

## Methods and data sources

This document describes the methods and data sources used in the series of three reports, titled:

1. Long-term trends in GP Practice consultation rates
2. The gap between need and supply of GP practice consultations
3. GP practice productivity and continuity of care

### Estimating GP practice consultation rates

The first report in the series includes estimates of crude GP practices consultation rates between 1995 and 2022. The second report estimates need-adjusted consultation rates between 2008 and 2019. These estimates are based on analyses of data obtained from the Clinical Practice Research Datalink, CPRD (protocol ID 22\_002493).

CPRD consists of two research databases, CPRD Gold and CPRD Aurum comprising anonymised data extracted from the Vision (Gold) and EMIS (Aurum) clinical information systems of participating GP practices. Further information about CPRD is available [here](#).

Year-stratified, exposure-weighted random samples of anonymised patient's records from English practices were drawn from CPRD Gold and CPRD Aurum for each year between 1995 and 2022. Twenty thousand patients were sampled from each system for each year. For the purposes of the sampling method, exposure was defined as the in-year duration of registration. The sampling method allowed for the same patient to be selected in multiple years, although the incidence of such repeated sampling was low.

The following variables were extracted or derived for each patient sampled each year:

- Year
- GP practice pseudonym
- Exposure
- Age
- Sex
- Deprivation (IMD2019) quintile
- Cambridge Multimorbidity Score
- Number of consultations (All)
- Number of consultations (in person at surgery or visit)
- Number of consultations (remote via telephone, video call etc)
- Number of consultations (GP)
- Number of consultations (other healthcare professional)

Age is defined as the difference between the exposure year and patient's year of birth. Ages take integer values between 0 and 89, with all aged over 90 grouped together as 90+.

Deprivation quintile is based on the English Indices of Deprivation 2019 (IMD2019) for the Lower Super Output Area (LSOA) of residence of the patients latest known address. Linkage to IMD2019 was carried out by CPRD (linkage request ID 3181).

The Cambridge Multimorbidity Score was calculated following the methods described by Payne et al 2020<sup>1</sup> for patients within the CPRD Gold sample. The 20 condition GP consultation model was used. Scores were rounded to the nearest integer, with all scores above 9.5 grouped together as 10+. Scores were calculated for each year from 2008 onwards.

The codelists used to calculate the Cambridge Multimorbidity Score were those developed by the Health Foundation and the University of Liverpool in their recent study, Health in 2040: projected patterns of illness in England.<sup>2</sup>

In-year consultation counts were derived using the rules and tables set out in the Appendix 1. Note that this process is similar to that described by Hobbs et al 2016<sup>3</sup> (CPRD Gold) and Vestesson et al 2023<sup>4</sup> (CPRD Aurum), although some staff and consultation type assignments types differ.

In-year exposure was calculated as the difference in days between the latest of two variables (current registration date, 1st January in the exposure year) and the earliest of four variables (transfer out or registration end date and date of death, 60 days before the practice last collection date and 31<sup>st</sup> December in the exposure year).

The following exclusions were applied after sampling.

Level	Exclusion criteria
Dataset (by year)	Patients drawn from CPRD Aurum for 2022 were excluded. CPRD Aurum data for 2022 was incomplete at the time of analysis.
Practice (by year)	Patients from practices with implausibly low in-year crude consultations rates (< 1 consultation per patient) were excluded following the method described by Hippisley-Cox et al 2008. <sup>5</sup>
Patient (by year)	Patients with gender other than male or female were excluded. Patients without a valid IMD quintile. Patients with no exposure (as defined above)
Consultations	Consultations for COVID-19 vaccinations were excluded using codes provided by CPRD. <sup>6</sup>

<sup>1</sup> <https://www.cmaj.ca/content/192/5/E107>

<sup>2</sup> <https://www.health.org.uk/publications/health-in-2040>

<sup>3</sup> [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(16\)00620-6/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)00620-6/fulltext)

<sup>4</sup> <https://publichealth.jmir.org/2023/1/e44944>

<sup>5</sup> <https://digital.nhs.uk/data-and-information/publications/statistical/trends-in-consultation-rates-in-general-practice/qresearch-report-on-trends-in-consultation-rates-in-general-practices-uk-1995-2008>

<sup>6</sup> <https://cprd.com/covid-19-feasibility-counts-vaccination-events> & <https://cprd.com/covid-19-feasibility-counts-vaccination-events>

We cap the number of consultations per member of staff, per patient, per type (in-surgery, remote, and home visit), per day, to 1.

A description of the study cohorts and their outcomes are shown in Appendix 2.

Four regression models were built for each of 5 outcomes:

- Number of consultations (All)
- Number of consultations (in person at surgery or visit)
- Number of consultations (remote via telephone, video call etc)
- Number of consultations (GP)
- Number of consultations (other healthcare professional)

These took the form of negative binomial generalised linear models, with an offset variable (log of exposure) and a practice random effect.

The four models are described in the table below:

Ref	Source dataset	Period coverage	Fixed Effects
G-AS	CPRD Gold	1995-2022	Year, age, sex
A-AS	CPRD Aurum	1995-2021	
G-ASDM	CPRD Gold	2008-2019	Year, age, sex, deprivation quintile, and Cambridge multimorbidity score
A-ASDM	CPRD Aurum	2008-2019	

Coefficients and fit characteristics for the 'all consultations' models are shown in Appendix 3.

Crude consultation rates by year were calculated as follows.

- 1) Start with data on population of England by year, age, and sex.
- 2) Calculating the population exposure of each year, age, and sex in (1) as 365 times the population size.
- 3) Using models G-AS and A-AS above, predict the number of consultations for each age, and sex sub-population from (2), and summing these for each year. Note that these predictions do not apply the practice random effect.
- 4) Dividing this predicted number of constitution (3) by the sum of the population in that year (1).

The expected number of consultations in 2019 for each Integrated Care Board at 2012 service levels were calculated as follows.

- 1) Using national data on population in 2019, by age, sex and LSOA and the assignment of LSOAs to deprivation quintiles and ICBs to estimate the population of each ICB in 2019 by age, sex and deprivation quintile.
- 2) Using our patient samples, calculate the proportion of the population in 2019 for age, sex and deprivation quintile subgroups by the 11 levels of the rounded, truncated Cambridge multimorbidity score (0 - 9 and 10+).
- 3) Applying these proportions (2) to the populations (1) to estimate the population of each ICB in 2019 by age, sex, deprivation quintile and Cambridge multimorbidity score.

- 4) Calculating the population exposure of each year, age, sex and deprivation quintile sub-population in (3) as 365 times the population size.
- 5) Using models G-ASDM and A-ASDM above, predict the number of consultations for each age, sex, deprivation quintile and Cambridge multimorbidity score sub-population from (4), with year set to 2012. Note that these predictions do not apply the practice random effect.

Analysis was conducted using R version 4.3.1<sup>7</sup>.

Scripts are available in the following GitHub repository: [https://github.com/The-Strategy-Unit/1047\\_GP\\_consultation\\_rate\\_trends](https://github.com/The-Strategy-Unit/1047_GP_consultation_rate_trends)

## Estimating GP Practice Productivity

The third report in the series describes GP Practice productivity and efficiency. This information is taken from three published studies listed below.

Arabadzhyan A, Castelli A, Gaughan J, Anaya Montes M, Chalkey M. Productivity of the English National Health Service: 2020/21 update. Centre for Health Economics, University of York. March 2023.

[https://www.york.ac.uk/media/che/documents/papers/researchpapers/NHS%20prod%20update%20202021\\_20230307-combined%20\(1\).pdf](https://www.york.ac.uk/media/che/documents/papers/researchpapers/NHS%20prod%20update%20202021_20230307-combined%20(1).pdf)

Williams K, Croft S, Mohammed M, Wyatt S. Estimating productivity levels in primary medical services across clinical commissioning groups in England and the impact of the COVID-19 pandemic: a data envelopment analysis. BMC Health Serv Res 23, 1194 (2023). <https://doi.org/10.1186/s12913-023-10117-2>

Kajaria-Montag H, Freeman M, Sholtes F. Continuity of Care Increases Physician Productivity in Primary Care. INSEAD Business School Working paper 2023/23/TOM. June 2023. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3868231](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3868231)

The second of these studies was carried out by the Strategy Unit, in conjunction with colleagues from the University of Birmingham. Details of the methods used can be found in the journal article itself and in the following GitHub repository: [https://github.com/The-Strategy-Unit/933\\_relative\\_efficiency\\_primary\\_care](https://github.com/The-Strategy-Unit/933_relative_efficiency_primary_care).

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<sup>7</sup> R Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>

## Supplementary data sources

The reports also draw on a range of supplementary data sources to provide context and aid interpretation. These are listed below.

### GP Practice appointments

Data on appointments in general practice was taken from the series of NHS Digital publications titled, Appointments in General Practice.

<https://digital.nhs.uk/data-and-information/publications/statistical/appointments-in-general-practice>

### GP outpatient referrals

GP outpatient referral data was sourced from NHS England's Monthly Referral Returns (MRR).

<https://www.england.nhs.uk/statistics/statistical-work-areas/outpatient-referrals/>

### Prescriptions

Data on GP prescribing were taken from NHS Digital's and the NHS Business Services Authority's Practice Level Prescribing dataset.

<https://digital.nhs.uk/data-and-information/areas-of-interest/prescribing/practice-level-prescribing-in-england-a-summary>

### GP Patient Survey

Data on the annual General Practice patient Survey was obtained from the NHSD England and Ipsos GPPS Analysis Tool.

<https://www.gp-patient.co.uk/analysistool>

### Practice - ICB allocation

Practice are allocated to Integrated care Board using the *epcmem* and *eccg* files obtained from NHS Digital's Organisation Data Service.

<https://digital.nhs.uk/services/organisation-data-service>



### Deprivation of area of residence

Deprivation was measured using the English Indices of Deprivation 2019 obtained from the Ministries of Housing, Communities and Local Government.

<https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019>

### Avoidable ED attendances

Avoidable ED attendances were identified in the A&E (pre-April 2019) and ECDS (April 2019 onwards) datasets in the National Commissioning Data Repository, using the method described by O'Keefe et al 2018.

<https://doi.org/10.1371/journal.pone.0192855>

### Ambulatory care sensitive admissions

Avoidable ED attendances were identified in the admitted patient care datasets in the National Commissioning Data Repository, using the method described by Purdy et al 2010.

<https://www.kingsfund.org.uk/sites/files/kf/Avoiding-Hospital-Admissions-Sarah-Purdy-December2010.pdf>

### NHS and primary medical services productivity trends

Trends in all NHS and primary medical services productivity are taken from a series of publications produced by the Centre for Health Economics at the University of York. The latest report in this series relates to the period 2020-2021.

[https://www.york.ac.uk/media/che/documents/papers/researchpapers/NHS%20prod%20update%20202021\\_20230307-combined%20\(1\).pdf](https://www.york.ac.uk/media/che/documents/papers/researchpapers/NHS%20prod%20update%20202021_20230307-combined%20(1).pdf)

### GP practice workforce

Workforce was obtained from NHS Digital publication series, General Practice Workforce.

<https://digital.nhs.uk/data-and-information/publications/statistical/general-and-personal-medical-services#latest-statistics>

## GP Worklife Survey

Data from the biennial GP Worklife Surveys was obtained from Health Organisation, Policy and Economics research group at the University of Manchester on behalf of the Policy Research Unit in Health and Social Care Systems and Commissioning (PRUComm).

<https://prucomm.ac.uk/eleventh-national-gp-worklife-survey-2021.html>

## Population

Data on population by single year of age, sex and Lower Super Outputs Area were obtained from the Office of National Statistics.

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/lowersuperoutputareamidyearpopulationestimates>

## Lower Layer Super Output Area to Integrated Care Board lookups

2011 Lower super output areas were assigned to Integrated Care Boards using lookup tables supplied by Office of national Statistics.

<https://geoportal.statistics.gov.uk/documents/1ac8547e9a8945478f0b5ea7ffe1a6b1/about>

## 2001 to 2011 and 2021 Lower Layer Super Output Area lookups

Lookups from 2001 to 2011 and 2021 Lower Layer Super Output areas were obtained from the Office of National Statistics.

<https://geoportal.statistics.gov.uk/datasets/ons::lower-layer-super-output-area-2001-to-lower-layer-super-output-area-2011-to-local-authority-district-2011-lookup-in-england-and-wales-1/about>

<https://geoportal.statistics.gov.uk/datasets/ons::lsoa-2011-to-lsoa-2021-to-local-authority-district-2022-lookup-for-england-and-wales-version-2/about>

## Appendix 1 - Identifying and classifying consultations

Consultations are identified and classified using a set of rules and codelists.

For CPRD Gold, we define a consultation as one which

is undertaken by a staff member with a staff role (*role*) that falls into one of the clinical (GP, nurse, other healthcare professional) job roles as defined in table G1,

AND,

has a consultation type (*constype*) code that falls into either the surgery, remote or visit group as defined in table G2

For CPRD Aurum, we define a consultation as one which

is undertaken by a staff member with a job category (*jobcatid*) that falls into one of the clinical (GP, nurse, other healthcare professional) job roles as defined in table A1,

AND,

[ has a EMIS consultation source identifier (*conssourceid*) description that falls into either the surgery, remote or a visit group as defined in table A2

OR

[ is an 'awaiting review' EMIS consultation source identifier (*conssourceid*) description

AND

has a consultation code source identifier (*consmedcodeid*) description that falls into either the surgery, remote or visit group as defined in table A3 ]

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**Table G1 - CPRD Gold staff type assignment**

role code	description	role group
1	Senior Partner	GP
2	Partner	GP
3	Assistant	GP
4	Associate	GP
5	Non-commercial local rota of less than 10 GPs	GP
6	Commercial Deputising service	GP
7	Locum	GP
8	GP Registrar	GP
10	Sole Practitioner	GP
47	Salaried Partner	GP
50	GP Retainer	GP
11	Practice Nurse	nurse
13	Community Nurse	nurse
14	Midwife	nurse
15	Community Psychiatric Nurse	nurse
34	Hospital Nurse	nurse
36	School Nurse	nurse
38	Contact Tracing Nurse	nurse
45	Mental Handicap Nurse	nurse
54	Other Nursing & Midwifery	nurse
61	Nurse Access Role	nurse
62	Nurse Manager Access Role	nurse
9	Consultant	OHP
12	Health Visitor	OHP
16	Social Worker	OHP
17	Pharmacist	OHP
18	Dispenser	OHP
19	Non-qualified Dispenser	OHP
26	Physiotherapist	OHP
27	Chiropodist	OHP
28	Dentist	OHP
29	Dietician	OHP
30	Counsellor	OHP
31	Osteopath	OHP
33	Other Health Care Professional	OHP
35	Community Medical Officer	OHP
37	Health Education Officer	OHP
39	Stomatherapist	OHP
41	Interpreter/Link Worker	OHP



role code	description	role group
42	Chiropractor	OHP
43	Acupuncturist	OHP
44	Homeopath	OHP
48	Occupational Therapist	OHP
49	Speech Therapist	OHP
51	Phlebotomist	OHP
52	Other Medical & Dental	OHP
53	Other Students	OHP
55	Other Allied Health Professionals	OHP
56	Other Professional Scientific & Technical	OHP
57	Other Healthcare Scientists	OHP
58	Other Additional Clinical Services	OHP
60	Clinical Practitioner Access Role	OHP
63	Health Professional Access Role	OHP
64	Healthcare Student Access Role	OHP
65	Biomedical Scientist Access Role	OHP
67	Optometrist	OHP
68	Radiographer	OHP
0	Data Not Entered	non clinical
20	Practice Manager	non clinical
21	Fund Manager	non clinical
22	Business Manager	non clinical
23	Administrator	non clinical
24	Secretary	non clinical
25	Receptionist	non clinical
32	Maintenance staff	non clinical
40	Computer Manager	non clinical
46	Carer	non clinical
59	Other Admin & Clerical	non clinical
66	Clinical Coder Access Role	non clinical



**Table G2 - CPRD Gold consultation type assignment**

constype code	description	consultation group
1	Clinic	surgery
7	Out of hours, Practice	surgery
9	Surgery consultation	surgery
18	Emergency Consultation	surgery
36	Co-op Surgery Consultation	surgery
38	Minor Injury Service	surgery
40	Community Clinic	surgery
61	Extended Hours	surgery
10	Telephone call from a patient	remote
21	Telephone call to a patient	remote
33	Triage	remote
35	Co-op Telephone advice	remote
55	Telephone Consultation	remote
2	Night visit, Deputising service	visit
3	Follow-up/routine visit	visit
4	Night visit, Local rota	visit
6	Night visit , practice	visit
11	Acute visit	visit
24	Children's Home Visit	visit
27	Home Visit	visit
28	Hotel Visit	visit
30	Nursing Home Visit	visit
31	Residential Home Visit	visit
32	Twilight Visit	visit
37	Co-op Home Visit	visit
50	Night Visit	visit
0	Data Not Entered	non consultation
5	Mail from patient	non consultation
8	Out of hours, Non Practice	non consultation
12	Discharge details	non consultation
13	Letter from Outpatients	non consultation
14	Repeat Issue	non consultation
15	Other	non consultation
16	Results recording	non consultation
17	Mail to patient	non consultation
19	Administration	non consultation
20	Casualty Attendance	non consultation
22	Third Party Consultation	non consultation
23	Hospital Admission	non consultation



constype code	description	consultation group
25	Day Case Report	non consultation
26	GOS18 Report	non consultation
29	NHS Direct Report	non consultation
34	Walk-in Centre	non consultation
39	Medicine Management	non consultation
41	Community Nursing Note	non consultation
42	Community Nursing Report	non consultation
43	Data Transferred from other system	non consultation
44	Health Authority Entry	non consultation
45	Health Visitor Note	non consultation
46	Health Visitor Report	non consultation
47	Hospital Inpatient Report	non consultation
48	Initial Post Discharge Review	non consultation
49	Laboratory Request	non consultation
51	Radiology Request	non consultation
52	Radiology Result	non consultation
53	Referral Letter	non consultation
54	Social Services Report	non consultation
56	Template Entry	non consultation
57	GP to GP communication transaction	non consultation
58	Non-consultation medication data	non consultation
59	Non-consultation data	non consultation
60	ePharmacy message	non consultation



**Table A1 - CPRD Aurum staff type assignment**

jobcatid code	description	role group
4	General Medical Practitioner	GP
5	Salaried General Practitioner	GP
15	Associate Practitioner - General Practitioner	GP
24	GP Registrar	GP
31	Sessional GP	GP
181	Locum GP	GP
183	Assistant GP	GP
6	Midwife - Sister/Charge Nurse	nurse
7	Midwife	nurse
8	Community Practitioner	nurse
9	Community Nurse	nurse
14	Health Care Support Worker	nurse
27	Specialist Nurse Practitioner	nurse
33	Nurse Consultant	nurse
36	Healthcare Assistant	nurse
47	Staff Nurse	nurse
48	Enrolled Nurse	nurse
50	Nursery Nurse	nurse
51	Helper/Assistant	nurse
52	Community Mental Health Nurse	nurse
55	Associate Practitioner - Nurse	nurse
59	Student Practice Nurse	nurse
60	Nurse Manager	nurse
61	Sister/Charge Nurse	nurse
88	Modern Matron	nurse
96	Community Learning Disabilities Nurse	nurse
98	Student Health Visitor	nurse
101	Midwife - Specialist Practitioner	nurse
111	Student Nurse - Adult Branch	nurse
115	Student District Nurse	nurse
137	Healthcare Cadet	nurse
148	Midwife - Consultant	nurse
153	Student Midwife	nurse
162	Nursing Cadet	nurse
169	Student Community Mental Health Nurse	nurse
186	Health Visitor	nurse
191	Student Occupational Health Nurse	nurse
204	Intermediate Care worker	nurse
211	Student School Nurse	nurse



jobcatid code	description	role group
213	Intermediate Care staff	nurse
214	Home help	nurse
221	Director of Nursing	nurse
225	Student Nurse - Mental Health Branch	nurse
232	Student Nurse - Learning Disabilities Branch	nurse
253	Trainee Nursing Associates	nurse
256	Nursing Associates	nurse
1	Consultant	OHP
2	Hospital Practitioner	OHP
3	Clinical Medical Officer	OHP
10	Chiropodist/Podiatrist	OHP
11	Dietitian	OHP
12	Pharmacist	OHP
13	Clinical Psychologist	OHP
16	Counsellor	OHP
17	Phlebotomist	OHP
25	Medical Student	OHP
34	Physiotherapist	OHP
35	Specialist Practitioner	OHP
37	Medical Technical Officer - Pharmacy	OHP
42	Social Worker	OHP
43	Trainee Practitioner	OHP
49	Multi Therapist	OHP
54	Technician - Healthcare Scientists	OHP
58	Associate Specialist	OHP
62	Psychotherapist	OHP
63	Osteopath	OHP
64	Social Care Support Worker	OHP
65	Assistant Psychologist	OHP
68	Psychiatrist	OHP
71	Dispenser	OHP
72	Clinical Assistant	OHP
73	Practitioner	OHP
77	Student Physiotherapist	OHP
78	Paramedic Specialist Practitioner	OHP
80	Physiotherapist Specialist Practitioner	OHP
82	Radiographer	OHP
83	Other Community Health Service	OHP
85	Community Worker (children)	OHP
86	Paramedic Consultant	OHP



jobcatid code	description	role group
87	Associate Practitioner	OHP
89	Asst. Clinical Medical Officer	OHP
91	Specialist Registrar	OHP
92	Chiropodist/Podiatrist Manager	OHP
93	Radiographer - Therapeutic, Manager	OHP
94	Optometrist	OHP
95	Assistant Practitioner	OHP
97	Technician - Additional Clinical Services	OHP
102	Occupational Therapist	OHP
105	Paramedic	OHP
106	Physiotherapist Consultant	OHP
112	Audiologist	OHP
113	Radiographer - Diagnostic	OHP
114	Therapist	OHP
116	House Officer - Post Registration	OHP
117	Speech & Language Therapist	OHP
118	Dietitian Specialist Practitioner	OHP
119	Trust Grade Doctor - SHO level	OHP
120	Director of Public Health	OHP
121	Staff Grade	OHP
122	Patient Welfare Officer	OHP
123	Occupational Therapy Specialist Practitioner	OHP
125	Chiropodist/Podiatrist Consultant	OHP
126	Trust Grade Doctor - Career Grade level	OHP
127	Student Community Practitioner	OHP
128	Healthcare Scientist	OHP
135	Art Therapist Specialist Practitioner	OHP
138	Dietitian Consultant	OHP
140	Social work assistant (mental health)	OHP
141	Chiropodist/Podiatrist Specialist Practitioner	OHP
142	Student Technician	OHP
144	Trainee Scientist	OHP
149	Art Therapist Consultant	OHP
152	Senior social worker (adults)	OHP
154	Radiologist	OHP
158	Radiographer - Diagnostic, Specialist Practitioner	OHP
159	Biomedical Scientist	OHP
165	Student Psychotherapist	OHP
166	Orthoptist	OHP
168	Approved Social Worker	OHP



jobcatid code	description	role group
171	Student Orthoptist	OHP
177	Trust Grade Doctor - Specialist Registrar level	OHP
178	Senior Clinical Medical Officer	OHP
179	Consultant Healthcare Scientist	OHP
180	Reporting Radiographer	OHP
185	Advanced Practitioner	OHP
188	Other Community Health Service - Social Care Worker	OHP
189	Physician Assistant	OHP
190	Deputising Doctor	OHP
192	Senior social worker (mental health)	OHP
193	Regional Dental Officer	OHP
197	Trust Grade Doctor - House Officer level	OHP
198	Art Therapist	OHP
199	Multi Therapist Specialist Practitioner	OHP
200	Drama Therapist	OHP
201	Healthcare Science Assistant	OHP
202	Social work assistant (adults)	OHP
205	Student Occupational Therapist	OHP
206	Student Dietitian	OHP
207	Healthcare Science Associate	OHP
210	General Dental Practitioner	OHP
212	Occupational Therapist Consultant	OHP
215	Art, Music & Drama Student	OHP
216	Specialist Healthcare Scientist	OHP
224	Specialist Healthcare Science Practitioner	OHP
226	Art Therapist Manager	OHP
227	Healthcare Science Practitioner	OHP
228	Assistant Psychotherapist	OHP
233	OT assistant	OHP
238	Orthotist	OHP
240	Multi Therapist Consultant	OHP
241	Dental Officer	OHP
243	Pharmacy Technicians	OHP
245	Mental Health Practitioners	OHP
246	Paramedic Advanced Practitioner	OHP
248	First Contact Physiotherapists	OHP
249	Clinical Pharmacists	OHP
250	Health and Wellbeing Coaches	OHP
251	Physician Associates	OHP
252	Dietitian Advanced Practitioner	OHP





jobcatid code	description	role group
254	Clinical Pharmacist Advanced Practitioner	OHP
255	Physiotherapist Advanced Practitioner	OHP
258	Chiropodist/Podiatrist Advanced Practitioner	OHP
18	Clerical Worker	non clinical
19	Manager	non clinical
20	Analyst	non clinical
21	System Administrator	non clinical
22	Desktop Support Administrator	non clinical
23	System Worker	non clinical
26	Other Community Health Service - Admin Clerk	non clinical
28	Receptionist	non clinical
29	Secretary	non clinical
30	Medical Secretary	non clinical
32	Clinical Application Administrator	non clinical
38	Health Records Administrator	non clinical
39	Helpdesk Administrator	non clinical
40	Appointments Clerk	non clinical
41	Senior House Officer	non clinical
44	Network Technician	non clinical
45	Clinical Coder	non clinical
46	Medical Records Clerk	non clinical
53	Senior Administrator	non clinical
56	Senior Manager	non clinical
57	Community Administrator	non clinical
66	Officer	non clinical
67	Technician - Admin & Clerical	non clinical
69	Health Records Clerk	non clinical
70	Desktop Support Technician	non clinical
74	Information Officer	non clinical
75	Network Administrator	non clinical
76	Chaplain	non clinical
79	Clinical Team Manager	non clinical
81	Helpdesk Technician	non clinical
84	Call Operator	non clinical
90	Community Team Manager	non clinical
99	Interpreter	non clinical
100	Medical Technical Officer	non clinical
103	Chief Executive	non clinical
104	Audit Manager	non clinical
107	Availability Monitor	non clinical



jobcatid code	description	role group
108	Medical Laboratory Assistant	non clinical
109	Gateway Worker	non clinical
110	Medical Records Manager	non clinical
124	Technician - PS&T	non clinical
129	Waiting List Clerk	non clinical
130	Clinical Director	non clinical
131	Pre-reg Pharmacist	non clinical
132	Mental Health Act Administrator	non clinical
133	Ward Clerk	non clinical
134	Support, Time, Recovery Worker	non clinical
136	Physiotherapist Manager	non clinical
139	Orthoptist Manager	non clinical
143	Complaints Investigator	non clinical
145	Radiographer - Diagnostic, Manager	non clinical
146	Social services care manager (mental health)	non clinical
147	Dietitian Manager	non clinical
150	Paramedic Manager	non clinical
151	Finance Director	non clinical
155	Ward Manager	non clinical
156	Midwife - Manager	non clinical
157	Waiting List Manager	non clinical
160	Board Level Director	non clinical
161	Non Executive Director	non clinical
163	Porter	non clinical
164	Social services care manager (adults)	non clinical
167	Clinical Director - Medical	non clinical
170	Other Executive Director	non clinical
172	Childcare Co-ordinator	non clinical
173	House Officer - Pre Registration	non clinical
174	SODP	non clinical
175	Outpatient Manager	non clinical
176	Medical Director	non clinical
182	Researcher	non clinical
184	Special salary scale in Public Health Medicine	non clinical
187	Dental Assistant Clinical Director	non clinical
194	Trainer	non clinical
195	Cytoscreener	non clinical
196	Chair	non clinical
203	Social work team manager (adults)	non clinical
208	Child Protection worker	non clinical



jobcatid code	description	role group
209	Professor	non clinical
217	Social Services information manager	non clinical
218	Occupational Therapist Manager	non clinical
219	Social services senior management	non clinical
220	Home Care organiser	non clinical
222	Nursery manager	non clinical
223	Caldicott Guardian	non clinical
229	Social work team manager (mental health)	non clinical
230	Playgroup leader	non clinical
231	Directory of Services Coordinator	non clinical
234	ODP	non clinical
235	Speech & Language Therapist Manager	non clinical
236	Complaints Coordinator	non clinical
237	Privacy Officer	non clinical
239	Day centre manager	non clinical
242	Occupational Therapy Team Manager	non clinical
244	Social Prescribing Link Workers	non clinical
247	Care Co-ordinators	non clinical
257	Registration Authority Agent	non clinical



**Table A2 - CPRD Aurum consultation type assignment - level1**

consourceid description	consultation group
Attendance	surgery
Baby Clinic	surgery
Booked Appointment	surgery
Branch Surgery	surgery
Clinic	surgery
Clinic NHS	surgery
Clinic Premises	surgery
Clinic note	surgery
Community Clinic	surgery
Community health clinic	surgery
Consultation	surgery
Diabetic Clinic	surgery
Duty Doctor Urgent Appointment	surgery
Emergency Appointment	surgery
Emergency Doctor	surgery
Emergency Gp Surgery	surgery
Emergency Nurse Clinic	surgery
Emergency Surgery	surgery
Emergency consultation	surgery
Extra Appointment	surgery
Face to face consultation	surgery
G P Consultation	surgery
G P Ordinary Surgery	surgery
G.P Surgery (Pm)	surgery
G.P. Evening Surgery	surgery
G.P. Morning Surgery	surgery
G.P.Surgery Urgent Consultation	surgery
GP Practice	surgery
GP Surgery	surgery
Health Centre	surgery
Main Surgery	surgery
Medicine Management	surgery
Nurse Minor Illness Clinic	surgery
Nurse Practitioner	surgery
Nurse Practitioner Surgery	surgery
Nurse Surgery	surgery
Nurse Triage Clinic	surgery
Nurse's Treatment Room Clinic	surgery
Nurses Room	surgery



consourceid description	consultation group
Nurses' Flu Clinic	surgery
OPEN DOOR SURGERY	surgery
Open Access Surgery	surgery
Open Surgery	surgery
Out of hours consultation at surgery	surgery
P.Nurse Clinic	surgery
Patient encounter data NOS	surgery
Practice Nurse	surgery
Practice Nurse Clinic	surgery
Practice Nurse Surgery	surgery
Primary Care Centre	surgery
Same Day Appointment	surgery
Same Day Clinic	surgery
Saturday Morning Surgery	surgery
Seen by Practice Nurse	surgery
Seen in GP's surgery	surgery
Seen in GPs surgery	surgery
Seen in Health Centre	surgery
Seen in Nurses Surgery	surgery
Seen in other clinic	surgery
Surgery	surgery
Surgery Attendance	surgery
Surgery Clinic	surgery
Surgery Emergency	surgery
Surgery consultation	surgery
Surgery or Clinic	surgery
Three Minute Surgery	surgery
Treatment Room	surgery
Treatment Room (Nurse)	surgery
Urgent Slots	surgery
Urgent Surgery	surgery
Urgent consultation	surgery
Walk-In Surgery	surgery
Walk-in clinic	surgery
Weekday Surgery	surgery
Consultation via video conference	remote
Duty Doctor Telephone	remote
Duty Telephone Appt	remote
Email Consultation	remote
Enterprise consultation	remote



consourceid description	consultation group
Nurse Triage	remote
Nurse telephone triage	remote
Online communication	remote
Online services message	remote
Out Of Hours Telephone Consultation	remote
Phone	remote
Telephone	remote
Telephone (Triage)	remote
Telephone Advice	remote
Telephone Advice By G.P	remote
Telephone Appt	remote
Telephone Call	remote
Telephone Consultation	remote
Telephone Surgery	remote
Telephone Triage	remote
Telephone Triage By Doctor	remote
Telephone call from a patient	remote
Telephone call to a patient	remote
Telephone encounter	remote
Telephone triage encounter	remote
Telephone with patient/carer	remote
Telephone: Nurse Triage	remote
Triage	remote
Triage By Phone	remote
accuRx Consultation	remote
Acute visit	visit
Daytime Visits patients home	visit
Follow-up/routine visit	visit
Home	visit
Home Visit	visit
Home of Patient	visit
Home visit note	visit
Hospital	visit
Hospital Visit	visit
Night Visit	visit
Night Visit patients home	visit
Night visit , practice	visit
Night visit, Local rota	visit
Normal Home Visit (08:00 - 11:00)	visit
Nursing Home	visit



consourceid description	consultation group
Nursing home visit note	visit
Out Of Hours Gp Visit	visit
Out Of Hours Visit	visit
Out of hours, Practice	visit
Residential Home	visit
Residential home visit note	visit
School	visit
Seen in own home	visit
Seen out of hours	visit
Visit-Home	visit
visit	visit
Awaiting review	see secondary list
A & E Attendance	non consultation
A & E Self Referral	non consultation
A&E, Information (no patient contact)	non consultation
A+E report	non consultation
Accident & Emergency	non consultation
Added By Summariser	non consultation
Admin (Patient Not Present)	non consultation
Admin Enquiry	non consultation
Admin Entry	non consultation
Admin Note	non consultation
Admin task	non consultation
Administration	non consultation
Administration (Pt Not Seen)	non consultation
Administration Entry	non consultation
Administration note	non consultation
Administrative Entry	non consultation
Apollo attached document	non consultation
ApolloScan document	non consultation
Bulk Operation	non consultation
Casualty Attendance	non consultation
Comment	non consultation
Comment For Medical Record	non consultation
Comment Only	non consultation
Communication Only	non consultation
Conversion	non consultation
Correspondence	non consultation
D.N.A.	non consultation
Data Entry	non consultation



consourceid description	consultation group
Data transferred from other system	non consultation
Day Case Report	non consultation
Did Not Arrive	non consultation
Did Not Attend	non consultation
Did Not Attend - Surgery	non consultation
Did Not Attend For Appointment	non consultation
Discharge details	non consultation
Discharged from inpatient care	non consultation
Discussion with colleague	non consultation
Dna	non consultation
Docman	non consultation
Doctors Message Book Query	non consultation
E-mail received from patient	non consultation
Elsewhere	non consultation
Elsewhere Non Payment	non consultation
Elsewhere Non-Payment	non consultation
Elsewhere none payment	non consultation
Elsewhere other	non consultation
Email	non consultation
Email sent to patient	non consultation
EnCompass document	non consultation
EnCompass message	non consultation
External	non consultation
External Encounter	non consultation
Externally Entered	non consultation
Externally entered note	non consultation
Failed encounter	non consultation
For Information Only	non consultation
GP2GP Import	non consultation
GP2GP Import, Contact method: Administration	non consultation
GP2GP Import, Contact method: Docman	non consultation
GP2GP Import, Contact method: G.P.Surgery	non consultation
GP2GP Import, Contact method: Letter encounter from patient	non consultation
GP2GP Import, Contact method: Seen in GPs surgery	non consultation
GP2GP Import, Contact method: Touchscreen	non consultation
GP2GP Import, Healthcare related organisation	non consultation
Health Authority	non consultation
Health Authority (trading)	non consultation
Hospital Outpatient	non consultation





consourceid description	consultation group
Hospital Outpatient Consultation	non consultation
Hospital inpatient	non consultation
Hospital inpatient report	non consultation
Hospital outpatient report	non consultation
Inbound Document	non consultation
Indirect Consultation	non consultation
Indirect encounter	non consultation
Information	non consultation
Information (no patient contact)	non consultation
Information Note	non consultation
Information Only	non consultation
Inpatient NHS	non consultation
Inpatient Trust	non consultation
Investigation result	non consultation
Laboratory Encounter	non consultation
Laboratory result	non consultation
Letter	non consultation
Letter Encounter	non consultation
Letter From Hospital	non consultation
Letter Received	non consultation
Letter encounter from patient	non consultation
Letter from Outpatients	non consultation
MJog	non consultation
Mail from patient	non consultation
Mail to patient	non consultation
Medication Course Commence	non consultation
Medication Issued	non consultation
Memo For Next Consultation	non consultation
Message	non consultation
Message In	non consultation
Message Out	non consultation
Minor Injuries Unit	non consultation
NHS Direct report	non consultation
Nhs Trust	non consultation
Night visit, Deputising service	non consultation
No Attendance Update	non consultation
No Patient Contact	non consultation
Non-consultation data	non consultation
Non-consultation medication data	non consultation
Not Actually Seen	non consultation



consourceid description	consultation group
Not Known	non consultation
Note	non consultation
Note Bene	non consultation
Notes	non consultation
Notes Entry. No Consultation	non consultation
Original Pathology Report	non consultation
Other	non consultation
Other note	non consultation
Other report	non consultation
Out Of Hours Centre	non consultation
Out of Hours	non consultation
Out of Hours report	non consultation
Out of hours, Non Practice	non consultation
Outbound Referral	non consultation
Outpatient Letter	non consultation
Outpatient NHS	non consultation
Outpatient Private	non consultation
Outpatient Trust	non consultation
Path. Lab.	non consultation
Path. Lab\Radiology	non consultation
Pathology Result	non consultation
Patient Not Present	non consultation
Patient Not Seen	non consultation
Patient Query	non consultation
PatientChase Insert	non consultation
Place Not Specified	non consultation
Place of Procedure NOS	non consultation
Post Received	non consultation
Prescription Request	non consultation
Primary care organisation	non consultation
Radiology	non consultation
Record Update	non consultation
Referral	non consultation
Referral letter	non consultation
Repeat Issue	non consultation
Report generated	non consultation
Result	non consultation
Results	non consultation
Results Of Tests (Sent Electronically)	non consultation
Results recording	non consultation



consourceid description	consultation group
Scanned In Letter	non consultation
Scanned document	non consultation
Scanner	non consultation
Screen Message	non consultation
Secretarial Office	non consultation
Secretary	non consultation
Seen by osteopath	non consultation
Seen in hospital out-pat.	non consultation
Summary Event Entry	non consultation
Telephone Admin	non consultation
Telephone call from relative/carer	non consultation
Telephone call to relative/carer	non consultation
Third Party	non consultation
Third party consultation	non consultation
Touchscreen	non consultation
Unspecified encounter	non consultation
Urgent Appointment	non consultation
Walk In Centre	non consultation
Walk-in Centre	non consultation
added by dispenser	non consultation
unknown	non consultation
NA	non consultation

**Table A3 - CPRD Aurum consultation type assignment - level2**

consmedcodeid description	consultation group
Emergency appointment	surgery
Emergency consultation	surgery
Extended hours consultation	surgery
Face to face consultation	surgery
GP Surgery	surgery
Group consultation	surgery
Routine consultation	surgery
Same day appointment	surgery
Seen in GP unit	surgery
Seen in baby clinic	surgery
Seen in diabetic clinic	surgery
Seen in influenza vaccination clinic	surgery
Seen in rapid access clinic at GP surgery	surgery
Urgent consultation	surgery
Walk-in clinic	surgery
Consultation via SMS text message	remote
Consultation via telemedicine web camera	remote
Telephone call from a patient	remote
Telephone consultation	remote
Telephone encounter	remote
Telephone triage encounter	remote
Children's home visit note	visit
Home visit note	visit
Night visit note	visit
Nursing home visit note	visit
School visit note	visit
Twilight visit note	visit
Weekly care home ward round	visit
Administration note	non consultation
Awaiting clinical code migration to EMIS Web	non consultation
Case conference	non consultation
Clinic note	non consultation
Consultation via multimedia	non consultation
Discussion with other professional	non consultation
District nurse visit	non consultation
Externally entered note	non consultation
Face to face consultation with relative/carer	non consultation
Hospital inpatient note	non consultation
Hospital inpatient report	non consultation



consmedcodeid description	consultation group
Hospital outpatient report	non consultation
Inbound document	non consultation
Inbound referral	non consultation
Laboratory result	non consultation
Mail from patient	non consultation
Mail to patient	non consultation
Medication requested	non consultation
Multidisciplinary team meeting without patient	non consultation
Non-consultation data	non consultation
OOH report	non consultation
Other consultation medium used	non consultation
Other note	non consultation
Provision of general practitioner intermediate care	non consultation
Repeat prescription	non consultation
Scanned document	non consultation
Seen in urgent care centre	non consultation
Telephone call from relative/carer	non consultation
Third party consultation	non consultation

## Appendix 2 - Description of study population and their outcomes

Table 1a: Study population

year	CPRD Gold						CPRD Aurum					
	patients	practices	mean exposure (days)	mean age (years)	% female	% most deprived quintile	patients	practices	mean exposure (days)	mean age (years)	% female	% most deprived quintile
1995	18388	372	356	40.2	50.4%	16.0%	12022	703	356	39.9	50.0%	16.7%
1996	18983	390	358	40.2	49.8%	16.1%	13042	781	357	40.5	50.8%	16.6%
1997	19470	398	356	40.5	50.2%	16.4%	13838	837	355	40.2	50.0%	16.6%
1998	19443	400	355	40.3	50.3%	16.5%	14877	901	355	40.7	50.2%	16.9%
1999	19741	408	355	40.2	51.0%	16.2%	15661	969	355	40.8	50.0%	17.2%
2000	19839	415	356	40.3	50.8%	16.4%	16510	1062	355	40.6	49.6%	17.7%
2001	19876	417	355	40.5	50.5%	15.7%	17089	1132	355	40.5	49.3%	17.5%
2002	19919	418	355	40.3	51.1%	16.1%	18037	1228	354	40.8	49.7%	17.9%
2003	19958	420	356	40.4	49.9%	16.2%	19007	1316	355	40.5	49.7%	18.6%
2004	19957	421	356	40.3	50.0%	15.8%	19479	1386	355	40.3	49.5%	19.6%
2005	19976	422	355	40.1	50.2%	16.2%	19716	1415	354	40.4	49.8%	19.6%
2006	19981	422	354	40.3	50.2%	15.6%	19760	1424	354	40.1	49.2%	19.6%
2007	19977	421	354	40.7	50.5%	15.8%	19818	1433	354	40.2	49.9%	19.4%
2008	19982	420	355	40.5	50.6%	16.4%	19867	1442	355	40.1	48.9%	19.6%
2009	19984	414	354	40.8	50.0%	16.1%	19878	1443	354	40.1	49.6%	19.4%
2010	19976	407	352	40.3	50.0%	16.2%	19869	1452	354	40.2	50.0%	19.5%
2011	19964	387	349	40.3	51.0%	16.4%	19887	1457	354	40.0	50.0%	19.7%
2012	19984	368	352	40.4	49.9%	16.2%	19882	1452	355	39.9	50.4%	19.5%
2013	19973	349	343	40.7	50.3%	16.9%	19887	1451	352	39.7	50.0%	19.6%
2014	19963	308	335	40.8	50.2%	16.1%	19869	1453	354	39.3	49.5%	19.1%
2015	19974	250	324	40.5	50.8%	17.1%	19899	1457	354	39.7	49.9%	19.3%
2016	19943	175	329	40.5	50.5%	16.9%	19880	1450	355	40.0	49.6%	19.6%



year	CPRD Gold						CPRD Aurum					
	patients	practices	mean exposure (days)	mean age (years)	% female	% most deprived quintile	patients	practices	mean exposure (days)	mean age (years)	% female	% most deprived quintile
2017	19920	129	340	40.0	49.8%	16.5%	19939	1452	355	39.7	50.5%	20.0%
2018	19955	105	341	40.2	50.3%	15.8%	19919	1452	354	39.5	50.1%	19.6%
2019	19988	88	322	40.5	50.6%	17.0%	19943	1438	352	40.0	50.2%	19.7%
2020	19873	62	313	40.6	50.1%	19.3%	19966	1402	354	39.4	50.1%	19.7%
2021	19596	41	288	41.2	49.6%	21.1%	19986	1347	357	40.0	48.8%	19.9%
2022	19612	20	265	42.6	49.6%	19.2%	-	-	-	-	-	-

**Table 1b: Study outcomes**

year	CPRD Gold							CPRD Aurum						
	consults	% GP			% other healthcare professional			consults	% GP			% other healthcare professional		
		% surgery	% remote	% visit	% surgery	% remote	% visit		% surgery	% remote	% visit	% surgery	% remote	% visit
1995	52920	89.3%	3.5%	3.7%	3.5%	0.0%	0.0%	27511	47.9%	1.3%	2.3%	43.0%	2.7%	2.8%
1996	56878	86.9%	2.9%	2.7%	7.5%	0.0%	0.0%	30749	50.9%	1.1%	2.1%	41.5%	2.0%	2.3%
1997	64053	83.3%	2.6%	2.2%	11.8%	0.1%	0.1%	33928	50.9%	1.2%	1.9%	42.4%	1.8%	1.7%
1998	70056	80.5%	3.0%	2.0%	14.2%	0.2%	0.1%	37082	54.5%	1.6%	1.8%	39.1%	1.5%	1.5%
1999	76126	77.3%	3.3%	2.0%	17.0%	0.2%	0.2%	40794	54.8%	1.7%	1.9%	38.6%	1.2%	1.9%
2000	85291	73.6%	3.0%	1.7%	21.1%	0.3%	0.4%	45450	55.2%	1.9%	1.9%	38.0%	1.1%	1.9%
2001	87137	71.5%	3.3%	1.7%	22.7%	0.4%	0.4%	52495	53.3%	2.3%	2.0%	39.4%	1.5%	1.5%
2002	87058	68.3%	3.1%	1.7%	25.9%	0.7%	0.4%	58595	52.7%	2.5%	2.0%	39.2%	1.6%	2.0%
2003	90977	66.0%	3.4%	1.8%	27.3%	0.9%	0.6%	66422	52.0%	3.0%	2.0%	40.2%	1.5%	1.4%
2004	93175	64.2%	3.8%	1.5%	28.7%	0.9%	0.9%	74042	50.1%	3.2%	1.8%	41.9%	1.6%	1.5%
2005	95215	61.8%	4.1%	1.6%	29.9%	1.3%	1.2%	80885	50.3%	3.5%	1.5%	41.6%	1.8%	1.4%
2006	93827	61.5%	4.6%	1.5%	30.1%	1.4%	0.9%	82838	50.6%	3.6%	1.5%	40.6%	1.8%	1.8%
2007	94591	59.6%	5.1%	1.6%	31.1%	1.6%	1.0%	85619	50.7%	4.2%	1.4%	40.1%	2.1%	1.4%
2008	94651	59.1%	5.7%	1.8%	30.9%	1.7%	0.7%	89313	49.6%	5.1%	1.5%	39.6%	2.2%	1.9%
2009	97792	58.5%	6.5%	1.2%	31.7%	1.4%	0.6%	91839	50.0%	6.0%	1.5%	39.1%	2.2%	1.1%
2010	96962	58.0%	6.7%	1.6%	31.4%	1.5%	0.7%	93378	51.1%	6.6%	1.4%	37.5%	2.1%	1.2%
2011	96431	57.6%	6.7%	1.5%	32.3%	1.4%	0.6%	94166	51.8%	7.2%	1.5%	36.6%	1.9%	0.9%
2012	101937	57.9%	7.5%	1.5%	30.9%	1.5%	0.7%	96483	53.3%	8.1%	1.7%	34.6%	1.7%	0.7%
2013	99257	56.9%	9.2%	1.7%	30.5%	1.3%	0.4%	96716	51.8%	9.6%	1.6%	34.8%	1.6%	0.5%
2014	96085	56.4%	10.4%	1.3%	30.0%	1.5%	0.4%	95836	50.4%	11.6%	1.7%	34.3%	1.5%	0.5%
2015	91633	56.2%	9.8%	1.3%	30.9%	1.5%	0.3%	95188	49.2%	12.6%	1.7%	34.5%	1.6%	0.4%
2016	92376	56.6%	9.8%	1.1%	30.5%	1.8%	0.2%	94299	48.1%	14.0%	1.5%	33.8%	2.0%	0.5%



year	CPRD Gold							CPRD Aurum						
	consults	% GP			% other healthcare professional			consults	% GP			% other healthcare professional		
		surgery	remote	visit	surgery	remote	visit		surgery	remote	visit	surgery	remote	visit
2017	91810	58.3%	9.0%	1.0%	29.4%	2.0%	0.3%	90126	46.0%	13.6%	1.5%	36.1%	2.4%	0.5%
2018	88687	57.1%	8.3%	1.2%	30.8%	2.2%	0.3%	87278	43.9%	15.0%	1.5%	36.1%	2.9%	0.6%
2019	83970	57.0%	8.6%	1.2%	30.7%	2.3%	0.2%	89220	43.2%	14.4%	1.2%	37.4%	3.1%	0.6%
2020	71652	50.2%	17.6%	0.6%	27.5%	4.0%	0.2%	85567	23.9%	34.7%	0.7%	30.1%	10.0%	0.6%
2021	70555	47.1%	20.9%	0.4%	29.5%	2.1%	0.1%	99577	20.7%	37.8%	0.5%	27.7%	12.9%	0.4%
2022	66958	45.9%	15.9%	0.6%	36.1%	1.3%	0.2%	-	-	-	-	-	-	-



## Appendix 3 - Model results and fit characteristics

Table 2a: Coefficients for models G-AS and A-AS

Term group	Term	CPRD Gold				CPRD Aurum			
		IRR	LCL95	UCL95	p	IRR	LCL95	UCL95	p
	intercept	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sex:age	f-00	6.57	6.07	7.12	0.00	7.47	6.84	8.17	0.00
	f-01	4.20	3.95	4.47	0.00	4.31	4.02	4.62	0.00
	f-02	2.41	2.27	2.56	0.00	2.46	2.30	2.64	0.00
	f-03	2.22	2.09	2.36	0.00	2.25	2.10	2.41	0.00
	f-04	2.13	2.00	2.27	0.00	2.17	2.03	2.34	0.00
	f-05	1.63	1.53	1.74	0.00	1.67	1.55	1.80	0.00
	f-06	1.40	1.31	1.49	0.00	1.29	1.20	1.39	0.00
	f-07	1.23	1.15	1.31	0.00	1.18	1.09	1.27	0.00
	f-08	1.10	1.03	1.17	0.01	1.17	1.08	1.26	0.00
	f-09	1.10	1.03	1.17	0.01	1.18	1.09	1.27	0.00
	f-10	1.04	0.98	1.11	0.20	1.07	0.99	1.15	0.09
	f-11	1.06	0.99	1.13	0.08	1.02	0.95	1.10	0.60
	f-12	1.03	0.97	1.10	0.35	1.06	0.98	1.14	0.15
	f-13	1.16	1.08	1.23	0.00	1.11	1.03	1.20	0.01
	f-14	1.37	1.28	1.46	0.00	1.35	1.25	1.45	0.00
	f-15	1.56	1.46	1.66	0.00	1.57	1.46	1.69	0.00
	f-16	1.90	1.78	2.02	0.00	1.79	1.66	1.93	0.00
	f-17	2.24	2.11	2.39	0.00	2.07	1.92	2.24	0.00
	f-18	2.53	2.38	2.70	0.00	2.46	2.28	2.65	0.00
	f-19	2.60	2.44	2.77	0.00	2.56	2.38	2.75	0.00
	f-20	2.75	2.59	2.93	0.00	2.63	2.45	2.82	0.00
	f-21	2.84	2.67	3.02	0.00	2.72	2.54	2.91	0.00
	f-22	2.93	2.76	3.12	0.00	2.80	2.61	3.00	0.00
	f-23	2.88	2.71	3.06	0.00	2.84	2.65	3.04	0.00
	f-24	3.01	2.83	3.19	0.00	2.72	2.54	2.91	0.00
	f-25	3.07	2.89	3.25	0.00	3.05	2.85	3.26	0.00
	f-26	3.00	2.82	3.18	0.00	2.98	2.79	3.19	0.00
	f-27	3.10	2.92	3.28	0.00	3.12	2.92	3.34	0.00
	f-28	3.20	3.02	3.39	0.00	3.29	3.08	3.52	0.00
	f-29	3.27	3.08	3.47	0.00	3.26	3.05	3.49	0.00
	f-30	3.11	2.93	3.30	0.00	3.25	3.04	3.47	0.00
	f-31	3.22	3.04	3.41	0.00	3.12	2.92	3.34	0.00
	f-32	3.21	3.03	3.40	0.00	3.07	2.88	3.28	0.00
	f-33	3.17	2.99	3.36	0.00	3.21	3.01	3.43	0.00
	f-34	3.20	3.03	3.39	0.00	3.22	3.02	3.44	0.00
f-35	3.14	2.96	3.32	0.00	3.16	2.96	3.37	0.00	



Term group	Term	CPRD Gold				CPRD Aurum			
		IRR	LCL95	UCL95	p	IRR	LCL95	UCL95	p
	f-36	3.08	2.91	3.26	0.00	3.13	2.93	3.35	0.00
	f-37	3.01	2.84	3.19	0.00	3.11	2.91	3.32	0.00
	f-38	2.99	2.82	3.17	0.00	3.06	2.86	3.27	0.00
	f-39	2.90	2.74	3.08	0.00	2.99	2.79	3.19	0.00
	f-40	3.00	2.83	3.18	0.00	3.05	2.85	3.26	0.00
	f-41	3.03	2.86	3.21	0.00	2.86	2.67	3.05	0.00
	f-42	2.89	2.73	3.06	0.00	3.03	2.83	3.24	0.00
	f-43	2.91	2.75	3.08	0.00	3.01	2.81	3.21	0.00
	f-44	2.96	2.80	3.14	0.00	3.01	2.81	3.22	0.00
	f-45	3.00	2.83	3.18	0.00	3.07	2.87	3.28	0.00
	f-46	3.19	3.01	3.38	0.00	3.12	2.92	3.34	0.00
	f-47	3.15	2.97	3.34	0.00	3.10	2.90	3.32	0.00
	f-48	3.15	2.97	3.34	0.00	3.28	3.07	3.51	0.00
	f-49	3.24	3.05	3.43	0.00	3.35	3.14	3.59	0.00
	f-50	3.32	3.14	3.52	0.00	3.34	3.12	3.57	0.00
	f-51	3.37	3.18	3.57	0.00	3.48	3.25	3.72	0.00
	f-52	3.32	3.13	3.51	0.00	3.46	3.23	3.70	0.00
	f-53	3.32	3.13	3.52	0.00	3.38	3.15	3.61	0.00
	f-54	3.44	3.24	3.65	0.00	3.40	3.17	3.64	0.00
	f-55	3.53	3.33	3.74	0.00	3.51	3.27	3.76	0.00
	f-56	3.53	3.33	3.75	0.00	3.67	3.43	3.94	0.00
	f-57	3.52	3.32	3.73	0.00	3.59	3.35	3.85	0.00
	f-58	3.65	3.44	3.87	0.00	3.58	3.34	3.84	0.00
	f-59	3.77	3.56	4.00	0.00	3.68	3.43	3.94	0.00
	f-60	3.67	3.46	3.90	0.00	3.79	3.53	4.07	0.00
	f-61	3.96	3.73	4.20	0.00	3.97	3.70	4.26	0.00
	f-62	3.89	3.66	4.14	0.00	3.94	3.67	4.23	0.00
	f-63	4.02	3.78	4.27	0.00	4.18	3.89	4.49	0.00
	f-64	4.02	3.78	4.27	0.00	4.06	3.78	4.36	0.00
	f-65	4.19	3.94	4.46	0.00	4.36	4.06	4.69	0.00
	f-66	4.22	3.96	4.49	0.00	4.44	4.13	4.77	0.00
	f-67	4.51	4.24	4.80	0.00	4.49	4.18	4.83	0.00
	f-68	4.45	4.18	4.74	0.00	4.74	4.41	5.09	0.00
	f-69	4.68	4.40	4.98	0.00	4.71	4.38	5.06	0.00
	f-70	4.84	4.54	5.15	0.00	5.18	4.82	5.58	0.00
	f-71	4.82	4.53	5.13	0.00	5.13	4.77	5.52	0.00
	f-72	5.10	4.79	5.43	0.00	5.16	4.80	5.56	0.00
	f-73	5.35	5.02	5.70	0.00	5.26	4.89	5.67	0.00
	f-74	5.44	5.11	5.79	0.00	5.48	5.08	5.90	0.00
	f-75	5.34	5.01	5.69	0.00	5.61	5.20	6.05	0.00
	f-76	5.67	5.31	6.05	0.00	5.67	5.25	6.12	0.00
	f-77	5.72	5.35	6.10	0.00	5.92	5.48	6.39	0.00
	f-78	5.79	5.42	6.18	0.00	5.96	5.52	6.44	0.00
	f-79	6.12	5.72	6.54	0.00	6.16	5.70	6.65	0.00



Term group	Term	CPRD Gold				CPRD Aurum			
		IRR	LCL95	UCL95	p	IRR	LCL95	UCL95	p
	f-80	6.02	5.63	6.45	0.00	6.16	5.70	6.66	0.00
	f-81	5.92	5.53	6.34	0.00	6.12	5.65	6.63	0.00
	f-82	6.12	5.71	6.56	0.00	6.05	5.57	6.56	0.00
	f-83	6.27	5.84	6.73	0.00	6.46	5.95	7.02	0.00
	f-84	6.47	6.02	6.95	0.00	6.54	6.00	7.13	0.00
	f-85	6.42	5.96	6.91	0.00	6.31	5.78	6.88	0.00
	f-86	6.52	6.03	7.05	0.00	6.65	6.07	7.28	0.00
	f-87	6.78	6.26	7.35	0.00	6.38	5.83	6.99	0.00
	f-88	6.63	6.09	7.21	0.00	6.15	5.59	6.75	0.00
	f-89	6.60	6.05	7.20	0.00	5.87	5.31	6.50	0.00
	f-90+	6.40	6.04	6.79	0.00	5.91	5.53	6.31	0.00
	m-00	7.37	6.83	7.95	0.00	7.79	7.16	8.49	0.00
	m-01	4.50	4.24	4.78	0.00	4.57	4.27	4.90	0.00
	m-02	2.68	2.52	2.84	0.00	2.66	2.48	2.85	0.00
	m-03	2.17	2.04	2.31	0.00	2.31	2.16	2.48	0.00
	m-04	2.20	2.07	2.33	0.00	2.22	2.07	2.38	0.00
	m-05	1.68	1.58	1.79	0.00	1.66	1.54	1.78	0.00
	m-06	1.33	1.25	1.41	0.00	1.36	1.27	1.46	0.00
	m-07	1.20	1.13	1.28	0.00	1.16	1.08	1.25	0.00
	m-08	1.11	1.04	1.18	0.00	1.07	0.99	1.15	0.08
	m-09	1.01	0.95	1.08	0.75	1.01	0.93	1.08	0.88
	m-10	0.99	0.93	1.06	0.83	0.99	0.92	1.06	0.71
	m-11 (ref)	1.00	-	-	-	1.00	-	-	-
	m-12	0.99	0.93	1.06	0.86	0.99	0.92	1.07	0.80
	m-13	1.02	0.95	1.08	0.64	0.95	0.88	1.03	0.21
	m-14	1.06	1.00	1.13	0.07	1.02	0.95	1.10	0.61
	m-15	1.04	0.98	1.11	0.19	1.16	1.08	1.25	0.00
	m-16	1.06	1.00	1.13	0.07	1.01	0.93	1.08	0.89
	m-17	1.02	0.96	1.09	0.47	1.00	0.93	1.08	0.98
	m-18	1.06	1.00	1.13	0.06	1.08	1.00	1.16	0.05
	m-19	1.05	0.99	1.12	0.12	1.10	1.02	1.19	0.01
	m-20	1.06	0.99	1.13	0.08	1.07	0.99	1.15	0.09
	m-21	1.10	1.03	1.18	0.00	1.07	1.00	1.15	0.06
	m-22	1.10	1.03	1.18	0.00	1.05	0.98	1.13	0.16
	m-23	1.16	1.08	1.23	0.00	1.07	1.00	1.15	0.06
	m-24	1.09	1.03	1.16	0.01	1.08	1.01	1.16	0.03
	m-25	1.11	1.05	1.19	0.00	1.12	1.05	1.21	0.00
	m-26	1.11	1.04	1.18	0.00	1.06	0.99	1.14	0.09
	m-27	1.18	1.11	1.26	0.00	1.11	1.04	1.19	0.00
	m-28	1.14	1.08	1.22	0.00	1.19	1.11	1.27	0.00
	m-29	1.16	1.09	1.23	0.00	1.23	1.15	1.32	0.00
	m-30	1.23	1.15	1.30	0.00	1.21	1.13	1.29	0.00
	m-31	1.19	1.12	1.26	0.00	1.26	1.17	1.34	0.00
	m-32	1.29	1.21	1.37	0.00	1.26	1.18	1.35	0.00



Term group	Term	CPRD Gold				CPRD Aurum			
		IRR	LCL95	UCL95	p	IRR	LCL95	UCL95	p
	m-33	1.30	1.22	1.38	0.00	1.28	1.20	1.37	0.00
	m-34	1.35	1.27	1.43	0.00	1.23	1.15	1.32	0.00
	m-35	1.36	1.28	1.44	0.00	1.33	1.24	1.42	0.00
	m-36	1.38	1.30	1.47	0.00	1.39	1.30	1.49	0.00
	m-37	1.46	1.38	1.55	0.00	1.37	1.28	1.46	0.00
	m-38	1.46	1.37	1.55	0.00	1.38	1.29	1.48	0.00
	m-39	1.46	1.37	1.55	0.00	1.38	1.29	1.48	0.00
	m-40	1.57	1.48	1.66	0.00	1.50	1.41	1.61	0.00
	m-41	1.54	1.46	1.64	0.00	1.58	1.48	1.69	0.00
	m-42	1.56	1.47	1.66	0.00	1.58	1.48	1.70	0.00
	m-43	1.59	1.49	1.68	0.00	1.62	1.52	1.74	0.00
	m-44	1.66	1.57	1.76	0.00	1.65	1.55	1.77	0.00
	m-45	1.78	1.68	1.89	0.00	1.73	1.62	1.85	0.00
	m-46	1.78	1.68	1.89	0.00	1.82	1.70	1.95	0.00
	m-47	1.76	1.66	1.87	0.00	1.76	1.65	1.88	0.00
	m-48	1.87	1.77	1.99	0.00	1.80	1.68	1.92	0.00
	m-49	2.00	1.88	2.12	0.00	2.00	1.86	2.14	0.00
	m-50	2.01	1.89	2.13	0.00	2.13	1.99	2.28	0.00
	m-51	2.09	1.97	2.21	0.00	2.24	2.09	2.39	0.00
	m-52	2.09	1.97	2.22	0.00	2.31	2.16	2.47	0.00
	m-53	2.23	2.10	2.36	0.00	2.23	2.08	2.38	0.00
	m-54	2.25	2.12	2.39	0.00	2.34	2.18	2.51	0.00
	m-55	2.34	2.21	2.48	0.00	2.48	2.31	2.65	0.00
	m-56	2.35	2.22	2.50	0.00	2.76	2.58	2.96	0.00
	m-57	2.67	2.51	2.83	0.00	2.71	2.53	2.91	0.00
	m-58	2.64	2.49	2.80	0.00	2.75	2.57	2.95	0.00
	m-59	2.76	2.60	2.93	0.00	2.86	2.67	3.07	0.00
	m-60	3.01	2.84	3.20	0.00	3.05	2.84	3.27	0.00
	m-61	3.22	3.03	3.41	0.00	3.10	2.88	3.32	0.00
	m-62	3.27	3.08	3.48	0.00	3.29	3.06	3.53	0.00
	m-63	3.38	3.18	3.59	0.00	3.42	3.18	3.67	0.00
	m-64	3.61	3.40	3.84	0.00	3.49	3.25	3.75	0.00
	m-65	3.83	3.60	4.07	0.00	3.84	3.57	4.13	0.00
	m-66	3.78	3.55	4.03	0.00	4.00	3.72	4.30	0.00
	m-67	4.03	3.78	4.29	0.00	4.14	3.85	4.46	0.00
	m-68	4.22	3.97	4.50	0.00	4.19	3.89	4.51	0.00
	m-69	4.25	3.99	4.53	0.00	4.35	4.04	4.68	0.00
	m-70	4.49	4.22	4.79	0.00	4.69	4.36	5.05	0.00
	m-71	4.50	4.22	4.80	0.00	4.79	4.45	5.17	0.00
	m-72	5.02	4.70	5.36	0.00	4.99	4.63	5.38	0.00
	m-73	4.85	4.54	5.18	0.00	4.95	4.59	5.34	0.00
	m-74	4.94	4.63	5.28	0.00	5.39	4.99	5.82	0.00
	m-75	5.18	4.84	5.55	0.00	5.32	4.92	5.75	0.00
	m-76	5.37	5.01	5.75	0.00	5.34	4.94	5.78	0.00



Term group	Term	CPRD Gold				CPRD Aurum			
		IRR	LCL95	UCL95	p	IRR	LCL95	UCL95	p
	m-77	5.50	5.13	5.89	0.00	5.52	5.09	6.00	0.00
	m-78	5.43	5.05	5.83	0.00	5.79	5.33	6.30	0.00
	m-79	5.84	5.42	6.28	0.00	5.85	5.36	6.37	0.00
	m-80	5.91	5.49	6.37	0.00	6.11	5.61	6.66	0.00
	m-81	6.30	5.84	6.80	0.00	5.71	5.22	6.25	0.00
	m-82	6.20	5.72	6.71	0.00	6.33	5.76	6.95	0.00
	m-83	6.16	5.68	6.69	0.00	6.31	5.75	6.93	0.00
	m-84	6.66	6.13	7.25	0.00	6.58	5.95	7.28	0.00
	m-85	6.41	5.86	7.01	0.00	6.61	5.98	7.32	0.00
	m-86	6.51	5.93	7.14	0.00	6.59	5.90	7.35	0.00
	m-87	6.33	5.72	7.00	0.00	6.75	5.99	7.59	0.00
	m-88	7.05	6.32	7.87	0.00	5.89	5.19	6.68	0.00
	m-89	7.11	6.33	7.98	0.00	6.21	5.43	7.10	0.00
	m-90+	6.59	6.12	7.11	0.00	5.83	5.36	6.34	0.00
year	1995	0.63	0.62	0.65	0.00	0.49	0.48	0.51	0.00
	1996	0.65	0.64	0.67	0.00	0.50	0.48	0.51	0.00
	1997	0.72	0.70	0.73	0.00	0.53	0.52	0.55	0.00
	1998	0.78	0.76	0.80	0.00	0.54	0.52	0.55	0.00
	1999	0.83	0.81	0.85	0.00	0.56	0.55	0.58	0.00
	2000	0.93	0.91	0.95	0.00	0.61	0.59	0.62	0.00
	2001	0.94	0.92	0.97	0.00	0.67	0.66	0.69	0.00
	2002	0.95	0.93	0.98	0.00	0.72	0.70	0.74	0.00
	2003	0.98	0.95	1.00	0.03	0.78	0.76	0.80	0.00
	2004	0.99	0.97	1.02	0.64	0.84	0.82	0.86	0.00
	2005	1.02	1.00	1.05	0.04	0.92	0.90	0.94	0.00
	2006	1.02	0.99	1.04	0.19	0.94	0.92	0.96	0.00
	2007	1.00	0.98	1.02	0.92	0.97	0.95	1.00	0.04
	2008 (ref)	1.00	-	-	-	1.00	-	-	-
	2009	1.04	1.02	1.07	0.00	1.05	1.02	1.07	0.00
	2010	1.04	1.02	1.06	0.00	1.05	1.03	1.08	0.00
	2011	1.04	1.02	1.06	0.00	1.06	1.03	1.08	0.00
	2012	1.09	1.07	1.12	0.00	1.09	1.06	1.12	0.00
	2013	1.09	1.07	1.12	0.00	1.10	1.08	1.13	0.00
	2014	1.07	1.05	1.10	0.00	1.09	1.06	1.12	0.00
	2015	1.06	1.04	1.09	0.00	1.08	1.05	1.10	0.00
	2016	1.07	1.04	1.10	0.00	1.07	1.04	1.10	0.00
	2017	1.03	1.00	1.05	0.02	1.03	1.00	1.06	0.02
	2018	0.99	0.96	1.01	0.31	1.01	0.99	1.04	0.42
	2019	0.96	0.94	0.99	0.00	1.05	1.02	1.07	0.00
	2020	0.82	0.80	0.84	0.00	1.01	0.99	1.04	0.38
	2021	0.86	0.84	0.88	0.00	1.18	1.15	1.21	0.00
	2022	0.88	0.86	0.90	0.00	-	-	-	-



**Table 2b: Other characteristics for models G-AS and A-AS**

Other model characteristics	CPRD Gold	CPRD Aurum
Standard deviation of practice random effect	0.267	0.323
Efron's pseudo R squared	0.201	0.188



**Table 2c: Other characteristics for models G-ASDM and A-ASDM**

Term group	Term	CPRD Gold				CPRD Aurum			
		IRR	LCL95	UCL95	p	IRR	LCL95	UCL95	p
	intercept	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cambridge Multimorbidity Score	0 (ref)	1.00	-	-	-	1.00	-	-	-
	1	1.64	1.62	1.66	0.00	1.65	1.62	1.68	0.00
	2	1.94	1.91	1.97	0.00	1.89	1.86	1.93	0.00
	3	2.27	2.23	2.32	0.00	2.17	2.13	2.21	0.00
	4	2.59	2.54	2.65	0.00	2.60	2.54	2.66	0.00
	5	2.84	2.75	2.92	0.00	2.83	2.75	2.92	0.00
	6	3.00	2.92	3.08	0.00	2.98	2.89	3.06	0.00
	7	3.34	3.24	3.44	0.00	3.39	3.28	3.49	0.00
	8	3.54	3.42	3.66	0.00	3.56	3.44	3.69	0.00
	9	3.71	3.57	3.85	0.00	3.80	3.66	3.95	0.00
	10+	4.44	4.33	4.55	0.00	4.62	4.50	4.74	0.00
deprivation quintile	1 (ref)	1.00	-	-	-	1.00	-	-	-
	2	1.03	1.01	1.04	0.00	1.00	0.98	1.01	0.54
	3	1.03	1.02	1.05	0.00	1.02	1.01	1.04	0.01
	4	1.06	1.04	1.07	0.00	1.06	1.04	1.08	0.00
	5	1.10	1.08	1.12	0.00	1.11	1.09	1.13	0.00
sex:age	f-00	8.17	7.35	9.09	0.00	9.47	8.50	10.56	0.00
	f-01	5.23	4.82	5.68	0.00	5.14	4.72	5.61	0.00
	f-02	2.72	2.50	2.95	0.00	2.94	2.69	3.21	0.00
	f-03	2.54	2.34	2.76	0.00	2.62	2.40	2.87	0.00
	f-04	2.38	2.19	2.59	0.00	2.63	2.40	2.87	0.00
	f-05	1.70	1.56	1.86	0.00	1.78	1.62	1.95	0.00
	f-06	1.47	1.34	1.60	0.00	1.45	1.32	1.59	0.00
	f-07	1.29	1.18	1.41	0.00	1.28	1.17	1.41	0.00
	f-08	1.20	1.09	1.31	0.00	1.24	1.13	1.37	0.00
	f-09	1.14	1.04	1.24	0.01	1.22	1.11	1.35	0.00
	f-10	1.12	1.02	1.22	0.02	1.22	1.11	1.34	0.00
	f-11	1.10	1.00	1.20	0.05	1.16	1.05	1.27	0.00
	f-12	1.11	1.01	1.21	0.02	1.18	1.07	1.30	0.00
	f-13	1.23	1.13	1.35	0.00	1.23	1.12	1.36	0.00
	f-14	1.59	1.46	1.74	0.00	1.47	1.33	1.61	0.00
	f-15	1.66	1.52	1.81	0.00	1.80	1.64	1.99	0.00
	f-16	1.96	1.80	2.14	0.00	2.00	1.81	2.20	0.00
	f-17	2.33	2.13	2.54	0.00	2.23	2.02	2.45	0.00
	f-18	2.58	2.37	2.82	0.00	2.44	2.22	2.69	0.00
	f-19	2.76	2.53	3.01	0.00	2.53	2.31	2.78	0.00
	f-20	2.63	2.41	2.87	0.00	2.64	2.41	2.88	0.00
	f-21	2.79	2.56	3.04	0.00	2.57	2.36	2.81	0.00
f-22	2.78	2.56	3.03	0.00	2.54	2.33	2.77	0.00	





Term group	Term	CPRD Gold				CPRD Aurum			
		IRR	LCL95	UCL95	p	IRR	LCL95	UCL95	p
	f-23	2.83	2.60	3.08	0.00	2.63	2.41	2.86	0.00
	f-24	2.91	2.68	3.16	0.00	2.56	2.35	2.79	0.00
	f-25	2.98	2.74	3.23	0.00	2.92	2.68	3.18	0.00
	f-26	2.84	2.62	3.08	0.00	2.79	2.56	3.04	0.00
	f-27	2.92	2.69	3.16	0.00	3.01	2.76	3.28	0.00
	f-28	3.06	2.82	3.32	0.00	3.19	2.93	3.47	0.00
	f-29	3.05	2.81	3.31	0.00	3.10	2.85	3.38	0.00
	f-30	2.91	2.68	3.16	0.00	3.05	2.80	3.32	0.00
	f-31	3.11	2.87	3.37	0.00	2.87	2.63	3.12	0.00
	f-32	2.98	2.75	3.23	0.00	2.97	2.73	3.24	0.00
	f-33	3.03	2.79	3.28	0.00	2.93	2.69	3.19	0.00
	f-34	2.97	2.74	3.22	0.00	2.96	2.71	3.22	0.00
	f-35	2.92	2.69	3.16	0.00	2.92	2.68	3.18	0.00
	f-36	2.82	2.60	3.05	0.00	2.87	2.63	3.12	0.00
	f-37	2.75	2.54	2.98	0.00	2.82	2.59	3.07	0.00
	f-38	2.74	2.53	2.97	0.00	2.62	2.40	2.85	0.00
	f-39	2.65	2.45	2.87	0.00	2.75	2.53	3.00	0.00
	f-40	2.64	2.43	2.86	0.00	2.70	2.47	2.94	0.00
	f-41	2.68	2.47	2.91	0.00	2.45	2.25	2.67	0.00
	f-42	2.58	2.38	2.80	0.00	2.51	2.30	2.73	0.00
	f-43	2.44	2.25	2.64	0.00	2.49	2.28	2.71	0.00
	f-44	2.43	2.24	2.64	0.00	2.38	2.19	2.60	0.00
	f-45	2.50	2.31	2.71	0.00	2.41	2.22	2.63	0.00
	f-46	2.60	2.40	2.82	0.00	2.44	2.24	2.65	0.00
	f-47	2.51	2.32	2.72	0.00	2.39	2.20	2.60	0.00
	f-48	2.45	2.26	2.65	0.00	2.42	2.22	2.64	0.00
	f-49	2.43	2.24	2.63	0.00	2.47	2.26	2.69	0.00
	f-50	2.54	2.34	2.75	0.00	2.54	2.33	2.76	0.00
	f-51	2.53	2.34	2.75	0.00	2.49	2.29	2.72	0.00
	f-52	2.43	2.24	2.64	0.00	2.47	2.26	2.69	0.00
	f-53	2.33	2.15	2.52	0.00	2.41	2.21	2.63	0.00
	f-54	2.37	2.18	2.57	0.00	2.37	2.17	2.59	0.00
	f-55	2.40	2.21	2.60	0.00	2.31	2.11	2.53	0.00
	f-56	2.32	2.14	2.51	0.00	2.40	2.20	2.63	0.00
	f-57	2.40	2.21	2.60	0.00	2.30	2.10	2.52	0.00
	f-58	2.44	2.24	2.65	0.00	2.35	2.15	2.57	0.00
	f-59	2.44	2.25	2.65	0.00	2.27	2.07	2.48	0.00
	f-60	2.30	2.11	2.50	0.00	2.46	2.25	2.69	0.00
	f-61	2.53	2.33	2.75	0.00	2.49	2.28	2.73	0.00
	f-62	2.48	2.29	2.70	0.00	2.44	2.23	2.67	0.00
	f-63	2.45	2.25	2.66	0.00	2.57	2.35	2.81	0.00
	f-64	2.50	2.30	2.72	0.00	2.46	2.25	2.70	0.00
	f-65	2.57	2.36	2.79	0.00	2.59	2.37	2.84	0.00
	f-66	2.50	2.30	2.72	0.00	2.62	2.39	2.87	0.00





Term group	Term	CPRD Gold				CPRD Aurum			
		IRR	LCL95	UCL95	p	IRR	LCL95	UCL95	p
	f-67	2.61	2.40	2.85	0.00	2.49	2.28	2.73	0.00
	f-68	2.56	2.35	2.79	0.00	2.61	2.38	2.86	0.00
	f-69	2.67	2.45	2.91	0.00	2.61	2.37	2.86	0.00
	f-70	2.86	2.62	3.12	0.00	2.79	2.54	3.06	0.00
	f-71	2.72	2.49	2.96	0.00	2.83	2.58	3.11	0.00
	f-72	2.76	2.53	3.01	0.00	2.70	2.46	2.97	0.00
	f-73	2.85	2.61	3.12	0.00	2.68	2.44	2.95	0.00
	f-74	2.89	2.64	3.16	0.00	2.91	2.65	3.21	0.00
	f-75	2.86	2.61	3.13	0.00	2.81	2.55	3.10	0.00
	f-76	2.99	2.73	3.28	0.00	2.74	2.48	3.02	0.00
	f-77	2.85	2.59	3.12	0.00	3.00	2.72	3.31	0.00
	f-78	2.98	2.72	3.27	0.00	2.89	2.62	3.19	0.00
	f-79	3.10	2.82	3.40	0.00	2.90	2.62	3.21	0.00
	f-80	2.90	2.64	3.19	0.00	2.82	2.55	3.12	0.00
	f-81	3.01	2.73	3.31	0.00	2.78	2.51	3.08	0.00
	f-82	2.92	2.65	3.22	0.00	2.75	2.47	3.05	0.00
	f-83	3.01	2.73	3.32	0.00	2.92	2.63	3.25	0.00
	f-84	3.06	2.77	3.38	0.00	2.84	2.55	3.18	0.00
	f-85	2.97	2.69	3.29	0.00	2.79	2.50	3.12	0.00
	f-86	3.02	2.71	3.37	0.00	2.86	2.55	3.21	0.00
	f-87	3.26	2.93	3.63	0.00	2.83	2.52	3.17	0.00
	f-88	2.85	2.54	3.18	0.00	2.67	2.38	3.00	0.00
	f-89	2.96	2.63	3.33	0.00	2.71	2.39	3.07	0.00
	f-90+	2.92	2.69	3.16	0.00	2.60	2.39	2.83	0.00
	m-00	9.33	8.44	10.32	0.00	10.11	9.09	11.23	0.00
	m-01	5.53	5.10	6.00	0.00	5.60	5.14	6.11	0.00
	m-02	2.97	2.74	3.23	0.00	3.17	2.90	3.47	0.00
	m-03	2.50	2.30	2.71	0.00	2.76	2.53	3.02	0.00
	m-04	2.44	2.24	2.65	0.00	2.54	2.32	2.77	0.00
	m-05	1.69	1.55	1.84	0.00	1.77	1.62	1.93	0.00
	m-06	1.38	1.27	1.51	0.00	1.45	1.33	1.59	0.00
	m-07	1.21	1.11	1.33	0.00	1.27	1.16	1.39	0.00
	m-08	1.15	1.06	1.26	0.00	1.20	1.10	1.32	0.00
	m-09	1.07	0.98	1.17	0.14	1.08	0.98	1.18	0.13
	m-10	1.04	0.95	1.14	0.40	1.13	1.03	1.24	0.01
	m-11 (ref)	1.00	-	-	-	1.00	-	-	-
	m-12	1.00	0.91	1.10	0.98	1.05	0.95	1.16	0.32
	m-13	1.07	0.98	1.17	0.12	1.05	0.96	1.16	0.30
	m-14	1.13	1.04	1.24	0.01	1.13	1.02	1.24	0.01
	m-15	1.09	1.00	1.19	0.06	1.15	1.05	1.27	0.00
	m-16	1.11	1.02	1.22	0.02	1.08	0.98	1.19	0.11
	m-17	1.02	0.93	1.12	0.62	1.05	0.95	1.16	0.34
	m-18	1.08	0.99	1.18	0.09	1.19	1.08	1.31	0.00
	m-19	1.10	1.01	1.21	0.03	1.22	1.11	1.34	0.00





Term group	Term	CPRD Gold				CPRD Aurum			
		IRR	LCL95	UCL95	p	IRR	LCL95	UCL95	p
	m-20	1.10	1.00	1.20	0.04	1.16	1.06	1.28	0.00
	m-21	1.08	0.99	1.18	0.10	1.09	0.99	1.19	0.08
	m-22	1.07	0.98	1.18	0.13	1.05	0.96	1.15	0.27
	m-23	1.12	1.02	1.22	0.01	1.03	0.94	1.13	0.50
	m-24	1.07	0.98	1.17	0.14	1.10	1.01	1.21	0.04
	m-25	1.12	1.02	1.22	0.01	1.07	0.98	1.17	0.15
	m-26	1.05	0.96	1.15	0.31	1.05	0.96	1.15	0.33
	m-27	1.15	1.05	1.25	0.00	1.11	1.01	1.22	0.02
	m-28	1.14	1.04	1.24	0.00	1.15	1.05	1.26	0.00
	m-29	1.12	1.03	1.23	0.01	1.22	1.11	1.33	0.00
	m-30	1.21	1.11	1.33	0.00	1.17	1.07	1.28	0.00
	m-31	1.17	1.07	1.27	0.00	1.22	1.12	1.34	0.00
	m-32	1.16	1.07	1.27	0.00	1.29	1.18	1.40	0.00
	m-33	1.20	1.10	1.30	0.00	1.19	1.09	1.30	0.00
	m-34	1.30	1.19	1.41	0.00	1.13	1.04	1.24	0.01
	m-35	1.28	1.18	1.40	0.00	1.24	1.14	1.36	0.00
	m-36	1.27	1.17	1.39	0.00	1.31	1.20	1.43	0.00
	m-37	1.38	1.27	1.50	0.00	1.25	1.14	1.36	0.00
	m-38	1.35	1.24	1.47	0.00	1.27	1.17	1.39	0.00
	m-39	1.31	1.21	1.43	0.00	1.27	1.17	1.39	0.00
	m-40	1.44	1.32	1.56	0.00	1.41	1.29	1.54	0.00
	m-41	1.46	1.34	1.58	0.00	1.45	1.33	1.58	0.00
	m-42	1.37	1.26	1.49	0.00	1.46	1.34	1.60	0.00
	m-43	1.37	1.26	1.49	0.00	1.43	1.31	1.56	0.00
	m-44	1.45	1.34	1.57	0.00	1.43	1.31	1.56	0.00
	m-45	1.54	1.42	1.67	0.00	1.50	1.38	1.64	0.00
	m-46	1.47	1.35	1.59	0.00	1.60	1.47	1.75	0.00
	m-47	1.44	1.32	1.56	0.00	1.48	1.36	1.62	0.00
	m-48	1.55	1.43	1.68	0.00	1.47	1.34	1.60	0.00
	m-49	1.60	1.48	1.74	0.00	1.56	1.43	1.70	0.00
	m-50	1.63	1.51	1.77	0.00	1.72	1.58	1.88	0.00
	m-51	1.63	1.51	1.77	0.00	1.75	1.60	1.91	0.00
	m-52	1.66	1.53	1.80	0.00	1.71	1.57	1.86	0.00
	m-53	1.70	1.57	1.85	0.00	1.73	1.58	1.89	0.00
	m-54	1.69	1.56	1.84	0.00	1.69	1.55	1.85	0.00
	m-55	1.75	1.62	1.90	0.00	1.87	1.71	2.04	0.00
	m-56	1.78	1.64	1.93	0.00	1.99	1.82	2.17	0.00
	m-57	1.91	1.75	2.07	0.00	1.90	1.73	2.07	0.00
	m-58	1.97	1.81	2.14	0.00	1.88	1.72	2.06	0.00
	m-59	1.98	1.82	2.15	0.00	1.91	1.75	2.09	0.00
	m-60	1.98	1.82	2.16	0.00	1.94	1.77	2.13	0.00
	m-61	2.10	1.93	2.28	0.00	2.03	1.85	2.22	0.00
	m-62	2.20	2.02	2.40	0.00	2.02	1.85	2.22	0.00
	m-63	2.10	1.93	2.28	0.00	2.00	1.83	2.20	0.00



Term group	Term	CPRD Gold				CPRD Aurum			
		IRR	LCL95	UCL95	p	IRR	LCL95	UCL95	p
	m-64	2.25	2.06	2.44	0.00	2.18	1.99	2.39	0.00
	m-65	2.38	2.18	2.59	0.00	2.26	2.06	2.48	0.00
	m-66	2.33	2.14	2.53	0.00	2.36	2.16	2.59	0.00
	m-67	2.30	2.11	2.50	0.00	2.44	2.22	2.67	0.00
	m-68	2.41	2.21	2.63	0.00	2.35	2.14	2.58	0.00
	m-69	2.47	2.26	2.69	0.00	2.36	2.15	2.59	0.00
	m-70	2.51	2.30	2.73	0.00	2.62	2.39	2.88	0.00
	m-71	2.51	2.29	2.74	0.00	2.52	2.29	2.77	0.00
	m-72	2.67	2.44	2.92	0.00	2.64	2.40	2.91	0.00
	m-73	2.56	2.33	2.80	0.00	2.46	2.24	2.71	0.00
	m-74	2.56	2.33	2.81	0.00	2.63	2.39	2.91	0.00
	m-75	2.66	2.42	2.93	0.00	2.60	2.35	2.87	0.00
	m-76	2.63	2.39	2.89	0.00	2.70	2.44	2.99	0.00
	m-77	2.75	2.50	3.02	0.00	2.48	2.23	2.75	0.00
	m-78	2.67	2.42	2.95	0.00	2.72	2.44	3.02	0.00
	m-79	2.82	2.55	3.12	0.00	2.73	2.45	3.04	0.00
	m-80	2.81	2.55	3.10	0.00	2.80	2.52	3.12	0.00
	m-81	2.81	2.53	3.11	0.00	2.48	2.21	2.77	0.00
	m-82	2.98	2.68	3.31	0.00	2.85	2.54	3.21	0.00
	m-83	3.05	2.73	3.41	0.00	2.95	2.64	3.31	0.00
	m-84	3.00	2.68	3.35	0.00	2.86	2.52	3.25	0.00
	m-85	3.02	2.69	3.41	0.00	3.02	2.67	3.41	0.00
	m-86	3.02	2.67	3.41	0.00	2.68	2.34	3.07	0.00
	m-87	2.84	2.50	3.23	0.00	3.08	2.68	3.54	0.00
	m-88	2.91	2.54	3.33	0.00	2.50	2.15	2.91	0.00
	m-89	3.23	2.79	3.75	0.00	2.72	2.33	3.19	0.00
	m-90+	3.04	2.75	3.35	0.00	2.59	2.33	2.87	0.00
year	2008 (ref)	1.00	-	-	-	1.00	-	-	-
	2009	1.03	1.01	1.06	0.00	1.03	1.01	1.06	0.00
	2010	1.01	0.99	1.04	0.20	1.04	1.01	1.06	0.00
	2011	1.02	1.00	1.04	0.10	1.03	1.01	1.05	0.01
	2012	1.06	1.04	1.09	0.00	1.06	1.04	1.08	0.00
	2013	1.06	1.04	1.08	0.00	1.06	1.04	1.08	0.00
	2014	1.04	1.02	1.07	0.00	1.05	1.03	1.07	0.00
	2015	1.04	1.01	1.06	0.00	1.04	1.01	1.06	0.00
	2016	1.03	1.00	1.05	0.02	1.01	0.99	1.03	0.40
	2017	0.98	0.96	1.00	0.06	0.96	0.94	0.99	0.00
	2018	0.95	0.93	0.97	0.00	0.94	0.92	0.96	0.00
	2019	0.93	0.91	0.95	0.00	0.98	0.95	1.00	0.03





**Table 2d: Other characteristics for models G-ASDM and A-ASDM**

Other model characteristics	CPRD Gold	CPRD Aurum
Standard deviation of practice random effect	0.289	0.298
Efron's pseudo R squared	0.352	0.319