SWG-05-82

Younger Adults' PSS Formula Spending Share

Adjustments to the Formula Options

Introduction

1. In summer 2004, DH commissioned consultants from SECTA to review the younger adult's PSS FSS formula, and the results of this work were included in the recent consultation. During the period of consultation, two issues have arisen with the proposed new formula options.

2. Firstly, new data on the variable *adults in receipt of disability living allowance (DLA)* have become available. This indicator is used in both options for updating the younger adults' formula. The original formula models used DLA for individuals aged 17 to 59. Data are now available for individuals aged 18 to 64, which matches the age of the client group and is therefore more appropriate. This paper explains how the variable has been updated with the new data, and sets out exemplifications of the effect.

3. Secondly, it was drawn to our attention through the consultation that the constant in both formula models is affected by the use of dummy variables. The constant forms the basic amount in the younger adults FSS allocations. An adjustment to correct this bias was therefore required. The second part of this paper explains the adjustment and sets out exemplifications of the effect.

The Updated Disability Living Allowance Data

4. When the modelling for the younger adults' PSS formula review took place, the data available at ward level for adults in receipt of DLA covered those aged 17 to 59. Subsequently, data for the age group 18 to 64 became available. This corresponds to the age of the client group being modelled. It was decided that it would be preferable to use these new data which cover the correct age group.

5. However, the new data cannot simply be applied to the model with the original coefficient from the formula based on DLA 17 to 59 age group data. The DLA variable with 17 to 59 age group data is closely correlated with 18 to 64 age group data, but there is an average 10% difference between the two.

6. Therefore, the final regressions were re-run for option SSA1, the cost dependent formula, and option SSA2, the numbers dependent formula,

to produce new coefficients based on the DLA data for the 18 to 64 age group. The results are shown at annex A

7. Re-running the formulae with the new data has reduced the coefficient on the DLA variable, as the new DLA variable covers a larger age range, so its average value is larger. The changes to the other coefficients are relatively small. The re-run models using the DLA 18-64 are much better specified, though they have very slightly lower R-squareds.

8. Exemplifications for both revised formula options are provided in Annex 2. This shows the younger adults PSS FSS allocations that would have been made if either revised option had been used in the 2005-06 settlement.

The revision of the constants

9. Consultation options SSA1 and SSA2 are derived from a small area OLS regression model. In the model, Local Authority (LA) level effects are taken account of using dummy variables. However, to carry out this modelling one dummy needs to be omitted. The size of the constant in the resulting equation is dependent on the dummy variable omitted.

10. Because the constant is affected by the omitted dummy, it needs to be adjusted before it can be used to calculate the basic amount in the formula used for allocations. The coefficients on the variables are independent of the choice of omitted dummy variable, so do not require any adjustment.

11. We have adjusted the constant to take this issue into account. The constant in each has been set so that application of each formula to the data predicts the actual level of need, in terms of client costs or numbers, at the national level. This means that the formulae adjust for deprivation levels around the mean value for England, rather than being affected by the choice of omitted dummy variable. Further detail on this methodology is provided in annex 3.

12. Amended constants and the revised basic amount for both SSA1 and SSA2 are shown in the following table.

	SSA1 Costs dep		**SSA2 Numbers dep**	
	Regression Output	Basic Entitlement	Regression Output	Basic Entitlement
Original constant	1070.03	£ 65.22	-0.950	£ 52.98
Amended constant	-318.48	£ 31.79	-1.891	£ 46.20

13. As this table shows, the effect of the adjustment is relatively large for option SSA1 (the cost dependent model) and relatively small for option SSA2 (the numbers dependent model). The effect of the adjustment to the constant on the allocations is shown in annex 4.

Conclusion

14. The new DLA variable covering the exact age range of the client group is a straightforward improvement to both the numbers dependent and costs dependent models. The adjustment to the constant is necessary to correct for the identified problem of the constant being affected by the omitted variable.

The comments of the group are invited.

Annex 1: The revised coefficients using new DLA data

Option SSA1: Cost Dependent CDEPZ2

	With DLA 17-59 Unstandardized Coefficients		Stan. Coef.	t	Sig.	With DLA18-64 Unstandardized Coefficients		Stan. Coef.	t	Sig.
	B	Std. Error	Beta			B	Std. Error	Beta		
Ending Constant	1,045.61	191.17		5.47	.000	1,070.03	192.97		5.545	.000
Adults receiving DLA	45,276.96	2714.08	.563	16.68	.000	39,350.82	2,446.10	.564	16.09	.000
Households without family	1,719.07	590.60	.111	2.91	.004	1,795.91	596.02	.116	3.01	.003
Ethnicity – black	2,197.49	990.53	.115	2.22	.03	2,260.25	999.77	.119	2.26	.024
R SQUARED	0.488					0.478				
RESET TEST	2.273					0.00007				

Option SSA2: Numbers Dependent NDEPZ1 Correct (Weighted)

	With DLA17-59 Unstandardized Coefficients		Stan. Coef.	t	Sig.	With DLA 18-64 Unstandardized Coefficients		Stan. Coef.	t	Sig.
	B	Std. Error	Beta			B	Std. Error	Beta		
Ending Constant	-0.92	0.67		-1.38	0.170	-0.95	0.68		-1.39	0.166
Adults receiving DLA	121.96	11.56	0.41	10.55	0.000	102.38	10.65	0.4	9.61	0.000
Households without family	7.60	1.59	0.13	4.77	0.000	7.83	1.61	0.14	4.87	0.000
In routine occupations	8.70	2.47	0.11	3.53	0.000	9.37	2.54	0.12	3.69	0.000
Never worked or LT unemployed	25.89	5.61	0.15	4.62	0.000	27.7	5.67	0.16	4.88	0.000
R SQUARED	0.749					0.744				
RESET TEST	4.151					0.018				

Annex 3: the methodology used to adjust the constant

As outlined in the main body of the paper, the use of LA dummies within the OLS modelling means that the constant requires adjustment. The results of the adjustment are set out in this paper, and the methodology for carrying out the adjustment is set out in more detail in this annex.

The constant from the modelling is adjusted in the formula used for the allocations so that the formula calculates the different need level in different areas relative to the mean need in England. The constant is adjusted so that, when applying the formula, the total projected number of clients is equal to the actual number of clients, and the total projected cost is equal to the actual total cost (using assumed cost schedule 2 which is set out below).

The method used for option SSA2, the numbers dependent model, is as follows:

1. the number of YA clients in the sample data for 18 councils was grossed up to a national estimate using shares of population aged 18 to 64;
2. the fitted value number of clients for each council was calculated using the YA formula with an initial estimated constant term (ACA not applied at this stage);
3. the fitted value number of clients was summed to produce an England fitted value number of clients and this was compared with the national estimate from step 1;
4. the constant term used in step 2 was adjusted until the national fitted value equalled the national estimate from step 1;
5. the constant estimated in step 4 was used in the formula to produce allocations following the usual methodology.

The method used for option SSA1, the cost dependent model, was very similar. The average cost of care was approximately £240 per client per week for clients in the data set with valid ward/postcodes (using assumed cost option 2). This was multiplied by the number of clients to calculate a total cost of care in the sample. This was then grossed up to a estimate of national total cost as in step 1 above, using shares of 18-64 population, and the rest of the methodology was applied as in the steps above.

Option and service type	**Client group**		
	LD	**PD**	**MH**
Option 2	**unit cost**	**unit cost**	**unit cost**
Nursing	1000	800	500
Residential	1000	800	500
Day care	180	180	180
Home care	140	140	140
Other care/profess support - for people living at home	50	50	50