The relationship between quality and local concentration

OFT Pharmacy Investigation

A report prepared for the Office of Fair Trading

The relationship between quality and local concentration

OFT Pharmacy Investigation

A report prepared for the Office of Fair Trading

November 2002

A member of the Frontier Economics Group

150 Holborn
London
EC1N 2NS

tel: +44 (0)20 7611 9494
fax: +44 (0)20 7611 9495
www.frontier-economics.com

Table of contents

Section Page

Table & Figures

Tables & Figures Page

Table & Figures

Tables & Figures Page

Executive Summary

As part of the OFT Pharmacy Investigation, Frontier Economics was asked to investigate whether there was any relationship between local competition and the quality of services offered by pharmacies. A previous aspect of the OFT Pharmacy Investigation had considered whether there was any relationship between price levels and local competition, as proxied by measures of local concentration, which we refer to as the 'price-concentration study'[1]. The investigation of pharmacy quality measures extended this previous work.

A number of potential quality measures were developed, which reflected the opening hours of pharmacies and whether additional services were offered. Data on these measures was generated through a questionnaire sent out by IMS Health to the pharmacies for which it regularly collected data on monthly sales, as employed in the price-concentration study. This questionnaire led to a response rate of 233 observations, or approximately 35%.

From these questionnaire responses, a number of different quality measures were formed. Regression analysis was then employed to determine whether there was any systematic statistical relationship between the presence or absence of particular quality measures and explanatory variables of interest. These explanatory variables included measures of the local concentration in the area of each pharmacy, regional factors, and characteristics of the pharmacy. Regression analysis was also employed to determine whether the results of the price-concentration study were unchanged once measures of quality were taken into account.

The key results of the analysis were as follows. Firstly, there was a systematic statistical relationship between some aspects of quality and some measures of local concentration. In particular:

- pharmacies were more likely to be open before 9am if they were the closest pharmacy to a GP, and if they faced a higher number of CPs per GP in their locality;
- pharmacies were more likely to offer a consultation area if there were more supermarket pharmacies in their locality; and
- when a pharmacy faced no other pharmacy within 5km, it was less likely to offer home delivery.

[1] For a full list and derivation of concentration measures used in this paper, see Frontier Economics, The relationship between price and local concentration, November 2002.

Executive Summary

The quality data collected for this study allowed us to review whether the results of the price-concentration study changed once quality variables were included in the price–concentration regressions as extra "controls". We found that there was no change in the key results of the price-concentration study once quality measures were taken into account.

1. Introduction

As part of the OFT Pharmacy Investigation, Frontier Economics was asked to investigate whether there was any relationship between local competition and the quality of services offered by pharmacies. A previous aspect of the OFT Pharmacy Investigation had considered whether there was any relationship between price levels and local competition, as proxied by measures of local concentration, which we refer to as the 'price-concentration study'[2]. The investigation of pharmacy quality measures extended this previous work.

A number of potential quality measures were developed, which reflected the opening hours of pharmacies and whether additional services were offered. Data on these measures was generated through a questionnaire sent out by IMS Health to the pharmacies for which it regularly collected data on monthly sales, as employed in the price-concentration study. This questionnaire led to a response rate of 233 observations, or approximately 35%.

From these questionnaire responses, a number of different quality measures were formed. Regression analysis was then employed to determine whether there was any systematic statistical relationship between the presence or absence of particular quality measures and explanatory variables of interest. These explanatory variables included measures of the local concentration in the area of each pharmacy, regional factors, and characteristics of the pharmacy. Regression analysis was also employed to determine whether the results of the price-concentraiton study were unchanged once measures of quality were taken into account.

This note describes the data collected and outlines the analysis carried out in more detail. It is structured as follows.

- Section 2 discusses the process of data collection.
- Section 3 gives key summary statistics on the quality measures collected.
- Section 4 summarises the results of the regression analysis.

Annex 1 contains the questionnaire submitted to the pharmacies. Annex 2 contains more detail on the regression analysis and output.

[2] For a full list and derivation of concentration measures used in this paper, see Frontier Economics, The relationship between price and local concentration, November 2002.

2. Data collection

Neither we nor the OFT were aware of any publicly available data sources on quality measures for pharmacies. It was therefore necessary to develop a set of quality indicators for this study. This was carried out by forming a questionnaire, with input from the OFT and IMS Health. This was sent by IMS Health to 657 pharmacies for which they collect monthly sales information and which constituted the sample used in the price-concentration study[3]. IMS Health carried out the survey in late September and early October 2002.

The questionnaire aimed to gather information on potential indicators of quality of service provided by pharmacists in terms of availability, access and value-added services. After discussion with the OFT and IMS Health to develop an appropriate set of quality indicators, the following measures were collected[4].

- *Opening and closing hours for each day*. Consumer access to pharmaceutical services is enhanced if pharmacies are open longer during the day.

- *Whether a pharmacy offers a repeat prescription collection service*: This consists of a pharmacy collecting repeat prescriptions from GPs on behalf of patients. Patients obtain their drugs directly from their pharmacy without visiting their GP.

- *Whether a pharmacy offers home delivery service*: This consists of a pharmacy delivering drugs to patients at home. This service may be made available either to all customers of the pharmacy, or only to those in need.

- *Whether a pharmacy offers a consultation area*: This was defined for the purpose of the survey as a private area within the pharmacy in which pharmacists could give advice to patients.

More detailed features of these services were explored through the questionnaire reported in Annex 1 and are discussed through charts in the next paragraphs. In addition, respondents were asked to report whether they received an additional hours payment. Additional hours payments are made by health authorities to pharmacies that remain open outside

---

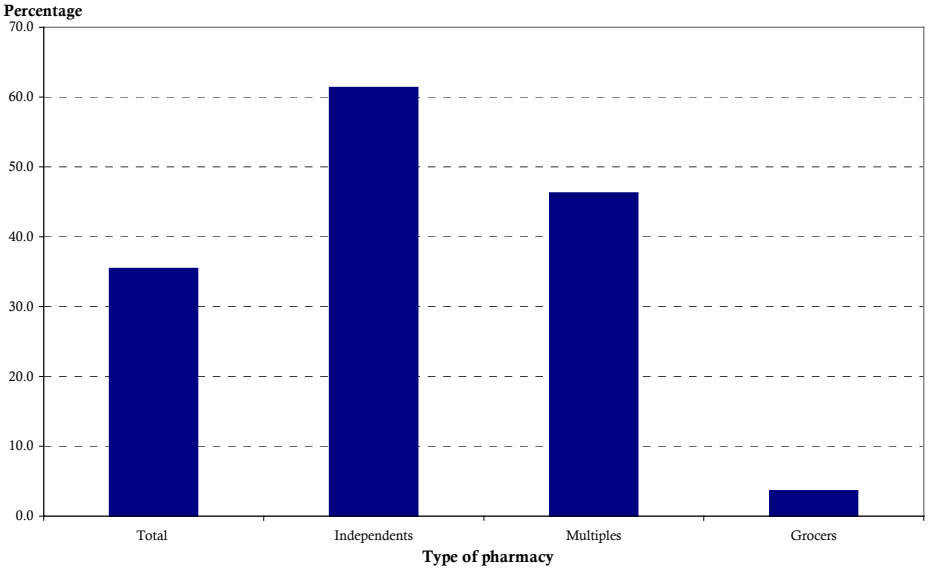
[3] Ibid, footnote 1.

[4] A number of further features were considered, including whether pharmacies offered particular types of products. These were eventually dropped from the survey as it was not clear that these could genuinely be interpreted as quality measures.

normal business hours, and therefore may not be an appropriate measure of quality when considering whether pharmacies respond to local competitive conditions by adjusting the quality of service they offer. However, it needs to be taken into consideration since it is a factor that may influence the total opening hours of pharmacies.

The response rate to the questionnaire varied by type of pharmacy. Figure 1 shows that the overall response rate was 35% (233 responses)[5]. The response rate was 61% (143 responses) for independents and 46% (81 responses) for multiples. The response rate by supermarkets was much lower at 3.6% (only 9 responses).

Figure 1: Response rate by type of pharmacy

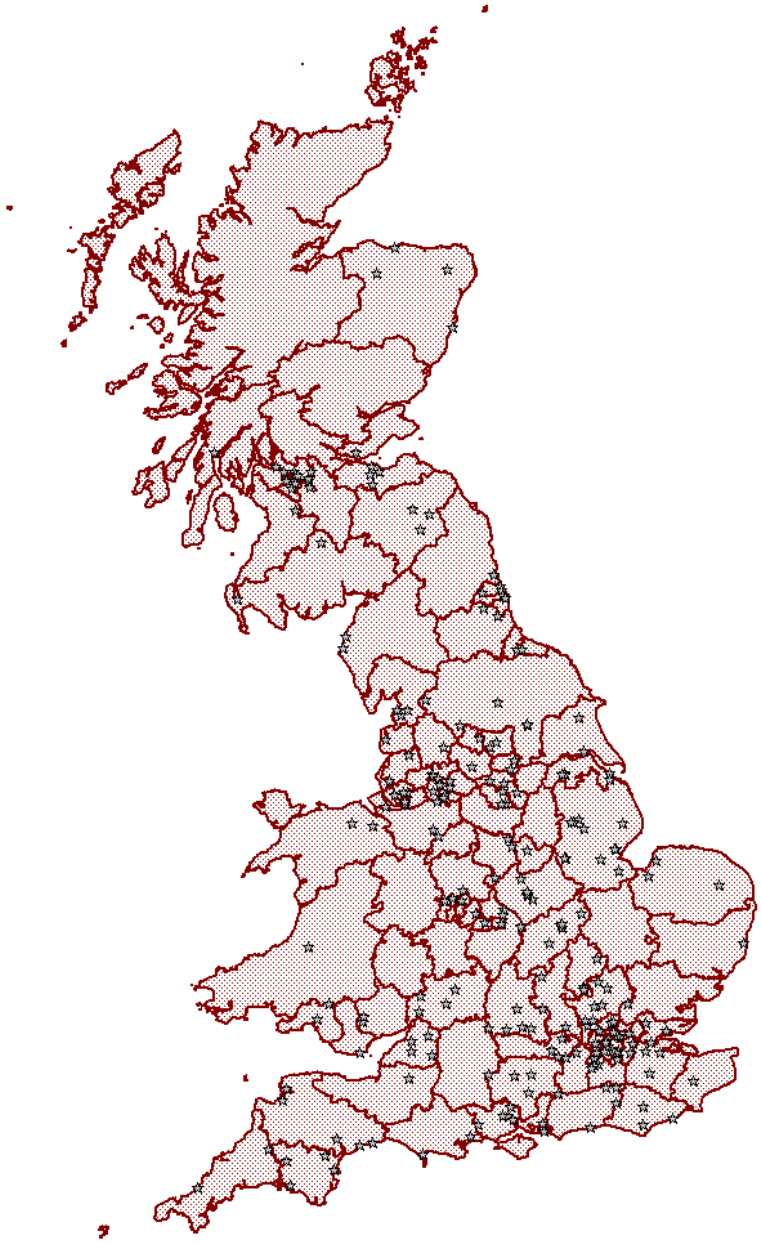


Source : Frontier Economics analysis of questionnaire responses

Figure 2 shows the geographic location of pharmacy respondents to the questionnaire. It shows that the respondents are well spread throughout Great Britain.

[5] Three additional replies were received but could not be coded and are excluded from the above total.

Figure 2: Geographic location of pharmacy respondents



Source: Frontier Economics analysis of questionnaire responses

It should be observed that the sample of pharmacies in this case was self-selected. Pharmacies were incentivised to respond to the questionnaire[6], and therefore if there is a correlation between the value of the incentive to particular pharmacies and quality measures, this could lead to biases in the results. However, it is not clear what the direction or magnitude of any such bias would be.

[6] Pharmacies were offered a £10 M&S voucher for a response.

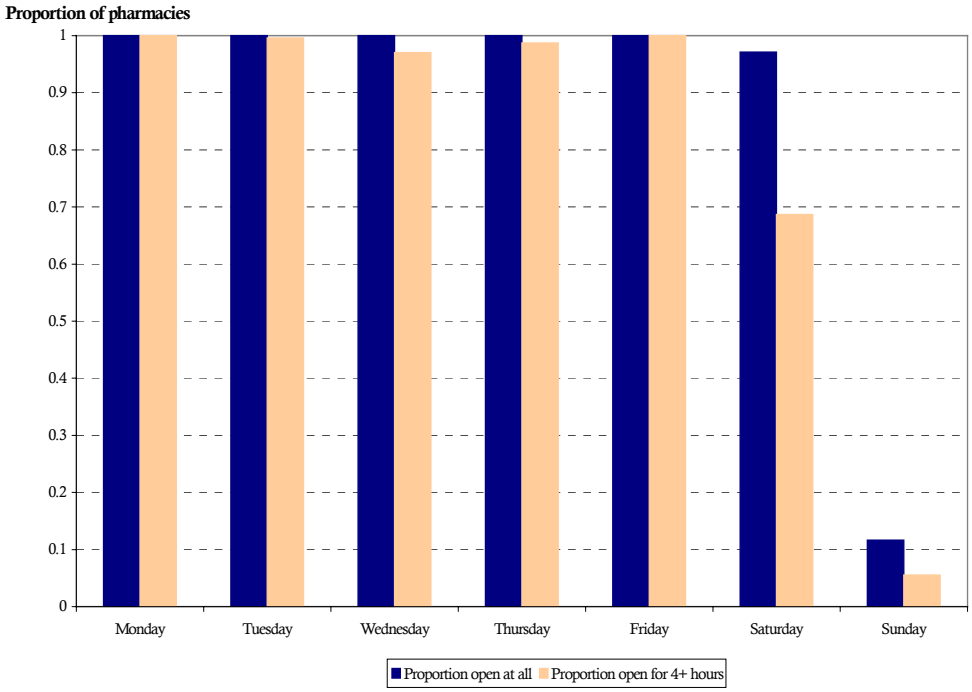
3. Summary statistics on quality measures

This section reports summary statistics from the responses to the survey. Results are presented in a number of instances by pharmacy type. It should be borne in mind that there are only a small number of supermarkets in the sample, and hence the results for supermarkets should be treated with care when making inferences.

3.1 Opening hours of pharmacies

Figure 3 shows that all pharmacies are open on weekdays but only 11.4% remain open on Sunday. Moreover, 68.7% of pharmacies open on Saturday for more than 4 hours.

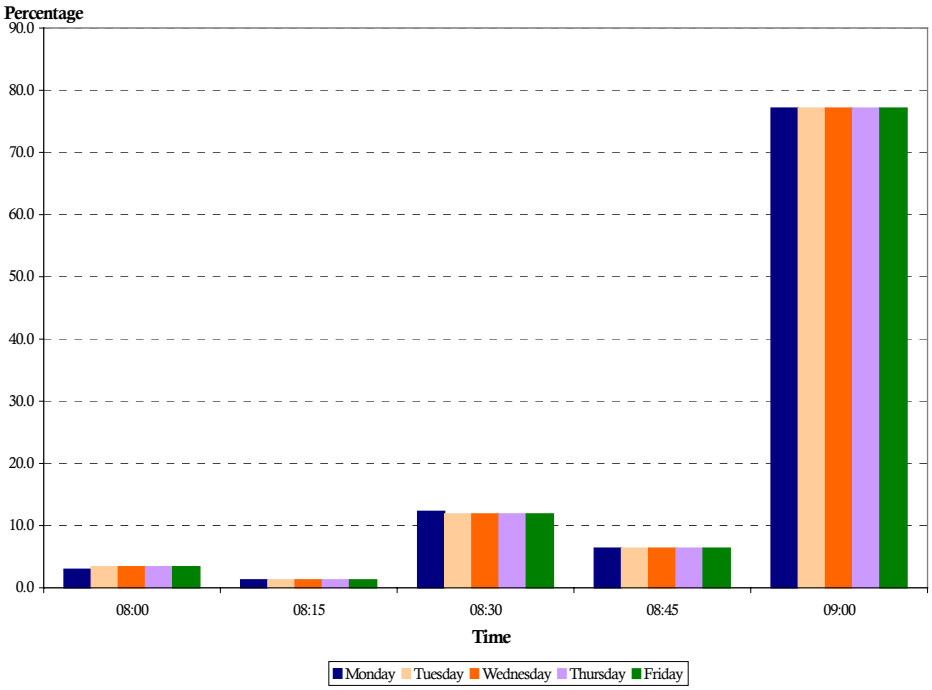
Figure 3: Proportion of respondents open each day



Source : Frontier Economics analysis of questionnaire responses

Figure 4 shows the distribution of starting time of pharmacies. Pharmacies open between 8am and 9am during working days, with nearly 80% opening at 9am. The next most frequent opening times are 8:30 and 8:45. There is minimal variation by day.

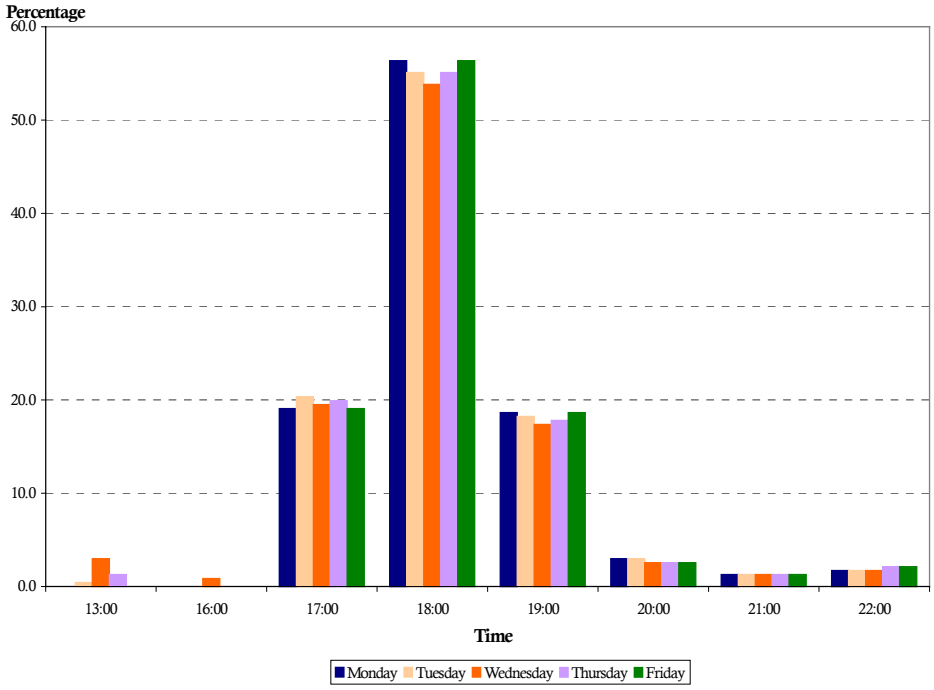
Figure 4: Distribution of starting time - Monday to Friday



Source : Frontier Economics analysis of questionnaire responses

Figure 5 shows the distribution of closing time for working days. There is a wider range of closing hours than of opening hours. The most frequent closing time is 6pm followed by 5pm and 7pm. There are slight variations by day and it is typically on Wednesdays that pharmacies are closed before 5pm, although this accounts for only 3.8% of the closing times on that day.

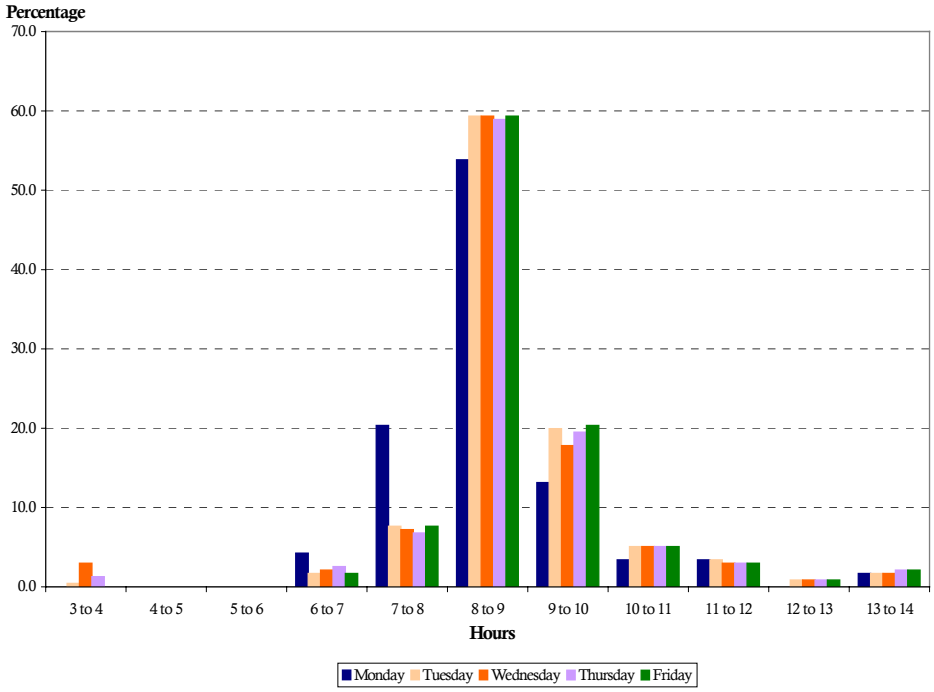
Figure 5: Distribution of closing time - Monday to Friday



Source : Frontier Economics analysis of questionnaire responses

Figure 6 shows the distribution of the total number of hours open per day for Monday to Friday. Around 60% of pharmacies are open between 8 and 9 hours each day, apart from Monday, for which the figure is 55%. Around 8% of pharmacies are open between 7 and 8 hours each day, again except for Monday, for which the figure is 20%. The late closing times for a small percentage of pharmacies in Figure 5 above are reflected in long opening hours, of 10 hours or more.

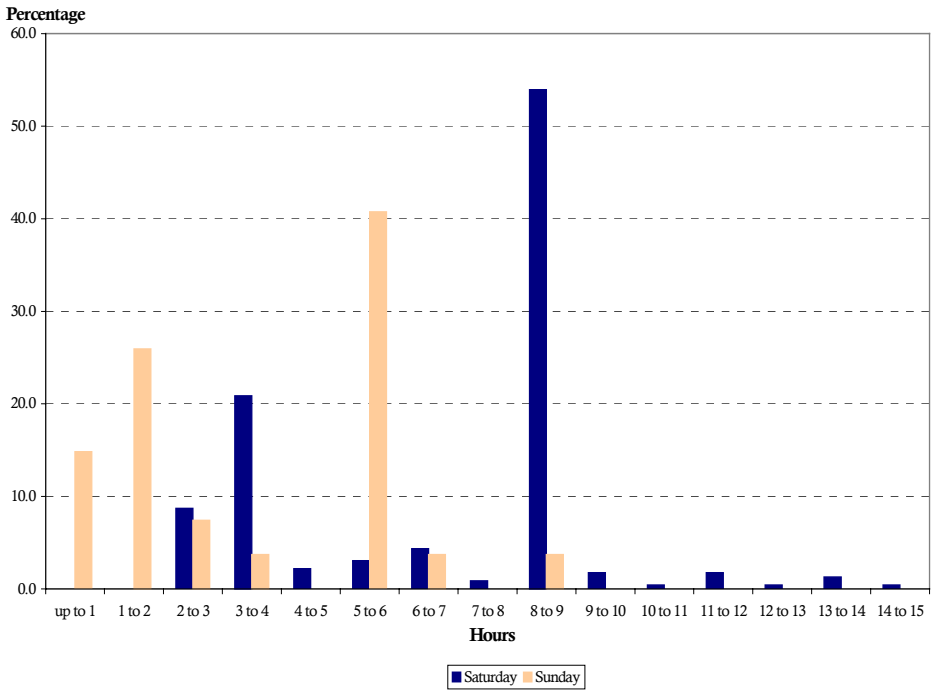
Figure 6: Distribution of opening hours - Monday to Friday



Source : Frontier Economics analysis of questionnaire responses

Figure 7 shows the number of opening hours for both Saturday and Sunday. Here there is more variation across pharmacies. Some 50% of pharmacies open on Saturday are open between 8 and 9 hours, as is common for working days. Pharmacies open on Sunday are open for fewer hours with just over 40% open between 5 and 6 hours.

Figure 7: Distribution of opening hours - Saturday to Sunday

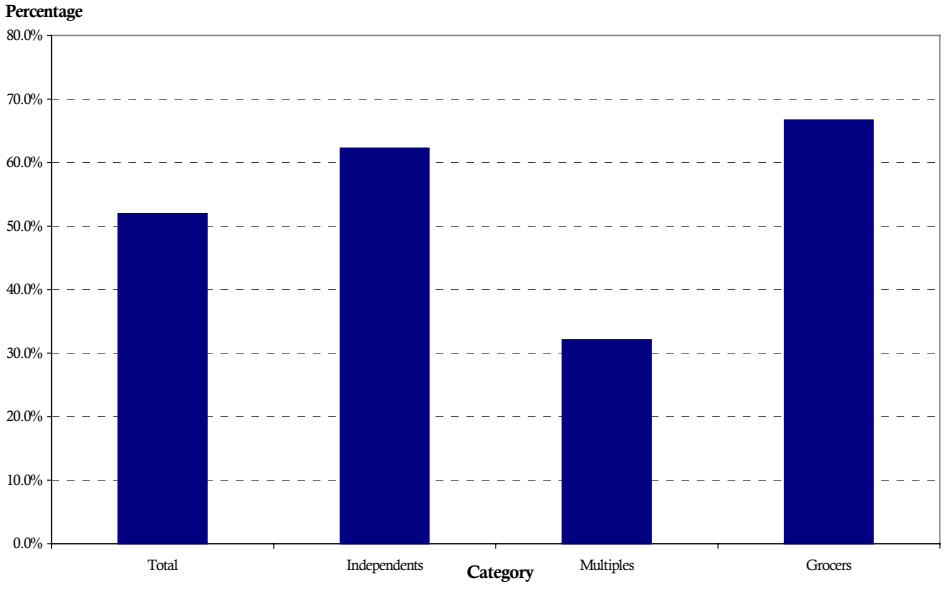


Source : Frontier Economics analysis of questionnaire responses

3.2 Services offered by pharmacies

Half of the pharmacies have a private consultation area, as shown in Figure 8. More than 60% of both supermarkets and independents have a consultation area, whilst for multiples this percentage is at 32%.

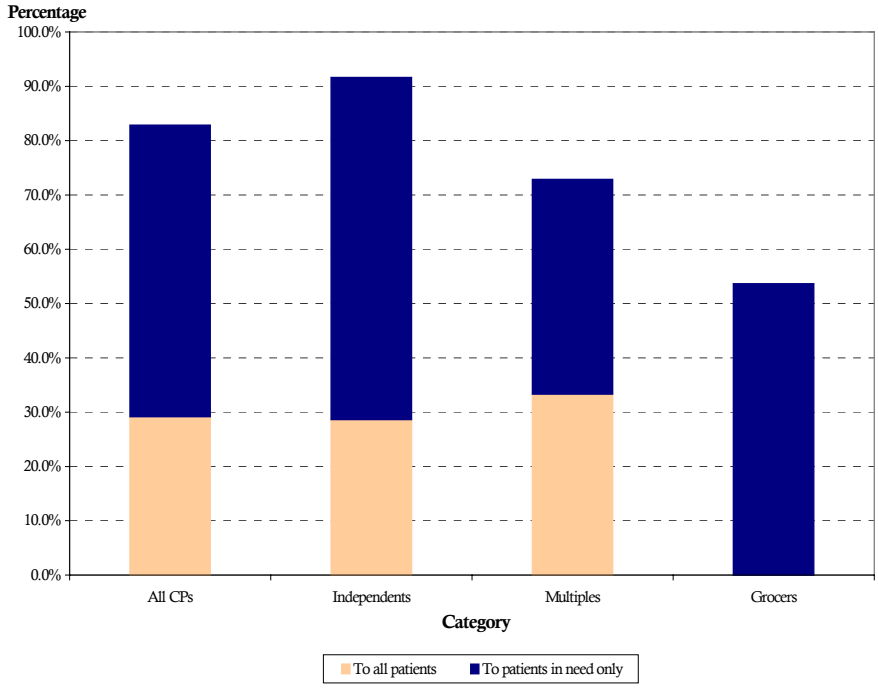
Figure 8: Proportion of pharmacies with a consultation area



Source : Frontier Economics analysis of questionnaire responses

Many pharmacies offer a home delivery service (82%) as shown in Figure 9. This percentage is higher for independents (92%) and lower for supermarkets (33%). Supermarkets make this service available to patients in need only. In contrast, roughly a third of independents offer this service to all patients (i.e. regardless of genuine need) as do 45% of multiples.

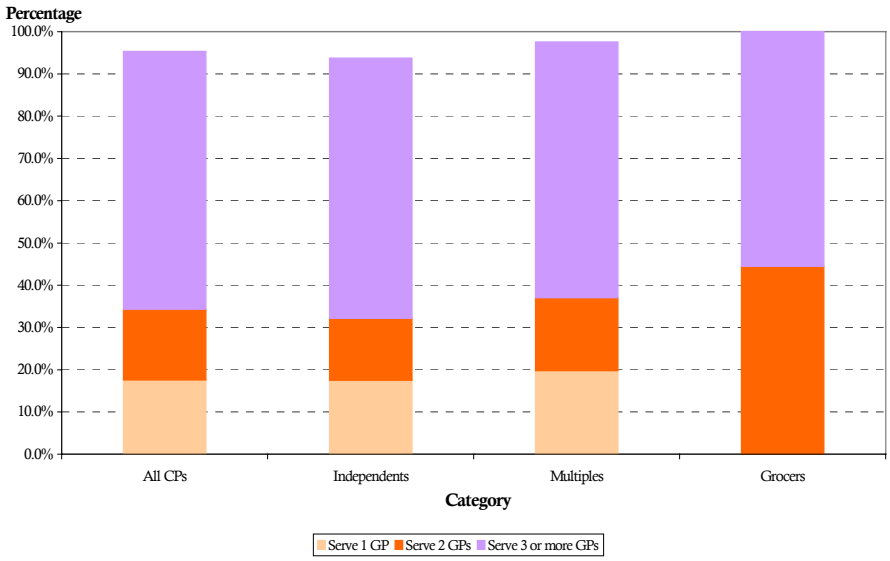
Figure 9: Proportion of pharmacies offering a home delivery service



Source : Frontier Economics analysis of questionnaire responses

Figure 10 shows that the repeat prescription collection service is on offer by most of the pharmacies in the sample (95%). Whenever available, the pharmacy tends to collect from several GPs.

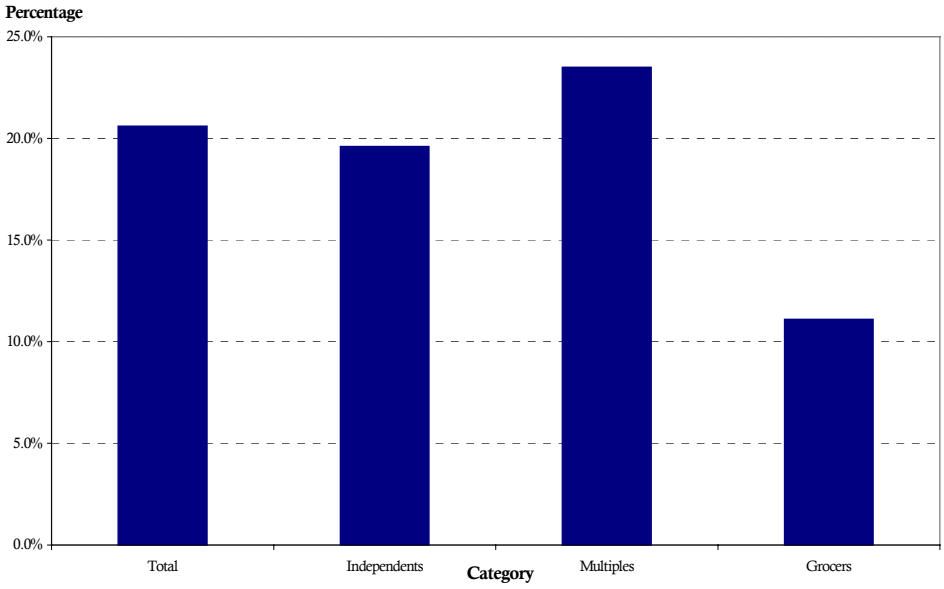
Figure 10: Proportion of respondents offering a repeat prescription collection service



Source : Frontier Economics analysis of questionnaire responses

A fifth of the respondents reported receiving an additional hours payment as shown in Figure 11. By category type, this was more prevalent among multiples (23.5%) whilst this payment was received by 11% of supermarkets.

Figure 11: Proportion of respondents receiving an additional hours payment



Source : Frontier Economics

4. Regression analysis

The quality variables were examined using regression analysis from two perspectives. The first was to assess whether the quality variables were statistically related to the presence and level of local competition variables (as proxied by local concentration measures). The second approach was to reconsider the relationship between price and local concentration found in the price-concentration study[7], to determine whether the results were affected by introducing quality variables in the regressions as additional "controls". Under the first approach the quality variables are dependent variables, whereas under the second, the quality variables are part of the set of independent (explanatory) variables.

The variables employed are discussed below in Section 4.1 and Section 4.2. Results are presented in Section 4.3 for each approach in turn.

4.1 Quality variables

In order to carry out the regression analysis, it was necessary to convert survey responses into operational variables. The raw data on opening and closing time was used to construct a variety of discrete and continuous variables. Discrete (dummy) variables were created for specific services indicating whether the service is on offer or not for each pharmacy. The full set of variables employed is reported in Table 1.

[7] Ibid., footnote 1.

Table 1: Description of quality measures

Variable name	Description
	Hours variables
mon9	Dummy, 1 if pharmacy opens before 9am on Monday. (Equivalent variables for other days are tue9, wed9, thu9 and fri9)
m2f-9	Dummy, 1 if pharmacy opens before 9am each day of the working week
mon6	Dummy, 1 if pharmacy is open after 6om on Monday. (Equivalent variables for other days are tue6, wed6, thu6 and fri6)
m2f-6	Dummy, 1 if pharmacy is open after 6pm each day of the working week
mon_out69d	Dummy, 1 if pharmacy is open outside 9am-6pm on Monday. Equivalent variables for other days are tue_out69d, wed_out69d, thu_out69d, fri_out69d.
mon_out69	Number of hours open outside 9am-6pm on Monday. Equivalent variables for other days are tue_out69, wed_out69, thu_out69, fri_out69.
mon_clin69d	Dummy, 1 if pharmacy is closed between 9am-6pm on Monday. Equivalent variables for other days are tue_clin69d, wed_clin69d, thu_clin69d, fri_clin69d.
mon_clin69	Number of hours closed between 9am-6pm on Monday. Equivalent variables for other days are tue_clin69, wed_clin69, thu_clin69, fri_clin69.
mon_clund	Dummy, 1 if pharmacy is closed at lunchtime on Monday. Equivalent variables for other days are tue_clund, wed_clund, thu_clund, fri_clund.
m2f-clund	Dummy, 1 if pharmacy is closed at lunchtime each day of the working week
sat4d	Dummy, 1 if pharmacy is open more than 4 hours on Saturday
sun4d	Dummy, 1 if pharmacy is open more than 4 hours on Sunday
mon_t	Number of hours open on Monday. Equivalent variables for other days are tue_t, wed_t, thu_t, fri_t, sat_t, sun_t).
	Other measures
cons_are	Dummy, 1 if pharmacy has a consultation area

Table 1: Description of quality measures

Variable name	Description
rep_serv	Dummy, 1 if pharmacy offers a repeat prescription collection service
rep_serv123	Composite ranking of number of GPS served with repeat prescription collection service.
hd	Dummy, 1 if pharmacy offers a home delivery service at all
hd_all	Dummy, 1 if pharmacy offers a home delivery service to all patients
hd-need	Dummy, 1 if pharmacy offers a home delivery service to patients in need only
addpay	Dummy, 1 if pharmacy receives additional hours payment for outside normal business hours
ca_dat_nr	Dummy, 1 if pharmacy whilst offering a consultation area has not reported the date of introduction
ca_datX	1 if pharmacy offered the consultation area before RPM was removed, 2 after or not reported
hd_dat_nr	Dummy, 1 if pharmacy whilst offering home delivery has not reported the date of introduction
hd_datX	1 if pharmacy offered home delivery before RPM was removed, 2 after or not reported

Source : Frontier Economics

4.2 Independent variables

The independent variables were are a subset of the variables considered for the initial price-concentration study[8]. These covered measures of local concentration, characteristics of the local market, and pharmacy characteristics. A smaller number of variables were used, compared to the initial analysis, to allow sufficient degrees of freedom in the analysis of the smaller sample for which quality information was available[9]. Table 2 describes the three sets of independent variables considered.

[8] Ibid, footnote 1.

[9] Degrees of freedom refer to the number of observations that are available to calculate statistics from data. The greater the degrees of freedom, the more accurate will inferences be. Commonly (in regression analysis) they equal the number of observations minus the number of independent variables, so reducing the number of independent variables increases the number of

Table 2: Description of independent variables

Variable name	Description
	Local concentration measures
Cps	Number of CPs in 1,000m buffer
cppop	Composite ranking from 1 to 4 of number of CPs per 1,000 population[10]
cpgp	Composite ranking from 1 to 4 of number of CPs per GP
supph	Number of supermarkets with pharmacies in 15 minute drivetime
sup25	Number of supermarkets over 25,000 sq. ft. without pharmacies in 15 minute drivetime
near_sup	Dummy variable[11], 1 if CP is the closest to a supermarket over 10,000 sq. ft. without a pharmacy
Dist_cp	Distance to nearest CP, up to 5,000m
Nocp	Dummy variable, 1 if no CP within 5,000m
Dist_gp	Distance to nearest GP, up to 5,000m
Nogp	Dummy variable, 1 if no GP within 5,000m
near_gp	Dummy variable, 1 if CP is the closest to a GP
supph5	Number of supermarkets with pharmacies, in 5 minute drivetime
sp_10_15	Number of supermarkets below 10,000 sq. ft. in 15 minute drivetime
	Local characteristics measures
pop	Composite ranking from 1 to 4 of population
scot	Dummy, 1 if CP is in Scotland
wales	Dummy, 1 if CP is in Wales

degrees of freedom.

[10] See Frontier Economics, Creating an electronic map of GB pharmacy locations, November 2002 for details on the creation of and rationale for composite indicators.

[11] A dummy variable is a variable that takes on the value 1 where the characteristic is present and 0 otherwise.

Table 2: Description of independent variables

Variable name	Description
	Pharmacy characteristics measures
groc	Dummy, 1 if pharmacy is a supermarket
mult	Dummy, 1 if pharmacy is a multiple
ind	Dummy, 1 if pharmacy is an independent
Pharmacy1*	Dummy, 1 if pharmacy is from Pharmacy1 group
Pharmacy2*	Dummy, 1 if pharmacy is from Pharmacy2 group

Notes: * Names of pharmacy chains removed for reasons of confidentiality. ***Source: Frontier Economics***

4.3 Regression results

A large number of regressions were carried out for different combinations of dependent and independent variables. The results for the regressions on hours and specific services for which statistically significant explanatory variables were identified are reported below. Attention is restricted to more robust statistical relationships which were observed across a number of specifications[12].

Results of the analysis of the relationship between quality and local concentration are reported in Section 4.3.1. Results of the analysis of the relationship between quality and local concentration are reported in Section 4.3.2.

4.3.1 Relationship between quality and local concentration measures

Regression analysis is carried out for each quality variable separately[13]. This leads to a high number of specifications, from which we seek

[12] In general, the R^2 values were low for these regressions. This indicates that for the regressions on opening and closing hours, the data was only able to explain a small proportion of the variation in these variables. However, for the regressions on the presence of particular services, this is at least partly an implication of the regression technique used. Please see Annex 2 for details.

[13] An ordinary least squares (OLS) approach was employed for all regressions. Please see Annex 2 for further details.

evidence not only of significant statistical relationships but also their recurrence across different specifications (for example, across different days). The analysis employed the full sample for which quality measures were available[14].

Results for quality measures on opening hours

A variety of regressions on different hours variables were run with all variables listed in Table 2 on the right hand side of the equation[15]. We sought primarily to investigate whether there were significant variables[16] and considered the sign and the relative size of any relationship with concentration measures[17]. The regressions for pharmacies that are open before 9am and for pharmacies that are open after 6pm are the most informative. Other hours variables did not provide similarly robust results.

Dependent variable is "Open before 9am"

Two concentration variables were significantly related to whether a pharmacy was open or not before 9am each working day (Monday to Friday)[18]:

- the higher the number of pharmacies per GP in the local area, the more likely the pharmacy was to be open before 9am;
- if a pharmacy was the nearest to a GP, the more likely it was to be open before 9am; and
- supermarket pharmacies were more likely to be open before 9am.

The effect from being nearest to the GP was approximately twice that of the effect from the number of pharmacies per GP.

---

[14] We also run each regression on a sample which excluded supermarkets. This was to control for the possibility that the sample was not representative for supermarkets since there were only a few observations. This alternative specification did not alter any of the main results reported in the text.

[15] In addition the potential influence of the "additional hour payment variable" on opening hours was tested. We added this variable as a control variable on the right hand side of the equation for each regression specification. Again, this change did not alter the main results.

[16] Using a 5% significance level.

[17] It is worth noting that the concentration measures are all related to one another to some degree. The inclusion of all of them in the equation jointly allows us to test explicitly the significance of one variable whilst controlling for related variables.

[18] We also run the same regression for each particular day. Each had the same significant variables with virtually the same size of coefficient on key variables of interest.

A possible interpretation of the results is that when faced with more competitive pressure (as perhaps proxied by the number of pharmacies per GP), a pharmacy may feel the need to differentiate in opening earlier than 9am. The decision to open before 9am may also reflect the opening hours of GPs, which may themselves open before 9am.

The regression output is reported in Annex 2, Figure 12.

Dependent variable is "Open after 6pm"

Both local market characteristics and pharmacy characteristics were significantly related to whether a pharmacy is open after 6pm for each working day (Monday to Friday):

- the higher the population density, the more likely was a pharmacy to be open after 6pm from Monday to Friday;
- if a pharmacy was located in Scotland, the less likely it was to be open after 6pm from Monday to Friday;
- if a pharmacy was an independent, the less likely it was to be open after 6pm from Monday to Friday; and
- of these variables, the largest impact was from being an independent, followed closely by the regional dummy for Scotland.

Being open after 6pm throughout the working week appears to be driven by local characteristics. A potential interpretation is that urban areas have a higher proportion of people at work and pharmacies remain open so that these customers can have access to the pharmacy. It may be also the case that the opportunity costs for independent pharmacists rise in the evening (as these are more likely to be owner/managers who may have been in the pharmacy all day) and this could explain their lower likelihood of remaining open later than 6pm.

The regression output is reported in Annex 2, Figure 13.

Results for quality measures on specific services

Among the variables for specific services, there were some statistically significant explanatory variables for home delivery, the provision of a consultation area and repeat script collection services. However, relationships with concentration measures are only found for the consultation area and repeat script collection services.

Consultation area

Three concentration measures were found to be statistically significant in the regression for the provision or not of a consultation area:

- if the pharmacy is the closest to a GP, the more likely it is that this pharmacy will have a consultation area;
- the higher the number of supermarkets with a pharmacy in local area, the more likely a pharmacy will have a consultation area; and
- the higher the number of large supermarkets without a pharmacy, the less likely the pharmacy will have a consultation area.

Of these concentration measures, the largest effect is from being nearest to the GP. A possible interpretation is that the pharmacies appear to respond to the competitive pressure exercised from nearby supermarket pharmacies[19]. It is not clear why pharmacies nearest to a GP are more likely to provide a consultation area.

The regression output is reported in Annex 2, Figure 14.

Home delivery

The dependent variable is whether a pharmacy offers home delivery or not. Statistically significant relationships with the provision of a home delivery service were found for four variables:

- where the pharmacy faced no other pharmacy within 5km, it was less likely that it offered home delivery;
- pharmacies located in Scotland were less likely to offer home delivery;
- independents pharmacies were more likely to offer home delivery;
- Pharmacy1 pharmacies were also more likely to offer home delivery service when compared with other multiple pharmacies.

The strongest effects came from both the concentration measure (no other pharmacy within 5km) and the independent dummy. One interpretation of these results is that home delivery is less likely to be offered in rural

[19] Although the interpretation of the negative result for supermarket without pharmacies is less clear.

areas, as proxied by the "no pharmacy within 5km" and "Scotland" variables.

The regression output is reported in Annex 2, Figure 15.

Home delivery to all patients

The dependent variable in this regression is for those pharmacies offering home delivery to all patients, as compared to pharmacies offering home delivery only to those in need. A number of statistical relationships were found to hold:

- the higher the number of supermarkets with pharmacies in the local area, the less likely it was that a pharmacy offered a home delivery to all patients; and
- the higher the number of small supermarkets (under 10k sq.ft) in a 15min drivetime, the more likely was a pharmacy to offer home delivery to all patients.

For each variable above, the effects are small. The regression output is reported in Annex 2, Figure 16.

Repeat prescription collection service

In this regression, we considered the sub-sample of pharmacies for which a repeat prescription collection service was available (in total this covered 95% of the whole sample). We explored whether the number of GPs served was related to the concentration measures and other independent variables. The following variables were found to be significant:

- the higher the number of supermarkets with a pharmacy, the lower was the number of GPs served;
- the higher the distance to the next pharmacy, the lower was the number of GPs served;
- with the absence of a pharmacy within 5km, the higher was the number of GPs served;
- a pharmacy located in Scotland was less likely to serve a high number of GPs';
- a Pharmacy1 pharmacy was less likely to serve a high number of GPs; and
- an independent pharmacy was less likely to serve a high number of GPs.

The full output is reported in Annex 2, Figure 17.

4.3.2 Relationship between prices and concentration controlling for quality

The second stage of the regression analysis involved reconsidering the results of the price-concentration study on the relationships between prices and local concentration[20], once quality measures were taken into account.

As a first step we re-run the original equation with the independent variables listed above for the smaller sample of observations (233) for which quality measures were available. These alternative specifications did not lead to different results to the price-concentration equation estimated with the full sample (657 observations) and wider set of explanatory variables as reported in the price-concentration study. In particular, no systematic statistical relationships were observed between any concentration measures and price. However, there were significant effects from supermarket pharmacies.

As a second step, the most significant quality variables from the quality-local concentration analysis were included in the price-concentration regressions. This alteration did not result in there being an impact on price from any concentration measure, nor were the quality variables themselves significantly related to prices. We therefore conclude that controlling for quality does not alter the original findings of the price-concentration analysis.

[20] Two specifications for prices were considered in this initial study. Firstly, the dependent variable for prices was the change in the price index for a representative selection of products. The second set of dependent variables reflected the level of prices in the first four months and the last four months of the sample period (and hence the change in coefficients before and after the removal of RPM).

Annex 1

IMS Questionnaire

«ID_Number»

Quality measures (Questionnaire)

1. Please indicate your standard opening hours as per Table A1-3.

Table A1-3: Opening hours (am/pm)

Day	Opening time	Closing time	Lunch
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			

2. Do you receive an additional hours payment? (Y/N)

3. Do you offer a repeat prescription collection service? (Y/N)

   How many GP surgeries does this serve?

   a. One? ☐

   b. Two? ☐

   c. More than two? ☐

   When was this introduced, if known (MM/YY) ☐☐☐☐

4. Do you offer a home delivery service? (Please choose one of the following.)

   a. Yes, promoted to all patients ☐

   b. Yes, promoted to patients in need only ☐

c. No ☐

If yes, when was this introduced, if known (MM/YY)? ☐☐☐☐

Do you have a private area within your pharmacy for consultations (Y/N)?

If so, please give approximate size (m^2). ☐

When was this introduced, if known (MM/YY) ☐☐☐☐

5. Do you trade as a:

   a. Sole trader? ☐

   b. Partnership? ☐

   c. Limited compan ☐

6. Is your business:

   a. an independent pharmacy with a single retail outle ☐

   b. an independent pharmacy with between 2 and 5 reta ☐ outlets?

   c. a pharmacy chain with more than 5 retail outlets ☐

   d. a supermarket pharmacy (supermarket owned)? ☐

   e. a supermarket pharmacy (franchise)? ☐

   f. some other pharmacy outlet? ☐

7. How long has the business been trading (years)? ☐☐

8. Is the annual turnover of this outlet:

   a. less than £400,000? ☐

   b. more than £400,000, but less than £1 million? ☐

   c. more than £1 million? ☐

9. Approximately what percentage of the total turnover of this outlet is accounted for by NHS receipts? ☐☐ %

Annex 2
Regression results

Regression analysis

This annex presents the detailed results of the regression analysis discussed in the main body of this report, and comments on a number of technical aspects.

All regressions employed ordinary least squares (OLS) techniques. For variables that are dichotomous, such that the service is either present or absent, this means that the regression coefficients can loosely be interpreted as percentage changes from a base (i.e. the presence of a variable is related to the presence of the service being more or less likely). One possible difficulty with this approach is that predicted percentages can be greater than 100% or less than 0% (a problem that would not be present, for example, if probit or logit analysis was used)[21]. However, since the main focus of the study was to investigate statistical relationships between variables, rather than to form a predictive or forecasting model, our view is that this is not of great importance, as both OLS and probit/logit would be expected to give similar answers[22].

Each regression was tested using the standard specification tests for heteroskedasticity, normality, and omitted variables. There was a tendency to reject the hypothesis of normality, whilst the hypotheses of homoskedasticity and no omitted variables were rejected some of the time. This further suggests that the coefficients of the regression analysis should be treated with some caution, although as above this is less of a problem in this instance since the focus is on investigating the statistical relationships between variables.

[21] To check the robustness of this approach, probit regressions were also carried out where appropriate. The results were extremely similar.

[22] In addition, R^2 is not a particularly informative measure in dichotomous regressions, where the dependent variable takes on only two values.

Figure 12: Regression output, dependent variable is open before 9am Monday to Friday, all pharmacy types

```
Dependent variable: m2f_9
Independent variables: cps cppop cpgp supph sup25 near_sup dist_cp nocp dist_gp
nogp near_gp supph5 sp_10_15   pop scot wales pharmacy1 pharmacy2 ind groc

    Source |       SS       df       MS              Number of obs =     233
-------------+------------------------------           F( 20,   212) =    3.72
       Model |  10.9258409    20  .546292044           Prob > F      =  0.0000
    Residual |  31.0913265   212    .1466572           R-squared     =  0.2600
-------------+------------------------------           Adj R-squared =  0.1902
       Total |  42.0171674   232   .18110848           Root MSE      =  .38296

------------------------------------------------------------------------------
       m2f_9 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cps |   .0177413   .0195133     0.91   0.364    -.0207236    .0562063
       cppop |  -.0274474   .0320328    -0.86   0.392     -.090591    .0356963
        cpgp |   .0871888   .0314054     2.78   0.006      .025282    .1490956
       supph |   .0017404   .0170658     0.10   0.919       -.0319    .0353808
       sup25 |  -.0060042   .0085265    -0.70   0.482    -.0228118    .0108034
    near_sup |   .0198464   .0581873     0.34   0.733    -.0948534    .1345463
     dist_cp |   .0076296   .0416222     0.18   0.855    -.0744168    .0896761
        nocp |  -.1886469   .2080466    -0.91   0.366    -.5987519     .221458
     dist_gp |   .0158556   .0469372     0.34   0.736    -.0766677    .1083789
        nogp |  -.0274658   .2072581    -0.13   0.895    -.4360165     .381085
     near_gp |   .1884386   .0650359     2.90   0.004     .0602387    .3166386
      supph5 |   .0787364    .073109     1.08   0.283    -.0653774    .2228502
    sp_10_15 |  -.0039369   .0040573    -0.97   0.333    -.0119347     .004061
         pop |   .0047099   .0371685     0.13   0.899    -.0685573    .0779772
        scot |  -.0231255   .0835631    -0.28   0.782    -.1878465    .1415955
       wales |   -.193245   .1474549    -1.31   0.191    -.4839106    .0974206
    pharmacy1 |   .0216993   .1026785     0.21   0.833    -.1807023    .2241009
    pharmacy2 |    .642722   .3991959     1.61   0.109    -.1441798    1.429624
         ind |  -.0805375    .098417    -0.82   0.414    -.2745387    .1134637
        groc |   .7026975   .1691202     4.16   0.000     .3693248    1.03607
       _cons |  -.0196387   .1764735    -0.11   0.911    -.3675063     .328229
------------------------------------------------------------------------------
```

Figure 13: Regression output, dependent variable is open after 6pm Monday to Friday, all pharmacy types

```
Dependent variable: m2f_6
Independent variables:   cps cppop cpgp supph sup25 near_sup dist_cp nocp
dist_gp nogp near_gp supph5 sp_10_15   pop scot wales pharmacy1 pharmacy2 ind
groc

      Source |       SS       df       MS              Number of obs =     233
-------------+------------------------------           F( 20,   212) =    4.75
       Model |   12.500789    20   .62503945           Prob > F      =  0.0000
    Residual |  27.8940608   212  .131575758           R-squared     =  0.3095
-------------+------------------------------           Adj R-squared =  0.2443
       Total |  40.3948498   232  .174115732           Root MSE      =  .36273

------------------------------------------------------------------------------
       m2f_6 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cps |   .0130086   .0184828     0.70   0.482    -.0234249    .0494422
       cppop |  -.0061702   .0303411    -0.20   0.839    -.0659792    .0536387
        cpgp |   .0043054   .0297468     0.14   0.885    -.0543319    .0629428
       supph |  -.0163973   .0161645    -1.01   0.312    -.0482611    .0154665
       sup25 |  -.0012364   .0080762    -0.15   0.878    -.0171563    .0146836
    near_sup |  -.0298445   .0551143    -0.54   0.589    -.1384868    .0787979
     dist_cp |   .0040586   .0394241     0.10   0.918    -.0736548     .081772
        nocp |   .1892737   .1970592     0.96   0.338    -.1991728    .5777203
     dist_gp |   .0112946   .0444583     0.25   0.800    -.0763424    .0989315
        nogp |  -.1490342   .1963124    -0.76   0.449    -.5360086    .2379402
     near_gp |   .0187205   .0616013     0.30   0.762    -.1027089      .14015
      supph5 |   .0854822    .069248     1.23   0.218    -.0510207     .221985
    sp_10_15 |  -.0024649    .003843    -0.64   0.522    -.0100404    .0051106
         pop |   .1080375   .0352056     3.07   0.002     .0386396    .1774354
        scot |  -.1741568     .07915    -2.20   0.029    -.3301785    -.018135
       wales |  -.2279722   .1396675    -1.63   0.104    -.5032871    .0473428
    pharmacy1 |   .0860835   .0972558     0.89   0.377    -.1056289    .2777958
    pharmacy2 |  -.3303187   .3781136    -0.87   0.383    -1.075663    .4150253
         ind |  -.2089327   .0932194    -2.24   0.026    -.3926884    -.025177
        groc |   .6766819   .1601887     4.22   0.000     .3609153    .9924486
       _cons |   .1064486   .1671536     0.64   0.525    -.2230475    .4359447
------------------------------------------------------------------------------
```

Figure 14: Regression output, dependent variable is the provision of a consultation area, all pharmacy types

```
Dependent variable: cons_are
Independent variables: cps cppop cpgp supph sup25 near_sup dist_cp nocp dist_gp
nogp neargp supph5 sp_10_15   pop scot wales pharmacy1 pharmacy2 ind groc

      Source |       SS       df       MS              Number of obs =     233
-------------+------------------------------           F( 20,   212) =    2.41
       Model |  10.7785277    20  .538926383           Prob > F      =  0.0010
    Residual |  47.3845625   212  .223512087           R-squared     =  0.1853
-------------+------------------------------           Adj R-squared =  0.1085
       Total |  58.1630901   232  .250702975           Root MSE      =  .47277

------------------------------------------------------------------------------
    cons_are |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cps |   .0303453   .0240896     1.26   0.209    -.0171405    .0778312
       cppop |  -.0608536   .0395452    -1.54   0.125    -.1388058    .0170986
        cpgp |   .0581532   .0387706     1.50   0.135    -.0182721    .1345784
       supph |   .0537754   .0210681     2.55   0.011     .0122456    .0953052
       sup25 |  -.0262393   .0105262    -2.49   0.013    -.0469887     -.00549
    near_sup |   .0130397   .0718335     0.18   0.856    -.1285598    .1546392
     dist_cp |   .0848051   .0513836     1.65   0.100     -.016483    .1860932
        nocp |  -.3693823   .2568381    -1.44   0.152    -.8756659    .1369012
     dist_gp |   .0316263    .057945     0.55   0.586    -.0825958    .1458483
        nogp |   .0486955   .2558647     0.19   0.849    -.4556694    .5530604
     near_gp |   .1632699   .0802883     2.03   0.043     .0050043    .3215356
      supph5 |   .0529422   .0902547     0.59   0.558    -.1249694    .2308538
    sp_10_15 |   .0003858   .0050088     0.08   0.939    -.0094877    .0102594
         pop |   .0600949   .0458854     1.31   0.192    -.0303552    .1505449
        scot |   .0664517   .1031605     0.64   0.520    -.1368999    .2698034
       wales |    .097728   .1820363     0.54   0.592    -.2611051     .456561
    pharmacy1 |  -.041718   .1267588    -0.33   0.742    -.2915871    .2081512
    pharmacy2 |   .6550137   .4928161     1.33   0.185    -.3164338    1.626461
         ind |   .2391406   .1214979     1.97   0.050    -.0003582    .4786394
        groc |   .2777868   .2087827     1.33   0.185    -.1337691    .6893427
       _cons |  -.0232025   .2178605    -0.11   0.915    -.4526528    .4062477
------------------------------------------------------------------------------
```

Figure 15: Regression output, dependent variable is the provision of a home delivery service, all pharmacy types

```
Dependent variable: hd
Independent variables: cps cppop cpgp supph sup25 near_sup dist_cp nocp dist_gp
nogp near_gp supph5 sp_10_15   pop scot wales pharmacy1 pharmacy2 ind groc

      Source |       SS       df       MS              Number of obs =     233
-------------+------------------------------           F( 20,   212) =    4.43
       Model |  9.76628978    20  .488314489           Prob > F      =  0.0000
    Residual |  23.3667574   212  .110220554           R-squared     =  0.2948
-------------+------------------------------           Adj R-squared =  0.2282
       Total |  33.1330472   232  .142814859           Root MSE      =  .33199

------------------------------------------------------------------------------
          hd |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cps |    .002175   .0169165     0.13   0.898    -.0311711    .0355211
       cppop |   .0269875   .0277699     0.97   0.332    -.0277531     .081728
        cpgp |    .004419    .027226     0.16   0.871    -.0492493    .0580873
       supph |  -.0044014   .0147947    -0.30   0.766     -.033565    .0247621
       sup25 |   .0040485   .0073918     0.55   0.584    -.0105223    .0186194
    near_sup |  -.0170405   .0504438    -0.34   0.736    -.1164762    .0823953
     dist_cp |  -.0273078   .0360832    -0.76   0.450    -.0984356     .04382
        nocp |  -.3655396    .18036    -2.03   0.044    -.7210683    -.010011
     dist_gp |   .0263359   .0406908     0.65   0.518    -.0538745    .1065463
        nogp |   .1194644   .1796765     0.66   0.507    -.2347169    .4736457
     near_gp |   .0775547    .056381     1.38   0.170    -.0335845    .1886939
      supph5 |   .0332008   .0633798     0.52   0.601    -.0917345     .158136
    sp_10_15 |  -.0058865   .0035174    -1.67   0.096      -.01282     .001047
         pop |   .0092262   .0322222     0.29   0.775    -.0542908    .0727431
        scot |  -.1890439   .0724426    -2.61   0.010     -.331844   -.0462438
       wales |  -.0014532   .1278318    -0.01   0.991    -.2534374    .2505309
    pharmacy1 |   .2751789   .0890141     3.09   0.002     .0997127    .4506451
    pharmacy2 |   .4381391   .3460714     1.27   0.207    -.2440427    1.120321
         ind |   .4072412   .0853198     4.77   0.000     .2390574     .575425
        groc |  -.2095354   .1466139    -1.43   0.154    -.4985433    .0794724
       _cons |   .4544927   .1529886     2.97   0.003     .1529189    .7560665
------------------------------------------------------------------------------
```

Figure 16: Regression output, dependent variable is the provision of a home delivery service to all patients, all pharmacy types that offer a home delivery service

```
Dependent variable: hd_all
Independent variables: cps cppop cpgp supph sup25 near_sup dist_cp nocp dist_gp
nogp near_gp  supph5 sp_10_15   pop scot wales pharmacy1 pharmacy2 ind groc

      Source |       SS       df       MS              Number of obs =     193
-------------+------------------------------           F( 20,   172) =    1.28
       Model |  5.69106228    20  .284553114           Prob > F      =  0.2008
    Residual |  38.3503885   172  .222967375           R-squared     =  0.1292
-------------+------------------------------           Adj R-squared =  0.0280
       Total |  44.0414508   192  .229382556           Root MSE      =  .47219

------------------------------------------------------------------------------
      hd_all |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cps |   .0024037   .0260395     0.09   0.927    -.0489945    .0538018
       cppop |    .000315   .0426773     0.01   0.994    -.0839236    .0845536
        cpgp |   .0042834   .0416146     0.10   0.918    -.0778576    .0864244
       supph |  -.0541697   .0236215    -2.29   0.023     -.100795   -.0075444
       sup25 |   .0059526   .0116109     0.51   0.609    -.0169656    .0288708
    near_sup |   .0054293   .0787464     0.07   0.945    -.1500046    .1608631
     dist_cp |  -.0606526   .0535285    -1.13   0.259    -.1663099    .0450048
        nocp |   .0245392   .3041057     0.08   0.936    -.5757204    .6247988
     dist_gp |   .0400857   .0625069     0.64   0.522    -.0832937     .163465
        nogp |   .0721206   .2758909     0.26   0.794    -.4724472    .6166885
     near_gp |   .0734356   .0860505     0.85   0.395    -.0964153    .2432865
      supph5 |  -.0780142   .0952836    -0.82   0.414    -.2660899    .1100615
    sp_10_15 |   .0135478   .0055414     2.44   0.016     .0026099    .0244856
         pop |   .0163648   .0503391     0.33   0.746    -.0829972    .1157267
        scot |  -.0282438   .1255796    -0.22   0.822    -.2761193    .2196317
       wales |   .1293929   .1976462     0.65   0.514    -.2607315    .5195174
    pharmacy1 |  -.0294918   .1683277    -0.18   0.861    -.3617458    .3027622
    pharmacy2 |   -.532019   .5040006    -1.06   0.293    -1.526842    .4628037
         ind |  -.1468432   .1630444    -0.90   0.369    -.4686687    .1749823
        groc |  -.4526502   .3275188    -1.38   0.169    -1.099124    .1938236
       _cons |   .3590986   .2498379     1.44   0.152    -.1340445    .8522417
------------------------------------------------------------------------------
```

Figure 17: Regression output, dependent variable is the provision of a repeat script collection service, all pharmacy types that offer the services

```
Dependent variable: rep_serv123
Independent variables: cps cppop cpgp supph sup25 near_sup dist_cp nocp dist_gp
nogp near_gp supph5 sp_10_15   pop scot wales pharmacy1 pharmacy2 ind groc

      Source |       SS       df       MS              Number of obs =     222
-------------+------------------------------           F( 20,   201) =    2.92
       Model |  30.8353497    20  1.54176748           Prob > F      =  0.0001
    Residual |    106.2142   201  .528428855           R-squared     =  0.2250
-------------+------------------------------           Adj R-squared =  0.1479
       Total |   137.04955   221  .620133708           Root MSE      =  .72693

------------------------------------------------------------------------------
 rep_serv123 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cps |   .0183166   .0375721     0.49   0.626    -.0557696    .0924027
       cppop |    -.06141   .0625892    -0.98   0.328    -.1848256    .0620056
        cpgp |   .0471917   .0606773     0.78   0.438     -.072454    .1668373
       supph |  -.0774689   .0331683    -2.34   0.020    -.1428713   -.0120664
       sup25 |   .0020506   .0168241     0.12   0.903    -.0311239     .035225
    near_sup |   .0461398   .1140826     0.40   0.686    -.1788124     .271092
     dist_cp |   -.195304    .079287    -2.46   0.015     -.351645    -.038963
        nocp |   .9594863   .4045892     2.37   0.019     .1617027     1.75727
     dist_gp |  -.0610119   .0901759    -0.68   0.499    -.2388241    .1168003
        nogp |  -.2968704   .3984843    -0.74   0.457    -1.082616    .4888756
     near_gp |  -.1077438   .1257504    -0.86   0.393    -.3557031    .1402154
      supph5 |   .2172936   .1392535     1.56   0.120    -.0572914    .4918787
    sp_10_15 |   .0051778   .0080336     0.64   0.520    -.0106632    .0210189
         pop |   .1161596   .0737729     1.57   0.117    -.0293086    .2616277
        scot |  -.5558569   .1704421    -3.26   0.001    -.8919409   -.2197729
       wales |  -.3611202   .2812862    -1.28   0.201    -.9157706    .1935302
    pharmacy1 |  -.6385058   .2043549    -3.12   0.002     -1.04146   -.2355513
    pharmacy2 |   -.238549   .7614337    -0.31   0.754    -1.739972    1.262874
         ind |  -.3908738   .1966696    -1.99   0.048     -.778674   -.0030736
        groc |  -.5318304   .3286318    -1.62   0.107    -1.179839    .1161777
       _cons |   2.994408   .3439424     8.71   0.000      2.31621    3.672606
------------------------------------------------------------------------------
```

Figure 18: Regression output, dependent variable is change in prices, all pharmacy types for which quality data is available, no control for quality

```
Dependent variable: deltav
Independent variables: cps cppop cpgp supph sup25 near_sup dist_cp nocp dist_gp
nogp near_gp supph5 sp_10_15   pop scot wales pharmacy1 pharmacy2 ind groc

      Source |       SS       df       MS              Number of obs =     233
-------------+------------------------------           F( 20,   212) =   16.32
       Model |  2.32022885    20  .116011443           Prob > F      =  0.0000
    Residual |   1.5070837   212  .007108885           R-squared     =  0.6062
-------------+------------------------------           Adj R-squared =  0.5691
       Total |  3.82731255   232  .016497037           Root MSE      =  .08431

------------------------------------------------------------------------------
      deltav |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cps |    .005565   .0042962     1.30   0.197    -.0029037    .0140336
       cppop |   -.008294   .0070525    -1.18   0.241     -.022196    .0056081
        cpgp |   .0053311   .0069144     0.77   0.442    -.0082987    .0189608
       supph |  -.0011352   .0037573    -0.30   0.763    -.0085416    .0062713
       sup25 |   .0001726   .0018772     0.09   0.927    -.0035278    .0038731
    near_sup |  -.0125184   .0128108    -0.98   0.330    -.0377713    .0127346
     dist_cp |    .010796   .0091638     1.18   0.240    -.0072678    .0288598
        nocp |  -.0006382   .0458047    -0.01   0.989    -.0909292    .0896527
     dist_gp |  -.0164202   .0103339    -1.59   0.114    -.0367906    .0039502
        nogp |   .0545505   .0456311     1.20   0.233    -.0353982    .1444992
     near_gp |  -.0130872   .0143187    -0.91   0.362    -.0413124     .015138
      supph5 |   .0156531   .0160961     0.97   0.332    -.0160758    .0473819
    sp_10_15 |  -.0012884   .0008933    -1.44   0.151    -.0030492    .0004725
         pop |   .0125874   .0081832     1.54   0.125    -.0035435    .0287183
        scot |  -.0265216   .0183977    -1.44   0.151    -.0627874    .0097443
       wales |  -.0408709   .0324645    -1.26   0.209    -.1048654    .0231236
   pharmacy1 |  -.0001558   .0226062    -0.01   0.995    -.0447177     .044406
   pharmacy2 |  -.0372914   .0878891    -0.42   0.672    -.2105399    .1359572
         ind |  -.0544374    .021668    -2.51   0.013    -.0971497    -.011725
        groc |  -.5262151   .0372344   -14.13   0.000    -.5996122   -.4528179
       _cons |   .1570956   .0388534     4.04   0.000     .0805072     .233684
------------------------------------------------------------------------------
```

Figure 19: Regression output, dependent variable is change in prices, all pharmacy types for which quality data is available, with control for quality

```
Dependent variable: deltav
Independent variables: cps cppop cpgp supph sup25 near_sup dist_cp nocp dist_gp
nogp near_gp supph5 sp_10_15    pop scot wales ind groc  cons_are  hd  m2f_9
m2f_6 addpay

      Source |       SS       df       MS              Number of obs =     233
-------------+------------------------------           F( 23,   209) =   14.61
       Model |   2.3597123    23  .102596187           Prob > F      =  0.0000
    Residual |  1.46760025   209  .007022011           R-squared     =  0.6165
-------------+------------------------------           Adj R-squared =  0.5743
       Total |  3.82731255   232  .016497037           Root MSE      =   .0838

------------------------------------------------------------------------------
      deltav |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cps |   .0060154   .0042944     1.40   0.163    -.0024506    .0144813
       cppop |   -.007415   .0070415    -1.05   0.294    -.0212966    .0064665
        cpgp |   .0058553   .0070389     0.83   0.406    -.0080211    .0197316
       supph |  -.0017107   .0037777    -0.45   0.651    -.0091579    .0057365
       sup25 |   .0001293   .0018922     0.07   0.946     -.003601    .0038596
    near_sup |  -.0137153   .0127497    -1.08   0.283    -.0388499    .0114193
     dist_cp |   .0100282   .0092031     1.09   0.277    -.0081147    .0281711
        nocp |  -.0062395   .0463089    -0.13   0.893    -.0975319    .0850529
     dist_gp |  -.0146515   .0104241    -1.41   0.161    -.0352014    .0058983
        nogp |   .0520365   .0454911     1.14   0.254    -.0376438    .1417168
     near_gp |  -.0087417    .014774    -0.59   0.555     -.037867    .0203835
      supph5 |   .0194552   .0161144     1.21   0.229    -.0123125    .0512228
    sp_10_15 |  -.0015244   .0008962    -1.70   0.090     -.003291    .0002423
         pop |   .0153928   .0084534     1.82   0.070    -.0012721    .0320578
        scot |  -.0372659   .0188565    -1.98   0.049    -.0744392   -.0000926
       wales |  -.0474266   .0326126    -1.45   0.147    -.1117185    .0168653
         ind |  -.0568339   .0141425    -4.02   0.000    -.0847141   -.0289537
        groc |  -.5177269   .0358307   -14.45   0.000    -.5883628    -.447091
    cons_are |  -.0005297   .0122671    -0.04   0.966    -.0247128    .0236533
          hd |  -.0266888   .0170854    -1.56   0.120    -.0603707     .006993
        m2f_9 |  -.0037078   .0152359    -0.24   0.808    -.0337436     .026328
        m2f_6 |  -.0285023   .0162199    -1.76   0.080    -.0604779    .0034732
       addpay |  -.0066651   .0147275    -0.45   0.651    -.0356986    .0223685
        _cons |   .1809563   .0373409     4.85   0.000     .1073433    .2545694
------------------------------------------------------------------------------
```

Figure 20: Regression output, dependent variable is change in price level at beginning, all pharmacy types for which quality data is available

```
Dependent variable: prindvbg
Independent variables: cps cppop cpgp supph sup25 near_sup dist_cp nocp dist_gp
nogp near_gp supph5 sp_10_15    pop scot wales pharmacy1 pharmacy2 ind groc
cons_are  hd  m2f_9  m2f_6   addpay sat4d ca_dat_nr ca_datX hd_dat_nr hd_datX
if sample2

      Source |       SS       df       MS              Number of obs =     233
-------------+------------------------------           F( 29,   203) =   11.49
       Model |  2.94129548    29  .101423982           Prob > F      =  0.0000
    Residual |  1.79139055   203  .008824584           R-squared     =  0.6215
-------------+------------------------------           Adj R-squared =  0.5674
       Total |  4.73268603   232  .020399509           Root MSE      =  .09394

------------------------------------------------------------------------------
    prindvbg |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cps |   .0024331   .0048673     0.50   0.618    -.0071638    .0120301
       cppop |   .0013879   .0080096     0.17   0.863    -.0144047    .0171805
        cpgp |    .006206   .0079255     0.78   0.435    -.0094208    .0218329
       supph |  -.0057918   .0043363    -1.34   0.183    -.0143417    .0027581
       sup25 |  -.0019854   .0021607    -0.92   0.359    -.0062457    .0022749
    near_sup |  -.0232732    .014508    -1.60   0.110    -.0518788    .0053324
     dist_cp |   .0098633   .0105984     0.93   0.353    -.0110338    .0307604
        nocp |  -.0255265   .0532552    -0.48   0.632    -.1305307    .0794777
     dist_gp |  -.0072696   .0119405    -0.61   0.543    -.0308129    .0162737
        nogp |  -.0144291   .0523051    -0.28   0.783      -.11756    .0887018
     near_gp |  -.0023122   .0167699    -0.14   0.890    -.0353777    .0307533
      supph5 |   .0261669    .018303     1.43   0.154    -.0099215    .0622553
    sp_10_15 |  -.0012016   .0010177    -1.18   0.239    -.0032083    .0008051
         pop |   .0183841   .0095827     1.92   0.056    -.0005102    .0372785
        scot |  -.0317114   .0214357    -1.48   0.141    -.0739766    .0105537
       wales |   -.046674   .0372694    -1.25   0.212    -.1201587    .0268108
    pharmacy1 |   .0151132   .0260925     0.58   0.563     -.036334    .0665603
    pharmacy2 |   .0092176   .1011042     0.09   0.927    -.1901315    .2085667
          ind |  -.1004268   .0263163    -3.82   0.000    -.1523151   -.0485384
         groc |  -.5408116   .0452414   -11.95   0.000    -.6300148   -.4516084
     cons_are |   -.027714   .0348369    -0.80   0.427    -.0964025    .0409745
           hd |  -.0492532   .0344716    -1.43   0.155    -.1172215     .018715
        m2f_9 |   -.013174   .0173295    -0.76   0.448    -.0473429    .0209949
        m2f_6 |  -.0257878   .0184871    -1.39   0.165    -.0622391    .0106636
       addpay |   .0090837   .0168042     0.54   0.589    -.0240494    .0422169
        sat4d |   .0121616   .0153918     0.79   0.430    -.0181867    .0425099
    ca_dat_nr |   .0622639   .0378005     1.65   0.101    -.0122681     .136796
      ca_datX |  -.0179626   .0217156    -0.83   0.409    -.0607797    .0248544
    hd_dat_nr |  (dropped)
      hd_datX |  -.0320283   .0265703    -1.21   0.229    -.0844174    .0203609
        _cons |   3.993561   .0808258    49.41   0.000     3.834196    4.152927
------------------------------------------------------------------------------
```

Figure 21: Regression output, dependent variable is change in price level at end, all pharmacy types for which quality data is available

```
Dependent variable: prindven
Independent variables: cps cppop cpgp supph sup25 near_sup dist_cp nocp dist_gp
nogp near_gp supph5 sp_10_15 pop scot wales pharmacy1 pharmacy2 ind groc
cons_are hd m2f_9 m2f_6 addpay sat4d ca_dat_nr ca_datX hd_dat_nr hd_datX
if sample2

      Source |       SS       df       MS              Number of obs =     233
-------------+------------------------------           F( 29,   203) =   10.47
       Model |  2.75357039    29  .094950703           Prob > F      =  0.0000
    Residual |  1.84100476   203  .009068989           R-squared     =  0.5993
-------------+------------------------------           Adj R-squared =  0.5421
       Total |  4.59457515   232  .019804203           Root MSE      =  .09523

------------------------------------------------------------------------------
    prindven |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cps |     .00159   .0049342     0.32   0.748     -.008139    .0113189
       cppop |  -.0009888   .0081197    -0.12   0.903    -.0169986     .015021
        cpgp |  -.0001359   .0080345    -0.02   0.987    -.0159777    .0157059
       supph |  -.0034007   .0043959    -0.77   0.440    -.0120682    .0052668
       sup25 |  -.0021927   .0021904    -1.00   0.318    -.0065116    .0021261
    near_sup |  -.0120396   .0147075    -0.82   0.414    -.0410387    .0169594
     dist_cp |   .0110455   .0107442     1.03   0.305     -.010139    .0322301
        nocp |  -.0430183   .0539876    -0.80   0.426    -.1494667    .0634301
     dist_gp |  -.0071981   .0121047    -0.59   0.553    -.0310652     .016669
        nogp |  -.0040911   .0530244    -0.08   0.939    -.1086404    .1004582
     near_gp |  -.0107883   .0170005    -0.63   0.526    -.0443086     .022732
      supph5 |   .0337723   .0185547     1.82   0.070    -.0028124     .070357
    sp_10_15 |  -.0006755   .0010317    -0.65   0.513    -.0027098    .0013588
         pop |   .0155233   .0097145     1.60   0.112    -.0036309    .0346775
        scot |  -.0232955   .0217305    -1.07   0.285    -.0661419    .0195509
       wales |   .0144033    .037782     0.38   0.703    -.0600921    .0888987
    pharmacy1 |     .01695   .0264514     0.64   0.522    -.0352047    .0691047
    pharmacy2 |  -.0162621   .1024948    -0.16   0.874    -.2183529    .1858287
          ind |  -.1049024   .0266782    -3.93   0.000    -.1575044   -.0523004
         groc |  -.5283748   .0458636   -11.52   0.000    -.6188048   -.4379447
     cons_are |   .0103663    .035316     0.29   0.769    -.0592669    .0799996
           hd |  -.0718676   .0349457    -2.06   0.041    -.1407707   -.0029646
        m2f_9 |  -.0228404   .0175679    -1.30   0.195    -.0574793    .0117984
        m2f_6 |  -.0298142   .0187413    -1.59   0.113    -.0667668    .0071385
       addpay |   .0110591   .0170353     0.65   0.517    -.0225297     .044648
        sat4d |   .0093991   .0156035     0.60   0.548    -.0213666    .0401648
    ca_dat_nr |    .019484   .0383204     0.51   0.612    -.0560731    .0950411
      ca_datX |   .0069396   .0220143     0.32   0.753    -.0364664    .0503455
    hd_dat_nr |  (dropped)
      hd_datX |  -.0323133   .0269357    -1.20   0.232     -.085423    .0207964
        _cons |   3.989023   .0819374    48.68   0.000     3.827466    4.150581
------------------------------------------------------------------------------
```