TAYLOR FRY

Annual report on the Benefit System for Working-age Adults

As at 30 June 2017

Appendices

This report has been produced for the Ministry of Social Development

APPENDIX A GUIDE TO APPENDICES

The Appendices provide much of the technical detail of our approach. The following table describes the various appendices supplied with the report.

Table A.1 Description of appendices

#	Title	Description
A	Guide to Appendices	Describes appendices
B	Background	Provides the context behind the projection and report
C	Projection assumptions	Details inflation, discounting, unemployment rate, overpayment recovery and recoverable assistance assumptions used in the projection
D	Data supplied	Describes the datasets provide by MSD and used in the projection
E	Projection scope	Details the various payment types and benefit codes within scope
F	Projection definitions	Details the inclusion/exclusion of certain clients and payments in the projection
G	Details on modelling approach	Provides further detail on the types of models used in the projection and their explicit parameterisation
H	Model Coefficients [Separate Excel file]	Excel file of parameters for each of the models
I	Computation details	Gives some background as to the way we performed the computation of the projection of the benefit system population
J	Actual versus expected comparisons for 2016/17 [Separate Excel file]	Tables of actual versus expected experience for the year to 30 June 2017
K	Change in projected payments	A segment level reconciliation of the changes from the 2016 to 2017 projected payments
L	Sensitivity Analysis	A segment level detailing of sensitivity to unemployment, discounting and inflation rates
M	Other one-way tables	Showing current client lifetime payments across a number of different dimensions
N	Projected number of clients and payments [Separate Excel file]	Tables detailing the projected number of people in each state and their corresponding payments, over the duration of the projection

APPENDIX B BACKGROUND

Since 2011, the New Zealand Government has applied an investment approach to reducing long-term benefit receipt and its associated social and financial outcomes. Annual projections of the benefit system are a key enabler of the investment approach. Projections make visible the key drivers of the future benefit support receipt— including policy and labour market changes—and quantify their impact on the future benefit support durations and payments. Annual projections, combined with monitoring and evaluation, also tell a performance story about how MSD is managing the benefit system and supporting clients towards independence.

Taylor Fry has been working in partnership with MSD and the Treasury since June 2011 to help develop this investment approach in the benefit system. Further detail is provided in our initial report on the feasibility of an investment approach,[1] and in our six prior reports of the benefit system.[2] All six reports are publicly available on MSD's website.

In 2016, we undertook the first projection of durations and costs of New Zealand's public housing system (as at 30 June 2015)[3]. This was undertaken with a combined benefit system - public housing system model; that is, clients' benefit and public housing status are modelled simultaneously. The combined approach was taken due to the large overlap in population as well as strong predictive effects between the two systems; public housing history is highly predictive of future benefit system pathways (and vice versa).

This report is the second projection of the benefit system using the combined model. While the projection model estimates future income-related rent subsidies to public housing tenants, these are **not** in the scope of the benefit system projection.

B.1 Definitions of future benefit system durations and payments

We worked closely with MSD and the Treasury in 2011 and 2012 to develop definitions that best facilitate the investment approach to the benefit system. Two key estimates of the projection are:

- Total future durations for current clients
- Total future benefit payments to current clients

Total future durations for current clients is defined as: The estimated future years of main benefit support among clients who received a benefit payment in the 12 months up to and including the effective date of the projection.

Total future payments for current clients is defined as: The estimated future lifetime benefit payments and associated expenses for working-age clients who received a benefit payment in the 12 months up to and including the effective date of the projection.

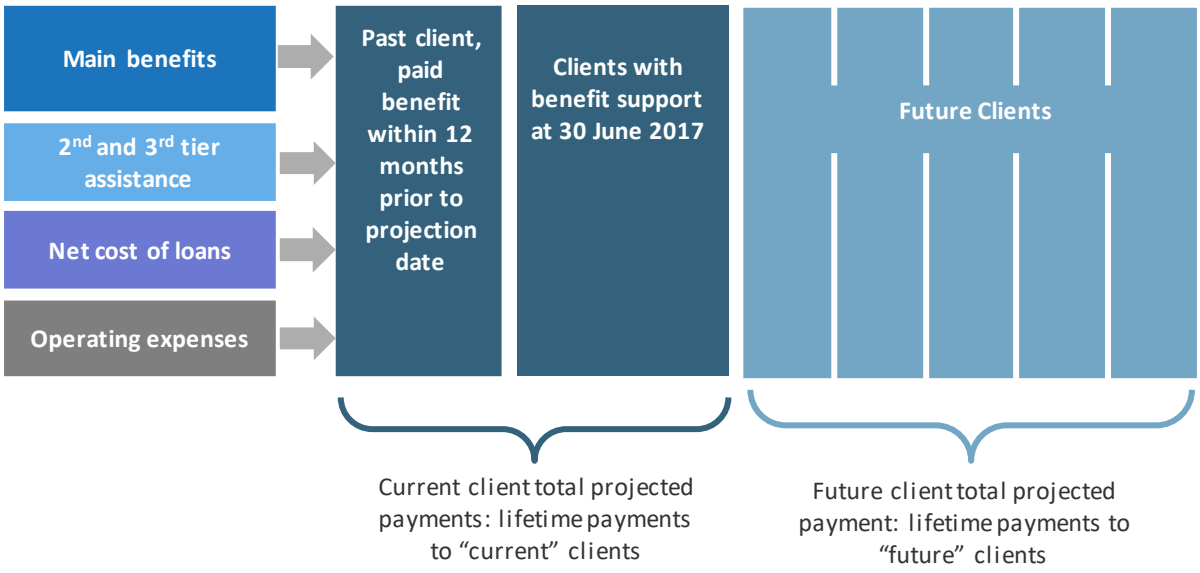
As illustrated in Figure B.1, we also include estimates of lifetime durations and payments associated with **future** clients— that is, the people we expect to enter the benefit system during the next five years, based on projections. Further details on definitions are provided in Appendix F.

[1] https://www.msd.govt.nz/documents/about-msd-and-our-work/publications-resources/evaluation/taylor-fry-ia-feasibility/taylor-fry-feasibility-of-an-ia-for-benefit-report.pdf

[2] https://www.msd.govt.nz/about-msd-and-our-work/publications-resources/evaluation/valuation-reports/index.html

[3] https://www.msd.govt.nz/about-msd-and-our-work/publications-resources/evaluation/social-housing-valuation/index.html

Figure B.1 Definition of client cohorts



B.2 Current client population

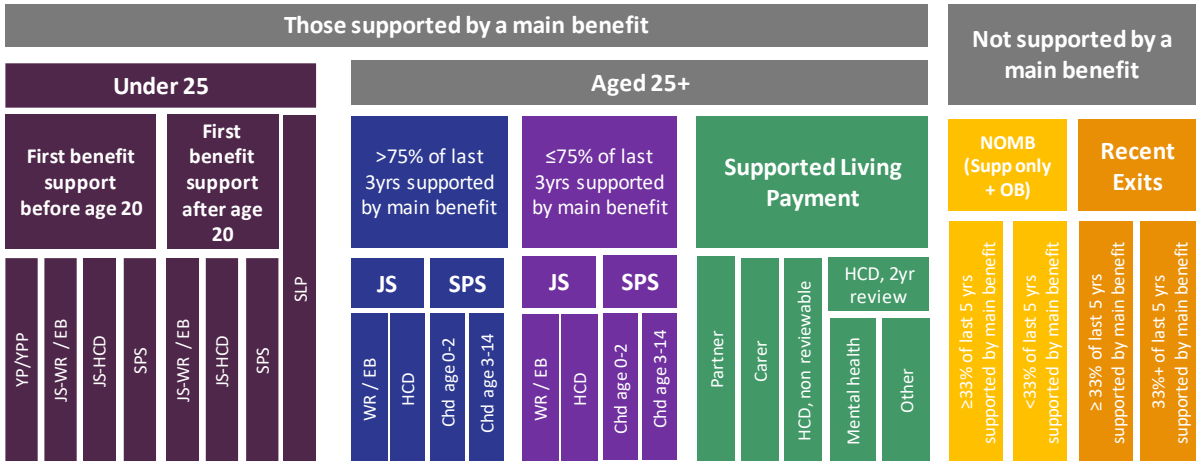
The 2017 current client projection estimates the lifetime benefit support duration and payments of about 535,000 working-age residents, representing one fifth of New Zealand's working-age population. The current client population is diverse. To discuss trends more meaningfully, this large population has been partitioned into more homogenous subgroups, particularly **Client segments** and **Work and Income regions**.

B.2.1 Client segments

Client segments are stable groupings of clients that are mutually exclusive; each client belongs to one and only one segment at any given time. This is particularly useful to give insight into different patterns of lifetime benefit receipt and risk factors, and enables system-wide operational control.

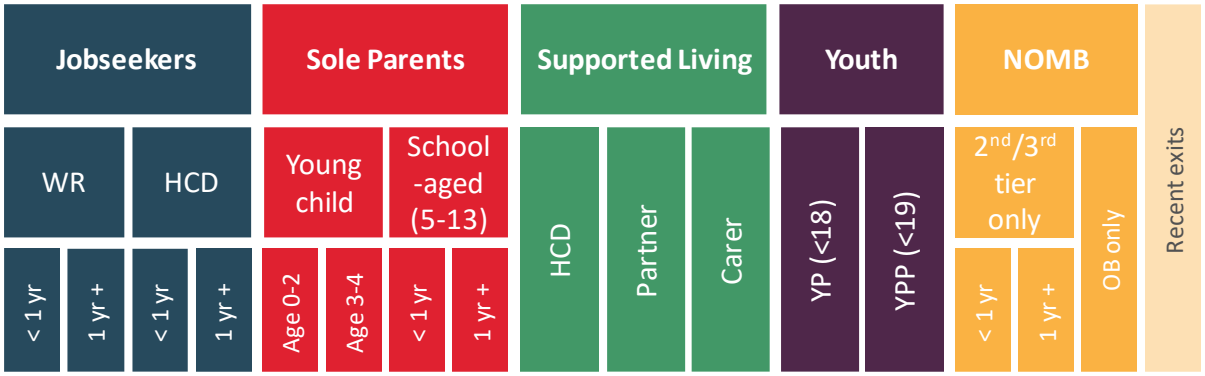
This year for the first time we report on the benefit system under a new segmentation framework (shown in Figure B.2 below).

Figure B.2 Client segments, 2017



Some results in the report make use of the old segments, rather than the new – typically this is when we reference 2016 expected results, where imposing new segments on last year's data would add complications. These segments are shown in Figure B.3.

Figure B.3 Client segments, 2012-2016



B.2.2 Work and Income regions

Regional break-downs of the benefit population provide a useful overview of the benefit system. Within regions, clients can be further sub-divided into segments for detailed operational control at the regional level.

We have included region-specific unemployment rate indicators. This is particularly useful to distinguish between labour market impacts and performance at a regional level.

The introduction of public housing into the models required an even finer-grained view of location. The combined projection also makes use of Territorial Local Authority (TLA) level information, such as local rents. There are 65 TLAs of them, excluding Auckland; Auckland is a single TLA, so we split it further into its 20 local boards. These TLAs and boards are all listed in the table below with their associated Work and Income region. Note that these groupings are not entirely exact; some TLAs straddle more than one Work and Income region. In these cases we have assigned a 'main' region based on benefit system populations.

Figure B.3 Work and income regions

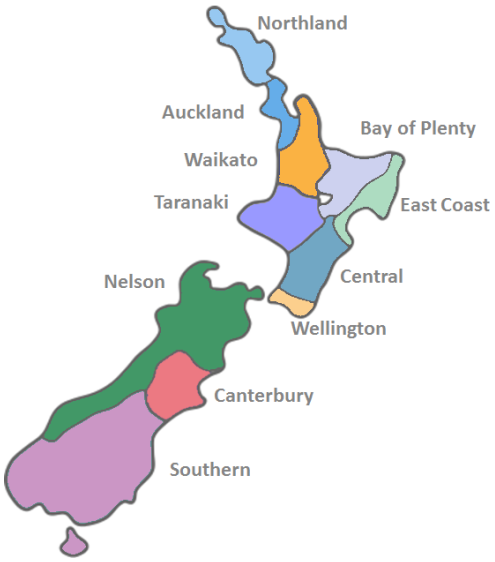


Table B.1 List of TLAs and Boards plus associated Work & Income region

Region	TLA/Board	Region	TLA/Board	Region	TLA/Board
Northland	Far North District	Central	Horowhenua District	Southern	Invercargill City
Northland	Kaipara District	Central	Kapiti Coast District	Southern	Mackenzie District
Northland	Whangarei District	Central	Manawatu District	Southern	Queenstown-Lakes District
Waikato	Hamilton City	Central	Masterton District	Southern	Southland District
Waikato	Hauraki District	Central	Palmerston North City	Southern	Timaru District
Waikato	Matamata-Piako District	Central	Rangitikei District	Southern	Waimate District
Waikato	Thames-Coromandel District	Central	Carterton District	Southern	Waitaki District
Waikato	Waikato District	Central	South Wairarapa District	Auckland	Albert-Eden Local Board Area
Waikato	Waipa District	Central	Tararua District	Auckland	Devonport-Takapuna Local Board Area
Bay of Plenty	Kawerau District	Wellington	Lower Hutt City	Auckland	Franklin Local Board Area
Bay of Plenty	Opotiki District	Wellington	Porirua City	Auckland	Henderson-Massey Local Board Area
Bay of Plenty	Rotorua District	Wellington	Upper Hutt City	Auckland	Hibiscus and Bays Local Board Area
Bay of Plenty	South Waikato District	Wellington	Wellington City	Auckland	Howick Local Board Area
Bay of Plenty	Taupo District	Nelson	Buller District	Auckland	Kaipatiki Local Board Area
Bay of Plenty	Tauranga City	Nelson	Grey District	Auckland	Mangere-Otahuhu Local Board Area
Bay of Plenty	Western Bay of Plenty District	Nelson	Kaikoura District	Auckland	Manurewa Local Board Area
Bay of Plenty	Whakatane District	Nelson	Marlborough District	Auckland	Maungakiekie-Tamaki Local Board Area
East Coast	Central Hawke's Bay District	Nelson	Nelson City	Auckland	Orakei Local Board Area
East Coast	Gisborne District	Nelson	Tasman District	Auckland	Otara-Papatoetoe Local Board Area
East Coast	Hastings District	Nelson	Westland District	Auckland	Papakura Local Board Area
East Coast	Napier City	Canterbury	Ashburton District	Auckland	Puketapapa Local Board Area
East Coast	Wairoa District	Canterbury	Christchurch City	Auckland	Rodney Local Board Area
Taranaki	New Plymouth District	Canterbury	Hurunui District	Auckland	Upper Harbour Local Board Area
Taranaki	Otorohanga District	Canterbury	Selwyn District	Auckland	Waiheke Local Board Area
Taranaki	Ruapehu District	Canterbury	Waimakariri District	Auckland	Waitakere Ranges Local Board Area
Taranaki	South Taranaki District	Southern	Central Otago District	Auckland	Waitemata Local Board Area
Taranaki	Stratford District	Southern	Clutha District	Auckland	Whau Local Board Area
Taranaki	Waitomo District	Southern	Dunedin City		
Taranaki	Wanganui District	Southern	Gore District		

B.3 Scope of projection

The benefit system projection considers the following component payments and expenses:

- **Benefit payments:**
  - Main benefits: Principally Jobseeker Support (JS), Sole Parent Support (SPS), Supported Living Payment (SLP), and Youth/Young Parent Payments (YP/YPP)
  - Supplementary (SUP) and Hardship Assistance: Principally Accommodation Supplement (AS) and other supplementary assistance
- **Net loans/debts:** Recoverable Assistance and over-payments, including fraud, net of recoveries
- **Operating expenses:** MSD's investments in employment and work-readiness outcomes, and administrative expenses.

Some of these payment types combine a number of different subcomponents. Further details on this and the scope of the projection are provided in Appendix E.

APPENDIX C PROJECTION ASSUMPTIONS

C.1 Benefit rate inflation

We model payments in June 2017 dollars. To do this, we inflate older payments to current levels using historical benefit inflation as per Table C.1.1 below. We also apply inflation to our projected payments in line with Treasury forecasts, presented in Table C.1.2.

Table C.1.1 Historic benefit rate increases

Date	Yearly increase	Scale up factor to June 2017
Apr-92		1.52
Apr-93	1.6%	1.50
Apr-94	1.6%	1.47
Apr-95	3.2%	1.43
Apr-96	3.3%	1.38
Apr-97	1.3%	1.36
Apr-98	0.1%	1.36
Apr-99	0.1%	1.36
Apr-00	0.5%	1.35
Apr-01	4.2%	1.30
Apr-02	1.9%	1.27
Apr-03	2.9%	1.24
Apr-04	1.6%	1.22
Apr-05	2.8%	1.19
Apr-06	3.3%	1.15
Apr-07	2.8%	1.12
Apr-08	3.3%	1.08
Apr-09	-1.2%	1.09
Apr-10	2.1%	1.07
Apr-11	1.2%	1.06
Apr-12	1.8%	1.04
Apr-13	0.8%	1.03
Apr-14	1.5%	1.02
Apr-15	0.5%	1.01
Apr-16	0.0%	1.01
Apr-17	1.2%	1.00

Notes:
(a) Changes have been based on the DPB/SPS rate for singles with one child. Most benefits move in the same proportions, but occasionally the increases will differ for different benefit types.
(b) Increases are determined based on gross benefit rates, consistent with the report.
(c) Increases have been checked for consistency with historical changes in CPI, on which changes should be based, as well as consistency across different benefit types.
(d) Increases apply at the first of April each year.
(e) The Apr-09 and Apr-11 results actually consist of a decrease of 4.7% (Jun-09) and 2.7% (Jun-11) that applied in the previous December quarter, followed by the usual CPI-related increase of 3.7% (Jun-09) and 4.0% (Jun-11) at the start of the June quarter. The decreases correspond to tax changes that affected the relationship between gross and net payments. We present the total impact over the year.

Table C.1.2 Projected benefit rate increases

Date	Yearly increase	Scale up factor
01-Apr-17		1.00
01-Apr-18	1.67%	1.02
01-Apr-19	1.67%	1.03
01-Apr-20	1.67%	1.05
01-Apr-21	1.67%	1.07
01-Apr-22	1.67%	1.09
01-Apr-23	1.67%	1.10
01-Apr-24	1.67%	1.12
01-Apr-25	1.67%	1.14
01-Apr-26	1.67%	1.16
01-Apr-27	1.67%	1.18
01-Apr-28	1.67%	1.20
01-Apr-29	1.67%	1.22
01-Apr-30	1.67%	1.24
01-Apr-31	1.67%	1.26
01-Apr-32	1.67%	1.28
01-Apr-33	1.67%	1.30
01-Apr-34	1.67%	1.33
01-Apr-35	1.67%	1.35
01-Apr-36	1.67%	1.37
01-Apr-37	1.67%	1.39
01-Apr-38	1.70%	1.42
01-Apr-39	1.73%	1.44
01-Apr-40	1.76%	1.47
01-Apr-41	1.79%	1.49
01-Apr-42	1.83%	1.52
01-Apr-43	1.86%	1.55
01-Apr-44	1.89%	1.58
01-Apr-45	1.92%	1.61
01-Apr-46	1.96%	1.64
01-Apr-47	1.99%	1.67
01-Apr-48	2.00%	1.71
01-Apr-49	2.00%	1.74
01-Apr-50	2.00%	1.77
01-Apr-51	2.00%	1.81
01-Apr-52	2.00%	1.85
01-Apr-53	2.00%	1.88
01-Apr-54	2.00%	1.92
01-Apr-55	2.00%	1.96
01-Apr-56	2.00%	2.00
01-Apr-57	2.00%	2.04
01-Apr-58	2.00%	2.08
Later	2.00%	

Notes:
(a) Inflation increases assumed to apply at 1 April, consistent with current practice.
(b) Assumptions based on Treasury projections of CPI as at Jun-17, in provided spreadsheet *disc-rates-jun17.xls.*

Table C.1.3 Comparison with previous projected inflation rates

Date	Previous Projection	Present Projection	Difference
01-Apr-18	1.5%	1.7%	0.2%
01-Apr-19	1.5%	1.7%	0.2%
01-Apr-20	1.5%	1.7%	0.2%
01-Apr-21	1.5%	1.7%	0.2%
01-Apr-22	1.5%	1.7%	0.2%
01-Apr-23	1.5%	1.7%	0.2%
01-Apr-24	1.5%	1.7%	0.2%
01-Apr-25	1.5%	1.7%	0.2%
01-Apr-26	1.5%	1.7%	0.2%
01-Apr-27	1.5%	1.7%	0.2%
01-Apr-28	1.5%	1.7%	0.2%
01-Apr-29	1.5%	1.7%	0.2%
01-Apr-30	1.5%	1.7%	0.2%
01-Apr-31	1.5%	1.7%	0.2%
01-Apr-32	1.5%	1.7%	0.2%
01-Apr-33	1.5%	1.7%	0.2%
01-Apr-34	1.5%	1.7%	0.2%
01-Apr-35	1.5%	1.7%	0.2%
01-Apr-36	1.5%	1.7%	0.1%
01-Apr-37	1.6%	1.7%	0.1%
01-Apr-38	1.6%	1.7%	0.1%
01-Apr-39	1.6%	1.7%	0.1%
01-Apr-40	1.6%	1.8%	0.1%
01-Apr-41	1.7%	1.8%	0.1%
01-Apr-42	1.7%	1.8%	0.1%
01-Apr-43	1.7%	1.9%	0.2%
01-Apr-44	1.7%	1.9%	0.2%
01-Apr-45	1.8%	1.9%	0.2%
01-Apr-46	1.8%	2.0%	0.2%
01-Apr-47	1.8%	2.0%	0.2%
01-Apr-48	1.8%	2.0%	0.2%
01-Apr-49	1.9%	2.0%	0.1%
01-Apr-50	1.9%	2.0%	0.1%
01-Apr-51	1.9%	2.0%	0.1%
01-Apr-52	1.9%	2.0%	0.1%
01-Apr-53	2.0%	2.0%	0.0%
01-Apr-54	2.0%	2.0%	0.0%
01-Apr-55	2.0%	2.0%	0.0%
Later	2.0%	2.0%	0.0%

Notes:
(a) Previous projection refers to 2016 actuarial valuation of the benefit system.
(b) The sum of previous projection and difference columns may not give present projection column due to rounding.

C.2 Rental growth assumptions

The introduction of public housing into the projection model led us to simulate first the probability of Accommodation Supplement (AS) receipt and then the payment amount given receipt. This is in contrast to other Tier 2 payments where we use an average loading for all clients. We have included the level of local weekly rents as a predictor of AS payment levels. One consequence is we project average AS payments to grow faster than CPI, as rents are projected to grow faster than CPI. This is consistent with a higher rate of uptake of AS and higher average support level over time because of higher rents in some regions.

We have used first quartile rent throughout our analysis – it is much close to average public housing rents than the average or median. We have assumed that growth in rents will be faster than AWE growth in the short to medium term. There are a number of reasons why rents can temporarily grow faster than average wages, as has indeed been the case over the past decade. First, average wages may mask higher wage growth in some regions such as major cities. Second, housing costs can grow as a proportion of total income. Third, housing supply constraints can squeeze both the owner-occupier and rental markets higher. These supply constraints can be further compounded by population growth, both from births and migration.

Longer-term, rents continuously growing faster than wages lead to implausible assumptions; beyond ten years we assume they both grow at the same rate.

Tables C.2.1 and C.2.2 show the historical and projected AWE increases and rental growth increases, both presented relative to CPI. The historical and projected rental growth assumptions are also presented (as a difference to CPI) in Tables C.2.3 and C.2.4.

Table C.2.1 Historic CPI, AWE and rental growth increase

Date	CPI Yearly increase	CPI Scale up factor to June 2017	AWE yearly increase (relative to CPI)	Rental growth yearly increase (relative to CPI)
01-Apr-95	4.0%	1.55	-1.5%	1.2%
01-Apr-96	2.2%	1.52	0.7%	3.3%
01-Apr-97	1.8%	1.49	2.1%	2.4%
01-Apr-98	1.3%	1.47	0.2%	0.4%
01-Apr-99	-0.2%	1.48	2.2%	-0.4%
01-Apr-00	1.5%	1.45	-0.1%	-0.7%
01-Apr-01	3.2%	1.41	-0.8%	-2.7%
01-Apr-02	2.6%	1.37	3.1%	1.0%
01-Apr-03	2.6%	1.34	0.7%	4.5%
01-Apr-04	1.6%	1.32	2.0%	5.8%
01-Apr-05	2.8%	1.28	0.2%	2.7%
01-Apr-06	3.3%	1.24	1.1%	1.8%
01-Apr-07	2.4%	1.21	3.1%	4.4%
01-Apr-08	3.5%	1.17	1.2%	3.7%
01-Apr-09	2.9%	1.14	2.7%	-0.6%
01-Apr-10	1.9%	1.12	-1.2%	-0.4%
01-Apr-11	4.5%	1.07	-0.4%	-1.2%
01-Apr-12	1.5%	1.05	2.2%	1.1%
01-Apr-13	0.9%	1.04	1.9%	2.5%
01-Apr-14	1.4%	1.03	1.9%	1.6%
01-Apr-15	0.3%	1.03	2.2%	2.5%
01-Apr-16	0.4%	1.02	1.7%	3.9%
01-Apr-17	2.2%	1.00	0.0%	2.8%

Notes:
(a) Historical CPI increases based on Statistics New Zealand data from http://www.stats.govt.nz/infoshare/ (CPI All Groups for New Zealand, Seasonally adjusted)
(b) Historical AWE increases based on Statistics New Zealand data from http://www.stats.govt.nz/infoshare/ (Total All Ind. & Both Sexes - Seasonally Adj)
(c) Historical rent increases based on MBIE data from http://www.mbie.govt.nz/info-services/housing-property/sector-information-and-statistics/rental-bond-data

Table C.2.2 Projected CPI, AWE and rental growth increases

Date	CPI Yearly increase	CPI Scale up factor	AWE yearly increase relative to CPI	Rental growth yearly increase (National), relative to CPI
01-Apr-17		1.00		
01-Apr-18	1.67%	1.02	-0.27%	0.71%
01-Apr-19	1.67%	1.03	0.83%	1.74%
01-Apr-20	1.67%	1.05	0.99%	1.79%
01-Apr-21	1.67%	1.07	0.68%	1.38%
01-Apr-22	1.67%	1.09	0.61%	1.20%
01-Apr-23	1.67%	1.10	0.74%	1.24%
01-Apr-24	1.67%	1.12	0.93%	1.32%
01-Apr-25	1.67%	1.14	1.11%	1.40%
01-Apr-26	1.67%	1.16	1.29%	1.48%
01-Apr-27	1.67%	1.18	1.46%	1.55%
01-Apr-28	1.67%	1.20	1.50%	1.50%
01-Apr-29	1.67%	1.22	1.50%	1.50%
01-Apr-30	1.67%	1.24	1.50%	1.50%
01-Apr-31	1.67%	1.26	1.50%	1.50%
01-Apr-32	1.67%	1.28	1.50%	1.50%
01-Apr-33	1.67%	1.30	1.50%	1.50%
01-Apr-34	1.67%	1.33	1.50%	1.50%
01-Apr-35	1.67%	1.35	1.50%	1.50%
01-Apr-36	1.67%	1.37	1.50%	1.50%
01-Apr-37	1.67%	1.39	1.50%	1.50%
01-Apr-38	1.70%	1.42	1.47%	1.47%
01-Apr-39	1.73%	1.44	1.47%	1.47%
01-Apr-40	1.76%	1.47	1.47%	1.47%
01-Apr-41	1.79%	1.49	1.47%	1.47%
01-Apr-42	1.83%	1.52	1.46%	1.46%
01-Apr-43	1.86%	1.55	1.47%	1.47%
01-Apr-44	1.89%	1.58	1.47%	1.47%
01-Apr-45	1.92%	1.61	1.47%	1.47%
01-Apr-46	1.96%	1.64	1.46%	1.46%
01-Apr-47	1.99%	1.67	1.47%	1.47%
01-Apr-48	2.00%	1.71	1.49%	1.49%
01-Apr-49	2.00%	1.74	1.50%	1.50%
01-Apr-50	2.00%	1.77	1.50%	1.50%
01-Apr-51	2.00%	1.81	1.50%	1.50%
01-Apr-52	2.00%	1.85	1.50%	1.50%
01-Apr-53	2.00%	1.88	1.50%	1.50%
01-Apr-54	2.00%	1.92	1.50%	1.50%
01-Apr-55	2.00%	1.96	1.50%	1.50%
01-Apr-56	2.00%	2.00	1.50%	1.50%
01-Apr-57	2.00%	2.04	1.50%	1.50%
01-Apr-58	2.00%	2.08	1.50%	1.50%
Later	2.00%		1.50%	1.50%

Notes:
(a) CPI and AWE increases assumed to apply at 1 April
(b) Rent assumed to apply quarterly
(c) CPI assumptions are as previously presented in table C.1.2 and based on Treasury projections of CPI as at Jun-17, in provided spreadsheet *disc-rates-jun17.xls*

Table C.2.3 Historical rental growth increases by region

Date	Yearly rental growth rate					
	Northland	Auckland	Waikato	East coast	Plenty	Taranaki
01-Apr-95	2.4%	4.0%	2.0%	-0.7%	-0.8%	-3.1%
01-Apr-96	4.9%	6.3%	3.6%	2.5%	0.1%	1.7%
01-Apr-97	4.7%	3.7%	4.7%	-1.3%	-0.7%	1.0%
01-Apr-98	0.4%	-0.5%	1.3%	1.5%	0.4%	0.4%
01-Apr-99	1.8%	-1.5%	-0.7%	0.7%	-2.4%	1.3%
01-Apr-00	-2.7%	-0.6%	-1.3%	-0.8%	-2.1%	-0.2%
01-Apr-01	-4.0%	-2.4%	-3.2%	-2.1%	-5.6%	-0.5%
01-Apr-02	-0.1%	1.9%	-0.4%	-1.5%	1.7%	0.1%
01-Apr-03	4.0%	5.9%	2.9%	0.9%	9.0%	1.2%
01-Apr-04	6.9%	4.3%	8.1%	8.3%	3.2%	2.4%
01-Apr-05	5.0%	0.8%	3.3%	5.1%	6.7%	0.9%
01-Apr-06	3.5%	0.3%	1.6%	2.7%	4.3%	3.9%
01-Apr-07	3.2%	3.8%	4.5%	5.2%	7.2%	4.1%
01-Apr-08	4.2%	3.3%	2.7%	3.0%	4.8%	3.6%
01-Apr-09	-1.3%	-1.1%	-1.3%	-0.8%	1.5%	0.4%
01-Apr-10	-0.4%	-0.6%	-0.1%	0.1%	-0.1%	-0.7%
01-Apr-11	-0.8%	-0.5%	-1.7%	-2.2%	-3.4%	-1.6%
01-Apr-12	-0.4%	1.6%	1.3%	0.9%	1.2%	0.9%
01-Apr-13	1.1%	3.1%	0.9%	2.3%	2.2%	1.7%
01-Apr-14	2.0%	2.3%	0.9%	-0.9%	0.5%	1.2%
01-Apr-15	2.6%	3.5%	3.4%	1.6%	1.3%	1.6%
01-Apr-16	4.4%	4.3%	8.0%	3.9%	3.8%	3.5%
01-Apr-17	6.0%	2.1%	5.0%	4.8%	1.0%	4.1%

Date	Yearly rental growth rate					
	Central	Wellington	Nelson	Canterbury	Southern	Total
01-Apr-95	1.7%	-1.6%	1.1%	0.7%	8.1%	1.2%
01-Apr-96	3.5%	0.5%	3.2%	-1.9%	10.6%	3.3%
01-Apr-97	4.9%	2.6%	1.0%	-5.2%	4.6%	2.4%
01-Apr-98	2.8%	1.3%	-1.6%	-2.4%	-2.4%	0.4%
01-Apr-99	2.4%	0.0%	-2.8%	0.7%	-4.4%	-0.4%
01-Apr-00	1.3%	0.1%	-1.5%	2.3%	-1.1%	-0.7%
01-Apr-01	-3.0%	-3.1%	-2.5%	-0.6%	-2.5%	-2.7%
01-Apr-02	-0.3%	3.2%	3.1%	3.2%	2.8%	1.0%
01-Apr-03	1.5%	8.8%	5.8%	7.8%	8.7%	4.5%
01-Apr-04	1.3%	8.1%	9.9%	8.8%	2.6%	5.8%
01-Apr-05	0.6%	1.1%	2.3%	3.7%	-1.7%	2.7%
01-Apr-06	-0.3%	0.9%	2.1%	-0.8%	-1.6%	1.8%
01-Apr-07	8.2%	3.9%	2.1%	2.2%	2.7%	4.4%
01-Apr-08	3.8%	4.2%	4.2%	2.9%	2.7%	3.7%
01-Apr-09	1.0%	1.7%	-3.2%	-1.1%	-1.4%	-0.6%
01-Apr-10	-0.1%	0.4%	-1.2%	-0.2%	-0.7%	-0.4%
01-Apr-11	-3.2%	-2.9%	1.9%	2.2%	0.1%	-1.2%
01-Apr-12	0.0%	1.5%	3.9%	-0.4%	2.5%	1.1%
01-Apr-13	0.4%	1.4%	9.1%	3.2%	3.6%	2.5%
01-Apr-14	1.9%	-0.2%	5.6%	4.4%	2.1%	1.6%
01-Apr-15	1.3%	0.8%	3.5%	2.1%	4.9%	2.5%
01-Apr-16	3.3%	2.0%	-3.1%	4.9%	5.4%	3.9%
01-Apr-17	3.4%	2.4%	-5.7%	4.0%	1.4%	2.8%

Notes:
(a) Historical rental increases based on MBIE data from http://www.mbie.govt.nz/info-services/housing-property/sector-information-and-statistics/rental-bond-data

Table C.2.4 Projected rental growth rates by region

Date	Quarterly rental growth rate					
	Northland	Auckland	Waikato	East coast	Plenty	Taranaki
30-Sep-17	0.65%	0.12%	0.45%	0.99%	0.45%	-0.18%
31-Dec-17	0.59%	0.12%	0.41%	0.90%	0.41%	-0.14%
31-Mar-18	0.53%	0.12%	0.38%	0.80%	0.38%	-0.11%
30-Jun-18	0.47%	0.12%	0.34%	0.70%	0.34%	-0.08%
30-Sep-18	0.78%	0.50%	0.68%	0.96%	0.68%	0.34%
31-Dec-18	0.71%	0.50%	0.63%	0.85%	0.63%	0.38%
31-Mar-19	0.64%	0.50%	0.59%	0.73%	0.59%	0.42%
30-Jun-19	0.57%	0.50%	0.55%	0.62%	0.55%	0.46%
30-Sep-19	0.43%	0.43%	0.43%	0.43%	0.43%	0.43%
31-Dec-19	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%
31-Mar-20	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%
30-Jun-20	0.41%	0.41%	0.41%	0.41%	0.41%	0.41%
30-Sep-20	0.33%	0.33%	0.33%	0.33%	0.33%	0.33%
31-Dec-20	0.32%	0.32%	0.32%	0.32%	0.32%	0.32%
31-Mar-21	0.32%	0.32%	0.32%	0.32%	0.32%	0.32%
30-Jun-21	0.31%	0.31%	0.31%	0.31%	0.31%	0.31%
30-Sep-21	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%
31-Dec-21	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%
31-Mar-22	0.29%	0.29%	0.29%	0.29%	0.29%	0.29%
30-Jun-22	0.28%	0.28%	0.28%	0.28%	0.28%	0.28%

Date	Quarterly rental growth rate					
	Central	Wellington	Nelson	Canterbury	Southern	Total
30-Sep-17	0.52%	0.29%	-0.09%	-1.68%	0.59%	0.18%
31-Dec-17	0.47%	0.27%	-0.07%	-1.48%	0.54%	0.17%
31-Mar-18	0.43%	0.25%	-0.04%	-1.28%	0.48%	0.16%
30-Jun-18	0.38%	0.23%	-0.02%	-1.08%	0.43%	0.16%
30-Sep-18	0.71%	0.59%	0.39%	-0.46%	0.75%	0.53%
31-Dec-18	0.66%	0.57%	0.42%	-0.22%	0.69%	0.52%
31-Mar-19	0.61%	0.55%	0.45%	0.02%	0.63%	0.52%
30-Jun-19	0.56%	0.52%	0.47%	0.26%	0.57%	0.51%
30-Sep-19	0.43%	0.43%	0.43%	0.43%	0.43%	0.43%
31-Dec-19	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%
31-Mar-20	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%
30-Jun-20	0.41%	0.41%	0.41%	0.41%	0.41%	0.41%
30-Sep-20	0.33%	0.33%	0.33%	0.33%	0.33%	0.33%
31-Dec-20	0.32%	0.32%	0.32%	0.32%	0.32%	0.32%
31-Mar-21	0.32%	0.32%	0.32%	0.32%	0.32%	0.32%
30-Jun-21	0.31%	0.31%	0.31%	0.31%	0.31%	0.31%
30-Sep-21	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%
31-Dec-21	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%
31-Mar-22	0.29%	0.29%	0.29%	0.29%	0.29%	0.29%
30-Jun-22	0.28%	0.28%	0.28%	0.28%	0.28%	0.28%

C.3 Discounting

Future cash flows are discounted to present value using the risk-free rate. This is taken to be the NZ government bond rate, as published by Treasury.

Table C.3.1 Discounting assumptions

Date	Treasury (monthly) forward rate	Discount factor applied to cashflows
30-Jun-18	2.17%	98.3%
30-Jun-19	2.52%	96.1%
30-Jun-20	2.77%	93.6%
30-Jun-21	2.99%	91.0%
30-Jun-22	3.19%	88.3%
30-Jun-23	3.37%	85.5%
30-Jun-24	3.52%	82.7%
30-Jun-25	3.66%	79.8%
30-Jun-26	3.77%	77.0%
30-Jun-27	3.87%	74.1%
30-Jun-28	3.97%	71.3%
30-Jun-29	4.05%	68.6%
30-Jun-30	4.14%	65.9%
30-Jun-31	4.21%	63.3%
30-Jun-32	4.29%	60.7%
30-Jun-33	4.35%	58.2%
30-Jun-34	4.41%	55.7%
30-Jun-35	4.47%	53.4%
30-Jun-36	4.51%	51.1%
30-Jun-37	4.55%	48.9%
30-Jun-38	4.57%	46.7%
30-Jun-39	4.59%	44.7%
30-Jun-40	4.61%	42.7%
30-Jun-41	4.63%	40.8%
30-Jun-42	4.65%	39.0%
30-Jun-43	4.67%	37.3%
30-Jun-44	4.69%	35.6%
30-Jun-45	4.71%	34.0%
30-Jun-46	4.73%	32.5%
30-Jun-47	4.75%	31.0%
30-Jun-48	4.75%	29.6%
30-Jun-49	4.75%	28.3%
30-Jun-50	4.75%	27.0%
30-Jun-51	4.75%	25.8%
30-Jun-52	4.75%	24.6%
30-Jun-53	4.75%	23.5%
30-Jun-54	4.75%	22.4%
30-Jun-55	4.75%	21.4%
30-Jun-56	4.75%	20.4%
30-Jun-57	4.75%	19.5%
30-Jun-58	4.75%	18.6%
Later	4.75%	

Notes:
(a) Discounting assumptions apply to the middle of each quarter. Although the table only shows the discount factor for each June quarter, in practice, separate discount factors are calculated for each quarter.
(b) Assumptions based on Treasury projections of monthly forward rates as at Jun-17, in spreadsheet titled *disc-rates-jun17.xls*. Forward rates are as provided Treasury.

Table C.3.2 Comparison with previous projected discount rates

Year (monthly forward rate at 30th June)	Previous projection	Present projection	Difference
2018	2.0%	2.2%	0.2%
2019	1.9%	2.5%	0.6%
2020	2.0%	2.8%	0.8%
2021	2.1%	3.0%	0.9%
2022	2.2%	3.2%	1.0%
2023	2.4%	3.4%	1.0%
2024	2.5%	3.5%	1.0%
2025	2.7%	3.7%	1.0%
2026	2.9%	3.8%	0.9%
2027	3.1%	3.9%	0.8%
2028	3.2%	4.0%	0.8%
2029	3.3%	4.1%	0.7%
2030	3.4%	4.1%	0.7%
2031	3.5%	4.2%	0.7%
2032	3.6%	4.3%	0.7%
2033	3.7%	4.4%	0.7%
2034	3.7%	4.4%	0.7%
2035	3.7%	4.5%	0.7%
2036	3.8%	4.5%	0.7%
2037	3.8%	4.6%	0.7%
2038	3.9%	4.6%	0.7%
2039	3.9%	4.6%	0.7%
2040	4.0%	4.6%	0.6%
2041	4.0%	4.6%	0.6%
2042	4.1%	4.7%	0.6%
2043	4.1%	4.7%	0.5%
2044	4.2%	4.7%	0.5%
2045	4.2%	4.7%	0.5%
2046	4.3%	4.7%	0.4%
2047	4.3%	4.8%	0.4%
2048	4.4%	4.8%	0.4%
2049	4.4%	4.8%	0.3%
2050	4.5%	4.8%	0.3%
2051	4.5%	4.8%	0.2%
2052	4.6%	4.8%	0.2%
2053	4.6%	4.8%	0.1%
2054	4.7%	4.8%	0.1%
Later	4.7%	4.8%	0.0%

Notes:
(a) Previous projection refers to 2016 actuarial valuation of the benefit system

C.4 Unemployment rate

Table C.4.1 Historic national unemployment rate

Unemployment rate				
Year	31 Mar	30 Jun	30-Sep	31-Dec
1991	9.8%	10.5%	11.2%	11.0%
1992	11.0%	10.4%	10.6%	10.6%
1993	10.1%	10.2%	9.6%	9.4%
1994	9.3%	8.5%	8.0%	7.6%
1995	6.8%	6.4%	6.3%	6.4%
1996	6.4%	6.1%	6.5%	6.2%
1997	6.7%	6.8%	7.0%	7.0%
1998	7.4%	7.9%	7.7%	8.0%
1999	7.5%	7.3%	7.0%	6.4%
2000	6.4%	6.3%	6.0%	5.8%
2001	5.5%	5.4%	5.4%	5.6%
2002	5.3%	5.3%	5.6%	5.0%
2003	5.0%	4.8%	4.5%	4.7%
2004	4.3%	4.2%	3.9%	3.7%
2005	3.9%	3.9%	3.8%	3.8%
2006	4.1%	3.7%	3.9%	3.8%
2007	3.9%	3.6%	3.6%	3.3%
2008	3.7%	3.8%	4.0%	4.4%
2009	5.0%	5.7%	6.1%	6.5%
2010	5.9%	6.5%	6.0%	6.2%
2011	6.0%	6.0%	5.9%	6.0%
2012	6.3%	6.4%	6.7%	6.2%
2013	5.7%	6.0%	5.8%	5.6%
2014	5.6%	5.3%	5.2%	5.5%
2015	5.4%	5.5%	5.6%	4.9%
2016	5.2%	5.1%	4.9%	5.2%
2017	4.9%	4.8%		

Notes:
(a) Rates supplied by NZ Treasury, sourced from Infoshare, table reference HLF097AA. Figures are seasonally adjusted.
(b) These figures may differ from those presented in 2015 and earlier as Statistics NZ revised the way in which they report the unemployment rate in 2016. On the new basis, recent rates are approximately 0.4% lower than on the old basis.

Table C.4.2 Projected national unemployment rate

Unemployment rate				
Year	31 Mar	30 Jun	30-Sep	31-Dec
2017			4.8%	4.7%
2018	4.7%	4.6%	4.6%	4.5%
2019	4.5%	4.4%	4.4%	4.4%
2020	4.3%	4.4%	4.4%	4.4%
2021	4.4%	4.3%	4.3%	4.3%
Later	4.3%	4.3%	4.3%	4.3%

Notes:
(a) Annual unemployment forecasts provided by Treasury in their BEFU 2017 economic forecasts to June 2021.

Table C.4.3.1 Historical regional unemployment rates in the Northland region

	Unemployment rate in Northland			
Year	31-Mar	30-Jun	30-Sep	31-Dec
1992	16.3%	12.3%	12.7%	12.1%
1993	10.0%	15.9%	15.8%	14.3%
1994	12.7%	12.9%	14.8%	14.3%
1995	13.6%	10.0%	10.1%	11.7%
1996	12.0%	11.4%	9.1%	6.9%
1997	8.7%	10.4%	9.3%	10.1%
1998	12.7%	11.5%	11.5%	14.2%
1999	13.3%	14.1%	9.2%	9.7%
2000	9.7%	8.9%	9.2%	9.0%
2001	7.9%	6.9%	8.5%	9.6%
2002	11.1%	8.9%	8.8%	8.8%
2003	10.2%	7.6%	8.7%	7.2%
2004	4.4%	5.0%	5.4%	4.4%
2005	4.4%	7.4%	5.9%	5.0%
2006	5.7%	6.0%	5.7%	3.6%
2007	5.1%	3.5%	5.5%	2.7%
2008	4.7%	4.1%	7.1%	6.5%
2009	8.5%	7.7%	8.9%	9.0%
2010	8.8%	8.9%	7.8%	8.2%
2011	9.3%	7.2%	8.2%	7.8%
2012	8.1%	8.7%	8.9%	9.0%
2013	9.2%	6.8%	9.0%	8.2%
2014	7.5%	7.3%	8.3%	7.8%
2015	8.8%	7.4%	8.1%	6.0%
2016	8.4%	10.6%	7.6%	7.2%
2017	7.9%	7.2%		

Table C.4.3.2 Historical regional unemployment rates in the Auckland region

	Unemployment rate in Auckland			
Year	31-Mar	30-Jun	30-Sep	31-Dec
1992	13.0%	12.0%	10.9%	10.9%
1993	10.8%	10.6%	9.9%	8.7%
1994	10.1%	8.0%	7.3%	6.7%
1995	5.9%	5.8%	5.4%	5.2%
1996	5.1%	5.3%	5.7%	5.1%
1997	6.4%	7.0%	7.3%	7.0%
1998	7.7%	7.8%	6.7%	6.7%
1999	7.0%	6.3%	6.3%	5.0%
2000	6.5%	5.9%	5.2%	5.1%
2001	5.4%	5.7%	4.3%	4.7%
2002	5.0%	5.2%	5.0%	4.1%
2003	4.6%	4.1%	3.4%	3.9%
2004	4.5%	3.9%	3.9%	3.4%
2005	4.2%	3.4%	3.5%	3.7%
2006	3.9%	3.2%	3.8%	3.8%
2007	4.6%	3.3%	3.6%	3.6%
2008	4.6%	4.1%	4.1%	5.0%
2009	6.3%	6.1%	6.2%	7.2%
2010	7.5%	8.1%	6.7%	6.9%
2011	7.0%	6.6%	6.2%	6.1%
2012	7.2%	6.8%	7.7%	6.4%
2013	6.7%	6.3%	5.9%	5.6%
2014	6.6%	5.8%	5.7%	5.6%
2015	6.5%	5.9%	5.6%	5.1%
2016	6.1%	4.7%	5.3%	5.1%
2017	5.0%	4.5%		

Table C.4.3.3 Historical regional unemployment rates in the Waikato region

	Unemployment rate in Waikato			
Year	31-Mar	30-Jun	30-Sep	31-Dec
1992	12.1%	11.2%	11.0%	10.5%
1993	12.1%	12.1%	9.6%	9.7%
1994	9.8%	9.4%	7.7%	7.8%
1995	8.8%	6.8%	6.3%	6.6%
1996	8.2%	6.5%	7.5%	6.5%
1997	8.3%	7.5%	6.7%	7.4%
1998	8.3%	8.3%	8.4%	9.2%
1999	10.3%	8.7%	7.6%	6.4%
2000	7.9%	5.9%	6.2%	6.1%
2001	6.6%	6.0%	5.9%	6.3%
2002	6.3%	5.0%	5.6%	5.6%
2003	5.7%	5.2%	3.3%	4.4%
2004	4.0%	3.1%	2.9%	3.2%
2005	4.2%	4.9%	3.9%	4.2%
2006	4.4%	2.9%	3.7%	2.8%
2007	4.4%	3.7%	3.3%	3.3%
2008	4.1%	3.9%	4.3%	4.4%
2009	5.6%	6.5%	6.0%	5.7%
2010	5.2%	5.6%	6.5%	5.5%
2011	6.7%	5.7%	6.6%	6.0%
2012	8.0%	6.5%	5.8%	5.3%
2013	5.4%	5.4%	5.7%	6.3%
2014	6.2%	6.1%	5.6%	5.4%
2015	5.9%	4.6%	6.2%	4.8%
2016	5.4%	4.8%	4.5%	5.7%
2017	4.9%	4.4%		

Table C.4.3.4 Historical regional unemployment rates in the Bay of Plenty region

	Unemployment rate in Bay of Plenty			
Year	31-Mar	30-Jun	30-Sep	31-Dec
1992	13.5%	12.8%	12.9%	12.6%
1993	13.5%	10.6%	9.6%	11.8%
1994	13.2%	10.7%	10.1%	9.7%
1995	10.1%	9.6%	7.0%	8.3%
1996	9.3%	6.6%	8.1%	9.2%
1997	10.6%	9.1%	8.3%	9.1%
1998	9.9%	12.2%	11.2%	11.7%
1999	11.9%	10.9%	9.2%	8.6%
2000	7.5%	8.9%	8.4%	6.7%
2001	9.0%	7.9%	8.6%	8.1%
2002	7.5%	8.3%	7.4%	6.9%
2003	7.9%	7.0%	5.3%	6.2%
2004	7.0%	5.3%	3.2%	4.5%
2005	4.7%	3.1%	4.3%	4.2%
2006	5.1%	3.9%	4.2%	3.6%
2007	4.0%	2.9%	3.4%	3.7%
2008	4.9%	3.8%	4.1%	4.3%
2009	5.9%	5.7%	7.5%	6.9%
2010	7.7%	7.7%	8.3%	6.8%
2011	7.0%	6.6%	7.3%	7.8%
2012	8.1%	5.8%	6.8%	8.2%
2013	7.7%	5.8%	6.8%	8.8%
2014	6.7%	5.4%	6.3%	5.4%
2015	7.5%	6.3%	5.8%	5.9%
2016	4.7%	5.1%	5.1%	4.9%
2017	7.6%	6.1%		

Table C.4.3.5 Historical regional unemployment rates in the East Coast region

	Unemployment rate in East Coast			
Year	31-Mar	30-Jun	30-Sep	31-Dec
1992	11.4%	10.0%	11.3%	13.6%
1993	9.9%	11.8%	10.3%	12.8%
1994	12.7%	8.8%	8.9%	9.4%
1995	9.2%	7.1%	7.7%	6.3%
1996	7.0%	7.4%	9.1%	7.9%
1997	8.9%	8.1%	10.2%	8.2%
1998	9.3%	9.2%	10.7%	8.1%
1999	7.0%	7.4%	7.5%	9.3%
2000	7.3%	6.3%	7.7%	8.0%
2001	7.0%	6.5%	6.0%	7.3%
2002	4.9%	5.0%	5.2%	6.0%
2003	6.3%	4.3%	5.3%	5.7%
2004	6.1%	4.4%	5.5%	4.9%
2005	4.7%	4.8%	7.0%	4.9%
2006	3.9%	3.8%	4.9%	4.8%
2007	4.8%	5.0%	4.2%	4.7%
2008	5.8%	4.4%	6.6%	6.3%
2009	6.8%	7.2%	9.7%	8.2%
2010	6.5%	8.2%	7.0%	6.9%
2011	7.8%	6.8%	7.0%	6.7%
2012	7.8%	6.0%	8.7%	8.4%
2013	8.0%	7.3%	8.1%	7.1%
2014	7.9%	6.5%	6.7%	7.8%
2015	7.2%	7.7%	6.9%	6.6%
2016	7.9%	5.0%	6.5%	8.1%
2017	7.6%	5.8%		

Table C.4.3.6 Historical regional unemployment rates in the Taranaki region

	Unemployment rate in Taranaki			
Year	31 Mar	30 Jun	30-Sep	31-Dec
1992	13.6%	10.1%	10.3%	12.2%
1993	13.4%	8.6%	11.2%	10.0%
1994	10.0%	8.2%	8.1%	7.8%
1995	7.8%	6.3%	8.2%	6.5%
1996	7.6%	6.4%	8.1%	7.4%
1997	8.3%	7.0%	8.0%	6.5%
1998	6.6%	8.1%	6.9%	7.3%
1999	6.9%	6.2%	6.8%	8.9%
2000	10.2%	8.2%	6.3%	5.3%
2001	6.2%	4.8%	5.9%	6.1%
2002	5.1%	4.6%	5.8%	5.7%
2003	5.1%	5.6%	5.1%	4.5%
2004	5.3%	3.8%	4.3%	4.3%
2005	3.8%	2.9%	3.4%	4.2%
2006	5.1%	2.3%	3.6%	2.7%
2007	4.1%	4.0%	2.6%	2.6%
2008	3.5%	2.9%	3.3%	3.0%
2009	2.7%	4.3%	3.7%	5.9%
2010	4.8%	4.5%	4.8%	4.8%
2011	4.6%	5.1%	5.0%	3.5%
2012	4.5%	3.5%	4.4%	5.0%
2013	5.1%	5.0%	5.1%	5.6%
2014	6.3%	5.0%	4.4%	4.8%
2015	6.0%	7.2%	4.6%	3.9%
2016	5.7%	4.9%	4.7%	6.8%
2017	6.2%	5.0%		

Table C.4.3.7 Historical regional unemployment rates in the Central region

	Unemployment rate in Central			
Year	31-Mar	30-Jun	30-Sep	31-Dec
1992	12.4%	10.4%	12.0%	13.0%
1993	12.1%	11.3%	9.3%	9.6%
1994	9.5%	8.9%	9.2%	8.7%
1995	6.0%	6.2%	8.2%	8.0%
1996	7.5%	6.3%	6.3%	6.1%
1997	6.0%	5.9%	5.5%	5.7%
1998	8.0%	6.8%	8.3%	5.6%
1999	7.5%	5.7%	7.3%	7.9%
2000	6.8%	6.8%	6.8%	5.5%
2001	6.7%	4.6%	4.3%	5.4%
2002	6.2%	5.4%	5.3%	4.0%
2003	4.8%	5.3%	5.4%	3.8%
2004	5.9%	4.3%	3.0%	4.3%
2005	4.8%	4.2%	4.5%	4.2%
2006	5.4%	4.8%	4.0%	4.4%
2007	5.0%	5.2%	5.1%	5.3%
2008	5.0%	4.4%	3.6%	3.7%
2009	4.7%	4.6%	5.4%	7.8%
2010	6.9%	6.8%	6.2%	6.5%
2011	6.5%	6.7%	6.1%	6.1%
2012	8.7%	6.9%	7.7%	8.0%
2013	7.0%	8.3%	7.1%	5.1%
2014	7.4%	6.6%	6.5%	8.8%
2015	7.2%	6.5%	6.3%	6.1%
2016	6.9%	5.6%	4.6%	5.9%
2017	5.3%	4.7%		

Table C.4.3.8 Historical regional unemployment rates in the Wellington region

	Unemployment rate in Wellington			
Year	31-Mar	30-Jun	30-Sep	31-Dec
1992	10.1%	8.0%	9.6%	10.0%
1993	10.0%	8.9%	9.2%	9.5%
1994	9.3%	9.3%	8.0%	7.7%
1995	7.6%	6.4%	6.5%	6.9%
1996	7.6%	6.4%	5.4%	6.0%
1997	6.6%	5.3%	5.0%	5.8%
1998	5.8%	5.4%	5.7%	7.1%
1999	6.7%	6.7%	5.1%	4.2%
2000	6.4%	5.4%	5.1%	4.8%
2001	4.5%	3.3%	4.7%	4.8%
2002	5.9%	4.6%	4.8%	5.0%
2003	6.2%	4.9%	4.8%	5.6%
2004	4.8%	4.8%	4.0%	4.0%
2005	4.7%	4.2%	3.2%	3.1%
2006	5.8%	5.9%	3.7%	4.4%
2007	4.7%	3.4%	3.3%	2.4%
2008	5.0%	3.1%	3.4%	3.5%
2009	4.7%	5.3%	5.6%	6.0%
2010	5.1%	4.8%	4.5%	4.8%
2011	6.4%	4.8%	5.0%	6.5%
2012	5.6%	5.9%	6.4%	7.1%
2013	6.2%	5.8%	5.4%	6.0%
2014	5.1%	5.0%	5.1%	5.5%
2015	5.7%	5.1%	6.2%	5.3%
2016	5.9%	5.3%	4.6%	5.6%
2017	5.1%	4.8%		

Table C.4.3.9 Historical regional unemployment rates in the Nelson region

	Unemployment rate in Nelson			
Year	31-Mar	30-Jun	30-Sep	31-Dec
1992	9.4%	6.1%	7.3%	9.1%
1993	8.3%	9.4%	7.9%	9.4%
1994	9.9%	6.8%	6.0%	6.5%
1995	7.7%	4.2%	5.5%	4.2%
1996	4.9%	5.9%	6.1%	7.2%
1997	5.2%	5.9%	4.8%	4.8%
1998	5.5%	7.3%	5.9%	5.3%
1999	6.2%	5.7%	6.8%	6.3%
2000	4.9%	5.4%	4.6%	4.7%
2001	3.0%	2.5%	4.6%	4.1%
2002	3.5%	4.0%	2.3%	4.2%
2003	3.5%	3.0%	3.8%	3.6%
2004	2.8%	3.3%	1.9%	2.2%
2005	2.8%	2.4%	2.6%	3.3%
2006	4.2%	2.1%	3.1%	3.2%
2007	2.3%	3.4%	2.5%	2.6%
2008	3.3%	2.9%	3.2%	3.3%
2009	2.9%	3.2%	4.0%	4.4%
2010	4.7%	3.2%	3.7%	4.4%
2011	5.0%	4.0%	3.7%	4.6%
2012	5.5%	4.3%	4.3%	5.7%
2013	4.6%	4.0%	3.8%	4.1%
2014	4.9%	3.9%	3.2%	6.1%
2015	4.3%	4.4%	5.0%	4.0%
2016	5.0%	5.8%	2.7%	4.1%
2017	2.7%	3.0%		

Table C.4.3.10 Historical regional unemployment rates in the Canterbury region

	Unemployment rate in Canterbury			
Year	31-Mar	30-Jun	30-Sep	31-Dec
1992	8.8%	9.3%	8.9%	8.5%
1993	9.7%	7.4%	6.6%	8.0%
1994	8.2%	7.2%	5.9%	6.5%
1995	6.0%	5.9%	5.2%	6.0%
1996	6.8%	6.0%	5.5%	6.3%
1997	7.2%	6.1%	6.8%	6.2%
1998	8.0%	7.6%	7.1%	8.5%
1999	7.8%	7.2%	7.0%	6.7%
2000	5.8%	6.2%	5.5%	5.4%
2001	6.0%	5.8%	5.2%	5.0%
2002	5.5%	4.7%	5.6%	4.2%
2003	4.4%	4.3%	4.4%	3.7%
2004	4.4%	4.0%	3.6%	3.1%
2005	4.0%	2.6%	3.0%	2.4%
2006	3.8%	2.7%	2.9%	2.9%
2007	3.3%	3.1%	2.6%	2.4%
2008	2.6%	3.1%	3.0%	3.3%
2009	4.5%	4.7%	5.2%	4.9%
2010	5.3%	4.5%	4.7%	5.4%
2011	4.9%	5.3%	4.9%	4.4%
2012	4.8%	6.0%	4.8%	4.4%
2013	4.0%	4.0%	3.9%	3.1%
2014	3.2%	2.7%	3.1%	3.4%
2015	2.8%	3.0%	3.5%	3.3%
2016	2.7%	3.2%	3.9%	3.7%
2017	4.0%	3.8%		

Table C.4.3.11 Historical regional unemployment rates in the Southern region

	Unemployment rate in Southern			
Year	31-Mar	30-Jun	30-Sep	31-Dec
1992	7.8%	8.6%	8.6%	7.5%
1993	7.2%	7.1%	7.9%	7.1%
1994	5.6%	6.5%	6.5%	6.0%
1995	4.9%	5.1%	3.8%	6.3%
1996	4.9%	5.5%	4.9%	4.7%
1997	4.8%	5.1%	5.4%	6.2%
1998	6.7%	6.6%	7.6%	7.3%
1999	7.1%	6.7%	6.5%	6.1%
2000	6.6%	5.8%	5.1%	5.7%
2001	4.5%	5.1%	5.4%	4.3%
2002	5.5%	4.7%	5.6%	4.8%
2003	5.1%	4.9%	4.9%	5.1%
2004	3.9%	3.9%	4.2%	3.4%
2005	4.2%	3.5%	2.5%	3.1%
2006	4.7%	2.9%	3.2%	3.2%
2007	3.2%	3.3%	2.9%	2.7%
2008	2.3%	3.6%	2.8%	2.8%
2009	3.5%	4.5%	4.7%	3.9%
2010	5.0%	4.3%	3.7%	4.6%
2011	4.0%	4.3%	4.2%	4.5%
2012	4.5%	4.1%	4.8%	4.1%
2013	3.9%	5.3%	4.8%	4.5%
2014	4.4%	3.1%	3.3%	3.6%
2015	3.5%	4.2%	4.3%	4.1%
2016	4.5%	4.7%	4.2%	4.3%
2017	4.5%	4.9%		

Notes:
(a) Regional unemployment rates sourced from Stats NZ. Figures are not seasonally adjusted.
(b) Southern region rates are the population weighted average of two Statistics NZ regions; Southland and Otago.
(c) These figures may differ from those presented in 2015 and earlier as Statistics NZ revised the way in which they report the unemployment rate in 2016 .

C.5 Methodology for projecting regional unemployment rates

C.5.1 Regional unemployment rate approach – historical series

Our projection models use a seasonally adjusted unemployment rate for New Zealand and its regions. Regional rates are only available in raw form, i.e. not seasonally adjusted. Therefore, for consistency in our modelling process, it is necessary to first produce seasonally-adjusted series of regional unemployment rates. We also remove some of the quarterly volatility via smoothing.

Our approach to producing adjusted regional unemployment rate series is as follows:

- Source raw data from Statistics NZ
- Calculate de-seasonalisation factors, taken as the average amount that quarter of year is above or below the average for a five-year moving window centred at that date. For example, the 1991Q2 de-seasonalisation factor is the average unemployment rate for Q2 in '89, '90, '91, '92, and '93 compared to the overall average in those five years
- Centre the de-seasonalisation factors so that each rolling year of factors is centred at 100%
- Use these centred de-seasonalisation factors to produce seasonally adjusted time series
- Smooth the time series by using neighbouring quarters:

$$UE(t) = 0.25\,UE(t-1) + 0.5\,UE(t) + 0.25\,UE(t+1)$$

C.5.2 Regional unemployment rate approach – projection series

The following approach is used to derive regional forecasts:

- Find regional weights using the average total labour force over 2016/17.
- Assume the quarters from 2005Q3 through to 2008Q2 represent a period of 'full employment', and calculate the average unemployment in each region over this period.
- Calculate the difference between the regional average and national average over that period. These differentials are used in the regional long-term rate assumption.
    - Currently Treasury uses 4.3% as the national long-term unemployment rate. For example, a differential of +1.1% was calculated for Northland (over 2005-2008), so the Northland long term rate is 5.4%.
- Mirror the Treasury projection shape for each region, taking the unemployment rate from the current level to the long-term average rate over 5 years.
    - Manual adjustment was made to the Canterbury projection; Canterbury's rate was judged to be lower than full employment, and a slow decrease to 3.3% was assumed.
- Add a correction factor to each future quarter, to ensure that the weighted average unemployment rate equals that used at the national level.

The forecast regional unemployment rates are shown below.

Table C.4.1 Projected regional unemployment rates

Date	Unemployment rate					
	Northland	Auckland	Waikato	Plenty	East Coast	Taranaki
30-Sep-17	7.1%	4.6%	4.5%	6.6%	6.5%	5.1%
31-Dec-17	7.0%	4.6%	4.5%	6.4%	6.4%	5.0%
31-Mar-18	6.8%	4.5%	4.5%	6.2%	6.3%	4.9%
30-Jun-18	6.7%	4.5%	4.5%	6.1%	6.2%	4.8%
30-Sep-18	6.5%	4.5%	4.5%	5.9%	6.1%	4.7%
31-Dec-18	6.3%	4.5%	4.4%	5.7%	6.0%	4.6%
31-Mar-19	6.0%	4.5%	4.4%	5.2%	5.8%	4.4%
30-Jun-19	5.8%	4.4%	4.4%	5.0%	5.7%	4.3%
30-Sep-19	5.7%	4.4%	4.3%	4.9%	5.6%	4.2%
31-Dec-19	5.7%	4.4%	4.3%	4.9%	5.6%	4.2%
31-Mar-20	5.6%	4.4%	4.3%	4.7%	5.5%	4.1%
30-Jun-20	5.6%	4.4%	4.3%	4.7%	5.5%	4.1%
30-Sep-20	5.6%	4.4%	4.3%	4.7%	5.5%	4.1%
31-Dec-20	5.6%	4.4%	4.3%	4.7%	5.5%	4.1%
31-Mar-21	5.6%	4.4%	4.3%	4.7%	5.5%	4.1%
30-Jun-21	5.4%	4.4%	4.3%	4.5%	5.4%	4.0%
30-Sep-21	5.4%	4.4%	4.3%	4.5%	5.4%	4.0%
31-Dec-21	5.4%	4.4%	4.3%	4.5%	5.4%	4.0%
31-Mar-22	5.4%	4.4%	4.3%	4.5%	5.4%	4.0%
30-Jun-22 & Later	5.4%	4.4%	4.3%	4.5%	5.4%	4.0%

Date	Unemployment rate					
	Central	Wellington	Nelson	Canterbury	Southern	Total
30-Sep-17	4.9%	5.0%	2.9%	3.8%	4.6%	4.8%
31-Dec-17	4.9%	4.9%	3.0%	3.7%	4.5%	4.7%
31-Mar-18	5.0%	4.9%	3.0%	3.7%	4.4%	4.7%
30-Jun-18	5.0%	4.9%	3.1%	3.6%	4.3%	4.6%
30-Sep-18	5.1%	4.8%	3.1%	3.6%	4.3%	4.6%
31-Dec-18	5.1%	4.8%	3.2%	3.6%	4.2%	4.6%
31-Mar-19	5.2%	4.7%	3.3%	3.5%	4.0%	4.5%
30-Jun-19	5.2%	4.7%	3.4%	3.4%	3.9%	4.4%
30-Sep-19	5.2%	4.7%	3.4%	3.4%	3.8%	4.4%
31-Dec-19	5.2%	4.7%	3.4%	3.4%	3.9%	4.4%
31-Mar-20	5.3%	4.6%	3.5%	3.3%	3.8%	4.3%
30-Jun-20	5.3%	4.6%	3.4%	3.3%	3.8%	4.4%
30-Sep-20	5.3%	4.6%	3.4%	3.3%	3.8%	4.4%
31-Dec-20	5.3%	4.6%	3.4%	3.3%	3.8%	4.4%
31-Mar-21	5.3%	4.6%	3.4%	3.3%	3.8%	4.4%
30-Jun-21	5.3%	4.6%	3.5%	3.3%	3.7%	4.3%
30-Sep-21	5.3%	4.6%	3.5%	3.3%	3.7%	4.3%
31-Dec-21	5.3%	4.6%	3.5%	3.3%	3.7%	4.3%
31-Mar-22	5.3%	4.6%	3.5%	3.3%	3.7%	4.3%
30-Jun-22 & Later	5.3%	4.6%	3.5%	3.3%	3.7%	4.3%

Notes:
(a) The "Total" column in the table above represents the national unemployment rate, consistent with Appendix C.4.2

C.6 Expense rates

Table C.6.1 Projected expense rates with comparison to previous rates

Year	Previous projection	Present projection	Difference
2018	12.6%	12.1%	-0.5%
2019	12.9%	12.4%	-0.4%
2020	13.2%	12.7%	-0.5%
2021	13.5%	13.0%	-0.5%
2022	13.3%	13.2%	-0.2%
2023	13.2%	13.0%	-0.2%
2024	13.1%	12.9%	-0.2%
2025	13.0%	12.7%	-0.2%
2026	12.8%	12.6%	-0.3%
2027	12.7%	12.4%	-0.3%
2028	12.6%	12.3%	-0.3%

Notes:
(a) Previous projection refers to 2016 actuarial valuation of the benefit system
(b) Expense rate is expressed as a percentage of total future payments excluding overpayments and recoverable assistance

C.7 Overpayments and Recoverable Assistance

For each of overpayments and recoverable assistance we must estimate:

1. The amount of new debts raised
2. The level and speed of recovery of debts

For overpayments, both items are estimated by an aggregate analysis of historical numbers. For recoverable assistance, new amounts are modelled at an individual level and recoveries are estimated using an aggregate analysis.

The overall rates estimated using aggregate analysis are shown in the table below.

Table C.6.1 Assumptions related to incurred overpayments and recoverable assistance recoveries

	Previous projection	Present projection	Difference
Overpayment proportion – rate of new debts raised	3.40%	3.50%	0.10%
Recovery rate for recoverable assistance	87.3%	85.5%	-1.75%

Notes:
(a) Previous projection refers to 2016 actuarial valuation of the benefit system
(b) Overpayment proportion refers to the percentage of extra benefit payments paid that relate to overpayments/fraud
(c) Recovery rate for recoverable assistance refers to the percentage of recoverable assistance that is recovered each quarter

Overpayments also require a timing schedule. We model both increases (new debts for the same individual) and decreases (write-offs and recoveries) over 15 years. The adopted schedule for the first 10 years is shown below.

Table C.6.2 Overpayments (and fraud) payment and recovery schedule

Duration (a)	Raised (b)	Recovery Rate (c)	Write off Rate (d)	Amount recovered or written off (e)	Amount Written off (f)	Overpayments paid by MSD (g)	Overpayments recovered by MSD (h)	Overpayments outstanding (i)
0	0.679	47.8%	1.2%	32.5%	0.004	67.9%	32.1%	0.354
1	0.778	30.8%	4.3%	13.9%	0.006	9.9%	13.4%	0.314
2	0.824	19.7%	4.3%	7.1%	0.003	4.5%	6.8%	0.288
3	0.853	15.6%	4.3%	5.0%	0.002	2.9%	4.8%	0.268
4	0.879	14.8%	4.3%	4.3%	0.002	2.6%	4.2%	0.250
5	0.896	12.4%	4.3%	3.3%	0.001	1.7%	3.2%	0.234
6	0.910	9.9%	4.3%	2.5%	0.001	1.4%	2.4%	0.224
7	0.923	9.4%	4.3%	2.2%	0.001	1.4%	2.1%	0.215
8	0.933	7.6%	4.3%	1.7%	0.001	1.0%	1.6%	0.208
9	0.941	7.0%	4.3%	1.5%	0.001	0.8%	1.5%	0.200
10	0.947	6.5%	4.3%	1.4%	0.001	0.6%	1.3%	0.193
11	0.953	6.1%	4.3%	1.2%	0.001	0.5%	1.2%	0.186
12	0.956	5.7%	4.3%	1.1%	0.000	0.4%	1.0%	0.179
13	0.961	5.3%	4.3%	1.0%	0.000	0.4%	0.9%	0.174
14	0.964	4.9%	4.3%	0.9%	0.000	0.3%	0.8%	0.168
15	0.966	4.6%	4.3%	0.8%	0.000	0.3%	0.7%	0.163
16	0.969	4.2%	4.3%	0.7%	0.000	0.3%	0.7%	0.159
17	0.972	3.9%	4.3%	0.6%	0.000	0.3%	0.6%	0.155
18	0.973	3.7%	4.3%	0.6%	0.000	0.1%	0.6%	0.151
19	0.975	3.4%	4.3%	0.5%	0.000	0.2%	0.5%	0.148
20	0.977	3.2%	4.3%	0.5%	0.000	0.2%	0.5%	0.145
21	0.980	2.9%	4.3%	0.4%	0.000	0.3%	0.4%	0.143
22	0.981	2.7%	4.3%	0.4%	0.000	0.1%	0.4%	0.141
23	0.982	2.5%	4.3%	0.4%	0.000	0.1%	0.3%	0.138
24	0.983	2.4%	4.3%	0.3%	0.000	0.1%	0.3%	0.136
25	0.984	2.2%	4.3%	0.3%	0.000	0.1%	0.3%	0.134
26	0.985	2.0%	4.3%	0.3%	0.000	0.1%	0.3%	0.132
27	0.986	1.9%	4.3%	0.3%	0.000	0.1%	0.2%	0.130
28	0.987	1.8%	4.3%	0.2%	0.000	0.1%	0.2%	0.129
29	0.988	1.6%	4.3%	0.2%	0.000	0.1%	0.2%	0.127
30	0.988	1.5%	4.3%	0.2%	0.000	0.1%	0.2%	0.126
31	0.992	1.4%	4.3%	0.2%	0.000	0.4%	0.2%	0.128
32	0.993	1.3%	4.3%	0.2%	0.000	0.1%	0.2%	0.127
33	0.995	1.2%	4.3%	0.2%	0.000	0.2%	0.2%	0.127
34	0.995	1.1%	4.3%	0.1%	0.000	0.0%	0.1%	0.126
35	0.996	1.1%	4.3%	0.1%	0.000	0.1%	0.1%	0.126
36	0.997	1.0%	4.3%	0.1%	0.000	0.1%	0.1%	0.126
37	0.998	0.9%	4.3%	0.1%	0.000	0.1%	0.1%	0.125
38	0.999	0.9%	4.3%	0.1%	0.000	0.1%	0.1%	0.125
39	0.999	0.8%	4.3%	0.1%	0.000	0.0%	0.1%	0.125
40	0.999	10.0%	95.0%	1.2%	0.012	0.0%	0.1%	0.112

Notes:
(a) Number of quarters since the initial debt raised
(b) The amount of total eventual overpayments attributable to a cash flow, by duration - expressed per notional $1 of overpayments
(c) The percentage of outstanding overpayments that is either recovered or written off
(d) The percentage of overpayments recovered that are actually written off
(e) Column (c) times the change in column (b) from the previous row
(f) Column (d) times (e)
(g) Change in column (b) from the previous row
(h) Column (e) minus (f)
(i) Previous row of (i) plus (g) minus (e)

APPENDIX D DATA SUPPLIED

D.1 SAS datasets

This year we received two versions of each dataset:

» One up to 31 March 2017 but extracted as at 30 April 2017
» A later version including information up to 30 June 2017 but extracted as at 31 July 2017

The earlier extracts were used for modelling and the more recent extracts were used to create the projection cohort as at June 2017. In the following sections we list only the more recent extract, the only difference being the extraction dates.

D.1.1 Benefit system datasets

SAS datasets relating to benefit receipt supplied by MSD were used to conduct the projection. The datasets were:

» **rate_period_20170630.sas7bdat:** Rate file with one record per client and benefit spell that contains:
  - Client identification number
  - Benefit type code (plus codes for supplementary benefits)
  - Gross and net payment amounts for primary benefit
  - Payment amounts for any supplementary benefits
  - Spell start and end date

  The dataset covered spells from March 1993 through to 30 June 2017, the projection date.

» **ahpy_lumpsum1_20170630.sas7bdat:** Lump sum file which covers those payment types recorded on system in a lump sum fashion (single date, rather than spell start and end dates). Fields include:
  - Client identification number
  - Benefit type code
  - Gross and net payment amounts
  - Input date

» **ahpy_ccs_20170630.sas7bdat:** Similar to the ahpy_lumpsum1 file, except specific to the child care subsidy benefit, which was not included on the original lump sum file.

» **rate_cda_20170630.sas7bdat:** Similar to the rate_period file, but specific to the child disability allowance benefit, which was not included on the original rate_period file.

» **spel_20170630.sas7bdat:** File with one row per spell per client, containing a variety of fields related to the spell. The “oldcomdt” field contained the first payment date for the spell, which was used to overwrite spell commencement dates before the 1993 system change.

» **swn_20170630.sas7bdata:** File with one row per client, with a range of static variables. This dataset was used to determine age, gender, education level and ethnicity for each client.

» **swns_with_dob_eth_20170630.sas7bdat:** File with one row per client, containing client ID and age for all clients. This data set was used to fill in this information for those clients where it was not included in swn20170630.sas7bdat.

» **chd_20170630.sas7bdat:** File containing one record for every ‘child spell’ per client. This effectively provides child records to attach to all benefit spells which depend on the age and number of children. Child age is also included.

- **dist_20170630.sas7bdat:** File containing one record for every district per spell per client. This allows the assignment of each client spell to their district and region.
- **dist_changes_20170630.sas7bdat:** File containing further records on districts by client and spell. Used to fill in information for client spells where it was not included in dist_20170630.sas7bdat.
- **yp_ypp_regions_20170630.sas7bdat:** File similar in structure to the rate file, but only for clients in the youth payment or young parent payment. An additional field indicates which of the two payments the client actually received.
- **ptnr_20170630.sas7bdat:** File containing one record for every 'partner spell' per client. This allows the assignment of each client's partner details on the historical data. The partner's identification number is also included.
- **incp_20170630.sas7bdat:** File containing one record for every 'incapacity spell' per client. This allows the assignment of each incapacity details such as type and number of incapacities to JS-HCD and SLP-HCD clients.
- **slp_sinc_20170630.sas7bdat:** File contained the required HCD reassessment frequency for SLP-HCD clients approximately each quarter end to 30 June 2017.
- **dv_debt_summary_20170630.sas7bdat:** File containing information about client loans in the form of recoverable assistance. There is an entry for every client who had a debt balance at 1 July 2007, plus one entry per client per change to their debt status (e.g. repayment made or debt issued) from 1 July 2007 to 30 June 2017. Pre-1 July 2007 data is not split by breach type.
- **prov_20170630.sas7bdat:** File giving the outstanding provision for debts owed to MSD as at 30 June 2017. It contains one row per client, their aggregated debt plus a range of other static variables.
- **Abt_final_appt_status_20170630.sas7bdat:** File containing one row per client appointment with MSD, a broad reason for the appointment and attendance information.
- **All_sanctions_20170630.sas7bdat:** File containing one row per client sanction indicating the type of sanction, the date and some categorical indicators. This was used to produce the new variable: number of suspensions in the past five years.

D.1.2 Public housing datasets

The projection is a combined benefit system – public housing model, we have previously been provided with historical data for public housing[4] and were provided with updated datasets from MSD covering the period from August 2015 to 30 June 2017. As with the benefit system datasets we received two extracts (as at 31 March 2017 and 30 June 2017) and list only the more recent:

- **register_snapshot_20170630.sas7bdat:** File with one record per application on the public housing register per end-of-month snapshot date. Includes information on application date, reasons for application, household size, type and current location of the applicant household and housing requirements such as number of bedrooms and preferred locations.

[4] Historical data is described in the appendices to previous reports:
Baseline valuation of the social housing system, 2015: https://www.msd.govt.nz/documents/about-msd-and-our-work/publications-resources/evaluation/social-housing-valuation/2015/2015-social-housing-valuation-appendices.pdf
Valuation of the Benefit System for Working-age Adults, 2016: https://www.msd.govt.nz/documents/about-msd-and-our-work/newsroom/media-releases/2017/valuation-of-the-benefit-system-for-working-age-adults-2016/valuation-of-the-benefit-system-for-working-age-adults-2016.pdf

- **register_hh_snapshot_20170630.sas7bdat:** File with one record per household member on the public housing register per end-of-month snapshot date. Includes information on the relationship to primary applicant and demographic variables.
- **houses_snapshot_ 20170630.sas7bdat:** File with one record per public house per end-of-month snapshot date. Includes information on location, house details, and market rent.
- **tenancy_snapshot_20170630.sas7bdat:** File with one record per public house tenancy per end-of-month. Includes information on the size, type and weekly income of the tenant household, the dates of entry into public housing, the current public house and details of income-related rent and subsidies that make up the market rent of the house. This also distinguished between HNZ and CHP providers.lib
- **tenancy_hh_snapshot_20170630.sas7bdat:** File with one record per household member in a public house tenancy per end-of-month snapshot date. Includes information on the relationship to primary householder and demographic variables.
- **evidence_items_20170630.sas7bdat**: File with records for public housing clients which dropped out of the data on migration. Included their start and end dates of public housing spells and associated households. Approximate age was also provided. These clients are mostly children with some additional occupants and not in receipt benefit support.
- **mig_map_register_20170630.sas7bdat**: File with register applications at August 2015 mapped from the HNZ to MSD systems. Used in combination with other migration mappings, Dmatch_id_20170630.sas7bdat to construct the longitudinal series for modelling.
- **mig_map_register_hh_20170630.sas7bdat**: File with individuals on register applications at August 2015 mapped from the HNZ to MSD systems. Used in combination with other migration mappings, Dmatch_id_20170630.sas7bdat to construct the longitudinal series for modelling.
- **mig_map_tenancy_20170630.sas7bdat**: File with households in public housing at August 2015 mapped from the HNZ to MSD systems. Used in combination with other migration mappings, Dmatch_id_20170630.sas7bdat to construct the longitudinal series for modelling.
- **mig_map_tenancy_hh_20170630.sas7bdat**: File with individuals in public housing at August 2015 mapped from the HNZ to MSD systems. Used in combination with other migration mappings, Dmatch_id_20170630.sas7bdat to construct the longitudinal series for modelling.
- **tenancy_exit_20170630.sas7bdat**: File with household that exited public housing between January 2015 and June 2017 and the reason giving for exiting.

D.1.3 Other datasets

As with previous years we were also provided with datasets covering information from CYF and Corrections, as well as a file linking anonymous identities across the different systems. The datasets were:

- **cyf_summary_20170630.sas7bdat:** File containing one record per client per child protection (CP) or youth justice (YJ) spell. This allowed the calculation of CP and YJ related variables for each client including the age of first entry into the CP and YJ and total number of CP and YJ events.
- **mmc_period_20170630.sas7bdat:** File containing one record per client per corrections sentence served. This allowed the calculation of criminal history related variables for each client including the percentage of time spent in prison over the last year and the percentage of time serving sentences over the last ten years excluding those for driving offences.
- **Dmatch_id_20170630.sas7bdat:** File linking anonymous identities from different sources including children registered to parents while on benefits, corrections identities, CP/YJ identities and public

housing identities. The matches in this file were used to attach CP/YJ, criminal history, intergenerational and public housing related variables to benefit system clients.

D.1.4 New Ministry of Education datasets

This year we were provided with multiple datasets containing Ministry of Education information of secondary schooling covering clients who have left a NZ school since 2008. The datasets provided were:

- **Edu_schoolsattended_20170630.sas7bdat:** File containing one row per enrolment at secondary school, includes anonymised school identifier and first and last day of attendance.
- **Edu_qualifications_20170630.sas7bdat:** File containing one row per qualification reported and provides the NQF qualification level. Qualifications include literacy, numeracy, NCEA qualifications and University Entrance. This was used to create the new educational attainment at school variable.
- **Edu_standdownsuspension_20170630.sas7bdat:** File containing one row per stand-down or suspension. Stand-downs are when students are not allowed at school for a number of days due to behavioural or other reasons, and Suspensions are for more serious incidents which may lead to longer periods away from school or exclusion. Contains the start and end dates, a reason group, student age and year level. This was used to create the new total duration of suspensions and stand-downs at school variable.
- **Edu_unjustifiedabsence_20170630.sas7bdat:** File containing one row per each non-enrolment or unjustified absence. A non-enrolment record is opened if a student stops attending one school and does not enrol at another. An Unjustified Absence record is opened if students do not attend the school they are enrolled at. Contains the start, end and outcome dates as well as an outcome category.
- **Edu_gateway_20170630.sas7bdat:** File containing one row per person undertaking a Gateway programme. Gateway is a long-standing programme to help students transition from secondary school to either tertiary education or employment. Information included the start and end dates, the outcome category, region and credits achieved. Data was only current to December 2015.
- **Edu_tradeacademies_20170630.sas7bdat:** File containing one row per person undertaking a secondary tertiary programme or trade academies programme. Trades academies (Secondary-Tertiary Programmes) aim to engage young people in education and equip them with the vocational skills and training they need to gain future employment[5]. Information included the start and end dates, the outcome destination category and credits achieved. Data was only current to July 2016.
- **Edu_tradeacademies_20170630.sas7bdat:** File containing one row per person undertaking a secondary tertiary programme or trade academies programme. Trades academies (Secondary-Tertiary Programmes) aim to engage young people in education and equip them with the vocational skills and training they need to gain future employment[6]. Information included the start and end dates, the outcome destination category and credits achieved. Data was only current to July 2016.
- **Edu_tertiaryattendance_20170630.sas7bdat:** File containing one row per tertiary enrolment either during the schooling period or after. Includes information on the enrolment year, NQF level of the course and anonymised tertiary provider. This was used to create the new variable: Highest NQF level of tertiary enrolments to date.
- **Edu_school_20170630.sas7bdat**: File containing one record per school attended by any matched student. Includes information on the type of school, the current decile and TLA.

[5] http://www.youthguarantee.net.nz/secondary-tertiary-programmes/
[6] http://www.youthguarantee.net.nz/secondary-tertiary-programmes/

- **Edu_schooldecilehistory_20170630.sas7bdat**: File containing a time-series of the decile of each school in Edu_school_20170630.sas7bdat. Includes the start date and end date of the period for which the decile applied.
- **Edu_schooltypehistory_20170630.sas7bdat**: File containing a time-series of the institution type of each school in Edu_school_20170630.sas7bdat. Includes the start date and end date of the period for which the type of school applied.

D.1.5 One-off datasets

We were also provided with two one-off datasets to enable analysis of tenancy reviews and 3k to work grants. The datasets were:

- **tenancy_review_20170630.sas7bdat**: File containing summaries of all tenancy reviews conducted by MSD from July 2014 to June 2017. Information included the household, the stage of the review and an outcome.
- **Grants3ktowork_20170630.sas7bdat**: File containing a list of anonymous identifiers and grant dates for recipients of 3k to work grants. The anonymous identifiers matched those used for other benefit system datasets so this information could be linked.

D.2 Benefit rates

Our analysis requires the conversion of historical payments to "current values". A series of pdf documents **BenefitRateSummary_1999-04-01.pdf**, **BenefitRateSummary_2000-04-01.pdf** etc. has previously been provided showing all benefit rates whenever they were updated (typically 1 April, and occasionally 1 September, each year). A spreadsheet **Benefit Rates pre 1999.XLS** has also previously been provided with values applicable before 1999. All but the most recent benefit rate information was carried across from the previous projection. The most recent information was provided on the MSD website[7].

D.3 Historical and forecast economic variables

- **befu17-charts-data.xls**: Treasury fiscal strategy model, 2017 version. Excel spreadsheet containing historical quarterly values as well as Treasury forecasts for the next five years for each of population, employment and unemployment rates.
- **disc-rates-jun17.xls**: Excel spreadsheet containing Treasury assumptions for government accounts for future discount and inflation rates as at June 2017.

D.4 Miscellaneous files

Several other files were either supplied or carried across from the prior years that aided investigation and interpretation, but did not directly feed into the projection:

- **benefit_cancellations.sas7bdat**: Contains identifiers for codes related to reasons for leaving benefits
- **benefit_codes.sas7bdat**: Contains identifiers for different benefit codes
- **district_codes.sas7bdat**: Contains identifiers for district codes and corresponding regions

Various other summary files, file descriptors and overviews were also provided on an ad hoc basis.

[7] https://www.workandincome.govt.nz/products/benefit-rates/benefit-rates-april-2017.html#null.

D.5 IDI analysis

Our analysis in Section 3.7 of the report of was performed using Statistics New Zealand's Integrated Data Infrastructure (IDI). This is a set of administrative data from government agencies linked across anonymous identities.

All results that use IDI data are subject to the following disclaimer:

The results in this report/these tables are not official statistics, they have been created for research purposes from the Integrated Data Infrastructure (IDI), managed by Statistics New Zealand. The opinions, findings, recommendations, and conclusions expressed in this report/these tables are those of the author(s), not Statistics NZ.

Access to the anonymised data used in this study was provided by Statistics NZ in accordance with security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular person, household, business, or organisation, and the results in these tables have been confidentialised to protect these groups from identification.

Careful consideration has been given to the privacy, security, and confidentiality issues associated with using administrative and survey data in the IDI. Further detail can be found in the Privacy impact assessment for the Integrated Data Infrastructure available from the Statistics NZ website. [8]

The results are based in part on tax data supplied by Inland Revenue to Statistics NZ under the Tax Administration Act 1994. This tax data must be used only for statistical purposes, and no individual information may be published or disclosed in any other form, or provided to Inland Revenue for administrative or regulatory purposes.

Any person who has had access to the unit record data has certified that they have been shown, have read, and have understood section 81 of the Tax Administration Act 1994, which relates to secrecy. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes, and is not related to the data's ability to support Inland Revenue's core operational requirements.

Within the IDI the datasets we made use of included:

- **msd_clean.msd_spell:** This contains records of benefit spells including benefit type, start dates and end dates
- **msd_clean.msd_incapacity:** This contains records of incapacity types for HCD benefit spells
- **moh_clean.pub_fund_hosp_discharges_event:** This contains a national collection of publicly and privately funded hospital discharge information, including clinical information, for inpatients and day patients
- **moh_clean.pharmaceutical:** The Pharmaceutical Collection is a data mart that supports the management of pharmaceutical subsidies
- **moh_clean.nnpac:** The National Non-Admitted Patient Collection (NNPAC) stores data about selected non-admitted secondary care events, such as outpatient and emergency department visits
- **moh_clean.pho_enrolment:** This contains information on Primary Health Organisations (PHO) enrolments
- **moh_clean.chronic_condition:** This contains information about healthcare users who have been diagnosed with a chronic conditions/significant health
- **moh_clean.PRIMHD:** This contains information on mental health and addition service activity and outcomes

[8] www.stats.govt.nz.

We also made use of the code from the Social Investment Agency (SIA) for standardised definitions of mental health and addictions (MHA) service access based on available data in the IDI. Details of this are provided by SIA. [9]

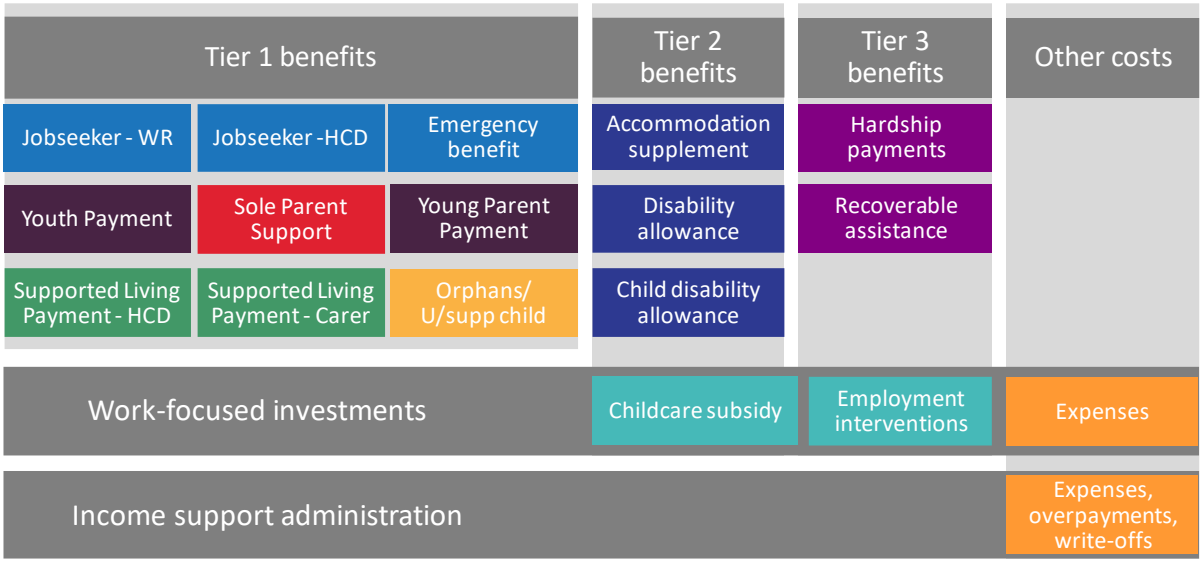
Further information on the health datasets is publicly available on the Ministry of Health website.[10]

[9] https://github.com/nz-social-investment-agency/mha_data_definition
[10] https://www.health.govt.nz/nz-health-statistics/national-collections-and-surveys/collections

APPENDIX E PROJECTION SCOPE

The current and future client projected durations and payments comprise of a number of different types benefit support and expenses. These are summarised in the following figure:

Figure E.1 Summary of payment categories included in the projection



The table below gives further details on this categorisation. In particular, it identifies into which components some of the smaller payments have been allocated. Note that all payments to clients aged over 65 have been excluded from scope. In this table we have attempted consistency with Treasury appropriations for 2016/17[11].

Multi-Category Expenses and Capital Expenditure	Allocation
Administering Income Support (M63) This category is limited to assessing, paying, reviewing entitlements and collecting balances owed by clients for income support, supplementary assistance, grants and allowances.	**Income support administration (Benefit processing)**
Improving Employment Outcomes – Service Provision (M63) This category is limited to providing services, including services provided in accordance with criteria set out in delegated legislation under the Social Security Act 1964, to facilitate transitions to work for people who are receiving or likely to receive working age benefits or youth support payments and are work ready to help them move into sustainable employment,	**Income support administration (work-focused case management, work brokerage, etc.)**
Improving Work Readiness – Service Provision (M63) This category is limited to providing services, including services provided in accordance with criteria set out in delegated legislation under the Social Security Act 1964, to address barriers to employment (such as literacy, numeracy, health, skills, drug or alcohol use, confidence and motivation) for people who are receiving or likely to receive working age benefits or youth support payments to help them become work ready.	**Income support administration (work-focused case management, work brokerage, etc.)**
MCA - Improving Employment outcomes – Assistance (M63)	**Work-focused investment (training)**

[11] http://www.treasury.govt.nz/budget/2017/suppestimates/suppest17socdev.pdf

This category is limited to providing specified assistance, including services provided in accordance with criteria set out in delegated legislation under the Social Security Act 1964, to facilitate transitions to work to help people who are receiving or likely to receive working age benefits or youth support payments and are work ready to move into sustainable employment	

Departmental Output Expenses	Allocation
Investigation of Overpayments and Fraudulent Payments and Collection of Overpayments (M63) This appropriation is limited to services to minimise errors, fraud and abuse of the benefit system and Income Related Rent, and services to manage the collection of overpayments, recoverable assistance loans and other balances owed by former clients.	**Income support administration** NB: NZ Super and student costs excluded
Collection of Balances Owed by Former Clients and Non-beneficiaries Services to manage the collection of overpayments and recoverable assistance loans from former clients and other balances owed comprising of Student Allowance overpayments, Liable Parent Contributions, and court ordered Maintenance. (Wound into Investigation of overpayment and fraudulent payments and collections of overpayment June 2015.)	**Income support administration (Collections)** NB: NZ Super and student costs excluded
Services to Protect the Integrity of the Benefit System Services to minimise errors, fraud and abuse of the benefit system. (Wound into Investigation of overpayment and fraudulent payments and collections of overpayment June 2015.)	**Income support administration (Integrity Services)**
Tailored Sets of Services This appropriation is limited to delivering tailored sets of services to individuals to help them into sustainable employment, participate more fully in their community or achieve a greater level of social independence; and the management of related non-departmental output contracts. The composition of each set of services is determined by the individual's needs and selected from a mix of employment readiness training and support, employment placement, social support services, payment of income support and training support benefits, and referrals to other employment or social support providers. (Wound into MCA Jan 2014)	**Income support administration (Benefit processing)** and **Work-focused investments** (work-focused case management, work brokerage, etc.)
Vocational Skills Training This appropriation is limited to vocationally based skills training for working-age people through the Training Opportunities Programme. (Closed in December 2013).	**Work-focused investment (training)**

Non-Departmental Output Expenses	Allocation
Vocational Services for People with Disabilities Provision of vocational services for people with disabilities including community participation and employment services.	**Work-focused investment (training)**

Benefits and Other Unrequited Expenses	Allocation
Emergency Benefit (M63) This appropriation is limited to the provision of means tested income support for people who are eligible for an Emergency Benefit as set out in the Social Security Act 1964 and delegated legislation made under that Act. Benefit code 611.	**Other Tier 1 Benefits – Emergency benefit**
Jobseeker Support – Health Condition, Injury or Disability (M63) Provision of means-tested income support for people who are not in full-time employment and are limited in their capacity for work, or who are in	**Key Tier 1 Benefits – JS-HCD**

employment but working at a reduced level, because of sickness, injury, disability or pregnancy. Paid in accordance with the criteria set out in the Social Security Act 1964. Benefit codes 600 and 601.	
Jobseeker Support – Work Ready (M63) This appropriation is limited to the provision of means tested income support for unemployed people who are able to work full time and taking steps to look for work. Eligibility for Jobseeker Support is set out in the Social Security Act 1964 and delegated legislation made under that Act. Benefit codes 115, 125, 603, 604, 605, 608 and 610.	**Key Tier 1 Benefits – JS-WR**
Orphan's Benefit (M63) Provision of income support for people charged with the responsibility for the care of a child whose parents are dead or cannot be located, or suffer a serious long-term disablement that renders them unable to care for the child, or where there has been a breakdown in the child's family. Paid in accordance with criteria set out in the Social Security Act 1964. Benefit codes 040, 044, 340 and 344.	**Other Tier 1 Benefits – Orphan's/Unsupported Child**
Sole Parents Support (M63) Provision of income support for sole parents, caregivers of sick or infirm people or women alone, whose domestic circumstances exclude them from fully participating in the labour force. Paid in accordance with criteria set out in the Social Security Act 1964. Benefit codes 313, 365, 613, 665.	**Key Tier 1 Benefits – SPS**
Supported Living Payment – Health Condition, Injury or Disability Provision of means-tested income support for people who are totally blind, or permanently and severely restricted in their capacity for work due to sickness, injury or disability. Paid in accordance with the criteria set out in the Social Security Act 1964. Benefit codes 020 and 320.	**Key Tier 1 Benefits – SLP-HCD**
Supported Living Payment – Carer Provision of income support for people who are caring full time for someone at home who is not their husband, wife or partner and, who would otherwise need to receive hospital or residential-level care. Paid in accordance with the criteria set out in the Social Security Act 1964. Benefit codes 367 and 667.	**Key Tier 1 Benefits – SLP-Carer**
Youth Payment and Young Parent Payment (M63) This appropriation is limited to the provision of income support and incentive payments for people aged 16, 17 or 18 years who are currently unemployed but are in or available for full-time education, training or work-based learning and where it is inappropriate for them to obtain financial support from their parents, and 16-, 17-, 18- and 19-year-old parents who are currently unemployed but are in or available for full-time education, training or work-based learning. Paid in accordance with criteria set out in the Social Security Act 1964 and delegated legislation issued under that Act.	**Key Tier 1 Benefits – YP and YPP**
Accommodation Supplement (M63) This appropriation is limited to the Accommodation Supplement, Special Transfer Allowance, and Away From Home Allowance to persons to cover accommodation costs, paid in accordance with the criteria set out in the Social Security Act 1964 and delegated legislation issued under that Act. Benefit codes 471, 470, 472, 473, 474 and 832.	**Tier 2 – Accommodation supplement**

Child Disability Allowance (M63) This appropriation is limited to the Disability Allowance to the caregivers of children with a serious disability, paid in accordance with the criteria set out in the Social Security Act 1964 and delegated legislation issued under that Act. Benefit code 065.	**Tier 2 – Child disability allowance**
Disability Allowance (M63) This appropriation is limited to the Disability Allowance to persons with disability costs, paid in accordance with the criteria set out in the Social Security Act 1964 and delegated legislation issued under that Act. Benefit codes 425, 836, 837, 838, and 843.	**Tier 2 –Disability allowance**
Hardship Assistance (M63) This appropriation is limited to Civil Defence payments, Funeral Grants, Live Organ Donors Assistance, Special Benefit, Special Needs Grants and Temporary Additional Support to provide means-tested temporary financial assistance to persons with emergency or essential costs, paid in accordance with the criteria set out in the Social Security Act 1964 and delegated legislation issued under that Act. Benefit codes 190, 191, 192, 193, 440, 450, 460, 461, 596, 621, 653, 654, 655, 830, 865 and 840.	**Tier 3 Benefits – Hardship Payments**
Special Circumstance Assistance (M63) This appropriation is limited to financial assistance to people in special circumstances and comprises the Clothing Allowance, and providing assistance for community costs, domestic violence and witness protection relocation, home help, social rehabilitation assistance, telephone costs paid in accordance with criteria set out in the Social Security Act 1964, and delegated legislation under that Act; and Civilian Amputees Assistance, paid in accordance with criteria set out in the Disabled Persons Community Welfare Act 1975.	**Tier 3 Benefits – Hardship Payments**
Childcare Assistance (M63) Provision of assistance for the costs of pre-school childcare that meets specific quality guidelines, where parents meet activity and income criteria set out in the Social Security Act 1964 and delegated legislation issued under that Act. Benefit code 062.	**Childcare subsidy**
Assistance to transition into employment (M63) Provision of payments to beneficiaries, low income earners, students and ex beneficiaries, who meet certain criteria, to assist in the transition from benefit to employment and the continuation of employment. Criteria are set out in relevant Welfare Programmes and Ministerial Directions pursuant to the Social Security Act 1964.	**Employment interventions**

Non-Departmental Other Expenses	Allocation
Debt Write-downs (M63) Provision for write-downs of Crown debt administered by the Ministry of Social Development due to debt write offs or debt provisions resulting from the need to value debt in accordance with generally accepted accounting practice.	**Tier 3 Benefits – Loans**
Improving Employment Outcomes – Assistance (M63) Provision of assistance to help address barriers faced by job seekers so they can become work ready, move into employment and stay in employment for longer periods of time. This employment assistance is governed by the Cabinet and Ministerial Guidelines for Employment and Training Assistance.	**Work-focused investments (training)**
Employment Assistance This appropriation is limited to the provision of transition support, further training, education and employment activities for all school leavers aged 15 to 20 years. This was wound into MCA in January 2014.	**Work-focused investment (training)**

Mainstream The Mainstream Employment Programme provides a package of subsidies, training, and other support to help people with significant disabilities get work in the State sector. This was wound into MCA in January 2014.	**Work-focused investment (training)**
Out of School Care Programmes (M63) Provision of assistance to CYF approved OSCAR programmes to assist with the establishment and/or operating costs of OSCAR programmes.	**Work-focused investments (OSCAR)**

Non-Departmental Capital Expenditure	Allocation
Recoverable Assistance (M63) Facility for low-income earners and beneficiaries to access means-tested assistance to enable them to meet essential and immediate needs, or costs in specific circumstances. Criteria are set out in relevant Welfare Programmes and Ministerial Directions pursuant to the Social Security Act 1964.	**Loans** **NB: net of recoveries on an annual basis**

APPENDIX F PROJECTION DEFINITIONS

Appendix B introduced the definitions of the cohorts:

- The **current client cohort** consists of all working-age clients who received a benefit payment in the 12 months up to and including the effective date of the projection. The total projected payments for the current client cohort includes all benefit payments to these clients until they reach age 65. The total projected duration for the current cohort includes all time in which these clients receive main benefit support until age 65.
- The **future client cohort** in each of the next five future years consists of all working-age clients who enter the benefit system in the next five years either for the first time, or after being off benefit for more than 1 year at the previous 30 June. The total projected payments for these future cohorts includes all benefit payments to the relevant clients until they reach age 65. The total projected duration for the future cohorts includes all time in which the relevant clients receive main benefit support until age 65

F.1 Inclusion of recent recipients in current client cohort

The current client cohort includes those recipients who are currently receiving benefits as well as those who are not currently receiving but have received benefits sometime in the previous 12 months. We use this definition for the following reasons:

- **Reducing spell definition issues:** Defining those people on benefit at a specific point in time can cause complications. For instance, some benefits are provided in lump sum form so the spell duration is not obvious and some benefits can have small breaks in spells. These factors have the potential to bias projection payments upwards or downwards.

- **Recently off-benefit clients have a higher probability of returning to benefits:** Of the former clients that have returned to Tier 1 benefits in 2016/17, we calculate that about 40% of them had been out of the system for less than a year. This high percentage means it is appropriate to still consider them alongside current clients. By contrast, in 2016/17 about half as many (20%) of clients returning were in their second year off benefits.

- **Reducing the potential for seasonal impacts:** The choice of the 30 June projection date has relevance as there are many benefits that show seasonal effects, with differing numbers on various benefits on each quarter due to annual cycles in the economy. The 12-month rule helps mitigate this seasonality.

F.2 Working-age assumption

The definition only includes those recipients of working-age; at least 16 and less than 65. We recognise that a small but not insignificant amount of benefits go to people beyond age 65, but have not included these:

- These payments are highly interrelated with New Zealand Superannuation, which is outside the scope of this projection
- MSD intends to improve the projection results by achieving better employment outcomes amongst current recipients. This objective has less relevance amongst clients over age 65
- Limiting attention to ages below 65 significantly simplifies the analysis and reporting of the results

Benefits payable to youths (aged 16-17) such as the Youth Payment (YP) and Young Parent Payment (YPP) have been included within the definition of working-age. This is because understanding the

transitions and lifetime pathways of clients entering the benefit system at a very young age provides important insight into the support these clients require.

F.3 Treatment of partners

Some benefits depend on relationship status and there are cases where both partners are on benefit. In theory, it would be possible to value couples as a unit as their future durations lifetime bene fit payments are likely to be dependent. However, in the projection we have treated all clients individually, so that a primary client and their partner have separate future duration and payment estimates.

One practical implication for this approach is that much of MSD's reporting is based around counting couples as single units. Thus, there will be some differences in attempting to reconcile numbers in this report to other published numbers. It also means that partners of the primary recipients need to be allocated to segments, requiring us to generate our own measure of continuous duration, rather than using a measure supplied by MSD, which does not incorporate partner spells.

F.4 Future benefits different to those currently received

The definition above includes benefits payable in the future of a different type to those currently being received. For instance, a person who is currently receiving Jobseeker Support may in the future receive Supported Living Payment; these future durations and payments have been included and attributed to that client. The purpose of incorporating all future durations and payments regardless of benefit type is to provide a basis for understanding long spells with benefit support and to provide a framework for investment decisions to reduce future spells.

We recognise that this property can cause a "gearing" effect in the projection, in that distant durations and payments that MSD may have little current control over are included or excluded from the projection results depending on current circumstances. For instance, suppose it is expected that a person will begin receiving Supported Living Payment in 20 years' time:

- If the person has not been on a benefit during the last 12 months, these future spells are excluded from the results
- However, if the person is currently or has been during the last 12 months on a different benefit (Jobseeker say), these future spells are included.

Thus, helping a Jobseeker Support recipient into employment today would have a compound effect of removing both their Jobseeker Support spell and other future spells of different benefit types from the current client results as measured at a future projection date one year from now, even if those later benefits will still occur.

Some alternative definitions exist that would not be subject to this effect. For example, the projection results could be defined as durations and payments until a client is off benefits for 12 months. While we recognise some advantages to alternative definitions, we believe the current one is to be preferred for the following reasons:

- **Clients who are "in the benefit system" are more likely to make use of other benefits:** For instance, in the example above a Jobseeker Support recipient is more likely to make use of the Supported Living Payment in the future than someone who has never been in the system. It is important to capture these effects to be able to manage long durations of benefit support.
- **Robustness:** The current definition is likely to be applicable under possible MSD policy and system changes, whereas this may be more difficult under more complex definitions.
- **Given the level of switching between benefits, it encourages a holistic view of current client results**: Under the current definition the key means of reducing the projection results is to encourage people to leave the system entirely, rather than simply leaving their current benefit. We believe this most closely ties in with MSD's philosophy of encouraging long-term employment outcomes.

» **Simplicity**: More complex definitions would be harder to communicate effectively and reconcile from year to year.

F.5 Relative size of future client projection results

As agreed with MSD, we have calculated the future cohort durations and payments for each of the next five years. The future cohort durations and payments relate to all clients that receive a benefit in each future year who had not received a benefit in the previous 12 months.

A practical issue that arises with this definition is that there is some double counting of cash flows in the current and future cohort totals. To illustrate this, consider a client who:

» Had received JS-WR in March 2017
» Was not on benefits at the projection date
» Received no benefits over the 2017/18 year
» Received further JS-WR benefits in 2018/19

In this example, future payments and durations relating to the client are now included in both the current client results and the future client results for 2017/18. Thus, if the durations or payments related to this client were added without adjustment there would be some double counting. In general, all future cohort results apart from the first future year, will have some degree of double counting of durations and payments.

Therefore, in our results sections where we present future cash flows and numbers with benefits, combining current and future cohort results, we have adjusted the projections related to the current cohort to remove this double counting.

F.6 Exclusion of Jobseeker Support – Student Hardship

As with previous projections, it was judged that the Jobseeker Support – Student Hardship was not an appropriate benefit type to include in the projection for the following reasons:

» All other financial assistance provided to students is excluded.
» The benefit is highly seasonal - students only receive the benefit if they cannot find employment in the summer holidays. This pattern is less amenable to management, as the concept of a long-term benefit system client is not applicable.
» The relationship between this benefit and other key benefits is fairly uncertain and has the possibility of skewing the main transition models.

Therefore, client spells on this benefit have been ignored, both in terms of projecting cash flows and determining qualifying clients to include in the current cohort.

F.7 Projection of CCS, EI and HS components

The estimation of future payments of Childcare Subsidy (CCS), Employment Interventions (EI) and Hardship Assistance (HS) are treated somewhat differently to other payments. It was decided that clients receiving these benefits should only be considered as being in the benefit system if they were also receiving another benefit. For CCS, there were three main reasons behind this decision, both theoretical and practical:

» (Theoretical) The receipt of CCS only is not a strong indicator of a greater chance of future main benefit support.
» (Practical) It is useful to separate those receiving CCS only from those receiving CCS in conjunction with another benefit. For example, MSD might want to encourage clients into work which would reduce numbers in the first group while increasing numbers in the second.

» (Practical) The data for CCS is in an ad hoc file with no spell information.

Similar points apply to the other two benefit types, EI and HS. Additionally, both these benefits cover a range of payment codes whose relationship to the other Tier 1 and 2 benefits varies. For this reason, it was judged simplest to exclude clients in receipt of only these benefits them from the definition of the projection cohort.

APPENDIX G DETAILS ON MODELLING APPROACH

G.1 Generalised linear models

Most of the models used in the projection are generalised linear models so we give a brief overview of the theory behind these models here.

G.1.1 Overview

A generalised linear model ('GLM') is a generalisation of ordinary least squares regression that can deal with non-normally distributed response variables. Given a response variable *y* and a set of independent variables or predictors $x_1, x_2, \ldots, x_n$, a GLM models the dependency as:

$$y = h^{-1}\left(\sum_{i=1}^{n} \beta_i x_i\right) + \varepsilon_i \qquad \text{(F.1)}$$

And

$$E(y) = \mu = h^{-1}\left(\sum_{i=1}^{n} \beta_i x_i\right) \qquad \text{(F.2)}$$

Where

$h^{-1}()$ is the **inverse link function**
β_i (i=1, 2, …, n) is the **parameter** corresponding to the dependent variable x_i
ε_i is an **error** term.

Note that

$$\eta = \sum_{i=1}^{n} \beta_i x_i \qquad \text{(F.3)}$$

is referred to as the **linear predictor** and that the GLM may be written as:

$$y = h^{-1}(\eta) + \varepsilon_i \qquad \text{(F.4)}$$

Thus, a GLM consists of three components:

- A probability distribution
- A link function
- A linear predictor.

G.1.2 Further detail

Probability distribution

In the equations (F.1) and (F.4) above, the error term ε_i is determined by the probability distribution of the response variable. Common distributions that may be used include:

- Normal
- Poisson

- Gamma
- Inverse Gaussian
- Binomial

The choice of distribution is informed by the response variable. For example, counts are naturally modelled by a Poisson distribution while strictly positive continuous quantities may be appropriately handled by a Gamma or Inverse Gaussian distribution depending on the distribution of the response values. Probabilities may be modelled using a Binomial distribution.

Link function

The inverse link function $h^{-1}()$ gives the relationship between the mean of the distribution and the linear predictor. There are many possibilities for the link function including (but not limited to):

- Identity link: $h^{-1}(\eta) = \eta$
- Log link: $h^{-1}(\eta) = \exp(\eta)$
- Logit link: $h^{-1}(\eta) = \exp(\eta)/(1 + \exp(\eta))$

It is usually convenient to choose a link function which matches the domain of the link function to the range of the response variable's mean. In other words, if a response must be positive (for example, an average benefit payment), then a log link will ensure that the fitted value μ in equation (F.2) is positive. If the modelled quantity is a probability (for example, the probability of transitioning off benefit in the next quarter), then the logit link ensures that the fitted value lies between 0 and 1, as probabilities must.

Linear predictor

The linear predictor (equation F.3) is the quantity which incorporates the information about the independent variables into the model and is typically denoted by η. η is expressed as a linear combination of unknown parameters β_i and independent variables x_i (i=1, 2, …), which are known.

In all cases, once the probability distribution and the link function have been selected, the linear predictor (F.3) needs to be constructed. The steps to doing this include:

- Identify the list of independent variables or predictors (x_i) to be considered.
- Using data exploration, modelling techniques, statistical tests and prior knowledge, identify those x_i that are useful for predicting the response variable. Note that this may include functions of the predictors, rather than the raw predictors themselves.
- Estimate the parameters β_i using GLM software.

The list of variables considered for the key benefits is given in Section G.5.

Functions of the predictors

The predictors or independent variables may be used as follows.

- In their raw forms: For example, gender with two levels F and M.

- As categorical groupings of the original variable: For example, age may be banded into several groups (<18, 18-29, 30-39 etc.).

- As indicator functions depending on the value of the original variable where one condition is assigned the value 1 and the complementary position 0: For example, letting I(age ≥ 30) be 1 for age ≥ 30 and 0 otherwise would fit a step term at age 30.

- As a spline for underlying raw predictors which are numeric or ordinal (e.g. age, benefit quarter, duration on benefit): The dependency of a linear predictor on duration could be modelled (if appropriate) by a combination of several line segments. For instance, if the linear predictor varied in

a linear fashion with duration with one slope from duration 1 to 4, a different slope from 4 to 12 and a third slope from 12 onwards, then using three line pieces (1-4, 4-12 and 12+) would capture this dependency. The points 4 and 12 where the resulting fitted spline bends are referred to as knot points.

» As interaction terms: All of the above may be used as interaction terms. For example, a duration effect may be well fitted by one spline for those aged under 30 and another for those aged 30 and above. This could be accommodated by interacting the spline with the I(age ≥ 30) term.

G.1.3 Model fitting approach

Our typical approach to fitting a model includes the following:

» First fit a saturated model including most, if not all, raw predictors as well as any known interactions. For continuous predictors like age, or categorical ordered predictors like duration, we would usually fit the predictor as a grouped version (e.g. for age which is in quarter years, we might fit it as integer years).

» Simplify the model by:
  - Removing insignificant parameters
  - Grouping together related parameters with similar estimated values
  - Using splines where this is warranted

» Using diagnostics check to see if there is evidence of poor fitting which may suggest the need for some interactions. Add additional terms as required until a satisfactory fit is obtained.

G.1.4 References

The following books give a complete introduction to GLMs:

» McCullagh P. and Nelder J. (1989). Generalized linear models, second edition. Chapman and Hall, London UK.
» Dobson A. J. (2002). An introduction to generalized linear models, second edition. Chapman & Hall/CRC, Florida USA.

For a discussion on the application of GLMs in contexts like the modelling of the MSD benefit liabilities (e.g. claim size and claim numbers modelling in insurance), the following papers provide some starting points.

» England, P. D. and Verrall, R. J. (2002). Stochastic claims reserving in general insurance. British Actuarial Journal, 8 443-544.
» Haberman, S. and Renshaw, A. E. (1996). Generalized linear models and actuarial science. The Statistician, 45 407-436.
» Mulquiney, P. and Taylor, G. (2007). Modelling Mortgage Insurance as a multi-state process. Variance 1, 81-102.
» Taylor, G. and McGuire, G (2004). Loss reserving with GLMs: a case study. Casualty Actuarial Society Discussion Paper Program 2004. Available at http://www.casact.org/pubs/dpp/dpp04/04dpp327.pdf

G.2 Transition models

With the combined benefit system – public housing projection the modelling involves producing probability estimates for

» transitioning from any given benefit state to any other each quarter
» transitioning from any given housing state to any other each quarter

» making a register application or moving off the register.

In this context, 'benefit state' refers to the current main benefit received by the client, or a state of 'SUP' or 'NOB' if a client is receiving supplementary benefits only or is not on benefits respectively. 'Housing state' refers to if a client is in public housing (PH), receiving Accommodation Supplement (AS) or neither (Nil). These probabilities will depend on a client's state as well as other modelling variables, listed in Section G.5. The transition models are fitted using generalised linear models; further detail on their exact parameterisations is given in Appendix H – spreadsheet appendix.

The transition model approach focuses on understanding how people move through the system over time. It is worth mentioning here that there exist alternatives to such an approach (see for instance, the snapshot based approaches used in Section 15 of the 2012 valuation report for the segmentation analysis). However, we have chosen the transition approach for several reasons:

» **Responsiveness:** Changes in movement behaviour observed in recent years can be correctly reflected in the models.
» **Long range accuracy:** We can leverage the behaviour of clients at various stages of the benefit system to make appropriate long range assumptions. For instance, the behaviour of older clients can be used to model the behaviour of the younger clients in the distant future.
» **Intuitive appeal:** A focus on measures such as probability of entering/exiting benefits is natural, and will allow easier drill down analysis.
» **Consistency:** The approach worked well in both the first aggregate level (Level I) valuation and the segment level (Level II) valuations performed on 2011 and 2012 data.

The nine benefit states are illustrated diagrammatically in Figure G.1. While most of the 81 (i.e. 9 x 9) different benefit state transition types are observed in each quarter, it is worth noting that the likelihood of many of these transitions is very small. We also estimate probabilities for the 9 housing state transitions.

The most frequent benefit transitions are:

» A client remaining in their current benefit state
» A client moving from benefits to no benefits (moving into the NOB state)
» A client moving from no benefits back to benefits (moving out of the NOB state)

We use a series of probability models which focus on these most probable transitions. We also note that the benefit population is not equally distributed across the various states. The largest six states are JS-WR, JS-HCD, SPS, SLP-HCD, SUP and NOB. Overall projection results will tend to be dominated by changes to these clients, by sheer weight of numbers.

Figure G.1 Benefit states in the quarterly transition model

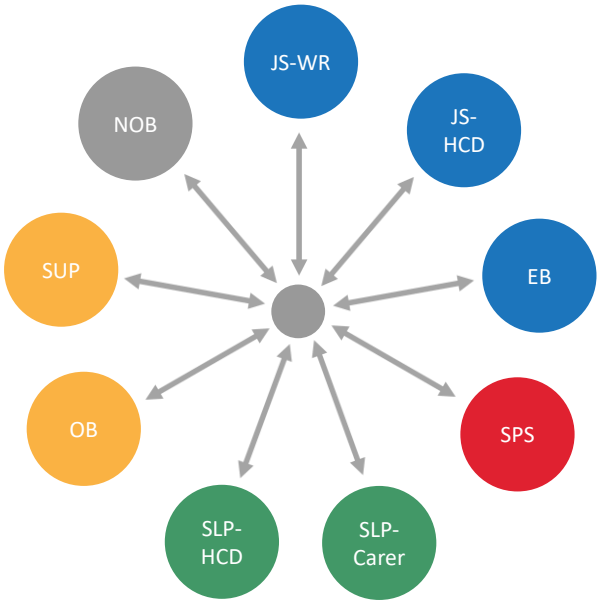


Table G.1 shows the models that have been fitted to describe the transition behaviour in the benefit system. Detailed parameter values for these models are given in Appendix H, with a brief guide to these provided in Section G.8. All models were GLMs with the standard logistic link, apart from eight multinomial models. These multinomial models used the multinomial extension to logistic regression.

Table G.1 List of benefit state transition models used in the projection

Benefit state	Type	Model ID	Description
JS-WR	Logistic	jwr_tra	Probability that a client remains in JS-WR in the next quarter
JS-WR	Logistic	jwr_nob	Probability that a client moves from JS-WR to NOB, given that they leave JS-WR
JS-WR	Multi-nomial	jwr_mul	Multinomial probability of moving to JS-HCD, SLP-HCD, SPS and OTH, conditional on leaving JS-WR and not entering NOB
JS-HCD	Logistic	jhd_tra	Probability that a client remains in JS-HCD in the next quarter
JS-HCD	Logistic	jhd _nob	Probability that a client moves from JS-HCD to NOB, given that they leave JS-HCD
JS-HCD	Multi-nomial	jhd _mul	Multinomial probability of moving to JS-WR, SLP-HCD, SPS and OTH, conditional on leaving JS-HCD and not entering NOB
SPS	Logistic	sps_tra	Probability that a client remains in SPS in the next quarter
SPS	Logistic	sps_nob	Probability that a client moves from SPS to NOB, given that they leave SPS
SPS	Multi-nomial	sps_mul	Multinomial probability of moving to JS-WR, SLP-HCD, JS-HCD and OTH, conditional on leaving SPS and not entering NOB
SLP-HCD	Logistic	slh_tra	Probability that a client remains in SLP-HCD in the next quarter
SLP-HCD	Logistic	slh_nob	Probability that a client moves from SLP-HCD to NOB, given that they leave SLP-HCD
SLP-HCD	Multi-nomial	slh_mul	Multinomial probability of moving to JS-WR, JS-HCD, SPS and OTH, conditional on leaving SLP-HCD and not entering NOB
NOB	Logistic	nob_tra	Probability that a client remains in NOB in the next quarter

Benefit state	Type	Model ID	Description
NOB	Multi-nomial	nob_mul	Multinomial probability of moving to JS-WR, JS-HCD, SPS, SLP-HCD and OTH, conditional on leaving NOB
Other – inwards	Logistic	oi_sup	Probability that someone entering OTH is entering SUP
Other - inwards	Multi-nomial	oi_mulm	Multinomial probability that someone entering OTH but not SUP enters EB, SLP-Carer or OB
Other	Logistic	o_tra	Probability that someone in OTH leaves their current state
Other	Logistic	o_nob	Probability that someone in OTH moves to NOB, given that they leave their current state
Other	Logistic	o_key	Probability that someone in OTH moves to one of JS-WR, JS-HCD, SPS or SLP-HCD, given that they leave their current state and do not move to NOB
Other	Multi-nomial	o_mulk	Multinomial probability of moving from OTH to each of JS-WR, JS-HCD, SPS and SLP-HCD, given that they move to one of these states
Other	Multi-nomial	o_mul2	Multinomial probability of moving within OTH to each of SUP, EB, SLP-Carer and OB, given that they move to one of these states

Notes:
(a) Other (OTH) in the table refers to benefits other than the main Tier 1 benefits, i.e. SUP, EB, SLP-Carer and OB

The structure of the transition models may appear somewhat convoluted at first glance, but it has the attractive feature of placing greater emphasis on the most important transitions: remaining in the current benefit and moving out of the benefit system. These transitions are handled by the models with "tra" and "nob" suffixes respectively.

G.3 Combining the transition models

The transition models are combined to permit calculation of moving into any state. The diagrams below show the steps involved in calculating these probabilities for:

- Starting in a key benefit state (JS-WR/JS-HCD/SPS/SLP-HCD, here JS-WR)
- Starting off benefits (NOB) and
- Starting from a non-key benefit state (SUP/SLP-Carer/EB/OB, here SLP-Carer)

Figure G.2 Transition diagram for a client starting in a key benefit – here JS-WR

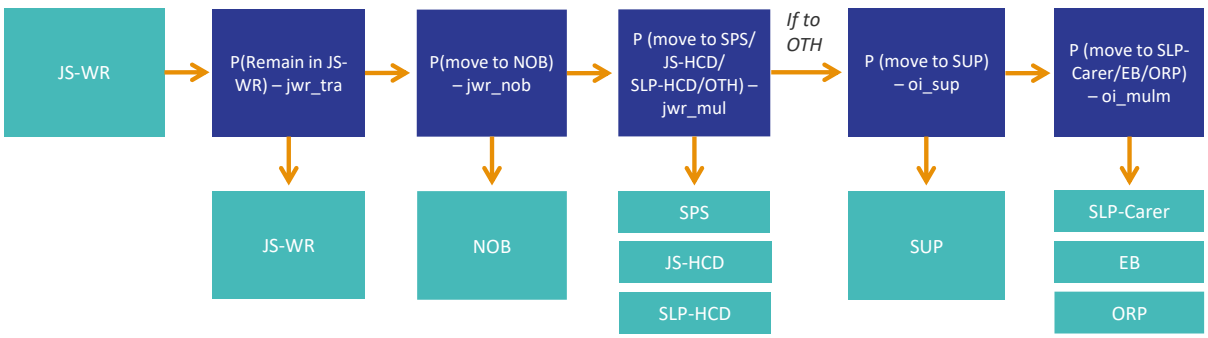


Figure G.3 Transition diagram for a client starting in NOB

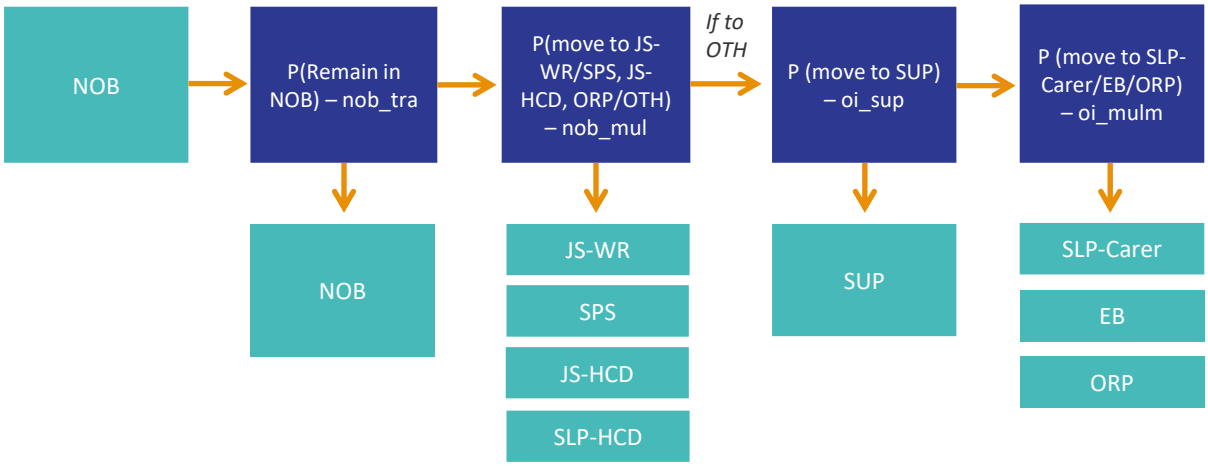
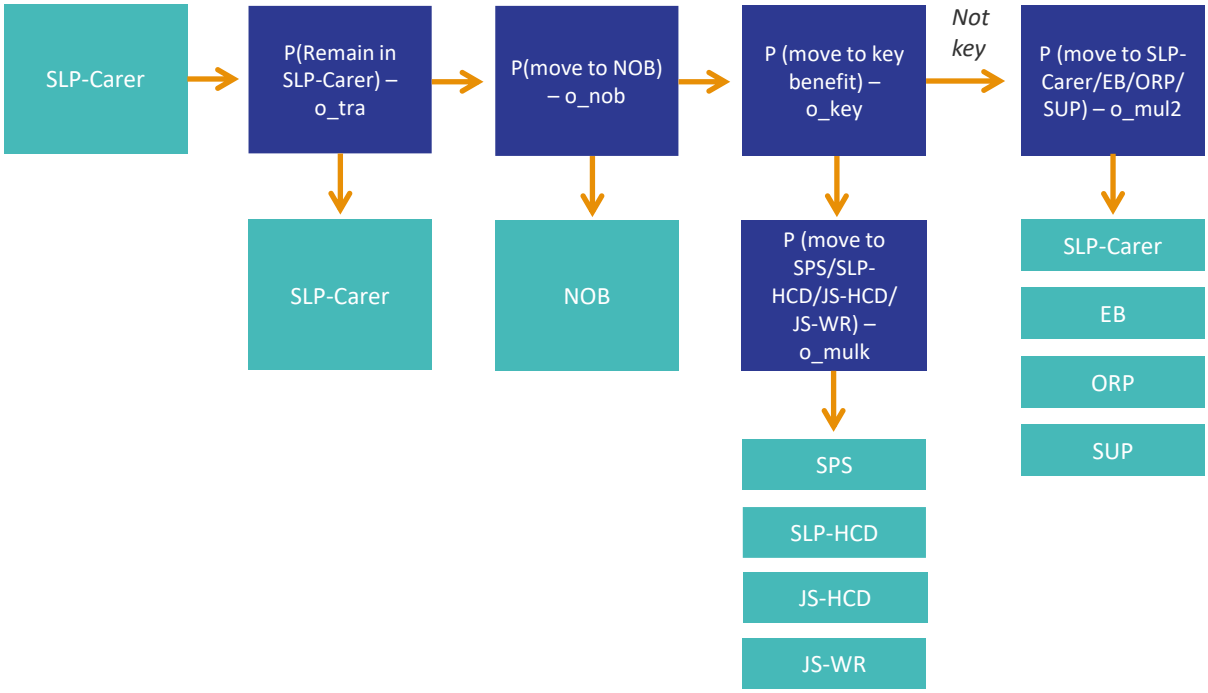


Figure G.4 Transition diagram for a client starting in a non-key benefit state– here SLP-Carer



G.4 Payment models

Clients in each benefit state can receive several different benefit types simultaneously:

- Their main Tier 1 payment
- Orphans (or child living alone) Benefit (OB)
- Accommodation supplement (AS)
- Disability allowance (DA)
- Child disability allowance (CDA)
- Childcare subsidy (CCS)
- Hardship assistance (HS)
- Employment intervention payments (EI)

» Recoverable assistance (LOA in this section)

If we want to be able to distinguish between these various benefits, then separate models are required to estimate each benefit type. The models also need to be sensitive to the current state of a client, as well as all their other characteristics listed in Section G.5.

These models are summarised in Table G.5 and Table G.6, which shows the payment models required for each of the states. Since the introduction of the combined benefit system – public housing projection we have explicitly modelled the receipt of AS as a public housing state. This enables more accurate individual level estimates of AS support. Although it is impossible to receive AS while in a public house, it is possible to receive AS before or after being in a public house within a quarter – hence the need to have an AS model for both the PH and AS public housing states.

Note that the LOA1 model refers to recoverable assistance payments made to clients. These are later partly offset by recoveries of recoverable assistance – see Section 9.4. Note also, OB may be received as a T1 main benefit

Table G.5 Payment models attributable to each state

Benefit state	Benefit type							
	Main T1 (excl OB)	OB	DA	CDA	CCS	HS	EI	LOA
SPS	●	●	●	●	●	●	●	●
SLP-HCD	●	●	●	●	●	●	●	●
JS-HCD	●	●	●	●	●	●	●	●
JS-WR	●	●	●	●	●	●	●	●
SLP-Carer	●	●	●	●	●	●	●	●
EB	●	●	●	●	●	●	●	●
OB		●	●	●	●	●	●	●
SUP			●	●	●	●	●	●
NOB					●	●	●	●

Table G.6 Accommodation supplement payment models

Housing state	AS
PH	●
AS	●
Nil	

While there are many payment models, we note that the relative significance of each differs greatly. Main benefits plus accommodation support make up 90% of benefit payments projected to current clients, so these payment types are modelled in greater detail.

It is therefore possible to rationalise the number of models by combining payments of a particular type across recipients in different benefit states. The models fitted are shown in Table G.. Each of the main benefit models are fitted separately as are the larger components of Tier 2 payments (e.g. AS for JS-WR recipients, DA for JS-HCD and SLP-HCD recipients).

Table G.7 Payment models attributable to each state

Benefit state	Payment type										
	Main T1 (excl. OB)	OB	AS			DA	CDA	CCS	HS	EI	LOA
			PH	AS	Nil						
JS-WR	jwr_abp	jwr_orp	hou_as	acc_pmt		a_da	a_cda	a_ccs	jwr_hs	x_ei	jwr_loa
JS-HCD	jhd_abp	jhd_orp	hou_as	acc_pmt		jhd_da	a_cda	a_ccs	jhd_hs	a_ei	jhd_loa
SPS	sps_abp	sps_orp	hou_as	acc_pmt		sps_da	sps_cda	sps_ccs	sps_hs	x_ei	sps_loa
SLP-HCD	slh_abp	slh_orp	hou_as	acc_pmt		slh_da	a_cda	a_ccs	slp_hs	a_ei	slh_loa
EB	emb_abp	a_orp	hou_as	acc_pmt		a_da	a_cda	a_ccs	a_hs	x_ei	a_loa
SLP-Carer	slc_abp	a_orp	hou_as	acc_pmt		a_da	z_cda	z_ccs	a_hs	a_ei	a_loa
OB		orp_abp	hou_as	acc_pmt		a_da	z_cda	z_ccs	a_hs	a_ei	a_loa
SUP			hou_as	acc_pmt		z_da	z_cda	z_ccs	z_hs	a_ei	z_loa
NOB								nob_ccs	nob_hs	nob_ei	nob_loa

Some detailed comments on the payment models follow:

- Payments are allocated by client quarter, or proportionally if payment spells span multiple quarters. Further, all payments are scaled to June 2017 benefit levels, using the CPI index applied to benefit payments over the past 23 years. We have used past increases in DPB/SPS payment levels to infer these CPI increases.
- All models were Poisson with a log link. The choice of distribution was found to have a very minor effect on predictions in the payment models.
- As implied above, some payment models are 'shared' across benefit states– for example, the disability allowance for clients on JS-WR, EB, SLP-Carer and OB all use the 'a_da' payment model. This sharing is done when the individual models are believed to share similarities to improve the efficiency of modelling. In these cases, the current benefit state is also used as a predictor to ensure that any differences between states are still modelled.
- It is possible to receive more than one Tier 1 benefit in a quarter. We have dealt with this by reallocating all Tier 1 payments to the current state; for example, if someone is allocated to JS-WR in a quarter but they receive both JS-WR and JS-HCD, all payments are summed and treated as JS-WR. The overall impact of this allocation is very small, since:
    - The amounts involved are generally small compared to a full quarter's benefit
    - The allocations largely offset each other (e.g. for every client with a JS-HCD payment allocated to JS-WR there is another with a JS-WR payment allocated to JS-HCD)
    - The average number of quarters before transitions is high enough that such a reallocation occurs in a relatively small proportion of quarters.
- NOB requires payment models for CCS, HS and EI because clients only in receipt of these benefits are assigned to the NOB state.
- There is an important point to note regarding the non-main payment models (that is, every column of models except Main T1 and AS in Table G.). These payments represent an **average** value across people in each benefit state; to take an example, the DA model for those in the JS-WR state estimates the average DA paid to clients receiving JS-WR, conditional on all their attributes like age, gender etc. However in reality some JS-WR clients receive DA and some do not, so at an individual level these payment models are misleading since the actual DA payments will usually be much higher (if the client receives DA) or much lower (if they do not). These payment levels are appropriate for the aggregate and segment level results, but must be interpreted carefully when inspected at an individual level. Distinguishing between the cases of receipt of supplementary payments at an individual level is beyond the scope of this projection.

G.5 Model predictors

A list of independent variables or predictors used in the various GLM models includes:

- Age
- Gender
- Benefit history, including number of quarters in various benefit states, duration in current state and benefit of previous spell
- Regional unemployment rates
- Region
- Ethnicity
- Education, including education attainment level as well as total duration of suspensions and stand-downs at school and highest NQF level of any enrolments at tertiary institutions for younger clients
- Family benefit history ('intergenerational') variables including match type with a parent beneficiary and intensity of the parent's benefit receipt while the client was aged 13-18 (note that this data is available only for those aged 30 or under)
- Relevant client characteristics which depend upon the benefit being received (e.g. Health condition or disability for JS-HCD or SLP-HCD, number and ages of children for SPS, partner information for several benefits etc.).
- History of previous benefit sanctions
- Child protection and youth justice history variables which measure a client's exposure to these services as a child (note that this data is available only for those aged 30 or under)
- Criminal conviction history variables which measure a client's convictions and related recent and longer-term exposure to correctional services
- Current public housing state variables indicating whether a client is currently:
    - In public housing and some associated variables; being the primary householder, a signatory, the household size, etc.
    - In receipt of AS.
    - On a register application and some associated variables; being the primary applicant, the needs assessment score of the application, etc.
    - The duration of the given housing state; that is, time in public housing or time receiving AS.
- Public housing history related variables including count of quarters spent in public housing, count of quarters of AS receipt, the housing state preceding the current.

In theory, there are a very large number of variables that would impact on a client's lifetime benefit system pathway that do not feature in the list above (including health system information, employment history, family status etc.). The omission of a variable does not imply that they are unimportant. Rather, it indicates that our results should be considered as an average over that variable.

For projection purposes, the variables may be separated into two categories:

- **Static variables:** those that remain fixed at all points in time. Examples include gender and age of entry to the benefit system.

- **Dynamic variables:** those that change over time. These may be further subdivided into:
    - Those that vary in a known (deterministic manner). Examples include benefit quarter, age, the various duration measures, unemployment rate (given our assumptions of a single set of forecasts for future unemployment rate by future benefit quarter and region).
    - Those that vary in an unknown (stochastic manner). A client's region, the number of children and age of youngest child for SPS recipients and the incapacity type for HCD clients (JS and SLP) are examples of these predictors.

We generally refer to the last category as "semi-dynamic", recognising that while they change over time, changes are generally slow; the value does not change for most clients each quarter. For example, most

clients remain in the same region in the subsequent quarter; only a small proportion move between regions.

A full list of the semi-dynamic variables is given here together with an overview of their updating method. Some detailed examples are then given.

G.5.1 List of semi-dynamic predictors

Children variables

The number of children (1, 2 or 3+) is stored for SPS recipients, as is the age of the youngest child.

Region and TLA

The client's region is stored for every client on benefit. With the introduction of the combined projection approach, regional information is also stored at the Territorial Local Authority (and Local Board in Auckland) level. Information on the region when last on benefit is retained for those not on benefit.

Partner flag

This is stored for clients in EB, SLP-HCD, JS-HCD and JS-WR. It is not stored for all other benefit types.

Incapacity variables

The variables relating to incapacity group, the number of incapacities, a flag for whether the client has mental condition as primary incapacity and a flag for whether the incapacity relates to a partner (for cases where the client has a partner) are stored for SLP-HCD and JS-HCD only. The incapacity reassessment frequency is stored for SLP-HCD clients only.

Education variables for younger clients

The variables indicating whether the client has left school, the attainment level at secondary school, the total days of any suspensions or stand-downs while at school and the highest NQF level of any tertiary enrolments to date are stored for clients aged under 25.

Benefit sanctions variables

Variable counting the number of sanctions over the past 5 years.

Child protection and youth justice

Variables specifying whether the client, as a child, was involved in child protection or youth justice services (or both), the number of events, days in child protection and age at first entry into the system are stored for clients up to age 30. These can potentially change for clients up to age 18, but are fixed thereafter.

Criminal conviction history variables

We used for variables related to criminal conviction and related sentences, available for all clients. These were the percentage of time in prison over the last year, serving any sentence over the last year excluding those for driving offences, serving any sentence over the last ten years excluding driving offences, and in serving a sentence specifically related to theft over the last ten years.

Public housing register status

Information on any register applications active during the quarter is stored for all clients.

Other public housing variables

The income related rent subsidy level and the market rent of the house for the area is stored for all clients in public housing.

G.5.2 Updating semi-dynamic predictors

This section discusses the updating methods for each of the semi-dynamic variables. Note that GLMs and probability tables referred to here are presented in the electronic appendices.

Children variables - number of children and age of youngest child – SPS only

These variables are updated as follows:

Entering SPS: Values for the number of children are sampled from a table of probabilities based on the client's age. Values for the age of the youngest child are sampled from a zero-inflated beta model (**aye**).

Remaining in SPS: At each quarter

- A GLM is run to calculate the probability of a new youngest child
- If no new youngest child, then the age of the youngest child increments by 0.25 years
- If there is a new youngest child, then the age of this child is sampled from a zero-inflated beta model. If the model returns 0 as the value, the age of the child is spread over 0, 0.25 and 0.5 years by the probabilities 0.2, 0.7 and 0.1 respectively.
- For all SPS clients, the change in the total number of children is sampled from a multinomial GLM. Note probabilities are different depending on whether there is a new youngest child or not

Leaving SPS: child variable information is forgotten.

Region – all benefits

For clients not in public housing, region is updated as follows:

Switching between benefits: A model is run to determine whether the region changes. If it changes, then the region is sampled from a table of probabilities. The new TLA is then sampled from a second table of probabilities. If the region does not change a second model is run to determine if the TLA changes. If it changes, then the new TLA is sampled from another table of probabilities.

Returning to benefit after being off benefit for at least one quarter: a binomial GLM gives the probability that a client's region (last updated when they were last on benefits) has changed while they were off benefit. In each simulation, we sample if the region has changed and if so, the new region is sampled from a table of probabilities. The new TLA is then sampled from a second table of probabilities. If the region has not changed a second model is run to determine if the TLA has changed. If it has, then the new TLA is sampled from another table of probabilities.

Leaving benefits: the region is not changed but the current value is stored.

For clients in public housing, region and TLA are stored regardless of benefit state. Furthermore, their region and TLA may only change if the client is simulated to apply to the transfer register for rehousing. In this case, a binomial GLM gives the probability that the client applies to the transfer register. The register characteristics (including TLA) are sampled from typical characteristics of clients entering the register. If the register application is successful in the simulation, the client's TLA and region are updated accordingly.

Partner flag – EB, SLP-HCD, JS-HCD and JS-WR only

The partner flag variable is updated as follows:

Moving into any of EB/SLP-HCD/JS-HCD/JS-WR from one of the other benefits: a binomial GLM gives the probability that the client has a partner.

Remaining in any of EB/SLP-HCD/JS-HCD/JS-WR: a binomial GLM gives the probability that the partner flag switches (i.e. if the client has a partner they switch to having no partner and vice versa).

Leaving EB/SLP-HCD/JS-HCD/JS-WR and moving into one of the other benefits: partner information is dropped.

Incapacity variables – JS-HCD and SLP-HCD only

The incapacity variables are updated as follows:

» **Entry into JS-HCD or SLP-HCD from other benefits:**

- The incapacity group is sampled from a probability table.
- A second probability table is used to simulate the number of incapacities
- If the client has a partner a third probability table is used to determine whether the incapacity relates to the partner or not
- A fourth probability table is used to determine if the client has a psychological incapacity (primary or secondary)
- If entering SLP-HCD the reassessment frequency is sampled from a fifth probability table

There are different probability tables for each of the situations: entry into JS-HCD from all benefits apart from SLP-HCD, entry into SLP-HCD from all benefits apart from JS-HCD, switching from JS-HCD to SLP-HCD and switching from SLP-HCD to JS-HCD.

» **Remaining in JS-HCD or SLP-HCD:** a binomial GLM gives the probability that the client changed primary incapacity type. If so then a series of probability tables as above are used to simulate the new incapacity variables.

» **Leaving JS-HCD / SLP-HCD:** incapacity variables are forgotten.

Education variables – clients aged under 25 only

The new education variables are updated for matched clients as follows:

» **Clients still at school:**

- Are simulated to leave school during the quarter using a probability table. At age 25 the probability is 1.
- If the client leaves school during the quarter the NQF level at exit is sampled from a probability table and the total duration of any stand-downs/suspensions is sampled from a zero inflated log-normal distribution.

» **Clients not still at school:**

- New tertiary enrolments are simulated using a probability table.
- If a new enrolment occurs the change in highest NQF level enrolment to date is sampled from a probability table.

Benefit suspension variables

The number of suspensions in each of the previous 20 quarters are stored to allow the calculation of the number of suspensions in the past 5 years. For each successive quarter, we delete the oldest of the 20 quarters and simulate the newest one. New suspension events in the quarter are sampled from a

probability table. If a suspension event occurs the probability that second occurs in the quarter is sampled from a probability table. A maximum of 2 suspensions in any quarter is allowed.

Child, Youth and Family variables

The Child, Youth and Family (CYF) variables are updated (for clients under age 18) as follows:

» A binomial GLM is run for the probability of at least one CYF event occurring in the quarter. If yes:
  - A lookup table is used to update the type of interaction (i.e. child protection or youth justice.
  - Another lookup table is used to simulate the number of new events in the quarter (one or more).
  - If it is the first event for a person, the age of entry into CYF is recorded.

» For both outcomes of the initial GLM, a binomial GLM is used to simulate the probability that the number of days in a CYF child protection placement changes in the quarter. This is always no if the CYF history does not include child protection.
  - If yes, then two lookup tables are used to simulate how many additional days in placement are applicable.

Criminal conviction history variables

The proportion of time in prison, non-prison theft sentences and other sentences are stored for the previous 40 quarters, making 120 variables in total. This is sufficient for calculating the four variables used in the transition and payment models. For each successive quarter, we delete the oldest of the 40 quarters and simulate the newest one:

» If there **was no** sentence served in the previous quarter, a binomial GLM is used to simulate the probability that a new sentence is served in the quarter. The GLM uses a number of demographic characteristics of the individual.
  - If no, then the sentence served variables for the new quarter are set to zero.
  - If yes, then a table is used to allocate which type of sentence is served (prison, theft or other). A second lookup table is then used to allocate the proportion of the quarter served for each non-zero variable.

» If there **was** a sentence served in the previous quarter, a binomial GLM is used to simulate the probability that a new sentence continues in the new quarter.
  - If no, then the sentence served variables for the new quarter are set to zero.
  - If yes, then an additional binomial GLM is used model the probability that the type of sentence being served changes. Lookup tables for the type and proportion are then used to simulate the new non-zero variables for that quarter.

This allows the 120 variables encoding sentence history to be updated for the new quarter. The four variables used in the models are then re-calculated before transition and payment models are applied.

Public housing register status

The public housing register status of clients is updated as follows:

» If a client has an active public housing register application:
  - For those not in public housing, a model is used to determine the relative likelihood that clients move from the register to public housing. The allocation step uses the likelihood, collective demand for houses of that size and location, and available supply. If they do not move from the register to public housing a second model is used to determine the probability they exit the register not to public housing.
  - A similar pair of models are used for clients already in public housing with an active transfer register application.

» If the client does not have an active public housing register application:

- For those not in public housing, a model is used to determine the probability a client makes a new application in the quarter. If so a further model and probability table determines the priority of the application and requested location respectively.
- A similar pair of models and table are used for clients already in public housing who may make a transfer register application.

G.6 Overlay models

Due to the benefit state definition of being on a benefit (SPS say) in a quarter, additional information is needed for benefit system segment allocation to know if:

» The client is on the benefit at the end of the quarter and
» The client has been on benefits continuously throughout the quarter.

We project this using models referred to as 'overlay models,' as they do not affect the main projection results, so they can be regarded as by-products of the simulation.

The overlay models include a full multinomial allocation of benefit type received by a client at the end of a benefit quarter. The process is:

» The benefit state for the current ("ben_now") and next quarter ("ben_next") are determined using the core transition models
» If ben_now or ben_next are NOB (not on benefit), then end of quarter benefit status ("ben_end") is set to NOB
» If not, then a binomial GLM is used for the probability that ben_end is the same as either ben_now or ben_next. If yes, then a lookup table is used to allocate
» If not, and either ben_now or ben_next are SUP, then ben_end = NOB
» If not, then binomial GLM is used for the probability that the end of quarter benefit is NOB. If yes, set to NOB
» If not, then binomial GLM is used for the probability that the end of quarter benefit is SUP. If yes, set to SUP
» If not, then a lookup table is used to simulate the remaining possibilities for ben_end

Once this chain of logic has been completed, we then update continuous duration. If ben_end is NOB, then the continuous duration is set to zero. Otherwise a binomial GLM is used to decide whether continuous duration is incremented by 1 (i.e. the client has had no 14 day breaks off benefits in the quarter) or reset to zero (i.e. they did have a 14-day break).

G.7 Number of new clients model

We use a model to determine the number of new clients in each benefit type in each quarter of the next 5 years. Some of these clients will also make a public housing register application in the same quarter. This model explicitly depends on regional unemployment rates, and implicitly allows for other demographic factors such as population growth and age distribution on a regional level.

Since we model number of entries explicitly, time trends that are not explained by changes in the regional unemployment rate will typically be reflecting the changing population demographics of the region.

For each new client in each benefit type we randomly sample client characteristics from the equivalent population of people entering the system in 2016/17. After that, the projection happens in a similar manner as for current clients.

This approach treats client returns and new entries simultaneously (the sampling population from 2016/17 includes both returning and new clients). It assumes that the relative numbers of new entrants versus returns will be similar to that seen in 2016/17.

Total results are obtained by aggregating the 20 quarterly cohorts of future client entries into five annual cohorts and discounting their total future payments into the middle of each year.

G.8 Guide to electronic Appendix H

The file Appendix H.xlsx contains tables of the parameters for:

- Each of the models listed in Table G.1 and Table G.7
- The models for dynamic predictors described in Section G.5.2
- The overlay models used for simulating continuous duration (Section G.6)
- The number of future new clients (Section G.7).

Many of the parameters correspond to functions of the predictors rather than the raw predictors (see Section G.1.3); thus, each table is accompanied by the formulae giving the derivation of the predictor.

Several models use offsets in their fitting. These help lock-in effects (for example, fixing the unemployment rate sensitivity to the same level as previously), as well as encode some of the projection assumptions described in Section 4.8 of the report. A description of these offsets is also included in the Appendix.

APPENDIX H MODEL COEFFICIENTS

Model parameterisations are included as an electronic Appendix H.

APPENDIX I COMPUTATION DETAILS

I.1 Introduction

A large amount of data was provided to us by MSD. This creates a range of computationally intensive stages for the project:

- Processing the data to make it suitable for modelling;
- Fitting models; and
- Applying models to project future client numbers and benefit payments.

The third point – the projection of clients and benefits payments was particularly intensive. In this appendix, we give some detail of how this was done, plus some brief comments on each of the other stages.

I.2 Projection of main results

Since the 2016 projection we have projected current and future clients simultaneously.

The current cohort is all those on benefit at 30 June of the projection year, or who have been on benefits within the 12 months leading up to the projection date. The future durations with support and associated payments make up the current cohort total future years and total future payments.

The future client cohorts are those newly on benefit for each quarter in the next five years. Newly on benefit is defined in this instance to mean those new to the benefit system or those returning after being off benefit for more than a year. The future durations with support and associated payments make up each of the future cohort total future years and future payments.

I.2.1 Projection variables

In building the projection models, the following variables were allowed for:

- Benefit quarter and the corresponding unemployment rate
- Client age
- Gender
- Number of quarters:
    - On current benefit
    - Since first benefit
    - Spent in each of the various benefit states
- Ethnicity
- Region
- Education level
- Variables relating to educational attainment, suspensions/stand-downs while at school and tertiary enrolments
- Youngest child age and number of registered children (for SPS clients)
- Partner flag (SLP-HCD, JS-HCD, JS-WR and EB clients)
- Incapacity type (SLP-HCD and JS-HCD clients)
- Whether the incapacity belongs to the client's partner (SLP-HCD and JS-HCD clients)
- Benefit of last spell (if any)
- Intergenerational variables
- Variables related to a history with child protection and youth justice services
- Variables related to sanctions
- Criminal conviction related variables

» Public housing history variables:
    - Past time in public housing
    - Past AS receipt
» Current public housing status:
    - In public housing, receiving AS or neither
    - If in public housing: primary householder, signatory householder, household size.
    - Part of an active register application or not

I.2.2 Simulation Approach

As discussed in Section 9.4.2 of the report, there are many possible combinations of these variables that make an analytic projection – i.e. the calculation of the expected cash flows associated with all possible future states – computationally infeasible. Thus, we have continued to use a simulation approach for the 2017 projection results.

Many of the variables above are dynamic in that their values change over time. Some change in a deterministic way (e.g. the benefit quarter, age, the number of quarters on benefit etc.) but many will evolve stochastically over the course of the projection (e.g. region, children ages and number of children, incapacity type etc.) so their evolution over time must be modelled (our approach is described in Appendix G) and then included in the simulation.

An outline of the simulation approach is as follows, starting in benefit quarter *b*:

» The first step is to calculate the expected payments for benefit quarter *b* based on the current benefit state, current housing state and the current state of all the modelling variables. The expected payments together with the benefit received and any other variables of interest are saved.

» Following this, new entrants are added into the data representing those who newly enter the benefit system in quarter *b+1*, or who re-enter after being off benefits for more than a year as at the projection date. Furthermore, new entrants to the public housing system, who are not otherwise receiving benefits, are also added.

» The next step is to update the dynamic variables to quarter *b+1* for all those in the data set at quarter *b* (i.e. new entrants in quarter *b+1* are not included in this step since their dynamic variables are already updated to the end of *b+1*). Those that are modelled are updated using a simulation approach. For example, to update a client's region, the following is carried out:
    - First calculate the probability that there is a change of region and then using this, sample whether a change in region occurs
    - If a change in region occurs then sample the new region from a table of probabilities for each new region. Further sample a new TLA from a table of probabilities for each new TLA.
    - If a change in region does not occur then calculate the probability of a TLA change and then using this, sample whether a change in TLA occurs. If a TLA change occurs then sample a new TLA from a table of probabilities for each new TLA.

» Once the dynamic variables have been updated, calculate the benefit state transition probabilities based on the current state of the models. Then, using a sampling approach, select the benefit for the next quarter. The one exception to this is when a client is at the assumed retirement age (64.75) – in the next quarter they transition to off benefit with probability 1 under the working age assumption described in Section F.2.

» Once benefit state has been updated calculate the public housing state transition probabilities based on the current state of the models. Then, using a sampling approach, select the public housing state for the next quarter and register exits both to and not to public housing.

» The process then repeats until all members of the current and future cohorts are retired.

Even taking the simulation approach rather than the exact approach leads to a computationally intensive task. To make the process manageable, a number of steps were taken:

» The projection code was written using various time-saving programming methods including the efficient use of memory to speed up the calculations as much as possible.

» The simulations were distributed across a number of machines.

To illustrate the computational burden, 20 simulations of the projection results use about 150 CPU hours in total.

I.3 Other computational considerations

I.3.1 Modelling transition probabilities

The modelling datasets for some of the benefits were particularly large, notably the probability of remaining in the same state for JS-WR and NOB. This was handled by means of stratified sampling, where the rarer response was sampled at a higher rate to the common response to minimise the corresponding decrease in accuracy. Observations were weighted to ensure the overall rates of transition remained correct.

This approach was used in cases where the available data was already very large, and so the potential impact on model performance was immaterial.

I.3.2 Data preparation

Processing the original datasets to convert them to a form amenable to modelling took a reasonable amount of computer time, perhaps around 10 hours to produce modelling datasets for each of the benefit types. Given this needs to be run just once, this was judged acceptable and was not further optimised or distributed.

I.3.3 GLM fitting in SAS

We use a suite of custom-built SAS macros to carry out all GLM fitting, model diagnostics and validation. These macros substantially extend the available tools within SAS as well as optimise the use of SAS's inbuilt GLM fitting capabilities.

APPENDIX J ACTUAL VERSUS EXPECTED COMPARISONS FOR 2016/17

Actual versus expected comparisons are included as an electronic Appendix J.

APPENDIX K CHANGE IN PROJECTED PAYMENTS

K.1 Attribution of change in projected payments from 2016 to 2017 by segment

Segment		2016 current client projection			Roll-forward to 2017					Change due to experience	
		Previous projection	Methodology changes	Projection using updated economic assumptions	Expected Payments	Liability less payments	Remove clients leaving the valn	Addition of future cohort clients	Unroll 1 year discounting	Difference between actual and expected cohort	Recognition of experience
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
		$m	$m	$m	$m	$m	$m	$m	$m	$m	$m
Jobseekers	Work-ready, <1 year	4,977	5,006	4,784	389	4,395	2,626	3,844	3,918	4,456	4,552
	Work-ready, >1 year	4,369	4,301	4,193	389	3,804	3,980	4,148	4,230	4,266	4,443
	JS-HCD, <1 year	2,943	2,923	2,824	267	2,556	1,518	2,316	2,362	2,858	2,852
	JS-HCD, >1year	6,172	6,130	5,930	589	5,341	5,830	5,993	6,112	6,021	6,037
Sole Parents	Youngest child 0-2	5,832	5,797	5,592	542	5,050	5,003	5,421	5,527	5,258	5,463
	Youngest child 3-4	2,881	2,838	2,754	290	2,464	2,388	2,491	2,539	2,395	2,504
	Child 5-13, <1 year	726	709	685	89	596	347	495	505	710	760
	Child 5-13, >1 year	4,840	4,776	4,608	525	4,082	4,268	4,312	4,397	4,361	4,608
Supported Living	Carer	1,537	1,543	1,510	167	1,344	1,422	1,500	1,529	1,522	1,503
	Partner	903	889	868	104	765	742	775	790	817	805
	SLP-HCD	16,830	16,605	15,932	1,459	14,473	15,253	15,697	16,010	15,865	16,161
Youth	Youth payment (<18)	318	322	305	16	289	53	264	269	265	286
	Young parent payt (<19)	247	252	246	20	226	116	243	248	233	241
Not On Main Benefits	Sup only, <1 year	1,479	1,418	1,354	97	1,258	725	1,285	1,311	1,313	1,315
	Sup only, >1 year	4,512	4,280	4,100	308	3,793	4,136	4,266	4,353	4,081	4,240
	Orphan only	599	601	587	75	512	500	570	581	608	615
Recent exits	Recent exits, <1 year	7,935	7,830	7,427	277	7,150	5,944	7,289	7,434	7,345	7,520
All segments		67,100	66,215	63,699	5,600	58,099	54,850	60,908	62,116	62,376	63,906
Net Rec Assist		181	187	180	15	165	154	172	175	176	205
Net Overpayt/ fraud		211	208	200	18	183	173	192	195	196	253
Expenses		8,498	8,402	8,089	704	7,385	7,137	7,921	7,917	7,921	7,880
Grand Total		75,991	75,012	72,168	6,337	65,831	62,313	69,192	70,403	70,670	72,244
Change			-688	-2,844		-6,337	-3,518	6,879	1,211	266	1,574

Notes:

(a) All net loans costs and expenses have been removed from the segment level liabilities and added as separate line items

(b) Methodology changes include:

Extension of child protection, youth justice and benefit system Improved allocation of partner indicator for SLP-HCD entrants.
Inclusion of proportion of past few years on benefits and SLP-HCD reassessment frequency
Introduction of new education and benefit sanctions data.
Improved handling of public housing that is made available and occupied by a new household within the same quarter.
Inclusion of some children in public housing as part of the projection cohort.

(c) Decrease in 2016 projection after updating economic assumptions driven by higher short-medium term discount rates offset partially by higher forecast inflation

(c) Expected payments in the 2016/17 year, actual dollars

(e) Equals (c) - (d)

(f) Clients exit the projection if no benefits are received in the 2016/17 year - this is the results for the residual of the cohort after the expected level of exits

(g) Clients not in the 2016 current client cohort but expected to receive payments in 2016/17, thus part of the 2017 current client total

(h) Can think of as adding on the "interest earned" on the notional $69b. This column represents our expected 2017 current client total

(i) Difference between actual and expected number of clients in the 2017 current cohort and their risk characteristics

(j) The transition and payment models have evolved with experience from those used in 2016

APPENDIX L SENSITIVITY ANALYSIS

L.1 Unemployment sensitivity

L.1.1 Table of national unemployment rates used in scenarios

Quarter	National unemployment rate		
	Adopted (a)	Constant scenario (b)	Recession scenario (b)
Sep-17	4.75%	4.81%	5.09%
Dec-17	4.71%	4.81%	5.38%
Mar-18	4.67%	4.81%	5.67%
Jun-18	4.63%	4.81%	5.95%
Sep-18	4.59%	4.81%	6.24%
Dec-18	4.55%	4.81%	6.53%
Mar-19	4.46%	4.81%	6.81%
Jun-19	4.42%	4.81%	7.10%
Sep-19	4.37%	4.81%	6.93%
Dec-19	4.38%	4.81%	6.75%
Mar-20	4.34%	4.81%	6.58%
Jun-20	4.35%	4.81%	6.40%
Sep-20	4.35%	4.81%	6.23%
Dec-20	4.35%	4.81%	6.05%
Mar-21	4.35%	4.81%	5.88%
Jun-21	4.30%	4.81%	5.70%
Sep-21	4.30%	4.81%	5.53%
Dec-21	4.30%	4.81%	5.35%
Mar-22	4.30%	4.81%	5.18%
Jun-22	4.30%	4.81%	5.00%
Sep-22	4.30%	4.81%	4.83%
Dec-22	4.30%	4.81%	4.65%
Mar-23	4.30%	4.81%	4.48%
Jun-23	4.30%	4.81%	4.30%
Sep-23 and beyond	4.30%	4.81%	4.30%

To run scenarios, each of these national rate alternatives considered above is converted into regional level forecasts in a similar fashion to the main projection.

L.1.2 Current client projected payments, adopted unemployment rate

Segment			Total future payments, $m													
			JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Total
Under 25s	First ben aged < 20	YP/YPP	75	41	200	41	12	1	9	86	5	6	23	2	27	527
		JS-WR/EB	522	298	520	289	51	8	45	401	30	25	56	11	121	2,375
		JS-HCD	118	246	211	283	19	2	16	201	29	12	25	3	65	1,231
		SPS	162	139	1,303	154	73	5	56	442	27	46	133	5	146	2,688
	First ben aged > 20	JS-WR/EB	66	34	48	29	7	1	5	48	3	3	8	1	13	268
		JS-HCD	16	41	26	44	3	0	2	32	5	2	4	1	9	184
		SPS	13	11	140	13	7	0	5	50	2	5	19	1	15	281
	SLP		33	37	42	1,897	33	1	9	259	95	11	14	2	67	2,499
	Sub-total		1,006	847	2,491	2,750	203	20	145	1,518	196	109	282	25	463	10,054
Over 25 and on a main benefit	>75% of last 3yrs on main benefits	JS-WR/EB	1,117	722	336	657	111	22	106	593	67	31	28	11	207	4,009
		JS-HCD	358	1,891	200	1,418	93	9	81	793	163	29	20	7	301	5,361
		SPS Chd 0-2	151	171	1,014	205	87	4	69	364	36	43	74	4	128	2,350
		SPS Chd 3-13	492	547	2,137	632	226	12	181	948	105	95	109	10	318	5,811
		Subtotal	2,117	3,331	3,687	2,912	517	47	437	2,698	371	198	230	32	954	17,531
	<75% of last 3yrs on main benefits	JS-WR/EB	643	412	179	376	66	18	57	383	37	18	22	10	122	2,343
		JS-HCD	175	668	97	558	37	4	35	330	60	13	13	4	120	2,113
		SPS Chd 0-2	48	54	401	66	28	2	21	169	12	17	44	2	52	914
		SPS Chd 3-13	98	108	471	125	46	3	38	243	21	23	37	3	73	1,291
		Subtotal	964	1,242	1,148	1,124	177	28	151	1,125	130	71	116	18	367	6,660
	Supported Living	Carer	76	113	72	141	660	2	45	169	33	28	11	1	68	1,417
		Partner	20	36	21	509	6	1	20	78	34	9	4	0	36	774
		No reassessment	17	33	7	4,378	5	1	22	433	240	12	6	1	153	5,308
		2yr Mental health	28	66	13	3,340	7	1	30	446	203	17	10	1	189	4,351
		2yr Other	26	67	13	3,097	8	1	55	398	225	17	9	1	203	4,120
		Subtotal	166	315	126	11,464	685	6	172	1,525	737	82	40	4	649	15,971
NOMB	>33% last 5yrs on main benefit		206	290	426	326	88	10	499	656	61	94	129	5	143	2,932
	>33% last 5yrs on main benefit		230	328	310	379	100	14	96	1,100	79	287	150	5	160	3,238
	Sub-total		437	617	736	706	188	24	595	1,756	139	380	279	10	302	6,170
Recent Exits	>33% last 5yrs on main benefit		910	901	912	927	148	23	132	885	90	54	134	20	293	5,429
	<33% last 5yrs on main benefit		325	327	284	338	67	12	70	399	37	31	81	8	113	2,091
	Sub-total		1,235	1,228	1,196	1,265	215	35	202	1,284	127	85	215	28	406	7,520
All segment sub-total			5,925	7,581	9,384	20,220	1,985	158	1,701	9,904	1,700	926	1,162	118	3,141	63,906

Notes:

(a) Adopted national unemployment rates shown in column (a) of table L.1.1, regional rates adjusted accordingly (see Appendix C).

(b) Excludes net loans and expenses.

L.1.3 Current client projected payments, constant unemployment rate forecast (4.81%)

Segment			Total future payments, $m														Change on base
			JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Total	
Under 25s	First ben aged < 20	YP/YPP	82	44	209	40	12	1	10	91	5	6	23	2	29	554	5%
		JS-WR/EB	589	316	528	278	55	8	46	420	30	26	55	11	127	2,489	5%
		JS-HCD	140	258	216	273	21	2	16	211	30	12	25	3	68	1,276	4%
		SPS	187	144	1,329	160	81	5	57	454	28	45	132	6	151	2,778	3%
	First ben aged > 20	JS-WR/EB	74	35	51	28	7	2	5	50	3	3	8	2	14	282	5%
		JS-HCD	19	46	27	45	3	0	2	33	5	2	4	1	10	197	7%
		SPS	14	11	140	14	7	0	5	50	2	4	19	1	15	281	0%
	SLP		37	38	43	1,895	32	1	10	262	95	11	14	2	68	2,508	0%
	Sub-total		1,142	892	2,544	2,734	218	20	150	1,571	198	110	280	26	481	10,366	3%
Over 25 and on a main benefit	>75% of last 3yrs on main benefits	JS-WR/EB	1,215	749	342	651	110	22	109	611	68	30	28	12	214	4,161	4%
		JS-HCD	397	1,925	206	1,401	97	8	84	802	164	30	20	7	306	5,447	2%
		SPS Chd 0-2	173	186	1,038	210	91	5	70	381	37	43	74	4	135	2,448	4%
		SPS Chd 3-13	553	571	2,163	645	235	14	190	979	108	96	109	11	330	6,003	3%
		Subtotal	2,338	3,431	3,748	2,908	533	49	453	2,773	377	199	231	34	986	18,059	3%
	<75% of last 3yrs on main benefits	JS-WR/EB	703	422	189	366	65	19	55	400	37	18	22	10	127	2,434	4%
		JS-HCD	195	686	106	573	41	5	35	341	62	13	13	4	125	2,199	4%
		SPS Chd 0-2	57	54	403	65	26	2	24	172	12	16	44	2	53	930	2%
		SPS Chd 3-13	113	118	476	134	50	3	38	252	22	22	37	3	76	1,345	4%
		Subtotal	1,068	1,280	1,174	1,138	182	29	153	1,165	133	70	117	19	381	6,909	4%
	Supported Living	Carer	86	115	67	146	664	2	47	173	34	28	11	1	69	1,442	2%
		Partner	22	39	22	500	6	1	20	80	34	9	4	0	37	776	0%
		No reassessment	22	37	6	4,381	5	1	23	438	242	12	6	1	156	5,330	0%
		2yr Mental health	33	70	13	3,354	9	1	30	453	206	17	9	1	194	4,391	1%
		2yr Other	32	73	14	3,091	8	1	54	403	225	17	9	1	206	4,134	0%
		Subtotal	195	335	122	11,472	692	6	174	1,547	741	82	40	4	662	16,073	1%
NOMB	>33% last 5yrs on main benefit		237	299	443	328	93	11	510	672	61	93	130	5	148	3,031	3%
	>33% last 5yrs on main benefit		265	346	321	386	104	15	101	1,127	81	287	151	6	167	3,355	4%
	Sub-total		502	645	763	714	197	26	611	1,799	142	381	281	11	315	6,386	4%
Recent Exits	>33% last 5yrs on main benefit		1,056	946	947	946	158	25	137	937	92	56	135	22	310	5,766	6%
	<33% last 5yrs on main benefit		378	357	302	346	71	12	74	423	39	33	83	8	121	2,247	7%
	Sub-total		1,434	1,302	1,249	1,292	229	38	212	1,359	132	89	217	30	430	8,014	7%
All segment sub-total			6,680	7,885	9,600	20,257	2,051	168	1,753	10,215	1,722	931	1,166	124	3,256	65,807	3.0%

Notes:

(a) Adopted national unemployment rates shown in column (b) of table L.1.1, regional rates adjusted accordingly (see Appendix C).

(b) Excludes net loans and expenses.

L.1.4 Current client projected payments, mild recession type unemployment rate forecast

Segment			Total future payments, $m														Change on base
			JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Total	
Under 25s	First ben aged < 20	YP/YPP	85	42	197	46	13	1	8	90	6	6	22	2	28	546	4%
		JS-WR/EB	619	309	525	298	53	8	44	426	30	25	54	11	129	2,532	7%
		JS-HCD	140	257	214	296	18	2	15	211	31	13	25	3	68	1,292	5%
		SPS	183	136	1,343	152	77	5	55	455	27	46	133	6	151	2,770	3%
	First ben aged > 20	JS-WR/EB	75	34	52	32	7	2	5	52	3	3	8	2	14	288	7%
		JS-HCD	19	45	25	41	3	0	2	32	5	2	4	1	9	188	2%
		SPS	16	11	139	13	9	1	5	51	2	5	19	1	15	286	2%
	SLP		37	39	42	1,914	34	1	9	264	95	11	14	2	69	2,531	1%
	Sub-total		1,175	873	2,537	2,792	213	21	144	1,580	200	111	279	27	483	10,433	4%
Over 25 and on a main benefit	>75% of last 3yrs on main benefits	JS-WR/EB	1,317	739	332	636	113	24	108	624	67	31	27	12	218	4,249	6%
		JS-HCD	409	1,965	207	1,414	95	9	83	817	166	29	19	7	311	5,532	3%
		SPS Chd 0-2	170	174	1,040	217	81	5	68	375	37	43	74	4	134	2,422	3%
		SPS Chd 3-13	568	570	2,184	626	240	14	181	986	107	97	108	11	332	6,024	4%
		Subtotal	2,465	3,449	3,764	2,893	530	51	440	2,802	377	200	227	34	995	18,227	4%
	<75% of last 3yrs on main benefits	JS-WR/EB	768	429	175	379	64	20	60	408	38	18	22	10	129	2,522	8%
		JS-HCD	211	696	105	583	38	5	35	345	62	13	13	4	127	2,238	6%
		SPS Chd 0-2	55	54	400	64	27	2	21	171	12	16	44	2	53	922	1%
		SPS Chd 3-13	118	110	483	133	44	3	41	250	21	23	37	3	76	1,342	4%
		Subtotal	1,152	1,290	1,164	1,159	173	30	157	1,175	134	70	115	20	385	7,023	5%
	Supported Living	Carer	88	114	67	139	669	1	44	171	33	28	11	1	68	1,435	1%
		Partner	24	40	27	508	5	1	20	84	35	9	4	0	38	795	3%
		No reassessment	20	36	6	4,379	5	1	23	436	241	12	6	1	155	5,321	0%
		2yr Mental health	33	73	13	3,341	8	1	29	454	204	17	9	1	193	4,376	1%
		2yr Other	33	73	14	3,108	8	2	56	407	227	17	10	1	207	4,161	1%
		Subtotal	198	334	126	11,476	696	7	172	1,552	740	83	40	4	661	16,089	1%
NOMB	>33% last 5yrs on main benefit		245	305	444	329	92	12	501	678	62	93	128	5	150	3,044	4%
	>33% last 5yrs on main benefit		266	352	328	394	101	14	96	1,123	81	284	150	6	169	3,364	4%
	Sub-total		511	656	772	723	193	26	597	1,801	142	377	278	11	319	6,408	4%
Recent Exits	>33% last 5yrs on main benefit		1,112	956	957	945	163	27	142	955	93	56	135	22	315	5,878	8%
	<33% last 5yrs on main benefit		405	358	304	359	72	13	77	430	40	33	84	9	123	2,307	10%
	Sub-total		1,517	1,313	1,261	1,304	235	40	219	1,385	133	89	219	31	437	8,185	9%
All segment sub-total			7,018	7,916	9,623	20,346	2,041	175	1,729	10,295	1,726	930	1,159	126	3,281	66,365	4%

Notes:

(a) Adopted national unemployment rates shown in column (c) of table L.1.1, regional rates adjusted accordingly (see Appendix C).

(b) Excludes net loans and expenses.

L.2 Economic sensitivity

L.2.1 Current client projected payments, discount rates 1% lower

Segment			Total future payments, $m														Change on base
			JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Total	
Under 25s	First ben aged < 20	YP/YPP	84	51	221	54	15	1	11	100	7	7	25	2	31	610	16%
		JS-WR/EB	580	359	584	375	63	10	57	467	38	29	62	12	142	2,778	17%
		JS-HCD	134	276	234	350	23	3	20	233	36	15	28	4	75	1,429	16%
		SPS	189	173	1,404	201	89	6	71	499	33	52	144	6	164	3,032	13%
	First ben aged > 20	JS-WR/EB	73	41	54	38	8	2	6	55	4	4	9	2	15	310	16%
		JS-HCD	18	45	29	54	3	0	2	36	6	2	5	1	11	212	15%
		SPS	15	14	150	17	8	1	6	55	3	6	21	1	16	313	11%
	SLP		39	45	48	2,201	36	1	11	304	113	13	15	2	80	2,909	16%
	Sub-total		1,134	1,004	2,724	3,290	245	23	184	1,749	240	128	309	28	534	11,592	15%
Over 25 and on a main benefit	>75% of last 3yrs on main benefits	JS-WR/EB	1,184	806	368	768	125	23	121	654	76	34	30	12	228	4,429	10%
		JS-HCD	390	2,005	217	1,598	103	10	91	860	179	32	21	7	326	5,839	9%
		SPS Chd 0-2	172	205	1,080	252	102	5	82	403	42	48	79	4	142	2,615	11%
		SPS Chd 3-13	546	630	2,248	747	257	14	209	1,037	119	103	116	11	349	6,386	10%
		Subtotal	2,292	3,646	3,912	3,364	588	51	503	2,954	417	217	247	35	1,045	19,270	10%
	<75% of last 3yrs on main benefits	JS-WR/EB	684	463	196	443	75	19	65	424	43	20	24	10	135	2,600	11%
		JS-HCD	191	711	105	631	42	5	39	360	66	14	14	4	131	2,312	9%
		SPS Chd 0-2	55	64	422	81	32	2	25	185	14	19	47	2	57	1,005	10%
		SPS Chd 3-13	108	125	493	148	52	4	44	264	24	25	40	3	80	1,410	9%
		Subtotal	1,038	1,362	1,216	1,303	202	30	173	1,233	147	78	124	20	402	7,327	10%
	Supported Living	Carer	83	126	78	161	694	2	49	183	36	30	12	1	73	1,529	8%
		Partner	22	40	23	544	6	1	22	85	37	9	5	0	39	833	8%
		No reassessment	20	38	8	4,783	6	1	24	476	263	13	6	1	167	5,806	9%
		2yr Mental health	31	75	15	3,659	8	1	33	489	223	19	10	1	207	4,772	10%
		2yr Other	29	75	14	3,328	9	1	59	429	243	18	10	1	218	4,434	8%
		Subtotal	185	353	137	12,476	723	6	187	1,663	803	88	43	4	704	17,373	9%
NOMB	>33% last 5yrs on main benefit		230	331	463	388	102	11	535	716	69	101	136	5	159	3,246	11%
	>33% last 5yrs on main benefit		258	374	337	449	115	16	111	1,186	89	303	158	6	178	3,579	11%
	Sub-total		488	705	799	836	216	27	646	1,903	158	404	294	11	337	6,825	11%
Recent Exits	>33% last 5yrs on main benefit		1,011	1,036	1,004	1,117	174	26	158	1,010	106	62	145	22	333	6,205	14%
	<33% last 5yrs on main benefit		363	375	312	407	77	13	81	451	44	35	87	8	128	2,382	14%
	Sub-total		1,373	1,411	1,316	1,524	251	39	239	1,461	151	97	232	31	461	8,586	14%
All segment sub-total			**6,510**	**8,481**	**10,104**	**22,792**	**2,226**	**176**	**1,933**	**10,963**	**1,916**	**1,012**	**1,249**	**128**	**3,484**	**70,973**	**11%**

Notes:

(a) Assumes all forward rates are 1% lower than those given in Appendix C.

(b) Excludes net loans and expenses.

L.2.2 Current client projected payments, discount rates 1% higher

Segment			Total future payments, $m														Change on base
			JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Total	
Under 25s	First ben aged < 20	YP/YPP	67	34	182	31.4	9	1	7	74.9	4	5	21	1.5	24	462	-12%
		JS-WR/EB	475	251	466	225.5	41	7	36	348.2	24	21	50	9.6	105	2,060	-13%
		JS-HCD	105	222	191	233.4	15	2	12	176.3	25	11	22	2.9	57	1,075	-13%
		SPS	140	113	1,215	118.6	60	4	45	395.0	22	40	123	5.0	131	2,412	-10%
	First ben aged > 20	JS-WR/EB	61	29	44	23.0	6	1	4	42.1	3	3	7	1.4	11	234	-12%
		JS-HCD	14	38	24	36.9	2	0	1	28.0	4	2	4	0.5	8	163	-12%
		SPS	11	9	132	10.1	6	0	4	45.0	2	4	18	0.5	13	256	-9%
	SLP		29	31	38	1655.9	30	1	7	223.4	80	10	12	1.4	57	2,176	-13%
	Sub-total		903	727	2,292	2334.8	170	17	115	1332.9	164	95	258	22.8	407	8,838	-12%
Over 25 and on a main benefit	>75% of last 3yrs on main benefits	JS-WR/EB	1,058	651	309	567.6	99	20	95	542.0	59	28	26	10.7	189	3,655	-9%
		JS-HCD	330	1,791	184	1,267.3	84	8	73	734.7	149	27	18	6.2	279	4,951	-8%
		SPS Chd 0-2	133	144	957	167.9	75	4	58	330.8	31	40	70	3.8	117	2,130	-9%
		SPS Chd 3-13	446	478	2,037	538.6	200	11	158	872.4	93	88	102	9.5	292	5,325	-8%
		Subtotal	1,966	3,064	3,487	2,541.4	458	43	384	2,479.9	332	182	216	30.1	877	16,061	-8%
	<75% of last 3yrs on main benefits	JS-WR/EB	607	370	164	321.7	59	17	50	349.1	32	17	21	9.1	111	2,128	-9%
		JS-HCD	162	631	89	496.7	33	4	31	304.3	54	12	12	3.8	111	1,944	-8%
		SPS Chd 0-2	42	45	381	54.0	24	1	18	154.8	10	15	42	1.7	48	838	-8%
		SPS Chd 3-13	89	95	452	106.7	41	3	34	225.1	19	21	35	2.6	67	1,190	-8%
		Subtotal	900	1,141	1,087	979.1	157	26	133	1,033.3	116	65	110	17.3	337	6,100	-8%
	Supported Living	Carer	70	101	66	123.9	628	1	41	157.0	31	26	10	1.0	63	1,320	-7%
		Partner	18	32	20	477.6	5	1	19	72.6	32	8	4	0.3	33	723	-7%
		No reassessment	15	30	6	4,031.3	4	1	20	396.1	221	11	6	0.5	141	4,883	-8%
		2yr Mental health	24	59	12	3,066.8	6	1	27	409.1	186	16	9	0.9	174	3,992	-8%
		2yr Other	24	61	11	2,894.9	7	1	51	371.3	210	16	9	0.8	190	3,847	-7%
		Subtotal	151	284	116	10,594.5	651	5	158	1,406.1	679	77	38	3.6	601	14,764	-8%
NOMB	>33% last 5yrs on main benefit		186	256	394	277.1	77	9	468	604.5	54	87	123	4.4	129	2,669	-9%
	>33% last 5yrs on main benefit		207	290	286	323.7	87	13	83	1,025.0	71	272	143	4.8	144	2,950	-9%
	Sub-total		394	545	681	600.8	164	22	551	1,629.5	124	359	265	9.3	273	5,619	-9%
Recent Exits	>33% last 5yrs on main benefit		827	793	833	778.5	128	21	111	783.2	76	47	124	18.4	260	4,800	-12%
	<33% last 5yrs on main benefit		294	289	260	284.7	58	11	61	355.3	32	28	76	7.1	100	1,855	-11%
	Sub-total		1,121	1,081	1,093	1,063.2	186	32	172	1,138.6	108	75	199	25.5	360	6,655	-11%
All segment sub-total			**5,435**	**6,842**	**8,755**	**18,114**	**1,787**	**144**	**1,514**	**9,020**	**1,524**	**853**	**1,086**	**109**	**2,855**	**58,037**	**-9%**

Notes:

(a) Assumes all forward rates are 1% higher than those given in Appendix C.

(b) Excludes net loans and expenses.

L.2.3 Current client projected payments, inflation rates 1% lower

Segment			Total future payments, $m														Change on base
			JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Total	
Under 25s	First ben aged < 20	YP/YPP	67	34	182	31.3	9	1	7	74.9	4	5	21	1.5	24	462	-12%
		JS-WR/EB	476	251	467	224.6	41	7	35	348.1	24	21	50	9.7	105	2,060	-13%
		JS-HCD	105	222	191	232.9	15	2	12	176.4	25	11	22	2.9	57	1,075	-13%
		SPS	140	112	1,218	118.1	60	4	45	395.3	22	40	123	5.0	132	2,414	-10%
	First ben aged > 20	JS-WR/EB	61	29	44	22.9	6	1	4	42.1	3	3	7	1.4	11	235	-12%
		JS-HCD	14	38	24	36.8	2	0	1	28.1	4	2	4	0.5	8	163	-12%
		SPS	11	9	133	10.1	6	0	4	45.0	2	4	18	0.5	13	256	-9%
	SLP		29	31	38	1655.9	30	1	7	223.3	80	10	12	1.4	57	2,175	-13%
	Sub-total		904	726	2,296	2332.7	170	17	115	1333.2	163	95	258	22.8	407	8,840	-12%
Over 25 and on a main benefit	>75% of last 3yrs on main benefits	JS-WR/EB	1,060	652	309	567.4	99	20	95	542.8	59	28	26	10.7	190	3,660	-9%
		JS-HCD	330	1,795	185	1,268.3	84	8	74	736.1	149	27	18	6.2	280	4,960	-7%
		SPS Chd 0-2	133	144	959	167.6	75	4	58	331.2	31	40	70	3.8	117	2,133	-9%
		SPS Chd 3-13	446	478	2,042	538.2	201	11	158	873.9	93	88	102	9.5	292	5,333	-8%
		Subtotal	1,970	3,069	3,496	2,541.5	459	43	384	2,484.0	333	182	216	30.2	879	16,086	-8%
	<75% of last 3yrs on main benefits	JS-WR/EB	608	370	165	321.5	59	17	50	349.6	32	17	21	9.1	111	2,131	-9%
		JS-HCD	162	632	90	497.1	33	4	31	304.8	54	12	12	3.9	111	1,948	-8%
		SPS Chd 0-2	42	45	382	53.9	24	1	18	155.0	10	15	42	1.7	48	839	-8%
		SPS Chd 3-13	89	95	453	106.6	41	3	34	225.5	19	21	35	2.6	67	1,192	-8%
		Subtotal	902	1,143	1,090	979.0	157	26	133	1,035.0	116	65	110	17.3	337	6,109	-8%
	Supported Living	Carer	70	102	66	123.9	630	1	41	157.3	31	27	10	1.0	63	1,322	-7%
		Partner	18	32	20	478.7	5	1	19	72.8	32	8	4	0.3	33	725	-6%
		No reassessment	15	30	6	4,038.1	4	1	20	396.7	221	11	6	0.5	141	4,891	-8%
		2yr Mental health	24	59	12	3,071.7	6	1	27	409.8	186	16	9	0.9	174	3,998	-8%
		2yr Other	24	61	11	2,901.2	7	1	51	372.0	210	16	9	0.8	190	3,855	-6%
		Subtotal	151	284	116	10,613.7	653	5	158	1,408.5	680	77	38	3.6	602	14,791	-7%
NOMB	>33% last 5yrs on main benefit		187	256	395	276.9	77	9	469	605.6	54	87	123	4.5	129	2,672	-9%
	>33% last 5yrs on main benefit		207	290	287	323.5	87	13	83	1,027.1	71	273	143	4.8	145	2,954	-9%
	Sub-total		394	545	682	600.4	164	22	552	1,632.6	125	360	266	9.3	274	5,626	-9%
Recent Exits	>33% last 5yrs on main benefit		828	793	835	777.5	128	21	111	783.6	76	47	124	18.5	261	4,803	-12%
	<33% last 5yrs on main benefit		295	289	260	284.3	58	11	61	355.6	32	28	76	7.1	100	1,856	-11%
	Sub-total		1,122	1,082	1,095	1,061.8	186	32	172	1,139.2	108	75	200	25.5	361	6,658	-11%
All segment sub-total			5,443	6,849	8,774	18,129	1,789	144	1,515	9,032	1,525	855	1,088	109	2,859	58,111	-9%

Notes:

(a) Assumes all April inflation increases are 1% lower than those given in Appendix C.

(b) Excludes net loans and expenses.

L.2.4 Current client projected payments, inflation rates 1% higher

Segment			Total future payments, $m														Change on base
			JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Total	
Under 25s	First ben aged < 20	YP/YPP	84	51	220	54.3	15	1	11	99.8	7	7	25	1.9	31	609	15%
		JS-WR/EB	578	359	583	375.0	63	10	57	465.9	38	29	62	11.7	141	2,772	17%
		JS-HCD	134	275	234	349.1	23	3	20	232.0	36	15	28	3.6	75	1,426	16%
		SPS	189	173	1,400	201.2	88	5	70	497.6	33	52	144	6.0	164	3,024	12%
	First ben aged > 20	JS-WR/EB	73	41	54	37.9	8	2	6	55.2	4	4	9	1.6	15	310	16%
		JS-HCD	18	45	29	53.7	3	0	2	36.0	6	2	5	0.6	11	211	15%
		SPS	15	14	149	17.0	8	1	6	55.3	3	6	21	0.6	16	312	11%
	SLP		39	45	48	2196.7	36	1	11	303.2	113	13	15	1.7	79	2,903	16%
	Sub-total		1,131	1,003	2,715	3284.8	245	23	184	1745.1	239	127	308	27.7	533	11,566	15%
Over 25 and on a main benefit	>75% of last 3yrs on main benefits	JS-WR/EB	1,180	804	367	765.9	125	23	120	651.8	76	34	30	12.2	228	4,416	10%
		JS-HCD	389	1,998	216	1,593.3	103	10	91	857.4	179	32	21	7.1	325	5,821	9%
		SPS Chd 0-2	172	204	1,076	251.5	102	5	82	402.1	42	48	79	4.5	141	2,608	11%
		SPS Chd 3-13	544	629	2,240	745.1	256	14	209	1,033.4	119	103	116	11.0	348	6,367	10%
		Subtotal	2,285	3,634	3,898	3,355.8	586	51	502	2,944.7	416	216	246	34.8	1,042	19,212	10%
	<75% of last 3yrs on main benefits	JS-WR/EB	682	462	195	441.7	75	19	64	422.6	42	20	24	10.3	135	2,593	11%
		JS-HCD	190	709	105	628.9	42	5	39	358.6	66	14	14	4.4	130	2,305	9%
		SPS Chd 0-2	55	64	421	80.9	32	2	25	184.4	14	19	46	2.0	57	1,002	10%
		SPS Chd 3-13	108	124	491	148.0	52	4	44	263.6	24	25	39	3.0	79	1,406	9%
		Subtotal	1,035	1,358	1,212	1,299.5	201	30	173	1,229.1	146	78	123	19.7	401	7,305	10%
	Supported Living	Carer	83	125	77	161.1	692	2	49	182.8	36	29	12	1.2	73	1,524	8%
		Partner	21	39	23	542.6	6	1	22	84.4	37	9	5	0.4	38	830	7%
		No reassessment	19	38	8	4,768.2	6	1	24	474.9	263	13	6	0.6	167	5,788	9%
		2yr Mental health	31	75	15	3,647.6	8	1	33	487.5	223	18	10	1.1	206	4,757	9%
		2yr Other	29	75	14	3,317.0	9	1	59	428.0	242	18	10	0.9	217	4,420	7%
		Subtotal	184	352	137	12,436.5	721	6	187	1,657.7	801	88	43	4.1	702	17,318	8%
NOMB	>33% last 5yrs on main benefit		230	330	461	386.8	102	11	533	714.0	69	101	136	5.3	159	3,237	10%
	>33% last 5yrs on main benefit		257	373	336	447.6	114	16	111	1,182.5	89	302	157	5.7	178	3,568	10%
	Sub-total		487	703	797	834.4	216	27	644	1,896.5	157	403	293	11.0	336	6,805	10%
Recent Exits	>33% last 5yrs on main benefit		1,008	1,034	1,001	1,115.4	174	26	158	1,007.6	106	62	145	22.0	332	6,189	14%
	<33% last 5yrs on main benefit		362	374	311	405.8	77	13	81	450.1	44	35	87	8.4	128	2,376	14%
	Sub-total		1,369	1,407	1,312	1,521.2	251	39	239	1,457.7	150	97	232	30.4	460	8,565	14%
All segment sub-total			6,490	8,458	10,071	22,732	2,220	176	1,928	10,931	1,910	1,008	1,245	128	3,474	70,770	11%

Notes:

(a) Assumes all April inflation increases are 1% higher than those given in Appendix C

(b) Excludes net loans and expenses.

L.3 Model sensitivity

In the tables below the current client projection results are recalculated with the standard economic parameters, but with the model transition rates individually increased or decreased by five percent.

L.3.1 Current client future years of benefit support, variable transition rates

Change		Future years of benefit support for current clients								Change on base
		JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	Total	
Transition from SPS rate	5%	2,889	3,452	2,374	6,882	612	135	376	16,720	-0.7%
	-5%	2,917	3,463	2,567	6,940	605	136	370	16,998	0.9%
Transition from JS-WR rate	5%	3,073	3,461	2,444	6,918	608	135	377	17,018	1.0%
	-5%	2,757	3,440	2,459	6,910	600	136	379	16,681	-1.0%
Transition from JS-HCD rate	5%	2,924	3,277	2,480	6,923	612	136	379	16,732	-0.7%
	-5%	2,875	3,635	2,453	6,907	616	133	375	16,993	0.9%
Transition from SLH rate	5%	2,901	3,459	2,478	6,802	611	135	373	16,757	-0.5%
	-5%	2,898	3,431	2,478	7,039	610	137	364	16,958	0.7%
Transition from NOB rate	5%	3,010	3,556	2,516	7,033	628	141	377	17,261	2.5%
	-5%	2,788	3,319	2,416	6,774	598	130	355	16,380	-2.8%

Notes:
(a) For example, if 10% of clients transition out of a benefit state, a 5% increase would change this to 10.5%

L.3.2 Current client projected payments, variable transition rates

Change		Future benefit payments to current clients														Change on base
		JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Total	
Transition from SPS rate	5%	5,921	7,600	9,042	20,134	2,002	158	1,702	9,811	1,691	926	1,164	117	3,125	63,392	-0.8%
	-5%	5,969	7,603	9,749	20,292	1,972	158	1,708	10,068	1,717	927	1,164	119	3,211	64,657	1.2%
Transition from JS-WR rate	5%	5,644	7,576	9,359	20,211	1,954	159	1,700	9,859	1,701	918	1,165	116	3,146	63,508	-0.6%
	-5%	6,298	7,599	9,304	20,227	1,977	158	1,714	9,998	1,705	924	1,160	120	3,187	64,371	0.7%
Transition from JS-HCD rate	5%	5,983	7,204	9,428	20,258	1,992	160	1,706	9,875	1,694	925	1,165	118	3,144	63,651	-0.4%
	-5%	5,888	7,988	9,331	20,190	2,010	156	1,708	10,001	1,722	923	1,159	118	3,195	64,390	0.8%
Transition from SLH rate	5%	5,942	7,597	9,424	19,929	1,988	158	1,707	9,932	1,690	929	1,165	118	3,166	63,744	-0.3%
	-5%	5,935	7,550	9,431	20,545	1,989	161	1,690	10,001	1,725	924	1,162	118	3,191	64,421	0.8%
Transition from NOB rate	5%	6,128	7,778	9,546	20,485	2,037	165	1,725	10,165	1,732	939	1,171	121	3,238	65,230	2.1%
	-5%	5,744	7,344	9,216	19,898	1,955	155	1,647	9,701	1,678	904	1,149	114	3,092	62,595	-2.1%

Notes:
(a) For example, if 10% of clients transition out of a benefit state, a 5% increase would change this to 10.5%
(b) Excludes net loans and expenses.

APPENDIX M OTHER ONE-WAY TABLES

M.1 Future benefit payments to current clients

M.1.1 By age at projection date

Group	Number of clients	Benefit payment														
		JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Loa+Exp (a)	Total
		$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m
16-17	3,246	80	46	145	247	10	1	8	101	14	5	17	2	29	92	798
18-19	17,964	327	240	620	648	49	6	40	412	47	27	79	8	121	342	2,965
20-24	66,539	1,088	922	2,444	2,214	215	23	167	1,590	178	124	329	28	475	1,278	11,074
25-29	69,333	997	1,010	2,400	2,398	275	24	206	1,712	211	169	337	25	509	1,340	11,614
30-34	60,551	784	923	1,580	2,210	269	20	200	1,425	200	168	206	18	418	1,098	9,516
35-39	57,110	686	950	1,021	2,287	276	19	215	1,261	199	159	109	13	376	988	8,560
40-44	56,040	610	976	625	2,563	280	17	230	1,128	217	133	48	10	361	939	8,137
45-49	58,006	555	990	354	2,807	287	16	252	996	236	88	22	7	351	908	7,870
50-54	52,141	411	796	135	2,449	187	13	209	705	202	37	10	4	270	708	6,137
55-59	49,454	276	540	48	1,781	109	12	135	435	146	13	5	2	176	480	4,155
60-64	47,160	110	189	12	617	28	8	39	139	51	3	1	0	56	164	1,418
All	537,544	5,925	7,581	9,384	20,220	1,985	158	1,701	9,904	1,700	926	1,162	118	3,141	8,338	72,244

Notes:
(a) Loans and expenses allocated proportionally

M.1.2 By continuous duration at projection date

Group	Number of clients	Benefit payment														
		JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Loa+Exp (a)	Total
		$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m
<1yr	112,876	1,793	1,919	2,141	2,446	355	44	309	2,123	236	179	283	36	641	1,631	14,135
1-2 yr	54,980	752	961	1,245	1,586	207	19	193	1,160	148	114	157	15	348	901	7,808
2-3 yr	38,416	448	633	915	1,291	162	12	139	850	117	89	114	9	251	656	5,684
3-4 yr	28,985	296	450	668	1,073	121	9	106	644	95	69	81	6	188	497	4,302
4-5 yr	20,774	199	311	500	909	98	6	83	478	78	52	58	4	142	381	3,298
5-6 yr	17,243	154	255	411	841	84	5	77	403	70	45	46	3	121	328	2,841
6-7 yr	14,793	127	217	349	775	71	4	65	343	65	38	38	3	106	287	2,487
7-8 yr	14,412	121	210	330	791	76	4	62	332	67	38	34	2	106	283	2,456
8-9 yr	14,346	125	221	337	839	82	4	65	341	71	37	33	2	111	296	2,565
9-10 yr	11,626	97	169	260	770	69	3	54	274	63	32	25	2	91	249	2,156
10-15 yr	35,450	284	493	634	2,680	210	8	164	808	215	88	55	5	282	773	6,696
15-20 yr	18,641	140	243	237	1,793	110	4	75	409	136	33	16	2	156	438	3,794
20-25 yr	12,211	79	143	102	1,270	65	2	50	233	92	16	6	1	95	281	2,437
25+ yr	19,056	73	129	58	1,892	61	2	56	224	119	12	4	1	97	356	3,083
Off benefits	123,735	1,235	1,228	1,196	1,265	215	35	202	1,284	127	85	215	28	406	981	8,501
All	537,544	5,925	7,581	9,384	20,220	1,985	158	1,701	9,904	1,700	926	1,162	118	3,141	8,338	72,244

Notes:
(a) Loans and expenses allocated proportionately

M.1.3 By region at projection date

Group	Number of clients	Benefit payment														
		JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Loa+Exp (a)	Total
		$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m
Northland	27,231	414	497	626	1,008	120	9	127	534	84	38	56	7	197	485	4,202
Auckland	173,535	1,400	2,508	2,871	5,062	784	46	421	3,505	419	271	331	30	1,015	2,435	21,097
Waikato	46,937	557	679	921	1,852	169	14	154	887	152	79	122	12	307	770	6,675
East Coast	32,095	406	428	696	1,476	148	15	161	567	105	77	110	10	195	573	4,968
Bay of Plenty	48,619	647	795	975	1,478	206	20	218	974	124	80	131	13	265	773	6,699
Taranaki	25,784	365	370	508	1,240	86	7	101	445	87	51	54	6	142	452	3,913
Central	35,423	454	462	581	1,642	124	11	125	646	136	75	93	8	208	596	5,162
Wellington	42,666	631	517	677	1,570	134	13	114	711	148	76	91	11	217	641	5,550
Nelson	20,442	208	276	303	725	42	5	54	367	73	31	32	4	117	292	2,529
Canterbury	45,331	405	623	698	2,284	109	8	123	709	202	89	85	9	293	735	6,372
Southern	35,655	438	426	528	1,624	63	10	102	541	149	59	57	7	182	546	4,730
Australia	3,826	1	1	0	259	0	0	0	18	21	0	0	0	3	40	345
All	537,544	5,924	7,580	9,384	19,961	1,985	158	1,701	9,886	1,679	926	1,162	118	3,138	8,298	72,244

Notes:
(a) Loans and expenses allocated proportionately

M.1.4 By ethnicity at projection date

Group	Number of clients	Benefit payment														
		JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Loa+Exp (a)	Total
		$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m
NZ European	214,133	1,683	2,633	2,481	9,964	512	28	448	3,875	902	422	371	33	1,265	3,212	27,828
Māori	171,126	3,168	3,285	5,160	6,322	942	72	1,061	3,691	497	307	540	65	1,250	3,439	29,801
Pacifiska	52,045	468	610	956	1,289	347	17	119	750	76	72	116	9	235	661	5,724
Asian	47,729	238	467	256	785	89	26	13	775	58	52	45	3	139	384	3,331
Other	52,511	368	585	531	1,861	96	15	60	812	167	74	90	7	252	642	5,560
All	537,544	5,925	7,581	9,384	20,220	1,985	158	1,701	9,904	1,700	926	1,162	##	3,141	8,338	72,244

Notes:
(a) Loans and expenses allocated proportionately

M.1.5 By public housing state at projection date

Group	Number of clients	Benefit payment														
		JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Loa+Exp (a)	Total
		$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m
Public housing	55,232	823	1,135	1,602	2,949	443	21	310	555	274	115	131	14	323	1,134	9,830
AS	280,007	3,447	4,647	5,905	11,420	1,134	88	745	7,398	1,048	450	715	68	2,189	5,121	44,375
Neither	202,305	1,654	1,799	1,877	5,851	408	49	646	1,951	379	362	317	35	629	2,082	18,039
All	537,544	5,925	7,581	9,384	20,220	1,985	158	1,701	9,904	1,700	926	1,162	118	3,141	8,338	72,244

Notes:
(a) Loans and expenses allocated proportionately

M.1.6 By cumulative time in public housing at projection date

Group	Number of clients	Benefit payments														
		JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Loa+Exp (a)	Total
		$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m
None	404,031	3,675	4,911	5,433	13,996	1,129	105	1,042	7,415	1,155	661	789	74	2,165	5,552	48,103
<1yr	11,278	204	234	326	526	57	5	44	240	44	21	33	4	92	239	2,068
1-2 yr	17,507	317	359	524	779	95	7	71	396	67	34	52	6	145	372	3,225
2-3 yr	13,025	234	271	404	591	74	6	60	286	51	27	39	5	106	281	2,435
3-4 yr	10,729	195	223	337	483	63	4	51	228	43	23	33	4	86	231	2,004
4-5 yr	9,191	160	193	291	405	59	4	44	185	37	19	28	3	71	195	1,693
5-6 yr	8,079	144	164	259	365	52	3	41	163	32	17	24	3	62	173	1,503
6-7 yr	7,074	123	145	226	329	48	3	37	139	29	15	21	2	54	153	1,325
7-8 yr	6,534	114	136	207	306	46	3	36	123	27	14	19	2	49	141	1,222
8-9 yr	6,090	104	125	182	289	43	2	31	108	26	12	16	2	44	128	1,112
9-10 yr	5,572	95	111	179	269	38	2	31	96	24	12	16	2	40	119	1,034
10-15 yr	20,601	330	410	606	1,040	155	8	119	316	91	41	53	6	136	432	3,743
15-20 yr	14,605	172	247	272	712	101	5	81	139	64	22	25	3	69	250	2,162
20-25 yr	1,993	36	33	87	76	16	1	8	44	6	5	9	1	15	44	380
>25 yr	1,235	21	19	51	56	9	0	4	26	4	3	5	0	9	27	234
All	537,544	5,925	7,581	9,384	20,220	1,985	158	1,701	9,904	1,700	926	1,162	118	3,141	8,338	72,244

Notes:
(a) Loans and expenses allocated proportionately

M.1.7 By youngest child age, current SPS clients at projection date

Group	Number of clients	Benefit payments														
		JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Loa+Exp (a)	Total
		$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m
0-2	25,444	354	357	2,655	417	186	10	144	958	73	104	261	11	319	763	6,615
3-4	13,348	174	188	1,156	232	91	5	74	464	40	50	96	5	148	355	3,078
5-6	10,118	137	155	811	190	77	4	58	345	33	36	54	4	110	263	2,276
7-8	7,815	114	129	546	149	56	3	47	249	25	24	30	3	80	190	1,645
9-10	6,121	101	113	352	126	46	3	35	179	21	17	16	2	59	140	1,209
11-12	5,026	102	107	206	109	33	2	28	133	17	11	9	1	46	105	908
13-14	2,564	66	64	54	61	15	1	14	61	8	4	3	1	22	49	423
All	70,436	1,048	1,112	5,779	1,284	504	29	400	2,389	217	247	470	27	783	1,864	16,154

Notes:
(a) Loans and expenses allocated proportionately

M.1.8 By incapacity type, current SLP-HCD clients at projection date

Group	Number of clients	Benefit payments														Total
		JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Loa+Exp (a)	
		$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m
Accident	4,196	7	13	5	519	2	0	7	67	35	3	2	0	31	90	782
Cancer	2,945	5	9	4	178	1	0	4	26	14	1	1	0	14	33	290
Cardio	6,769	6	15	5	521	2	0	15	63	37	3	2	0	33	91	792
Immune	3,480	4	9	2	323	1	0	8	40	24	2	1	0	20	57	492
Infectious	911	1	3	1	101	0	0	1	13	8	1	0	0	7	18	153
Intl hndcp	10,089	7	10	4	2,028	1	0	4	171	69	5	3	0	36	305	2,643
Musc-skel	10,304	9	22	6	947	3	0	21	123	76	6	3	0	67	167	1,450
Nervous Sys	7,565	9	18	7	1,040	3	0	9	125	73	6	4	0	54	176	1,523
Other dis	9,071	15	24	12	1,495	4	1	12	191	102	8	6	1	73	253	2,195
Pregnancy	17	0	0	0	2	0	0	0	0	0	0	0	0	0	0	3
Psych	32,124	52	105	34	5,264	12	2	41	690	303	26	17	2	267	889	7,705
Respiratory	3,061	3	6	2	240	1	0	7	31	18	1	1	0	17	43	369
Sensory	2,716	3	6	3	370	1	0	4	47	25	2	1	0	17	63	542
Substance	1,664	2	7	1	195	1	0	2	24	14	1	0	0	12	34	294
All	94,912	122	246	86	13,223	32	5	135	1,611	798	64	41	4	647	2,220	19,233

Notes:
(a) Loans and expenses allocated proportionately

M.1.9 By incapacity type, current JS-HCD clients at projection date

Group	Number of clients	Benefit payments														Total
		JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Loa+Exp (a)	
		$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m
Accident	4,853	58	185	35	150	11	1	9	91	15	4	4	1	33	78	675
Cancer	1,253	7	33	3	27	2	0	2	15	3	1	0	0	6	13	112
Cardio	3,560	22	116	9	89	6	1	6	46	8	1	1	0	17	42	365
Immune	3,109	24	125	12	83	7	1	6	48	9	2	1	0	18	44	381
Infectious	708	7	28	4	23	2	0	1	12	2	0	0	0	5	11	94
Intl hndcp	50	1	2	0	4	0	0	0	1	0	0	0	0	0	1	10
Musc-skel	12,222	82	475	37	318	23	3	22	187	38	6	5	2	70	165	1,432
Nervous Sys	2,123	21	86	16	90	5	1	5	44	9	2	2	0	15	39	335
Other dis	3,376	33	124	26	106	8	1	7	64	12	3	4	1	23	53	462
Pregnancy	1,026	17	22	80	21	6	0	4	34	3	3	8	0	12	28	240
Psych	33,449	392	1,476	339	1,327	81	8	70	783	149	35	41	9	282	651	5,643
Respiratory	1,859	13	69	6	54	4	0	4	26	5	1	1	0	10	25	220
Sensory	810	8	29	4	23	2	0	1	14	2	1	1	0	5	12	102
Substance	3,777	55	187	35	146	9	1	6	88	16	3	3	1	34	76	662
All	72,175	738	2,957	606	2,462	165	18	145	1,455	272	61	71	16	529	1,239	10,734

Notes:
(a) Loans and expenses allocated proportionately

M.1.10 By partner, current JS-WR, JS-HCD, SLP-HCD and EB clients at projection date

Group	Number of clients	Benefit payments														
		JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Loa+Exp (a)	Total
		$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m
EB, no ptnr	1,987	26	24	19	35	6	15	12	28	4	2	3	1	9	24	208
EB, ptnr	1,118	10	10	9	12	2	8	3	12	1	1	2	0	4	10	83
SLP-HCD, no ptnr	79,568	90	182	53	11,994	22	3	99	1,438	718	49	32	3	567	1,990	17,240
SLP-HCD, ptnr	15,344	32	64	33	1,229	10	2	36	173	80	15	9	1	80	230	1,994
JS-HCD, no ptnr	59,908	640	2,558	508	2,145	137	14	117	1,261	238	47	58	14	458	1,069	9,265
JS-HCD, ptnr	12,267	98	399	98	316	28	4	28	194	34	14	13	2	70	170	1,469
JS-WR, no ptnr	75,946	2,290	1,466	1,082	1,328	222	30	191	1,435	132	68	114	34	459	1,155	10,006
JS-WR, ptnr	17,579	421	288	292	272	55	8	54	291	29	25	34	6	96	244	2,116
All	263,717	3,608	4,990	2,093	17,331	482	83	540	4,830	1,236	222	265	62	1,745	4,891	42,379

Notes:
(a) Loans and expenses allocated proportionately

M.1.11 By proportion of time on main benefits in the last three years at projection date

Group	Number of clients	Benefit payments														
		JS-WR	JS-HCD	SPS	SLP-HCD	SLP-Carer	EB	OB	AS	DA	CDA	CCS	EI	HS	Loa+Exp (a)	Total
		$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m
0	91,283	248	354	318	420	108	15	453	1,084	83	293	159	5	167	484	4,190
0.01<0.1	19,346	155	182	185	200	40	5	39	238	24	21	37	4	63	156	1,348
0.1-0.2	28,439	229	251	276	287	55	8	55	338	33	29	57	5	91	224	1,938
0.2-0.3	24,765	238	263	296	301	57	8	54	340	34	29	56	5	94	232	2,006
0.3-0.4	22,609	250	274	315	316	59	8	49	339	35	27	54	6	97	239	2,068
0.4-0.5	40,193	524	570	657	669	119	15	99	673	72	50	101	12	201	491	4,253
0.5-0.6	19,716	300	330	380	379	68	8	54	372	41	28	54	6	114	279	2,414
0.6-0.7	19,918	328	354	434	434	69	8	55	399	45	28	57	7	125	306	2,649
0.7-0.8	23,938	392	431	530	534	87	9	65	473	54	34	67	8	151	370	3,206
0.8-0.9	23,353	431	471	598	620	95	10	71	507	61	35	67	9	167	410	3,551
0.9-1.0	223,984	2,830	4,101	5,395	16,060	1,228	64	707	5,140	1,220	353	454	50	1,871	5,150	44,622
All	537,544	5,925	7,581	9,384	20,220	1,985	158	1,701	9,904	1,700	926	1,162	118	3,141	8,338	72,244

Notes:
(a) Loans and expenses allocated proportionately

APPENDIX N PROJECTED NUMBER OF CLIENTS AND PAYMENTS

Projected numbers and payments are included as an electronic Appendix N.