GMS CONTRACT: WORKLOAD FORMULA

I.   INTRODUCTION

I.1   Generating a Workload Formulae

This report presents the core findings from the analysis to support the practice level allocations formula for the new GMS contract. The proposed formula applies a similar structure to that used for resource allocation purposes in the past, and includes the following components:

• An adjustment for the age and sex structure of the population

• An adjustment for the additional needs of the population, relating to socio-economic status (covered by a separate report)

• An adjustment for other factors which impact on the workload of general practice

• An adjustment for the unavoidable cost of delivering services to that population (partly covered by a separate report)

The formula differs from those previously developed for resource allocation purposes in two key respects. Firstly, elements of the formula are to be applied to each of the four countries within the United Kingdom, where 'traditionally' between country differences have been taken to be paramount. Secondly, the formula will be applied to practice populations, rather than Primary Care Trust or Health Authority populations; and designing allocation formulae for populations of this size (average 5,500), raises the issue of stability of demand (Peacock and Smith, 1995).

This report summarises the approaches and the main results in respect of the age sex workload adjustment, the adjustment for other factors, and the adjustment for the unavoidable costs of rurality. The additional needs adjustment and the market forces factor are subject to separate reports. Together these reports provide options and recommendations on how these global sum allocations should be made.

I.2   Background and Context

The New GMS Contract has been negotiated between the NHS Confederation and the British Medical Association. The document published in February this year sets out plans for the new GMS contract. The proposed system represents a complete overhaul in the methods by which GPs will be remunerated. One of the key departures in the contract is that the contract will apply at Practice level rather than General Practitioner level. Practices will receive resources through several funding streams, including:

> • *Essential and Additional services*: providing the range of basic services that GPs would normally provide through GMS, and including GP pay costs as well as the majority of infrastructure costs. All GPs must provide essential services but will be able to agree with the PCT to opt out of providing some or all additional services in certain circumstances;

- *Enhanced services*: which are outside the normal range of GMS services but which GPs can opt into providing, including activities covered under the current Local Development Scheme system, such as outpatient work or increased services to nursing/ residential homes. Enhanced services are broken into two categories, nationally negotiated and priced and locally negotiated and priced; and

- *Quality Framework*: GPs will receive payment for aspiring to and achieving high quality across a broad range of clinical, organisational and patient experience standards.

A proportion of resources to support essential and additional services will be delivered to practices through their 'global sum' allocation. This allocation will be made using a formula based on the basis of the practice population, weighted for factors that influence the relative demand of the population, and factors that influence the relative costs of delivering services to the population.

The approach to developing the formula follows that established elsewhere in the field of resource allocation. This involves establishing an age-sex cost curve, estimating the additional resource implications of additional needs, and then adjusting for other factors that affect the cost of delivering services. Given the lack of routinely available data in this area, a large number of different exercises have been carried out.

II.   AGE SEX COST CURVE

The basis of any allocation formula for a set of services is the population served. For General Medical Services in the UK this has been defined by those registered on the lists of each General Practitioner. That list is well-defined, although there are equally well-recognised problems in maintaining accurate lists.

It has also been recognised that different age-sex groups on the practice list generate different workloads; and this is recognised through variation in the capitation amounts in the existing GMS fees and allowances.

Estimating workload is made more complex as the core services can be delivered in three different locations: in the surgery, the patient's own home or in a nursing or residential care home, as there is no single data source adequately covering general practice consultations in all of these environments. Whilst there is some routine data available on consultations in the surgery, there is only limited data on home visits and no systematic data on nursing and residential homes consultations. Consequently they have to be estimated separately, with separate databases and then the results combined to generate an overall age-sex cost curve.

II.1 Analysis of General Practice Research Database (GPRD)

The analyses of surgery consultations has been based on the General Practice Research Database (GPRD). The General Practice Research Database was initially set up as a research tool, principally to carry out pharmaco-epidemiological studies (mainly drug side-effects). It is increasingly used for

health services research, e.g., time trends in disease prevalence & treatment, area & inter-practice variations. This was the first time that the length-of-consultation field had been used as a marker for workload.

II.1.1   The data set and its use in this context.

GPRD has individual level consultation frequencies and information on duration has been recorded for all members of the primary care health team, in most of the practices since 1999.

It includes data from 240 practices, including 8 from Northern Ireland, 10 from Wales and 12 from Scotland. There is good geographical coverage with at least one practice from 91 of the 115 health authorities and health boards in England, Wales and Scotland. Table II.1 provides a breakdown of practices by country and old regional office area for England. On balance, we believe the GPRD to be the most comprehensive source of data on consultations in the surgery with all members of the primary health care team across the UK.

Table II.1 Regional and national distribution of participating practices

	Frequency	Percent
Eastern Regional Office	23	9.6
London Regional Office	34	14.2
N. Ireland	8	3.3
North West Regional Office	36	15.0
Northern & Yorkshire Regional Office	18	7.5
Scotland	12	5.0
South East Regional Office	39	16.3
South West Regional Office	22	9.2
Trent Regional Office	15	6.3
Wales	10	4.2
West Midlands Regional Office	23	9.6
Total	240	100.0

The whole dataset covers a period from 1996 to August 2002 and contains details of 99 million consultations. The number of consultations per year is shown in Table II.2. However, prior to 1999 the vast majority of the computer systems in these 240 practices did not record when patient files were opened and closed. Of the whole dataset, 69% (68 million) have been time stamped. At the time of analysis, data had not yet been collected from all practices for the early months of 2002, so the analysis has concentrated on consultations from 1999 to 2001.

Table II.2 Numbers of file openings per year

	Frequency	Percent
1996	13,417,765	13.55
1997	14,737,718	14.88
1998	16,078,858	16.24
1999	17,571,626	17.74
2000	19,453,123	19.64
2001	16,057,713	16.22

2002	1,711,473	1.73
Invalid date	31	0.0
	99,028,307	100.0

It is important to emphasise that the GPRD material refers to "consultations", but these are simply instances of a patient's computer file being accessed. So a receptionist checking an appointment, or a computer manager doing data checks will both count as 'consultations'. They are more properly referred to as 'file openings'.

GPs and other doctors were responsible for just over half (51 million) of the computer file openings (Table II.3). Receptionists were the second heaviest users (17.3%). Practice managers, administrators and other practice administrative and technical staff accounted for 13.1% of activity and practice nurses for about 7.5%.

Table II.3 Numbers of file openings by staff group

	Frequency	Percent
Professions Allied to Medicine	798,256	0.81
Administrators	5,645,852	5.70
GPs and locums and deputising services	50,758,486	51.26
Other Health Care professionals	1,008,531	1.02
Managers and practice staff	7,356,158	7.43
Social workers etc	32,032	0.03
Dispenser and pharmacist	1,534,667	1.55
Practice Nurse	7,412,452	7.49
Receptionist	17,128,071	17.30
No data entered	7,353,802	7.43
Total	99,028,307	100.00

A small proportion (0.65%) of file openings relates to patients who were temporarily registered. These temporary registrations are divided into two groups: those who were temporary residents for less than 16 days and those who were resident from 16 days to 3 months. These are considered in section IV below.

The basis for using the GPRD to generate the age-sex cost curve is that the *relative* annual GP workload associated with different patients groups may be approximated by the total length of time for which the corresponding files were open and that these data may also be used to estimate consultation rates. The obvious objections are that the opening of a patient's computer file may not denote a consultation and that the length of time for which the file is opened may not reflect the workload associated with the event being recorded - as for example, if the GP is entering a note about a home visit. Such retrospective entering of home visits details will not reflect the full workload of home visits, which are often longer than surgery visits and also have an associated travel time. For this reason, home visits have been treated separately.

Apart from the home visits issue, there is no apparent reason to believe the potential inaccuracies in treating file openings (including consultations) as reflecting workload to be biased by age or sex. However, comparisons with the General Household Survey and with the Census suggest that there may be some issues. Essentially, there appear to be three potential problems with the GPRD:

- How can we relate the length of file openings to duration of consultations, especially given the large number of zero length openings in GPRD data
- GPRD produces lower estimates of total activity (3.46 file openings per person per year) compared with GHS (4.68 consultations per person per year).
- GPRD records lower levels of activity for over 85s than for 74-85 year olds which seems counter-intuitive.

These are considered in the next three sub-sections.

II.1.2 What does the duration of file openings represent?

Of the 99 million file openings, 69% were time stamped. The majority of the missing data relates to the earlier years when the computer systems in only a minority of the participating practices were able to time stamp the files. Among those that were time stamped, about a quarter of the file openings were of "zero" duration, that we have assumed lasted one minute or less either because the reporting software does not compute the number of seconds or because it rounds down the numbers of seconds into a whole number of minutes. At the other extreme, nearly three-quarters of one percent lasted 60 minutes or more and this also seemed implausible.

Very Short or Zero File Openings

Although about a quarter of openings are recorded as of zero duration, most of these have events associated with them. The GRPD coding scheme refers to five types of relevant events: therapy, clinical immunisation, referral and test events. Based on an analysis of file openings between 1999 and 2001, just over 7% of file openings had no record of events of these types (compared to 25% of events with zero duration), whilst nearly 3% have 11 or more recorded events of these types.

Different groups of staff opened files for different lengths of time and this is particularly true of the proportions of short file openings. For receptionists and other practice administrative staff approximately 60% of file openings lasted two minutes or less, whereas the corresponding percentage for GPs was 28%. The plausibility of this difference supports the validity of the data.

The GPRD data might be thought to more closely approximate the numbers and duration of surgery based consultations if openings of zero duration are excluded, as are openings in which no events are recorded. The effect of doing this is shown in Appendix II.1. Overall, the pattern remains unchanged but, of course, the total average times decrease.

Table II.4 Percentage of file openings of different lengths - by staff type.

	Time (minutes)								
	Zero	1	2-3	4-6	7-9	10-14	15-29	30-59	60+	N consults
PAMS	22.76	17.63	16.78	10.99	7.30	8.50	10.76	4.22	1.05	787,102
Administrators	34.87	26.77	18.54	8.37	3.58	3.07	2.87	1.22	0.72	5,619,407
GPs and locums and deputising services	18.46	9.81	13.55	18.91	14.95	13.96	8.52	1.23	0.61	27,997,963
Other HC professionals	36.93	22.36	16.63	9.46	4.82	3.98	3.63	1.45	0.74	1,002,534
Managers and practice staff	32.66	24.44	16.26	9.04	4.84	4.55	4.94	2.20	1.07	7,318,800
Soc workers etc	17.72	25.17	16.36	8.51	4.84	4.40	6.28	10.32	6.39	27,495

Dispenser & pharmacist	35.31	29.84	14.64	7.74	3.80	3.30	3.37	1.36	0.65	1,525,437
Practice Nurse	14.00	15.73	14.40	14.71	11.61	12.95	13.15	2.85	0.59	6,929,368
Receptionist	33.52	26.28	17.83	8.98	4.05	3.40	3.55	1.61	0.78	16,968,981
No staff code entered	29.20	26.75	18.75	8.96	4.31	4.76	4.05	1.31	1.91	310,552
All	25.35	18.25	15.53	13.58	9.36	8.85	6.73	1.64	0.72	68,487,639

One possibility is that a large proportion of file-openings related to older people are very short either because they represent repeat prescriptions or because they represent a record entry after a home visit (where the rates increase with age).

The tabulations in Tables II.5A and II.5B confirm that the percentage of zero length file openings increase continuously with age, from approximately 21% in the youngest group to 28% for the oldest. The percentage of openings of 3 minutes or less increases from 65.3% for women aged 75-84 to 71.1% for women aged 85 and over (the corresponding figures for men are 65.5% and 68.7%). Although there is an increase with age the rate of increase in home visits is much steeper among the very old. (Tables II.15A and Table II.15B)

Table II.5A - Percentage of file openings of different times - by age (females)

	Time (minutes)									
Females	Zero	1-1.99	2-3	4-6	7-9	10-14	15-29	30-59	60+	N consults
0_4	20.83	16.05	17.76	17.99	11.01	8.64	5.49	1.41	0.82	1,652,627
5_14	21.86	16.97	17.88	17.85	10.28	7.89	5.28	1.34	0.65	1,730,190
15_44	23.27	15.92	15.11	14.45	10.43	10.25	7.99	1.82	0.77	14,315,990
45_64	25.70	18.16	14.38	12.77	9.60	9.67	7.41	1.64	0.66	10,711,839
65_74	27.88	19.89	14.92	12.03	8.66	8.34	6.14	1.49	0.64	5,652,773
75_84	28.05	21.08	16.17	11.52	7.69	7.40	5.78	1.56	0.75	5,307,314
85&over	29.14	23.48	18.46	10.57	5.77	5.39	4.71	1.57	0.90	2,524,973
All	25.32	18.18	15.45	13.37	9.37	9.03	6.91	1.65	0.73	41,895,706

Table II.5B - Percentage of file openings of different times - by age (males)

	Time (minutes)									
Females	Zero	1-1.99	2-3.99	4-6	7-9	10-14	15-29	30-59	60+	N consults
0_4	20.72	16.01	17.66	18.02	11.00	8.67	5.62	1.46	0.83	1,881,764
5_14	22.32	17.71	18.14	17.25	9.76	7.55	5.23	1.38	0.66	1,776,964
15_44	23.11	16.13	15.59	15.56	10.55	9.48	7.05	1.76	0.76	6,646,517
45_64	25.77	18.11	14.68	13.20	9.54	9.24	7.08	1.70	0.68	7,396,595
65_74	28.23	20.22	14.99	12.02	8.33	7.96	6.10	1.50	0.64	4,575,274
75_84	28.60	21.15	15.77	11.51	7.64	7.28	5.78	1.55	0.72	3,348,129
85&over	28.49	22.58	17.61	11.00	6.43	6.09	5.24	1.66	0.91	965,852
All	25.40	18.35	15.65	13.91	9.35	8.57	6.45	1.62	0.72	26,591,095

Long File openings

At the other extreme, 0.72% lasted for 60 minutes or more (Table II.5). We can reasonably assume that these very long periods are cases of files being left open by mistake, but not used throughout the period for which they are open.

Consideration was given to the possibility of setting those more than 60 minutes to the average length but:

- an overall average adjustment made very little difference;
- there would have had to be different average adjustments for each staff group;
- there was no particular reason for using the average.

All the tables in this report exclude cases lasting 60 minutes or more.   A check was made to see if the relative times were being influenced by excluding openings of more than 60 minutes (see Appendix II.1). There is a very slight increase (in all cases less than 1%) in the total time per age-sex group.

II.1.3 Accounting for discrepancies in activity/consultation rates between GPRD and other sources

The overall GHS estimate of the number of consultations (both in the surgery and at home) for the years 1996/97, 1998/99 and 2000 is 4.68 per patient year (26*11130/61599), which is quite a bit higher than that recorded in GPRD.

Table II.6   **Comparison GHS and GPRD**

	Males				**Females**			
	Total N of consults	Total N of persons	GHS Rate of consults per patient year	GPRD rate of file openings per year	Total N of consults	Total N of persons	GHS Rate of consults per patient year	GPRD rate of file openings per year
0_4	558	2,184	6.643	4.20	434	2,082	5.420	3.86
5_14	404	4,341	2.420	1.38	433	4,205	2.677	1.49
15_44	1,264	11,712	2.806	1.48	2,768	12,644	5.692	2.96
45_64	1,233	7,225	4.437	2.64	1,663	7,541	5.734	3.92
65_74	563	2,563	5.711	4.32	723	2,906	6.469	5.02
75_84	368	1,451	6.594	5.02	533	1,947	7.118	5.49
85& over	65	263	6.426	3.90	131	535	6.366	3.86
	4,455	*29,739*	*3.895*		*6,685*	*31,860*	*5.455*	

The most likely causes of the low estimate in GPRD are -

- problems with denominator data
- under-recording by GPs
- coding and analysis errors

Denominator data - problems

Errors in method of extraction or subsequent handling of denominator data could lead to overestimates of the numbers of registered patients and therefore inflate the denominators used to compute activity rates.

It is not possible to carry-out direct checks as GPRD don't keep basic material on the list sizes of their participating practices, but the denominator data has been checked against the numbers of patients who are currently registered and who have consulted. Apart from the small differences due to non-

consulting patients, the figures appear to match; and the age-sex distributions of the denominator data and of those who consulted are similar - i.e. both have a higher proportion in the oldest groups than the census.

Under-recording (or at least under-use of computers) by (some of the) GPs

The initial presumption in using GPRD was that, at a minimum, every consultation would be recorded on the computer but the comparisons with the General Household Survey shown above suggest this is not the case.

One possibility was that file openings were not being attributed correctly to GPs. The staff codes entered on the database has been checked and they seem to have been correctly entered. Whilst it is possible that the 7.4% of file openings with no staff code could all be attributed to GPs, there is no evidence either way.

The likelihood that the GPs contributing to the GPRD vary greatly in their use of the computer is supported by the very large variation in activity rates between practices. The average numbers of file openings per person year (across patients of all ages) varies from just over 1 to just more than 10 - the average is 3.64. For specific age groups the variation is predictably greater - a range of at least 30:1 for women aged 85 and over (see Table II.1A.1 in Appendix). Fortunately, our purpose in using the data is to assess the relativities between different age and sex groups rather than the absolute overall level of activity.

Coding and analysis errors

The original code sets use long text fields and subsidiary tables and absolute dates - so a great deal of restructuring and recoding had to be carried out. There were plenty of opportunities to mis-recode staff data and make mistakes in handling data on event and birth dates - all of which could impact on activity rates. Extensive checks have been carried out on data from a couple of practices, based on full (unrecoded material) and results tally with results for the same practices in the large scale runs. Particular attention has been paid to the types of errors that could inflate numbers of people (or reduce number of events) in the highest age group; and there were no obvious errors.

II.1.4. Lower activity for over 85 year olds

The results presented below show a significant decline in activity for over 85s compared with 75-84 year olds. Although the tabulations have shown that the proportion of short consultations increases with age, these increases are, in themselves, too small to account for the 31% and 40% reductions in overall average time.

It is possible that the counter-intuitive reduction in average time (and hence relative workload) could be explained by a higher proportion of very short file openings for the older groups to record other information about the patient, with the further possibility that these may refer to home or care home visits whose details are recorded *post hoc* and do not reflect the actual workload generated by home visits. As mentioned above, because the workload generated by home visits is not adequately dealt with in the GPRD, a separate adjustment is included.

Another possibility, however, is that the extraction software truncates or rounds down the number of seconds into a whole number of minutes and Table II.10 shows the effect of adding 0.5 minutes to every duration under 60 minutes (those of 60 minutes or more are excluded). The figures in column A

are the original data, without the extra 30 seconds, those in column B have the 30 seconds added. For all age groups, the average total file opening time increases by between 7 and 10%. The relative times for each group are unlikely to be significantly altered by this addition.

Table II.10 Effects of adding 0.5 mins to all durations
(excludes openings of more than 60 mins)

	Males		Ratio B to A	N registered patient years	Females		Ratio B to A	N registered patient years
	Average time per person				Average time per person			
	(A)	(B)			(A)	(B)		
0_4	37.07	40.05	1.08	110455.00	34.06	36.84	1.08	104772.50
5_14	9.13	9.92	1.09	304529.00	9.96	10.83	1.09	291834.20
15_44	10.79	11.61	1.08	1055669.00	22.47	24.14	1.07	1088219.00
45_64	21.83	23.46	1.07	566746.10	34.54	37.08	1.07	552995.40
65_74	35.72	38.62	1.08	177617.10	42.68	46.09	1.08	197425.60
75_84	37.93	41.18	1.09	108081.80	41.14	44.66	1.09	161146.20
85over	17.98	19.72	1.10	39792.26	17.62	19.47	1.10	97978.11

II.1.5   Average total time for age-sex groups

Whilst the objections are not negligible, the analysis above suggests that the GPRD is still adequate for generating the relative workload of age-sex groups. It was not easy to link patients, total file openings of age-sex groups has been estimated by dividing total file opening times for all patients in that age-sex group by the number

The following summaries of average times and rates are based on data from 1999 and 2001 when almost all of the 240 practices that contributed had systems that date-stamped the opening and closing of a file. However, not all practices had this facility for all three years. Therefore this analysis is based on approximately 490 practice years. The criteria used to exclude an entire practice year were: (1) if it had more than 2% of cases without time stamps and (2) if the total consultation time for all males aged 0-4 was 100 minutes or less.

Workload and consultation rates from file openings

The next two tables (Tables II.8A-II.8B) exclude cases of practices opening a file for 60 minutes or more, but include those for which the length of file opening is recorded as zero. Including cases of zero duration will not affect the average time per registered person, but it will reduce the average length per opening ("consultation"). The data in the tables refer to 4,857,161 registered patient years and 16,780,260 file openings (i.e. 3.455 per person per year). Temporary registrations are excluded (but see Table IV.2 and IV.3).   The numbers in each age group have been adjusted to ONS populations.

The first table (Table II.8A) shows the average total time per year for which a GP opened the file of a person in the relevant group - which could be a proxy for relative workload. The denominators (the numbers in each age and sex group) are based on the number of registered person days for each group for every month included in the analyses - i.e. those months when the systems were date-stamping files.

For both males and females, average total file opening time per person increases from ages 5-14 to 75-84 by a factor of four, then declines for the oldest age group (see II.1.4). The main difference between sexes is that the difference in average times between the 5-14 and 15-44 age groups is (predictably) greater for females than for males.

Table II.8A Average total time for which a patient file was opened by a GP (per year).

	Males			Females		
	Average time per person	Ratio to lowest	N registered patient years	Average time per person	Ratio to lowest	N registered patient years
0_4	40.05	4.01	110455	36.84	3.71	104773
5_14	9.92	0.99	304529	10.83	1.09	291834
15_44	11.61	1.16	1055669	24.14	2.43	1088219
45_64	23.46	2.35	566746	37.08	3.74	552995
65_74	38.62	3.87	177617	46.09	4.65	197426
75_84	41.18	4.13	108082	44.66	4.50	161146
85&over	19.72	1.98	39792	19.47	1.96	97978

(excludes openings of more than 60 minutes, but includes opening with zero, but not missing times)

The second table (Table II.8B) shows the average length a file was opened by all members of the primary healthcare team, weighted by an average staff input cost factor. The weightings are as follows:

Table II.9   Weights to be applied to Staff input

	Salaries (thousands)	Weights (relative to GPs)
GP and Locums	56.6	1.000
Other healthcare professionals including PAMS but not practice nurses	24.0	0.425
Managers etc	15.0	0.265
Practice nurse	20.5	0.363
Receptionist	12.5	0.221
Administrator	14.0	0.248

Table II.8B Average total time for which a patient file was opened by all practice staff (per year)

	Males			Females		
	Average time Per person	Ratio to males 5-14	N registered patient years	Average time per person	Ratio to males 5-14	N registered patient years
0_4	50.38	3.97	109781	46.31	3.65	104109
5_14	12.69	1.00	303265	13.35	1.05	290570
15_44	14.64	1.15	1050100	31.00	2.44	1083692
45_64	30.65	2.42	563655	48.28	3.80	550099
65_74	53.81	4.24	176687	62.38	4.92	196536
75_84	58.62	4.62	107476	63.06	4.97	160315
85&over	29.16	2.30	39649	29.14	2.30	97668
All persons				8.48	2.49	4833601

(excludes openings of more than 60 minutes, but includes opening with zero, but not missing times)

II.2   Age-Sex Cost Curve: Home Visits

II.2.1   Background

A large proportion of consultations with very elderly patients take place in the patients own home rather than in the surgery. The GPRD does not systematically record home visits; so that we cannot use that as a basis for either the rate or their length. There may be a file opening corresponding to home visits (although not always), but this is likely to be very short as the information will be added after the home visit has taken place and not reflect the actual workload.

The problem is to estimate the frequency and age-sex distribution of home visiting, and the lengths of the consultations especially as rates of home visiting as a proportion of total consultations have been declining since the 1960s (see below).

The key issues to address in the home visits adjustment are therefore as follows:

- What proportion of total consultations do home visits represent?
- What is the relative home visiting rate by age and sex of population?
- Length of home visits

II.2.2   The proportion of total consultations accounted for by home visits

The proportion of total consultations accounted for by home visits has been declining over the last 20 years.

Aylin et al (1996), based on MSGP4 (data collected in 1991/92), documented an annual home visiting rate in 1991 of 299 per 1,000 patient years, with home visits accounting for 10.1% of all contacts with general practitioners. Although this represented a 27% decline from the figure reported in MSGP3 (data collected in 1981/82) of 411 per 1,000 patient years, it was still clearly a substantial fraction of all patient contacts with their general practitioners; and because the total visit time is approximately three times that of a surgery consultation, it represented a substantial fraction (around 25%) of their workload at the time.

The 1977 General Household Survey reported that 20% of all contacts with GPs were home visits, this had fallen to around 6.4% of all contacts by 2000 (see below). For the purpose of this analysis, we propose to assume that 6.4% of all contacts are home visits.

II.2.3   Relative home visiting rates by age and sex

The most extensive data on home visits is that from MSGP4 (in 1991/92). Aylin et al (1996), in their analysis of MSGP4 show that there was a clear J shaped relationship between age and home visiting rates. It decreased from 477 per 1,000 in children aged 0-4 years to 103 per 1,000 in people aged 16-24 years and thereafter increased steadily and, in later ages, exponentially to 3009 per 1,000 in people aged 85 years and over. Rates were higher among females than males - although not substantially so - in every age group except children 0-4 years (see Table II.11).

Table II.11: Rates per 1000 complete patient years in 1991/92

Sex	0-4	'5-15	16-24	25-44	45-64	65-74	75-84	85+	*All ages*
Male	498	126	56	63	136	506	1,331	2,792	*2,680*
Female	454	128	150	163	200	608	1,628	3,081	*3,320*

Source Aylin et al 1996; exact figures supplied by Professor Majeed.

The General Household Survey also provides information on home visits by age and sex. This survey asks whether or not the patient has seen a doctor in the last fortnight and where the contact took place. Table II.12 shows the numbers of home visits - per 100 consultations with GP at surgery or at home over a fortnight - for the 1996/97, 1998/99 and 2000 GHS data sets.

The overall rate of home visiting (303/1,000 - calculated as 26 times the fortnightly rate of 0.0117) is about the same as the rate recorded in 1991/92, but it now represents only 6.4% of all contacts with general practitioners compared to 10.1% in 1991/92). Whilst the bases on which the age-sex rates are calculated are relatively small (i.e. 718 visits of c. 61,600 people over a two week period, compared to those calculated by Aylin et al (1996), based on 139,801 home visits to approximately 500,000 people over a year), the percentage age distribution (in the last column of this table) are similar to those in Table II.11. Moreover, as we have remarked, the total volume of home visits has remained about the same over the 1990s at around 300 per 1000 patients.

Table II.12: General Household Survey - Home Visits per fortnight

		Ratio of home visits per 100 consultations							Rate of home visits per 100 patient-years
		GHS 96/97	GHS 97/98	GHS 2000	All 3 data sets	Total N home visits	Total N consults	Total persons	
Males	0_4	6.99	6.63	3.07	5.73	32	558	2184	38.095
	5_14	5.13	4.62	1.69	3.96	16	404	4341	9.583
	15_44	4.26	0.78	1.1	2.29	29	1264	11712	6.438
	45_64	6.77	5.57	1.01	4.54	56	1233	7225	20.152
	65_74	11.06	8.00	8.33	9.24	52	563	2563	52.751
	75_84	20.00	25.83	9.26	18.75	69	368	1451	123.639
	85&over	40.00	40.00	48.00	43.08	28	65	263	276.806
					6.32	*282*	*4455*	*29739*	*24.654*
Females	0_4	10.22	0.67	2.04	5.07	22	434	2082	27.474
	5_14	1.94	5.92	2.38	3.46	15	433	4205	9.275
	15_44	4.39	2.35	1.29	2.89	80	2768	12644	16.450
	45_64	4.71	4.86	2.85	4.21	70	1663	7541	24.135
	65_74	10.22	12.73	9.17	10.65	77	723	2906	68.892
	75_84	26.13	18.56	19.76	21.76	116	533	1947	154.905
	85&over	44.44	41.67	42.00	42.75	56	131	535	272.150
					6.52	*436*	*6685*	*31860*	*35.581*

Given the small numbers involved in the age-sex cells from the General Household Survey and the fact that the overall rate of home visiting is nearly identical to that shown in 1991/92, the proposal here is to use the age-sex relativities estimate from MSGP4 (i.e. those in Table II.11) combined with the relative contact rate of 6.4%.

II.2.4 Length of a home visit

The other aspect of this adjustment is the length of home visits compared with that in the surgery. Evidence suggests that home visits are longer than consultations in the surgery, not only because of the travelling time associated with home visits, but also because the consultation itself tends to be longer. The 1992-93 workload survey showed that average length of consultation was 13.2 minutes, and the average travel time was 12 minutes, giving a total length of 25.2 minutes. A one week survey of four practices in Sheffield (Hodgkin, Waller and Eve, 1999) showed that the average home visit time was 24.5 minutes. We shall continue to use the 1992-93 workload survey estimate. Table II.13 shows the estimated volume of work, by applying this consultation length to consultation rates by age and sex.

Table II.13: Estimated additional workload volume generated by home visits (in minutes per patient year)

Sex	0-4	5-15	16-24	25-44	45-64	65-74	75-84	85+
Male	12.55	3.18	1.41	1.59	3.43	12.75	33.54	70.36
Female	11.44	3.23	3.78	4.11	5.04	15.32	41.03	77.64

Source: Table II.11, multiplied by 25.2 minutes per visit.

This table should be combined with the 'in surgery' table (II.8B) to generate the age/sex workload index for consultations in surgery and in the patients own home.

II.3   The workload implications for GPs of visits to their patients residing in care homes (nursing and residential).

II.3.1. Introduction

Over the past decade GPs and their representative bodies have expressed concern about the additional workload created by the number of patients on their practice lists residing in care homes (GMSC 1996). It is argued that this is caused both by the high level of dependency of such patients (Stern et al 1993) which requires excessive medical treatment, and the time spent travelling to attend patients in their care homes rather than being able to see them at the practice surgery as is the case for an increasing number of patients living in their own home (Aylin et al 1996).

High numbers of care home patients on the practice list would therefore skew normal workload patterns. Glendinning et al (2001) also say that the evidence available suggests that caring for older people in nursing and residential homes increases GPs' workload compared with the care needed by older people in their own homes, although the 'recent evidence' they cite is an evaluation by Chambers (1997) of primary care workload in North Staffordshire and a study by Kavenagh and Knapp (1998) of access arrangements.

No routine data is available on consultations rates and lengths with GPs from patients in nursing and residential homes; and there has only been limited research in this area. Indeed, there are only three studies that appear to have made an estimate of workload: two local studies and one national study. The first local study was a prospective study by Pell and Williams (1999), comparing the contacts with primary care over a three-month period of 345 residents of nursing homes with an age-sex matched sample of 690 community residents in the Greater Glasgow Health Board. They found that nursing home patients had about twice the number of face-to-face contacts with GPs compared to controls living in the community matched for age and sex (0.40 per patient per month compared to 0.21 per patient per month. Whilst individual consultation times with nursing home residents were shorter, overall consultation time during the year was longer - equivalent to an additional 28 minutes per nursing home resident annually although this would need to be offset against shorter travelling time spent on nursing home residents.

The second local study is by Groom et al (2000) who collected retrospective data on all residents in nursing homes registered with nine Nottinghamshire practices over a year. These were matched with patients living in the community by practice age and sex. Based on data for 270 pairs of patients, they estimated that the residents of nursing homes had 0.59 contacts per patient per month compared to 0.40 for the controls living in the community. Because home visits cost much more than surgery consultations, they estimate d that nursing home patients cost £18.21 a month compared to £7.72 a month for the controls, although these estimates were based on the assumption that the GP only saw one patient on each visit.

The Health Survey for England 2000 carried out a booster sample among residents of 'care homes' in 2000. Their achieved sample was 2488 about half of which were personal interviews and about half with a proxy respondent (see Methodology). A separate analysis shows the following rates.

Table II.14 Numbers of consultations with the GP per hundred persons in the last fortnight

Type Of	MEN	WOMEN

Care Home												
	65-74		75-84		85+		65-74		75-84		85+	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
Unspecified	24	4.2	42	21.4	48	33.3	25	12.0	112	22.3	245	26.9
Residential	22	13.6	95	35.8	111	30.6	42	45.2	253	29.6	475	26.7
Dual	27	40.7	59	39.0	61	26.2	38	44.7	154	42.9	254	42.9
Nursing	19	52.6	53	94.3	45	44.4	30	46.7	96	45.8	157	44.0

Source Health Survey for England 2000; own analysis

These rates are clearly higher than the total contact rates (surgery attendances and own home visits) of the general population in the same age groups reported in the General Household Survey (see Table II.6 above). However, there is no clear pattern with age (as one would expect), presumably because of the small numbers involved, and one might reasonably have suspicions about the quality of estimates from survey given that is based on 50% proxy respondents:

- On the one hand, one might expect the estimate from an interview survey to be *lower* because the very ill or infirm - who are likely to be receiving more GP visits - would be less likely to respond.
- On the other hand, one might expect the estimate from an interview survey to be *higher* because recall of time periods, which is always a problem in retrospective self-report surveys, will almost certainly have been exacerbated among an older population. In general one would expect that time periods would be compressed so that events taking place more than a fortnight ago will be reported as having taken place within the last fortnight.

The existing evidence does not therefore provide a secure basis for developing an adjustment for the allocation formula. In order to assess the extent of the additional workload generated by residents of nursing and residential homes, two separate surveys were carried out, one of a sample of nursing and residential home managers to estimate the age and sex consultation rates; and one of a sample of GPs to estimate the duration of consultation and travel time.

II.3.2   Nursing and Residential Care home Surveys

II.3.2.1   Sampling

The sample was drawn from the A-Z Database of Care Homes, which holds details of 17,978 care homes in the UK. The sampling had to address a number of questions, including the following:

1. whether to stratify by size of home?
2. how to ensure a good geographical coverage
3. whether to draw separate samples of nursing and residential homes, and what to do about dual homes?(dual homes, on average have between 60 and 75% nursing places - see Appendix II.3A, Table II.3A3).
4. whether to vary the sampling ratio between the UK nations?

In the event, the sample was stratified to ensure a minimum of 5 homes sampled per local authority across the four nations. The final sample drawn was 2,474: the response rate was good: 1,270 returns, or 51% of the 2474 sent out.

II.3.2.2   Characteristics of Achieved Sample

After a single postal reminder, 1266 (51%) of the 2474 homes returned completed questionnaires. Geographical coverage was good (see Table II.15). Response rates varied slightly between the UK nations: highest in Scotland (60%), lowest in Wales (46%) and 53% and 50% in Northern Ireland and England. Apart from one English LA, a reply was received from at least one home in every local authority.

Table II.15   Numbers of homes returning completed questionnaires

	N of LAs	Type of home			Total
		Dual	Nursing	Residential	
England	147	144	192	432	768
Wales	22	28	45	66	139
N Ireland	26	18	57	88	163
Scotland	32	21	80	95	196
All	227	211	374	681	1266

The total numbers of residents covered by the replies are shown in Table II.16: more than 19,000 people in residential places and 18,000 in nursing places.

Table II.16 Numbers of residents in homes returning questionnaires (by type of care)

	Residential	Nursing
England	13234	10174
Wales	1816	1691
N Ireland	1747	2228
Scotland	2246	4022
All	19043	18115

The distribution of residents by age and sex is shown in Tables II.17(a-d). Several minor anomalies appear in these figures: for example, the high proportion of male residents in the 0-18 age band in Wales. These are likely to be people with special needs in special types of homes, but there is no particular reason to exclude them.

Table II.17   Age and gender breakdown of residents in residential places
(a) Residential Places

	Males	0-18	19-64	65-74	75-84	85+
Males	England	185	1053	592	1116	1221
	Wales	142	260	65	110	147
	N Ireland	28	351	59	107	75
	Scotland	52	273	98	143	152

		0-18	19-64	65-74	75-84	85+
	All	407	1937	814	1476	1595
Females	England	84	623	710	2894	4756
	Wales	6	163	49	306	568
	N Ireland	18	230	115	343	421
	Scotland	26	222	118	385	777
	All	134	1238	992	3928	6522

(b Nursing Places

		0-18	19-64	65-74	75-84	85+
Males	England	1	536	601	1189	772
	Wales	12	96	87	163	140
	N Ireland		171	115	291	154
	Scotland	6	130	178	412	286
	All	19	933	981	2055	1352
Females	England	1	408	710	2674	3282
	Wales	2	67	124	431	569
	N Ireland		54	196	639	608
	Scotland		133	306	1083	1488
	All	3	662	1336	4827	5947

II.3.2.3   Access to GPs

Notwithstanding recent tendencies by many homes to deal with a single general practice, many of the homes in the survey had residents registered with more than one practice. Indeed, more than 20% of homes had residents registered with 6 or more practices (Table II.18).

Practices make different types of arrangements for visiting patients in homes. In addition to calls on request, GPs hold regular surgeries in 27% of homes. The most usual pattern is for such surgeries to be held weekly. Most visits are by request, but, in addition to any regular surgery arrangements at the home, 26% of homes reported GPs visiting without request, usually to do periodical or opportunistic check-ups.

Retainers were paid by 209 (16.5%) of homes for GPs to provide services. It is not known whether these services were additional to those that would normally be provided under GMS. Jacobs et al (2001) found that 8.5% of residential homes and 33% of nursing homes paid one or more GPS for medical services. They and by the Association of Charity Officers (2001) have drawn attention to the possible legal and policy implications raised by this tendency - that GPs should not be being paid a second time for services which they are required to provide under the contract.

Table II.18   How many general practices have patients resident in the home.

N of GPs	Frequency	Percent
Missing	35	2.8
1	243	19.2
2	194	15.3

3	184	14.5
4	138	10.9
5	114	9.0
6	76	6.0
7	52	4.1
8	55	4.3
9	43	3.4
10	41	3.2
11	19	1.5
12	23	1.8
13-15	18	1.4
16-23	13	1.2
Total	1248	98.6
Missing	18	1.4
	1266	100.0

II.3.2.4   Numbers and rates of visits

Managers were asked to record the number of visits made by GPs to the home during the previous fortnight. In the period covered by the survey, there were a total of 9,496 GP visits to the residents in the homes: 5,774 were to people in nursing places and 3,722 to people in residential care. The overall rates per hundred residents per fortnight are: 31.9 (nursing care) and 19.5 (residential care). Whilst the latter is about the same as the overall consultation rate (both at the surgery and in the patient's own home) recorded for the same age groups in the General Household Survey, the former is considerably higher.

The numbers of visits to each age group by time of day and type of care upon which the following estimates below are based are given in Table II.19 (detailed figures for each country are given in Appendix II.3B, Tables II.3B1 – II.3B8).

Table II.19   Numbers of Visits to different Age-Sex Groups

		All ages	0-18	19-64	65-74	75-84	85+
(a) Males							
Nursing	Normal	1,686	0	194	286	721	485
Nursing	Out-of-Hours	241	1	20	28	101	91
Residential	Normal	934	19	114	114	294	393
Residential	Out-of Hours	201	59	26	12	29	75
(b) Females							
Nursing	Normal	3,455	5	161	414	1,316	1,559
Nursing	Out-of-Hours	392	0	19	39	156	178
Residential	Normal	2,255	24	88	123	823	1,197
Residential	Out-of Hours	332	4	14	18	111	188

Of all the visits to women, 11.3% (724/6,434) were not in normal hours; for men, the corresponding figure is 14.4% (442/3,062). The proportion of out-of hours visits is slightly greater for those in residential places: where 14.3% of visits are out-of hours compared with 11.0% of visits to people in nursing places. While we know that GPs held surgeries in 27% of responding homes, these figures do not distinguish between visits made to individual residents and visits made by the GP to hold a surgery or to provide additional services.

Separate rates have been computed for both out-of-hours and normal visiting for 10 age-sex groups. These rates have also been computed for each of the 4 nations, but the numbers of residents and visits on which the rates are based (see Table II.17 above and Appendix II.3B, Tables II.3B1 – II.3B8) are too few to produce reliable estimates for out-of hours visits for most age-sex groups everywhere except England. The figures here are for all four countries combined with specific country tabulations in the Appendix II.3B, Tables II.3B9-II.3B12).

Normal Hours Visiting

For persons in nursing care, visiting rates for males during normal hours across the entire sample range from 20.8 to 35.1 per hundred persons per fortnight. The rates for women are 24.3 to 31.0 (excluding those aged 0-18). For men the rate increases with age, but for women the highest rate is in the 64-75 age band.

The rates of normal hours GP visiting to people in residential care are generally lower than those in nursing care. For men (excluding the youngest are group) they range from 5.9 to 24.6 and for women (again excluding the youngest age group) from 7.1 to 21.0. Again, the rates for men increase with age, but for women the highest rate is not for the oldest group, but the 75-84 year-olds.

Table II.20 Rates of visiting to people in nursing care during normal hours
(No. of visits per hundred persons per fortnight)

	0-18	19-64	65-74	75-84	85+
Males		20.79	29.15	35.09	35.87
Females	166.67	24.32	30.99	27.26	26.21

Table II.21 Rates of visiting to people in residential care during normal hours
(No. of visits per hundred persons per fortnight)

	0-18	19-64	65-74	75-84	85+
Males	4.67	5.89	14.00	19.92	24.64
Females	17.91	7.11	12.40	20.95	18.35

Out-of-Hours visiting

Out-of hours visiting rates are much lower than those during normal hours. For men in nursing care they range from 2.1 to 6.7 and for men in residential care from 1.3 to 4.7 (in both cases, results for those aged 0-18 are omitted because of the low numbers of visits and people). For men in both types of care the rates increase quite steeply with age.

The range of out-of hours rates by age is narrower for women than men - largely because women do not have the same high rates in the oldest age group. Rates range from 2.9 to 3.2 for women in nursing care, and from 1.1 to 2.8 for women in residential care (as for men, figures for the 0-18 age group are omitted). For women in residential care, as for men, the rates increase with age from 19 to 85+, but for those in nursing care, the highest rate is observed in the 74-85 age group.

Table II.22 Rates of visiting to people in nursing care outside normal hours
(No. of visits per hundred persons per fortnight)

	0-18	19-64	65-74	75-84	85+
Males	5.26	2.14	2.85	4.91	6.73

		2.87	2.92	3.23	2.99
Females					

**Table II.23 Rates of visiting to people in residential care outside normal hours
(No. of visits per hundred persons per fortnight)**

	0-18	19-64	65-74	75-84	85+
Males	14.50	1.34	1.47	1.96	4.70
Females	2.99	1.13	1.81	2.83	2.88

II.3.2.5 Discussion

The total rates of visiting are given in Tables II.24 and II.25 (detailed figures for each country are given in Appendix II.3B, Tables II.3B13 and II.3B14). The extreme values recorded for 0-18 year olds is because of the very small numbers involved.

Questions were also raised about the possible biases introduced by the general approach to sampling. The sensitivity of the estimates to the size of homes and the approach to sampling is examined in Appendix II.3C and the variation between the four countries in Appendix II.3D.

**Table II.24 Rates of visiting to people in nursing care
(No. of visits per hundred persons per fortnight)**

	0-18	19-64	65-74	75-84	85+
Males	5.3	22.9	32.1	40.0	42.6
Females	166.7	27.2	33.9	30.5	29.2

**Table II.25 Rates of visiting to people in residential care
(No. of visits per hundred persons per fortnight)**

	0-18	19-64	65-74	75-84	85+
Males	19.2	7.2	15.5	21.9	29.3
Females	20.9	8.2	14.2	23.8	21.2

In residential homes the approximate combined visiting rates of 15 per 100 persons per fortnight for 65-74 year olds, 23 for 75-84 year olds and 25 (30 for males, 20 for females) for 85+ year olds, when translated into annual rates, are slightly lower than those recorded in the General Household Survey of 2000 (see Table II.6 above). In contrast, the rates for nursing homes of about 33 for 65-74 year olds (male and female) and about 40 for males 75+ and 30 for females 75+ imply higher annual rates than those recorded in the General Household Survey.

When compared to the data presented from the Health Survey for England, the patterns with age are more consistent. When compared to the frequency of consultations estimated from the General Household Survey, the rates of visiting to those in residential places are so close that there does not appear to be any justification for treating them differently from any other patients of the same ages. For those in nursing places, the rates appear to be higher, translating to an additional 3.1 and 2.6 consultations per year for males and females respectively.

II.3.3   GP self-report survey of visits to residential and nursing homes

GPs were surveyed to estimate travel time and length of consultation and not the visit rates (although see Appendix II.3E, Table II.3E1, and the brief commentary below). In order to increase the reliability of these estimates, GPs with most care homes within 5 km of their surgery were over-sampled, and the senior partner was asked to pass the questionnaire to the GP most involved with care visits.

II.3.3.1 Sampling

For England, Wales and Scotland the survey used a stratified random sample to ensure a minimum target number in every local authority area, with a booster sample of GPs in areas with concentrations of care homes. A simple random sample was used for Northern Ireland.

Although the overall response rate was poor (20.6%), there was reasonably good geographical coverage across the four nations.

Table II.26 - Response rate by country

	Target sample N	Achieved N
England	955	197 (20.6%)
Wales	305	55 (18.0%)
Scotland	387	87 (22.5%)
NI	376	77 (20.5%)
All	2023	416 (20.6%)

We had assumed that the patterns of visiting and the time taken to travel to care homes would be related to the number of homes in the vicinity of the GP's surgery. If this were the case, the results might have to be weighted to re-adjust for the booster sample in areas with a concentration of homes. In the event we found no significant correlation between travel times and numbers of homes and have not weighted the results. However, there may be a case for weighting to adjust for the greater number of people seen per visit (and hence average travel times per person) in areas with concentrations of homes.

The overall response rate was 20.6%, but only 253 (60.8%) of the 416 GPs supplied information on visits to care homes - most of the remainder did not make any such visits in the specified fortnight. Of these 253, 115 (45.5%) were in England, 53 (20.9%) in Northern Ireland, 51 (20.2%) in Scotland and 34 (13.4%) in Wales**.**

II.3.3.2   Numbers of consultations

The 253 GPs made 868 visits to care homes and saw nearly 1900 people. Of these 945 (49.8%) were in England, 459 (24.2%) in Scotland, 291 (15.3%) in Northern Ireland and 202 (10.6%) in Wales). As before, the number of responses from the four countries were too small to provide reliable estimates (see Appendix, Table II.3E.1).

If the 416 who responded had been representative of all GPs (and we are not pretending it is) then this would give a rate of 4.6 consultations in homes per fortnight or 118.75 per year per GP. If we assume that there are 30,000 full-time-equivalent GPS then this would mean a total of 3,560,000 visits per year. This is about 25% more than the rough estimate from the nursing and residential care homes survey of 2.7 million, which is consistent with our intentional over-sampling of those practices with more care homes within a radius of 5 km and with the presumption that those who tended to visit care homes more frequently were more likely to reply.

Visiting care homes was not a major part of the workload of most of the GPS who responded. Just under half of them saw four or fewer people in care homes during the fortnight, but 14% saw 15 or more.

Table II.27 Numbers of persons seen (in care homes) in the fortnight per GP

N of people seen	N of GPs	Percent of GPs	Cumulative Percent
1,2	60	23.7	23.7
3,4	65	25.7	49.4
5-9	64	25.3	74.7
10-14	27	10.7	85.4
15-19	18	7.1	92.5
20&over	19	7.5	100.0
Total	253	100.0	

In the majority (65%) of care home visits the GP sees only one person, but 10% or more visits involve consultations with 5 or more people. On average, 2.19 people were seen per visit (highest in Scotland, lowest in northern Ireland – see Appendix II.3E, Table II.3E1).

Table II.28 Numbers of people seen (consultations) per visit
(Frequency Distribution

Number of people seen per visit	Number of visits	Percent of all visits	Cumulative Percent
1	555	64.5	64.5
2	112	13.1	77.6
3,4	84	9.8	87.3
5 – 9	88	10.2	97.6
10 – 14	20	2.3	99.9
15 – 19	1	0.1	100.00
Total	860	100.00	

II.3.3.3   Travel time

The average return travel time _per visit_ (based on 857 responses) is 14 minutes (slightly higher in Northern Ireland – see Appendix II.3E, Table II.3E2). The overall travel times associated with consultations independent of the umber of people seen (Table II.29) is highest with those aged 65-74 and lowest with those aged 85 & over.

Table II.29 Travel times associated with consultations by age and gender (All UK)

	Men	Women
under 65	15.01	16.36
65-74	17.17	17.10
75-84	13.87	13.64
85 & over	12.76	12.33
All		13.64

When the number of people seen at each visit is taken into account, the average travel time _per person_ is 6.41 minutes. Relative to the average travel time, the per person time increases in Wales compared

with England and Scotland, but Northern Ireland still has the highest figures overall – see Appendix II.3E, Table II.3E4.

II.3.3.4   Workload Implications

Three times are computed. The first is the time the GP said they spent with each person they saw. The second is the sum of the contact time and the return travel time divided by the number of people seen. The third is the contact time plus the total travel time to the visit, regardless of the number of people seen.

On average, consultations in care homes lasted just under 11 minutes, lowest in Scotland, then England, above the UK average in Wales and highest in Northern Ireland. When average travel time (per person) to the home is added, the total increases to 17.3 minutes with the same pattern between the countries; adding the total travel time for the visit (independent of the number of people seen) further increases the total time per person to 24.4 minutes with England, Wales and Scotland all a little lower and that for Northern Ireland quite a lot higher – see Appendix II.3E, Table II.3E5 – II.3E8).

Contact times are relatively constant across all age and gender groups, with the exception of the lower figure for males and females aged 64 and under (Table II.30).

Table II.30   Consultation and travel times – by age and gender (All UK)

	Average Consultation Time	Consultation + average travel time	Consultation + total travel time	N of consultations
Males				
Under 65	9.56	16.07	24.65	52
65-74	11.82	19.72	28.99	76
75-84	11.36	18.19	25.23	289
85 & over	10.66	16.42	23.42	165
Females				
Under 65	10.90	19.03	27.26	39
65-74	11.24	18.51	28.34	120
75-84	10.59	17.33	24.23	512
85 & over	10.46	16.49	22.79	591
	10.75	17.29	24.39	1844

The estimates of consultation + total travel time are close to the estimate for a visit to one person in their own home of 25.2 minutes (based on the 1992/93 Workload Survey). The estimates below are based on consultation + *average* travel time.

II.3.4   Additional Workload Generated by Visits to Care Homes

On the whole, the rates reported here are lower than in other studies. However, if there were to be a bias in the care home survey, one would expect it to be towards an *over*estimate. Given the relative numbers of patients involved, we believe that our estimates should be taken as more reliable: moreover, the HSE survey does not *distinguish* between residential and nursing places but only by type of home. We have taken our estimates as to be the best available.

The suggested addition for people in nursing and residential homes is therefore the product of the adjustments for the rates of visits from the care homes survey and the length of visit from the GP survey. For those under 65, where we do not have differentiated estimates of the amount of time taken, we have used the weighted average of the rates of visiting (weighted by the relative numbers of visits to 0-18 years olds and to 18-64 year olds: for males the ratio is 1:5; and for females 1:9). The results are provided in Table II.31.

Table II.31: Additional Workload generated by those Nursing and Residential Homes

	Visiting Rates per fortnight per 100		Consultation time + Average travel time	Estimates of annual workload in minutes		Comparator Workload for those in their own homes	Nursing Home Relative Weight	Residential Home Relative Weight
	Nursing Homes	Residential Homes		Nursing Homes	Residential Homes			
Males								
0-18	5.3	19.2	16.07	22.14	80.22	20	1.1	4.0
19-64	22.9	7.2	16.07	95.68	30.08	42.39	2.3	0.7
65-74	32.1	15.5	19.72	164.58	79.47	66.56	2.5	1.2
75-84	40	21.9	18.19	189.18	103.57	82.16	2.3	1.3
85+	42.6	29.3	16.42	181.87	125.09	99.52	1.8	1.3
Females								
0-18	166.7	20.9	19.03	824.80	103.41	20.5	40.2	5.0
19-64	27.2	8.2	19.03	134.58	40.57	75.38	1.8	0.5
65-74	33.9	14.2	18.51	163.15	68.339	77.7	2.1	0.9
75-84	30.5	23.8	17.33	137.43	107.24	104.09	1.3	1.0
85+	29.2	21.3	16.49	125.19	91.32	106.68	1.2	0.9

The numbers in our surveys that are the basis for the estimates for 0-18 year olds are too small to be used in this context and have been ignored in the proposals that follow. Otherwise, the workload generated by those in care homes relative to those living in their own homes is about double and for those in residential homes about the same. There is a slight suggestion that the relative workload turns down among the 85+ year olds, which is to be expected given the relatively high rate of home visiting among those living in their own homes in that age group.

Table II.32   Weights for those in Nursing and Residential Homes RELATIVE to those living in their own homes

Age group	Nursing	Residential	Age group	Nursing	Residential
0-18	1.1	4.0	0-18	40.2	5.0
19-64	2.3	0.7	19-64	1.8	0.5
65-74	2.5	1.2	65-74	2.1	0.9
75-84	2.3	1.3	75-84	1.3	1.0
85+	1.8	1.3	85+	1.2	0.9

There are two options for applying this adjustment. The first is to have a separate index for patients living in a nursing or a residential home, as set out in the table above. The second is to apply a uniform adjustment over and above the age sex cost curve for all patients of all ages in nursing or residential homes, based on the average extra workload for all patients. If a uniform uplift is to be applied, the appropriate average factor is 1.43 times.

III.   LIST TURNOVER AND TEMPORARY REGISTRATIONS

There are several other factors other than age or sex or socio-economic status that affect workload. Two factors, for which it is possible to quantify the additional workload are the impact of new registrations on workload and temporary registrants..

III.1   List Turnover

Anecdotal evidence suggests that areas with high turnover often have higher consultation rates, as new patients often present with an illness and consequently place a higher demand on GMS than an existing patient. List turnover is often highly correlated with list inflation, and because the current system does not adjust lists for list inflation, high list inflation practices gain. This higher payment associated with higher list inflation has often been justified as a way of compensating for practices with high turnover. It should be noted that any further adjustment may imply some double counting.

The impact of list turnover of consultations has been analysed, using the GPRD. The results are shown in Table III.1. The denominator is those people whose file was opened at least once by a GP within 6 months of their registration.

The results of this analysis show that the average times (for all age groups) are some 40%-50% higher for the patients in their first year of registration at the practice than for permanent residents but the pattern of relative times is very similar for the two groups (compare the index columns for the 12 month new registrants with that for permanent registrants).

Relative to the index for permanent registrants for one year, overall the first year registrants do generate more workload (especially during the first three months) for all age sex groups. The impact varied across age and sex band, with males between 15 and 64 appearing to have the highest additional effect. In terms of applying this adjustment to practice lists there are two options:

- Construct a separate index based on the total surgery time first year registrants spend with a GP relative to the total GOP surgery time with all males 5-14 years old and assume that applies to all workload in the surgery (including that contributed by other staff groups) or at home;
- Apply a uniform uplift, over and above the age sex cost curve, for all patients in their first year of registration at the practice. The appropriate factor is 1.46.

Table III.1Total length of file opening time in first 3,6 and 12 months since registration

		Total Times			Internally Indexed					
		3 months	6 months	12 months	3 months	6 months	12 months	Ratios for permanent list	% difference in indices	Total Time
Males	0_4	14.29	25.06	44.68	3.43	3.29	3.32	3.25	+2.2	76.32
	5_14	4.16	7.61	13.44	1.00	1.00	1.00	1.00	0.0*	19.64
	15_44	8.3	13.31	21.24	2.00	1.75	1.58	1.27	24.4	25.15
	45_64	12.65	21.84	36.99	3.04	2.87	2.75	2.40	14.6	48.07
	65_74	16.66	29.01	50.24	4.00	3.81	3.74	3.79	-1.3	80.37
	75_84	18.32	31.09	52.24	4.48	4.38	3.89	4.21	-7.6	94.03
	85&over	15.62	26.17	40.87	3.75	3.44	3.04	2.93	+3.8	112.22
	All	10.32	17.42	29.37						
Females	0_4	12.96	21.98	39.52	3.12	2.89	2.94	2.98	-1.3	87.71
	5_14	4.34	8.07	14.78	1.04	1.06	1.10	1.09	+0.9	34.00
	15_44	12.77	22.73	39.26	3.07	2.99	2.92	2.68	+9.0	48.53
	45_64	15.88	28.46	49.66	3.82	3.74	3.69	3.61	+2.2	68.33
	65_74	18.26	32.2	56.19	4.39	4.23	3.92	4.40	-10.9	91.61
	75_84	18.26	31.11	52.71	4.39	4.09	3.92	4.55	-13.8	114.02
	85&over	14.09	23	36.91	3.39	3.02	2.75	2.78	-1.1	116.92
	all	12.87	22.63	39.39						
Persons	all	11.66	20.16	34.64						

III.2   Temporary registrations

The relative workload of temporary residents has also been investigated using the GPRD.

These might be the holiday-maker who moves inside England for a fortnight, has a minor accident (whether involving her/himself or one of the household members); such a person (or family) would usually be registered for less than 16 days. The episode will typically involve an initial treatment and a rapid (within 10 days) call-back which is confirmed with the overall average being nearly 2. An alternative is the seasonal worker who is employed for approximately 3 months during the 'season'.

The GPRD identifies two groups of temporary residents – those resident for 16 days or less and those registered for between 16 days and three months. The second group generates approximately 50% more "work" per person than the first. Both have a very different age pattern of consulting from permanent residents – consistent with much of the consulting relating to acute conditions and accidents amongst younger age groups. The average workload (per person) for the longer stay temporary residents approaches that for a full year of a permanent patient. Again, there is a case for a workload supplement related to the numbers of temporary residents.

Note that the time for males 5-14 in the first 16 days is exactly the same as the estimate for the annual time spent by GPs on the age-sex group (see Table III.2). The indexes in the table have all been calculated relative to 9.63 minutes. Apart from 15-44 year olds, all the indexes are between 1.24 and 1.59, so it might be appropriate to think in term of, say a 40%-50% uplift for all temporary registrants relative to males 5-14 year-old. The alternative is to use the weights presented in the Table III.2.

Table III.2   Average Total Time and Indexes for Temporary Registrants

		<16 days	16 days – 3 months	All temporary registrations	Ratios for permanent list	<16 days	16 days – 3 months	All temporary registrations
Males	0_4	1.10	1.71	1.28	3.25	10.64	16.42	12.31
	5_14	1.00	1.79	1.37	1.00	9.63	17.27	13.23
	15_44	1.97	2.04	1.83	1.27	19.06	19.69	17.60
	45_64	1.14	2.02	1.59	2.40	10.94	19.42	15.28
	65_74	1.04	2.02	1.46	3.79	10.60	19.45	14.07
	75_84	0.98	2.13	1.53	4.21	9.42	20.51	14.74
	85&over	1.04	1.75	1.45	2.93	10.01	16.83	13.97
	All					14.59	19.23	15.92
Females	0_4	1.09	1.63	1.26	2.98	10.47	15.68	12.13
	5_14	1.12	1.76	1.24	1.09	10.82	16.98	11.92
	15_44	1.53	2.91	2.51	2.68	14.73	28.07	24.14
	45_64	1.25	2.23	1.58	3.61	12.07	21.50	15.17
	65_74	1.11	1.98	1.46	4.40	10.70	19.09	14.06
	75_84	1.06	2.02	1.48	4.55	10.22	19.48	14.22
	85&over	1.09	1.71	1.43	2.78	10.45	16.49	13.80
	All					12.68	24.82	19.64
Persons	All					13.80	22.50	18.10

IV.   UNAVOIDABLE COSTS

As well as factors that influence the relative workload generated by a practice list, there are also factors that impact on the costs of delivering services to practices in certain geographical areas. The market forces factor adjustment, reflecting the increased costs of delivering services in areas of high staff costs is the subject of a separate report. This section focuses on the unavoidable costs associated with delivering services to a rural population.

It can be argued that rurality impacts on primary care services in two broad ways. Firstly, there may be higher costs of delivering a given level and standard of service to a rural population. This may relate to the fact that a practice in a rural area may have higher costs relating to the additional travelling costs associated with visiting patients, or the need to procure, staff and run branch surgeries. Secondly, a practice in a rural area may have greater workload resulting from the fact that there are no alternative healthcare providers in the area. For example, remote practices often act as community hospitals and emergency units as well as a primary care provider.

The latter, the impact of rural location on workload, may be an important issue, but it is unlikely to be addressed adequately through an analysis of the relation between costs or income and rurality. Ideally, an analysis of this should use frequency and length of consultations as the dependent variable, against factors that influence these rates, including distance from alternative healthcare provision.

Unfortunately, there is limited data on which this type of analysis would be possible. The two sources of consultation information used for the formula are the GPRD and the GHS. Neither of these sources lend themselves to attribution of isolation indicators as they are anonymised and unlikely to have sufficient observations in rural areas.

One potential data source for this is the 92/93 workforce survey data that includes GP level information on consultation rates and distinguished between practices in receipt of rural practice payments compared with those that are not. The obvious problems with this are the age of the data, and the fact that we would be using rural practice payments as a proxy for isolation. While the two may be correlated, it is unlikely that these payments would accurately reflect the problems associated with isolation.

It should also be noted that practices providing a range of services beyond the normal remit of GMS will be eligible for payments through the 'enhanced services' route. Many of the additional services that rural practices provide are typical enhanced services.

The analysis in this section therefore focuses only on the issue of the impact of rurality on costs only.

IV.1   Objectives

The purpose here was to model the impact of the rurality indicators against the costs of delivering GMS services, defined as:

- total expenses
- total expenses per patient.

The other dependents that were seen as interesting were:

- the expenses to earning ratio.
- total income (profit plus expenses) per patient
- profit per patient

IV.2   Data Sources

Information on costs of delivering GMS services can be obtained from two broad sources:

HA payment information

Payments made to GPs for GMS services are available through Health Authority accounts, although the practice level information is not available centrally and would need to be collected. The other major drawback with this data source is that although it provides information on the amount that was paid to GPs to deliver GMS, it does not provide information of the costs to the GP of delivering GMS. An analysis of the impact of rurality and remoteness on these payments would also introduce an element of circularity into the modelling, as it will pick up the current payments made to GPs in rural areas.

Inland Revenue accounts information

The other source of GMS costs from the tax returns made by GPs to the Inland Revenue. The key advantage of this information is that total costs are broken down into income and expenses, so the impact of rurality on the costs of delivering services can be analysed, and for this reason it has been preferred. The principle disadvantage of this approach is that the expenses relate to all GP expenses, not just the ones associated with delivering GMS, and the non-GMS earnings potential is likely to vary geographically.

The data set available from the Inland Revenue comprises around 20,000 GPs across England, Scotland and Wales. It does not include any PMS doctors and others have been excluded because National Insurance numbers couldn't be matched. GPs were also excluded if their list size was less than 100 (this applied to 4.5% of GPs in the sample). GPs on the data set are distinguished by dispensing status, the nature of their contract (full-time, three quarters, half-time and job-sharing) and by their age and gender. The Inland Revenue supply financial data with expenses broken down into the eight categories with expenses broken down into the standard Inland Revenue categories. They have also attached socio-demographic information, market forces factors and rurality and sparsity data provided by the Department of Health via the National Insurance number. The GPs are identified on the data set only by a totally anonymous reference number and by an anonymous practice reference number.

Rurality Indicators

The rurality indicators included in the modelling related to population density and population dispersion. For population density, the indicator chosen was persons per hectare from the ward from which the practice drew its population. For population dispersion, the proportion of the list within distance bands of the main practice surgery were calculated. The following bands were used:

> 0-499 metres from the practice surgery
> 500-999

1000-1999
2000-3999
4000-5999
6000-11999
12000-23999
24000 and above

The average distance to practice for the entire list was also calculated. Descriptive statistics of these variables showed high inter-correlations between the average distance variables. In the end, the average distance, population density and proportion of patients more than 6km away from the practice were used, and the final model only included average distance and population density.

IV.3   Preliminary Analysis

IV.3.1 Distribution and Functional Form

The first exercise was to examine the distributions of the dependent variables (see Table IV.1) and of the crucial independent variables – those concerned with rurality (Table IV.2).

Table IV.1 Descriptives of Various Dependent variables

	Minimum	Maximum	Range	Mean	Std.Dev.	Skewness	Kurtosis
Income	4847	1975905	1971058	158129	69327	3.00	37.51
CNETCAS	-2452	63129	65581	2916	2310	4.91	62.24
Interest	0	68648	68648	1357	3381	4.09	27.93
Other Expenses	0	1669311	1669311	90678	52125	3.92	56.31
Miscellaneous Expenses	0	61400	61400	346.7	2097	13.27	256.76
Business Expenses	0	180253	180253	10978	7438	4.43	54.62
Premises Expenses	-15212.8	176514	191726	8430	7337	4.34	41.37
Employment Expenses	0	1109830	1109830	45109	22595	7.89	281.09
Travel Expenses	0	52895	52895	2309	1902	4.28	70.09
Expenditure on Interest	-254.19	170595	170849	3067	5175	4.77	78.09
CEXPDEPN	-12158	44246	56404	1289	1973	5.40	60.99
CEXPOTHER	-97.1757	712033	712130	21951	36089	3.81	22.34
CEXPNETCA	-2452	63129	65581	2916	2310	4.91	62.24
Total Expenses	0	1777195	1777195	96050	54135	4.01	61.17

Table IV.2   Descriptives of Rurality Variables

	Minimum	Maximum	Mean	Std.Dev.
% under 500 m	0	100	17.05	11.17
% between 500 m and 1 km	0	100	24.36	11.17
% between 1 and 2 km	0	100	26.46	12.91
% between 2 and 4 km	0	100	19.75	12.88
% between 4 and 6 km	0	86.9	7.11	8.71
% more than 6 km	0	100	5.26	10.75
Average Distance away	0	197.73	19.51	11.50
Population per hectare	0.01	269.69	27.03	25.10

Average distance away of furthest 10%	00	1.0	0.104	0.306
proportion between 4 and 6 km	0	1.0	0.104	0.305
Population per hectare of sparsest 10%	0	1.0	0.0828	0.276

Most of the distributions of the variables are skew but, apart from those specifically designed to pick out small subsets of the data (e.g. Average distance of top 10%), they are relatively well-behaved. Linear, Log-Linear and Log-Log functional forms were tested; on the whole, models with log-log specification perform the best.

Log-log models are of the form

log (expenditure per patient) = constant + log(independent variables).

This means that the coefficients are elasticities on the log of expenditure per patient. For example, where the coefficient is -0.7, this means that for a unit change in the independent variable, there is a -0.7 change in the logarithm of expenses per patient. Where dummies have been included e.g. for dispensing status or sometimes for list size) this means that the log of expenses per patient is changed by the antilog of the coefficient (or more simply, the coefficient becomes a constant multiplier for expenses per patient).

IV.3.2 Preliminary Analyses

Our preliminary results based on a linear model show that expenses per patient are predictable, with contract and dispensing status making a very important contribution to explaining the variance in expenses per head followed by list size. If entered last, the rurality and sparsity variables only add about 1% to explained variance. The model performs reasonably well: linear models explain around 30% of the total variation in GP costs.

The important initial results were that:

- A substantial proportion of the variance in expenses per head can be accounted for by the proposed allocation formula variables (and some more by variables such as age and sex of GP which are not relevant for this exercise);

- The results are stable whether we exclude those with list sizes less than 100 or less than 500. Initial analyses excluding list sizes less than 100 suggested that the model performs reasonably well: linear models explain around 30% of the total variation in GP costs. There was little difference between runs excluding lists less than 500 or less than 1000, so the cut-off of 100 has been retained and these are the results reported here.

- The average distance to practice variable had a significant positive co-efficient, and the population density variable had a significant negative co-efficient, implying that rurality, as defined by these variables increases the cost of delivering services.

GP versus Practice level analysis

Analysis of the data was carried out at both individual GP level as well as practice level. The advantage of using the GP level analysis is that the number of observations is increased, the main drawback is that the practice rather than the GP is the entity that delivers the service. Models based on the practice and the GP are reported below.

Effect of List Size - the Impact of Scale

One of the variables included in the modelling was list size. Using expenses per patient as the dependent variable, and list size as an independent allows . The impact of scale was measured and modelled in a variety of ways, the three preferred models were as follows:

List size as a continuous variable against GP level expenses per patient

This model uses GP list size as a continuous variable impacting on expenses per patient. The difficulty with this is that the impact of scale should ideally be modelled at practice rather than GP level. An individual GP may have a small list but may be part of a large practice and so benefit from economies of scale.

List size as a continuous variable against practice level expenses per patient

This analysis treats practices expenses per person as the independent, as the list size of the practice most adequately represents the scale of the practice. The drawback with this analysis is that data from around 50% of practices was excluded, as information for all partners was unavailable. Additionally, the sample of the remaining practices is skewed towards smaller practices, as practices with a large number of partners were more likely to be excluded.

List size as a dummy variable GP level expenses per patient

This model bands list size into five categories, to allow the impact of scale to have alternative distributions.

IV.4   Main Results

IV.4.1 Final Models

The final models have a log-log specification, uses total expenses per patient as the dependent variable, and the following independents:

GPs Age
GPs Sex

Practice Characteristics

> List size
> Number of Partners
> Contract Status
> Dispensing Status
> Staff market Forces Factor

Socio-Demographics

      Proportion of List in Social Classes 1 and 2
      Proportion of List with 2 or more cars
      Limiting Long Standing illness Rate
      Proportion of List on income Support
      Age-sex weighting of list based on relative total consulting times form GPRD

(All except the latter are based on the attribution of socio-demographic characteristics to individuals on the list from the wards in which they live)

Rurality and Sparsity

      Average Distance
      Population per hectare

IV.4.2 Preferred Model

Three preferred models are reported here, these are:

      Model I at GP level with List Size continuous (Table IV.3)
      Model II at GP level with List Size Dummies (with breaks at 100, 1500, 2000, 2500) (Table IV.4).
      Model III at Practice Level with Total Practice List Size (Table IV.5)
      Model IV at Practice Level with List Size Dummies (Table IV.6)

The Practice Level Models can only be run for the practices where there is complete information and this has reduced the potential sample size substantially especially amongst the larger practices (see Table in Annex).

Table IV.3   **Model I: GP level dependent log Total Expenditure**
          (N = 18874)List Size Continuous

Name of Variable	Coefficient	T value
(constant)	8.89	59.00
Age of GP	-0.0002	-0.57
Sex of GP (M=1, F=2)	-0.13	-19.92
Log Number of Partners	-0.08	-15.87
Contract Status (FT=100, etc.)	0.01	37.68
Dispensing Status (1=Dispensing)	0.60	71.47
Log Proportion in Social Class I and II	0.08	5.74
Log Proportion with 2+ cars	-0.04	-3.32
Log Standardised Limiting Long Term Illness Ratio	-0.08	-3.32
Log Income Support	0.03	2.41
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.76	15.78
Log GP List Size	-0.74	-114.00
Age Sex Weight of List based on GPRD total times	-0.01	-0.92

Log of Average Distance of Patients from Practice	0.04	5.38
Log of Density of wards where patients live	-0.01	-3.92
Adjusted R square	**0.566**	

Table IV.4   Model II   GP level dependent log Expenditure (N=18874)
GP list size dummies

Name of Variable	Coefficient	T value
(constant)	3.43	20.42
Age of GP	-0.002	-4.09
Sex of GP (M=1, F=2)	-0.12	-17.22
Log Number of Partners	-0.07	-13.50
Contract Status (FT=100, etc.)	0.009	31.03
Dispensing Status (1=Dispensing)	0.60	65.70
Log Proportion in Social Class I and II	0.08	5.69
Log Proportion with 2+ cars	-0.06	-4.35
Log Standardised Limiting Long Term Illness Ratio	-0.12	-4.20
Log Income Support	0.05	3.18
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.68	13.02
GP List Size 1	1.12	86.15
GP List Size 2	0.54	47.41
GP List Size 3	0.33	34.62
GP List Size 4	0.18	19.68
Age Sex Weight of List based on GPRD total times	-0.03	-1.81
Log of Average Distance of Patients from Practice	0.03	3.75
Log of Density of wards where patients live	-0.02	-6.49
Adjusted R square	**0.490**	

Table V.5   Model III: Practice models (N=3521) Dependent Log Total Expenditure List Size Continuous

Name of Variable	Coefficient	T value
(constant)	6.29	25.69
Proportion of GPs with Dispensing Status	0.69	29.68
Log Number of Partners	0.12	1.44
Age Sex Weight of List based on GPRD total times	0.18	6.44
Log Proportion in Social Class I and II	0.09	3.39
Log Proportion with 2+ cars	-0.20	-8.73
Log Standardised Limiting Long Term Illness Ratio	-0.26	-5.81
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.46	4.47
Log GP List Size	-0.34	-17.11
Log of Average Distance of Patients from Practice	0.05	3.21
Log of Density of wards where patients live	-0.06	-8.50
Adjusted R square	**0.492**	

Whilst, on the whole, they perform less well in terms of accounting for the variations in expenses per patient, the same variables appear as significant and the coefficient on List Size is more respectable at -0.34.

The same variations have been attempted as with the GP level models and there is little difference in the pattern of performance

Table IV.6   Model IV: Practice level dependent log total Expenditure (N=3521) Practice list size dummies

Name of Variable	Coefficient	T-value
(constant)	4.10	17.71
Proportion of GPs with Dispensing Status	0.69	28.46
Log Number of Partners	-0.18	-2.00
Age Sex Weight of List based on GPRD total times	0.16	4.45
Log Proportion in Social Class I and II	0.11	4.02
Log Proportion with 2+ cars	-0.26	-10.85
Log Standardised Limiting Long Term Illness Ratio	-0.32	-6.80
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.38	3.54
GP List Size 3	-0.13	-7.38
GP List Size 4	-0.20	-7.24
GP List Size 5	-0.25	-6.78
GP List Size 6	-0.33	-7.11
Log of Average Distance of Patients from Practice	0.05	3.03
Log of Density of EDs(?) where patients live	-0.09	-12.00
Adjusted R square	**0.461**	

Commentary on the Results

The commentary here focuses on the results for the crucial List Size and ruralty/sparsity variables; and these are explained for all three candidate models.

Confounders or Control Variables

Dispensing status has a substantial effect on the level of expenses with a coefficient of 0.60. Contract status makes a significant but not substantial contribution. The staff market forces factor makes a positive contribution.

The proportion of the list in Social Classes I or II and the proportion of the list with 2+ cars make roughly equal but opposite contributions. The proportion of the list with Limiting long standing illness and the proportion of the list on income support also make roughly equal but opposite contributions.

Summary and Implications

The coefficients on the crucial variables can be summarised as follows:

Table IV.7: Summary of Key Results for the Models

	GP, list size continuous	Practice, List size continuous	GP, list size dummies
Log Density	-0.01 (-3.92)	-0.06 (-8.5)	-0.02 (-6.49)
Log Average Distance	0.04 (5.38)	0.05 (3.21)	0.03 (3.75)
Log List Size	-0.74 (-114)	-0.34 (-17.11)	
List Size Dummies, 100-999			1.12 (86.15)
100-1499			0.54 (47.41)
1500-1999			0.33 (34.62)
2000-2499			0.18 (19.68)
Adjusted R-Square	0.566	0.49	0.492

This indicates that as patients are located further away from practices, costs of delivering GMS services to them increases. This could potentially be used as the basis for a rurality and remoteness adjustment in the contract. The coefficients are relatively stable no matter which definition of GP costs is used, and across different model specifications.

In addition to this, a significant economies of scale effect was found. There was a significant and relatively stable negative coefficient on the list size variable, when costs per patient was analysed. This was the case at GP and practice level, and for total income per head as well as total expenses per head. The list size co-efficient was much larger in the GP level model than the practice level model.

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Appendix II.1a - Sensitivity Analyses With GPRD

Table II.1A.1   Variation in activity rates (number of file openings per person per year) among the different practices (Table based on 207 practices)

Age Groups	Males				Females			
	Minimum	Maximum	Mean	Std. Dev.	Minimum	Maximum	Mean	Std. Dev.
	1.02	10.14	3.64	1.26	1.05	11.14	4.38	1.32
0_4	1.21	11.57	4.71	1.41	0.47	4.45	1.75	0.58
5_14	0.32	4.52	1.62	0.58	0.76	10.48	3.78	1.37
15_44	0.60	4.96	1.84	0.66	1.65	13.69	5.06	1.83
45_64	1.13	9.24	3.43	1.26	2.07	22.19	6.63	2.61
65_74	1.54	20.31	5.79	2.32	1.86	26.12	7.26	3.18
75_84	1.44	24.65	6.73	2.95	0.76	28.55	5.71	3.37
85&over	0.61	25.03	5.65	3.44	0.61	25.03	5.65	3.44

A similar check was made to see if the relative times were being influenced by excluding openings of more than 60 minutes. Average times (for the entire data set) were computed for each age-sex group, in a run in which 30 seconds were added to all the times. These averages were substituted for the openings of 60 minutes or more, which would otherwise have been excluded. The resulting times are compared with those based on the addition of 30 seconds and exclusion of those lasting more than 60 minutes. There is a very slight increase (in all cases less than 1%) in the total time per age-sex group.

Table II.1A.2   Result of substituting average times (for each age-sex group) for previously excluded consultations with durations > 60 minutes
(Baseline figs taken from..)

	Males		Ratio B to A	N registered Patient years	Females		Ratio B to A	N registered
	Average time per Person				Average time per Person			
	(A)	(B)			(A)	(B)		Patient years
0_4	40.05	40.31	1.01	110455	36.84	37.07	1.01	104773
5_14	9.92	9.96	1.00	304529	10.83	10.88	1.00	291834
15_44	11.61	11.67	1.00	1055669	24.14	24.25	1.00	1088219
45_64	23.46	23.57	1.00	566746	37.08	37.25	1.00	552995
65_74	38.62	38.83	1.01	177617	46.09	46.33	1.01	197426
75_84	41.18	41.46	1.01	108082	44.66	44.98	1.01	161146
85&over	19.72	19.92	1.01	39792	19.47	19.68	1.01	97978

Appendix II.3A Care Home Survey: Sampling of Nursing and Residential Homes

The sample was drawn from the A_Z Database of Care Homes, which holds details of 17978 care homes in the UK.

The sampling had to address a number of questions, including the following:

1. whether to stratify by size of home?
2. whether to vary the sampling ratio between the UK nations?
3. whether to draw separate samples of nursing and residential homes, and what to do about dual homes
4. how to get good geographical coverage

(1) Stratification

The question of whether to stratify by size of home was resolved by using a list of the places in the homes, rather than a list of the homes, as the sampling frame (see Table II.3A.1); this also provided a means of dealing with dual homes.

Table II.3A.1 Number of homes and places in each of four nations

	Total no. of homes	No. of nursing homes	No. of residential homes	No. of dual homes	No. of residential places	No. of nursing places	Population
England	15609	2985	10808	1816	257056	167055	50356331
Wales	419	189	176	54	3789	8896	1577690
N Ireland	892	212	520	160	12661	11207	2946100
Scotland	1058	450	520	88	12264	24586	5114600
All	17978	3836	12024	2118	285770	211744	59994721

(2) Sampling Ratios

The numbers of homes and total number of places per thousand population is approximately the same in all four nations, although the division between nursing and residential places varies between the four nations (see II.3A.2).

Table II.3A.2 Number of places per thousand population

	Homes per thousand pop	Residential places per thousand	Nursing places per thousand
England	0.310	5.105	3.317
N Ireland	0.266	2.402	5.639
Wales	0.303	4.298	3.804
Scotland	0.207	2.398	4.807

If we had used the same sampling fraction, we would either have had to have a very large sample, or we would only have had very small achieved samples for the other three nations. We have therefore taken an approximate 1 in 10 sampling fraction for England, and varied the sampling ratio to generate about 300 in each of the other nations.

(3) Differentiating Nursing, Residential and Dual Homes

Dual homes, on average have between 60 and 75% nursing places (see Table II.3A.3).

Table II.3A.3 Composition of Dual Registered Homes

	No. of dual homes	No. of residential places	No. of nursing places	Total places	Percent nursing
England	1816	37704	63615	101319	62.8
N Ireland	57	735	1952	2687	72.6
Scotland	88	1786	3178	4964	64.0
Wales	160	2662	4632	7294	63.5

Using a list of the places in the homes resolved this problem: duplicates were eliminated.

(4) Geographical Coverage

Geographical coverage was ensured by varying the sampling ratio between local authorities so that (wherever possible) a minimum of five homes was chosen from each authority. The composition of the sample, by country and number of homes of each type, is shown in Table II.3A.4.

Table II.3A.4 Numbers of homes in the sample - by country

	N of LAs	Type of home			Total
		Dual	Nursing	Residential	
England	148	296	403	838	1537
Wales	22	78	89	136	303
N Ireland	26	38	119	150	307
Scotland	32	31	137	159	327
	228	443	748	1283	2474

For England, the higher level local authorities (n=149) were chosen in preference to the lower tier (n=353 excluding Scilly Isles). Although the lower tier authorities are more similar in population size to the LAs in NI, Scotland and Wales, using the lower tier districts would lead to 433 sampling points which would not always contain all three types of home.

In a few areas, the sampling strategy was subverted by local authorities not containing examples of certain types of home. In England 14 LAs contain no nursing home; 1 (the Isles of Scilly) has no residential home and 28 have no dual homes. In Scotland 2 have no nursing home and 9 no residential home. In NI 5 LAs have no dual home and in Wales 1 has no dual home.

Appendix II.3B: Care Home Survey: Additional Tables on Numbers and Rates of Visits by Country

II.3.B.1 Numbers of Visits

Table II.3B.1 Nursing normal hours: Males

	0-18	19-64	65-74	75-84	85+
England	0	144	169	449	327
Wales	0	19	13	47	26
N Ireland	0	17	48	79	48
Scotland	0	14	56	146	84

Table II.3B.2 **Nursing Normal Hours: Females**

	0-18	19-64	65-74	75-84	85+
England	2	113	253	780	983
Wales	1	13	21	85	134
N Ireland	2	22	73	169	133
Scotland	0	13	67	282	309

Table II.3B.3 Nursing out-of-hours: Males

	0-18	19-64	65-74	75-84	85+
England	1	10	16	61	59
Wales	0	3	1	5	4
N Ireland	0	3	7	16	15
Scotland	0	4	4	19	13

Table II.3B.4 **Nursing Out-of Hours: Females**

	0-18	19-64	65-74	75-84	85+
England	0	7	22	88	107
Wales	0	2	4	8	13
N Ireland	0	8	6	28	21
Scotland	0	2	7	32	37

Table II.3B.5 Residential normal hours: Males

	0-18	19-64	65-74	75-84	85+
England	6	72	84	217	279
Wales	0	9	8	29	40
N Ireland	0	14	5	10	14
Scotland	13	19	17	38	60

Table II.3B.6 **Residential Normal Hours: Females**

	0-18	19-64	65-74	75-84	85+
England	11	43	68	509	804
Wales	0	7	14	168	114
N Ireland	0	22	7	40	50
Scotland	13	16	34	106	229

Table II.3B.7   Residential out-of-hours: <u>Males</u>

	0-18	19-64	65-74	75-84	85+
England	26	16	8	24	55
Wales	0	0	3	2	8
N Ireland	0	4	0	1	1
Scotland	33	6	1	2	11

Table II.3B.8   **Residential Out-of Hours: Females**

	0-18	19-64	65-74	75-84	85+
England	3	5	6	77	116
Wales	0	2	3	15	17
N Ireland	0	5	4	6	15
Scotland	1	2	5	13	40

<u>II.3.B.2</u>   <u>Rates</u>

For persons in nursing care, visiting rates for males during normal hours in the four countries range from 9.9 for 19-64 year olds in Northern Ireland to 42.4 for 85+ year olds in England. The corresponding figures for women are 9.8 for 19-64 year olds in Scotland to 40.8 for 19-64 year olds in Northern Ireland.   For men, the rate increases with age in England from 26.9 to 42.4 (in parallel with the UK) but not in the other three countries, and for women the highest rate is in the 65-74 age band in both England and Northern Ireland.

The rates of normal hours GP visiting to people in residential care are generally lower than those in nursing care. For men (excluding the youngest are group) they range from 3.5 in Wales for 19-64 year olds to 39.5 in Scotland for 85+ year olds; and for women (again excluding the youngest age group) from 4.3 for 19-64 year olds and 54.9 for 75-84 year olds in Wales. Again, the rates for men increase with age in all four countries of the UK, but for women there is no consistent pattern with the highest rates in England and Wales being among the 75-84 year-olds. And the highest rates in Scotland and Northern Ireland among the 85+ year olds.

Table II.3B.9   Rates of visiting to people in NURSING care during normal hours

(a) Males	0-18	19-64	65-74	75-84	85+
England		26.87	28.12	37.76	42.36
Wales		19.79	14.94	28.83	18.57
N Ireland		-9.94	41.74	27.15	31.17
Scotland		10.77	31.46	35.44	29.37
(b) Females					
England	200	27.70	35.63	29.17	29.95
Wales	50	19.40	16.94	19.72	23.55
N Ireland		-40.74	37.24	26.45	21.88
Scotland		-9.77	21.90	26.04	20.77

(No. of visits per hundred persons per fortnight

Table II.3B.10 Rates of visiting to people in residential care during normal hours

(a)Males	0-18	19-64	65-74	75-84	85+
England	3.24	6.84	14.19	19.44	22.85
Wales		3.46	12.31	26.36	27.21
N Ireland		3.99	8.47	9.35	18.67
Scotland	25	6.96	17.35	26.57	39.47
(b) Females	0-18	19-64	65-74	75-84	85+
England	13.10	6.90	9.58	17.59	16.90
Wales		4.29	28.57	54.90	20.07
N Ireland		9.57	6.09	11.66	11.88
Scotland	50	7.21	28.81	27.53	29.47

(No. of visits per hundred persons per fortnight)

Out-of-Hours visiting

Out-of hours visiting rates are much lower than those during normal hours. For men in nursing care they range from 1.2 among 19-64 year olds in Wales to 9.7 among 85+ year olds in Northern Ireland; and for men in residential care from 0.9 among 75-84 year olds in Northern Ireland to 7.2 among 85+ year olds in Scotland (in both cases, results for those aged 0-18 are omitted because of the low numbers of visits and people). For men in nursing care the rates increase quite steeply with age in England but not consistently in any other country; and for men in residential care, although the rates among 85+ year olds are always the highest, there is no monotonic trend with age.

With one exception, the range of out-of hours rates by age is narrower for women than men - largely because women do not have the same high rates in the oldest age group. In nursing care, rates range from 1.5 among 19-64 year old women in Scotland to 4.4 among 75-84 year olds (although there is the outlier of 14.8 among 19-64 year olds in Northern Ireland); in residential care from 0.8 among 19-64 year olds in England to 6.1 among 65-74 year olds in Wales (as for men, figures for the 0-18 age group are omitted). For women although the rates are generally higher among the older age groups, there is no monotonic trend in any of the four countries.

Table II.3B.11 Rates of visiting to people in nursing care outside normal hours
(No. of visits per hundred persons per fortnight)

(a) Males	0-18	19-64	65-74	75-84	85+
England	100	1.87	2.66	5.13	7.64
Wales		3.13	1.15	3.07	2.86
N Ireland	-	1.75	6.09	5.50	9.74
Scotland		3.08	2.25	4.61	4.55
(b) Females					
England		1.72	3.10	3.29	3.26
Wales		2.99	3.23	1.86	2.28
N Ireland	-	14.81	3.06	4.38	3.45
Scotland	-	1.50	2.29	2.95	2.49

Table II.3B.12 Rates of visiting to people in residential care outside normal hours (No. of visits per hundred persons per fortnight)

(a) Males	0-18	19-64	65-74	75-84	85+
England	14.05	1.52	1.35	2.15	4.50
Wales				4.62	1.82	5.44
N Ireland		1.14		.93	1.33
Scotland	63.46	2.20	1.02	1.40	7.24
(b) Females	0-18	19-64	65-74	75-84	85+
England	3.57	.80	.85	2.66	2.44
Wales			1.23	6.12	4.90	2.99
N Ireland			2.17	3.48	1.75	3.56
Scotland	3.85	.90	4.24	3.38	5.15

Combined Normal and Out-of-Hours Visiting

The combined visiting rates in each of the four countries are shown in Table 11A and 11B separately for males and females

Table II.3B.13 Residential Homes

(a) Males	0-18	19-64	65-74	75-84	85+
England	17.29	8.36	15.54	21.59	27.35
Wales			3.46	16.93	28.18	32.65
N Ireland			5.13	8.47	10.28	20.00
Scotland	88.46	9.16	18.37	27.97	46.71
(b) Females					
England	16.67	7.70	10.43.	20.25	19.34
Wales			5.52	34.69	59.80	23.06
N Ireland			11.74	9.57	13.41	15.44
Scotland	53.85	8.11	33.05	30.91	34.62

Table II.3B.14 Nursing Homes

(a) Males	0-18	19-64	65-74	75-84	85+
England		1.00	28.74	30.78	42.89	50.00
Wales			22.92	16.09	31.90	21.43
N Ireland			11.69	47.83	32.65	40.91
Scotland			13.85	33.71	40.05	33.92
(b) Females					
England	200.00	29.42	38.73	32.46	32.21
Wales	50.00	22.39	20.17	21.58	25.83
N Ireland			55.55	40.30	30.83	25.33
Scotland	166.67	11.27	24.19	28.99	23.26

Appendix II.3C Care Home Survey: Sensitivity of Estimate of Rates

These tables (II.3.C.1 and II.3.C.2) are similar to those presented in the body of the report but are based only on visits to those homes with 50 or more residents or 25 or more residents.

Table II.3C.1 Numbers of GP visits per person per fortnight - residential places
(Figures for homes with total numbers of places >= 50 and >= 25)

		0_18	19_64	65_74	75_84	85&over
Males	Rates resid norm hours	0.90	1.86	18.32	20.16	19.84
(totres ge 50)	Rates resid OH	14.35	1.02	0.25	2.95	4.25
	Combined rate	15.25	2.88	18.56	23.10	24.09
Males	Rates resid norm hours	1.25	4.11	19.56	21.35	25.57
(totres ge 25)	Rates resid OH	24.17	1.57	1.61	2.28	4.86
	Combined rate	25.42	5.68	21.17	23.63	30.43
Females	Rates resid norm hours	0.00	1.27	9.80	16.93	15.79
(totres ge 50)	Rates resid OH	0.00	0.42	1.00	2.00	1.60
	Combined rate	0.00	1.69	10.80	18.93	17.39
Females	Rates resid norm hours	25.00	7.46	12.40	18.43	17.44
(totres ge 25)	Rates resid OH	12.50	0.91	1.73	2.49	2.49
	Combined rate	37.50	8.37	14.13	20.92	19.92

Table II.3C2 Numbers of GP visits per person per fortnight - nursing places
(Figures for homes with total numbers of places >= 50 and >= 25)

		0_18	19_64	65_74	75_84	85&over
Males	Rates nursing norm hours	.00	24.04	29.90	33.99	35.66
(totres ge 50)	Rates nursing OH	.00	2.12	3.14	4.73	6.99
	Combined rate	0.00	26.15	33.03	38.73	42.65
Males	Rates nursing norm hours	.00	20.62	28.82	34.28	35.99
(totres ge 25)	Rates nursing OH	.00	2.11	2.97	4.79	6.60
	Combined rate	0.00	22.73	31.79	39.06	42.59
Females	Rates nursing norm hours	100.00	32.79	34.58	27.52	24.32
(totres ge 50)	Rates nursing OH	.00	3.25	3.84	3.19	2.65
	Combined rate	100.00	36.04	38.42	30.71	26.97
Females	Rates nursing norm hours	300.00	25.86	31.38	26.58	25.63
(totres ge 25)	Rates nursing OH	.00	2.85	3.06	3.09	2.88
	Combined rate	300.00	28.71	34.43	29.66	28.52

Table II.3C3 Numbers of homes within 5 kms of practice main surgery - England and achieved sample compared.

Proportion of practices with this number or less of homes within 5 kms	England – all practices	Achieved sample in England
25% have this number or less	16	19
50% have this number or less	38	49
75% have this number or less	71	85

| Mean number of practices | 45.3 | 55.1 |

APPENDIX II.3D: Care Home Survey: Size of Variations Across Countries

Some concern has been expressed that the survey is showing differential rates between the four nations. Before presenting the evidence, it is worth bearing in mind that one would expect there to be differences for several reasons:

- different place of nursing and residential homes in the structure of care in the constituent nations
- differential use of nursing and residential homes in the four constituent nations and therefore differential levels of morbidity
- differential staffing of nursing an residential homes

The total number of homes returning questionnaires was 1266. The overall weighted mean rate has been given in the main report for the whole of the UK (see also column 5 of the tables below), and for the four constituent nations. Means have also been calculated for the 8/9 standard regions of England and minimum and maximum values among the 12 subset of the UK are given in columns 6 and 7 of each of the tables.

These appear to vary considerably but the standard deviations of the rates between the homes (shown in the final column of each table for each age group, in nursing or residential hours, for normal hours and for out-of-hours visits) are very large. Given that the maximum number of homes (the divisor for calculating the standard errors) in any subset is never more than 20% of the total sample of homes in that row, there are only a few of largest values that are statistically significant from their mean; and these are usually the English regional values rather than the country maxima which are shown in column 8 of the tables. Of the 9 cases where the country maximum is the largest (or very close to the largest) 4 of them are out-of-hours and the differences in three of those cases are not statistically significant; so there are only 6 cases (out of 32 comparisons) - and a maximum of 2 for any one country - where the national difference is statistically significantly different from the overall UK mean.

We conclude that, although there are some differences between the mean rates reported for the four nations, there is no systematic effect for any one of the four nations that would lead us to suggest differential adjustments.

The total rates and the outliers for each of the main categories are shown in Table 14 (a) and (b)

Table II.3D.1   Rates of Visiting in the Different Countries to those in nursing home places or residential places in normal hours and out-of-hours.

(a) Males

			19-64	65-74	75-84	85+
Nursing	Normal Hours	UK	20.79	29.15.0	35.09	35.87
		Outlier	9.94	14.94	27.15	18.57
		Country	N	W	N	W
	Out-of-Hours	UK	2.14	2.85	4.91	6.73
		Outlier	3.13	1.15	3.07	2.86
		Country	W	W	W	W
	Total		22.93	32.00	40.0	42.60
Residential Homes	Normal Hours	UK	5.89	14.00	19.92	24.64
		Outlier	3.46	8.47	9.35	39.47
		Country	W	N	N	S
	Out-of-Hours	UK	1.34	1.47	1.96	4.70
		Outlier	0.00	4.62	0.93	1.33
		Country	W	W	N	N
	Total		7.23	15.47	21.88	29.34

(b) Females

			19-64	65-74	75-84	85+
Nursing	Normal Hours	UK	24.32	30.99	27.26	26.21
		Outlier	40.74	16.94	19.72	20.77
		Country	62%	-45%	-28%	-21%
			N	W	W	S
	Out-of-Hours	UK				
		Outlier	2.87	2.92	3.23	2.99
		Country	14.81	2.29	1.86	2.28
			416%	-22%	-42%	-24%
	Total		N	S	W	W
Residential Homes	Normal Hours	UK	27.19	33.91	30.49	29.20
		Outlier				
		Country	7.11	12.40	20.95	18.35
			4.29	28.81	54.90	29.47
	Out-of-Hours	UK	-40%	132%	162%	61%
		Outlier	W	S	W	S
		Country				
			1.13	1.81	2.83	2.88
	Total		2.17	6.12	4.90	5.15

Appendix II.3.E: GP Survey: Additional Tables on Variations between Countries

On average, most people were seen per visit in Scotland and least in Northern Ireland

Table II.3E1   Numbers of GPs supplying information, numbers of consultations and number of consultations per visit – by country

	N of GPs	%	N of consults	%	N of people seen	Mean N of visits	Std. Dev.
England	115	45.5	945	49.8	383	2.41	2.55
Wales	34	13.4	202	10.6	115	1.75	1.26
Scotland	51	20.2	459	24.2	180	2.55	2.63
NI	53	20.9	291	15.3	179	1.63	1.58
Total	253	100.0	1897	100.0	857	2.19	2.29

Travel time

The average return travel time per visit is similar for England Wales and Scotland and slightly higher for Northern Ireland.

Table II.3E2   Average Travel time by visit

	Av time - mins	N -visits	Std. Deviation
England	13.45	383	8.31
Wales	12.59	115	9.04
Scotland	13.98	180	10.13
N Ireland	16.23	179	10.51
Total	14.03	857	9.36

When the number of people seen at each visit is taken into account, the relative average travel time <u>per person</u> increases in Wales compared with England and Scotland. Northern Ireland still has the highest figures overall.

Table II.3E3   Average travel time per consultation - by country

	Average time – minutes	N- consultations	Std. Deviation
England	5.57	924	6.74
Wales	7.20	201	8.22
Scotland	5.48	459	7.06
N Ireland	9.98	291	9.38
Total	6.41	1875	7.62

Workload Implications

Table II.3E4   Consultation and travel times - by country

	Average Consultation Time	Consultation + average travel time	Consultation + total travel time	N of consutations
England	10.33	15.97	23.8	919
Wales	11.76	18.88	23.08	204
Scotland	9.49	15.16	23.23	444
N Ireland	13.40	23.89	29.21	277
ALL	10.75	17.29	24.39	1844

Table II.3E5   Consultation and travel times - by age and gender (England)

		Average Consultation Time	Consultation + average travel time	Consultation + total travel time	N of consultations
Males	Under 65	9.96	14.89	28.29	27
	65-74	10.64	14.96	24.36	33
	75-84	10.41	15.85	23.25	145
	85 & over	11.25	17.75	23.13	79
Women	Under 65	11.5	18.54	27.8	20
	65-74	10.08	17.44	28	60
	75-84	10.46	16.38	24.5	230
	85 & over	9.95	15.08	22.24	325
ALL		10.33	15.97	23.8	919

Table II.3E6   Consultation and travel times - by age and gender (Wales)

		Average Consultation Time	Consultation + average travel time	Consultation + total travel time	N of consultations
Males	Under 65	8.00	16.00	18.50	10
	65-74	10.00	20.56	25.00	5
	75-84	13.20	22.09	25.64	32
	85 & over	10.15	13.58	19.07	26
Women	Under 65	9.17	20.56	22.50	6
	65-74	12.13	21.67	27.75	8
	75-84	10.68	18.07	23.18	56
	85 & over	13.65	20.01	23.39	61
ALL		11.76	18.88	23.08	204

Table II.3E7   Consultation and travel times - by age and gender (Scotland)

		Average Consultation Time	Consultation + average travel time	Consultation + total travel time	N of consultations
Males	Under 65	6.86	13.70	18.29	7
	65-74	13.00	20.11	30.91	22
	75-84	11.03	14.98	24.57	58
	85 & over	9.75	15.20	26.01	46
Women	Under 65	6.17	9.30	16.33	6
	65-74	11.23	17.42	30.93	30
	75-84	8.79	14.79	21.55	136
	85 & over	8.78	14.62	21.06	139
ALL		9.49	15.16	23.23	444

Table II.3E8   Consultation and travel times - by age and gender (N Ireland)

		Average Consultation Time	Consultation + average travel time	Consultation + total travel time	N of consultations
Males	Under 65	12.50	22.19	25.63	8
	65-74	13.19	28.75	37.13	16
	75-84	13.17	25.59	30.99	54
	85 & over	11.31	18.22	24.59	14
Women	Under 65	14.71	27.48	39.14	7
	65-74	14.09	21.77	25.95	22
	75-84	13.60	23.12	28.26	90
	85 & over	13.56	24.11	28.58	66
ALL		13.40	23.89	29.21	277

Appendix IV.A: Definition of Variables included

Rurality Indicators

The rurality indicators chosen were based on the density and distribution of population around the practice. They are defined as follows:

Population Density

Population density is measured as the weighted average of the ward population per hectare from the wards from which the GP draws his/her list.

Population Sparsity

A range of indicators were developed, based on distances of patients from the practice, these were:

Also included was the average distance of patients from practice.

Scale and Size

Banding List Size

Bands used	Frequency	Percentage	Cumulative Percent
100 – 2500		8.1	8.1
2500 – 5000		17.9	26.0
5000 – 7500		23.6	49.6
7500 – 10000		23.2	72.8
10000 – 12500		11.6	88.4
12500		11.6	1000

Number of Partners

	Frequency	Percent	Valid Percent
1	1556	7.8	7.8
2	2013	10.1	10.1
3	2682	13.5	13.5
4	3640	18.3	18.3
5	3532	17.7	17.7
6	2937	14.7	14.7
7	1889	9.5	9.5
8	870	4.4	4.4
9	402	2.0	2.0
10	185	0.9	0.9
11+	80	0.4	0.4
12	58	0.3	0.3
13	23	0.1	0.1
14	22	0.1	0.1
15	12	0.1	0.1
16	12	0.1	0.1
Total	19913	100.0	100.0

Appendix IV.B Sensitivity Analyses on preferred Models

Table IV.B.1 Model 1A GP level dependent log Total Expenditure (N=18873) (Using Total practice list size)

Name of Variable	Coefficient	T value
(constant)	9.21	44.33
Age of GP	-0.008	-17.44
Sex of GP (M=1, F=2)	-0.03	-3.59
Log Number of Partners	0.32	20.69
Contract Status (FT=100, etc.)	0.001	3.80
Dispensing Status (1=Dispensing)	0.60	55.58
Log Proportion in Social Class I and II	0.09	5.09
Log Proportion with 2+ cars	-0.09	-5.43
Log Standardised Limiting Long Term Illness Ratio	-0.19	-6.00
Log Income Support	0.08	5.02
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.42	6.86
Log GP List Size	-0.43	-27.78
Age Sex Weight of List based on GPRD total times	-0.26	-14.13
Log of Average Distance of Patients from Practice	0.03	2.92
Log of Density of EDs(?) where patients live	-0.05	-11.00
Adjusted R square	**0.298**	

Table IV.B.2 Model 1B: GP level dependent log Expenditure (N=18910) Using Partner Dummies

Name of Variable	Coefficient	T value
(constant)	8.78	58.35
Age of GP	-0.0003	-0.79
Sex of GP (M=1, F=2)	-0.13	-19.76
Contract Status (FT=100, etc.)	0.01	37.83
Dispensing Status (1=Dispensing)	0.61	71.57
One Partner	0.15	12.47
Two Partners	0.04	3.80
Three Partners	0.03	3.43
Five Partners	-0.01	-1.22
Six Partners	-0.02	-2.44
Seven Partners	0.008	0.77
Eight + Partners	-0.07	-6.27
Log Proportion in Social Class I and II	0.08	0.60
Log Proportion with 2+ cars	-0.04	-3.42
Log Standardised Limiting Long Term Illness Ratio	-0.08	-3.18
Log Income Support	0.03	2.51
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.76	15.80
Log GP List Size	-0.74	-114.07
Age Sex Weight of List based on GPRD total times	-0.01	-0.91
Log of Average Distance of Patients from Practice	0.04	5.15
Log of Density of EDs(?) where patients live	-0.01	-4.33
Adjusted R square	**0.567**	

Table IV.B.3   **Model IC: GP level dependent log Expenditure (N=15918) Full Time GP's only**

Name of Variable		
(constant)	9.91	61.71
Age of GP	-0.0003	-0.79
Sex of GP (M=1, F=2)	-0.12	-17.58
Log Number of Partners	-0.07	-14.70
Dispensing Status (1=Dispensing)	0.60	67.05
Log Proportion in Social Class I and II	0.07	4.93
Log Proportion with 2+ cars	-0.04	-3.19
Log Standardised Limiting Long Term Illness Ratio	-0.11	-4.35
Log Income Support	0.03	2.45
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.74	14.48
Log GP List Size	-0.72	-97.24
Age Sex Weight of List based on GPRD total times	-0.03	-2.00
Log of Average Distance of Patients from Practice	0.05	5.92
Log of Density of EDs(?) where patients live	-0.02	-4.21
Adjusted R square	**0.555**	

Table IV.B.4   **Model IIA   GP level dependent log Total Expenditure Practice level dummies (N = 18874)**

Name of Variable	Coefficient	T value
(constant)	5.79	28.74
Age of GP	-0.008	-17.22
Sex of GP (M=1, F=2)	-0.03	-3.30
Log Number of Partners	0.17	12.10
Contract Status (FT=100, etc.)	0.0004	1.21
Dispensing Status (1=Dispensing)	0.59	54.37
Log Proportion in Social Class I and II	0.10	5.70
Log Proportion with 2+ cars	-0.13	-7.83
Log Standardised Limiting Long Term Illness Ratio	-0.25	-7.80
Log Income Support	0.10	5.95
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.36	5.85
Practice List Size 1	0.60	19.43
Practice List Size 2	0.39	17.81
Practice List Size 3	0.26	16.74
Practice List Size 4	0.16	11.75
Practice List Size 5	0.10	8.00
Age Sex Weight of List based on GPRD total times	-0.25	-13.66
Log of Average Distance of Patients from Practice	0.03	2.93
Log of Density of EDs(?) where patients live	-0.07	-14.88
Adjusted R square	**0.284**	

PRACTICE LEVEL ANALYSES

Table IV.B.5   Model IIIA Practice Level Expenses Per Patient - Pl1

Name of Variable			
(constant)	7.18	0.33	21.82
Proportion of GPs with Dispensing Status	0.91	0.04	25.60
Log Number of Partners	0.04	0.09	0.49
Age Sex Weight of List based on GPRD total times	0.04	0.03	1.42
Log Proportion in Social Class I and II	0.10	0.03	3.62
Log Proportion with 2+ cars	-0.19	0.03	-5.77
Log LPEROCC	0.009	0.04	0.24
Log Standardised Limiting Long Term Illness Ratio	-0.24	0.05	-4.48
Log Income Support	0.01	0.03	0.38
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.65	0.10	6.49
Log GP List Size	-0.33	0.02	-16.42
Log of Average Distance of Patients from Practice	0.08	0.02	4.39
Log of Density of EDs(?) where patients live	-0.08	0.008	-9.37
P6KM	0.001	0.002	0.70
Adjusted R square	**0.48**		

APPENDIX IV.C   OTHER DEPENDENTS

IV.C.1   Models for INCOME

Table IV.C.1   Practice models (N=3520) Dependent Log Income

Name of Variable	Coefficient	T value
(constant)	7.00	40.60
Proportion of GPs with Dispensing Status	0.54	32.79
Log Number of Partners	0.15	2.50
Age Sex Weight of List based on GPRD total times	0.11	5.38
Log Proportion in Social Class I and II	0.05	2.64
Log Proportion with 2+ cars	-0.16	-10.00
Log Standardised Limiting Long Term Illness Ratio	-0.21	-6.60
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.36	4.88
Log GP List Size	-0.35	-25.42
Log of Average Distance of Patients from Practice	0.05	4.00
Log of Density of EDs(?) where patients live	-0.05	-10.31
Adjusted R squared	**0.584**	

Table IV.C.2   PRACTICE LEVEL INCOME PER PERSON - PL2

Name of Variable	Coefficient	Std, Dev.	T value
Constant	7.63	0.23	32.95
Proportion of GPs with Dispensing Status	0.72	0.03	28.84
Log Number of Partners	0.08	0.06	1.38
Age Sex Weight of List based on GPRD total times	-0.003	0.02	-0.14
Log Proportion in Social Class I and II	0.05	0.02	2.86
Log Proportion with 2+ cars	-0.16	0.02	-6.86
Log LPEROCC	0.008	0.03	0.31
Log Standardised Limiting Long Term Illness Ratio	-0.19	0.04	-4.93
Log Income Support	0.0003	0.02	0.01
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.51	0.07	7.23
Log GP List Size	-0.35	0.01	-24.59
Log of Average Distance of Patients from Practice	0.08	0.01	5.53
Log of Density of EDs(?) where patients live	-0.06	0.006	-11.08
P6KM	0.0002	0.001	0.14
Adjusted R squared	**0.57**		

IV.C.2 Analyses on Drug Expenditure only

Table IV.C.3 GP level dependent log Drug Expenditure (N=18632)

Name of Variable	Coefficient	T value
Age of GP	-0.009	-0.68
Sex of GP	-0.18	-7.95
Log Number of Partners	-0.13	-7.64
Contract Status (FT=100, etc.)	0.006	6.48
Dispensing Status (1=Dispensing)	1.94	65.44
Log Proportion in Social Class I and II	0.09	1.86
Log Proportion with 2+ cars	0.35	7.99
Log Standardised Limiting Long Term Illness Ratio	0.07	0.77
Log Income Support	-0.009	-0.20
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.01	0.07
Log GP List Size	-0.70	-30.75
Age Sex Weight of List based on GPRD total times	0.13	2.62
Log of Average Distance of Patients from Practice	0.07	2.63
Log of Density of EDs(?) where patients live	0.02	1.51
Adjusted R square	**0.328**	

Table IV.C.4 Practice models (N=3521) Dependent Log Drug Expenditure

Name of Variable	Coefficient	T value
Constant	8.94	7.74
Age of GP	-0.004	-1.20
Sex of GP	-0.15	-2.96
Log Number of Partners	-0.29	-7.28
Contract Status	0.01	5.27
Log Proportion in Social Class I and II	-0.58	-4.45
Log Proportion with 2+ cars	0.58	3.69
Log Standardised Limiting Long Term Illness Ratio	-0.48	-2.39
Log Income Support	-0.21	-2.40
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	-0.59	-1.24
Log GP List Size	-0.73	-13.62
Age Sex Weight of List based on GPRD total times	0.08	0.67
Log of Average Distance of Patients from Practice	0.34	6.60
Log of Density of EDs(?) where patients live	-0.15	-7.00
Adjusted R square	**0.221**	

IV.C.3 Expenses to Earnings

Table IV.C.5   GP Level: Expenses To Earning Ratio Logged Independents

Name of Variable	Coefficient	Std. Dev.	T value
Constant	0.63	0.03	18.48
Age of GP	-0.0003	0	-3.64
Sex of GP	0.009	0.001	6.27
Log Number of Partners	-0.03	0.001	-24.79
Contract Status (FT=100, etc.)	-0.00009	0	-1.43
Dispensing Status (1=Dispensing)	0.09	0.002	44.80
Log Proportion in Social Class I and II	0.02	0.003	6.69
Log Proportion with 2+ cars	-0.01	0.003	-4.48
Log Standardised Limiting Long Term Illness Ratio	-0.01	0.01	-1.71
Log Income Support	0.008	0.003	2.53
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.11	0.01	12.31
Log GP List Size	0.004	0.001	2.87
Age Sex Weight of List based on GPRD total times	0.01	0.003	3.17
Log of Average Distance of Patients from Practice	0.003	0.002	1.31
Log of Density of EDs(?) where patients live	-0.003	0.001	-3.46
P6KM	0.0003	0	3.26
Adjusted R square	**0.19**		

Table IV.C.6   GP Level: Expenses To Earning Log-Log

Name of variable	Coef-ficient	St. Error	T value
Constant	-0.50	0.06	-8.15
Age of GP	-0.0007	0	-4.43
Sex of GP	0.02	0.003	6.58
Log Number of Partners	-0.04	0.002	-20.16
Contract Status (FT=100, etc.)	-0.0001	0	-1.11
Dispensing Status (1=Dispensing)	0.15	0.004	41.10
Log Proportion in Social Class I and II	0.03	0.01	6.20
Log Proportion with 2+ cars	-0.02	0.01	-3.06
Log Standardised Limiting Long Term Illness Ratio	-0.01	0.01	-1.31
Log Income Support	0.01	0.01	2.68
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.19	0.02	11.74
Log GP List Size	0.01	0.003	3.59
Age Sex Weight of List based on GPRD total times	0.02	0.01	3.58
Log of Average Distance of Patients from Practice	0.004	0.004	1.12
Log of Density of EDs(?) where# patients live	-0.004	0.002	-2.36
P6KM	0.0004	0	2.80
Adjusted R square	**0.16**		

APPENDIX IV.D SENSITIVITY ANALYSES FOR DIFFERENT COUNTRIES OF UK

DIFFERENT COUNTRIES OF GREAT BRITAIN

The three pairs of runs below are for the different countries of Great Britain. The results are similar for the basic control variables of contract and dispensing status and list size, but there are some variations with the socio-demographic variables and with the three 'rurality' variables.

The three variables are strongly significant and retain the same signs in the England subset. But, in the analyses for Scotland and Wales, the three variables do not reach statistical significance (except for the proportion more than 6 km in the Welsh model for income) and, perhaps more importantly, the population density indicator was found to have a significant positive impact on costs, meaning that as population density rises costs associated with delivering services to that population also increase. The most logical explanation for this result is that the population density indicator is acting as a proxy for urban areas, which often have higher costs associated with higher deprivation or Market Forces Factor effects. This does not occur with the England results as we have explicit values for the MFF.

Preferred Model Expenses For England Only - E1

Name of Variable			
Constant	10.11	0.18	56.37
Age of GP	0	0	-0.03
Sex of GP	-0.12	0.007	-17.86
Log Number of Partners	-0.07	0.005	-13.09
Contract Status (FT=100, etc.)	0.01	0	37.26
Dispensing Status (1=Dispensing)	0.51	0.01	54.69
Log Proportion in Social Class I and II	0.11	0.01	7.83
Log Proportion with 2+ cars	-0.20	0.02	-13.09
Log Standardised Limiting Long Term Illness Ratio	-0.29	0.03	-9.08
Log Income Support	0.07	0.01	4.88
Log UK Staff Market Forces Factor (Smoothed; Scotland, Wales = 1.1)	0.50	0.05	9.74
Log GP List Size	-0.75	0.01	-109.18
Age Sex Weight of List based on GPRD total times	-0.03	0.02	-2.07
Log of Average Distance of Patients from Practice	0.02	0.01	2.52
Log of Density of EDs(?) where patients live	-0.06	0.004	-13.67
P6KM	0.002	0	5.56
Adjusted R square	**0.59**		