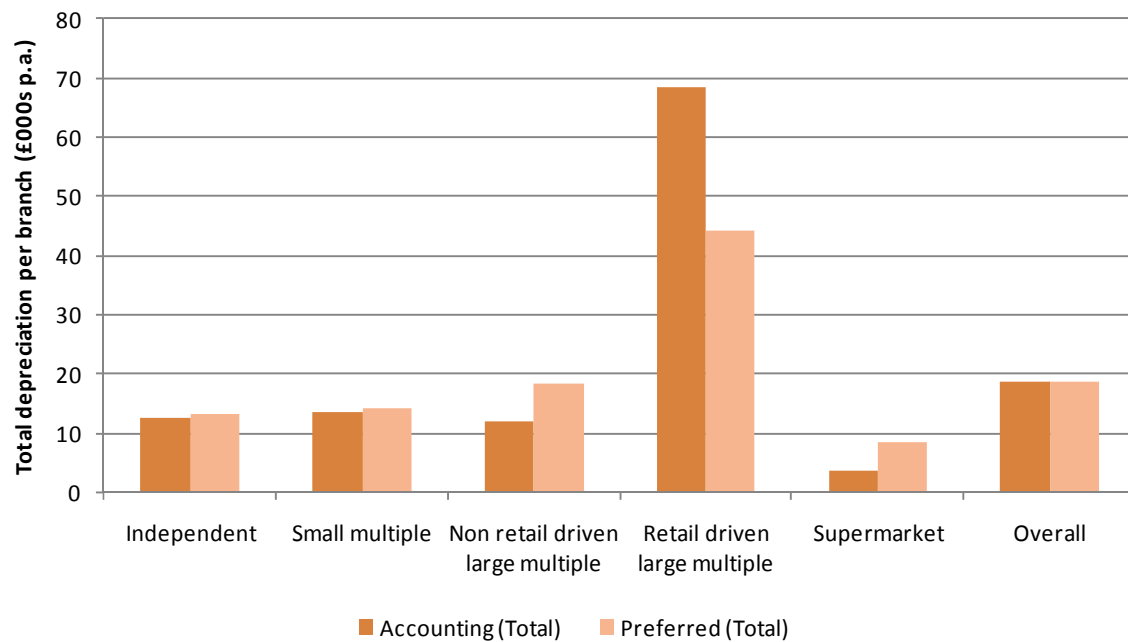
Figure 5 shows the NHS depreciation calculated under the accounting and preferred economic methodologies.

Figure 5: NHS depreciation estimated under accounting and preferred allocation methodologies
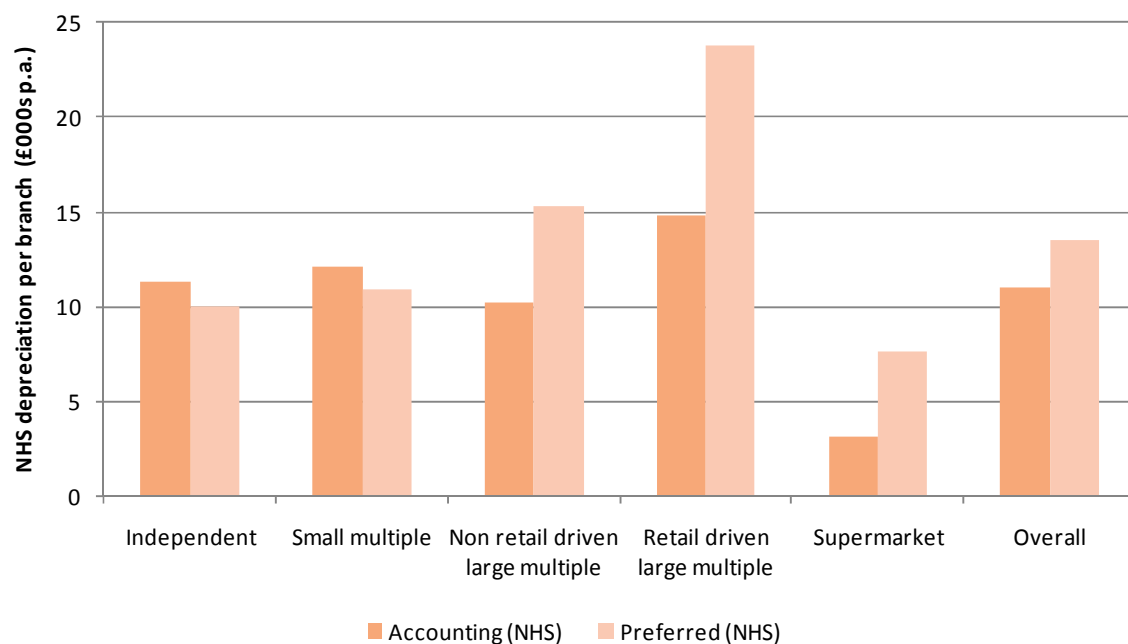
Under the accounting methodology, all depreciation is categorised as common and then allocated between NHS and non-NHS based on an EPMU approach. Under the preferred methodolody, depreciation is allocated between NHS and non-NHS based on economic estimates of depreciation for NHS and non-NHS assets.

Using the asset lives proposed the proportion of depreciation costs allocated to the NHS increases from 59% under the accounting methodology to 73% under the preferred methodology. This is due to the NHS assets, on average, having shorter asset lives and therefore contributing more to depreciation than non-NHS assets. Overall this is equivalent to an increase of £2,438 per branch compared with the accounting depreciation

methodology where all depreciation is treated as common. In our view, the preferred approach reflects a more accurate picture of where the depreciation should be allocated and uses more information provided in the survey.

1.3.5. *Allocation of other branch costs*

The survey asked respondents to provide details of any Other costs not already covered in responses to the survey questions. Where possible, these costs have been categorised and a breakdown is provided in the table below. On average, branches reported Other costs of £20,909.

Table 7: Other branch costs

	Indp	SM	NRD LM	RD LM	Spmkt	Total Other Costs (£)	*Total Other Costs (%)*
Repairs	£3,465	£4,526	£5,926	£18,211	£2,536	£6,200	*30%*
Professional fees	£5,257	£1,158	£349	£267	£1,066	£2,137	*10%*
Professional subscriptions	£1,858	£939	£1,287	£1,639	£551	£1,433	*7%*
Delivery	£736	£2,787	£404	£0	£0	£772	*4%*
Marketing and advertising	£1,050	£448	£244	£445	£1,044	£610	*3%*
Interest payments	£1,055	£813	£275	£0	£0	£563	*3%*
Staff training	£773	£545	£230	£369	£493	£486	*2%*
Insurance	£691	£708	£242	£0	£0	£414	*2%*
Postage, printing and stationary	£503	£479	£409	£0	£0	£379	*2%*
Cleaning	£117	£244	£537	£0	£193	£273	*1%*
Information technology	£445	£496	£0	£0	£0	£217	*1%*
Mixed financials	£164	£675	£0	£0	£0	£148	*1%*
Bank charges	£245	£200	£0	£0	£0	£110	*1%*
Other	£1,408	£480	£10,873	£22,616	£1,381	£7,167	*34%*
Total other branch costs	**£17,767**	**£14,498**	**£20,776**	**£43,547**	**£7,265**	**£20,909**	***100%***

Source: PwC survey of pharmacists

The table below summarises our approaches to allocating other branch costs between the NHS and retail cost categories. The approach taken for each cost type is the same for both Allocation methods 1 and 2 but the precise costs may differ slightly due to the use of an equi-proportional mark up (EPMU) approach when re-allocating common costs (as this depends on the proportions of staff costs allocated to each category).

Table 8: Allocation of other branch costs

Cost	Approach
Business rates	Business rates are closely related to the value of the property occupied by the pharmacy business. Accordingly, the treatment of business rates should be consistent with the treatment of pharmacies' property costs (i.e. it is split in the same proportion as NHS and retail revenues, with the exception of supermarkets which are 100% NHS).
Utilities	Utility costs incurred by any business are likely to be related to the size of the occupied premises. Accordingly, the treatment of utility costs should be consistent with the treatment of pharmacies' property costs (i.e. it is split in the same proportion as NHS and retail revenues, with the exception of supermarkets which are 100% NHS).
Professional body	We expect that professional body subscription costs primarily relate to the fees paid by pharmacists and pharmacy technicians to the Royal Pharmaceutical Society of Great Britain. As registration with RPSGB

subscriptions	is required for community pharmacies to offer NHS-related services and the associated costs would not be incurred if NHS activities ceased, these costs should be allocated entirely to the NHS. These professional body subscriptions will not include cost of contributions to LPCs as these are deducted from income at source.
Interest payments	Interest payments should be covered through the fair return calculations so they have been excluded from our analysis.
Other branch costs	This cost category is not significant for most contractors. In the absence of further information, we have allocated these costs in the same proportion as NHS and non-NHS revenues.

Figure 6 below shows the magnitude of the total other costs reported by pharmacy type and the proportions of Other costs allocated to the NHS and non-NHS. Overall, Other costs allocated to NHS are £14,607 per branch.

Figure 6: Allocation of Other Costs between NHS and NHS (under Allocation Method 1)

Allocated NHS costs (method 1)　　Allocated non-NHS costs (method 1)
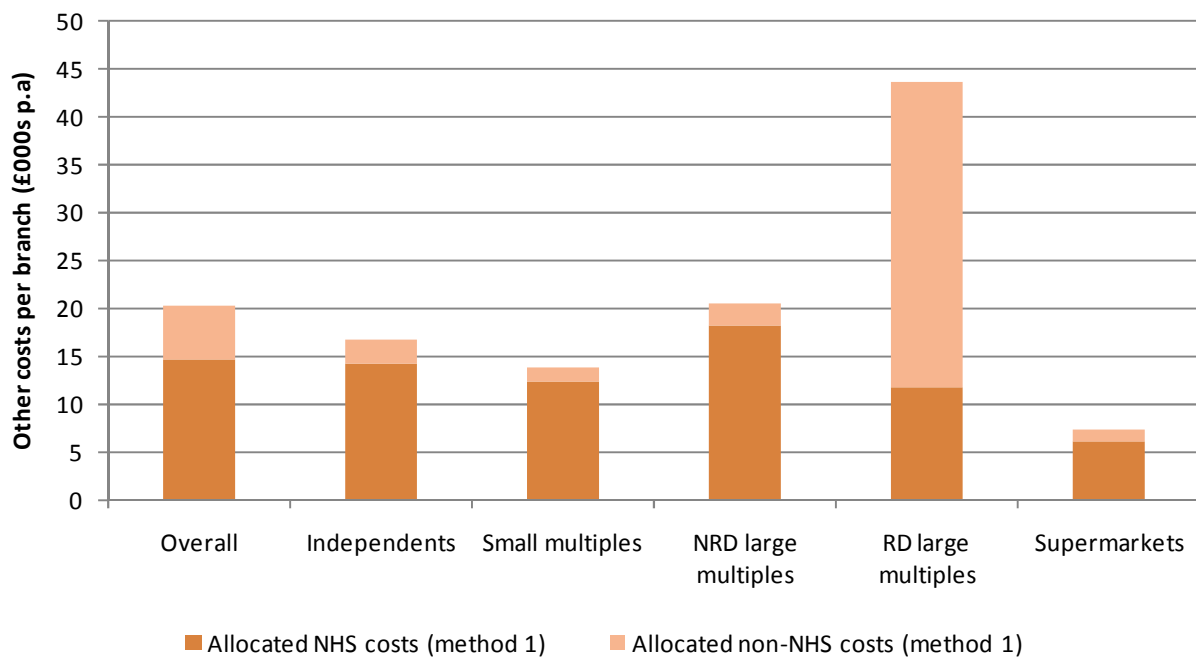
Source: PwC survey of pharmacists and assumptions discussed with DH/PSNC

1.4.　*Approach to allocating head office costs*

1.4.1.　*Introduction*

The purpose of this section is to describe our approach to allocating head office costs to individual branches and between NHS, non-NHS and common cost categories. Head office costs need to be allocated accurately because some (probably smaller) entities will deal with head office functions at a branch level, while other entities will deal with them together. This means that, unless head office costs are allocated accurately between branches, we will not be comparing like with like between different types of pharmacy.

There are three issues to be considered in relation to the allocation of head office costs:

- The overall quantum of head office costs;
- The allocation of head office costs to individual branches; and
- Separating the head office costs allocated to branches between NHS, non-NHS and common cost categories.

1.4.2.   The overall quantum of head office costs

In the survey, we asked respondents to report head office costs in two ways – an overall estimate of head office costs (the aggregate approach) and costs for specific head office functions (the divisional approach). While the costs reported in the divisional section of the survey do not always directly agree with those reported in the total costs section of the survey, overall the difference between these two totals tended to be small.

Figure 7 below shows the two head office totals for each of the individual retail driven and non-retail drive large multiples (anonymised) and also as an average percentage across these large multiple entities. The biggest differences occur in the small entities, but these have relative small effect on overall costs. Overall, for these six entities, the divisional totals are less than 5% larger than the aggregate totals provided.

Figure 7 Aggregate vs. divisional approach to allocation (for the RDLM and NRDLM entities)
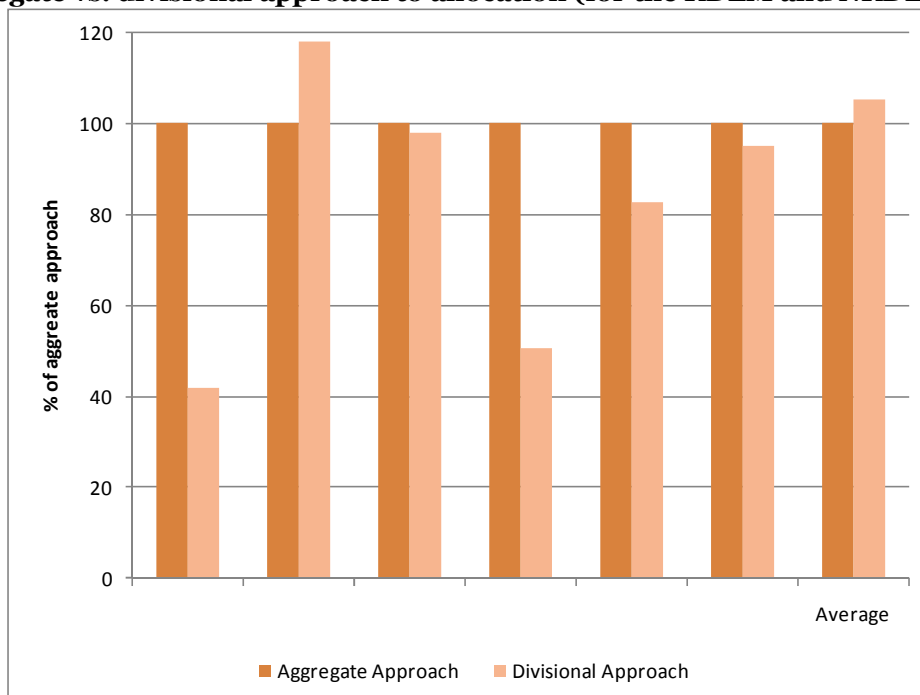
Source: PwC Analysis

In the analysis that follows, we have assumed that the data reported by entities on aggregate head office costs is correct. Any discrepancies between that and the summation of individual divisions are assumed to be either because the breakdown of divisions in the survey did not cover all head office functions or because not all entities were able to report costs for all the divisions requested.

1.4.3.   Allocation of head office costs to branches

In discussion with the Project Team, it was determined that the most important factor when considering head office allocations to branches was that, if the allocations were weighted up to the population, the total must be the same as the sum of the head office costs reported in the survey. If this is the case the choice of approach will not impact the overall costs derived from the FAC and LRIC methodologies but may be important for the econometric analysis where knowing how head office costs are allocated to an individual branch becomes important.

The requirement for the head office costs to sum to the total given in the survey is not necessarily met under every allocation methodology as within pharmacy type our weights are not determined by entity but using a number of different criteria relating to the size and location of the pharmacy. There is the further issue when considering small multiples as we have not sampled branches from every entity and, as a result, we do not know what the total head office costs should be across all pharmacies in the smaller multiples sampling frame.

In discussion with the project team it was suggested that the best approach to allocating head office costs would be a linear combination of a revenue approach (i.e. multiplying the head office costs by each branches share of overall revenue) and a uniform approach (i.e. splitting head office costs evenly between branches).

Figure 8: Allocation to branches
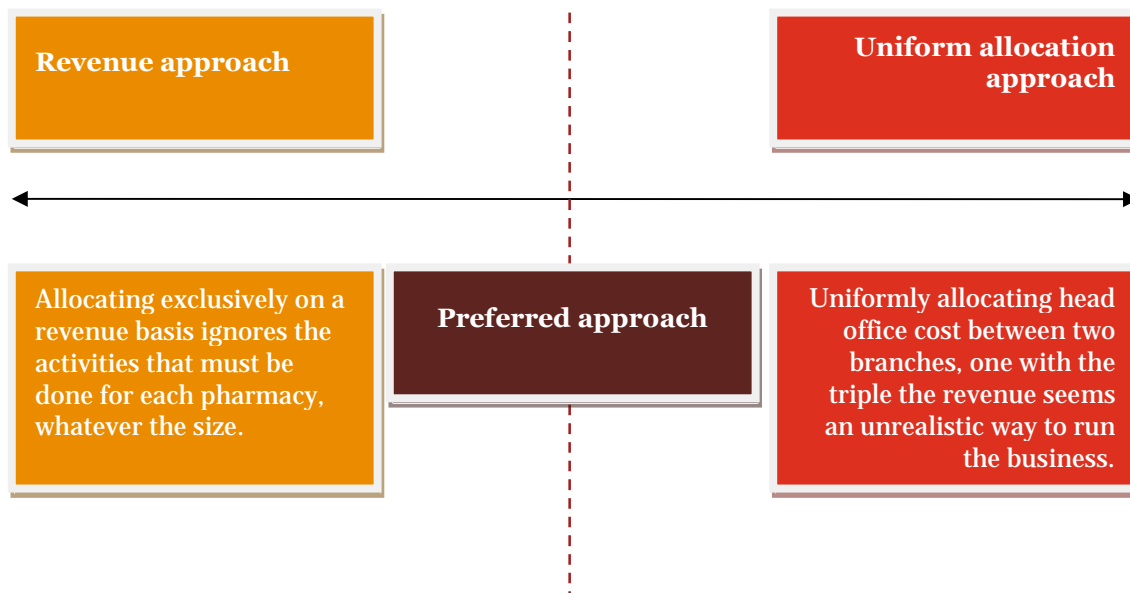
We have required the proportions allocated to branches under each of the two approaches to be constant within entity but not necessary across the entire sample (as entities may differ in the functions they perform at a head office level).

In the survey, we asked respondents to estimate both overall head office costs and the allocation of those costs between different head office divisions. We can use these divisions as the basis for allocating costs to branches by making assumptions about which divisions are providing services that are likely to be spread uniformly across branches and which will vary depending on the size of a branch (which we have assumed is represented by revenue). The table below shows how we assume head office costs would be allocated across branches for individual categories of divisional cost.

Table 9: Allocation approach by division

Division	Allocation approach
Buying wholesale	Revenue
Professional services	Uniform
Finance	Uniform
Payroll processing	Revenue
Advertising and marketing	Uniform
IT	Uniform
Human resources	Revenue
Other	Uniform (arbitrarily selected)

Across the entities in our sample that were not collected by PwC's International Survey Unit (data from large multiples and the largest small multiples was collected by the PwC project team in London) the allocations shown in the table above imply that 25% of head office costs should be allocated using the revenue approach and 75% should be allocated using the uniform approach.

However, when we sum this across the sample, the weighted sum of the head office costs allocated to branches in the sample still does not total to 100% of the head office costs for large multiples. Therefore we calculate an additional factor to uplift the calculated proportions to ensure that the head office costs reported in our sample of large multiples gross-up to head office costs for the entire sampling frame of large multiples. This uplift is 5.3% and is applied only to large multiples4.

Figure 9 below shows the results of using different head office allocation methodologies. Our preferred methodology allocates based on the distribution of divisional costs reported above and is a combination of the revenue and uniform allocation approaches.

For small multiples and non-retail driven large multiples, at the branch level there can be a big discrepancy between the revenue and uniform approaches to allocation. One would expect this discrepancy where the distribution of branches by size is broad. However, as the divisional analysis suggests that the majority of costs should be allocated using the uniform approach, the preferred approach is generally far closer to the uniform approach than the revenue approach.

We note that the Independent head office costs captured by the survey are very low. These figures include certain centralised costs, but do not include any staff costs, as these have been categorised as owner costs for Independents (and combined with branch staff costs for the purpose of analysis). On average, head offices costs for independents are less than £2,600 per branch. It is possible that there may have been some under-reporting of centralised costs by Independent pharmacies in the survey.

Figure 9: Total head office cost to branch allocation methodologies
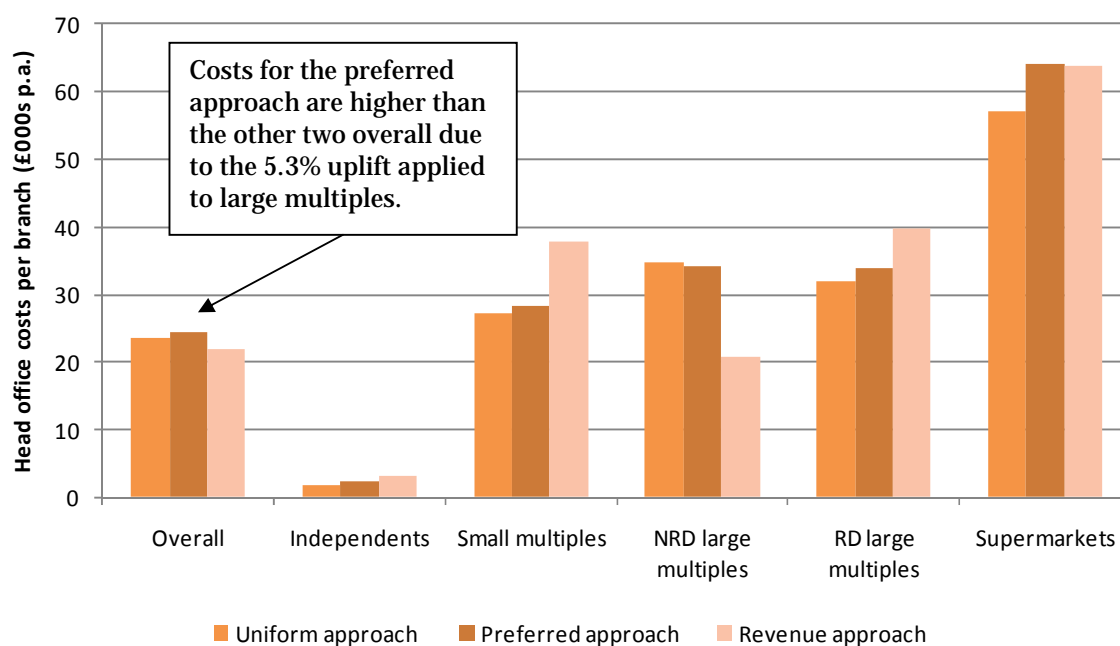
Source: PwC Analysis

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4 It has not been possible to calculate an equivalent adjustment for Smaller Multiples as the sampling methodology was not designed to collect data from all Smaller Multiple entities in the population. We note that this 5.3% adjustment applied to large multiple head office costs is equivalent to the 13.7% adjustment to large multiple head office assets (as described in Appendix M). The adjustments differ because one is based on asset values and the other on costs. Also the methods used to allocate head office assets and costs to branch NHS are not exactly the same.

1.4.4.   *Head Office distribution costs*

For the purposes of this report, we have excluded head office distribution costs from our base case calculations on the assumption that these are the costs of delivering drug supplies to the pharmacy branches (and therefore may overlap with wholesaler services for smaller pharmacies).   Table 10 shows the size of these excluded head office distribution costs per branch by pharmacy type.

Table 10: Excluded head office distribution costs (£ per branch)

	Overall	Independents	Small multiples (less than 20 branches)	Small multiples (more than 20 branches)	Non-retail driven large multiples	Retail driven large multiples	Supermarkets
Total HO distribution costs	4,626	0	571	16,729	3,298	17,986	0
HO Distribution costs that would be allocated to NHS[5]	2,371	0	450	13,519	3,033	2,074	0

1.4.5.   *Allocation between NHS, non-NHS and common*

Once head office costs have been allocated to branches, the costs need to be allocated between NHS, non-NHS and common categories. In discussion with the Project Team, it was agreed that this would be done via a divisional approach where each head office cost division has its costs allocated to NHS, non-NHS and common categories based on the split reported in the survey. In cases where divisional information has not been provided we have used the EPMU method in order to ensure that some head office allocation does still take place (i.e. treated head office costs as common and then allocated to NHS/non-NHS in proportion to NHS and non-NHS branch costs).

When this approach is applied a significant proportion of the head office costs that were previously allocated to the NHS under the EPMU method are now all allocated to the non-NHS category, particularly in the cases of non-retail and retail driven large multiples.

The chart below compares the impact of using the divisional approach described to allocate head office costs versus using an EMPU approach for allocating head costs. As shown, the approach used makes quite a large difference to results. We feel that the figures based on the divisional approach to allocation better represents reality as these figures are based more on the data provided in the survey and less on assumptions made by the project team on to how to allocate common head office costs.

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[5] These HO distribution costs are not included in the analysis calculations, however the table shows the value of the HO distribution costs that would be allocated to NHS had they not been excluded.

Figure 10 Head office to NHS/non-NHS/common methodologies
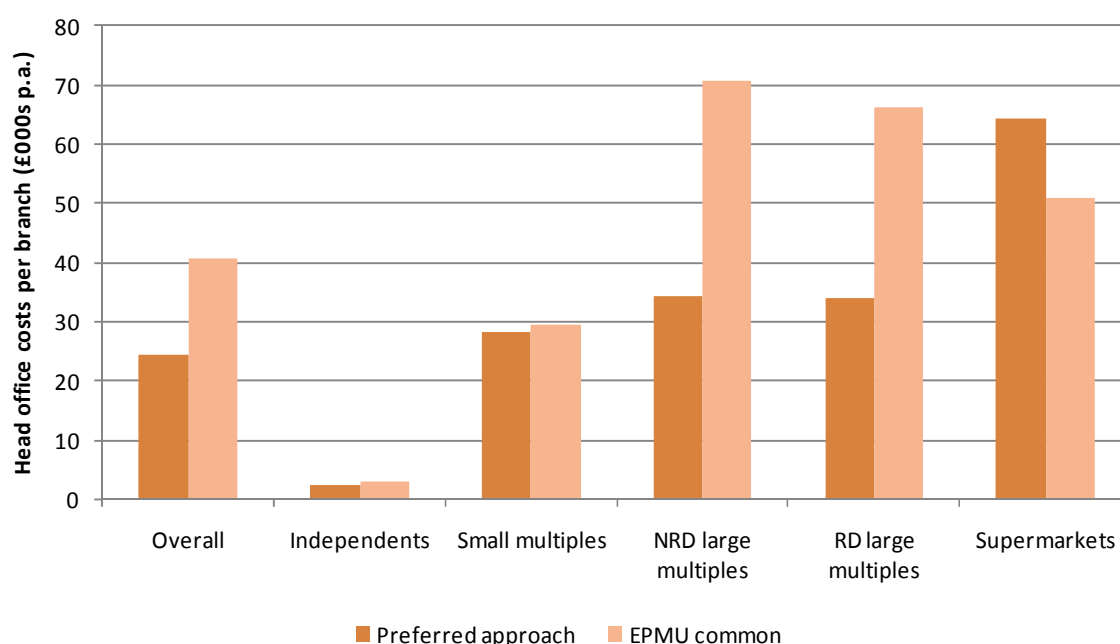
Source: PwC Analysis

1.4.6. Conclusion

Our recommendation is to use divisional head office cost data both in allocating from an entity to branches and between NHS, non-NHS and common cost categories. Where this divisional data has not been provided we recommend allocating the head office costs on a uniform basis between branches and then using an EPMU method to split this between NHS and non-NHS categories.

1.5. Approach to allocating common costs

The discussion so far has focussed on apportioning the overall costs incurred by community pharmacies to three categories: NHS, retail and common costs. The common costs, although not directly incrementally associated with either the NHS or retail businesses, are nevertheless incurred by the pharmacy providers and must be recovered by them in charges for NHS services and retail prices. If pharmacy providers are consistently unable to recover common costs, then the long term financial viability of the pharmacy sector is threatened.

While it is clear that the common costs must be recovered in some way, economic theory offers little guidance as to how they should be apportioned between NHS and retail activities. Several approaches could potentially be considered:

Table 11: Common cost allocation methods

Approach	Comments
Only NHS costs are remunerated through NHS charges	Under this methodology, remuneration would only cover NHS incremental costs, and common costs would need to be recovered entirely through retail activities. This may appear counterintuitive given that for a majority of pharmacies, NHS dispensing constitutes the main source of revenue.
Equi-proportional markup (EPMU)	Under this approach, the common costs of the business are allocated to NHS and non-NHS segments in proportion to the relative costs allocated directly to these activities. This methodology more closely reflects the relative contribution and importance of the two segments and has in the past been applied by regulatory authorities in other sectors. However, this approach becomes less reliable as common costs become larger in relation to the NHS and non-NHS costs and particular cases where the EPMU proportions significantly differ from the revenue split may have to be investigated further.

Approach	Comments
Standalone cost approach	Under this methodology all common costs would need to be recovered via NHS activities. This cannot be ruled out as an approach in economic theory, but it might appear unreasonable for no portion of common costs to be recovered from non-NHS activities. However, if the survey evidence were to show that for many contractors retail activities are incrementally unprofitable then any methodology which involves requiring a portion of common costs to be recovered through revenues for the non-NHS segment of the business would risk creating a situation where a proportion of common costs is not recovered, threatening the long term viability and diversity of the pharmacy sector.
Ramsey pricing	Ramsey pricing apportions common costs in such a way as to minimise the impact of recovering common costs on the volume of products and services demanded. As such, it is the preferred economic approach in theory. Under this approach, a lower proportion of common cost burden is recovered from products and services for which the demand is relatively price sensitive. In the context of pharmacies, Ramsey pricing is likely to imply a relatively low proportion of common costs to be recovered from non-NHS activities, since many customers would choose to source items such as non-prescription medication from alternative sources (e.g. a convenience store or a supermarket) if prices for these products in community pharmacies were to increase substantially. Ramsey pricing is a complex economic technique and so despite being appealing from an efficiency stand point it is likely to be difficult to implement in practice.

The appropriateness of the various methodologies to allocate common costs is to a large extent a matter of judgement. For the purpose of presenting results, we have used an Equi-Proportional Mark-Up (EPMU) approach to allocation common costs throughout.

1.6.   Summary

The table below shows the final amounts allocated to the NHS for each of the cost types described earlier in this appendix.

Figure 11 Final operating cost amounts allocated to NHS (under Allocation Method 1)

£ per branch p.a.	Indep	SM	NRD LM	RD LM	Smkt	Overall
Staff costs (including portion of owner costs) [6]	112,969	133,818	118,598	209,825	134,998	130,640
Branch property costs	18,751	25,172	25,674	65,329	14,080	27,416
Branch depreciation costs	10,295	11,418	14,910	20,913	7,436	13,198
Other branch costs	14,141	12,429	18,190	11,685	6,145	14,607
Portion of head office costs	2,480	28,199	34,140	34,060	64,200	24,314
Total costs (excluding fair return)	**158,636**	**211,036**	**211,512**	**341,813**	**226,859**	**210,175**

Source: PwC Analysis

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[6] For Independents and Smaller Multiples (SM), total staff costs include a portion of owner costs as well as branch staff costs. For Independents, 44% of the staff costs are based on a portion of the reported owner costs being allocated to the individual branch. For SM, 5.5% of the total staff costs are a portion of reported owner costs.

Annex A – Econometrics and cost allocation

In the course of the project we considered whether econometrics could be used to inform the allocation of costs between NHS and non-NHS instead of the FAC and LRIC allocation approach described above. This would have had the advantage that the allocation would be data-driven rather than assumption driven.

Ideally we would like to estimate an equation of the form:

$$\text{Total pharmacy cost} = \alpha \cdot \text{NHS activity variables} + \beta \cdot \text{Non-NHS activity variables} + \gamma + \varepsilon$$

We could then used this to allocate pharmacy costs to the NHS using the relevant coefficients in the model:

$$\text{NHS pharmacy cost} = \alpha \cdot \text{NHS activity variables} + \gamma \cdot \text{NHS fixed cost factor}$$

A critical issuein this approach is the treatment of the constant in the first equation (and any coefficients on dummy variables) as these represent the fixed costs of running a pharmacy (and the variable costs for which the activity variables are unchanged in our sample). If this constant was included in the allocation econometrics then an appropriate factor (the NHS fixed cost factor in the second equation) needs to be chosen to allocate it to NHS costs.

One method would be to allocate the fixed cost on an equi-proportional mark-up (EPMU) basis (assuming that the fixed costs are allocated in the same way as the costs already allocated through the activity variables). However there is no reason to suggest that this assumption would be correct as the fixed costs of running a pharmacy are likely to be distributed between NHS and non-NHS in a different way to the variable costs.

An alternative approach would be to constrain the constant in the first equation to be zero. This forces the regression model to allocate the fixed cost over the variable cost coefficients. However this also presents a number of issues relating to:

- Endogeneity

- Hypothesis testing

- Statistical measures

- Precedence

Each of these issues is discussed in further detail below.

Endogeneity

One of the necessary conditions for the Ordinary Least Squares estimator to produce unbiased coefficients is that strict exogeneity must hold. That is:

$$\mathrm{E}(\varepsilon | X) = 0$$

In other words, the residuals are uncorrelated with each of the regressors and must have a mean of zero. OLS including a constant in the equation results in the OLS residuals having zero mean which means that the model explains 'the average level of costs'. However, constraining the constant to be zero means that this is no longer the case and therefore that the mean of the error terms can be, for example, positive. Then however, the regression would systematically predict lower costs as the missing constant is partially captured up by the remaining coefficients and partly by the (now non-zero mean) residuals. To back out allocations based on this is likely to be biased as the coefficients are based on a model that, as a whole, systematically under-estimates total costs.

The econometric allocation approach also presents issues when it comes to the NHS cost driver analysis. This analysis is required to estimate coefficients to be used in any forecasting of future NHS pharmacy costs.

Another issue with using econometrics to allocate costs is that we would ideally use the NHS cost from our allocation approach as the dependent variable in the econometric cost driver analysis. As described above, the econometric allocation model tells us that:

$$\text{NHS pharmacy cost} = \alpha \cdot \text{NHS activity variables} + \gamma \cdot \text{NHS fixed cost factor}$$

When this is entered on the left hand side of the econometric cost driver equation, we get:

$$\alpha \cdot \text{NHS activity variables} + \gamma \cdot \text{NHS fixed cost factor} = \theta \cdot \text{Pharmacy characteristics} + \vartheta + u$$

The pharmacy characteristics need to be independent of both costs and NHS activity variables otherwise this equation is endogenous, violating the exogeneity assumption discussed above. However, a lack of independent variables means that some key variables, such as fee items, would have to be used in both equations as one would expect these to be both key identifiers of NHS activity and key pharmacy characteristics.

Hypothesis testing

In any econometrics it is best practice to hypothesize an appropriate model and then test this through estimation of the regression coefficients. This ensures that the model form being used in the regression is appropriate to the real world which it is attempting to explain.

In our case, however, we know that the model specification we are testing is not true of reality if we exclude the constant. This is because we know that there is a non-random element of total pharmacy cost that is not explained through volume effects (i.e. the fixed cost of running a pharmacy) and this element is statistically significant as can be seen when we run the model allowing a constant. To back out allocations based on this is likely to be biased as the coefficients are.

Statistical measures

The removal of the constant causes a problem with regards to our statistical measures as well. This is because, when we add restrictions such as this to our model, the R^2 and standard errors of the model no longer operate in the expected way. For example, the R^2 is no longer bounded between 0 and 1, meaning that it cannot be compared with a similar output from models including a constant. As a result, models may (incorrectly) seem to dramatically improve in terms of these statistical measures when removing the constant.

Precedence

The final issue with removing the constant is one of precedence. To the best of our knowledge there is little precedence, in either cost allocation or econometrics in general, of specifying a model with a forced zero constant when it is known with 95% confidence that, if the constant were included, it would be significant.

Conclusions

We conclude that we must include a constant in any econometric allocation modelling as described. However we have no way of knowing how to share the fixed cost that this constant represents between the NHS and non-NHS cost elements and so cannot come up with a reliable estimate of NHS funding requirement using this methodology. Furthermore the issue of endogeneity with the NHS cost driver analysis means that we would not be able to use this NHS pharmacy cost in the NHS cost driver analysis. We therefore do not recommend using an econometric approach to allocate costs between NHS and non-NHS.

Appendix L - Cost Inflation Methodology

1.1.1. Introduction

Respondents to the survey were asked to provide cost information sourced from each pharmacy's latest set of accounts[2]. These accounts will not necessarily be from a consistent time period and as a result inflation assumptions must be made to grow the survey data to a chosen common time period.

Inflation assumptions also need to be made for forecasting future pharmacy costs. Although consistency between these two sets of assumptions would be ideal, slightly different measures of inflation may have to be used as some historical measures are not available as forecasts.

This appendix presents the different measures of cost inflation available both historically and for forecasting. It also demonstrates the impact of choosing certain assumptions on our two cost Allocation Methods. Fee item volume inflation and changes in numbers of branches over time have not been considered in this appendix. NHSBSA fee item volumes for the year corresponding to the cost data provided in the survey are used in any fee item analysis shown in the main report or any of the appendices unless otherwise stated. Similarly we have not applied any inflation to other measures of service activity such as volumes of other services provided, nor adjusted for additional regulatory burden or efficiency since the survey. There is a degree of inconsistency in using inflated costs together with such uninflated activity measures. However we suggest that, at least for the purposes of econometric analysis (as presented in Appendix R), this is a pragmatic approach given that we have no information on how different activity measures may have changed over time.

Throughout the analysis presented in this report and accompanying Appendices, the numbers of branches in each pharmacy type are assumed to be as shown in the table below.

Table 1: Number of branches assumed for the population sampling frame (based on NHSBSA data)

	Indep-endent	SM	NRD LM	RD LM	Super-market	Overall
Number of branches	3,424	1,398	3,598	1,225	552	10,197

1.1.2. Historical inflation

Under the current remuneration arrangement, we understand that two inflation rates are used:

- Average Weekly Earnings Index (seasonally adjusted including bonuses) is used to grow staff costs; and
- GDP Deflator is used to grow all other costs.

While the Average Weekly Earnings Index is viewed by the project team as a good measure of inflation for staff costs, there are some concerns over the use of the GDP Deflator for other costs. This is because these costs may be influenced by inflation from outside the UK (not included in the GDP Deflator) and as a result it is felt that it may be more appropriate to use other price inflation indices such as the Retail Price Index (RPI) or Consumer Price Index (CPI).

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[2] Cost data for 50% of the sample was provided for a 12-month period closing less than 6 month before the date of the survey (April 2010). Less than 8% of branches provided data for a 12-month period closing before the end of 2008. The average closing month of accounts for which cost data was provided was August 2009.

The best source for all historic data for cost inflation is the Office of National Statistics (ONS), well established as the official data source for the UK. The ONS publishes monthly as well as annual data, allowing for detailed analysis.

Given the concerns listed above, we have decided to make use of different inflation measures for the following three cost categories:

- Staff costs;
- Property costs; and
- Other costs.

For staff costs we use the Average Weekly Earnings Index for all industry sectors, seasonally adjusted and including bonuses. This ensures consistency with the current methodology. The index can potentially be segmented by the following industry sectors:

- Health and social work;
- Retail trade and repairs;
- Public sector;
- Private sector; or
- Services.

We have tested the effect of using the private sector index instead of the all industry sectors index.

Property costs inflation is a more problematic area as there is not much information available on rent of commercial properties. We use RPI, which is built up of a basket of prices including mortgage interest repayments and the cost of utilities. Clearly mortgage interest repayments do not necessarily represent commercial rents but we feel they are the best available proxy for which forecasts are also available. We also note that, in light of recent economic conditions, some property costs may have remained constant, or possibly even decreased, between the period covered by the most recent accounts and the period used for analysis.

An alternative where forecasts are not available would be to use the "Housing, water, electricity, gas and other fuels" part of CPI. This includes the following elements:

- Actual rents for housing;
- Regular maintenance and repair of dwellings;
- Water supply and miscellaneous services for dwellings; and
- Electricity, gas and other fuels.

There is an issue with using either this index or RPI in that they do not remove the effect of changes in the rate of indirect taxation. RPIY would remove this but would also remove the impact of morgage interest repayments, defeating the object of using this measure of inflation. This is a particular issue given the decrease in the rate of VAT from 17.5% to 15% on 1 January 2008 and its subsequent return back to 17.5% on 1 January 2010 (and then to 20% in January 2011).

For inflating other costs, CPI is the preferred measure of UK fiscal authorities (Bank of England etc). If CPI was used for property costs this could be considered independently driven from the other inflation measures described above. However, this index suffers from the same problem with regards to indirect taxation as described above. Therefore we propose using CPIY, which excludes the effect of changes in VAT. We note however that using CPI or CPIY may be more appropriate for some types of costs than others and that, in reality, certain costs may decrease over time rather than increase.

The average number of months of inflation applied to uprate the survey accounting periods to the analysis period of April 2009 – March 2010 is shown in the table below.

Table 2: Mean average number of months of inflation required to inflate survey accounting periods to period ending 31/03/2010 (assuming 30 days in a month)

	Mean average months of inflation
Independent	12.1
Smaller multiples (20 branches or fewer)	9.8
Smaller multiples (more than 20 branches)	4.0
Supermarket	0.8
Non retail driven large multiple	7.3
Retail driven large multiple	3.0
Overall	8.0

1.1.3.   Inflation forecasts

Inflation forecasts are required for use in the Pharmacy Cost Excel Model to allow for estimation of future costs through until March 2015. The Budget Medium Term Forecast appears to be the best source of this data with the benefit of drawing all forecasts from the same source. The budget was overseen by the independent oversight body, the Office for Budget Responsibility, and was judged to "represent a reasonable and central view", i.e. no political bias or favourable representation of data.

There are however far fewer indices available to select from. As a result, for the purposes of forecasting future costs, we recommend the following indices for our three cost categories:

- Staff costs – Average Weekly Earnings Index;
- Property costs – Retail Price Inflation; and
- Other costs – Consumer Price Inflation.

We note that we propose to use CPI for future inflation of "Other Costs" whereas we use CPIY for historic inflation of "Other Costs". Precise forecasts of CPIY are not available. However the Bank of England produces stylised illustrations of the contribution of forthcoming changes in VAT to twelve-month CPI inflation[3] shown in Table 3 below.

Table 3: Contribution of forthcoming changes in VAT – example scenarios

Period	Full pass through	50% pass through	0% pass through
2010 Q1	1.4%	0.7%	0.0%
2010 Q2	1.4%	0.7%	0.0%
2010 Q3	1.4%	0.7%	0.0%
2010 Q4	1.7%	0.8%	0.0%
2011 Q1	1.4%	0.7%	0.0%
2011 Q2	1.4%	0.7%	0.0%
2011 Q3	1.4%	0.7%	0.0%
2011 Q4	1.1%	0.6%	0.0%

3 Chart 4.3, http://www.bankofengland.co.uk/publications/inflationreport/ir10aug4.xls

2012 Q1	0.0%	0.0%	0.0%

Source: Bank of England

The full and 50% pass through columns respectively show what would be expected if the prices of all and half of the CPI basket subject to the standard rate of VAT varied in response to the changes in VAT. For the purposes of this work we suggest it may be sensible to take the 50% value as some, but not necessarily all, "Other Costs" incurred by community pharmacies may be subject to VAT. The 50% pass-through figures shown in Table 3 above may be subtracted from the forecasts for CPI to give a measure of future inflation that is more equivalent to the CPIY index used for inflating historic Other Costs. We acknowledge that the use of this 50% pass-through assumption is a rough assumption only and that those involved in generating projections for the future cost of pharmacy may choose to use other inflation assumptions.

1.1.4.   Cost inflation values

The table and graph below show historic inflation rates back to March 2008. The data represents the percentage change over a 12 month period.   The average earnings rate is calculated for the whole economy, seasonally adjusted and includes bonuses.

Table 4: Inflation rates

Time	RPI	CPIY	Average Earnings	GDP Deflator
2008 03	3.8%	2.6%	4.7%	2.9%
2008 04	4.2%	3.0%	3.4%	2.9%
2008 05	4.3%	3.3%	3.4%	2.9%
2008 06	4.6%	3.9%	3.4%	2.8%
2008 07	5.0%	4.5%	3.7%	2.8%
2008 08	4.8%	4.9%	3.2%	2.8%
2008 09	5.0%	5.4%	3.2%	2.8%
2008 10	4.2%	4.6%	3.5%	2.8%
2008 11	3.0%	4.3%	2.7%	2.8%
2008 12	0.9%	4.6%	3.2%	2.8%
2009 01	0.1%	4.4%	2.6%	2.8%
2009 02	0.0%	4.6%	-1.6%	2.8%
2009 03	-0.4%	4.3%	-1.0%	2.8%
2009 04	-1.2%	3.8%	4.1%	2.8%
2009 05	-1.1%	3.6%	2.2%	2.7%
2009 06	-1.6%	3.1%	1.8%	2.5%
2009 07	-1.4%	3.1%	1.2%	2.4%
2009 08	-1.3%	2.8%	1.6%	2.3%
2009 09	-1.4%	2.2%	1.3%	2.2%
2009 10	-0.8%	2.7%	1.7%	2.1%
2009 11	0.3%	3.1%	1.6%	2.0%
2009 12	2.4%	2.8%	1.2%	1.9%
2010 01	3.7%	1.9%	0.9%	1.8%
2010 02	3.7%	1.3%	5.6%	1.7%
2010 03	4.4%	1.8%	6.6%	1.6%

Source: Office of National Statistics

Figure 1: Historic inflation rates

Inflation rates: Mar 08 - Mar 10
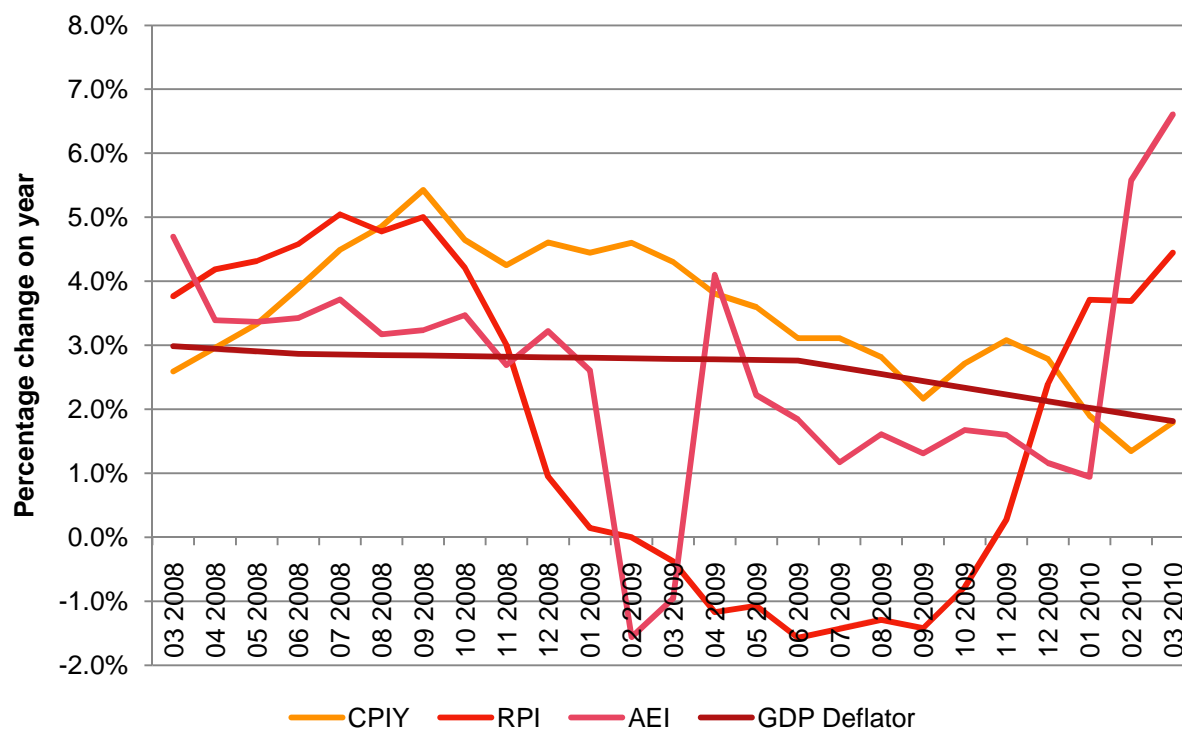
Source: Office of National Statistics

The table and graph below show forecast inflation rates from the budget (as agreed with the Office of Budget Responsibility). The CPI forecast has been reduced to take account of 50% of the contribution of the change in VAT to inflation as described in Table 3.

Table 5: Forecast inflation rates

Year	RPI	CPI with VAT adjustment	Average Earnings	GDP Deflator
2010/11	3.7%	2.0%	2.1%	2.0%
2011/12	3.2%	1.7%	1.9%	3.0%
2012/13	3.2%	1.9%	2.3%	2.3%
2013/14	3.3%	2.0%	3.8%	2.5%
2014/15	3.4%	2.0%	4.4%	2.5%[4]

Source: 2010 Budget, p84, C2: Detailed summary of central economic forecast

Bringing these two sources of data together gives the following historic and forecast inflation rates:

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4 No forecasts provided for 2014-15 so assumed the same as 2013-14.

Figure 2: Historic and forecast inflation rates

Inflation rates: Mar 08 - Mar 10
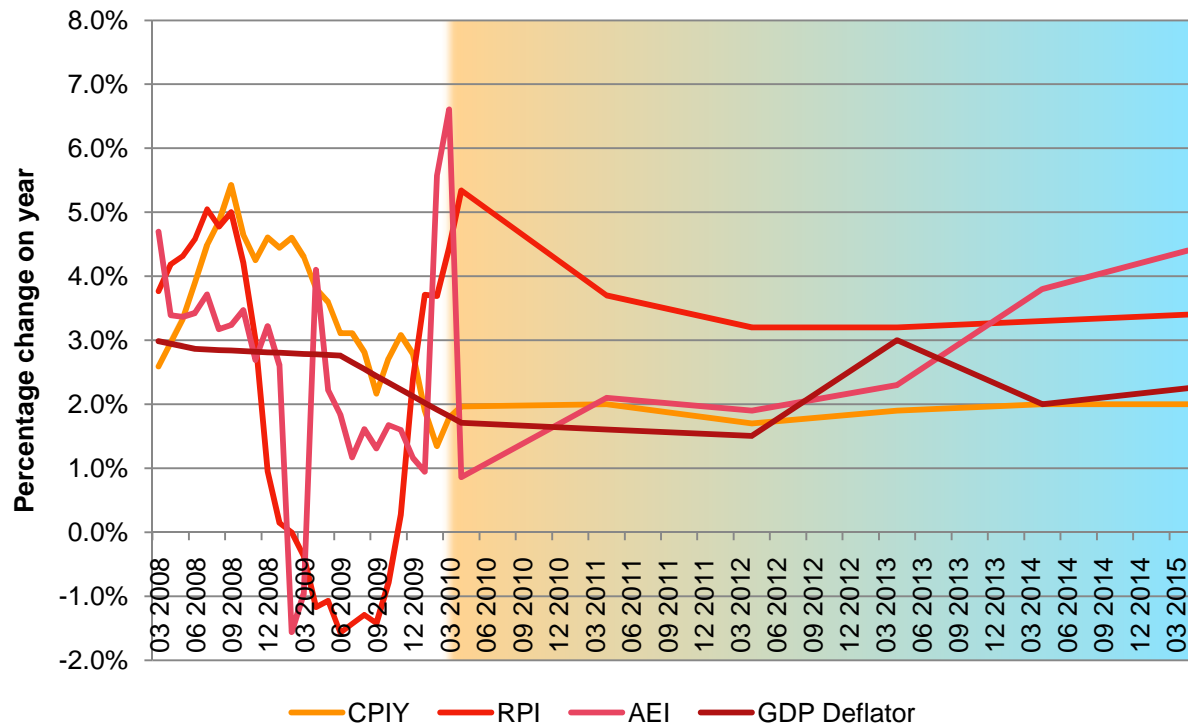
Source: PwC analysis

The above graph shows that CPIY and the GDP deflator are generally quite similar over the period under consideration, with only relatively localised variations between the two. For this reason we wouldn't expect changing from using one to the other to have a particularly large impact.

1.1.5. *Results of inflating costs*

The figure below demonstrates the aggregate effect of applying our preferred measures of inflation to grow the survey costs from the accounting period to March 2010 values as follows:

- Staff costs – Average weekly earnings index (AEI);
- Property costs – Retail price index (RPI);
- Other costs – Consumer price index with the effect of indirect taxation removed (CPIY).

The results are compared with those obtained using those current remuneration arrangement indices, i.e.:

- Average Weekly Earnings Index (seasonally adjusted including bonuses) is used to grow staff costs;
- GDP Deflator is used to grow all other costs.

Figure 3 Aggregate inflation assumptions

Aggregate inflation assumptions

■ Inflated (current renumeration assumptions)　■ Inflated (preferred assumptions)
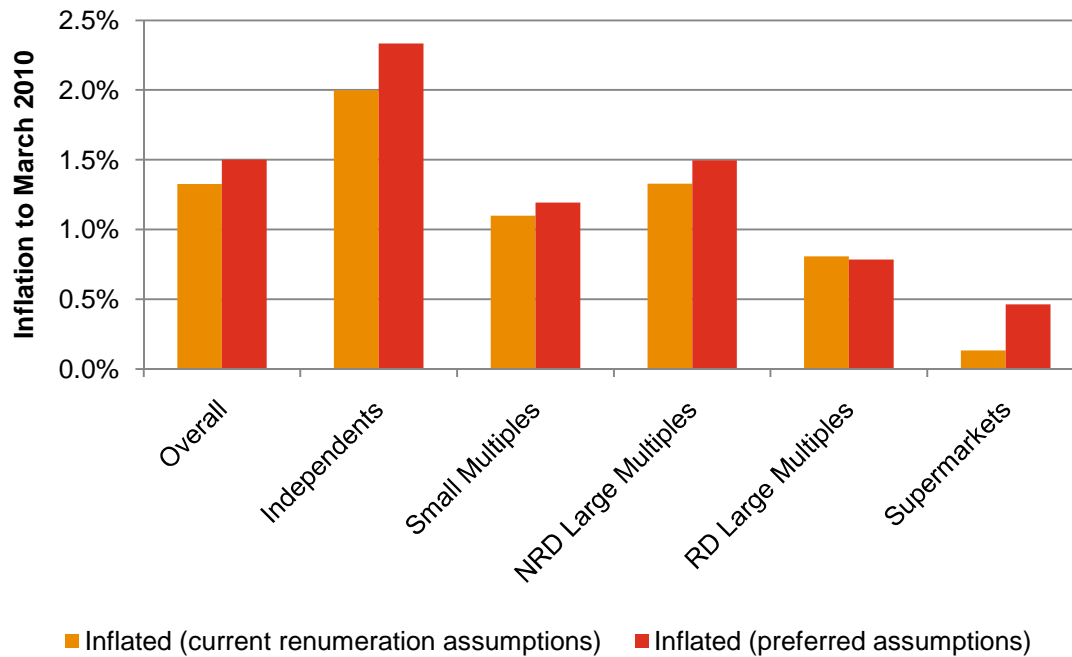
Source: PwC Analysis

These figures are based on NHS average cost per branch calculated using Allocation Method 1, however changing to the Allocation Method 2 would not have a significant effect on this result. Overall the inflation uplift is equivalent to increasing the allocated NHS cost per branch by £3,671 using the preferred assumptions and by £3,245 using the current remuneration assumptions.

The allocated NHS cost per branch in March 2010 prices can be divided by the number of fee items in year to March 2010 to give an updated average cost per fee item. As numbers of fee items have increased at a faster rate than prices have inflated (2.5% on average), average unit cost has decreased. The figure below shows this overall decrease taking account of both cost inflation and fee item decrease.

Figure 4 Inflation in unit cost to March 2010

Inflation of unit cost

■ Inflated (current renumeration assumptions)　■ Inflated (preferred assumptions)
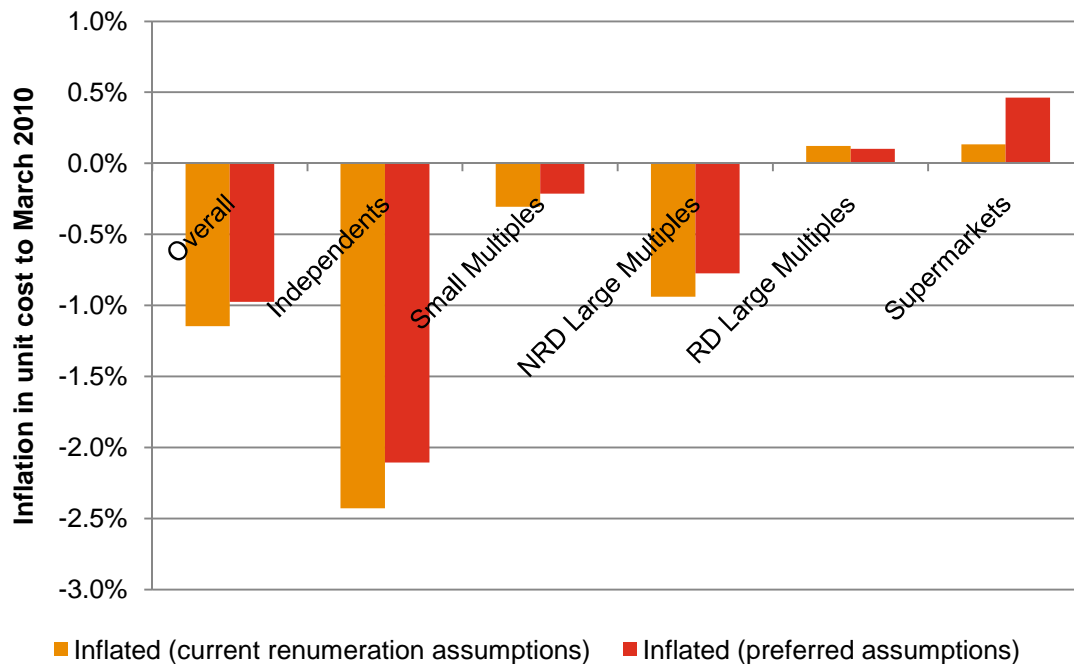
Source: PwC Analysis

Two pharmacy types (retail driven large multiples and supermarkets) have had an overall increase in unit cost because their numbers of fee items have increased more slowly since the accounting period reported in the accounts (generally their accounting periods were closer to March 2010).

Overall the inflation adjustment is equivalent to -£0.03 per fee item under the preferred assumptions and -£0.04 per item under the current remuneration assumptions.

1.1.6.   Summary

Whilst we would aim for the highest levels of disaggregation possible to provide the most precise insight into cost factors, in practical terms we are limited by the data that is available and some level of aggregation is unavoidable. Therefore we use CPIY as the inflation assumption for general costs, RPI for property costs and the Average Weekly Earnings Index for staff costs. The rationale for using these more aggregated indices, rather than more specific ones, is to maintain consistency of approach in terms of the historic and future forecast data we use.

Identifying a proxy for property costs was the most challenging, as there is no index that is closely related to it. Housing indices such as those published by Nationwide or Halifax are calculated on the basis of residential property only, a category which doesn't include pharmacies. Similarly, commercial rent indices are calculated on the basis of rents on offices of a much greater size than the average pharmacy. Our decision to use RPI, which contains aspects of general property costs, is reasonably satisfactory.

Overall, however, we have found that using different inflation assumptions, such as using the GDP deflator instead of RPI and CPIY, has a very small effect on allocated NHS cost per branch and unit cost.

These inflation rates are applied historically to the individual cost lines in the survey data to uplift to a common base period (chosen to be April 2009 – March 2010). The inflation assumptions may also be applied to the forecast cost estimates (based on the econometric model results) in order to give nominal costs for future years. Here the individual cost lines are no longer available so the cost split identified for 2009/10 is assumed to hold for future years and this is used to generate a composite inflation rate which can be applied to the total costs. As the mix of costs between cost lines will vary by pharmacy type, this composite inflation rate will as well.

We acknowledge that the choice of which inflation assumptions to use for the purposes of making projections regarding how the cost of pharmacy changes over time involves an element of judgment. Those involved in generating projections for the future cost of pharmacy may choose to use other inflation assumptions than those proposed by PwC.

Appendix M – Tangible Asset Valuation

1.1. Summary

In addition to operating costs, the cost of providing NHS pharmaceutical services also includes a fair return on investment. The project team held a series of meetings at which the appropriate rate of return for investors in community pharmacies was discussed. We note that the purpose of this report is to identify and quantify the various NHS costs involved in delivering community pharmacy services.   The question as to the extent to which the NHS should pay for the different categories of cost is outside the scope of PwC's work and may be a matter for further negotiation.

To remain a viable commercial enterprise, investors in pharmacy businesses need to earn a fair rate of return to recognise the risks they have taken in investing in their business. We have sought to estimate the fair return for the NHS component of a pharmacy business. The approach taken to estimating this rate of return is based on the Weighted Average Cost of Capital (WACC). The WACC is the minimum rate of return an investor would achieve in a competitive market. WACC is most readily applied to calculating fair return for investors in large companies, since its application generally involves the use of stock market information. It has strong theoretical underpinnings and many regulators and competition authorities have used the WACC framework in their analyses; there is therefore strong precedent for its use. WACC is arguably not so well suited for calculating fair return for investors in smaller companies, such as Independents and Smaller Multiple pharmacy businesses. However, there is no standard framework that is commonly used for estimating a fair rate of return for investors in such smaller businesses. We recommend that a pragmatic, and defensible, approach is to use the standard WACC framework for the small pharmacy companies as for the Large Multiples & Supermarkets, with appropriate application of a Small Companies Premium. Such premia have been adopted by UK regulators in setting prices (for example, by OFWAT[2]).

Under the WACC approach, the Fair Rate of Return is calculated as:

$$Fair\ Rate\ of\ Return = WACC\ x\ (Tangible\ Assets + Intangible\ Assets)$$

The purpose of this paper is to outline the approach to estimating the value of tangible assets. The issues of valuing intangible assets and estimating an appropriate WACC are covered in Appendices N and O respectively.

In summary, the key analysis assumptions are:

- Calculating NHS tangible asset value as the sum of NHS dispensing stock, NHS working capital, physical NHS assets (from branch plus a portion of Head Office NHS assets) and a portion of physical common assets (from branch plus a portion of Head Office Common assets).

- Valuing physical assets based on survey refit estimates and assuming that assets are 50% depreciated.

- Capping the refit estimates for "Other Assets" at £150K for each branch and the dispensing stock valuations at £200K for each branch.

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[2] As described in the Ofwat report "Future water and sewerage charges 2010-15:Final determinations"(2009).

- Calculating working capital as 0.2 months of drug costs3 and using stock valuation figures provided in the survey.

- Inflating all valuation amounts using CPIY to represent average values for the year ending March 2010.

- Allocating head office assets to branches on a uniform basis and applying an uplift to the calculated head office asset values for Large Multiples to ensure that the weighted sample head office asset values are equal to the total head office asset values in the population. For asset calculations, the required uplift calculated is 13.7%.

Overall, the average NHS tangible asset value is estimated to be £118.4K per branch.

1.2. *Valuing tangible assets*

The components of NHS tangible assets for an individual branch comprise the following:

- Value of NHS dispensing stock +
- Value of NHS working capital +
- Value of NHS physical assets (valued using refit estimates) +
- Proportion of the value of common physical assets (valued using refit estimates)

To enable us to allocate an appropriate portion of the value of common branch assets to NHS, it is also necessary for us to estimate the value of non-NHS branch assets.

The components of non-NHS tangible assets for an individual branch comprise the following:

- Value of OTC stock +
- Value of other non-NHS stock +
- Value of non-NHS physical assets belonging to the branch (valued using refit estimates) +
- Proportion of the value of common physical assets belonging to the branch (valued using refit estimates)

We note that we do not include an estimate of working capital in the calculation of the value of non-NHS assets as we do not have any survey data or NHSBSA data to use as a basis for calculating this. This will have an effect on the proportion of common assets allocated to NHS.

The value of the NHS and non-NHS tangible assets includes the value of branch assets and also a proportion of Head Office assets.

1.3. *Stock valuation*

In the survey, branches provided the value of their "most recent stock valuation" (and the date this took place) as follows:

- Total stock, broken down into:
- Dispensing (including NHS stock)
- OTC medicines
- Other (including toiletries, baby goods, electrical, sundries)

We understand that pharmacy stock is typically valued based on an estimate of the price paid by the pharmacy to the wholesaler4. Missing values for dispensing stock and OTC medicines have been imputed since it is assumed that in reality all pharmacy branches will hold some dispensing and OTC stock.

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3 The estimate of working capital assumes a target margin of £500m.

Stock values provided have been inflated from the stock valuation date to September 2009 using CPIY. This date is the mid-point of the year ending March 2010 and as such, the value of stock on this date may be seen to be an average stock value for the 12-month period. We note however, that in reality the price paid for drugs may go down as well as up over time. In addition that volume of stock held by contractors will not be constant over time. For example, changes in policies regarding the breadth of lines contractors are required to hold or lack of availability of certain lines may lead to changes in stock holdings. On balance, however, for the purposes of the analysis presented in this report, we took the view that it is reasonable to inflate the stock values provided as described.

Stock valuation dates were not provided by just under 10% of the sample. Where the stock valuation date was not provided by respondents, the un-inflated stock valuations have been used in calculations[5].

The analysis uses the dispensing stock value to add into the value for NHS tangible assets. The mean average value[6] of NHS dispensing stock is shown in the table below. This stock value has been expressed as days of stock by dividing it by a daily estimate of the cost of goods[7].

We note that the dispensing stock values have been capped at £200K for each branch. 3 Independent branches provided stock values much larger than this value and these outlier values were pulling up the mean average for Independents.

Table 1: Average value of NHS dispensing stock

	Independent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
Dispensing stock	£33,841	£39,239	£50,790	£55,065	£49,426	£69,502	£46,748
Dispensing stock (expressed as days of stock)	32	24	25	32	36	61	33

Source: PwC survey

The value of OTC medicines and Other stock are added into the value of non-NHS tangible assets (and therefore affect the proportion of common assets assigned to NHS).

The table below shows mean average non-NHS stock values for each pharmacy type.

Table 2: Average value of non-NHS stock

Indep-endent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall

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4 In reality pharmacies purchase their drugs from a range of suppliers and each may achieve different discounts. This means that the stock valuation figures reported by pharmacies may or may not reflect the actual price paid for the drugs. We note however that stock valuation figures are required for each contractor's accounts so the objective is that they should be broadly reflective of the actual price paid.

5 In our view, not inflating stock valuations where no date is provided is a reasonable approach, particularly given the discussion in the text regarding the various factors affecting stock valuations. Among the pharmacies who did provide stock valuation dates, 90% of these were less than a year before the date of the survey (i.e. since March 2009).

6 Unless otherwise stated, all averages shown are mean averages.

7 The daily cost of goods is calculated by dividing the annual cost of goods (assuming £500m drugs margin deducted) by 365.

OTC non-NHS stock	£8,645	£6,282	£7,341	£18,636	£35,857	£36,984	£16,730
Other non-NHS stock	£13,032	£6,424	£14,844	£7,457	£171,925	£4,801	£29,435

Source: PwC survey

Head Offices were also asked to provide the value of stock (split by prescription medicines, non-prescription medicines and other stock) held at head office (including the stock held at all centralised warehouse facilities) based on their most recent stock valuation. However, we have not included any portion of Head Office stock in the calculation of the value of branch assets. This is for consistency and for the same reason that we are excluding distribution costs from our main costs analysis – i.e. because not all pharmacies have head offices that hold stock – and these non-vertically-integrated pharmacies will tend to be the pharmacies that pay a higher fee to their wholesalers.

1.4. *Working capital*

We propose that an estimate of working capital should be added into the value of NHS Tangible Assets.

The starting point for calculating the cost of drugs to pharmacies is the reimbursement paid by NHSBSA to cover the cost of drugs. Pharmacies are able to negotiate discounts with their wholesaler on NHS related drugs and the reimbursement paid to pharmacies by the NHSBSA includes application of the discount deduction scale. However, the reimbursement amount is more than the amount actually paid by pharmacies, since the funding is designed to provide a target drugs margin of £500m. We suggest that this drugs margin should be subtracted from the NHSBSA reimbursement amount to obtain an estimate of the actual amount pharmacies pay to purchase their drugs, and thus a basis for calculating working capital. For the purpose of these calculations, we assume that the target £500m drugs margin is allocated between branches in the sampling frame in proportion to prescription item volumes[8]. We calculate an annual average value for the cost of drugs to pharmacies of £626,444 across all pharmacy types. This is 92.7% of the average value of NHSBSA reimbursement value of £675,478.

For the purposes of analysis, we assume that the NHS is accurately able to leave the £500m drugs margin in the system, however the Annex to this Appendix shows the impact on the overall tangible asset value of assuming a drugs margin of £750m or £1000m (and also £0).

NHSBSA payment data has been inflated to March 2010 (the date of the survey) using CPIY.

In terms of estimating NHS Working Capital as a percentage of NHS reimbursement payments, we understand that every month a contractor receives:

- An 80% advance estimate for prescriptions sent to NHSBSA one month earlier

- Plus the full value of the priced prescriptions submitted two months earlier

- Minus the recovery of the 80% advance paid the previous month.

The advance payment means that contractors get paid some money before all prescriptions have been processed and priced[9]. This means that, assuming all prescriptions are bought and dispensed in the middle of the month:

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[8] The Annex to Appendix M shows the impact on the tangible asset value of assuming an actual drugs margin of £750m or £1000m.

[9] The 80% advance is calculated using the total items sent to the NHSBSA and the average drug costs for the previous month. Pharmacies also receive 80% of their fees and an inflationary allowance.

- Contractors receive 80% of payment 1.5 months after dispensing the medicines; and
- 20% of payments 2.5 months after dispensing the medicines (assuming the correction payments cancel out).

We understand that pharmacies generally pay wholesalers at the end of the month after the medicines have been bought, so:

- Contractors pay 100% of the cost of medicines 1.5 months after dispensing the medicines.

This suggests that, on average, working capital is worth 0.2 of one month's worth of drug costs (due to the one month lag between pharmacies paying the wholesaler and receiving the final 20% of their reimbursement).

The table below shows average NHS working capital for different pharmacy groups, based on 0.2 months of drug costs (obtained from NHSBSA data and the calculation set out above).

Table 3: Working capital estimate (assuming £500 margin deducted)

	Indep-endent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
NHS working capital (assuming £500m margin)	£9,023	£10,312	£13,502	£11,283	£10,633	£11,160	£10,548

Source: NHSBSA data and PwC survey and assumptions discussed with DH/PSNC

The table below shows the sensitivity of the Working Capital estimates to the assumption of how much money is left in the system when pharmacies are reimbursed for the drugs they buy.

Table 4: Working capital sensitivity analysis (assuming different margins)

	Indep-endent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
NHS working capital (assuming £0 margin)	£9,747	£11,128	£14,527	£12,176	£11,427	£11,985	£11,374
NHS working capital (assuming £750m margin)	£8,661	£9,904	£12,990	£10,837	£10,236	£10,748	£10,135
NHS working capital (assuming £1000m margin)	£8,299	£9,496	£12,478	£10,391	£9,840	£10,336	£9,722

Source: NHSBSA data and PwC survey and assumptions discussed with DH/PSNC

1.5. *Value of assets - based on refit estimates*

1.5.1. *Branch assets*

Survey respondents were asked to estimate the cost of replacing branch assets with brand new equivalents. The Table below shows how these asset categories have been allocated between NHS, non-NHS and common.

Table 5: Proposed allocation of branch tangible assets between NHS, non-NHS and common

Branch Asset	Survey description	Categorisation
Dispensary	All fixtures and fittings as well as the labour costs involved in installing a dispensary	NHS
Consultation Room	All fixtures and fittings as well as the labour costs involved in installing a consultation room	NHS
Counter Area	All shelving, cashier equipment as well as the labour costs involved in installing a counter area	Common

Retail Shelving	All shelving used to display retail products in the shop front, as well as the labour cost involved in installing the shelving	Non-NHS
IT equipment – NHS-related equipment	All IT equipment used exclusively for NHS-related purposes: for example, IT equipment in the dispensary and consultation room	NHS
IT equipment – non-NHS-related equipment	All IT equipment used exclusively for non-NHS-related purposes (including retail and private healthcare)	Non-NHS
IT equipment – other IT equipment	All IT equipment which cannot be exclusively attributed either to NHS or non-NHS activities: for example, the till or computers used for administrative tasks	Common
Motor Vehicles10	Provided if dedicated vehicle(s) used for services such as prescription collection and delivery	NHS
All Other Assets	All other assets in the branch including: fixtures and fittings in shop front area (excluding retail shelving) storage areas, offices, WC etc.	Common

Source: PwC assumptions discussed with DH/PSNC

We suggest that these refit estimates are the most appropriate starting-point for estimating the value of tangible assets (plus value of stock and working capital).

We assume that the current value of an asset is calculated as 50% of the refit cost. That is, we assume that on average assets are halfway through their economic life.

The tables below shows the value of NHS, non-NHS and Common branch assets based on the refit estimates provided in the survey and categorised as described in the table above.

Missing refit values for Dispensary, Counter, Shelving and NHS IT have been imputed before calculating averages as it is assumed that all branches will own these assets. Any other missing refit estimates have been incorporated into the average calculations assuming a zero value.

Table 6: Value of branch-specific assets based on refit estimates

	Indep-endent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
Categorised as NHS							
Dispensary	£14,648	£13,962	£14,897	£15,130	£22,782	£11,041	£15,576
Consultation Room	£3,102	£3,084	£2,999	£3,772	£2,703	£6,493	£3,465
NHS IT	£4,098	£2,580	£4,890	£3,171	£2,738	£3,623	£3,549
Motor Vehicles	£2,110	£1,828	£2,564	£1,386	£1,066	£0	£1,632
Sum	*£23,958*	*£21,454*	*£25,351*	*£23,459*	*£29,290*	*£21,158*	*£24,222*

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10 Survey respondents were not asked to identify the purpose for which any motor vehicle assets owned by a branch were used. In discussion with DH/PSNC, PwC has made the assumption that the majority of branch motor vehicle assets will be used for NHS business, for example the collection of prescriptions from surgeries and the delivery of drugs to patients.

Categorised as non-NHS							
Retail Shelving	£9,065	£7,452	£12,007	£4,012	£24,793	£2,227	£8,924
Non-NHS IT	£839	£415	£180	£1,231	£3,506	£577	£1,207
Sum	*£9,904*	*£7,866*	*£12,187*	*£5,243*	*£28,299*	*£2,804*	*£10,132*
Categorised as Common							
Counter	£5,921	£5,493	£7,977	£3,727	£3,053	£4,009	£4,828
Other IT	£928	£803	£2,363	£2,534	£20,747	£533	£3,955
Other Assets	£4,542	£3,699	£8,717	£27,546	£54,858	£121	£18,729
Sum	*£11,391*	*£9,995*	*£19,057*	*£33,807*	*£78,658*	*£4,664*	*£27,512*

Source: PwC survey and assumptions

The "Other Assets" category was described in the survey questionnaire as "all other assets in this branch including: fixtures and fittings in shop front area (excluding retail shelving) storage areas, offices, WC etc." Respondents were not required to specify exactly what was included in this Other Assets category. In addition to the specific examples provided in the survey text, it is possible that asset values reported here may also include capital payments made to set up the pharmacy business, for instance premium payments to developers and payments for leasehold improvements made prior to the business first starting trading.

We note that the refit estimates provided for "Other Assets" have been capped at a value of £150,000. This is because certain retail driven large multiple branches provided extremely large "Other Asset"refit estimates that were skewing the mean average results. It has been suggested that these very large refit estimates may include values for assets already captured elsewhere in the operating costs. The Annex shows the impact of this cap on the overall value calculated for tangible assets.

We note that the asset values calculated based on the branch refit estimates are comparable with the depreciation costs calculated as set out in Appendix K. This comparison is shown in Table 7. Depreciation reflects the return *of* the investment made in assets. Fair return on tangible assets reflects the return *on* this investment.

Table 7: Comparison of asset values and depreciation costs (as set out in Appendix K)

	Average value (from Table 6)	Refit estimate (2 x value previous column)	Refit cycle (as set out in Appendix K)	Implied Depreciation (refit estimate divided by refit cycle)
NHS				
Dispensary	£15,576	£31,153	8	£3,894
Consultation room	£3,465	£6,931	10	£693
NHS related IT equipment	£3,549	£7,098	3	£2,366
Motor vehicles	£1,632	£3,264	5	£653
Non-NHS				
Retail shelving	£8,924	£17,849	10	£1,785

	Average value (from Table 6)	Refit estimate (2 x value previous column)	Refit cycle (as set out in Appendix K)	Implied Depreciation (refit estimate divided by refit cycle)
Non-NHS related IT equipment	£1,207	£2,415	3	£805
Common				
Counter area	£4,828	£9,656	10	£966
Other IT equipment	£3,955	£7,909	3	£2,636
All other assets	£18,729	£37,457	8	£4,682

Aggregated NHS/Non-NHS/Common		Sum of implied depreciation costs (above)	Depreciation costs (as set out in Appendix K)
NHS		£7,606	£7,646
Non-NHS		£2,590	£2,604
Common		£8,284	£8,328
Aggregated costs following EMPU allocation of Common			
NHS		£13,786	£13,859
Non-NHS		£4,694	£4,719

Source: PwC survey and assumptions

The slight differences between the NHS and non-NHS branch depreciation costs calculated via the two methods are due to inflation assumptions. The rough calculations to get from asset value to depreciation cost do not make any adjustments for inflation.

1.5.2. Head office assets

Survey respondents also provided information on the refit costs for the following Head Office assets. The current assumptions regarding allocation to NHS, non-NHS and Common are shown in Table 8 below.

Table 8: Allocation of head office assets between NHS, non-NHS and common costs

Head Office	Survey description	Categorisation
IT equipment / software – NHS-related equipment	All NHS-related IT equipment at head office: for example, IT assets for dispensing related systems	NHS
IT equipment / software – Non-NHS-related equipment	All non-NHS-related equipment at head office: for example, IT assets for retail purchasing IT systems	Non-NHS
IT equipment / software – other IT equipment	All IT equipment which cannot be clearly attributed either to NHS or retail activities: for example, computers used for administrative tasks	Common
Motor vehicles[11]	Provided if head office has dedicated vehicle(s) used	Common

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11 Survey respondents were not asked to identify the purpose for which any motor vehicle assets owned by a head office (as defined in Table 8) were used. In discussion with DH/PSNC, PwC has made the assumption that

	for services such as stock delivery	
Head office fixtures and fittings	All head office fixtures and fittings	Common
Other	Other significant head office assets which have not been specifically mentioned above	Common

Source: PwC assumptions discussed with DH/PSNC

We have calculated the value of these head office assets in the same way as described for branch assets. For the purposes of calculating average values, where refit costs are missing we have assumed them to be zero – we have not imputed a value.

A portion of head office asset value is then allocated to each branch. The approach to head office asset value allocation adopted in this analysis is as follows:

- Allocate Head Office assets to NHS, non-NHS and Common based on allocations set out in the table above.

- Allocate Head Office assets to individual branches using a uniform proportion based on the number of branches in the group (ie. if the Head Office assets relate to an entity with 100 branches, 1% of the head office asset value will be allocated to each branch from the entity contained in the survey sample).

- Adjust Head Office asset values to ensure that the total Head Office asset value for Large Multiples based on the weighted sample of branches is equal to the actual total Head Office asset value for the Large Multiple entities. The calculated adjustment is 13.7%. This adjustment has been applied to Large Multiple Head Office asset values only.

The value of NHS Head Office assets attributable to branch NHS assets (before the 13.7% adjustment) are shown in the table below.

Table 9: Average value of Head Office assets attributable to branch (prior to 13.7% adjustment)

	Indep- endent	SM<20	SM>20	NRD LM	RD LM	Super- market	Overall
NHS branch assets	£62	£198	£702	£12	£6	£79	£90
nonNHS branch assets	£21	£189	£513	£8	£250	£0	£88
Common branch assets	£124	£3,087	£5,435	£54,181	£110,067	£0	£34,890

Source: PwC survey and assumptions discussed with DH/PSNC

We note that the head office asset values implied for NRD LM and RD LM are larger than for other pharmacy types. These larger values are due to large head office refit estimates provided for "other assets" and also for fixtures and fittings and Common IT. Respondents did not always specify exactly what was included in "other assets", but examples include "Building re-instatement value", "Warehouse fittings" and "Telecommunications system". The Annex shows the impact of these "Other" head office assets on the overall tangible asset value calculated.

It may be expected that the head office assets of the weighted sample should exactly equal the head office assets for the population. The only pharmacy type for which we have information on the head office assets of the full population is the Large Multiples group (the 10 entities that collectively represent NRD LM, RD LM and

the head office motor vehicle assets may be used for both the NHS and non-NHS sides of the business, and are therefore classified as Common assets.

Supermarkets). We have calculated the weighted sum of the head office assets allocated to each branch in the sample belonging to the Large Multiples group. We have then compared this weighted sum with the sum of the asset values calculated based on the head office refit estimates provided by each of the 10 Large Multiple entities. We observe that the latter number is 13.7% larger than the weighted sample sum. This discrepancy occurs because the sample was drawn at a branch level rather than an entity level.

We have applied an upward adjustment of 13.7% to the head office asset value allocated to each branch in the Large Multiples group. It has not been possible to calculate an equivalent uplift factor for the other pharmacy types so any Independent and Smaller Multiple Head Office asset values are left unadjusted. We note that this 13.7% adjustment to large multiple head office assets is equivalent to the 5.3% adjustment applied to large multiple head office costs (as described in Appendix K). The adjustment percentages differ because one is based on asset values and the other on costs. Also the methods used to allocate head office assets and costs to branch NHS are not exactly the same.

The table below shows the value of NHS and also non-NHS and Common Head Office assets attributable to individual branches following this 13.7% adjustment. This table provides an additional breakdown of the asset categorised as Common.

The majority of the Head Office asset value is categorised as Common. A portion of the Head Office common assets allocated to the individual branch are allocated to NHS and non-NHS, together with branch common assets (this is described in further detail in the next section).

Table 10: Average value of Head Office assets attributable to branch (after 13.7% adjustment)

	Indep-endent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
HO assets categorised as NHS and allocated to branch							
NHS IT	£62	£198	£702	£14	£7	£90	£97
HO assets categorised as Non-NHS and allocated to branch							
Non-NHS IT	£21	£189	£513	£9	£284	£0	£95
HO assets categorised as Common and allocated to branch							
Other IT	£16	£451	£692	£8,248	£15,089	£0	£4,809
Motor Vehicles	£54	£463	£2,350	£1,688	£3,374	£0	£1,225
Fixtures and Fittings	£49	£932	£2,192	£24,104	£49,626	£0	£14,706
Other Assets	£5	£1,240	£201	£27,547	£57,025	£0	£16,664
Common Head Office assets attributable to branch (total of 4 rows above)12	£124	£3,087	£5,435	£61,587	£125,113	£0	£37,404

Source: PwC survey and assumptions discussed with DH/PSNC

1.6.   Allocating Common assets

The tables below shows the calculated value of assets allocated to each branch categorised as NHS, non-NHS and Common.

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12 See note under Table 9 regarding the size of certain Head Office asset values.

Table 11: NHS-specific assets (excluding common)

	Independent	SM<20	SM>20	NRD LM	RD LM	Supermarket	Overall
Dispensing stock	£33,841	£39,239	£50,790	£55,065	£49,426	£69,502	£46,748
Working capital	£9,023	£10,312	£13,502	£11,283	£10,633	£11,160	£10,548
Branch assets categorised as NHS							
Dispensary	£14,648	£13,962	£14,897	£15,130	£22,782	£11,041	£15,576
Consultation Room	£3,102	£3,084	£2,999	£3,772	£2,703	£6,493	£3,465
NHS IT	£4,098	£2,580	£4,890	£3,171	£2,738	£3,623	£3,549
Motor Vehicles	£2,110	£1,828	£2,564	£1,386	£1,066	£0	£1,632
HO assets categorised as NHS and allocated to branch							
NHS IT	£62	£198	£702	£14	£7	£90	£97
Total NHS-specific assets (based on refit estimates)	£66,884	£71,204	£90,346	£89,821	£89,356	£101,911	£81,616
As proportion of NHS + Non-NHS	68%	77%	72%	74%	27%	70%	59%

Source: PwC survey and assumptions discussed with DH/PSNC

Table 12: Non-NHS-specific assets (excluding common)

	Independent	SM<20	SM>20	NRD LM	RD LM	Supermarket	Overall
OTC and Other non-NHS stock	£21,677	£12,706	£22,184	£26,093	£207,782	£41,786	£46,165
Branch assets categorised as non-NHS							
Retail Shelving	£9,065	£7,452	£12,007	£4,012	£24,793	£2,227	£8,924
Non-NHS IT	£839	£415	£180	£1,231	£3,506	£577	£1,207
HO assets categorised as non-NHS and allocated to branch							
Non-NHS IT	£21	£189	£513	£9	£284	£0	£95
Total non-NHS-specific assets (based on refit estimates)	£31,602	£20,761	£34,884	£31,345	£236,364	£44,590	£56,392
As proportion of NHS + Non-NHS	32%	23%	28%	26%	73%	30%	41%

Source: PwC survey and assumptions discussed with DH/PSNC

Table 13: Common assets

	Independent	SM<20	SM>20	NRD LM	RD LM	Supermarket	Overall

Branch assets categorised as Common							
Counter	£5,921	£5,493	£7,977	£3,727	£3,053	£4,009	£4,828
Other IT	£928	£803	£2,363	£2,534	£20,747	£533	£3,955
Other Assets	£4,542	£3,699	£8,717	£27,546	£54,858	£121	£18,729
HO assets categorised as Common and allocated to branch							
Other IT	£16	£451	£692	£8,248	£15,089	£0	£4,809
Motor Vehicles	£54	£463	£2,350	£1,688	£3,374	£0	£1,225
Fixtures and Fittings	£49	£932	£2,192	£24,104	£49,626	£0	£14,706
Other Assets	£5	£1,240	£201	£27,547	£57,025	£0	£16,664
Total Common assets (based on refit estimates)	£11,515	£13,082	£24,492	£95,394	£203,771	£4,664	£64,915

Source: PwC survey and assumptions discussed with DH/PSNC

Common assets (both branch-specific and those allocated from the Head Office) are allocated to NHS based on the ratio of NHS to non-NHS asset value. For example, if a particular branch had NHS assets of £70K, Non-NHS assets of £30K and Common assets of £10K, then £7K of the Common assets would be allocated to NHS and £3K would be allocated to non-NHS.

Table 14 below shows the total value of Common assets allocated to NHS and non-NHS for each branch. This value includes common assets from the branch and also the portion allocated from head office. Table 14 also shows these values expressed as a proportion of total average Common assets allocated to each branch. These proportions are not exactly equal to the proportions shown in Table 11 because the average of a product is not equivalent to the product of the average. In the analysis the allocation of common assets is done at the individual branch level rather than at the pharmacy type average level as shown in these tables.

Table 14: Implied proportion of common asset values allocated to NHS (product of the averages)

	Indep-endent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
Total Common allocated to NHS per branch (includes HO)	£7,766	£10,214	£17,244	£70,604	£59,127	£3,490	£36,747
Implied average proportion of Common assets allocated to NHS	67%	78%	70%	74%	29%	75%	57%
Total Common allocated to Non-NHS per branch (includes HO)	£3,749	£2,868	£7,248	£24,790	£144,644	£1,174	£28,169
Implied average proportion of Common assets allocated to Non-NHS	33%	22%	30%	26%	71%	25%	43%

Source: PwC survey and assumptions discussed with DH/PSNC

1.7. *NHS tangible asset estimates*

Table 15 below shows the final values calculated for NHS and non-NHS tangible assets (per branch).

Table 15: Calculated total tangible asset values

	Indep-endent[13]	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
NHS Tangible Assets	£74,650	£81,417	£107,589	£160,425	£148,483	£105,400	£118,362
Non-NHS Tangible Assets	£35,537	£23,748	£42,445	£56,277	£382,251	£45,941	£84,863

Source: PwC surevy and assumptions discussed with DH/PSNC

Table 16 summarises how the final average NHS tangible asset value is built up using the elements described in this paper.

Table 16: Average total NHS tangible assets attributable to branch

	Indep-endent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
Dispensing stock	£33,841	£39,239	£50,790	£55,065	£49,426	£69,502	£46,748
NHS working capital	£9,023	£10,312	£13,502	£11,283	£10,633	£11,160	£10,548
Physical NHS branch assets	£23,958	£21,454	£25,351	£23,459	£29,290	£21,158	£24,222
Head Office NHS IT	£62	£198	£702	£14	£7	£90	£97
Sum of NHS asset values	*£66,884*	*£71,204*	*£90,345*	*£89,821*	*£89,356*	*£101,911*	*£81,616*
Portion of physical Common branch assets	£7,680	£7,642	£13,386	£24,635	£22,096	£3,490	£15,598
Portion of physical Common Head Office assets	£86	£2,571	£3,858	£45,969	£37,031	£0	£21,149
Sum of common asset values	*£7,766*	*£10,214*	*£17,244*	*£70,604*	*£59,127*	*£3,490*	*£36,747*
Total NHS tangible assets	**£74,650**	**£81,417**	**£107,589**	**£160,425**	**£148,483**	**£105,400**	**£118,362**

Source: PwC survey and assumptions discussed with DH/PSNC

13 For the Independents group, we have hard copy accounts that quote a value for approximately half the sample. The mean average total tangible asset value in the branch accounts is £113K. As shown in the table above, the mean average total tangible asset value calculated for the Independents group is close to this at £110.2K (£74.7 + £35.5). We do not have sufficiently detailed accounts for enough branches in the other pharmacy types to carry out the equivalent cross-check for the multiples.

1.8. Annex – Sensitivities

In this annex we show the sensitivity of the Total NHS tangible asset value (as shown in the first row of Table 15) to a number of assumptions mentioned in this paper. All other assumptions are kept at their default values.

1.8.1. Margin assumption

The table below shows the sensitivity of the total NHS tangible asset estimates to the assumption of how much money is left in the system when pharmacies are reimbursed for the drugs they buy.

Table 17: Sensitivity to margin assumption

	Independent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
Base case (assuming £500m margin)	£74,650	£81,417	£107,589	£160,425	£148,483	£105,400	£118,362
Assuming £0 margin	£75,398	£82,256	£108,667	£161,471	£149,615	£106,231	£119,297
Assuming £750m margin	£74,276	£80,998	£107,050	£159,901	£147,917	£104,985	£117,895
Assuming £1000m margin	£73,901	£80,578	£106,511	£159,376	£147,349	£104,569	£117,426

Source: PwC survey

1.8.2. Capping of Dispensing Stock valuation at £200K

The table below shows the sensitivity of the total NHS tangible asset estimates to the capping of Dispensing Stock value at £200,000K. Only 3 Independent contractors provided a value greater than this.

Table 18: Sensitivity to capping of dispensing stock value at £200K

	Independent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
Base case (capping dispensing stock value at £200K)	£74,650	£81,417	£107,589	£160,425	£148,483	£105,400	£118,362
No capping of dispensing stock value at £200K	£79,272	£81,417	£107,589	£160,425	£148,483	£105,400	£119,914

Source: PwC survey

1.8.3. Inclusion of Motor Vehicles

The table below shows the sensitivity of the total NHS tangible asset estimates to the assumption of whether or not the value of branch and head office motor vehicles are included in the calculation.

Table 19: Sensitivity to inclusion of value of motor vehicles

	Independent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall

Base case (including value of branch and HO Motor Vehicles)	£74,650	£81,417	£107,589	£160,425	£148,483	£105,400	£118,362
Excluding value of HO Motor Vehicles	£74,613	£81,056	£105,940	£159,164	£147,483	£105,400	£117,637
Excluding value of branch and HO Motor Vehicles	£72,411	£79,183	£103,221	£157,549	£146,054	£105,400	£115,836

Source: PwC survey

1.8.4. Capping of "Other Assets" at £150K

The table below shows the sensitivity of the total NHS tangible asset estimates to the capping of "Other Asset" refit estimates at £150,000K. The value of £150,000 is approximately the 90% percentile of the refit estimates provided for this category.

Table 20: Sensitivity to capping of "other" asset refit estimate at £150K

	Independent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
Base case (capping "Other asset" value at £150K)	£74,650	£81,417	£107,589	£160,425	£148,483	£105,400	£118,362
No capping of "Other asset" value at £150K	£74,682	£81,417	£107,589	£160,558	£200,154	£105,400	£124,626

Source: PwC survey

1.8.5. Inclusion of "Other" Head Office assets

The table below shows the sensitivity of the total NHS tangible asset estimates to the inclusion of "Other" Head Office assets. This sensitivity is shown because some NRD LM and RD LM provided very large refit estimates for "Other" Head Office assets.

Table 21: Sensitivity to inclusion of "Other" Head Office assets

	Independent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
Base case (including all reported head office costs)	£74,650	£81,417	£107,589	£160,425	£148,483	£105,400	£118,362
Excluding "Other" Head Office costs	£74,646	£80,281	£107,423	£139,901	£131,638	£105,400	£109,013

Source: PwC survey

1.8.6.   Application of 13.7% upward adjustment to Large Multiple Head Office assets

The table below shows the sensitivity of the total NHS tangible asset estimates to the 13.7% upward adjustment applied to the Large Multiple Head Office asset values. This uplift is calculated and applied to ensure that the Head Office assets for the weighted sample of Large Multiples (overall) are equal to the Head Office assets for the full Large Multiples population.

Table 22: Sensitivity to 13.7% upward adjustment of Large Multiple Head Office asset values

	Indep-endent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
Base case (applying 13.7% upward adjustment to all Head Office assets)	£74,650	£81,417	£107,589	£160,425	£148,483	£105,400	£118,362
Not applying 13.7% adjustment to Head Office assets	£74,650	£81,417	£107,589	£154,895	£144,030	£105,389	£115,875

Source: PwC survey

1.8.7.   Allocation of Head Office assets

The table below shows the sensitivity of the total NHS tangible asset estimates to how the Head Office asset value is allocated to individual branches. In the base case, calculations the Head Office asset values are allocated uniformly among all the branches belonging to that entity in the population. The table below shows how the results change if the Head Office asset values are allocated to individual branches in proportion to the revenues they generate.   We note that, if head office assets are allocated in proportion to branch revenue, the corresponding implied uplift calculated for Large Multiples (as discussed in section 1.5.2) is 22.8% rather than 13.7%.

Table 23: Sensitivity to method of allocating Head Office assets to branches

	Independent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
Base case (allocating Head Office assets to branches uniformly)	£74,650	£81,417	£107,589	£160,425	£148,483	£105,400	£118,362
Allocating Head Office assets to branches in proportion to revenue	£74,668	£81,920	£107,493	£136,583	£164,131	£105,419	£111,858

Source: PwC survey

Appendix N – Intangible Asset Valuation

1.1.   Summary

In addition to operating costs, the cost of providing NHS pharmaceutical services also includes a fair return on investment. The project team held a series of meetings at which the appropriate rate of return for investors in community pharmacies was discussed. We note that the purpose of this report is to identify and quantify the various NHS costs involved in delivering community pharmacy services.   The question as to the extent to which the NHS should pay for the different categories of cost is outside the scope of PwC's work and may be a matter for further negotiation.

To remain a viable commercial enterprise, investors in pharmacy businesses need to earn a fair rate of return to recognise the risks they have taken in investing in their business. We have sought to estimate the fair return for the NHS component of a pharmacy business. The approach taken to estimating this rate of return is based on the Weighted Average Cost of Capital (WACC). The WACC is the minimum rate of return an investor would achieve in a competitive market. WACC is most readily applied to calculating fair return for investors in large companies, since its application generally involves the use of stock market information. It has strong theoretical underpinnings and many regulators and competition authorities have used the WACC framework in their analyses; there is therefore strong precedent for its use. WACC is arguably not so well suited for calculating fair return for investors in smaller companies, such as Independents and Smaller Multiple pharmacy businesses. However, there is no standard framework that is commonly used for estimating a fair rate of return for investors in such smaller businesses. We recommend that a pragmatic, and defensible, approach is to use the standard WACC framework for the small pharmacy companies as for the Large Multiples & Supermarkets, with appropriate application of a Small Companies Premium. Such premia have been adopted by UK regulators in setting prices (for example, by OFWAT[2]).

Under the WACC approach, the Fair Rate of Return is calculated as:

Fair Rate of Return = WACC x (Tangible Assets + Intangible Assets)

The purpose of this paper is to outline the approach used to estimate the value of intangible assets. The issues of valuing tangible assets and estimating an appropriate WACC are covered in Appendices M and O respectively.

In summary, the modelling approach used is as follows:

- The intangible asset percentage is estimated using a Greenfield Net Present Value (NPV) modelling approach with steady-state revenue and cost figures based on the survey sample and using a revenue convergence profile for the start-up that is based on fee item analysis of NHSBSA data for start-up pharmacies.

- Start-up costs are assumed to lie between steady state costs and a convergence profile for costs that is based on a squared-term regression of NHS revenue against NHS costs for the steady-state main survey sample (including a constant term). We recommend using the mid-point of results using these two assumptions as the base case assumption for calculating a value for intangible assets.

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[2] As described in the Ofwat report "Future water and sewerage charges 2010-15:Final determinations"(2009).

- Start-up pharmacies are assumed to reach steady state over a period of 5 years and the profits are calculated over a period of 25 years.

- The assumed terminal growth rate is 2.25% which is equivalent to a long-term view of real GDP

- The assumed average tax rate is 25.6% which is the average of the tax rates used in the WACC calculations.

- The discount rate used is 9.2% which is the real post-tax WACC. This discount rate reflects the cost of capital to an investor of investing in a pharmacy business.

- Intangible asset value is calculated as 20% of total NHS turnover

Three Annexes are included showing: the details of the market capitalisation analysis, the sensitivity of the Greenfield results to a number of different analysis assumptions and a summary of the Greenfield base case assumptions.

In this paper we set out the details of the method used to estimate a value for Intangible Assets for individual pharmacy branches. Based on current assumptions, the average NHS intangible asset value is estimated to be £169.6K per branch.

1.2.   *Estimating the value of intangible assets*

In addition to earning a fair return on the tangible assets invested in a business, an investor requires a fair return on the intangible assets associated with the business. Intangible assets include the effort and negative profits involved in the early years of setting up a business to reach the point where is it possible for the business to generate a steady stream of revenues.

PwC's recommendation is to include an estimate of intangible asset value in the asset base for fair return calculations[3]. However, the issue of how best to quantify intangible assets is the subject of some debate.

Broadly speaking, there are two possible methods of estimating the value of intangible assets within community pharmacies:

- Bottom-up approach. This approach seeks to value each identifiable intangible asset within a pharmacy to derive an aggregate measure.
- Top-down approach. There are a variety of methods within this approach, but all attempt to establish the value of intangible assets by reference to a proxy measure – for example, the additional revenues a company is able to generate.

We outline each approach in more detail below.

1.2.1.   *Bottom-up approach*

In a bottom-up approach, we would typically identify specific intangible assets in existence within pharmacies and then attempt to estimate their value.

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[3] We note that there is potentially some degree of overlap between intangible asset value and operating costs, however when considering any such overlap it would be necessary to distinguish between the cost of building up intangible assets originally versus the cost of maintaining intangible assets at that level. Although we have no basis for quantifying these two types of cost, we suggest that the majority of operating costs that might be seen as overlapping with intangible asset values are in fact the cost of maintaining assets rather than acquiring them originally.

Figure 1 shows the bottom-up approaches commonly used when valuing intangible assets. We comment on each of these approaches below.

Figure 1: Intangible asset valuation approaches

Market approach	Income approach	Cost approach
Value estimate – based on multiples or prices from market transactions involving the sale of comparable assets	Value estimate – present value of earnings attributable to the asset or costs avoided as a result of owning the asset	Value estimate – reproduction/replacement cost, adjusted for depreciation and obsolescence

Income approach methods: Relief-from-Royalty method | Multi-period excess earnings method | Incremental cash flow method

Source: PwC

- It is often difficult to use the market approach because of difficulties identifying market transactions of comparable assets.

- The income approach tends to be the most commonly used methodology to value intangible assets. However, use of this technique introduces an element of circularity into the calculation – businesses have assets whose value is determined by what they can charge, and charges are then based on the asset values calculated. This is not an issue in most valuations as valuers generally want to identify an accepted market value based on forecast revenues. But in the case of NHS pharmacy the issue is to identify an appropriate level of remuneration, and to base it on projections of current remuneration would not provide an independent measure. For example, it is possible that the present value of future earnings may be inflated by restricted entry to the sector. If it were the case that restricted entry increased earnings above what they would otherwise be in a situation of free entry, then the income approach would be unreliable – the calculation of the intangible asset value would take into account the hypothesised increased earnings, potentially creating a self-fulfilling circularity where the hypothesised increased earnings would be justified on the basis of intangible asset values which were themselves inflated by the same earnings figures. As a consequence, we concluded that the income approach may not be the most appropriate methodology for valuing intangible assets in this instance.

- The cost approach uses either the depreciated replacement cost to determine the value of the intangible assets, or the actual costs incurred in creating the assets (a "pure" cost approach), which often represents the minimum value which should be attributed to the intangible assets. Where possible, the results of such analysis should be compared with examples of where market prices have been paid to recreate the intangible assets in question. However the cost approach may not give an objective or reliable measure of the value of intangible assets contained within a pharmacy. Many of the intangible assets will have been created over a number of years through time, training and effort in providing a high standard of service and care. Simply using identifiable costs will not provide an appropriate or reasonable estimate of the value of the intangible assets.

A bottom-up approach to valuing intangible assets may seem preferable due to its greater potential for accuracy. However, there are several practical difficulties in trying to evaluate intangible asset value using such

an approach. Furthermore, the analysis necessary to complete the bottom-up approach is extensive and outside the scope of this study.

As a consequence, we have chosen to use top-down analysis to assess the overall levels of intangible assets that exist within NHS pharmacies.

1.2.2. *Top-down approach*

There are various methods of estimating the value of intangible assets using a top-down approach. We have considered two for use in this analysis:

- A hypothetical comparison of the value of an established pharmacy against the cost of setting-up a new pharmacy (a "Greenfield" assessment).

- A comparison of the market capitalisations of companies with their tangible net asset bases.

Each method relies on the assumption that an established business will have built up intangible assets over time and that investors would implicitly recognise the intangible asset base by placing a premium on an established business compared to a start-up. The cost of acquiring a mature pharmacy would therefore reflect the fact that the business included assets or factors that were not necessarily represented on the balance sheet.

The potential advantage of the Greenfield approach is that it uses information gathered from our pharmacy sample and can be tailored to the specific case of community pharmacy. However:

- The results of the model are sensitive to input assumptions, particularly the assumptions regarding convergence of revenues towards a steady state.

- We acknowledge that in reality our sample is likely to have included a small number of pharmacy branches in start-up phase. Revenues and costs for these branches are reflected in our estimates of average branch revenues and costs, meaning that we slightly understate the profitability of a fully established pharmacy and therefore also understate the value of the intangibles assets that is derived.

- We also note that when computing average values for revenues and costs to provide inputs to the Greenfield model it may be appropriate to make certain adjustments for the various fees and allowances that pharmacies receive (e.g. payments for very small pharmacies).

- The estimate of operating costs currently includes the cost of providing enhanced services, although not all pharmacy branches provide these.

The potential advantage of the market capitalisation approach is that it is based on observed data and is a reasonable measure of the value that investors attach to intangible assets. However, this is not a perfect approach in the context of community pharmacies, principally because:

- It is difficult to find companies that are good comparators to the population of pharmacies. In this analysis we have confined the analysis to quoted companies with a retail focus.

- The intangible assets in the comparator group are likely to include a significant element of brand value. This is unlikely to be as significant in the case of community pharmacies, although the personal reputation of the pharmacist is something that retailers do not have to the same extent.

- The estimate is likely to be sensitive to the time period chosen for examining valuations of the comparator group.

The Greenfield approach is our preferred methodology for estimating the value of intangible assets because it is transparent about the assumptions being made and is based on direct assessment of the current pharmacy market in England.

For the purposes of comparison, in Annex 1 we also show the intangible asset valuation results based on an analysis of market capitalisation figures.

1.3. Greenfield model

1.3.1. Overview

The Greenfield model approach to valuing intangible assets is based on building simple models of two types of pharmacies: a steady-state pharmacy and a start-up pharmacy.

The difference in value between the two types of pharmacy represents the premium an investor might be willing to pay to invest in an established pharmacy compared with a start-up pharmacy. This is illustrated in the chart below.

Figure 2: Greenfield approach illustration
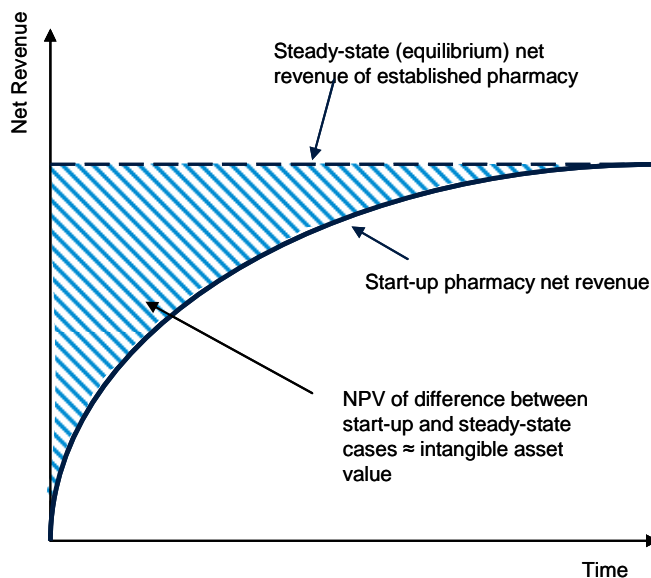
This premium that an investor would be willing to pay can be seen as a measure of the intangible asset value for the steady-state pharmacy, i.e.

Intangible asset value of steady-state pharmacy =

NPV of steady-state pharmacy − NPV of start-up pharmacy

This intangible asset value can then be scaled to individual pharmacy branches by expressing in terms of some measure of the size of the branch. We have chosen to express the value of intangible assets as a percentage of the steady-state NHS turnover of each branch.

1.3.2. Modelling assumptions

We have built a simple Excel model to carry out this Greenfield assessment. The key inputs to these models are:

- Costs and revenues for a steady-state pharmacy.

- How costs and revenues build-up for a start-up pharmacy, in particular, the starting point and the number of years it takes to reach steady-state.

The details of all model inputs are described in this paper. Annex 2 provides further detail on the sensitivity of the results to different analysis assumptions.

The model inputs are based on data from our sample and data from secondary sources as well as discussions we have had with an independent pharmacy owner, a pharmaceutical wholesaler and a pharmacy refit company.

Where possible, we have used the COSI survey data to inform the inputs for the Greenfield model. By using the survey sample to provide inputs to the Greenfield calculation, we are assuming that the branches in the sample

have reached a steady state in terms of revenues. We believe this to be a reasonable working assumption although in reality a small number of the branches in the sample are likely to have been in start-up phase at the time of the survey. According to NHSBSA data, 13 of the pharmacies in the survey sample have opened since January 2005.

1.3.3.   Model Structure

We use a single model with inputs based on the average data across all pharmacy types. All revenues and costs in the model are expressed in real terms.

We model cash flows on a 25-year time horizon (plus terminal value) across all revenue phasing scenarios, although the same results would be obtained with cash flows modelled on a 3-, 5-, or 7-year time horizon.

We calculate NHS profit as NHS revenues minus NHS operating costs.

We assume that there is no significant additional capital expenditure or investment in working capital required in either the steady-state or start-up pharmacy scenario.

The Greenfield model does not include any estimate of the costs of setting up the start-up business

Tax assumptions are as follows:

- As for the WACC calculations, we assume a tax rate of 28% for pharmacies belonging to multiples and 21% for independent pharmacies. This is equivalent to an overall average tax rate of 25.6%.

- We assume that tax is paid on profits but tax is not paid if profits are negative.

- We assume that losses are rolled forward indefinitely such that tax is only assumed to be paid if the total profits since Year 0 are positive.

- We assume that tax is not paid until the following year.

- To ensure that the terminal values in the Greenfield model are calculated correctly, we have extended the Greenfield modelling period from 10 years to 25 years to ensure that, even when assumptions imply that the business makes considerable losses in the earlier years, they have begun paying tax before the end of the modelling period.

To calculate the NPV of the business, we use an annual discount rate. For this we use the post-tax real WACC[4] (calculated using a real risk-free rate based on an inflation assumption of 2.5%). This discount rate reflects the cost of capital to an investor of investing in a pharmacy business.

We assume that the business will continue operating into perpetuity so we include a terminal value calculation. For the terminal growth rate (the rate at which profits are assumed to grow beyond the modelling period) we use a long-term view of real GDP growth of 2.25%[5].

We calculate the difference in NPV between the start-up and established pharmacy business and express this difference as a percentage of NHS turnover. This is the estimate of NHS intangible assets.

Annex 3 shows full details of the Greenfield calculations based on base case assumptions.

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4 In this context, the post-tax real WACC is being used as a means to calculate the NPV of a pharmacy business. Once the estimate of intangible assets has been calculated the WACC is then applied to calculate the annual fair return required on those intangible assets.

5 The value of 2.25% is PwC's view - but is also broadly in line with Treasury assumptions.

1.4.   *Steady-state Pharmacy*

1.4.1.   *Steady-state Costs*

The steady-state total NHS cost for a pharmacy is assumed to be equivalent to the average NHS cost based on the survey data. For the calculations in the Greenfield model, average NHS costs are estimated using an FAC approach and include a proportion of common, Owner and Head Office costs. The cost figure excludes the cost of goods and also any element of fair return. It includes components of wages/salaries, lease/rates, energy, water, telephone, maintenance, professional fees, motor running costs, professional subscriptions, and training.

The overall average costs used in the Greenfield calculations is shown in the table below – together with a break down by pharmacy type.

Table 1: NHS Costs

	Indep-endent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
NHS Costs (excl Fair Return)	£155.0k	£173.9k	£236.2k	£208.4k	£338.5k	£226.4k	£207.1k

Source: PwC survey of pharmacists, 2010

1.5.   *Steady-state Revenues*

The steady-state total NHS revenue (Fees and NIC) is assumed to be equivalent to the average NHS revenue based on the survey data[6].

From this we have used NHSBSA reimbursement data to derive an average value for NHS revenues minus the cost that pharmacies pay for the drugs they dispense (i.e. NHS revenue (Fees only)). This calculation includes an assumption that the NHSBSA reimbursements paid to pharmacists includes a target drugs margin of £500m. We subtract this margin from the NHSBSA reimbursement payment to obtain an estimate of the cost that pharmacists pay for their drugs. For the purposes of the base case calculations we assume that the drugs margin is £500m and that it is allocated between pharmacies based on fee item volumes. This adjusted NHSBSA reimbursement figure is then subtracted from total NHS revenues to obtain an estimate of steady state NHS revenues excluding the cost of drugs.

The overall average revenues used in the Greenfield calculations are shown in the table below – together with a breakdown by pharmacy type.

Table 2: Average turnover figures for (assumed) steady-state pharmacies

	Independent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
NHS revenue (Fees and NIC)	£722.4k	£827.8k	£1,087.0k	£910.2k	£863.2k	£874.7k	£847.9k
NHS revenue (excluding cost of drugs)	£191.0k	£217.0k	£276.7k	£240.7k	£223.0k	£210.2k	£221.5k

Source: PwC survey of pharmacists, 2010

In addition, the average annual fee items processed by pharmacies are shown in the table below.

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[6] The exception to this is 10 branches where the NHS revenue figure based on the survey data was significantly larger or smaller than the NHS revenue figure obtained via NHSBSA payment data. Where NHS survey revenue was greater than 5x the NHSBSA revenuesor less than 20% of NHSBSA revenue, NHSBSA revenue was used for the purposes of calculations instead of the NHS survey revenue.

Table 3: Average annual fee items

	Independent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
Average annual fee items	68,428	77,509	98,591	84,974	76,680	78,756	78,659

Source: PwC survey of pharmacists, 2010

1.6. Start-up Pharmacy

1.6.1. Start-up Costs

For the start-up pharmacy, we assume that costs converge to the steady-state level of costs over the same period of time as the revenues.

We do not have any data on the costs of start-up pharmacies, however we suggest that it is possible to make some assumptions about the upper and lower bounds of these costs.

In terms of an upper bound, we suggest that over the start-up period we would not expect the costs of a start-up pharmacy to exceed the costs of a steady-state pharmacy over the same period. We test the impact on the results of assuming steady-state costs from the beginning of the start-up period.

In terms of a lower bound, we suggest that over the start-up period we would not expect the costs of a start-up pharmacy to be less than the costs of a steady-state pharmacy processing the same volume of fee items. We can use the survey data to quantify a relationship between NHS revenues (excluding NIC and assuming a margin of £500m) and NHS costs to enable us to estimate the costs of a steady-state pharmacy with a given fee item volume.

Using OLS regression to estimate a model of the form:

$$\text{NHS costs} = f(\text{NHS revenues}),$$

we find that the best fitting model is of the form:

NHS costs = a x (NHS revenues)^2 + b

where a = 1.05×10^{-6} (i.e. 0.00000105) and b = £ 141,888.2

The R-squared for this model is 0.50, compared with the equivalent linear model which has an R-squared of 0.47.

This squared term equation is such that when revenues reach steady-state, the calculated costs also match the costs of the steady-state pharmacy.

In Section 1.7, we calculate the results of the Greenfield model using these upper and lower bound assumptions for start-up costs.

Qualitative assessment of start-up costs

As a sense-check on these assumptions and the results of the regression analysis, we have given some qualitative consideration to the likely costs incurred by pharmacies in the early years of start-up.

In Year 0, we suggest that a start-up pharmacy would employ the minimum number of staff which we suggest might be 1 owner/pharmacist and 1 counter assistant (although we recognise that some start-up branches may feasibly be able to operate with only 1 pharmacist and no counter assistant)

We assume that all other costs would be the same as for an established pharmacy.

As shown in the table below, based on these assumptions and the full weighted survey sample, the mean average NHS cost would be £137,792. The median average is £122,775.

Table 4: Hypothetical costs for a start-up pharmacy

Cost component	Assumption for start-up in Year 0 (mean average)
1 Pharmacist	£46,525
1 Counter Assistant	£3,365
Other branch costs	£48,615
Head office costs	£28,601
Owner costs	£18,380
Total	£137,792

This average, based on qualitative assumptions, is slightly lower than the starting costs implied by the steady state regression analysis, but does suggest that start-up costs may be at least as high as £138K. In addition, start-ups are likely to incur additional costs in their early years as they develop their business – for example:

- Time costs involved in setting up their business and recruiting and training staff
- Cash costs relating to legal, accounting, regulatory and banking arrangements
- Cash costs relating to fitting out the pharmacy premises prior to trading commencing

In our view, therefore, the Year 0 costs implied by the results of the regression analysis, i.e. £156.9K[7], may reasonably be seen as a lower bound for the purposes of the Greenfield model.

1.6.2. Start-up Revenues

For the start-up pharmacy, we assume that revenue converges to the steady-state level of revenue over a number of years.

We have analysed historic NHSBSA payment data for the pharmacy population to inform the revenue convergence profile used in the Greenfield model. We have analysed data for the period September 2005 – March 2010[8]. Since exact payments and tariff amounts have changed since January 2005, for the purposes of analysis, we have focused on how the number of fee items dispensed evolves over time. The assumption is that the profile of how item volumes increase over time will be similar to the profile of how NHS revenues increase over time.

We understand there is some lag between items being dispensed by pharmacies and full payment being made by the NHSBSA. This means that the number of fee items calculated based on the September 2005 report (the earliest month for which we have data) will have actually been dispensed slightly earlier than this.

Based on information supplied by NHSBSA, which is based on a "best endeavours basis", there are 897 pharmacies that have opened and 248 that have closed since June 2005. For the purposes of extracting this data, a new contractor was defined as one that is:

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[7] This value of £156.9K is obtained by (1) multiplying the assumed steady state revenues of £221.5K (as shown in Table 2) by 48% (the Year 0 start-up revenue percentage shown below in Table 10) to obtain a Year 0 start-up revenue of £106.2K and (2) using this in the regression equation presented earlier in this section to calculate Year 0 costs.

[8] This was the period for which NHSBSA payment data was provided to the analysis team. PwC was initially provided with the 4 most recent years of data (i.e. September 2005 – August 2009). An additional 7 months of data was then provided during the analysis phase (i.e. September 2009 – March 2010)

- Linked to a PCT
- At a premises where there was not a contractor previously
- At a postcode where there was not a contractor previously
- Has not moved to this address from another premises

There are 806 pharmacies that opened since June 2005 and have not since closed for which monthly data has been provided to us by NHSBSA. These pharmacies form the basis for an analysis of how revenues evolve over time.

For the purposes of analysis, we divide the sample of 806 branches into 5 cohorts based on the period of time for which data is available, i.e. there is a much shorter time series of data available for pharmacies recently opened than those which opened in June 2005. A description of these 5 cohorts is provided below.

Table 5: Description of cohorts

Cohort	Number of months for which pharmacy has been open (ie. for which data is available)	Average number of months of data	Number of branches
1	1 – 12 months	5.8	252
2	13 – 24 months (1 full year)	17.7	187
3	25 – 36 months (2 full years)	29.4	165
4	37 – 48 months (3 full years)	40.8	135
5	49 – 55 months (4 full years)	53.2	67
	Total		806

Source: NHSBSA data

For information, the number of pharmacies of each type contained in these 5 cohorts is shown in the table below. This categorization is based on the classifications provided by NHSBSA. The distinction between SM<20 and SM>20 is based on our knowledge of the smaller multiples and the entities that were found during fieldwork to have more than 20 branches.

Table 6: Breakdown of cohorts by pharmacy type

Cohort	Independent	SM<20	SM>20	Large multiple
1	165	16	8	63
2	105	10	4	68
3	68	6		91
4	41	3	2	89
5	10		2	55
Grand Total	389	35	16	366

Source: NHSBSA data

The dataset of start-up pharmacies is not large enough to estimate separate start-up profiles for different pharmacy types. We focus on the set of start-up pharmacies as a whole and use the NHSBSA payment data to estimate a revenue convergence profile based on number of fee items

The table below shows average fee item volumes for each year for each of the 4 cohorts for which a full year of data is available (i.e. cohorts 2 – 5). The shading indicates that the average fee items are based on a partial year of data. For this analysis the start of each year is determined by the month in which the pharmacy began to receive payments for fee items. For example, this means that "1st year" covers a different time period for each pharmacy.

Table 7: Average annual fee items by cohort

Cohort	Description	1st year	2nd year	3rd year	4th year	5th year
2	1 full year	38,234	27,924	0	0	0
3	2 full years	39,970	61,383	30,126	0	0
4	3 full years	33,183	51,037	59,791	25,476	0
5	4 full years	44,737	57,026	63,386	69,426	33,000

Source: NHSBSA data, PwC analysis

The table below is an alternative presentation of this data, in which the partial year of data has been scaled up to represent 12 months. The scaling has been done based on the fee items processed in the corresponding months of the previous year as a proportion of the total fee items processed in the previous year. The partial years of data have been scaled up using the inverse of this proportion. The red font indicates data that has been scaled up in this way.

Table 8: Average annual fee items by cohort – with extrapolation

Cohort	Description	1st year	2nd year	3rd year	4th year	5th year
2	1 full year	38,234	118,748[9]			
3	2 full years	39,970	61,383	62,338		
4	3 full years	33,183	51,037	59,791	63,795	
5	4 full years	44,737	57,026	63,386	69,426	65,901

Source: NHSBSA data, PwC analysis

For the purpose of assessing an appropriate revenue convergence profile for the Greenfield model, we focus particularly on Cohorts 4 and 5 for which the longest time series of data is available. The sample size for Cohort 4 is twice as large as the sample size for Cohort 5 – but Cohort 5 provides an extra year of data.

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9 The extrapolated figure of 118,748 is more than 4 times larger than the original figure of 27,924. This is due to the fact that, in the case of Cohort 2, the extrapolation is based on looking at the fee items processed in the equivalent months in Year 1 – i.e. the first year the pharmacy was open - and expressing this fee item volume as a proportion of the total fee item volumes for the first year. As would be expected, there is a ramping up in terms of fee items processed such that the majority of fee items dispensed are dispensed later in the year. For example, in the first 4 months (33% of the year in terms of months), a pharmacy may have dispensed only 20% of the annual total of items. This means, the first 4 months of Year 2 would be multiplied by a factor of 5 (the inverse of 20%) to obtain an extrapolated estimate of Year 2 fee items. We note, however, that figures based on Cohorts 2 and 3 are not used in the final conclusions regarding an appropriate revenue ramp-up profile.

Figure 3: Average annual fee item volumes for start-up pharmacies
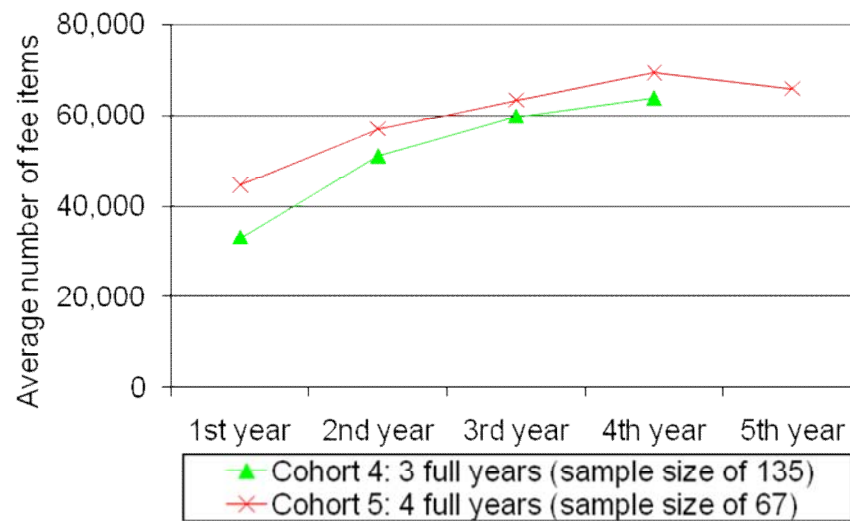
Source: NHSBSA data, PwC analysis

For the purposes of defining a revenue convergence profile, these annual fee item volumes are expressed as a percentage of the average annual fee item volumes dispensed by a steady-state pharmacy. These steady state fee item volumes are based on the survey sample and the percentages are calculated based on average fee item volumes for each pharmacy type.

Table 9: Annual fee item volume as percentage of steady state pharmacy volume

Cohort	Description	Sample size	Year 0	Year 1	Year 2	Year 3	Year 4
4	3 full years	135	44%	67%	79%	85%	
5	4 full years	67	56%	71%	79%	87%	83%
Weighted Average		202	48%	69%	79%	85%	83%

Source: NHSBSA data, PwC analysis

This analysis indicates that, after 4 years, on average pharmacies are dispensing 83% of the fee item volume of a steady-state pharmacy of the same type. We must now take a view on the number of years it will take beyond this point for fee item volumes to reach 100% (i.e. the steady-state level).

In the previous cost inquiry, we understand a 5-year ramp up profile was used. We suggest that a 5-year profile would also be consistent with the results of this analysis. We have created a scenario that assumes a 5-year ramp-up profile as shown in the chart below ("5 year analysis scenario"). The fee item percentages for years 4 and 5 are qualitative assumptions. We suggest that the Year 4 figure of 83% emerging from the analysis, which is lower than the Year 3 figure of 85%, may be driven by the fact that the sample size of 67 is relatively small, and also that the Year 4 figure is based on extrapolation rather than actual data. In the "5-year analysis scenario" the Year 4 figure of 83% is replaced with a value of 92% (which is the mid-point of the Year 3 and Year 5 figures). We assume that fee items reach 100% in year 5.

We refer to this revenue convergence profile as the "5 year analysis profile (based on fee items)".

Figure 4: 5-year analysis scenario
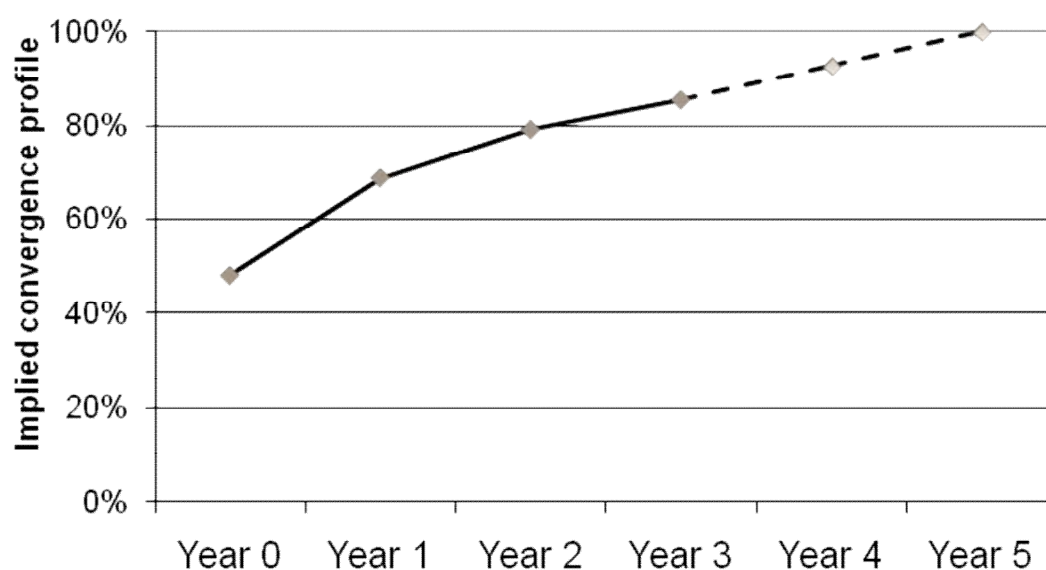
The table below shows the numbers this chart is based on.

Table 10: Assumed turnover profile for start-up pharmacy

	Years from launch					
	Year 0	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Turnover (as a percentage of steady-state turnover)	48%	69%	79%	85%	92%	100%

We note that the revenues paid to pharmacies processing more than (approximately) 2500 fee items per month include an annual establishment payment of (approximately) £25,000. Pharmacies processing less than 2500 fee items per month do not receive this payment. To reflect this, in the Greenfield model we subtract £25,000 from annual revenues for the early years of the start-up pharmacy. We have subtracted £25,000 where the start-up revenue percentage multiplied by the average monthly fee items is less than 2500.

1.7.   *Estimate of Intangible Assets*

In the table below we show the results of the Greenfield model based on the approach and assumptions set out in this paper and using the "5 year analysis (based on fee items)" scenario as a basis for revenue convergence of the start-up pharmacy. We show results using the two alternative sets of assumptions discussed for the costs of the start-up pharmacy.

Table 11: Greenfield model results

Scenario	Number of years	% of total NHS turnover	% of turnover exc. NIC
Lower bound: Start up costs based on squared-term regression	5	12.3%	47.2%
Upper bound: Start-up costs assumed to be equal to steady state costs	5	25.7%	98.5%
Mid-point (recommended)	5	20.0%	76.5%

We consider that the 12.3% figure is likely to be an underestimate of intangible assets and the 25.7% figure is likely to be an overestimate of intangible figures. In the absence of data on how the costs of start-up pharmacies

evolve, we suggest that a pragmatic approach is to use a percentage between these two values. We propose to use a value of 20% in our base case calculations10.

The market capitalisation analysis shown in Annex 1 suggests a value of 38% rather than 20%, however we suggest that the market capitalisation analysis overestimates the value of intangibles since it is based on a comparator set of retail companies. We suggest that the Greenfield model is a better basis for estimating a value for intangible assets since it is specifically tailored to community pharmacy businesses.

Using an estimate of 20% and expressing intangible assets as a percentage of total NHS turnover, the estimated values of intangible assets are as shown in the table below.

Table 12: Intangible asset values

	Indep-endent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
Calculated as 20% of total NHS turnover	£144.5k	£165.6k	£217.4k	£182.0k	£172.6k	£174.9k	£169.6k

Source: PwC survey of pharmacists, 2010

10 We note that the exact mid-point of the upper bound and lower bound percentages mentioned is closer to 19%, however we suggest that given the assumption-driven nature of the Greenfield approach, it is more appropriate to round this value t0 20%. 20% is the output of a model where start-up costs are calculated as a weighted average of the steady state costs and the squared term regression costs and the relative weights of the steady state and regression costs are 52%/48% respectively.

Annexes

Annex 1 - Market capitalisation approach

The market capitalisation approach is based on looking at the difference between the market capitalisation of quoted companies in a competitive industry and their tangible net assets. This gives an indication of the value that investors attribute to intangible assets.

The percentage calculated via the market capitalisation analysis is comparable to the Greenfield percentages expressed in terms of total turnover (including NIC). We note however that estimates of intangible asset value derived from market capitalisation analysis are likely to be high in the context of pharmacy because they include an element of brand value, which is arguably less relevant for pharmacy, particularly independents and small multiples.

To undertake this approach, we have identified a number of comparator companies (focusing on quoted companies in the retail sector). The companies are: Marks and Spencer, French Connection, Alexon Group, Blacks Leisure Group, Next, Laura Ashley, Ted Baker plc, Morrisons, Sainsbury, Tesco, Home Retail Group, DSG International, Mothercare, WH Smith. We are aware that these comparators are less than ideal in the context of community pharmacy.

We have calculated the excess of market capitalisation over net assets over a number of years to examine the fluctuation within, as well as between, the sample of retail companies. The results are shown in the table below – expressed as a percentage of total turnover.

Table 13: Market capitalisation analysis results

	2010	2009	2008	2007	2006	2005	Average 2005-2010
Marks and Spencer	38.2%	17.4%	65.5%	126.2%	92.9%	69.4%	68.3%
French Connection	-26.1%	-32.2%	-5.4%	29.3%	51.6%	65.1%	13.7%
Alexon Group	4.5%	-10.7%	-14.1%	4.3%	12.9%	23.2%	3.4%
Blacks Leisure Group	-16.3%	-24.7%	-14.6%	9.2%	40.7%	40.3%	5.7%
Next	110.7%	69.4%	84.6%	136.7%	139.4%	149.6%	115.1%
Laura Ashley	16.6%	4.3%	45.9%	69.3%	14.9%	7.7%	26.4%
Ted Baker plc	94.8%	61.0%	116.0%	189.7%	175.1%	207.9%	140.7%
Morrisons	21.9%	19.0%	29.7%	29.9%	6.8%	78.6%	31.0%
Sainsbury	8.8%	3.9%	12.7%	20.0%	6.0%	-2.7%	8.1%
Tesco	38.8%	32.7%	49.9%	57.1%	45.4%		44.8%
Home Retail Group	-9.4%	-27.5%	-11.7%	21.6%			-6.8%
DSG International	7.0%	-5.3%	0.8%	22.6%	28.0%	24.5%	12.9%
Mothercare	51.2%	20.0%	35.6%	25.8%	30.7%	13.5%	29.5%
WH Smith	42.5%	26.0%	74.0%	40.3%	42.2%	14.9%	40.0%
Average	27.4%	10.9%	33.5%	55.9%	52.8%	57.7%	38.1%

As shown, the average annual figure for this group of companies over the period 2005 – 2010 is 38.1% of turnover, although the figures do show considerable variation by company and by year. This value can be seen as an estimate of the average intangible asset value of the companies over the period.

As already stated, our preferred approach for estimating an appropriate intangible asset value is the Greenfield approach rather than market capitalisation analysis. We suggest that the market capitalisation analysis results in a percentage that is too high in the context of community pharmacy.

Annex 2 – Intangible asset sensitivity analysis

This Annex shows the sensitivity of the intangible asset calculations to certain analysis assumptions. For the most part, this analysis focuses on the sensitivity of the results when using the mid-point of the squared term regression and steady steady to estimate start-up costs (i.e. the cost model that yields the result of 20% of revenues as an estimate of intangible assets).

Start-up Revenues - Using analysis of NHSBSA remuneration (excl reimbursement) to generate revenue convergence profile instead of NHSBSA fee items

The table below shows average NHSBSA remuneration for each year for each of the 4 cohorts for which a full year of data is available (i.e. cohorts 2 – 5). For simplicity of this illustrative analysis, this remuneration does not include any element of drugs margin. The shading indicates that the average NHSBSA remuneration is based on a partial year of data. For this analysis the start of each year is determined by the month in which the pharmacy began to receive payments. For example, this means that "1st year" covers a different time period for each pharmacy.

Table 14: Average annual NHSBSA remuneration by cohort

Cohort	Description	1st year	2nd year	3rd year	4th year	5th year
2	1 full year	£92,756	£62,808	£0	£0	£0
3	2 full years	£82,941	£142,486	£69,055	£0	£0
4	3 full years	£64,374	£101,236	£141,207	£58,170	£0
5	4 full years	£82,300	£108,298	£119,327	£163,278	£74,962

Source: NHSBSA data, PwC analysis

The table below is an alternative presentation of this data, in which the partial year of data has been scaled up to represent 12 months. The scaling has done based on the NHSBSA remuneration in the corresponding months of the previous year as a proportion of the NHSBSA remuneration in the previous year. The partial years of data have been scaled up using the inverse of this proportion. The red font indicates data that has been scaled up in this way.

**Table 15: Average annual NHSBSA remuneration by cohort – with extrapolation**

Cohort	Description	1st year	2nd year	3rd year	4th year	5th year
2	1 full year	£92,756	£120,470			
3	2 full years	£82,941	£142,486	£132,175		
4	3 full years	£64,374	£101,236	£141,207	£142,224	
5	4 full years	£82,300	£108,298	£119,327	£163,278	£145,867

Source: NHSBSA data, PwC analysis

For the purpose of assessing an appropriate revenue convergence profile for the Greenfield model, we focus particularly on Cohorts 4 and 5 for which the longest time series of data is available. The sample size for Cohort 4 is twice as large as the sample size for Cohort 5 – but Cohort 5 provides an extra year of data.

Figure 5: Average annual NHSBSA remuneration for start-up pharmacies
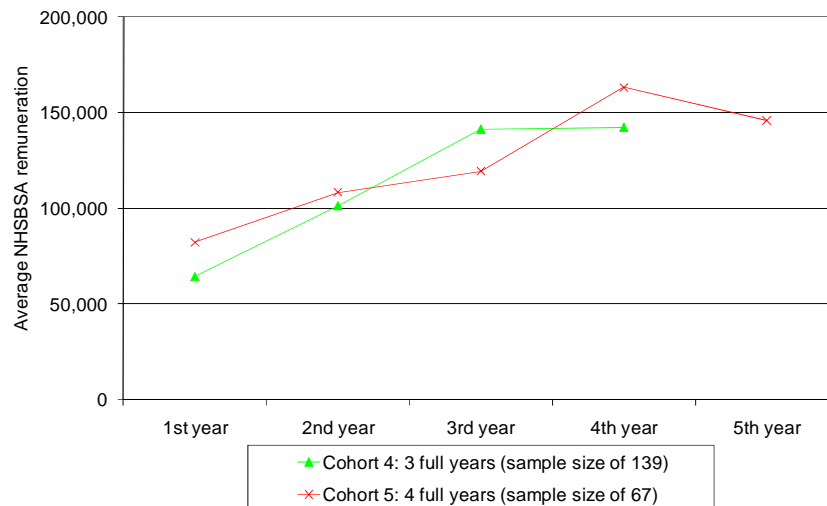
Source: NHSBSA data, PwC analysis

For the purposes of defining a revenue convergence profile, these NHSBSA remuneration amounts are expressed as a percentage of the average NHSBSA remuneration dispensed by a steady-state pharmacy, by pharmacy type.

Table 16: Annual fee item volume as percentage of steady state pharmacy volume

Cohort	Description	Sample size	Year 0	Year 1	Year 2	Year 3	Year 4
2	1 full year	189	58%	164%			
3	2 full years	166	49%	85%	107%		
4	3 full years	139	39%	61%	85%	85%	
5	4 full years	67	47%	62%	68%	93%	82%
Weighted average		206	41%	61%	79%	88%	82%

Source: NHSBSA data, PwC analysis

This analysis indicates that, after 4 years, on average pharmacies are receiving 82% of the remuneration from the NHSBSA for a steady-state pharmacy of the same type. We must now take a view on the number of years it will take beyond this point for fee item volumes to reach 100% (i.e. the steady-state level).

We have created a scenario that assumes a 5-year ramp-up profile as shown in the chart below ("5 year analysis scenario"). The fee item percentages for years 4 and 5 are qualitative assumptions. We suggest that the Year 4 figure of 82% emerging from the analysis, which is lower than the Year 3 figure of 88%, may be driven by the fact that the sample size of 67 is relatively small, and also that the Year 4 figure is based on extrapolation rather than actual data. In the "5-year analysis scenario" the Year 4 figure of 83% is replaced with a value of 94% (which is the mid-point of the Year 3 and Year 5 figures). We assume that fee items reach 100% in year 5.

Figure 6: 5-year analysis scenario (based on remuneration)
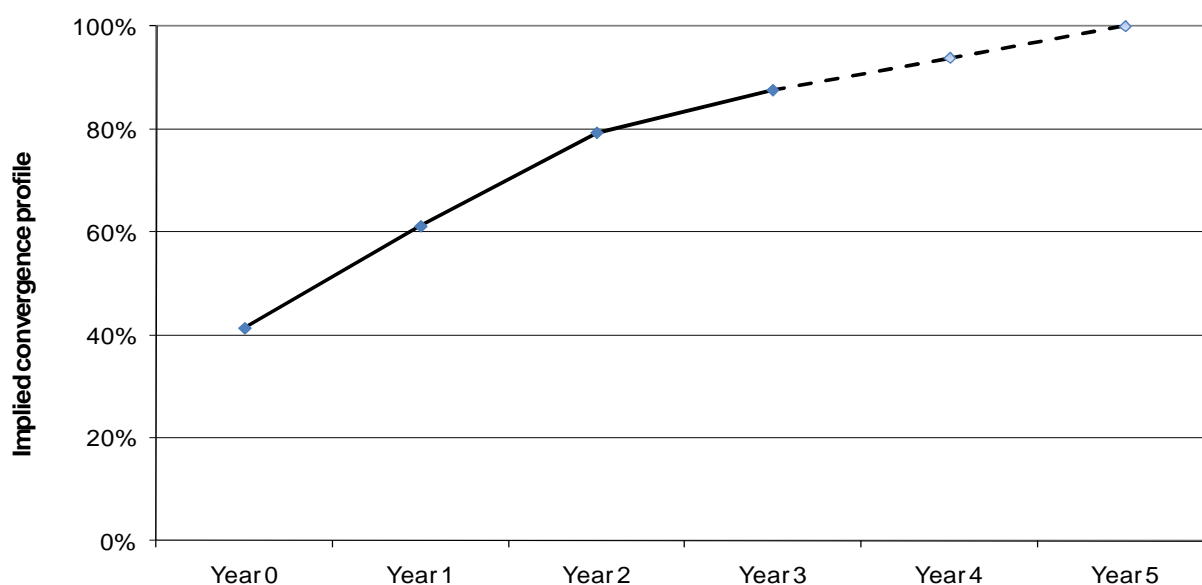
Source: NHSBSA data, PwC analysis and assumptions

We note that when using this profile to model start-up revenues in the Greenfield model, it is unnecessary to subtract the establishment payment from the calculated revenues since this will have potentially already been captured in the calculation of the profile percentages.

In the table below we show the results of the Greenfield model using the "5 year analysis (based on remuneration)" scenario as a basis for revenue convergence of the start-up pharmacy and keeping all assumptions at their default levels.

Table 17: Greenfield model results (using costs based on regression)

Scenario	Number of years	% of total NHS turnover	% of turnover exc. NIC
5-year analysis scenario (based on fee items)	5	20%	76.5%
5-year analysis scenario (based on remuneration)	5	22.6%	86.4%

Start-up Revenues - Other revenue profiles tested

For the purposes of comparison, the table below shows a number of other revenue convergence scenarios discussed during the course of the project. The table following shows the results of the Greenfield model using each of these scenarios.

Table 18: Scenario definitions

Scenario	# years	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
5-year analysis scenario	5	48%	69%	79%	85%	92%	100%		
Profile used for previous COSI	5	59%	64%	73%	78%	90%	100%		
Profile used in previous PwC	5	47%	57%	70%	83%	95%	100%		

work								
Qualitative scenario - 5 years	5	30%	55%	75%	90%	95%	100%	
Qualitative scenario - 3 years	3	40%	70%	90%	100%			
Qualitative scenario - 7 years	7	30%	45%	57%	70%	80%	88%	95%	100%

The table below shows the results of the Greenfield model using each of these revenue convergence scenarios for the start-up pharmacy.

Table 19: Greenfield model results (using costs based on regression)

Scenario	Number of years	% of total NHS turnover	% of turnover exc. NIC
5-year analysis scenario (based on fee items)	5	20%	76.5%
Profile used for previous COSI	5	21.3%	81.5%
Profile used in previous PwC work	5	24.7%	94.5%
Qualitative scenario developed earlier in this project - 5 years	5	29.8%	114.2%
Qualitative scenario developed earlier in this project - 3 years	3	15.5%	59.4%
Qualitative scenario developed earlier in this project - 7 years	7	44.8%	171.6%

Start-up Costs – linear model rather than squared term model

In the base case model, the lower bound costs for the start-up pharmacy are based on a squared term regression of costs against turnover squared. The results using a linear regression of costs against turnover are shown in the table below. This model has an R-squared of 0.47 which is only slightly lower than that of the squared term model (0.5). The linear model is of the form costs = 0.674 x turnover + 57,747.2 .

Table 20: Start-up costs regression model

Scenario	Number of years	% of total NHS turnover	% of turnover exc. NIC
Squared term costs model	5	12.3%	47.2%
Linear costs model	5	7.3%	28.1%

Steady-State Revenues – Margin assumption

Currently in our analysis the default assumption is that the margin on drugs is £500m

The margin assumption is used in the analysis to calculate the amount pharmacists actually pay for the drugs they purchase relative to the amount they are reimbursed by NHSBSA.

The table below shows the sensitivity of the Greenfield results to this assumption. All other assumptions are set to default.

Table 21: Greenfield sensitivity to drug margin assumption (using costs based on squared term regression)

	% of total NHS turnover	% of turnover exc. NIC
Revenues calculated assuming £500M margin (Average turnover excluding NIC is £221k)	20.0%	76.5%
Revenues calculated assuming £750M margin (Average turnover excluding NIC is £246k)	20.6%	70.9%
Revenues calculated assuming £1000M margin (Average turnover excluding NIC is £271k)	22.0%	68.9%

Tax rate assumption

The tax rate used in the Greenfield model is 25.6%

This is a weighted average of the survey sample. As discussed in Appendix O, a tax rate of 21% is assumed for Independents and a tax rate of 28% is assumed for all other pharmacies.

The table below shows the sensitivity of the Greenfield percentages to the tax rate assumption.

Table 22: Greenfield sensitivity to tax rate assumption (using costs based on regression)

	% of total NHS turnover	% of turnover exc. NIC
Tax rate of 21%	20.7%	79.3%
Tax rate of 25.6%	20.0%	76.5%
Tax rate of 28%	19.6%	75.1%

Expressing results as percentage of turnover

The table below shows the impact of calculating intangible asset values as % of total NHS turnover or NHS turnover excluding cost of goods. On average, the result is the same, but there are variations at the pharmacy type level.

Table 23: Intangible assets expressed as proportion of turnover

	Independent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
Calculated as 20% of total NHS turnover	£144.5k	£165.6k	£217.4k	£182.0k	£172.6k	£174.9k	£169.6k
Calculated as 76.7% of NHS turnover excluding cogs	£146.2k	£166.2k	£211.8k	£184.3k	£170.7k	£160.9k	£169.6k

Median average intangible asset values

The table below shows the median average intangible asset values calculated, as well as the mean average values.

Table 24: Median and mean average intangible asset values

	Independent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall

Mean average	£144.5k	£165.6k	£217.4k	£182.0k	£172.6k	£174.9k	£169.6k
Median average	£146.2k	£166.2k	£211.8k	£184.3k	£170.7k	£160.9k	£169.6k

1.8.   Annex 3 - Base Case Greenfield Model

Below we outline our detailed assumptions underpinning the Greenfield modelling analysis.

Figure 7: Greenfield modelling assumptions

Input	Value	Notes/Source
Average tax rate	25.6%	Average of 21% for independents and 28% for all other types
Terminal growth rate	2.25%	Equivalent to long-term view of real GDP
Nominal post-tax WACC	12.3%	Based on current WACC assumptions
Real post-tax WACC (used as the discount rate)	9.2%	Converted from nominal using 2.5% inflation and Fisher relationship
Steady-state NHS turnover (total NHS)	£847.9k	Average from survey
Steady-state NHS turnover (excluding COGS)	£221.5k	Average from survey – assuming £500m drugs margin
NHS turnover squared	£61,976,213k	Average from survey – assuming £500m drugs margin
Steady-state NHS costs (excluding fair return)	£207.1k	Average from survey – using Allocation Method 1
Steady-state fee items	78,659	Average from survey
Start-up revenue profile	Year 0: 48%, 1: 69%, 2: 79%, 3: 85%, 4: 92%, Year 5: 100%	Analysis of NHSBSA fee item volume data for start-up pharmacies
Start-up cost profile	Lower bound based on: squared term regression of the form costs = a = 1.05 x 10-6 x turnover squared +£141,888.2 ,Upper bound based on: assumption of steady state costs for start-up pharmacy (£207.1k)	Calculate results for upper and lower cost estimates – and take approximate mid-point of results for use in base case calculations.

Screenshots of the Greenfield model calculations are pasted into the figures below.

Figure 8: Greenfield model (costs based on squared-term regression)

Start-up option

NHS fee remunerations (minus establishment payment if implied items per month are less than 2500 based on revenue ramp up assumption)	£'000	106.2	152.3	175.1	189.1	203.8	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	
Costs	£'000	(156.9)	(172.7)	(182.6)	(189.3)	(197.0)	(207.0)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	
Pre-tax operating profit	£'000	(50.6)	(20.4)	(7.4)	(0.2)	6.8	14.5	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	
Tax	£'000											(0.1)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	
Post-tax profit	£'000	(50.6)	(20.4)	(7.4)	(0.2)	6.8	14.5	14.4	14.4	14.4	14.4	14.3	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	11.0
Discount factor		1.00	0.92	0.84	0.77	0.70	0.64	0.59	0.54	0.49	0.45	0.41	0.38	0.35	0.32	0.29	0.27	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.13	0.12
Present value of profits	£'000	(50.6)	(18.6)	(6.2)	(0.2)	4.8	9.4	8.5	7.8	7.1	6.5	5.9	4.1	3.7	3.4	3.1	2.9	2.6	2.4	2.2	2.0	1.8	1.7	1.5	1.4	17.5
NPV of start-up option	£'000	27.4																								

Purchase Established Pharmacy

NHS fee remunerations (minus establishment payment if implied items per month are less than 2500 based on revenue ramp up assumption)	£'000	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	
Costs	£'000	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	
Pre-tax operating profit	£'000	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	
Tax	£'000	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	
Post-tax profit	£'000	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	11.0
Discount factor		1.00	0.92	0.84	0.77	0.70	0.64	0.59	0.54	0.49	0.45	0.41	0.38	0.35	0.32	0.29	0.27	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.13	0.12
Present value of profits	£'000	10.7	9.8	9.0	8.2	7.5	6.9	6.3	5.8	5.3	4.9	4.5	4.1	3.7	3.4	3.1	2.9	2.6	2.4	2.2	2.0	1.8	1.7	1.5	1.4	17.5

NPV of established pharmacy	£'000	132.0
NPV of start-up pharmacy		27.4
NPV of established pharmacy		132.0
Difference due to intangible assets		**£104.6k** i.e. the premium that a purchaser, with a similar time horizon, would be prepared to pay to invest in an established pharmacy
As % of total turnover		**12.3%**
As % of NHS turnover excluding Net Ingredient Cost		**47.2%**

Notes:
1   We have ignored capital expenditure and investment in working capital on the basis that interested in intangible asset related difference
2   We have not included start-up costs in the analysis although this would most likely increase the differential

Figure 9: Greenfield model (costs assumed to be constant)

Start-up option

NHS fee remunerations (minus establishment payment if implied items per month are less than 2500 based on revenue ramp up assumption)	£'000	106.2	152.3	175.1	189.1	203.8	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	
Costs	£'000	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	
Pre-tax operating profit	£'000	(100.8)	(54.7)	(31.9)	(17.9)	(3.3)	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	
Tax	£'000																			(2.0)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	
Post-tax profit	£'000	(100.8)	(54.7)	(31.9)	(17.9)	(3.3)	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	12.4	10.7	10.7	10.7	10.7	10.7	11.0
Discount factor		1.00	0.92	0.84	0.77	0.70	0.64	0.59	0.54	0.49	0.45	0.41	0.38	0.35	0.32	0.29	0.27	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.13	0.12
Present value of profits	£'000	(100.8)	(50.1)	(26.8)	(13.8)	(2.3)	9.3	8.5	7.8	7.1	6.5	6.0	5.5	5.0	4.6	4.2	3.9	3.5	3.2	3.0	2.7	2.1	1.7	1.5	1.4	17.5
NPV of start-up option	£'000	(86.1)																								

Purchase Established Pharmacy

NHS fee remunerations (minus establishment payment if implied items per month are less than 2500 based on revenue ramp up assumption)	£'000	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	
Costs	£'000	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	
Pre-tax operating profit	£'000	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	
Tax	£'000	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	
Post-tax profit	£'000	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	11.0
Discount factor		1.00	0.92	0.84	0.77	0.70	0.64	0.59	0.54	0.49	0.45	0.41	0.38	0.35	0.32	0.29	0.27	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.13	0.12
Present value of profits	£'000	10.7	9.8	9.0	8.2	7.5	6.9	6.3	5.8	5.3	4.9	4.5	4.1	3.7	3.4	3.1	2.9	2.6	2.4	2.2	2.0	1.8	1.7	1.5	1.4	17.5

NPV of established pharmacy	£'000	132.0
NPV of start-up pharmacy		(86.1)
NPV of established pharmacy		132.0
Difference due to intangible assets		**£218.1k** i.e. the premium that a purchaser, with a similar time horizon, would be prepared to pay to invest in an established pharmacy
As % of total turnover		**25.7%**
As % of NHS turnover excluding Net Ingredient Cost		**98.5%**

Notes:
1   We have ignored capital expenditure and investment in working capital on the basis that interested in intangible asset related difference
2   We have not included start-up costs in the analysis although this would most likely increase the differential

Figure 10: Greenfield model (mid-point costs that yield overall result of 20%)

Start-up option

	£'000																										
NHS fee remunerations (minus establishment payment if implied items per month are less than 2500 based on revenue ramp up assumption)	£'000	106.2	152.3	175.1	189.1	203.8	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5
Costs	£'000	(186.0)	(192.6)	(196.8)	(199.6)	(202.8)	(207.0)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)
Pre-tax operating profit	£'000	(79.7)	(40.3)	(21.6)	(10.5)	0.9	14.5	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Tax	£'000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(1.9)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)
Post-tax profit	£'000	(79.7)	(40.3)	(21.6)	(10.5)	0.9	14.5	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	12.5	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7
																											11.0
Discount factor		1.00	0.92	0.84	0.77	0.70	0.64	0.59	0.54	0.49	0.45	0.41	0.38	0.35	0.32	0.29	0.27	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11
Present value of profits	£'000	(79.7)	(36.9)	(18.1)	(8.1)	0.7	9.3	8.5	7.8	7.1	6.5	6.0	5.5	5.0	4.6	4.2	3.9	3.1	2.4	2.2	2.0	1.8	1.7	1.5	1.4	1.3	1.2
																											17.5
NPV of start-up option	£'000	(37.5)																									

Purchase Established Pharmacy

	£'000																										
NHS fee remunerations (minus establishment payment if implied items per month are less than 2500 based on revenue ramp up assumption)	£'000	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5	221.5
Costs	£'000	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)	(207.1)
Pre-tax operating profit	£'000	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Tax	£'000	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)	(3.7)
Post-tax profit	£'000	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7
																											11.0
Discount factor		1.00	0.92	0.84	0.77	0.70	0.64	0.59	0.54	0.49	0.45	0.41	0.38	0.35	0.32	0.29	0.27	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11
Present value of profits	£'000	10.7	9.8	9.0	8.2	7.5	6.9	6.3	5.8	5.3	4.9	4.5	4.1	3.7	3.4	3.1	2.9	2.6	2.4	2.2	2.0	1.8	1.7	1.5	1.4	1.3	1.2
																											17.5
NPV of established pharmacy	£'000	132.0																									

NPV of start-up pharmacy	(37.5)
NPV of established pharmacy	132.0
Difference due to intangible assets	£169.5k i.e. the premium that a purchaser, with a similar time horizon, would be prepared to pay to invest in an established pharmacy
As % of total turnover	20.0%
As % of NHS turnover excluding Net Ingredient Cost	76.5%

Appendix O – Cost of Capital

1.1.   Introduction

In addition to operating costs, the cost of providing NHS pharmaceutical services also includes a fair return on investment. The project team held a series of meetings at which the appropriate rate of return for investors in community pharmacies was discussed.   We note that the purpose of this report is to identify and quantify the various NHS costs involved in delivering community pharmacy services.   The question as to the extent to which the NHS should pay for the different categories of cost is outside the scope of PwC's work and may be a matter for further negotiation.

To remain a viable commercial enterprise, investors in pharmacy businesses need to earn a fair rate of return to recognise the risks they have taken in investing in their business. We have sought to estimate the fair return for the NHS component of a pharmacy business. The approach taken to estimating this fair return is based on the Weighted Average Cost of Capital (WACC). The WACC is the minimum rate of return an investor would achieve in a competitive market. WACC is most readily applied to calculating fair return for investors in large companies, since its application generally involves the use of stock market information. It has strong theoretical underpinnings and many regulators and competition authorities have used the WACC framework in their analyses; there is therefore strong precedent for its use. WACC is arguably not so well suited for calculating fair return for investors in smaller companies, such as Independents and Smaller Multiple pharmacy businesses. However, there is no standard framework that is commonly used for estimating a fair rate of return for investors in such smaller businesses. We recommend that a pragmatic, and defensible, approach is to use the standard WACC framework for the small pharmacy companies as for the Large Multiples & Supermarkets, with appropriate application of a Small Companies Premium. Such premia have been adopted by UK regulators in setting prices (for example, by OFWAT[2]).

Under the WACC approach, the Fair Rate of Return is calculated as:

Fair Rate of Return = WACC x (Tangible Assets + Intangible Assets)

The purpose of this paper is to outline approaches to estimating the value of the Cost of Capital. The issues of valuing tangible and intangible assets are covered in Appendices M and N respectively.

1.2.   The components of WACC

The WACC reflects the fact that firms are generally financed through a mixture of debt and equity finance, providers of which face differing levels of risk. Using the WACC approach, the overall measure of the (post-tax) cost of capital of a firm is calculated using the formula:

$$\text{WACC} = \frac{D}{D+E} k_D (1-T) + \frac{E}{D+E} k_E \text{,}$$

Where: D is the value of debt in the capital structure;

E is the value of equity in the capital structure;

k_D is the pre-tax cost of debt;

k_E is the post-tax cost of equity; and

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2 As described in the Ofwat report "Future water and sewerage charges 2010-15: Final determinations"(2009).

T is the tax shield, or corporate tax rate.

To estimate the overall WACC, each of the individual elements of the formula needs to be determined. In the remainder of this paper we outline in detail our approach to the estimation of each of these elements, before bringing them all together and presenting our WACC estimates.

In the course of this WACC paper, we discuss the types of risks faced by pharmacies and their impact on the required rate of return for investors.

1.3.   Summary of our approach

In summary, the modelling approach used is as follows:

- A standard Capital Asset Pricing Model (CAPM) framework has been used to calculate the cost of equity across all pharmacy types. An equity beta point estimate of 0.82 is used based on a set of retail pharmacy comparators. Detail is provided on why we believe this level of equity beta is appropriate. Values of 1.0 and 0.7 have also been tested based on a comparison with regulated businesses. Regulated businesses may be viewed as relevant comparators for a pure pharmacy business. In particular, they have very stable demand cyclicality which may be considered analogous to pharmacies.

- Based on an analysis of the size of the companies in the sample, we recommend a Small Company Premium (SCP) of 6.33% for Independents and Smaller Multiples and 1.13% for Large Multiples & Supermarkets.

- We use an EMRP of 5% based on a review of EMRP estimates.

- We use a debt margin of 2.5% based on margins for a spread of UK companies with a BBB credit rating.

- The risks facing a pharmacy branch may vary depending on the pharmacy type and its ownership structure. For the purposes of calculating the Cost of Capital for the Cost Inquiry the pharmacy branch population of England has been divided into four key groups: Independents (belonging to entities with 1 - 5 branches), SM<20 (belonging to entities with 6 - 20 branches), SM>20 (belonging to entities with more than 20 branches but which are not one of the 10 Large Multiples & Supermarkets), and Large Multiples & Supermarkets (the 10 largest pharmacy multiples and supermarkets offering pharmacy services).

- The D/E ratio is assumed to be 19% for Large Multiples & Supermarkets and SM>20 (based on analysis of comparator companies) and 0% for SM<20 and Independents (because the debt they hold is backed by personal guarantees and thus has equity-like characteristics).

- We describe and calculate the tax benefit adjustment required for Independents and SM<20 necessitated by the assumption that they have 0 debt for the purposes of the WACC calculation.

- The tax rate is assumed to be 21% for Independents and 28% for all other groups.

- The nominal risk-free rate of 4.5% (based on 20-year UK Government nominal bonds as at March 2010) is converted to a real risk-free rate using the Fisher Relationship and a long-term inflation assumption of 2.5%.

- The calculated real WACC is based on the latest data available as at March 2010 and is our best estimate of what the WACC should be going forward.

- We use a real WACC to avoid double-counting of inflation when multiplying by the nominal asset base.

- Annex 2 provides further comparison of using retail pharmacy companies or regulated businesses as comparators for obtaining the necessary Cost of Capital inputs.

- Annex 3 provides details of an alternative approach to calculating the Cost of Capital. The key difference in this approach is the use of a total beta rather than a standard equity beta for the smaller pharmacy entities. As described in the Annex, total beta is a measure of total risk whereas the equity beta is a measure of systematic risk only.

Based on current PwC assumptions, the real WACC values are as shown in the table below:

Table 1: Summary real WACC results

	Pre-tax WACC
Large Multiples & Supermarkets	9.1%
SM>20	15.2%
SM<20	17.2%
Independents	15.7%
Overall	12.3%

Throughout this paper we refer to Smaller Multiples with more than 20 branches as "SM>20" and Smaller Multiples with 20 branches or less as "SM<20".

Whilst this paper sets out PwC's preferred approach on each subject, Cost of Capital is not a precise science and so the ranges based on alternative approaches (whether in terms of methodology or choice of number) are of relevance and may inform any negotiation between the DH and PSNC as to the appropriate Cost of Capital to apply when calculating funding levels. Annex 2 also provides details of an alternative methodology for calculating the Cost of Equity that was discussed at a series of meetings of the Cost of Service Inquiry (COSI) working group.

In addition recognition should be given to WACC as a minimum required return, and to the uncertainty in calculating WACC. Regulators have implicitly or explicitly allowed a relatively generous WACC where circumstances suggested that investment could be discouraged by a cautious approach to WACC. Generally regulators have recognised an asymmetry in outcomes – if the WACC is set too high, the outcome is higher than reasonable returns for the regulated business, if too low there is a risk of under-investment in the business.

1.4. Cost of Equity
1.4.1. Two types of risk

The issue of risk and reward is complicated and merits careful consideration.

The two key types of risk to consider are as follows:

- Specific risks are those risks which are specific to a company or project, and can be "diversified away" by holding a portfolio of investments. That is, by holding a diversified portfolio of equity investments, an equity investor is not exposed to such risks since those investments which perform badly due to specific risk factors can be expected to be offset by investments which perform well for specific risk reasons and vice versa. Since equity investors need not be exposed to specific risks they do not affect required returns, and hence are not captured in the standard cost of equity, but should be reflected in the calculation of the expected cash flows from the project.

- Systematic risk refers to risk factors which affect all equity investments simultaneously in the same direction to a greater or lesser extent, and hence cannot be diversified away. Movements in economy wide factors such as changes in the GDP growth rate, interest rates, savings rates and inflation contribute to systematic risk. These risks are captured in the cost of equity and hence WACC. Standard equity betas are a measure of this risk (i.e. the systematic risk associated with a particular equity investment, relative to the average risk of investing in the equity market). If a particular investment is of average risk, beta = 1; beta is

greater than 1 for a more than average risky investment and less than 1 for a less risky investment. The higher the beta, the higher is the exposure to systematic risk, and hence the higher is the cost of equity.

1.4.2. Approach to calculating the Cost of Equity

The standard framework for calculating the cost of equity is the Capital Asset Pricing Model (CAPM). The standard CAPM model is the most commonly used approach for calculating the cost of capital for commercial and regulatory purposes.

Under the CAPM, the cost of equity is expressed as follows:

$$k_E = r_F + (\beta_E \times \text{EMRP}) + \text{SCP}$$,

where r_F is the risk-free rate;

* β_E is the equity beta;
* EMRP is the equity market risk premium; and
* SCP is the small company premium (if required – this is not a standard term in the CAPM but is often applied as explained below).

The CAPM framework assumes that equity investors require their investment to yield at least the return available on risk-free instruments (e.g. UK government bonds). Added to this risk-free rate of return, equity investors expect a premium for the additional risk associated with an equity investment.

This premium is defined as the general equity market risk premium (EMRP) multiplied by an appropriate equity beta value. The EMRP is the additional expected return an investor demands for investing in equities of average risk. The equity beta is a measure of the "riskiness" of a particular equity investment relative to the average equity investment.

The CAPM implies that there should be no return available to equity investors for bearing non-systematic risks because by diversifying their portfolios they can simply avoid exposure to such risks. Arguably, diversification is rational and relatively easy to achieve and, in principle, individuals who choose not to diversify should nevertheless not achieve higher rewards because they are constrained by competition from others who do diversify and hence do not require the extra reward.

The implication of this is that non-diversified investment in a business is inefficient from a financing perspective as it fails to take advantage of the "free gift" of risk reduction through portfolio investment. Where such business models exist, either they are not sustainable in the long run (e.g. in traditional retail, owner-retailer businesses are in decline compared with plc chains) or these inefficiencies are offset by other benefits of the business structure chosen (e.g. the benefits of uniqueness or the personal touch, or the utility to the owner associated with being self-employed).

However, we acknowledge that non-systematic risks are often more important quantitatively in financial terms – these are the risks that generally most impact business finances and create winners and losers in markets. Although the theory says that there should be no return available for bearing these risks, in practice no-one would enter business if they did not expect revenue to cover a reasonable expectation of the financial burden on the business of exposure to all risks, including non-systematic risks. This factor is important when interpreting the results of the cost survey. For a given type and size of pharmacy, there is a considerable dispersion of costs incurred in any given year. We have chosen to base the majority of the analysis of operating costs on the mean average of the full sample of pharmacies, rather than only focusing on those pharmacies with lower costs who might be seen to be most efficient. It is our view that using a baseline of costs which reflected a "fair-weather" cost outcome for pharmacies would result in investors in pharmacy being insufficiently compensated for asymmetric downside risk.

The standard CAPM framework is most readily applied to calculating fair return for investors in large companies, since application generally involves the use of stock market information to calculate the EMRP and beta. It is not so well suited for calculating fair return for investors in smaller companies, such as Independents

and Smaller Multiple pharmacy businesses. However, there is no standard framework that is commonly used for estimating a fair rate of return for investors in such smaller businesses. The CAPM framework only compensates investors for systematic risks rather than specific risks. We recognise that investors in smaller pharmacy businesses are not typically fully diversified with respect to their investments in these businesses, and are therefore exposed to specific as well as systematic risk. However, we suggest that this is a matter of personal choice and that investors who choose not to diversify may perceive non-financial benefits related to owning and running their own business. In addition, the specific risks encountered by pharmacies will be partially reflected in the wide range of operating costs incurred by pharmacies in the 12-month period captured in the survey responses.

Although we acknowledge that the WACC and CAPM frameworks may not be ideal for small pharmacy businesses, we note that the application of a larger Small Company Premium for these small pharmacy types does allow them a higher return (albeit this additional return is not motivated by an allowance for specific risk, as will be explained below). Such premia have been adopted by UK regulators in setting prices (for example, by OFWAT3).

Annex 2 provides details of an alternative approach to calculating the cost of equity that was discussed by the project team in the course of this work. The key difference in this approach is the use of a total beta rather than a standard equity beta for the smaller pharmacy entities. Total beta is a measure of the total risk a business is exposed to, not just the systematic risk.

1.5.   *Risk-free rate*

Under the CAPM approach to the estimation of the cost of equity, the risk-free rate should be the return on an asset that has returns that are uncorrelated with movements in the market portfolio. In practice, such an asset does not exist and thus the true risk-free rate is not observable.

In practice, the redemption yields on "safe", liquid, financial instruments, which are considered to have negligible default risk, are generally used as approximations of the risk-free rate. To determine the risk-free rate, the yield on bonds issued by a reliable sovereign state is normally used as a proxy. Given that we are interested in the cost of equity for community pharmacies in the UK, we can use the yield on UK government bonds as an estimate of the risk-free rate.

The maturity of the risk-free rate should represent the typical investment horizon within the pharmacy sector, which is in the range of 5-20 years. Normally, this would suggest that we should use UK government bonds with a 10 year maturity in our analysis. However, given recent events in the financial markets, the yield on such UK government bonds may have been artificially driven down by investors choosing low risk assets during volatile financial markets. While in fundamental terms we believe the risk-free rate should have come down due to a decrease in inflation expectations and more depressed views of future economic growth, it is not clear that the yields observed on 10-year UK government bonds reflect these fundamentals rather than temporary market factors.

The figure below illustrates the evolution of nominal UK sovereign bond yields since 2000 for 10-year and 20-year maturities.

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3 As described in the Ofwat report "Future water and sewerage charges 2010-15:Final determinations"(2009)

Figure 1: Nominal yields on 10 and 20 year UK Gilts
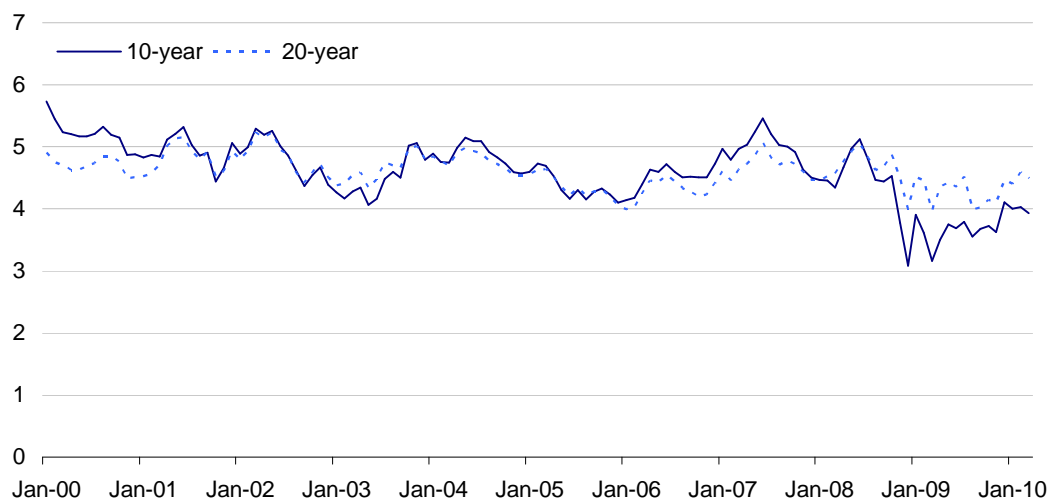
Historically there has been a spread of approximately 10-20 basis points (bps) between the 10- and 20-year yields. However, over the past year this spread has increased to a maximum of approximately 100 bps, as the 10-year bond yield has fallen more significantly than the 20-year bond yield, which has been relatively stable.

This suggests that 20 year UK government bond yields have been less distorted by current market conditions, whilst still reflecting the shift in fundamentals described above. As at the end of Q1 2010, the yield on a 20-year UK government bond was approximately 4.5%.

Our recommendation is that a figure of 4.5% should be used for the risk-free rate in the estimation of the WACC for community pharmacy companies. This is a nominal risk-free rate.

Ordinarily, we would obtain a real risk-free rate by looking at the expected yields on index-linked Government bonds. This has the advantage of being based on market data. However, in this instance we recommend calculating a real risk-free rate by converting the nominal risk-free rate using an inflation assumption and the Fisher relationship.

We recommend this because the expected yields on index-linked Government bonds (which would ordinarily be used to obtain a real risk-free rate) are currently distorted by market conditions and are unrealistically low. One of the reasons for historically low real yields on Index-linked Government bonds is that investors are concerned about a high inflation tail-risk (i.e. an increased possibility that inflation could jump up significantly). This means that investor interest is particularly strong in Index-linked bonds, thereby depressing their yields.

We suggest that the yields on nominal Government bonds are less distorted by market conditions and provide a more reasonable basis for calculating a risk-free rate as at 31st March 2010.

The Fisher relationship is defined as:

$$(1 + Rnom) = (1 + Rreal)(1 + i)$$

where: Rnom = nominal rate

Rreal = real rate

i   = rate of inflation

To convert the nominal risk-free rate into a real risk-free rate, we use an inflation assumption of 2.5%. This is a forward-looking long-term view of inflation which is appropriate since we are using it to convert a nominal risk-free rate based on expected future yields for 20 year bonds. Until recently, 2.5% was the Bank of England target inflation rate. Although this target inflation rate has now been reduced to 2.0%, this is due to a change in the index being targeted (i.e. now based on the Consumer Price Index rather than the Retail Price Index) rather than a fundamental change in the inflation target itself, and hence market expectations. We also suggest that in this case 2.5% is a more appropriate forward-looking estimate of inflation than 2.0% because currently inflation is running significantly above 2.0%.

Based on the assumptions described, the implied real risk-free rate as at March 2010 is 2.0% (converting the nominal risk-free rate of 4.5% using the inflation assumption of 2.5% and the Fisher Relationship).

In recent cost of capital decisions UK regulators and the Competition Commission have typically used Government index linked bonds to obtain real risk-free rate values ranging from 2% to 3%. In the period from 2000 to 2004 there was a general tendency for the figure to be in the top half of this range, whilst since 2005 the chosen real risk-free rate has tended to be in the bottom half of the range. This risk-free rate we use in our calculations is broadly aligned to the risk-free rate recently used in regulatory decisions, although we note that the risk-free rate is affected by market conditions and is dependent on the instrument used to calculate it and the date at which the calculations are carried out.

1.6.   Identifying a set of comparators

The application of the CAPM generally requires the identification of listed businesses which are comparable to the business or businesses being analysed. This is because data on these comparators can be used to estimate beta and gearing. It is important that the comparators are similar businesses so that the factors that drive beta and gearing (e.g. cyclicality of demand, and cost structure including the proportion of fixed costs) are comparable to the target business.

Ideally, to measure the risk of the provision of NHS pharmacy services we would examine the returns of comparable listed companies that exclusively provide these services. In practice, no such companies exist in the UK so it was necessary to look for comparators in Europe and America. Even internationally, we have not been able to identify any comparators that exclusively provide community pharmacy services such as the dispensing of prescription drugs and provision of basic health services.

As a next best alternative, we have identified listed companies with an industrial classification that includes drug retail and pharmacies. From this group of comparators, we reviewed company descriptions to identify those companies for which the retail of prescription and non-prescription drugs was a primary activity. The specific screening criteria used are outlined in Table 2.

Table 2: Comparator screening criteria

Industry classification	Catalog Drug Store and Pharmaceutical Retail OR Online Drug Retail and Pharmacies OR Drug Stores and Pharmacies
Company type	Public company
Geographic location	North America and developed European markets
Business description	Included the sale of prescription pharmaceuticals and operation of retail pharmacy. Excluded supermarkets with pharmacy operations.

This approach identified eight potential comparators, which are listed in the table below[4]. We subsequently rejected three of these comparators: Rite Aid Corp., Graymark Healthcare, Inc and Drugstore.com Inc.

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4 See Annex 1 for further detail of comparators included in analysis.

Graymark Healthcare was excluded because the standard error of the beta estimate was sufficiently high to indicate that the beta estimate was not statistically significant. Rite Aid was excluded as it had a very high gearing level and was clearly an outlier in the comparator group. Drugstore.com Inc was excluded because it exclusively operates online and is therefore not representative of the majority of pharmacy businesses.

We acknowledge that the comparators identified are not perfect. However we believe that they provide a good representation of the level of risk inherent in the community pharmacy business. The list of comparators was discussed with the project team and Steering Group.

Table 3: Comparators included in WACC analysis

Comparators meeting screening criteria and included in beta analysis:

CVS Caremark Corporation	CVS Caremark Corporation operates as a pharmacy services company in the United States. The Retail Pharmacy segment sells prescription drugs, over-the-counter drugs, beauty products and cosmetics, photo finishing, seasonal merchandise, greeting cards, and convenience foods through its pharmacy retail stores and online. The Pharmacy Service segment provides a range of prescription benefit management services, including mail order pharmacy services, specialty pharmacy services, plan design and administration, formulary management, and claims processing.
Galenica Ltd.	Galenica Ltd., through its subsidiaries, operates as a diversified healthcare company primarily in Switzerland, Europe, and the Americas. The company engages in the development, manufacture, and marketing of pharmaceutical products; runs pharmacies; provides logistical and database services; and sets up networks.
Shoppers Drug Mart Corp.	Shoppers Drug Mart Corporation licenses retail drug stores operating under the Shoppers Drug Mart and Pharmaprix names in Canada. The company's stores offer over-the-counter medications, health and beauty aids, and cosmetics and fragrances.
The Jean Coutu Group (PJC) Inc.	The Jean Coutu Group (PJC) Inc. engages in retailing and distributing prescription and non-prescription drugs and general merchandise primarily in eastern Canada.
Walgreen Co.	Walgreen Co., together with its subsidiaries, operates a chain of drugstores in the United States. The drugstores sell prescription and non-prescription drugs, and general merchandise.

Table 4: Comparators excluded from WACC analysis

Comparators meeting screening criteria but excluded from WACC analysis:

Graymark Healthcare, Inc.	Graymark Healthcare, Inc. operates independent retail pharmacy stores that sell prescription drugs and a small assortment of general merchandise in the United States.
Rite Aid Corp.	Rite Aid Corporation, through its subsidiaries, operates retail drugstores. Its drugstores primarily provide pharmacy services. The company sells prescription drugs and front-end products.
Drugstore.com Inc.	Drugstore.com, inc. operates as an online provider of health, beauty, vision, and pharmacy products. The company operates in three segments: Over-The-Counter (OTC), Vision, and Mail-Order Pharmacy.

1.7. *Debt-Equity Ratio*

1.7.1. *Recommended gearing assumptions*

We take a view on the appropriate debt-equity ratio (D/E) in order to calculate the WACC as a combination of the two components, the cost of equity and cost of debt.

A target debt-equity ratio is required to assess the cost of capital. This is in order to reflect the likely long term optimal level of gearing.

The table below presents the 5-year median and average debt-equity ratios of the 5 selected comparator companies[5]. The median (rather than the mean) debt-equity ratio is used to calculate the WACC due to the wide range of debt-equity ratios across the comparators.

Table 5: D/E ratios for comparators

	Geographic locations	D/E ratio
CVS Caremark Corporation	US & Canada	0.19
Galenica Ltd.	European Developed Markets	0.26
Shoppers Drug Mart Corp.	US & Canada	0.12
The Jean Coutu Group (PJC) Inc.	US & Canada	0.19
Walgreen Co.	US & Canada	0.03
Mean		0.16
Median		0.19

Note: Equity betas are Blume-adjusted 5-year monthly betas to Q1 2010.

Source: PwC analysis, Capital IQ

Based on the results of the comparator analysis shown in Table 9 the median gearing ratio (D/E) is 0.19. This is the gearing level we use for Large Multiples & Supermarkets and Smaller Multiples with more than 20 branches.

The debt of smaller pharmacies is unusual in that it has equity-type characteristics – because it is typically backed by personal guarantees. For this reason, for the purposes of calculating the cost of capital, we assume that the gearing ratio (D/E) for small pharmacies is 0. For the purposes of analysis, we define "small" pharmacies as Independent pharmacies and Smaller Multiples with 20 branches or fewer. For these pharmacies we use a gearing ratio assumption of 0 (although we show the sensitivity of results to a value of 0.19).

Table 6: Sensitivity of pre-tax real WACC value to D/E ratio (with all other inputs set to defaults)

	Gearing ratio = 0 (for two smallest groups)	Gearing ratio = 0.19 (for two smallest groups)
Large Multiples & Supermarkets	9.1%	9.1%
SM>20	15.2%	15.2%
SM<20	17.2%	15.2%
Independents	15.7%	13.9%
Overall	12.3%	11.5%

We also note that, as part of the analysis carried out to assess the appropriate level of SCP for Large multiples & Supermarkets (described in 1.10.3), we looked at the most recent financial accounts for the 10 companies in the large multiples group. As part of the SCP analysis we estimated net debt and the Enterprise Value for each entity. This allows us to calculate a gearing value, and a D/E ratio, for the large multiple entities. We find that the median gearing level is 30% which corresponds to a D/E ratio of 43%. We do not use this value in our WACC calculations, however. Best practice is to use the comparator gearing level. First, the D/E ratio of 0.19 is

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5 This is an average of the annual average D/E ratios calculated for the period 31 March 2005 - 31 March 2010. For each year, the D/E ratio is calculated as Total Debt divided by Market Capitalisation.

based on 5 years of data while the 0.43 figure is based on a single year of accounts only. Second, the analysis that made it possible to calculate the estimate of 0.43 has only been carried out for the 10 large multiples, not for all pharmacy entities – and the actual gearing levels of large multiples may also be complicated by the presence of other retail or wholesale activities (for examples, Tesco's D/E ratio will be dominated by its other supermarket activities and Boots is a wholesaler of drugs and a retailer as well as a pharmacy).

1.7.2.   Tax-benefit adjustment

We note that, in the scenario where the debt of Independents and SM<20 is assumed to be zero, there is nevertheless an implied tax benefit on the debt interest actually paid. This tax benefit must be subtracted from the final values calculated for fair return. The required adjustment is calculated as interest paid multiplied by the corporate tax rate. To carry out this calculation it is necessary to estimate the average debt levels and interest paid of these smaller pharmacy businesses. In the UK tax is paid on profits after interest payments. Debt servicing, therefore, receives a tax shield in Fair Return calculations due to the deductibility of interest payments in the calculation on corporation tax.

In the Fair Return calculations we have treated debt for Independents and SM<20 as if it was equity. The debt these pharmacies hold is often backed by personal guarantees. The risk characteristics of this sort of finance are, therefore, more closely associated with equity than debt. This treatment of debt as equity means that the WACC calculated for these two pharmacy types, and therefore the fair return figures, are higher than they would otherwise be.

However, as these pharmacy types do in fact have finance that is viewed as debt by HMRC, in reality the interest that they pay on this debt means that they are liable to pay tax on slightly lower profit levels than if no debt interest was paid. For independents and SM<20, the fair return figures calculated by multiplying the WACC by the NHS asset base implicitly contain the assumption that the pharmacies require remuneration for tax commitments assuming that no debt interest is paid. When calculating remuneration pre-tax, it is therefore necessary to apply an adjustment to account for the tax relief the pharmacies receive when servicing the debt that they hold.

This tax benefit adjustment is equal to:

<p style="text-align:center">debt per branch (£) x cost of debt (%) x tax rate (%)</p>

To estimate the average level of debt per branch for SM<20 we have obtained information on net debt from the most recent financial accounts of the SM<20 entities in the sample. Net debt is calculated as "long-term debt" + "loans (short-term debt)" – "cash & cash equivalents". For each entity we have divided the net debt figure obtained from the accounts by the number of branches in the group to calculate an estimate of debt per branch.

We calculate weighted average debt per branch where each entity is weighted according to the total of the sample weights for the branches from that entity that have been picked up in the sample. The results are shown in the table below.

Table 7: Estimating average debt per branch

Description	Value
Number of entities	27
Total weight of branches from these entities in the sample	627
Number of entities for which is has been possible to estimate net debt	24
Total weight of branches from these entities in the sample	563.5
Debt figures (£000s)	
Mean debt per branch (weighted)	£119.6
Median debt per branch (weighted)	£90.4
Minimum debt per branch	-£305.6
Maximum debt per branch	£530.3

For the SM<20 group, we use the median average to provide a mid-range point estimate of debt per branch. This is consistent with the rest of the WACC calculations where we have used median averages. We treat this calculated average as a generic estimate of typical debt levels rather than being specific to a particular time period.

The second input to the tax benefit adjustment calculation is the % interest paid on debt. For the purposes of this calculation we assume that the % interest is the nominal pre-tax cost of debt. This is calculated as 7%. The cost of debt calculation is discussed further in section 0.

The tax benefit adjustment (real, pre-tax) is calculated as:

debt per branch (£) x cost of debt (%) x tax rate (%)

= £90,400 x 7% x 28% = £1,772

We make the assumption that pharmacy branches in the Independents group (i.e. entities with $1-5$ branches) have the same average levels of debt per branch as branches in the SM<20 group (i.e. entities with $6-20$ branches). However, for the Independents group we assume the small companies tax rate of 21%, so the tax benefit adjustment for Independents is calculated as:

£90,400 x 7% x 21% = £1,329

Table 8: Calculating the tax benefit adjustment

	Independents	**SM<20**
Debt per branch (£000s)	£90,400	£90,400
Cost of debt (real)	7%	7%
Tax rate	21%	28%
Tax benefit adjustment	£1,329	£1,772

This adjustment must be subtracted from the fair return figure calculated for the Independents and SM<20 groups. No adjustment is necessary for the larger pharmacy entities.

1.8.   Equity beta

1.8.1.   Comparator analysis

A key input to the cost of equity is the beta. The standard CAPM framework uses an equity beta which measures the sensitivity of a specific equity investment's returns to systematic risk. Specific risk is not captured in this calculation because specific risk may be eliminated by holding a diversified portfolio.

The equity beta can be estimated by regressing historic returns of the equity against the returns of the overall market. The stronger the correlation, and the greater the amplitude of any movement in returns, the higher the systematic risk associated with an investment.

The betas calculated from historical market data are equity betas. They reflect the risk that equity providers bore by investing in the companies examined given that the companies had a particular level of gearing. The existence of debt finance in companies increases the risk to equity investors as debt has first call on available cash for investors. Equity betas are thus higher than the underlying "asset" betas (which are the betas that would reflect the risk borne by equity investors were the company financed by equity only, and there was no additional financial risk to equity providers associated with the inclusion of debt).

Asset betas have been derived from the observable equity betas by employing an appropriate adjustment formula[6]:

$$\beta_a = \frac{\beta_e}{\left(1 + \dfrac{D}{E}\right)}$$

The table below presents equity betas, debt/equity (D/E) ratios and asset betas for each comparator. The equity betas are based on 5 years of monthly data for the period March 2005 – March 2010. They include a Blume adjustment which is appropriate because the comparator group is relatively small. The Blume adjustment[7] is widely used by CAPM practitioners and takes account of the tendency of equity betas to converge towards 1 over the long-term. Standard errors and coefficients of determination (R2) for the beta estimates are also presented.

For the purposes of calculating the D/E ratios, Debt is defined as "Total debt" and Equity is defined as "Market Capitalisation". For each company we have calculated the debt/equity ratio (ie. total debt divided by market capitalisation) over the last 5 years (from 31 March 2005 - 31 March 2010) and then taken a mean average of these annual ratios to provide the "5 year debt/equity ratio" for each of the 5 comparator companies.

Table 9: Equity beta estimates for comparators

	Geographic locations	Equity beta	Standard error	R2	5-year D/E ratio	Asset beta
CVS Caremark Corporation	US & Canada	0.82	0.16	0.28	0.19	0.69
Galenica Ltd.	European Developed Markets	0.99	0.23	0.23	0.26	0.79
Shoppers Drug Mart Corp.	US & Canada	0.62	0.13	0.16	0.12	0.55
The Jean Coutu Group (PJC) Inc.	US & Canada	0.64	0.23	0.06	0.19	0.54
Walgreen Co.	US & Canada	0.84	0.18	0.24	0.03	0.82
Mean		0.78			0.16	0.68
Median		0.82			0.19	0.69

Note: Equity betas are adjusted[8] 5-year monthly betas to Q1 2010.

Source: PwC analysis, Capital IQ

As shown in the final column of the table, the median value of the asset betas is 0.69. Relevering this asset beta estimate using the median D/E ratio of 0.19 gives an equity beta estimate of 0.82.

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6 The formula we use for "relevering" beta is known as the Harris and Pringle formula. This formula is used in the situation where future debt tax shields are uncertain and is consistent with companies having active debt management policies. We believe this is a reasonable assumption to make in the context of pharmacy businesses.

7 Blume, Marshall (1971), "On the assessment of risk", The Journal of Finance. The Blume adjustment is of the form Blume-adjusted Beta = 0.67 * Raw beta + 0.33 * 1

8 For this set of comparators, the unadjusted median average is 0.74 and the unadjusted mean average is 0.67.

1.8.2.   *Appropriate equity beta value to use in calculations*

The companies selected as comparators for the beta analysis are involved in other businesses apart from pure pharmacy, primarily retail, and as a result their betas represent the risk of the blended business. We have given qualitative consideration to how the equity beta might differ if the comparators were a set of pure pharmacy companies. In particular, we have considered:

- How an equity beta for a pure pharmacy business in England might compare with the equity beta for a retail pharmacy business such as the ones in our comparator set.
- How an equity beta for a pure pharmacy business might compare with the equity beta for a regulated company.

The appropriate level for an equity beta is associated with the cyclicality of available returns or profits to equity providers – and how these fluctuate relative to the economy.

In particular, when selecting an appropriate equity beta, it is important to consider:

- Cyclicality of revenues (due to the economy)
- Cyclicality of costs (the ability of the company to tailor its costs according to market conditions). This in turn is driven by:

    – Operational gearing – i.e. the level of fixed costs.
    – Debt gearing – i.e. the level of debt funding.

These factors are not independent of each other as companies make decisions on their cost structure, particularly their debt gearing, based on the nature of their revenues. This interdependence leads to clustering of equity betas around 1.0 – i.e. if a business has low cyclicality of revenues and low fixed costs (which would imply a lower asset beta) it is likely to choose to take on more debt (which implies a higher equity beta).

1.8.3.   *Comparing pharmacy with retail businesses*

Cyclicality of Revenues

Revenues from a retail business are arguably more cyclical than revenues from a pure pharmacy business since when the economy declines, people spend less on discretionary retail purchases. However, we note that, in the case of retail pharmacies, part of the retail business is OTC medicines. We would not expect revenues from OTC medicines to be as cyclical as other, non-healthcare-related, retail revenues since people still become ill and buy OTC medicines even when the economy declines. We would expect the demand for medicines to be relatively inelastic with respect to incomes. On balance, however, we suggest that the revenues of a pharmacy-only business will be less cyclical than a retail plus pharmacy business because of the lower demand volatility. We also suggest that the revenues of a UK pharmacy may be less cyclical than a US pharmacy because of the fact that in the US end-consumers without health insurance pay for the cost of their drugs out of their own pockets and even US end-consumers with health insurance are responsible for paying a proportion of the cost of drugs and, particularly in the case of branded drugs, the consumer payments required may be quite high. In England, by comparison, the charge per item is capped and those on lower incomes, the elderly and children are protected through exemptions and the NHS Low income Scheme. Taken together, these points argue for a pharmacy beta that is lower than the comparator betas.

Cyclicality of Costs – Operational gearing

We suspect that a pure pharmacy business may have a higher proportion of fixed costs than a retail business, since a pharmacy business has more obligations to fulfil and regulations to adhere to than a retail business - for example, the requirement for a qualified pharmacist to be on site at all times when the store is open. This argues for a pure pharmacy beta that is higher than the comparator betas (since the comparator companies are retail plus pharmacy businesses).

Cyclicality of Costs – Debt gearing

Decisions about how much debt to take on are made by the company based on an assessment of the cyclicality of revenues and also the level of operational gearing. A higher risk business will tend to take on less debt and a

lower risk business will tend to take on more debt. This has a normalising effect on the equity betas – and suggests a pharmacy beta that is similar to a retail plus pharmacy business beta.

Comparing pharmacy with retail businesses - conclusion

As outlined above, we have given qualitative consideration to the factors that could lead to the equity betas of retail pharmacy businesses (such as the selected set of comparator companies) differing from pure pharmacy businesses. The two factors that argue for a different pharmacy beta point in opposite directions and the third factor suggests the betas would be equal. Based on this qualitative assessment, we conclude that there is no good reason to make an adjustment to the equity beta from that observed for the set of retail pharmacy comparator companies.

1.8.4.   Comparing pharmacy with regulated businesses

Regulated businesses may also be viewed as relevant comparators for a pure pharmacy business. In particular, they have very stable demand cyclicality which may be considered analogous to pharmacies. When regulators set equity betas for these businesses their intention is directly analogous to our intention in identifying equity betas for pharmacies – to allow the calculation of a reasonable return on equity when setting prices/remuneration.

Betas used in regulatory decisions

We have investigated the equity betas - and the implied asset betas - used in recent regulatory decisions and the results are shown in the table below. We also show the proportion of debt that these regulated companies hold (i.e. their gearing).

As already stated, asset betas can been derived from the observable equity betas by employing the adjustment formula:

$$\beta_a = \frac{\beta_e}{\left(1 + \dfrac{D}{E}\right)}$$

The sectors included in the table below are not all traditional utilities[9], but they are all regulated companies – regulated because they are low-risk monopoly-type businesses whose services are vital to the country's interests.

Table 10: Regulatory decisions

Regulator	Review	Equity beta	Gearing	Implied D/E ratio	Implied Asset beta
ORR (Oct 2000)	Periodic review of Rail track's access charges: final conclusions	1.1 - 1.3	50%	100%	0.60
CC (Nov 2002)	BAA plc: A report on the economic regulation of the London airports companies (BAA Q4)	0.8 - 1.0	25%	33%	0.68

9 We note that if mobile phone companies and airport/NATS decisions are excluded from the calculation of average beta used in regulatory decisions (as shown at the bottom of Table 10), the median equity beta remains at 1.0. We also note that the mean equity beta drops from 1.09 to 0.99, although the mean average is not used as an input to our calculations.

CAA (Feb 2003)	Economic Regulation of BAA London Airports Q4 (Heathrow & Gatwick Q4)	0.8 - 1.0	25%	33%	0.68
CC (Feb 2003)10	Mobile Phone Charges Inquiry	1.0 - 1.6	10%	11%	1.17
Ofgem (Nov 2004)	Electricity Distribution Price Control Review 4	1.0 (implied)	57.50%	135%	0.43
Ofwat (Dec 2004)	Future water and sewerage charges 2005-10	1	55%	122%	0.45
Ofcom (Aug 2005)	Ofcom's approach to risk in the assessment of the cost of capital (BT copper access network)	0.8 – 0.9	33%	48%	0.57
CAA (Dec 2005)	NATS Price Control Review 2006-2010 (CP2)	1.7	64%	178%	0.61
Postcomm (Dec 2005)	Royal Mail Price and Service Quality Reviews	0.8 - 0.9	20%	25%	0.68
Ofgem (Dec 2006)	Transmission Price Control Review, 2007-2012	1.0 (implied)	60%	150%	0.40
Ofcom (Mar 2007)	Mobile Call Termination Statement	1.0 - 1.6	10%	11%	1.17
Ofgem (Dec 2007)	Gas Distribution Price Control Review 2007-13	1.0 (implied)	62.50%	167%	0.38
CAA/CC (Mar 2008)	Economic Regulation of Heathrow and Gatwick Airports (Heathrow / Gatwick)	0.9 – 1.2 / 1.0 - 1.3	60%	150%	0.44
CC (Nov 2008)	Stansted Price Control Review (2009-14)	1.0 - 1.2	50%	100%	0.55
CAA (Mar 2009)	Stansted Price Control Review (2009-14)	1.0 - 1.2	50%	100%	0.55
	Mean	1.09	42%	91%	0.62
	Median	1.00	50%	100%	0.57

Source: PwC analysis, Regulator websites[11].

Cyclicality of revenues

Like demand for pharmacy services, demand for regulated services is relatively insensitive to the state of the economic cycle, making them relatively low equity beta businesses. We acknowledge that regulated businesses are exposed to some risk associated with regulatory uncertainty. In addition, we note that some regulated

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10 We note that the asset beta used in the 2003 Mobile Phone Charges Inquiry is significantly higher than the asset betas used in other regulatory decisions.

11 Betas used in regulatory decisions are arrived at using a variety of methods and considerations. They may or may not explicitly use a set of comparator companies and apply a Blume adjustment. As described in 1.8.1, the Blume adjustment is used as a means for obtaining a reasonable estimate of a long-term equity beta for retail pharmacy based on a small set of comparator companies. This beta can then be used as an estimate of the beta to be used in the calculation of pharmacy fair return. For this reason the average adjusted betas shown in Table 9 can be seen as comparable with the betas shown inTable 10. In both cases they are estimates of the appropriate beta to use in the calculation of fair return in a given situation.

companies, particularly utilities, may be exposed to a risk of a limited amount of bad debt e.g. water companies because they are not permitted to cut off supply even if customers do not pay. We also note that those utilities that are able to cease supply in the case of non-payment by consumers may still have costs associated with this e.g. the cost of chasing up payment, or writing-off debt, and the cost of shutting off supplies etc. However, the regulator does have a statutory duty to ensure that regulated businesses can continue to fund themselves, so the risks of bad debt and regulatory uncertainty are limited risks for these companies.

Overall we conclude that the cyclical risk of pharmacies is arguably higher than that of regulated businesses and that on this basis we might expect an equity beta for pure pharmacy to be at least as high as the beta for a regulated business.

Cyclicality of Costs – Operational gearing

Regulated businesses typically have high levels of fixed costs which suggests that on this basis we might expect an equity beta for pure pharmacy to be lower than the beta for a regulated business.

Cyclicality of Costs – Debt gearing

As already stated in section 1.8.2, decisions about how much debt to take on are made by a company based on an assessment of the riskiness of the business and this has a normalising effect on the equity beta, making them similar.

Comparing pharmacy with regulated businesses - conclusion

The median value of the equity betas used in Table 1 is 1.0. The relatively high equity beta values are driven by the high levels of debt that regulated businesses choose to take on as a result of the non-cyclicality of their revenues. This demonstrates the interdependence of the factors that influence beta and illustrates why equity betas typically cluster around 1.0. To calculate an equity beta estimate that strips out this effect, we can look at the underlying asset betas used in the regulatory decisions, then re-lever them using an estimate of debt gearing for pharmacies.

As discussed in the paragraphs following Table 10, we suggest that a pure pharmacy business will have higher revenue cyclicality than a regulated business but lower operational gearing. Based on the analysis of regulatory decisions, we note that regulated businesses typically have quite high levels of debt (the median gearing is 50% compared to the median gearing for the set of retail pharmacy comparators which is 16%[12]). The fact that pharmacy companies (based on the comparator analysis) appear to take on less debt than regulated businesses[13] suggests that in underlying terms a pharmacy business is more risky – and therefore we would expect the asset beta for a pharmacy business to be higher than the asset beta for a regulated business. This is indeed the case – we observe that the median value of the asset betas for regulated businesses used in Table 1 is 0.57 compared to the average asset beta of 0.69 emerging from the pharmacy comparator analysis (see Table 9). More generally, we would not expect the equity beta for a pure pharmacy business to be lower than that of a regulated business. By their nature regulated businesses are very low risk businesses – they have stable demand and are regulated with the intention of being able to fund their business but not make an excessive return.

Based on this comparison with regulated businesses, we would expect the asset beta for a pharmacy business to be higher than the asset beta for a regulated business, but we would expect the equity betas to be similar. The median value of the equity betas used in Table 1 is 1.0.

We suggest that a lower bound for the pharmacy equity beta may be obtained by re-levering the regulated business asset beta of 0.57 using the pharmacy comparator gearing ratio of 0.19 (see Table 9) to give an equity beta value of 0.68. This is 0.7 to one decimal place. We suggest that this 0.7 may be seen as a lower bound as, if

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12 D/(D+E) = (D/E)/(1+(D/E))

13 This conclusion is based on the comparator analysis. We have not had access to evidence of D/E ratios in the English pharmacy sector specifically.

a pharmacy business did in reality have as low an asset beta as a regulated business, we would ordinarily expect to see higher levels of debt gearing than those observed[14].

1.8.5. Conclusions on equity beta

For the purposes of the WACC calculation we recommend using an equity beta of 0.82. We also test a value of 1.0 and show results for a lower bound of 0.7. The value of 0.82 is based on pharmacy comparator analysis – and supported by a qualitative consideration of what drives pharmacy and retail equity betas. The values of 1.0 and 0.7 are based on a comparison with regulated businesses. We note that the 0.85 mid-point of the range 0.7 – 1.0 is very close to the value from the retail pharmacy comparator analysis. Although we show the results for an equity beta of 0.7, we suggest that this level of equity beta is unreasonably low.

The table below shows the sensitivity of the WACC calculation to this range of beta values.

Table 11: Sensitivity of pre-tax real WACC to equity beta level (with all other inputs set to defaults)

	Equity beta = 0.82 (from retail pharmacy comparator analysis)	Equity beta = 1.0 (from comparison with regulated businesses)	Equity beta = 0.7 (indicative lower bound)
Large Multiples & Supermarkets	9.1%	10.1%	8.4%
SM>20	15.2%	16.2%	14.5%
SM<20	17.2%	18.4%	16.4%
Independents	15.7%	16.8%	14.9%
Overall	12.3%	13.4%	11.5%

1.9. Equity market risk premium (EMRP)

The EMRP is the additional expected return that an investor demands for the additional risk faced when investing in equities of average risk, compared to a risk-free investment. Our estimate of the EMRP is based on a survey of both ex post and ex ante studies of the EMRP. Key results from these studies are presented below.

Where possible, both geometric and arithmetic mean returns are provided. The geometric mean return gives a measure of the average annual return achieved by an investor as if the investor enters into a buy and hold strategy for the whole period considered. The arithmetic mean return is equal to the average of all the single year returns over the period. We consider both methods of calculating average excess returns.

1.9.1. Ex-post

Ex-post third party evidence has been summarised in the table below.

Table 12: Ex-post estimates of the EMRP

Source	Time period considered	EMRP – geometric mean (%)	EMRP – arithmetic mean (%)

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14 The equity beta estimate results from assuming a combination of low asset beta and low gearing. This is a relatively uncommon situation, although in theory it could occur in the market. A combination of low asset beta and low gearing for a company would suggest that though the company is exposed to low levels of systematic risk it is exposed to high levels of specific risk. If this was the case we would expect to see a lot of dispersion in any sample of the costs incurred by companies of this sort.

DMS – LBS (2010): UK	1900 – 2008	3.9	5.2
Barclays Capital (2007): UK	1900 – 2006	4.2	n/a
Morningstar (2009): UK	1970 – 2008	5.4 – 6.1	n/a

Sources: Dimson, Marsh and Staunton (2010), "Credit Suisse Global Investment Returns Sourcebook 2010"; Barclays Capital (2007), "Equity Gilt Study"; Morningstar (2009), International Equity Risk Premia Report

There are two inherent assumptions built into the use of long-run ex-post data on actual historic additional equity returns to estimate the forward looking EMRP. The first is that the long-run historical EMRP is a good guide to the current or future EMRP. The second assumption is that over the long-run the actual returns achieved by equity investors in the past must reflect the returns they needed to compensate them for investing in equities – under- or over-performance of equities could not persist in the long-run, because demand for equities would have increased or decreased, changing share prices to bring the available returns back into line. Of course, in shorter run periods, actual returns below or in excess of the EMRP can be experienced which is why practitioners who use the ex-post approach prefer a very long-run data series such as that provided by DMS. The use of very long-tem historic figures also implies that the EMRP is expected to be a stable figure over the long-run.

The ex-post EMRP evidence suggests an EMRP range of 4.0% – 6.0%.

1.9.2. Ex-ante

Approaches that take a forward looking view on EMRP place more weight on current market evidence and are referred to as ex-ante approaches. Ex-ante EMRP estimates are generally calculated using the dividend growth model ("DGM")[15]. Evidence from ex-ante approaches has been summarised below.

Table 13: Ex-ante estimates of EMRP

Source	EMRP (%)	Comments
Competition Commission (2008)	3.8 – 5.0	Based on DGM
Grabowski (30th January 2009)	6.0	Using an EMRP derived during "normal" economic times will underestimate the cost of equity.
Bloomberg (April 2010)	5.7 – 6.9	DGM based US and European markets EMRP estimates

Sources: Competition Commission (2008), "Stansted Airport – Q5 price control review"; Grabowksi, J, Roger (2009), "Problems with cost of capital estimation in the current environment – update", 30th January

The ex-ante evidence points towards a slightly higher range relative to ex-post evidence. Proponents of the ex-ante approach would argue that this suggests the EMRP has increased as a result of the current capital market conditions.

1.9.3. Recent views on EMRP

Regulators often have to take a view on the level of the EMRP in order to assess the appropriate equity returns for regulated companies (i.e. in order to set price controls). Moreover, regulators tend to use the long-term EMRP because regulated companies typically invest in assets with long lives.

The table below summarises recent evidence on regulatory precedents from the UK, which heavily uses the CAPM approach in setting regulatory prices.

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15 $P0 = (D0 * (1+g)/(r-g)$, where: P0 is the current share price, D0 is the current dividend, g is the dividend growth rate (assumed to be constant) and r is the cost of equity.

Table 14: EMRP – regulatory precedents

| Regulator	Description	Date	Applied EMRP
CAA	Economic regulation of Stansted Airport 2009-2014	March 2009	3.0 – 5.0
Competition Commission	Rolling stock leasing market investigation	April 2009	3.5
Ofcom	A new pricing framework for Openreach	May 2009	5.0
Ofwat	Future water and sewerage charges 2010-15	November 2009	5.4
Ofgem	Fifth Electricity Distribution Price Control	December 2009	3.0 – 5.0

Source: CAA (2009), "Economic regulation of Stansted Airport 2009-2014"; Competition Commission (2009), "Rolling stock leasing market investigation"; Ofcom (2009), "A new pricing framework for Openreach"; Ofwat (2009), "Future water and sewerage charges 2010-15"; Ofgem (2009), "Fifth Electricity Distribution Price Control".

We have also considered the EMRP estimates that are based on surveys of finance professors; and that have been used by investment banks in recent deals. A survey conducted by Welch (2008) and Fernandez (2008) of finance professors indicates an EMRP range of 4.0% – 7.0%[16]. The EMRP estimates used by investment banks in recent deals vary between 4.5% – 6.0% with an average figure of 5.0%.

1.9.4. Conclusions on EMRP

The chart below shows the range of EMRP values resulting from each of these 4 types of data sources.

Figure 2: EMRP ranges
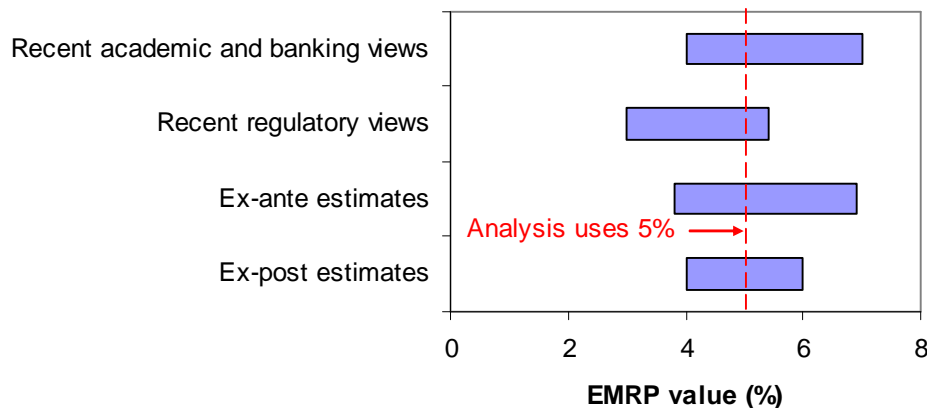
We consider that in the context of assessing the level of fair return on pharmacy assets it is most appropriate to use a long-term estimate of the EMRP. Our recommendation is that we use an EMRP of 5.0% for the purposes of the WACC calculation. This is a mid-point of the values obtained from the review of evidence.

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16 Fernandez, Pablo (2008), "Market risk premium used in 2008" Working paper; Welch, Ivo (2008) "The Consensus Estimate For the Equity Premium by Academic Financial Economists in December 2008"

PricewaterhouseCoopers LLP

1.10. *Small company risk premium (SCP)*

We recommend that a pragmatic, and defensible, approach to calculating a Cost of Capital for smaller companies is to add a Small Company Premium (SCP) to the standard CAPM formula. By applying a larger SCP for the smallest companies, we allow them a higher return.

This approach to selecting an appropriate SCP follows on from the findings of Fama and French[17], who suggested that the CAPM may be mis-specified with respect to size. Such premia have been adopted by UK regulators in setting prices (for example, OFWAT and the Competition Commission).

To estimate the SCP, we first look at sources of data on a range of potential premia, which vary according to company size. We then look at data on company size for our sample to select the appropriate premium.

We are aware that, in some recent decisions, regulators have taken a more considered approach to selecting an appropriate level of SCP, rather than selecting a premium purely based on the size of company involved. We note, however, that regulators are typically dealing with a limited number of companies, and can adopt a bespoke approach to allowing for small company business risks in decisions about what cash flows to assume for the purposes of price setting. For the purposes of the Cost of Service Inquiry it would not be practical to consider the appropriate risks and cash flows for each individual pharmacy entity in the English population. Selecting an SCP from existing sources of data, such as the ones we describe below, has a sound economic basis and is accepted practice in the regulated world and standard practice in the valuation world.

US data on SCPs is based on a large number of companies and goes back over many years. Hence, whatever the source of the risk that gives rise to the excess returns over CAPM for the smaller companies, and this is not clear, the fact that it is persistent and monotonic shows that there is definitely a factor connected to the size of the company that means that investors require a higher return to incentivise them to invest in smaller companies than larger companies.

1.10.1. *Sources of small company risk premia*

To identify a range of potential SCPs, we have referred to two reports:

- Ibbotson (2009): provides analysis of long-term US equity returns in excess of CAPM data, by size of company (measured in terms of market capitalisation).
- Duff & Phelps (2010): provides long-term historical equity risk premiums based on the New York Stock Exchange (NYSE), by size of company (using eight alternate measures of company "size", including market capitalisation, and 25 size-ranked portfolios)

The list of premia estimates from the Ibbotson study are summarised in the table below.

Table 15: Small company risk premiums – Ibbotson 2010

Portfolio decile (S&P 500)	Market cap of largest company ($m)	Size premium
10	214	6.28%
9	431	2.85%
8	685	2.49%
7	1,063	1.73%
6	1,600	1.73%
5	2,384	1.69%
4	3,415	1.15%

17 Fama E.F. and French K.R (1993)

3	5,936	0.85%
2	14,692	0.74%
1	329,725	-0.37%

Source: Ibbotson (2010)

The list of premia estimates from the Duff & Phelps study are summarised in the table below. The Duff & Phelps premiums are similar to those in Ibbotson, although slightly larger for smaller companies.

Table 16: Small company risk premiums – Duff & Phelps 2010

Portfolio Rank by Size	Average Market Value ($ millions)	Size premium
25	61	6.37%
24	212	5.17%
23	315	4.78%
22	411	4.52%
21	534	4.27%
20	664	4.06%
19	818	3.88%
18	954	3.71%
17	1,127	3.55%
16	1,311	3.40%
15	1,523	3.25%
14	1,741	3.12%
13	1,992	2.99%
12	2,281	2.86%
11	2,594	2.74%
10	2,965	2.61%
9	3,481	2.45%
8	4,160	2.28%
7	5,218	2.06%
6	6,756	1.81%
5	9,104	1.52%
4	12,761	1.19%
3	17,592	0.88%
2	29,763	0.37%
1	103,041	-0.83%

Duff & Phelps 2010, Table B-1

We note that the SCP figures are based on analysis of US companies. It may be that equivalent analysis of UK companies would yield different SCP values, but no such analysis exists to our knowledge.

We also note that as the data supplied by Ibbotson and Duff & Phelps are based on companies which are all listed, it can reasonably be assumed that the equity investors in these businesses are well-diversified, even for the smallest companies in the data. Hence, whatever the source of the risk that gives rise to the excess returns over CAPM for the smaller companies, a lack of diversification cannot be one of them. The inclusion of an SCP does not, therefore, compensate explicitly for lack of investor diversification in smaller pharmacies.

1.10.2. *Estimating market capitalisation*

To select the appropriate level of size premia to use in calculations, we must determine the range of pharmacy company sizes for the pharmacy types in question, that is Large Multiples & Supermarkets, SM>20, SM<20 and Independents. We are interested in the total size of the companies, not just the pharmacy portion of their business. This is because the source of small company premium figures is floated company data which relate to the market cap of whole businesses, not just particular divisions.

For companies which are not listed, it is possible to get a rough estimate of market capitalisation using multiples of profit measures. The formula used to calculate this estimate of market cap (Equity Value) is:

$$Equity\ Value = Enterprise\ Value\ (EV) - Net\ Debt$$

Where:

$$Enterprise\ Value = EBITDA \times (EV/EBITDA\ multiple)$$

EV/EBITDA is one of the most commonly used valuation metrics, as EBITDA is commonly used as a proxy for the cash flow available to the firm. EBITDA and Net Debt are obtained by looking at the most recent financial accounts for the companies. An appropriate EV/EBITDA multiple may be selected by looking at the EV/EBITDA multiples of a set of comparator companies. For this purpose, we have used the same set of comparator companies as is used for the equity beta analysis. The current EV/EBITDA multiples for these companies are shown in the table below. In this table "LTM" is the multiple for the "Last Twelve month period" (i.e. based on actual historic data), and "FY + 1" and "FY + 2" are the multiples looking 1 and 2 years ahead (i.e. based on forecast data).

Table 17: EV/EBITDA multiples for set of comparator companies

	Equity Value (£m)	Enterprise Value (£ m)	Equity Value ($ m)	Enterprise Value ($m)	EV/EBITDA multiple		
					LTM	FY+1	FY+2
CVS Caremark Corporation	£26,365	£33,224	£41,657	$52,494	6.8	6.8	6.2
Galencia Ltd	£1,658	£2,397	£2,620	$3,787	10.1	10.7	11.5
Shoppers Drug Mart Corp	£4,700	£5,567	£7,426	$8,796	7.8	7.7	7.5
The Jean Contu Group (PJC) Inc.	£1,236	£1,364	£1,953	$2,155	8.6	7.9	7.5
Walgreen Co.	£17,671	£17,706	£27,920	$27,975	6.2	6.2	5.5
Mean	£10,326	£12,052	£16,315	$19,042	7.9	7.9	7.6
Median	£4,700	£5,567	£7,426	$8,796	7.8	7.7	7.5
Min	£1,236	£1,364	£1,953	$2,155	6.2	6.2	5.5
Max	£26,365	£33,224	£41,657	$52,494	10.1	10.7	11.5

Source: CapitalIQ, As at 4th August 2010

For the purpose of this analysis we use the median EV/EBITDA multiple from the set of comparator companies. Since the calculations are based on historic accounts, rather than financial forecasts, we use the median LTM multiple of 7.8 (shaded in blue in the table above).

1.10.3. *Large Multiples & Supermarkets*

There are 10 companies in the Large Multiples & Supermarkets group. Three of these companies are listed supermarkets, and their market capitalisation values are shown in the table below.

Table 18: Equity value of listed supermarkets in Large Multiples & Supermarkets group

Entity		Market Cap (£ millions)	Market Cap ($ millions)
Tesco	LSE:TSCO	£32,198	$50,873
WM Morrison Supermarkets plc	LSE:MRW	£7,184	$11,351
Sainsbury's	LSE:SBRY	£6,526	$10,311
Source: CapitalIQ, as at 4th August 2010			
Exchange rate: $1.58 = £1			

For the remaining 7 companies in the Large Multiples & Supermarkets group which are not listed we calculate an estimate of market cap based on the approach set out above.

The market capitalisation figures – both estimated and actual - are set out in the table below.

Table 19: Equity value for companies in Large Multiples & Supermarkets group

	Most recent accounts (year end)	EBITDA (last full year) (EUR m)	Net debt18 (most recently published) (EUR m)	Equity Value (EURm)	Equity Value ($m)
Estimate of Equity Value calculated based on EV/EBITDA multiple					
Asda Group Limited	31/12/08	€ 987	€ 1,320	€ 6,377	$8,417
Co-operative Group Limited	31/01/09	-€ 462	€ 17,900	-€ 21,503	-$28,385
Boots UK Limited	31/03/09	€ 516	€ 1,384	€ 2,637	$3,481
Lloyds Pharmacy Limited	31/12/08	€ 158	€ 379	€ 852	$1,125
Superdrug Stores plc	31/12/08	€ 5	€ 238	-€ 201	-$266
L.Rowland & Company (Retail) Limited	31/01/09	€ 39	€ 481	-€ 180	-$237
Day Lewis plc	31/03/09	€ 11	€ 81	€ 3	$3
Actual Equity Value for Listed Companies					
Tesco Plc					$50,873
J. Sainsbury plc					$10,311
WM Morrison Supermarkets plc					$11,351
Summary statistics (excluding negative estimates)					
Mean					$12,223
Median					$8,417
Min					$3
Max					$50,873

Exchange rate: $1.32 = EUR 1

As shown in the table, three of the market cap calculations yield negative estimates. Market cap can never actually be negative but, due to negative EBITDA for the year in question or a high level of net debt relative to profits, this method of estimating market cap yields a negative value in this case. There are alternative methods of estimating market cap that might not yield negative estimates for these companies, but we suggest that such

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18 Net debt is calculated as "short term debt (i.e. loans)+ long term debt – cash & cash equivalents"

further analysis is unnecessary in this instance as the objective is simply to find a rough average value for market cap to guide the selection of the appropriate band for the SCP. For the purposes of calculating a median market cap value for the Large Multiples & Supermarkets group, the negative values have been excluded.

The median average market cap value of our Large Multiples & Supermarkets sample is $8,417million (excluding those with negative equity value). As shown in the table below, this value corresponds to a SCP of 0.74% based on the Ibbotson data and 1.52% based on the Duff & Phelps data.

We would not typically use an SCP for large companies such as Tesco and Boots in a valuation or investment appraisal. We note however that there is a broad range of company sizes included in the Large Multiples & Supermarkets group ranging from large supermarkets to relatively small companies such as Day Lewis. Given the range of company sizes included in this group, we recommend adding on an SCP for this group although we acknowledge there is a degree of uncertainty introduced by using US analysis to define what is a "small" company in UK terms.

Table 20: Implications for SCP

	SCP	Note
Ibbotson	0.74%	Since implied market cap average is more than $5,936m but less than $14,692m
Duff & Phelps	1.52%	Since implied market cap average is closest to portfolio average of $9,104m.
Average	1.13%	

Based on this analysis, we propose to add on an SCP of 1.13% for the Large Multiples & Supermarkets group. This is the mid-point of the SCP values implied by Ibbotson and Duff & Phelps based on an average market cap estimate of $8,417million. We also show results assuming 0% SCP for Large Multiples & Supermarkets.

1.10.4.   Smaller Multiples and Independents

There are 8 smaller multiple entities in the sample with more than 20 branches. We have been able to locate current financial data for 7 of these companies. We have calculated an estimate of market cap of these companies based on the approach set out above.

The market cap estimates are set out in the table below.

Table 21: Equity value for companies in SM>20 group

	Last year end	EBITDA (last full year) (EURm)	Net debt (most recently published) (EURm)	Equity Value (EURm)	Equity Value ($m)
Estimate of Equity Value calculated based on EV/EBITDA multiple					
Gorgemead	31/08/2009	€ 8.9	€ 35.1	€ 34.2	$45.1
Paydens Ltd	31/03/2009	€ 8.5	€ 28.8	€ 37.3	$49.2
PCT Healthcare	30/11/2009	€ 6.6	€ 29.1	€ 22.7	$30.0
WR Evans	31/07/2009	€ 5.8	€ 19.0	€ 26.5	$35.0
Waremoss Ltd	31/08/2009	€ 6.7	€ 8.7	€ 43.4	$57.3
Pasab Ltd	31/08/2009	€ 0.9	€ 5.8	€ 1.4	$1.8
C.G. Murray & Son Ltd	31/03/2009	€ 2.7	€ 5.0	€ 15.7	$20.7
Summary statistics					
Mean					$34.2
Median					$35.0
Min					$1.8

Max		$57.3

Exchange rate: $1.32 = EUR 1

The median average market cap value of the "Smaller Multiples with more than 20 branches" sample is $35.0 million. As shown in the table below, this value is less than the smallest portfolio band reported by both Ibbotson and Duff & Phelps, and therefore the maximum SCP value.

Table 22: Implications for SCP

	SCP	Note
Ibbotson	6.28%	Since implied market cap average less than $214m
Duff & Phelps	6.37%	Since implied market cap average is closest to portfolio average of $61m.
Average	6.33%	

As these companies are smaller than the smallest companies considered by Ibbotson and Duff & Phelps there is in principle an argument that we should use an even larger SCP than that in the table. However, we have no evidence on which to base this, and as already mentioned a degree of upward bias may have been introduced by applying US concepts of smallness to UK businesses. We therefore use the largest US SCP estimate as the ceiling for the SCP that we apply.

Based on this analysis, we propose to add on an SCP of 6.33% for the "Smaller Multiples with more than 20 branches" group. This is the mid-point of the SCP values implied by Ibbotson and Duff & Phelps based on an average market cap estimate of $35 million.

Furthermore, we propose to also add on an SCP of 6.33% for "Smaller Multiples with 20 branches or less" and the "Independents" group since the entities in these groups are even smaller than those in the "Smaller Multiples with more than 20 branches" group and therefore should also attract the maximum SCP value.

1.10.5. Sensitivity of WACC results to SCP assumptions

The SCP feeds into the calculation of the weighted average cost of capital (WACC), which in turn is used to measure the return that pharmacies expect to earn on their asset base. The table below shows the sensitivity of the resulting WACC estimate for Large Multiples & Supermarkets to an SCP of 1.13% or 0%.

Table 23: Large Multiples & Supermarkets - sensitivity of pre-tax real WACC numbers to SCP level (with all other inputs set to defaults)

	SCP = 1.13% for Large Multiples & Supermarkets	SCP = 0% for Large Multiples & Supermarkets
Large Multiples & Supermarkets	9.1%	7.8%
SM>20	15.2%	15.2%
SM<20	17.2%	17.2%
Independents	15.7%	15.7%
Overall	12.3%	11.6%

1.11. Cost of debt

1.11.1. Calculating the cost of debt

The cost of debt can be expressed as follows:

$$k_D = r_F + m_D,$$

where r_F is the risk-free rate;

m_D is the debt margin.

1.12. Inputs

- As discussed in section 1.5 the risk-free rate used in this analysis is 4.5%.

- We have calculated a figure for Debt margin using a three-month average of the margins for a UK BBB spread. Over a 10 year timeframe we found the margin to be 2.7% and over a 15 year timeframe we found the margin to be 2.3%. The average of these two values is 2.5%.

- Our recommendation is that a figure of 2.5% is used for debt margin in the WACC calculation – although we also demonstrate the effect of using a value of 2.75% as we spoke to a bank which suggested that the debt margin used for calculating lending rates for small pharmacy businesses was 2.5% - 2.75%. As shown, the WACC calculated for Small Multiples with 20 branches and Independents is unaffected by the debt margin assumption as our default assumption for calculating WACC for these two groups is that they have no debt (because the debt they do hold has equity type characteristics).

Table 24: Sensitivity of pre-tax real WACC to debt margin level (with all other inputs set to defaults)

	Debt margin = 2.5%	Debt margin = 2.75%
Large Multiples & Supermarkets	9.09%	9.13%
SM>20	15.16%	15.20%
SM<20	17.20%	17.20%
Independents	15.67%	15.67%
Overall	12.27%	12.29%

1.13. Corporate tax rate

For the larger multiples WACC calculation we recommend using the Main Rate of UK corporation tax of 28%. This tax rate applies to companies with annual profits in excess of £1.5m. The large UK multiples such as Alliance Boots and Lloyds comfortably have profits in excess of this level, and so in our view will Smaller Multiples.

For the Independents WACC calculation we recommend using the Small Profits Rate of UK corporation tax of 21%. This level of tax applies to companies with annual profits not exceeding £300k. Given the levels of profitability of most independent pharmacies, it seems reasonable to assume that all independents will face this lower rate of corporation tax – and possibly also Smaller Multiples with 20 branches or less. The use of a lower corporation tax rate for small pharmacies decreases the value of the tax shield provided by debt interest payments but reduces the pre-tax returns needed to cover the tax bill. The table below shows the sensitivity of the WACC results to this assumption.

Table 25: Sensitivity of pre-tax real WACC to Independents tax rate (with all other inputs set to defaults)

	Tax rate = 21%	Tax rate = 28%
Large Multiples & Supermarkets	9.1%	9.1%
SM>20	15.2%	15.2%
SM<20	17.2%	17.2%
Independents	15.7%	17.2%
Overall	12.3%	12.8%

1.14. WACC estimates

The tables below summarise the components of the WACC calculations for each of the four pharmacy groupings, based on the current analysis and assumptions outlined in this paper.

When choosing the appropriate WACC value to include in calculations, it is important to match the WACC to the intended use and data.

1.14.1. Large multiples & Supermarkets WACC estimate

Table 26: Large multiple & Supermarkets WACC inputs and estimates

Component	Value/Range Used	Comment
Nominal risk-free rate	4.5%	Based on 20Y govt bond yield
Real risk-free rate	2.0%	Converted from real using inflation assumption of 2.5% and Fisher relationship
Debt margin	2.5%	Average margins for UK BBB spread
Tax rate (T)	28%	Corporation tax rate
Debt / Equity Ratio (D/E)	0.19	Comparator analysis
Target Gearing (D/D+E)	0.16	Comparator analysis
EMRP	5.00%	Analysis of ex-ante and ex-post evidence
Equity beta	0.82	Based on comparator analysis
Small Company Premium	1.13%	Based on assessment of average size of entities
Nominal post-tax WACC (based on default inputs)	9.0%	Based on equity beta + SCP approach, using nominal risk-free rate
Nominal pre-tax WACC	12.5%	Post-tax WACC / (1-T)
Real post-tax WACC	6.5%	Based on equity beta + SCP approach, using real risk-free rate
Real pre-tax WACC	9.1%	Post-tax WACC / (1-T)

1.14.2. Smaller multiples (>20 branches) WACC estimate

Table 27: SM>20 WACC inputs and estimates

Component	Value/Range Used	Comment
Nominal risk-free rate	4.5%	Based on 20Y govt bond yield
Real risk-free rate	2.0%	Converted from real using inflation assumption of 2.5% and Fisher relationship
Debt margin	2.5%	Average margins for UK BBB spread
Tax rate (T)	28%	Corporation tax rate
Debt / Equity Ratio (D/E)	0.19	Comparator analysis
Target Gearing (D/D+E)	0.16	Comparator analysis
EMRP	5.00%	Analysis of ex-ante and ex-post evidence
Equity beta	0.82	Based on comparator analysis
Small Company Premium	6.33%	Based on assessment of average size of entities - maximum SCP
Nominal post-tax WACC (based on default inputs)	13.4%	Based on equity beta + SCP approach, using nominal risk-free rate

Nominal pre-tax WACC	18.5%	Post-tax WACC / (1-T)
Real post-tax WACC	10.9%	Based on equity beta + SCP approach, using real risk-free rate
Real pre-tax WACC	15.2%	Post-tax WACC / (1-T)

1.14.3. Smaller multiples (20 branches or fewer) WACC estimate

Table 28: SM<20 WACC inputs and estimates

Component	Value/Range Used	Comment
Nominal risk-free rate	4.5%	Based on 20Y govt bond yield
Real risk-free rate	2.0%	Converted from real using inflation assumption of 2.5% and Fisher relationship
Debt margin	2.5%	Average margins for UK BBB spread
Tax rate (T)	28%	Corporation tax rate
Debt / Equity Ratio (D/E)	0.0	Comparator analysis
Target Gearing (D/D+E)	0.0	Comparator analysis
EMRP	5.00%	Analysis of ex-ante and ex-post evidence
Equity beta	0.82	Based on comparator analysis
Small Company Premium	6.33%	Maximum SCP
Nominal post-tax WACC (based on default inputs)	14.9%	Based on equity beta + SCP approach, using nominal risk-free rate
Nominal pre-tax WACC	20.7%	Post-tax WACC / (1-T)
Real post-tax WACC	12.4%	Based on equity beta + SCP approach, using real risk-free rate
Real pre-tax WACC	17.2%	Post-tax WACC / (1-T)

1.14.4. Independents WACC estimate

Table 29: Independents WACC inputs and estimates

Component	Value/Range Used	Comment
Nominal risk-free rate	4.5%	Based on 20Y govt bond yield
Real risk-free rate	2.0%	Converted from real using inflation assumption of 2.5% and Fisher relationship
Debt margin	2.5%	Average margins for UK BBB spread
Tax rate (T)	21%	Tax rate for small companies
Debt / Equity Ratio (D/E)	0.0	Comparator analysis
Target Gearing (D/D+E)	0.0	Comparator analysis
EMRP	5.00%	Analysis of ex-ante and ex-post evidence
Equity beta	0.82	Based on comparator analysis
Small Company Premium	6.33%	Maximum SCP
Nominal post-tax WACC (based on default inputs)	14.9%	Based on equity beta + SCP approach, using nominal risk-free rate
Nominal pre-tax WACC	18.9%	Post-tax WACC / (1-T)
Real post-tax WACC	12.4%	Based on equity beta + SCP approach, using real risk-free rate
Real pre-tax WACC	15.7%	Post-tax WACC / (1-T)

1.15.   Sensitivity to WACC assumptions

We have calculated the fair rate of return based on the WACC assumptions outlined in this paper. This is PwC's recommended approach; however we acknowledge that there are some challenges in applying this framework to the NHS pharmacy sector. In particular, we note that:

- There is a broad mix of large and small businesses in the sector. Typically WACC is most commonly applied to larger businesses.

- We are dealing with a sector comprising 3000+ separate businesses so detailed analysis of the factors affecting individual businesses is not possible.

- The available comparator data on which to base WACC assumptions is not perfect.

As described in this chapter, we have taken steps to address these issues. This has involved some reliance on proxy data and other assumptions in order to derive the WACC, however we note that estimating an appropriate WACC is not a precise science and it is always necessary to use a degree of judgment.

During the course of the COSI, there has been particular discussion with the project team on two issues:

- The extent to which regulated companies may be better comparators for pharmacy than the set of retail pharmacy companies listed in Table 3.

- The extent to which it is appropriate to use a standard equity beta for estimating the cost of equity – since the standard equity beta only compensates investors for systematic risk, not specific risk and many investors in pharmacy, particular smaller pharmacy businesses, are unlikely to be well diversified so are exposed to specific risk as well as to systematic risk.

Annexes 2 and 3 provide sensitivity analysis to show the impact of on the overall results of basing calculations on alternative assumptions.

1.16.   The application of WACC

This section covers:

- The rationale for using the pre-tax WACC (rather than post-tax or vanilla) and the impact this has on the numbers calculated.
- The rationale for using a real WACC and applying this to an inflated asset base.

1.16.1.   Pre-tax, Post-tax and Vanilla WACC

When calculating the Fair Return on an asset it is important correctly to account for the way a company's tax liability is remunerated. The Fair Return should account for the effect of tax as what matters to an investor is the return received after tax.

A business can be remunerated for its tax expense under three different WACC approaches:

1. Pre-tax WACC - The return required by equity investors, post-tax, is multiplied by a factor equal to the tax wedge. This new pre-tax rate of return provides sufficient revenues to meet the tax liabilities as well as meeting the requirements of equity investors.

2. Vanilla approach - Corporation tax is treated as a cash flow and so specifically modelled as with other operating costs of a business. This approach abstracts from tax in the WACC calculation. Tax liabilities for pharmacy businesses would, therefore, have to be compensated as part of the normal running costs of a business.

3. Post-tax WACC – As under the vanilla approach, no uplift is applied to the cost of equity to account for the tax expense and a separate modelling of tax is required. In contrast to the vanilla approach, however, post-tax WACC does account for the benefit of a tax shield on interest payments. This is shown in the formulae below. It is therefore essential to incorporate this in the cash flow modelling, to avoid double counting.

The formulae for the three approaches are set out in the table below, together with the average WACC values based on current assumptions (where g is gearing, Kd is the pre-tax cost of debt, Ke is the post-tax cost of equity and t is the corporation tax rate.

Table 30: Alternative approaches to assessing the WACC and tax expense

WACC approach	Description	Nominal	Real
Pre-tax WACC	g x Kd + 1/(1-t) x Ke x (1-g)	15.6%	12.3%
Post-tax WACC	g x Kd x (1-t) + Ke x (1-g)	11.7%	9.2%
Vanilla WACC	g x Kd + Ke x (1-g)	11.9%	9.3%

Source: PwC analysis

If precise tax modelling is conducted and the correct effective tax wedge is applied then the three methods will be equivalent. In practice, however, one or both of these can break down, so the decision can make an important difference. We have adopted a pre-tax WACC approach for two reasons.

1. The vanilla and post-tax approach would require detailed modelling of the tax liabilities. Whilst this may be the best approach in regulated industries with a few large players, the possible benefit is not sufficient when we would need to assess over 500 pharmacies.

2. The second reason is that the pre-tax WACC approach is conceptually straightforward. This approach does have the drawback that it is unlikely that each pharmacy will have the same effective tax rate. However, applying the same tax rate for companies of a similar size seems reasonable in this inquiry and greatly reduces the complexity of the calculations.

1.16.2.   *Nominal v Real WACC*

In the calculation of the fair return on an asset base it is important correctly to account for inflation. The fair return should account for inflation as what matters to investors are the returns they receive in real terms.

A decision must be made over whether WACC should be computed in nominal or real terms. The choice of real or nominal does not matter provided there is consistency in the application - in this case in the rates of return and asset base estimates[19]. Two options are available:

1. Apply a nominal rate, which incorporates inflation expectations, to the historic cost of assets.

2. Apply a real rate of return to assets that have been indexed with inflation.

For this inquiry we recommend using a real WACC and applying this to an inflated asset base. We recommend this approach for four reasons:

1. This approach is typical of the majority of UK regulatory precedent.

2. Under this approach, in real terms, the depreciation allowance is constant in each year. This means that today's and tomorrow's customers pay the same amount for the asset.

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[19] When calculating total remuneration for the current year, it is obviously also necessary to inflate operating expenses to current price levels

3. Under this approach, inflation of the asset base over time can be tailored to pharmacies, whereas the inflation element contained in a nominal WACC is more generic.

4. Estimates of the cost to refit assets in the pharmacy (which are a key input for the calculation of tangible assets) were provided at the time of the survey, at the end of the 2010 financial year. This is at the end of the first year for which the Fair return is to be calculated. Inflation has already been accounted for in the value of the assets, and applying a nominal WACC would therefore double-count inflation.

We will apply a consistent methodology for the period 2010/11 – 2014/15. We will inflate the asset base each year and apply a real WACC to calculate the fair return.
We have calculated a real WACC using a real risk-free rate. This is the approach most commonly used by regulators to calculating a real WACC. This is described further in Section 1.5. The alternative is to calculate a nominal WACC using a nominal risk-free rate and then converting the whole nominal WACC to a real WACC using the Fisher relationship.

Annex 1: Detail on comparators

Table 31: Comparator companies used in WACC analysis

Company name	Industry classifications	Geographic locations	Market capitalisation (USDm)	Business Description
CVS Caremark Corporation	Drug Stores and Pharmacies (Primary); Catalog Drug Store and Pharmaceutical Retail; Online Drug Retail and Pharmacies	United States and Canada	47,903	CVS Caremark Corporation operates as a pharmacy services company in the United States. It operates in two segments, Pharmacy Services and Retail Pharmacy. The Pharmacy Service segment provides a range of prescription benefit management services, including mail order pharmacy services, specialty pharmacy services, plan design and administration, formulary management, and claims processing. This segment primarily serves employers, insurance companies, unions, government employee groups, managed care organizations and other sponsors of health benefit plans, and individuals. As of December 31, 2009, it operated 49 retail specialty pharmacy stores, 18 specialty mail order pharmacies, and 6 mail service pharmacies located in 25 states, Puerto Rico, and the District of Columbia. This segment operates business under the Caremark Pharmacy Services, Caremark, CVS Caremark, CarePlus CVS/pharmacy, CarePlus, RxAmerica, AccordantCare, and TheraCom names. The Retail Pharmacy segment sells prescription drugs, over-the-counter drugs, beauty products and cosmetics, photo finishing, seasonal merchandise, greeting cards, and convenience foods through its pharmacy retail stores and online. It also provides health care services. This segment operated 7,025 retail drugstores located in 41 states and the District of Columbia; and 569 retail health care clinics in 25 states. The company has a strategic alliance with Alere, L.L.C. for the management of disease management program offerings that cover chronic diseases, such as asthma, diabetes, congestive heart failure, and coronary artery disease. CVS Caremark Corporation was founded in 1892 and is based in Woonsocket, Rhode Island.

Company name	Industry classifications	Geographic locations	Market capitalisation (USDm)	Business Description
Galenica Ltd.	Drug Stores and Pharmacies	European Developed Markets	2,353	Galenica Ltd., through its subsidiaries, operates as a diversified healthcare company primarily in Switzerland, Europe, and the Americas. The company engages in the development, manufacture, and marketing of pharmaceutical products; runs pharmacies; provides logistical and database services; and sets up networks. It operates in four segments: Pharma, Logistics, Retail, and Other. The Pharma segment develops, produces, and markets pharmaceutical products worldwide. It focuses on iron deficiency anaemia and consumer healthcare, a range of prescription and non-prescription products and herbal remedies; markets products manufactured by third parties; and develops and markets CellCept for applications in auto-immune diseases. The Logistics segment provides services for pre-wholesale pharmaceutical companies, including storage and distribution; supplies healthcare products to pharmacies, physicians, drugstores, and hospitals; and provides marketing support to its customers. The Retail segment owns and operates a chain of pharmacies. As of December 31, 2009, it operated 268 stores and 109 partner pharmacies. This segment operated a chain of pharmacies under the Amavita brand in 121 locations; 101 pharmacies under the Sun Store brand; 39 own sales points in partnership with Coop under the Coop Vitality brand; and 109 Winconcept partner pharmacies. The Other segment offers solutions for the networked healthcare market that include the databases, which provide knowledge for the service providers in the Swiss healthcare market, and develop management solutions for the networked healthcare market. It also provides master data systems for healthcare market; and publishes printed and electronic technical information on pharmaceutical products in Switzerland. The company was formerly known as Collaboration Pharmaceutique SA and changed its name to Galenica Ltd. in 1932. Galenica Ltd. was founded in 1927 and is headquartered in Berne, Switzerland.

Company name	Industry classifications	Geographic locations	Market capitalisation (USDm)	Business Description
Shoppers Drug Mart Corp.	Drug Stores and Pharmacies (Primary)	United States and Canada	7,707	Shoppers Drug Mart Corporation licenses retail drug stores operating under the Shoppers Drug Mart and Pharmaprix names in Canada. The company's stores offer over-the-counter medications, including supplements and natural health products, analgesics, and cough and cold products; health and beauty aids, such as oral hygiene, hair care, deodorants, skin care, feminine hygiene, men's grooming, baby needs, and other toiletries; and cosmetics and fragrances, which comprise color cosmetics, skin treatment, fragrances, hair color, cosmetic accessories, and leg wear. It also provides seasonal products and everyday household essentials, including confection and food, cleaning and paper products, greeting cards, magazines, and photo products; and private label products marketed under various trademarks, such as Life Brand, Quo, Everyday Market, Bio-Life, Balea, Nativa, and Easypix. In addition, the company offers HealthWATCH program that offers patient counseling and advice on medications, disease management, and health and wellness; and the Shoppers Optimum program, a retail loyalty card program. Further, Shoppers Drug Mart Corporation provides specialty drug distribution, pharmacy, and patient support services; and pharmaceutical products and services to long-term care facilities. As of March 30, 2010, it had a network approximately 1,170 Shoppers Drug Mart/Pharmaprix retail drug stores; and licensed or owned approximately 49 medical clinic pharmacies operating under the Shoppers Simply Pharmacy name and approximately 6 luxury beauty destinations operating as Murale. It also owned and operated approximately 64 Shoppers Home Health Care stores, which engage in the sale and service of assisted-living devices, medical equipment, home-care products, and durable mobility equipment to institutional and retail customers. The company was founded in 1962 and is headquartered in Toronto, Canada.
The Jean Coutu Group (PJC) Inc.	Drug Stores and Pharmacies (Primary)	United States and Canada	2,047	The Jean Coutu Group (PJC) Inc. engages in retailing and distributing prescription and non-prescription drugs and general merchandise primarily in eastern Canada. The company operates franchised drugstores under the PJC Jean Coutu, PJC Sante Beaute, and PJC Clinique names. Its franchised store network retails pharmaceutical, parapharmaceutical, and other products. As of February 28, 2009, the company operated a network of 353 franchised pharmacies located in Quebec, Ontario, and New Brunswick. Its franchising activities include operating two distribution centers and providing various services to PJC franchised pharmacies, which centralized purchasing, distribution, marketing, training, human resources, management, operational consulting and information systems, and professional services, as well as participation in private label programs. The Jean Coutu Group also manages properties that house franchisee outlets. The company was founded in 1969 and is headquartered in Longueuil, Canada.

Company name	Industry classifications	Geographic locations	Market capitalisation (USDm)	Business Description
Walgreen Co.	Drug Stores and Pharmacies (Primary)	United States and Canada	34,440	Walgreen Co., together with its subsidiaries, operates a chain of drugstores in the United States. The drugstores sell prescription and non-prescription drugs, and general merchandise. Its general merchandise comprises household items, personal care, convenience foods, beauty care, photofinishing, candy, and seasonal items. The company provides its services through drugstore counters, as well as through mail, telephone, and the Internet. As of August 31, 2009, Walgreen operated 7,496 locations comprising 6,997 drugstores, 377 worksite facilities, 105 home care facilities, 15 specialty pharmacies, and 2 mail service facilities in 50 states, the District of Columbia, Puerto Rico, and Guam. It also owned 33 strip shopping malls. The company was founded in 1901 and is based in Deerfield, Illinois.

Source: Capital IQ

Annex 2: Alternative approach to comparator analysis

This Annex demonstrates how the WACC we have calculated for pharmacies might differ if assumptions were based on a comparison with regulated businesses as opposed to the set of retail pharmacy companies identified The WACC calculated using the retail pharmacy companies is higher than that obtained if regulated companies are used as comparators. The two key reasons for the higher numbers are:

- Debt gearing: The cost of debt is lower than the cost of equity and the WACC is a weighted average of the two, based on the proportions of debt and equity held by the companies in question. The retail pharmacy comparators have a median debt proportion of 16%, whereas utilities and regulated companies typically have much higher proportions of debt than this. The median debt proportion used in the regulatory decisions looked at was 50%.

- Small company premium: We have added on a SCP for each pharmacy type. In particular, the SCP used for Independents and Smaller Multiples is quite large (6.33%) - the largest premium listed in the Ibbotson and Duff & Phelps data. This is based on an assessment of the average size of companies in these groups. Utilities and regulated businesses do sometimes add on SCPs, but these tend to be much smaller, e.g. 1% or less, since regulated businesses are typically still relatively large.

The table below sets out WACC values calculated based on a number of different assumptions. The first column of numbers is based on the base case set of assumptions used in our calculations and as described in the written report. The second column shows the impact on the numbers of assuming 50% debt gearing for all pharmacy types and leaving all other assumptions unchanged. The third column shows the impact on the numbers of assuming 0% Small Company Premium and leaving all other assumptions unchanged from the base case. The fourth columns shows the combined impact of these two assumptions (i.e. 50% debt gearing and 0% SCP). As shown in column 4, the combined alternative assumptions result in the pre-tax real WACC dropping from the 12.3% used in the report to a value of 6.3%.

Table 32: WACC values assuming gearing as for regulated companies and 0% SCP

	Base case	Assuming 50% gearing (similar to utilities)	Assuming 0% SCP	Assuming 50% gearing and 0% SCP
WACC (post-tax real)	9.2%	6.5%	5.8%	4.7%
WACC (vanilla real)	9.3%	7.0%	5.9%	5.3%
WACC (pre-tax real)	12.3%	8.7%	7.8%	6.3%
WACC (post-tax nominal)	11.7%	8.7%	8.3%	6.9%
WACC (vanilla nominal)	11.9%	9.6%	8.4%	7.8%
WACC (pre-tax nominal)	15.6%	11.7%	11.1%	9.3%

Table 32 above shows the impact on the WACC calculations of varying the gearing and SCP assumptions from those set out in the main body of this Appendix. In the table above, the equity beta remains set at 0.82. 0.82 is the median equity beta of the retail pharmacy companies. The median equity beta of recent regulatory decisions is 1.0. Table 33 below is equivalent to Table 32 except that in this table, the equity beta is set at the regulatory decision median of 1.0 rather than 0.82.

Table 33: WACC values assuming gearing as for regulated companies and 0% SCP and equity beta of 1.0

	Base case	Assuming 50% gearing (similar to utilities)	Assuming 0% SCP	Assuming 50% gearing and 0% SCP
WACC (post-tax real)	13.3%	8.4%	7.0%	5.2%
WACC (vanilla real)	13.3%	8.9%	7.0%	5.7%

WACC (pre-tax real)	16.8%	10.6%	8.8%	6.6%
WACC (post-tax nominal)	15.8%	10.7%	9.5%	7.5%
WACC (vanilla nominal)	15.8%	11.4%	9.5%	8.3%
WACC (pre-tax nominal)	20.0%	13.5%	12.0%	9.5%

Annex 3: Alternative approach to calculating the equity beta

The working group discussed a possible alternative approach to estimating the cost of equity for small pharmacy businesses. For comparison, we set out the approach and results below.

1.17. Independents and Smaller Multiples – approach to calculating the Cost of Equity

The standard CAPM framework is typically used to calculate fair return for investors in large companies. It is arguably less appropriate for calculating fair return for investors in smaller companies, such as Independents and Smaller Multiple pharmacy businesses. There is no standard framework that is commonly used for estimating a fair rate of return for investors in such smaller businesses.

One alternative approach is based on an alternative method of calculating the beta value to use for the cost of equity equation. This method uses Total Beta rather than the standard equity beta (as is used in the CAPM). Total beta is a measure of the total risk of an investment. It measures both systematic and specific risk, rather than the standard equity beta which measures only systematic risk – and thus recognises that investors in smaller pharmacy businesses are not typically well diversified and are therefore exposed to specific as well as systematic risk.

Total beta is calculated as the relative volatility of an individual asset compared to the market average (rather than the statistical relationship between returns of an individual asset and the market returns, as with the standard equity beta). The major proponents of the total beta method are Butler and Pinkerton, who claim academic underpinning dating back to the 1980s. ("Derivation of the Butler Pinkerton Model", Gary Schurman, May 5 2010, provides further detail on this approach).

It was suggested to us that when using Total Beta it is inappropriate also to add on a Small Companies Premium because the SCP arguably captures some of the same risk as the total beta. However, as explained in the main text, whilst the source of risk-related returns incorporated in the SCP is not clear, it cannot reflect a lack of diversification as our evidence for the SCP is derived from listed companies whose investors can reasonably be assumed to be well-diversified. We therefore do not see why if Total Beta is appropriate this rules out a need for an SCP. However, as the intention of this Annex is to set out the approach suggested to us and not our own view we do not include an SCP.

Under the total beta approach, the cost of equity may be expressed as follows:

$$k_E = r_F + (\beta_T \times \text{EMRP})$$,

where r_F is the risk-free rate;

β_T is the total beta; and

EMRP is the equity market risk premium.

Total beta is defined as the relative volatility of an individual asset compared to the market average (rather than the statistical relationship between returns of an individual asset and the market returns, as with the standard Equity Beta).

Total beta is calculated as:

$$\beta_T = \frac{\sigma_i}{\sigma_M}$$

with i being the individual asset and M the whole market.

Carrying out this calculation for the same comparator group used in the Equity Beta calculation results in the Total Beta values shown in the table below.

Table 34: Total beta estimates

	Total beta
CVS Caremark Corporation	1.40
Galenica Ltd.	1.77
Shoppers Drug Mart Corp.	0.94
The Jean Coutu Group (PJC) Inc.	1.79
Walgreen Co.	1.55
Mean	1.49
Median	1.55

Note: Total beta estimates based on 5 years of monthly returns.
Source: PwC analysis, Capital IQ

The median total beta is 1.55. This is the beta value that may be used in the cost of equity equation for the Independents and Smaller Multiples. The Total beta estimates are higher than the Equity beta estimates shown in Table 9. This is because total betas are a measure of total risk, rather than just systematic risk.

The table below shows the WACC values calculated using a total beta for Independents and Smaller Multiples (and no Small Company Premium) and a standard equity beta approach for Large Multiples & Supermarkets (with an SCP of 1.13% added in).

Table 35: Pre-tax real WACC values using alternative approach

	PwC recommended approach	Alternative approach (described in this annex)
Large Multiples & Supermarkets	9.1%	9.1%
SM>20	15.2%	12.0%
SM<20	17.2%	13.5%
Independents	15.7%	12.3%
Overall	12.3%	10.7%

We note that this alternative approach gives an overall WACC that is lower than that calculated using PwC's recommended approach. Clearly, if the Total Beta approach was used in conjunction with PwC's SCP approach – and we can see no reason why the two are mutually exclusive – then WACC would be higher than is the case using PwC's recommended approach. The table below shows the results based on such a combined approach (ie. equity beta of 0.82 and SCP of 1.13% for Large Multiples & Supermarkets and total beta of 1.55 and SCP of 6.33% for all other groups)

Table 36: Pre-tax real WACC values using combined approach

	PwC recommended	Alternative approach	Combined approach using

	approach	(described in this annex)	both total beta and SCP
Large Multiples & Supermarkets	9.1%	9.1%	9.1%
SM>20	15.2%	12.0%	19.4%
SM<20	17.2%	13.5%	22.3%
Independents	15.7%	12.3%	20.3%
Overall	12.3%	10.7%	14.5%

References

Barclays Capital (2007), "Equity Gild Study".

Citigroup Global Markets (2008), "Calculating the cost of capital in a downturn".

Claus & Thomas (2001), "Equity premia as low as three percent? Empirical evidence from analysts earnings".

Competition Commission (2007), "A report on the economic regulation of the London airports companies (Heathrow Airport Ltd and Gatwick Airport Ltd)".

Competition Commission (2008), "Stansted Airport – Q5 price control review".

DMS (2008), "Global Investment Returns Yearbook 2008".

Grabowski (2009), "Problems with cost of capital estimation in the current environment – update".

Gregory (2007), "How Low is the UK Equity Risk Premium?".

Ibbotson (2009), "Ibbotson SBBI Classic Yearbook"

Duff & Phelps (2010), Table B-1

Nomura (2008), "European Strategy Weekly".

Welch (2008), "The Consensus Estimate for the Equity Premium by Academic Financial Economists in December 2007".

Appendix P – Calculating Fair Return

1.1.   Introduction

In addition to operating costs, the cost of providing NHS pharmaceutical services also includes a fair return on investment. The project team held a series of meetings at which the appropriate rate of return for investors in community pharmacies was discussed. We note that the purpose of this report is to identify and quantify the various NHS costs involved in delivering community pharmacy services.   The question as to the extent to which the NHS should pay for the different categories of cost is outside the scope of PwC's work and may be a matter for further negotiation.

To remain a viable commercial enterprise, investors in pharmacy businesses need to earn a fair rate of return to recognise the risks they have taken in investing in their business. We have sought to estimate the fair return for the NHS component of a pharmacy business. The approach taken to estimating this rate of return is based on the Weighted Average Cost of Capital (WACC). The WACC is the minimum rate of return an investor would achieve in a competitive market. WACC is most readily applied to calculating fair return for investors in large companies, since its application generally involves the use of stock market information. It has strong theoretical underpinnings and many regulators and competition authorities have used the WACC framework in their analyses; there is therefore strong precedent for its use.   WACC is arguably not so well suited for calculating fair return for investors in smaller companies, such as Independents and Smaller Multiple pharmacy businesses. However, there is no standard framework that is commonly used for estimating a fair rate of return for investors in such smaller businesses. We recommend that a pragmatic, and defensible, approach is to use the standard WACC framework for the small pharmacy companies as for the Large Multiples & Supermarkets, with appropriate application of a Small Companies Premium. Such premia have been adopted by UK regulators in setting prices (for example, by OFWAT[2]).

Under the WACC approach, the Fair Rate of Return is calculated as:

$$Fair\ Rate\ of\ Return = WACC\ x\ (Tangible\ Assets + Intangible\ Assets)$$

The detailed methodology and calculations to derive an appropriate WACC and the valuation of the asset base are covered in Appendices M - O. This note provides a summary of the current figures and assumptions behind the Fair Return calculations.

1.2.   Fair return numbers

Based on current base case assumptions, the calculated average pre-tax fair return per branch is £33,189 (for the year ending March 2010). This estimate is built up as shown in the table below.

Table 1: Fair return components

	Indep-endent	SM<20	SM>20	NRD LM	RD LM	Super-market	Overall
Total NHS Revenues	£722,420	£827,833	£1,086,992	£910,222	£863,214	£874,715	£847,924
% from Greenfield Model	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%

[2] As described in the Ofwat report "Future water and sewerage charges 2010-15:Final determinations"(2009).

Intangible Assets	£144,484	£165,567	£217,398	£182,044	£172,643	£174,943	£169,585
Tangible Assets	£74,650	£81,417	£107,589	£160,425	£148,483	£105,400	£118,362
Total Assets	£219,134	£246,984	£324,988	£342,469	£321,126	£280,343	£287,947
Real WACC	15.7%	17.2%	15.2%	9.1%	9.1%	9.1%	12.3%
Fair Return	£34,344	£42,472	£49,272	£31,138	£29,197	£25,489	£33,744
Tax Benefit Adjustment	-£1,329	-£1,772	£0	£0	£0	£0	-£555
Adjusted Fair Return	£33,015	£40,700	£49,272	£31,138	£29,197	£25,489	£33,189
Fair return (intangible)3	£21,768	£27,283	£32,960	£16,552	£15,697	£15,906	£19,546
Fair return (tangible)	£11,247	£13,417	£16,312	£14,586	£13,500	£9,583	£13,642

1.3.   *Fair return assumptions*

The table below provides a summary of the key assumptions behind the Fair Return figures

Table 2: Fair return assumptions

Components	Assumptions
Total NHS Revenues	• Total annual NHS revenues are reported in the survey • Any missing data is filled in using NHSBSA data (NHSBSA data is also used for 10 branches for which there was a large discrepancy between survey revenues and NHSBSA revenues). • Revenues inflated using CPIY to represent revenues for the year ending March 2010.
% from Greenfield Model	• An assumption of 20% is used. • This is a mid-point between the value of 12.3% resulting from estimating start-up costs using regression on the survey sample data and the value of 25.7% resulting from assuming that start-up costs are equal to steady-state costs. • The profile for start-up revenues is based on analysis of NHSBSA fee item data for start-up pharmacies.
Intangible NHS Assets (nominal)	• Intangible assets are calculated as 20% of total NHS revenues (including reimbursement) • We suggest that the percentage of 38% emerging from the Market Capitalisation analysis is an overestimate of intangible assets for community pharmacy businesses and that more reliance should be placed on the Greenfield approach which has been tailored more specifically to pharmacy businesses.
Tangible NHS Assets (nominal)	• NHS tangible asset value is calculated as the sum of NHS dispensing stock, NHS working capital, physical NHS assets (from branch plus a portion of Head Office NHS assets) and a portion of physical common assets (from branch plus a portion of Head Office Common assets). • Physical assets valued based on survey refit estimates and assuming that assets are 50% depreciated. • Refit estimates provided for "Other Assets" are capped at the 95% percentile (£150K) for each branch and stock valuations are capped at £200K. • Calculating working capital as 0.2 months of Net Ingredient Cost and using stock valuation figures provided in the survey. • Valuation amounts inflated using CPIY to represent average values for the year ending March

3 The tangible and intangible elements of fair return are calculated based on the ratio of tangible asset value to to intangible asset value.

	2010.
	• Head office assets allocated to branches on a uniform basis and for Large Multiples are adjusted upwards by 14% to ensure weighted sample equals population total for Large Multiples group.
Total NHS Assets (nominal)	• Total assets are the sum of Intangible and Intangible NHS Assets.
	• This is the nominal asset base since assets have been inflated to represent the average asset base for the year ending March 2010.
Real WACC (pre-tax)	• A standard CAPM framework has been used to calculate the cost of equity across all pharmacy types.
	• An equity beta point estimate of 0.82 is used based on a set of retail pharmacy comparators. Values of 1.0 and 0.7 have also been tested based on a comparison with regulated businesses. Regulated businesses may be viewed as relevant comparators for a pure pharmacy business. In particular, they have very stable demand cyclicality which may be considered analogous to pharmacies.
	• A Small Company Premium (SCP) of 6.33% is used for Independents and Smaller Multiples and 1.13% for Large Multiples.
	• EMRP of 5% based on review of EMRP estimates.
	• Debt margin of 2.5% based on margins for UK BBB spread.
	• D/E assumed to be 19% for Large Multiples and SM>20 (based on comparator companies) and 0% for SM<20 and Independents.
	• Tax rate assumed to be 21% for Independents and 28% for all other groups.
	• The nominal risk-free rate of 4.5% (based on UK Government nominal bonds) is converted to a real risk-free rate using the Fisher Relationship and a long-term inflation assumption of 2.5%.
	• The calculated real WACC is based on the latest data available as at March 2010 and is our best estimate of what the WACC should be going forward.
	• We use a real WACC to avoid double-counting of inflation when multiplying by the nominal asset base.
Fair Return	• Unadjusted pre-tax fair return is calculated by multiplying the nominal asset base by the real WACC
Tax Benefit Adjustment	• A tax benefit adjustment is calculated for Independents and SM<20 to remove the tax benefit implied by assuming 0% debt for these pharmacies.
	• This adjustment is calculated as average debt per branch x interest rate x tax rate.
Adjusted Fair Return (pre-tax)	• The tax benefit adjustment is subtracted from the initial Fair Return figures to give an adjusted, and final, Fair Return figure for the year ending March 2010.
	• When calculating Fair Return for future years, the asset base should be inflated but the WACC and tax benefit assumptions should be kept constant.

Appendix Q – Cost Sensitivity Analysis

1.1. Introduction

Our analysis has suggested that independents and retail driven large multiples have significantly different costs (lower and higher respectively) than all other pharmacy types. This appendix investigates the effect on the overall average cost per branch of removing these pharmacies from the sampling frame.

For the purpose of this paper we only use Allocation Method 1 (which uses a fully allocated cost (FAC) approach to allocating staff costs) to estimate the allocated NHS cost of community pharmacy. Using Allocation Method 2 (which uses a long run incremental cost (LRIC) approach to allocating staff costs) would make a small difference to the cost per branch but the order of magnitude of removing pharmacy types would be similar.

1.2. Current situation

On the basis of our analysis the overall average cost per branch is £243,364 or £3.03 per fee item. This funding requirement can be broken down by pharmacy type in the following way:

Table 1: Summary results

Pharmacy type	Cost per branch (FAC)	Cost per fee item (FAC)
Independents	£191,650	£2.68
Small multiples	£256,471	£2.85
Non-retail driven large multiples	£242,650	£2.81
Retail driven large multiples	£371,010	£4.84
Supermarkets	£252,348	£3.20
Overall	£243,364	£3.03

1.3. Methodologies

This appendix explores three approaches to removing certain pharmacy types from the analysis, which are as follows:

1. Replace the average cost per branch with the cost per branch of another pharmacy type;

2. Replace the average cost per fee item with the cost per fee item of another pharmacy type; and

3. An econometric approach.

1.3.1. Cost per branch approach

In the sampling frame there are 3,424 independent branches each with an average cost of £191,650 per branch. If these were assumed instead to have an average cost of £256,471 per branch (the equivalent cost per branch of small multiples) then the average cost per branch overall would rise from £243,364 to £265,127 (a 9% increase).

Likewise, in the sampling frame, there are 1,225 retail driven large multiple branches each with an average cost per branch of £371,010. If these were assumed instead to have an average cost per branch of £242,650 (equivalent to non-retail driven large multiples) then the average cost per branch overall would fall from £243,364 to £227,946 (a 6% reduction).

There are a number of disadvantages associated with this approach, which are as follows:

1. It does not take account of the volume effect: Independents and retail driven large multiples process far fewer prescription items per branch than small multiples and non-retail driven large multiples respectively.

2. It does not take account of the location of the retail driven large multiple branches: These are likely to be located in prime locations, such as city centres, and therefore it may not be reasonable to replace them with branches with equivalent costs to the non-retail driven large multiples currently in our sample.

3. It does not take account of other aspects of the service provided by the retail driven large multiples and how this may differ from the service provided by other pharmacy types.

1.3.2. Cost per fee item approach

In the sampling frame independent branches process a total of 244.8 million fee items per year with an average cost of £2.68 per item. If they had an average cost per fee item of £2.85 (the equivalent average cost per fee item of small multiples) then the overall cost per fee item would rise from £3.03 to £3.08 (an increase of 2%).

Retail driven large multiples process a total of 93.9 million fee items per year with an average cost of £4.84 per fee item. If these fee items were assumed instead to have an average cost of £2.81 (the equivalent for non-retail driven large multiples) then the overall cost per fee item would fall to £2.80 (a reduction of 8%).

This approach addresses the volume effect issue identified for the cost per branch approach but still has the second and third disadvantages listed in 1.3.1 above.

1.3.3. Econometric approach

We have carried out econometric analysis to identify the extent to which different pharmacy characteristics explain the NHS cost per branch they incur. Our "best" econometric model estimates the following coefficient values on a dependent variable of cost per branch:

Table 2: Current best econometric model

Variable	Independents	Small multiples	NRD large multiples	RD large multiples	Supermarkets
Scripts	1.90	1.90	1.90	1.90	1.90
Weekly opening hours minus 35	1,215	1,215	1,215	1,215	1,215
Branches in England	36.44	36.44	36.44	36.44	36.44
Constant	37,821	66,641	9,420	138,320	36,001

When these coefficients are applied to the variables in the dataset they give a fitted value of £243,360 per branch (very close to the actual cost of £243,364 per branch).

If all independent branches were assumed to be equivalent to small multiples (and the small multiple coefficients applied to the variables from independent branches) then the overall average cost would increase to £253,057 (an increase of 4%).

Likewise if all retail driven large multiples were assumed to be non-retail driven large multiples then the overall cost would decrease to £227,878 per branch (a reduction of 6%).

This approach takes account of the first two issues listed in 1.3.1 above but still does not take account of the different levels of service between different pharmacy types.

We also note that there are some fundamental issues with applying coefficients estimated based on a real world scenario (with interactions for coefficients on particular pharmacy types) to an artificial reality where those same pharmacy types have been removed.

Appendix R - Econometrics

1.1.   Introduction

We use econometric analysis to help understand which factors contribute to the NHS costs of community pharmacies. The outputs from this modelling exercise are designed to:

- Better understand how pharmacies operate and the costs they incur;
- Inform discussions between the DH and PSNC; and
- Act as a basis for the inputs used in forecasting costs.

This appendix describes the methodology and results from five different models of allocated NHS cost. The econometrics, described in this appendix, is performed on the cross-section of the 573 pharmacies for the year ending the end of March 2010. Appropriate inflation measures have been applied to the survey responses so that all costs are all in a consistent time period[2].

1.2.   Model Structure

The general structure used in the modelling is shown below:

$$NHS\ pharmacy\ cost = \alpha + \beta \cdot NHS\ service\ variables + \gamma \cdot Pharmacy\ Characteristics + \varepsilon$$

We tested different functional forms for the cost equation shown above. We tested a unit cost specification but found that the fit was not improved compared to specification above. We tested a Cobb-Douglas specification, which is a cost function which is found sometimes in the literature but, as this would be less useful in forecasting, we decided not to take it forwards.[3]

We also estimated separate models for each pharmacy types but the large reduction in sample size led to worse results. Finally, as the introduction of interaction terms between pharmacy types and the fee items generally led only to a minor improvement of the results, we decided to not include them to ease interpretation.

We performed a weighted least squares regression on the specification shown above (which takes account of the fact that different branches in the sample represents a different number of branches in the full sampling frame), with an adjustment to standard errors to take account of the fact that the analysis was being carried out on survey data based on a stratified sample drawn from a finite population[4].

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[2] We note however that prescription item volumes have not been inflated. NHSBSA fee item volumes for the year corresponding to the cost data provided in the survey are used in any fee item analysis shown. Similarly we have not applied any inflation to other measures of service activity such as volumes of other services provided, nor adjusted for additional regulatory burden or efficiency since the survey. There is a degree of inconsistency in using inflated costs together with such uninflated activity measures. However we suggest that, for the purposes of econometric analysis, this is a pragmatic approach given that we have no information on how different activity measures may have changed over time.

[3] The hypothesis in this model is that pharmacy NHS costs are multiplicative in costs drivers instead of additive as in the specification above. A log transformation is applied to both sides of the model before estimation. This multiplicative relationship can be critised on the basis that even if one cost component is zero, one would expect the overall cost to be positive for some pharmacies.

[4] To implement this analysis, the svy STATA function was used.

The calculation of these sample weights is described in Appendix G. The weights are designed to sum to 10,197, the size of the sampling frame used for the survey.

We tested all (potential) cost drivers that were available from the survey or from NHSBSA data. A full list of the variables that were tested is not provided here. However, the variables used in the models described, and a description of these variables, are shown in the table below.

Table 1: Variables Used

NHS services variables	Description
Fee items	Fee items prescribed in the 12 months covered by the accounting period
Fee items squared	As above squared
Medicine usage reviews (MURs)	MURs conducted in the 12 months covered by the accounting period
Weekly opening hours minus 35	Weekly opening hours above thirty five hours[5]
Pharmacy type	Dummy-variables indicating pharmacy type (takes a value of 1 if type specified and 0 otherwise)
Number of branches in entity	Total pharmacy branches of entity or chain to which the pharmacy belongs
Urban	Dummy-variable indicating whether the pharmacy is located in an urban area (takes a value of one if area is urban and zero if the area is urban)
GP practice or health centre	Dummy-variable indicating whether the pharmacy is in a GP practice or Health Centre (takes a value of 1 if pharmacy is in a GP practice or Health Centre and 0 otherwise)

1.3.   *Methodology*

Our approach is to specify a pharmacy cost function and then test whether this is a reasonable representation of the industry using the actual data.

Our main variable of interest, the dependent variable, is therefore a measure of cost for each of the pharmacies:
- We use the total NHS cost either using the FAC or LRIC approach to allocating staff costs (i.e. Allocation Method 1 or Allocation Method 2).
- NHS cost, under both methods, includes an allocation of the common cost, head office and owner costs and an element of fair return.
- The cost variables also include the cost of Enhanced Services.

We define and test five separate models of NHS cost. In each model we include different explanatory variables, so called because these variables may explain why the NHS costs differ between pharmacies.

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[5] Weekly opening hours is incorporated into the econometric analysis as a continuous variable, however before using it is transformed by subtracting 35 (for example, a branch with opening hours of 40 hours per week is incorporated into the regression analysis as having a value of 5 for the variable "weekly opening hours minus 35". 35 hours per week is the minimum opening hours reported by the pharmacies in the sample. The rationale for subtracting this minimum from each value is to prevent the coefficient for the the opening_hours variable taking most of the fixed effect for the first 35 hours, which would otherwise be the case.

1. We define an initial model based on only fee items.
   The equation used for this model is given below:
       NHS pharmacy cost=α+ β·Fee Items + ε

2. We then test the effect of adding additional variables to this initial model. If variables are found to be significant then these variables are included in the model before testing further variables. The order in which new sets of variables are tested is based on theoretical considerations (those we expect to have most influence on NHS costs are added first)[6]. In this way we arrive at the specification which fits the data "best" before including any variables indicating the scale or type of pharmacy.
   The equation used for this model is given below:
       NHS pharmacy cost=α+ β·Fee Items + μ·Pharmacy Characteristics + ε

3. We then add the number of branches in the entity to which the pharmacy belongs. With this variable included we follow the same process outlined above to give the third model.
   The equation used for this model is given below:
       NHS pharmacy cost=α+ β·Fee Items + μ·Pharmacy Characteristics + λ·Entity Numbers + ε

4. In model 4 we add dummy variables for each pharmacy type. For example, the Small Multiple dummy takes the value of 1 if the type is a Small Multiple and zero otherwise. We follow the same methodology to arrive at a fourth model including pharmacy type dummies. Note that there is not a dummy for Independents as the fixed effect for this pharmacy type is indicated by the constant.
   The specification used for this model is given below:
       NHS pharmacy cost=α+ β·Fee Items + μ·Pharmacy Characteristics + λ·Entity Numbers+γ1 SM Dummy + γ2 RD LM Dummy + γ3 NRD LM Dummy + γ4 Supmrkt Dummy + ε

5. Finally we add a non-linear term to the model. We include a variable equal to the number of fee items squared to model 4. This variable was included to test whether there was a non-linear relationship between fee items dispensed and overall pharmacy NHS cost.
   The specification used for this model is given below:
       NHS pharmacy cost=α+ β·Fee Items + ψ·Fee Items Squared + μ·Pharmacy Characteristics + λ·Entity Numbers+γ1 SM Dummy + γ2 RD LM Dummy + γ3 NRD LM Dummy + γ4 Supmrkt Dummy + ε

1.4.   Results

1.4.1.   Model 1: Simple regression model

The only explanatory variable we include in this initial model is the annual volume of fee items.

The coefficients estimated for this model are shown in the table below. The coefficients have been estimated based on two versions of the dependent variable of allocated NHS costs, calculated using the two alternative Allocation Methods (referred to as AM1 and AM2).

Figure 1: Results from model 1

	Dependent variable NHS costs	
Independent variables	AM 1	AM 2
Fee items	1.992***	1.936***
	(0.148)	(0.130)

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6 Generally, the order in which variables were tested had little influence on the set of variables included in the final model.

	Dependent variable NHS costs	
Constant	83,331***	89,922***
	(10,573)	(9,437)
Observations	573	573
R-squared	0.530	0.538

Source: PwC Analysis

Note: The asterisks indicate the significance of the variables. The number of asterisks indicates the probability (p) that this coefficient could be different from zero only by chance; *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The standard errors are shown beneath the coefficients in parentheses[7].

This model (in **Error! Reference source not found.**Figure 1 above) shows that NHS costs are higher when a pharmacy dispenses more fee items. In this simple regression model the cost associated with each script is between £1.94 and £1.99 depending on the method used to allocated staff costs. There are between £83k and £90k of NHS costs not associated with fee items and these are captured in the constant. However, as the following models will show, this model is missing variables that are significantly associated with NHS cost. The coefficients and standard errors shown on the variables may not therefore correct.

The R-squared shows that 53% - 54% of the variation in pharmacy NHS costs can be explained by the variation in fee items.

1.4.2. Model 2: Multiple regression model

In this model we test all explanatory variables identified as possible cost drivers, <u>apart from the number of entity branches or pharmacy type variables</u>.

We tested to see if any of the additional explanatory variables in the multiple regression model were highly correlated. High levels of collinearity between the explanatory variables can lead to identification problems and spurious results. Table 2 below shows the correlation matrix for the possible cost drivers used in the final models. As shown there are generally low levels of correlation between the variables. A higher level of correlation is observed between the number of branches within an entity and MURs. For this reason we do not present any models including both of these explanatory variables.

Table 2: Explanatory variable correlation matrix

	Fee items	MURs	Urban	Opening hours minus 35	GP practice or health centre	Entity branches
Fee items	1					
MURs	0.24	1				
Urban (0=Rural,1=Urban)	0.04	0.08	1			
Weekly opening hours minus 35	0.09	0.21	0.09	1		

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[7] We quote standard errors, but not "robust" standard errors. Robust standard errors account for heteroskedasticity. As we are using a weighted regression we have heteorskedasticty by definition. This cannot, therefore, be combined with a calculation of robust standard errors.

	Fee items	MURs	Urban	Opening hours minus 35	GP practice or health centre	Entity branches
GP practice or health centre (0=No, 1=Yes)	0.23	0.06	0.06	-0.10	1	
Entity branches	0.07	0.44	0.02	0.19	0.02	1

PwC Analysis

The specification of model 2 that fits the data best is shown below:

Figure 2: Results from model 2

	Dependent variable: NHS costs			
Independent variables	AM 1		AM 2	
Fee items	1.842***	1.887***	1.788***	1.823***
	(0.141)	(0.145)	(0.124)	(0.128)
Urban (0=Rural, 1=Urban)	14,327**	15,771**	12,929*	14,085**
	(7,127)	(7,095)	(6,660)	(6,652)
Weekly opening hours minus 35	1,911***	1,819***	1,853***	1,780***
	(344.2)	(342.3)	(330.2)	(330.0)
MURs	128.2***	128.5***	127.8***	128.0***
	(23.44)	(23.08)	(21.89)	(21.60)
GP practice or health centre (0=No, 1=Yes)		-28,389***		-22,740**
		(10,320)		(9,536)
Constant	27,520*	27,357**	36,296***	36,166***
	(14,136)	(13,878)	(12,517)	(12,320)
Observations	573	573	573	573
R-squared	0.598	0.603	0.608	0.611

Source: PwC Analysis

Note: The asterisks indicate the significance of the variables. The number gives the probability (p) that this coefficient could be different from zero by chance; *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The standard errors are shown beneath the coefficients in parentheses.

In this model the cost associated with each script is lower than for model 1, £1.79 to £1.89. The slope coefficient estimates for fee items in model 1 were partially capturing the effect of other cost drivers, which was likely to be due to the fact that the fee items variable was positively correlated with a number of the variables (shown in Table 2). A pharmacy located in an urban area is associated with £12.9k to £15.8k additional NHS cost. Each hour open per week, above 35 hours, is associated with an annual NHS cost of £1,780 to £1,911. This equates to £34 to £37 per additional hour open.

In this model MURs are significant, adding about £128 to NHS costs. There is a chance that pharmacies with a higher number of MURs also perform more enhanced services. If this is true this coefficient may incorporate some of cost for these services. We were not able to adequately capture enhanced services separately in the

econometric analysis. The responses in the survey were poorly filled out and often only indicated whether the pharmacy conducted the service was filled out, and not how many hours were spent.

Based on this analysis. a pharmacy that is in a GP practice or health centre appears to be associated with £23k to £28k lower NHS costs. This may be because these pharmacies process a high number of scripts and therefore appear to be lower cost once volume is considered. However, an alternative explanation is that the GP or health centres are more likely to be one of the pharmacy types that are lower cost. We note that of the 66 GP practice or health centre pharmacies in the sample, none are Retail Driven Large Multiples, the highest cost pharmacy type. This latter explanation appears to be the more likely explanation as once the pharmacy type variables are included in the regression the GP/health centre variable is no longer statistically significant (see result for Model 4 below).

The constant, the NHS cost not associated with any of the variables shown, is between £27k and £36k.

As expected, model 2 fits the observed data better than model 1. The addition of the new variables improves the overall fit of the model, shown by the higher R-squared terms. All the variables significantly explain observed variatiations in NHS cost; the adjusted R-squared values are also, therefore, higher than in model 1 (although these are not presented in this appendix).

1.4.3. Model 3: Multiple regression model with entity branch numbers

In this model we also include a variable giving the number of branches in the entity to which the pharmacy belongs. The mean number of branches in an entity is shown below by pharmacy type.

Table 3: Entity branches by pharmacy type

	Obs	Mean
Independent	229	2.7
Small multiple	116	36.0
Non retail driven large multiple	154	1302.3
Retail driven large multiple	51	1466.7
Supermarket	23	222.9

PwC Analysis

The specification of model 3 which we found to fit the data best is shown in the table below.

Figure 3: Results from model 3

Independent variables	Dependent variable: NHS costs			
	AM 1		AM 2	
Fee items	1.852***	1.896***	1.798***	1.832***
	(0.132)	(0.136)	(0.115)	(0.119)
Urban (0=Rural, 1=Urban)	17,953**	19,348***	16,545**	17,652***
	(7,006)	(7,019)	(6,535)	(6,568)
Weekly opening hours minus 35	1,835***	1,748***	1,777***	1,708***
	(289.2)	(289.8)	(281.2)	(282.6)
Entity branches	37.27***	37.19***	37.19***	37.13***
	(4.354)	(4.301)	(3.935)	(3.892)
GP practice or health centre		-27,377***		-21,730**
		(10,246)		(9,359)

Dependent variable: NHS costs

(0=No, 1=Yes)

Constant	20,366	20,241	29,152**	29,053**
	(13,560)	(13,308)	(11,944)	(11,760)
Observations	573	573	573	573
R-squared	0.635	0.639	0.647	0.650

Source: PwC Analysis

Note: The asterisks indicate the significance of the variables. The number gives the probability (p) that this coefficient could be different from zero by chance; *** p<0.01, ** p<0.05, * p<0.1. The standard errors are shown beneath the coefficients in parentheses.

The new variable included, the number of branches in an entity, is positively associated with NHS cost. The coefficient shows that each additional pharmacy branch in the entity to which the pharmacy belongs is associated with £37 of additional NHS cost per branch. In this model two pharmacies that are identical except that one belongs to a chain with 100 more branches that the other will have annual NHS costs that differ by £3,700. The fact that this coefficient is positive suggests that, based on the survey data, there are diseconomies of scale. This result may be driven however, by the fact that there are some very high cost pharmacies in the sample that are part of entities with a high number of branches and possibly also some very low cost pharmacies that are part of entities with a low number of branches.

In this model the cost associated with each script is roughly the same, £1.80 to £1.90; the urban variable is slightly higher and opening hours slightly lower. The constant is lower in this model, between £20k and £29k.

The MURs variable is no longer included in this regression, or in model 4, as it has no longer a significant effect on costs. This may be due, in part, to the correlation with the newly added variable.

As expected, this model fits the observed data better than model 2. The addition of the entity branch variable increases the R-squared of the regression to between 0.63 and 0.65.

1.4.4. *Model 4: Multiple regression model including pharmacy types*

In this model we also include pharmacy type dummies. We do not include all pharmacy types as one must be the reference type, here Independents. The coefficients on these variables should be interpreted as the difference between the constant cost for this pharmacy type and the constant for the reference pharmacy type (independents). For example a coefficient of £20,000 on the Small Multiple dummy variable indicates that the constant for Small Multiple pharmacies is £20,000 higher than for Independent pharmacies. If in the same example the overall constant for the model was £25,000 then the constant for Small multiples would be £25,000 + £20,000 = £45,000. In this model we also test all potential NHS cost drivers where we have data.

The specification we found to fit the data best is shown in the table below.

Figure 4: Results from model 4

	Dependent variable NHS costs	
Independent variables	AM 1	AM 2
Fee items	1.904***	1.858***
	(0.111)	(0.0977)
Weekly opening hours minus	1,215***	1,120***

|	Dependent variable NHS costs	
35	(330.4)	(337.0)
Entity branches	36.44***	28.99***
	(6.975)	(6.994)
Pharmacy type dummies		
Small multiples	28,820***	20,214***
	(7,001)	(6,884)
Non-retail driven large multiples	-28,401**	-11,605
	(11,091)	(10,937)
Retail driven large multiples	100,499***	105,460***
	(19,458)	(19,426)
Supermarkets	-1,820	7,499
	(17,179)	(16,842)
Constant	37,821***	44,450***
	(8,849)	(8,305)
Observations	573	573
R-squared	0.732	0.729

Source: PwC Analysis

Note: The asterisks indicate the significance of the variables. The number gives the probability (p) that this coefficient could be different from zero by chance; *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The standard errors are shown beneath the coefficients in parentheses.

The constant in this regression of £38k to £45k is the NHS cost for the reference type, Independents. The pharmacy type dummies on Non-Retail Driven Large Multiples under AM 2 and Supermarkets are not statistically significant. This means that we cannot dismiss the hypothesis that the constant costs associated with these types are the same as of Independents. The Non-Retail Driven Large Multiple dummy under AM 1 is negative £28k and significant. This does not, however, suggest that the constant costs for this pharmacy type are negative overall because it represents the difference between the constant costs Non-Retail Driven Large Multiples and Independents, which have a larger, positive constant.

A full table of the estimated constants and therefore baseline costs is shown below:

Table 4: Mean constants by pharmacy type in model 4

	Obs	Constant		Constant (incl entity branches)	
		AM1	*AM2*	*AM1*	*AM2*
Independents	229	£38,239	£44,945	£38,281	£44,978
Small multiples	116	£67,163	£65,243	£68,451	£66,268

	Obs	Constant		Constant (incl entity branches)	
Non retail driven large multiples	154	£9,945	£44,945	£58,345	£83,466
Retail driven large multiples	51	£139,375	£151,078	£194,899	£195,269
Supermarkets	23	£38,239	£44,945	£46,703	£51,682

PwC Analysis

As shown in The specification we found to fit the data best is shown in the table below.

Figure 4, the cost associated with each script is still broadly similar to previous models at about £1.85 to £1.90. The magnitude of the coefficient on opening hours has reduced with the addition of the pharmacy type dummies. The MURs, Urban and GP or Health Centre variables are no longer included in this regression as they were not significant.

Again, this model fits the observed data better than model 3. The addition of the pharmacy type dummies increases the R-squared of the regression to 0.73.

1.4.5.   Model 5: Multiple regression model with fee items squared

In this model we also include fee items squared.

The specification used for this model is given below:

NHS pharmacy cost=α+ β·Fee Items + ψ·Fee Items Squared + µ·Pharmacy Characteristics + λ·Entity Numbers+γ1 SM Dummy + γ2 RD LM Dummy + γ4 NRD LM Dummy + γ4 Supmrkt Dummy + ε

The specification we found to best fit the data is shown in the results table below.

Figure 5: Results from model 5

Independent variables	Dependent variable NHS costs	
	AM 1	AM 2
Fee items	1.261***	1.341***
	(0.213)	(0.193)
Fee items squared	2.75e-06***	2.21e-06***
	(9.20e-07)	(7.90e-07)
Weekly opening hours minus 35	1,198***	1,106***
	(320.9)	(330.7)
Entity branches	38.08***	30.30***
	(6.803)	(6.865)
Pharmacy type dummies		
Small multiples	31,455***	22,334***
	(7,033)	(6,966)
Non-retail driven large multiples	-25,736**	-9,461
	(10,975)	(10,841)
Retail driven large multiples	91,803***	98,464***
	(19,169)	(19,306)
Supermarkets	373.7	9,263
	(16,137)	(16,040)
Constant	64,975***	66,294***
	(10,983)	(10,278)
Observations	573	573
R-squared	0.740	0.734

Source: PwC Analysis

Note: The asterisks indicate the significance of the variables. The number gives the probability (p) that this coefficient could be different from zero by chance; *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The standard errors are shown beneath the coefficients in parentheses.

The constant in this regression is significantly higher, £65k to £66k for the reference type, Independents. This reflects the new relationship between fee items and NHS costs. The coefficient on fee items is much lower, £1.26 to £1.34. The NHS cost associated pharmacies with relatively low levels of fee items is lower in this model, more of the cost is therefore captured in the constant.

In this model there is also a positive association with fee items squared. This suggests that a pharmacy dispensing more scripts will have NHS costs that are disproportionately higher. The squared term is significant and the R-squared is higher suggesting that this should be the preferred model. This model suggests that there are diseconomies of scale in dispensing fee items.

We do not, however, consider this to be the most preferred model. Firstly the improvement in fit of the model overall is small. Secondly a priori there does not appear to us an obvious reason why costs will increase more than proportionately with fee items. Diseconomies are sometimes observed at very large scales but economies of scale are more common, especially in an industry with fixed costs. It is possible that this result may be linked to the fact that there is a correlation between volume of fee items and enhanced services. It may also be the case that the fee items squared variable is significant because there are some pharmacies that have high fee item volumes and particulary high costs – and other pharmacies with low fee item volumes and particularly low costs. These observations may have undue impact on the results when a non-linear relationship with fee items is permitted. The graph below shows a plot of fee items and NHS cost with a linear and a quadratic line of best fit. This shows that the pharmacies with very higher fee items generally have NHS costs above the trend line.8 Whether model 5 is more appropriate than model 4 crucially depends on whether the relationship indicated in model 5 is a fair reflection of what actually happens in a given pharmacy as fee item volumes increase.

Figure 6: Relationship between fee items and NHS cost
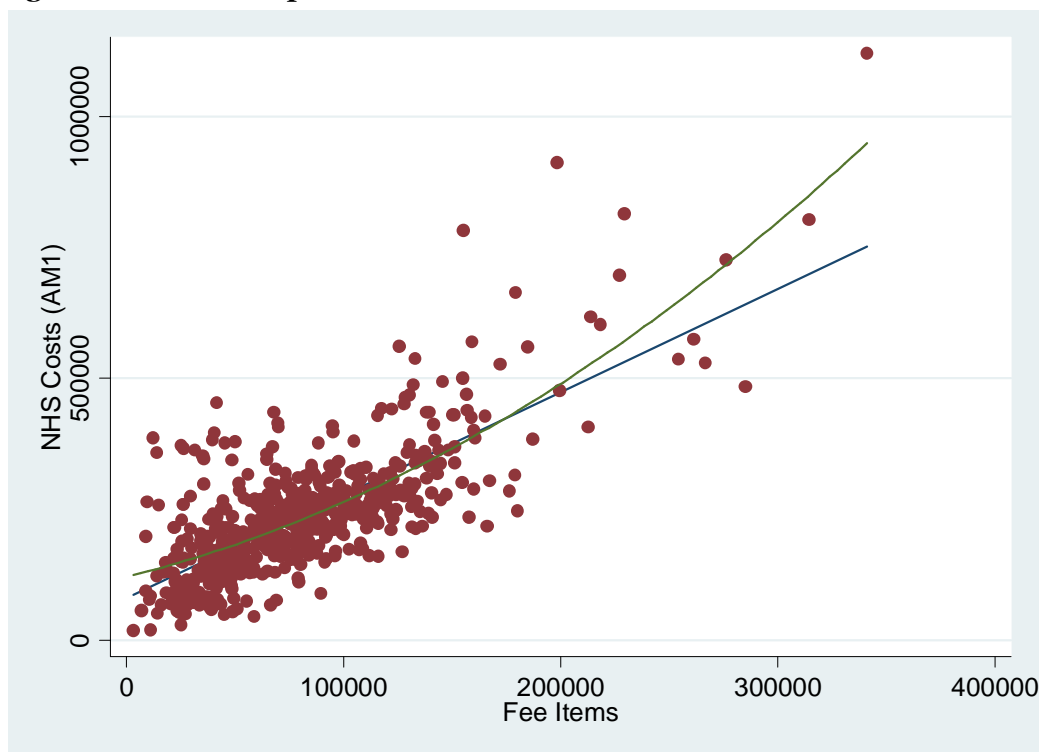
1.5.   *Model Testing*

In this section we test the validity of the final two models using different post estimation techniques.

We first look at at whether there was any pattern in the NHS costs not explained in model 5. Patterns within the residuals would suggest that there could be a problem with the specification or a missing variable potentially confounding the results. In a well specified model we would expect to see a random pattern in the residuals. Figure compares the residuals, the costs that were not explained in the model, and the fitted values, the predicted NHS costs. If we observed more positive residuals for pharmacies that have higher predicted NHS costs this would suggest that there is a variable associated with higher predicted cost but also unexplained costs.

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8 In Figure 7 the variables included in model 5 other than fee items are not considered so this should not be interpreted as a direct representation of the results in figure 5.

This would bring into question the validity of the results as this variable should be included in the model. The graph is shown for Allocation Method 1, but is very similar for NHS costs calculated using Allocation Method 2.

Figure 7: Relationship between residual NHS costs and predicted NHS costs for AM 1
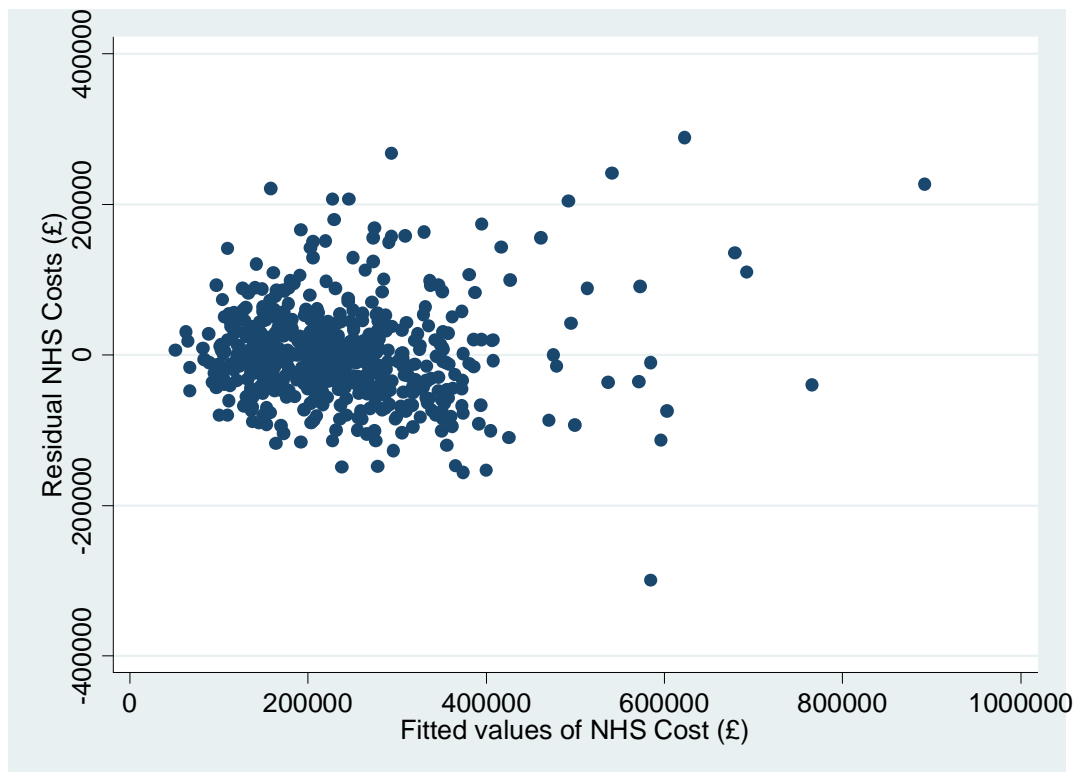
PwC Analysis

The graph shows a random distribution of residuals. Although the residuals do appear to have higher variances at higher fitted values, there does not seem to be a systematic pattern above or below zero. Figure 8, again for Allocation Method 1, shows the residuals relative to one of the key cost drivers, annual fee items. This is again testing the validity of the model. If there was a variable, omitted from the model that was both an important cost driver and correlated with annual fee items we would expect to see a pattern in the residuals. As the graph shows there appears to be no systematic pattern that might be give reason for concern.

Figure 8: Relationship between residual NHS costs and annual fee items for AM 1
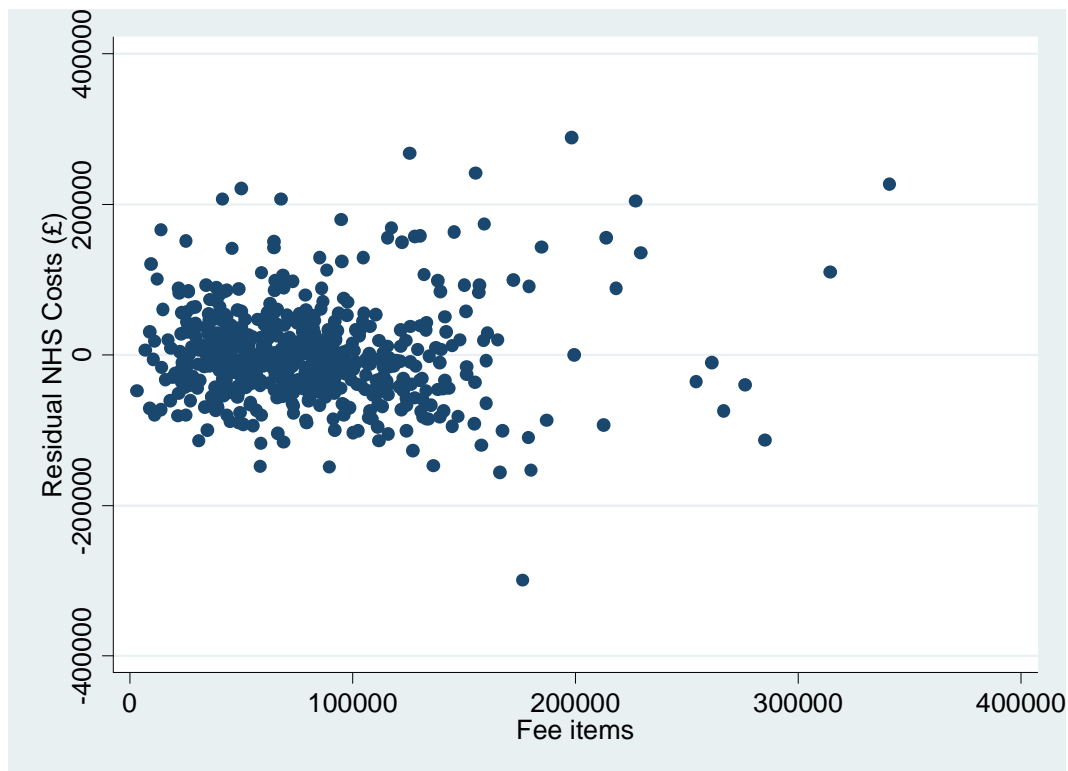
PwC Analysis

We conducted the Ramsay RESET test on models 4 and 5[9]. This tests whether higher powers of the fitted values of NHS cost help to explain actual NHS cost when added to the orginal regression. If these variables are significant it suggests that the model is misspecified. This is the case when the test is applied to model 4 whereas model 5 does pass the REST test.[10] Whilst this does technically provide evidence that model 4 is not as well specified from a statistical perspective we believe this is again a product of the set of high cost pharmacies described previously.

We did not test for heteorskedasticity as this is present by construction as we have used probability weights. This also prevents standard leverage plots and analysis.

1.6. Concluding Remarks

We find that the most important driver of allocated NHS cost is annual fee items. We also find that opening hours and the number of branches in the entity are associated with higher costs. We observe that, even when these variables are accounted for, there are important differences between the different pharmacy types.In particular we find that Small Multiples and Retail Driven Large Multiples have significantly higher NHS costs.

The model that we find to fit the data the best includes a variable of fee items squared. We do not believe, however, that it is clear cut that this model is the best representation of the community pharmacy cost function.

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9 Unfortunately we were unable to adjust the standard errors in this test to take account of the use of stratified survey data. This adjustment may have a small effect on the results if it was made.

10 Test stat is 5.11 and 1.87 and the Prob > F is 0.0017 and 0.13 for Model 4 and 5 respectively.

Model 4 (the second best fitting model) still explains more than 70% of the variation in NHS cost which we consider to be high for cross sectional survey data.

The econometric analysis outlined in this paper provides information on the contribution different pharmacy characteristics and pharmacy services make to the NHS costs of community pharmacies. The results should be treated with care, however, as the quality of any econometric model is limited by the explanatory variables available. We note also that in this case the method used to allocate head office costs to individual branches will affect the results. As we are not able to explain all of the observed variation in NHS costs, and large parts of the costs we can explain as associated with dummies relating to pharmacy types, the coefficients estimated for the models shown in this paper may not individually accurately represent the unit or incremental cost associated with each of the explanatory variables. They do, however, appear to accurately estimate costs when used in conjunction with one another.

1.7.   *Annex – Explanatory variables*

The tables below give the weighted mean for the cost driver variables used in the five models, split by pharmacy type. No adjustment has been made for our stratified survey sample when estimating the standard deviation, although the relative weightings have been taken into account.

Independents (Obs = 229)	Mean	Std Deviation
Fee Items	71,969	43,722
MURs	79	122
Weekly opening hours minus 35	15	9
GP or Health Centre (0=no, 1=yes)	0.09	0.29
Urban (0=Rural,1=Urban)	0.83	0.38

Small Multiples (Obs = 116)	Mean	Std Deviation
Fee Items	90,008	47,472
MURs	117	121
Weekly opening hours minus 35	14	6
GP or Health Centre (0=no, 1=yes)	0.15	0.36
Urban (0=Rural,1=Urban)	0.89	0.32

Non-Retail Driven Large Multiples (Obs = 154)	Mean	Std Deviation
Fee Items	81,865	36,479
MURs	178	147
Weekly opening hours minus 35	16	7
GP or Health Centre (0=no, 1=yes)	0.18	0.39
Urban (0=Rural,1=Urban)	0.86	0.34

Retail Driven Large Multiples (Obs = 51)	Mean	Std Deviation
Fee Items	72,305	70,096
MURs	265	150
Weekly opening hours minus 35	26	13
GP or Health Centre (0=no, 1=yes)	0.00	0.00
Urban (0=Rural,1=Urban)	0.96	0.20

Supermarkets (Obs = 23)	Mean	Std Deviation
Fee Items	**72,523**	41,406
MURs	**133**	141
Weekly opening hours minus 35	**48**	9
GP or Health Centre (0=no, 1=yes)	**0.00**	0.00
Urban (0=Rural,1=Urban)	**0.96**	0.21

Appendix S – Efficiency Analysis

1.1.   Introduction

The econometric models, as discussed in appendix R, explain a large degree of the variation in NHS costs. The econometric models yield residuals for each pharmacy, which are the difference between the actual NHS costs and the estimated NHS costs. This may provide information on the relative efficiency of pharmacies.

The size of the residuals may be due to a number of factors:

- variables that impact NHS costs but that have not been included in the model (because the data is not available);

- relative levels of efficiency; or

- random variation.

We cannot distinguish between these different factors influencing the unexplained variation using data from a single point in time. It may be possible, if the same pharmacies were surveyed in future Cost of Service Inquiries, to build a time series dataset that could be used to further identify the causes of this variation.

It is not possible to say what portion of the residual is due to differences in levels of efficiency, nor is it possible to assume that the the size of the residuals will necessarily be correlated with the level of efficiency.

This appendix investigates the characteristics of these NHS cost residuals based on econometric model 4 as defined in Appendix R. This model fits the data well and is our preferred model for reasons set out in Appendix R. The independent variables included in this model are: pharmacy type, number of fee items, opening hours and number of branches in the entity. The dependent variable is average NHS cost per branch based on either allocation method 1 (FAC Staff Costs) or allocation method 2 (LRIC Staff Costs).

1.2. *Distribution*

The histograms below show the distribution of the residuals under both allocation method 1 (which uses a FAC allocation of staff costs) and allocation method 2 (which uses a LRIC allocation of staff costs). The residuals are the difference between the actual NHS costs and those predicted by model 4.

Figure 1: Histogram of Econometric Residuals (Allocation method 1)

Distribution of Residuals (Allocation Method 1)
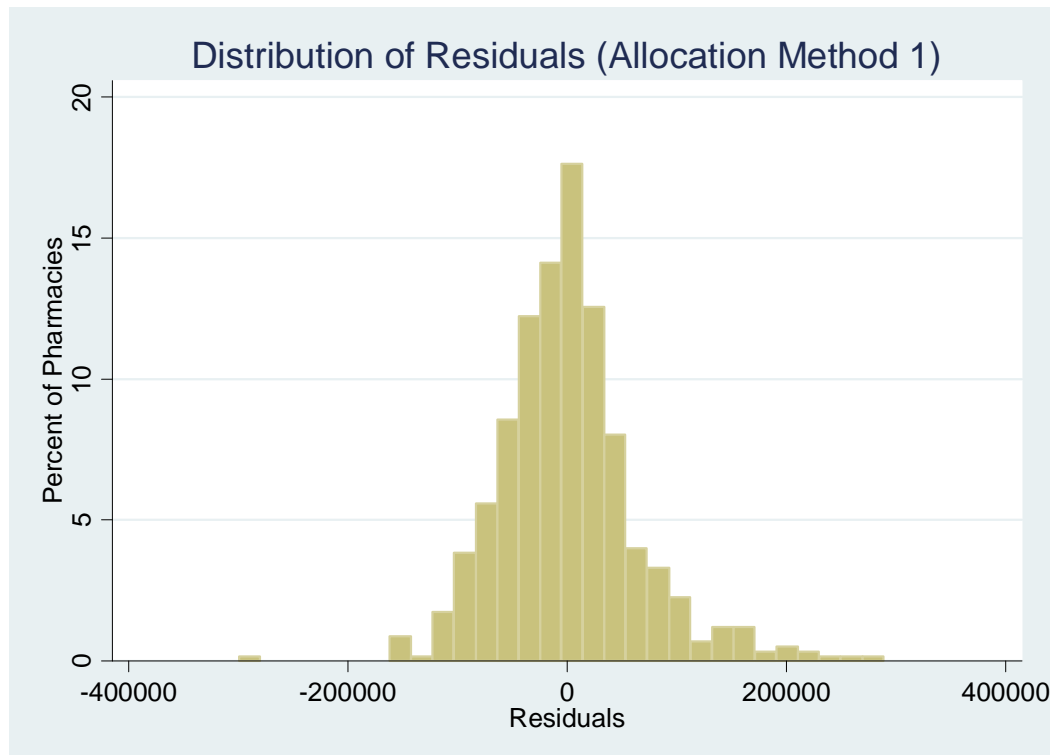
Figure 2: Histogram of Econometric Residuals (Allocation method 2)

Distribution of Residuals (Allocation Method 2)
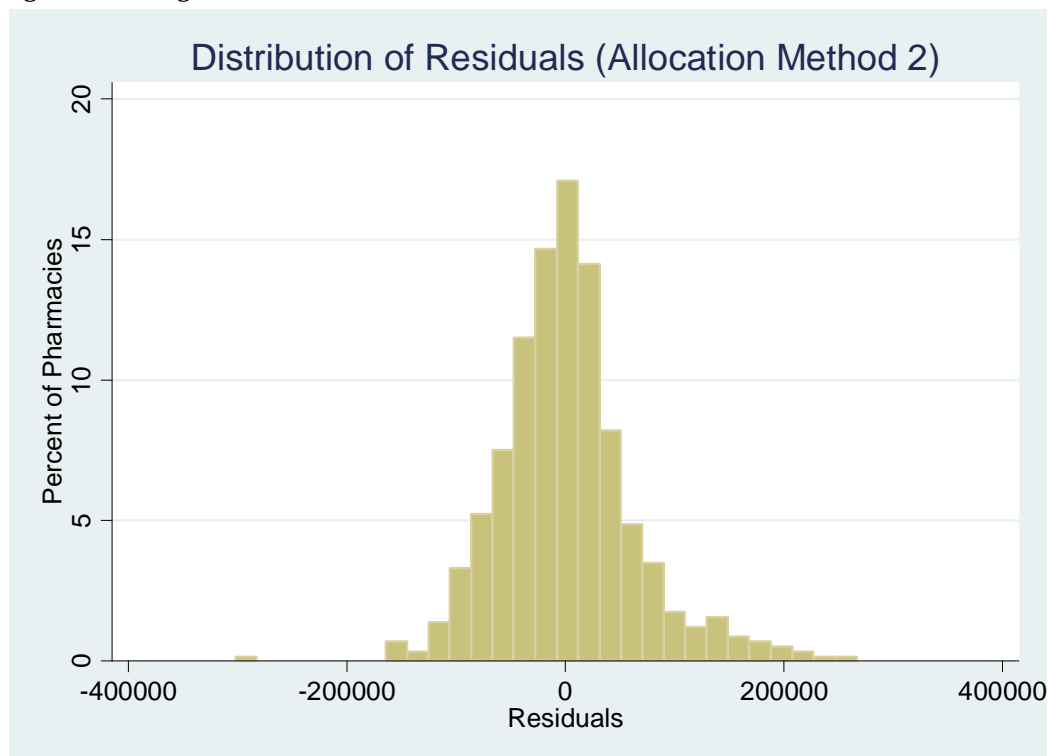
The key points shown in these distribution plots[2] are:

- The distribution is broadly symmetric above and below zero.

- A large percentage of the observations are clustered around the peak of zero. Under allocation method 1 30% of the observations have a residual which is less than £20,000 from £0.

- The distribution of residuals looks broadly similar under the two different allocation methods. Under all0cation method 1 (FAC allocated staff costs) there is a slightly greater concentration of observations around the peak.

The remainder of the analysis shown in this paper is conducted based on the residuals under allocation method 1 (FAC allocated staff costs). The results do not significantly differ under allocation method 2 (LRIC allocated staff costs).

1.3.   *Grouping Residuals*

To investigate the residuals we have split the pharmacies into five groups based on the size of their residuals.

When performing this analysis we are mostly interested in the statistics and characteristics of the pharmacies that lie in the tails of the distribution. This is because it is these pharmacies that are more likely to have something other than just random variation affecting the size of their unexplained NHS costs. We therefore segment the pharmacies into 5 groups such that 4 of the groups (groups 1-2 and 4-5) focus on those pharmacies with residuals further from zero and group 3 picks up the middle 50% of the observations.

The residual groups used in the analysis are defined as shown in Table 1.

Table 1: Residual Groups

Group Number	Percentiles	Number of Pharmacies In Group
1	10% largest negative residuals	57
2	10% - 25% largest negative residuals	86
3	Middle 25% - 75%	286
4	10% - 25% largest positive residuals	86
5	10% largest positive residuals	58

Source: PwC Analysis

Table 2 Table 2 shows the mean NHS costs and residuals for the residual groups shown in Table 1. We can see the average residual cost varying substantially between the higher groups. The mean residual for group 5, the 10% of pharmacies with the largest residuals, is over £230,000 higher than the mean residual for group 1, the smallest 10% of residuals. There is about £100,000 difference between the mean residuals of group 2 and 4.

Table 2: Costs by residual group

Group	Residual	Mean NHS	Mean Predicted NHS	Mean Residual

[2] We tested the residuals from model 4 and found some evidence of the residuals being non-normal, which is an assumption made when calculating standard errors and when doing hypothesis testing. To consider the possible effect of this, we performed the same hypothesis tests using a non-parametric approach and found very similar confidence intervals and the same conclusions on the significance of variables. We are therefore sufficiently reassured that assuming the residuals are normally distributed is a reasonable assumption to makein this case.

Number	Percentiles	Costs[3]	Costs[4]	
1	0% - 10%	£192,828	£293,120	-£100,292
2	10% - 25%	£194,011	£245,357	-£51,346
3	25% - 75%	£216,145	£219,039	-£2,894
4	75% - 90%	£258,244	£210,930	£47,314
5	90% - 100%	£429,117	£297,441	£131,676

Source: PwC Analysis

The same data is presented in figure 3 below.

Figure 3: Mean costs by residual group
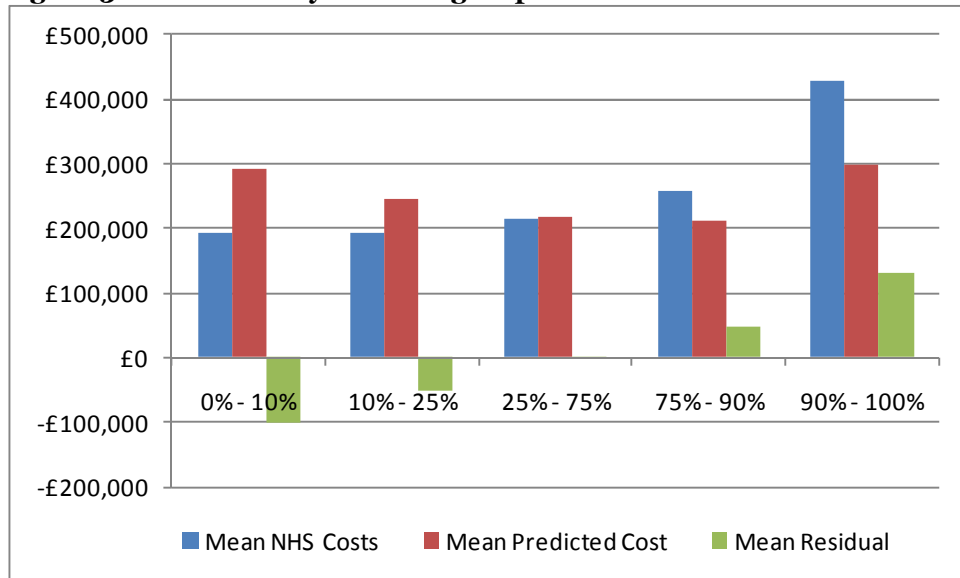
Source: PwC Analysis

1.4. *Variables affecting residual patterns*

The variables included in the final econometric model (model 4 in appendix R) are annual fee items, opening hours, number of branches in the entity and pharmacy type. The effect each variable has on NHS costs should be adequately captured in the regression analysis, providing the model is correctly specified. We would therefore not expect there to be a pattern between any variable included in the final model and the distribution of pharmacies across the five groups.

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[3] Actual NHS costs based on the survey results

[4] NHS costs calculated based on Model 4 as described in Appendix R.

1.4.1. *Pharmacy Type*

We check that this is indeed the case by looking at the distribution of pharmacy types across the 5 residual groups. The table below shows the difference between the number of pharmacies of each type actually in each residual group and the number of pharmacies of this type that would be expected if they were distributed proportionally across the residual groups.

Table 3: Difference between pharmacies in each residual group and the proportional number

	Indp	SM	NRD LM	RD LM	Supermarkets
0% - 10%	8	-6	-7	4	1
10% - 25%	-3	6	-5	4	-1
25% - 75%	-5	0	18	-11	-1
75% - 90%	-4	2	3	-2	2
90% - 100%	5	-2	-9	5	1

Key: More than expected pharmacies
        Less than expected pharmacies

Source: PwC Analysis

As would be expected, the matrix shows there is no systematic pattern inside any pharmacy group. For example, with a given pharmacy type, we would not expect to see more pharmacies than expected in groups 1 and 2 and fewer pharmacies than expected in groups 4 and 5.

We would expect the conclusions to be the same performing similar analysis for the other variables included in model 4. In the sections that follow we carry out similar analysis but focus on variables that are not included in the final specification of model 4. This is to test whether, although these variables are not significantly associated with NHS costs, they can help to explain the size of the residuals.

1.4.2. *Enhanced Services (ES)*

We were not able to adequately model the provision of Enhanced Services (ES) in the econometric models. A number of the pharmacies did supply information on whether each of 22 enhanced services were offered at the pharmacy. Table 4 and This same data on average number of enhanced services offered is shown in the chart below.

Figure 4 show the mean number of ES offered by the different residual groups. This is shown for all 573 pharmacies in the sample and also for the 265 pharmacies who indicated they offer at least one ES (i.e. those pharmacies who definitely attempted to provide a response to this question).

As the table shows, in both columns, the group with the highest residuals offers the highest mean number of ES. This is an interesting result as it provides some evidence for the hypothesis that some of the pharmacies that have relatively large residuals are performing services not capture in the econometrics. Any NHS cost associated with these services would therefore potentially increase the size of the unexplained costs.

Table 4: Average number of Enhanced Services offered - by residual group

Group Number	Residual Percentiles	All	1 or more ES (sample size shown in brackets)	
1	0% - 10%	2.1	4.7	(34)
2	10% - 25%	1.2	4.4	(37)

3	25% - 75%	1.3	3.7	(128)
4	75% - 90%	1.3	4.0	(34)
5	90% - 100%	2.7	6.2	(32)

Source: PwC Analysis

This same data on average number of enhanced services offered is shown in the chart below.

Figure 4: Enhanced Services by residual group
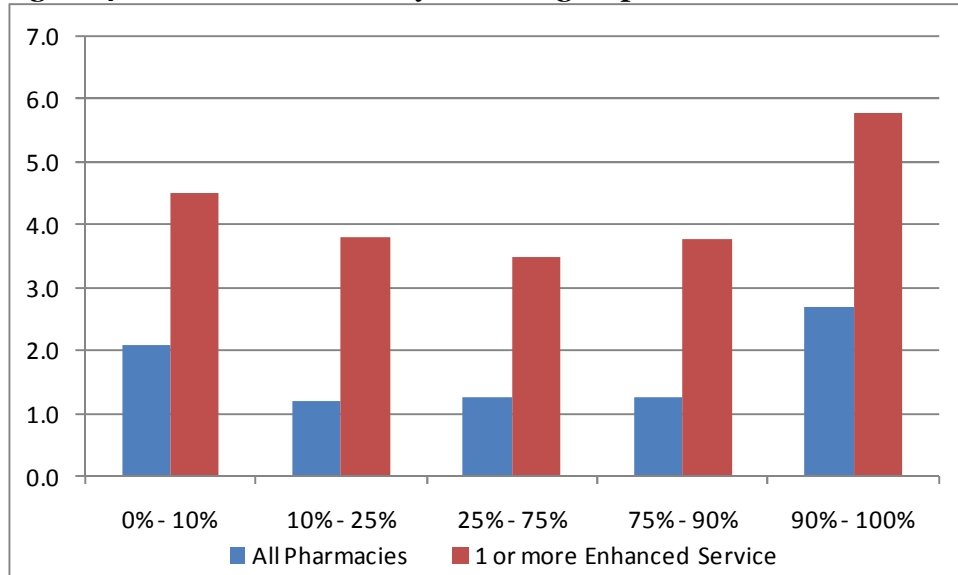
Source: PwC Analysis

1.4.3. Region

Where the pharmacy was located was not found to be significant in our econometric model. We did, however, find some evidence of regional effects in early models.

The SHA areas included in the region variables used are as follows:

- North – North East, North West, Yorkshire and the Humber;

- Midlands – West Midlands and East Midlands;

- South - South Central, South West and South East Coast; and

- London – London.

The table below shows the difference between the actual number of pharmacies in each residual group and the expected number of pharmacies from each region if the pharmacies were proportionately distributed across the residual groups.

Table 5: Location by residual group

Residual Group		North	South	London	Midlands
1	0% - 10%	6	-3	-2	-1
2	10% - 25%	1	-8	1	5
3	25% - 75%	0	1	-3	2
4	75% - 90%	-2	2	1	-2
5	90% - 100%	-5	7	2	-4

Key: More than expected pharmacies

                 Less than expected pharmacies

Source: PwC Analysis

As shown by the colouring there are a disproportionate number of pharmacies from London and the South (South Central, South West and South East Coast) in the two higher residual groups. There are also a disproportionate number of pharmacies in residual groups 1 and 2 from the North and the Midlands. This suggests there may be some regional differences in NHS costs that contribute to the residuals.

1.4.4. *Medicines Usage Reviews (MURs)*

The graph below shows that there is no obvious pattern in the mean annual volume of MURs conducted by the five residual groups. This suggests that variables already included in the econometric model are capturing any signicant effect MUR volumes have on cost.

Figure 5: Mean MUR volume by residual groups
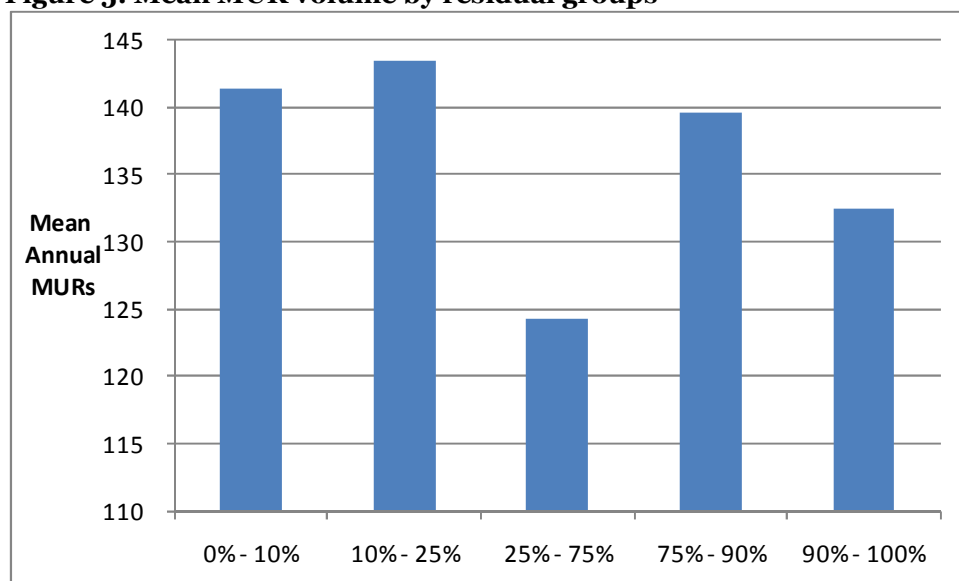
Source: PwC Analysis

1.4.5. *Urban/Rural location*

Urban/rural location was not included in the final model. The graph below shows that there is no real pattern in the percentage of pharmacies that are located in urban areas from the five residual groups. This suggests that, once the other variables are included, locating in an urban area is not associated with additional NHS cost.

Figure 6: Share of urban pharmacies in the residual groups
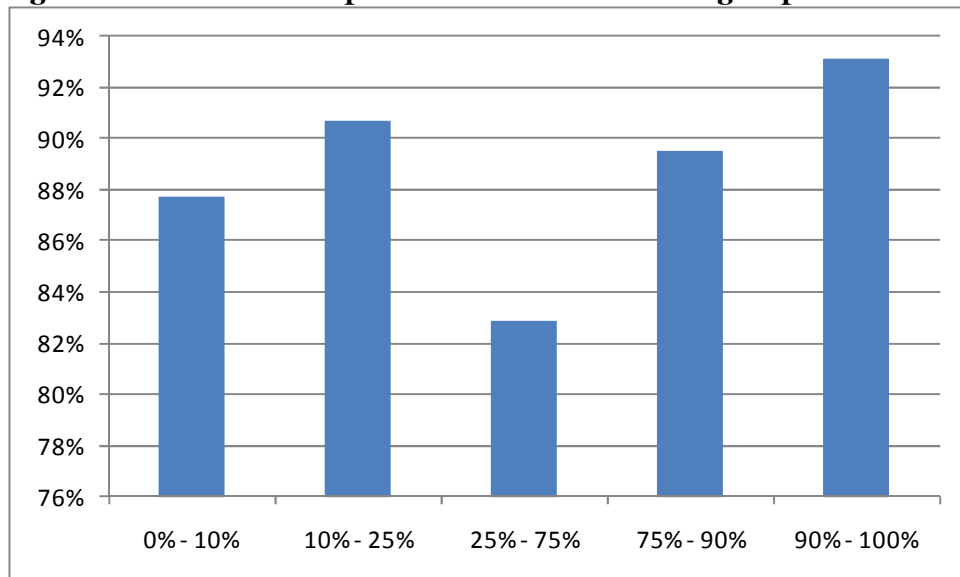
1.4.6. *GP Practice or Health Centre*

A variable indicating that a pharmacy is in a GP practice or Health Centre was included in early models but not the final specification. The graph below shows that there is a higher proportion of GP practice or Health Centre pharmacies in the lowest residual group.

Figure 7: Share of GP practice or Health Centre pharmacies in the residual groups
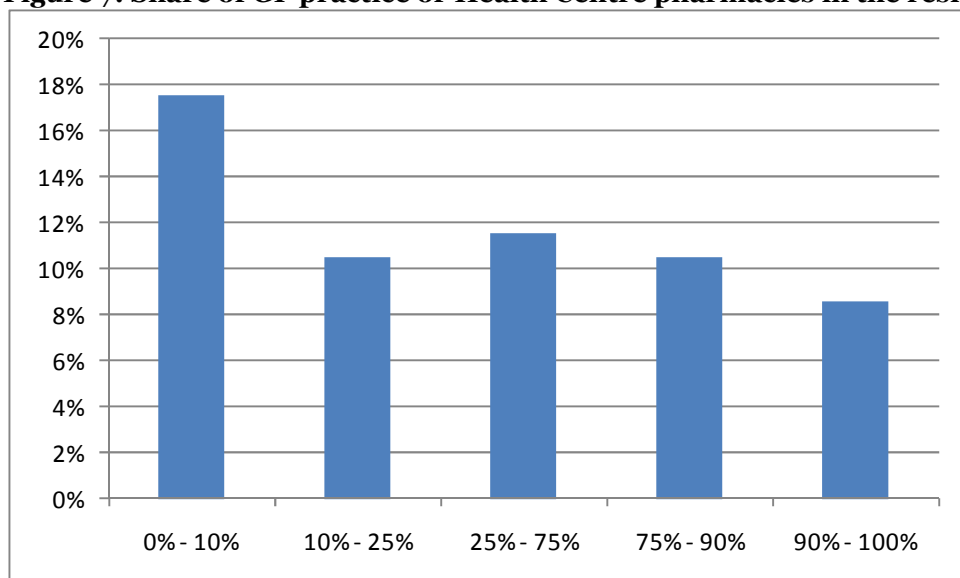
1.4.7. *Index of multiple deprivation (IMD) and health index*

The econometrics suggests that there is no significant association between the Health deprivation Index or the Index of Multiple Deprivation (IMD)[5] and NHS pharmacy costs. The graph below show that this is also the case for the residuals from the preferred econometric model.

Figure 8: Mean index scores by residual group
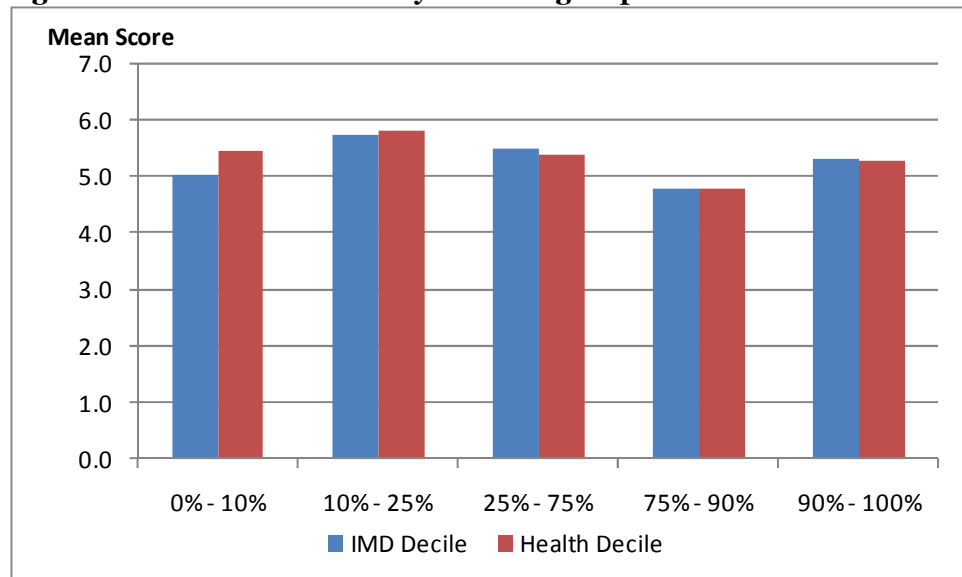
1.5. *Concluding Remarks*

We have carried out analysis of the residuals from the econometric modelling. The purpose was to explore the characteristics of pharmacies with particularly large or small residuals. We also wanted to understand the reasons why some pharmacies may have costs that are higher or lower than those predicted by our model. Part of the analysis investigates variables that appear to have some relationship with NHS costs but were not included in the final model.

Residuals are the cost is that is not explained by an econometric model. As stated at the beginning of this paper, one reason for unexplained costs may be differences in levels of efficiency between pharmacy branches. Other reasons for unexplained costs may include non-standard, one-off costs incurred by pharmacies, costs attributable to pharmacy characteristics for which data was not collected by our survey and normal variation in costs which is expected in a survey of this sort.

We have shown in this paper that there is evidence that some variables not included in the final model (Enhanced Services, Region and GP/ Health Centre) do explain some of the size of the unexplained variation captured in the residuals. Whilst we are not able to say what share of the residual is accounted for by efficiency or random variation, we are able to show in this paper some possible explanations for the size of the residual costs.

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[5] These indices are based on deciles, where 1 indicates areas with the lowest levels of deprivation and 10 indicates areas with the highest levels of deprivation.