Public support for older disabled people: evidence from the English Longitudinal Study of Ageing on receipt of disability benefits and social care subsidy

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Abstract

In England, state support for older people with disabilities consists of a national system of non-means tested cash disability benefits, and a locally-administered means-tested system of social care. Evidence on how the combination of the two systems targets those in most need is lacking. We estimate a latent factor structural equation model of disability and receipt of one or both forms of support. The model integrates the measurement of disability and its influence on receipt of state support, allowing for the socio-economic gradient in disability, and adopts income and wealth constructs appropriate to each part of the model.

We find that receipt of each form of support rises as disability increases, with a strong concentration on the most disabled, especially for LA-funded care. The overlap between the two programmes is confined to the most disabled. Less than half of recipients of local authority-funded care also receive a disability benefit; a third of those in the top 10% of the disability distribution receive neither form of support. Despite being non means-tested, disability benefits display a degree of income and wealth targeting, as a consequence of the socio-economic gradient in disability and likely disability benefit claims behaviour. The scope for improving income/wealth targeting of disability benefits by means testing them, as some have suggested, is thus less than might be expected.

Keywords: older people, disability, social care, disability benefits, target efficiency, English Longitudinal Study of Ageing (ELSA). *JEL codes:* H24, I18, I38, C30.

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Policy points:

- Receipt of disability benefits is much higher (14%) than receipt of publicly-funded care (3.3%) in the 65+ household population in England.
- Receipt of each form of support rises as disability rises. Within the 10% of the most disabled older people, the rate of receipt of disability benefits is 53%; 23% receive publicly-funded social care.
- Overall, only about 50% of older recipients of publicly-funded care report receipt of disability benefits. Receipt of both forms of support is confined to the most disabled.
- A third of the 10% of most disabled older people receive neither disability benefits nor publicly-funded social care.
- Disability benefits display a degree of income and wealth targeting without means-testing: people on low income are more likely to be disabled and to claim their entitlement to public support.

Acknowledgement

This paper arises from research funded by the Nuffield Foundation through a study on the Care and Support of Older People Living in the Community (grant OPD/40526) and by the Economic and Social Research Council through the Research Centre on Micro-Social Change (grant no. RES-518-28-5001). We are grateful for this funding and for comments received from the wider research team for the Nuffield-funded study and from participants at various workshops and advisory group meetings associated with the study. Data from ELSA were developed by researchers based at University College London, the Institute for Fiscal Studies and the National Centre for Social Research and are made available through the UK Data Archive. The funders, collectors of the data and the UK Data Archive bear no responsibility for the analyses or interpretations presented here, which rests solely with the authors.

I. Introduction

Increasing proportions of people are reaching the ages where the need for care and support with everyday activities becomes more likely. Worldwide, the number of people aged 85 or over is projected to double over the next two decades (United Nations, 2017). As a consequence many countries must decide how best to use public resources to help people meet the needs associated with impaired functioning. An important issue is whether state support should be focussed on those least able to afford the cost of care via some form of means testing, or whether the need for care alone should determine eligibility for publicly funded support.

There is a large literature on the merits of universalism versus targeting (usually through some form of means testing) in welfare programmes. Much of it concerns their respective poverty/inequality reducing properties (e.g. Creedy, 1996; Lancker and Mechelen, 2015). The advantages of universalism over means testing are usually considered to be weaker adverse labour supply incentives and smaller administrative costs. The main disadvantage of universal systems is usually assumed to be that more of a programme's expenditure is likely to go to those who may not be in economic need (e.g. Besley, 1990).

As described in more detail in Section II, England has a two part system of public support for older people with disabilities: a national system of cash disability benefits which are neither means tested nor taxable, administered by the Department for Work and Pensions; and a means-tested system of publicly subsidised social care administered by local government. It has sometimes been suggested that in comparison with social care, disability benefits are not well targeted (see e.g., Department of Health, 2009; Wanless, 2006) because they are not means tested and hence must be received by people not in economic need. However, in previous work we have shown that patterns of receipt of disability benefits for older people in England mimic to some degree the effect of means testing (Hancock et al., 2015). Descriptive analysis suggests that receipt of disability benefits and of publicly funded social care are both inversely related to (pre-disability benefit) income (Hancock et al., 2016).

There has been relatively little assessment of the targeting of social care in England. A recent study Vlachantoni et al. (2015) used wave 4 (2008) of the English Longitudinal Study of Ageing (ELSA) to examine the socio-economic and

demographic factors associated with receipt of care. It found that the number of activities of daily living (ADLs), instrumental activities of daily living (IADLs) and mobility activities with which respondents had difficulties were the strongest predictors of receiving publicly provided care. Income and wealth were not found to be significantly associated with receipt of publicly provided care, which is surprising given the means test.

There is a considerable policy debate on the English system of support for older people with disabilities. Proposals for reform have included suggestions for closer integration of the two parts of the system and/or means testing of disability benefits (see e.g., Wanless, 2006; Department of Health, 2009; Commission on the Future of Health and Social Care in England, 2014; Department for Communities and Local Government, 2015).

Decisions on potential reforms need to be informed by good evidence on how well the two parts of the current system of support work in combination in terms of reaching those in most need. We are not aware of any research on how the two parts work in combination.

The first aim of this paper is to contribute to the debate on means testing versus universalism, in the context of disability in later life taking the specific example of the two-part English system in which one part (social care) is stringently means tested while the other (cash disability benefits) is not. A second important aim is to address difficulties in the measurement of disability and in the construction of appropriate income measures for use in the assessment of the degree of income targeting. We extend previous research on Attendance Allowance (Hancock et al., 2015), adopting a similar latent variable approach to allow for the noise inherent in self-reported indicators of disability. We exploit new data on social care which were collected in wave 6 (2012) of ELSA, which allow us to expand the analysis to include receipt of publicly and privately funded social care as well as disability benefits. The analysis requires careful construction of income and wealth variables appropriate to each part of the model. Specific definitions of current income and wealth enter the social care means test rule in a particular way, but quite different concepts of income and wealth are relevant to the incidence and severity of disability and the propensity to claim entitlements to public support. Section II describes the systems of state-funded social care and disability benefits for older people operating in England. Section III reviews

methods used in previous research evaluating the targeting of disability benefits and explains our preferred econometric approach. Its implementation is set out in Section IV. Estimation results are presented in Section V and Section VI aids their interpretation through post-estimation analyses. Section VII concludes.

II. Social Care and Disability Benefits for Older People in England

England has a two part system of public support for older people with disabilities: a national system of cash disability benefits administered by the Department for Work and Pensions (DWP); and a local government-administered system of social care. Disability benefits for older people consist of two main benefits: *Attendance Allowance* (AA) which can be claimed from age 65 onwards, and *Disability Living Allowance* (DLA)[1] which must be claimed before reaching 65 but can continue in payment beyond 65. AA and DLA are tax-free and not means tested (although their receipt can trigger additions to means-tested benefits). AA and DLA are intended to contribute towards the extra living costs that disabled people face, such as more expensive transport and the cost of help with daily living activities. AA has two possible weekly rates: currently £57.30 or £85.30 from April 2018, while DLA payments range from £22.65 to £145.35. In May 2017, there were 0.8 million DLA recipients aged 65 and over, and 1.3 million AA recipients in England, comprising respectively 8% and 12% of the 65+ population.[2]

Publicly funded social care in England[3] is organised by Local Authorities (LAs). The system entails both a stringent disability test and a means test. National guidance determines the principles of the means test for people receiving care in their own homes[4] while leaving LAs discretion over some of its details. Even if care needs are assessed as high, there is no entitlement to publicly funded social care if total financial assets are above an upper threshold of at least £23,250 (some LAs use higher thresholds). The local authority will require eligible disabled older

[1]From April 2013 DLA is gradually being replaced by the *Personal Independence Payment* (PIP), which differs from DLA in certain details. Very few over-65s are currently receiving PIPs.

[2]Source: DWP tabulator tool (https://stat-xplore.dwp.gov.uk/; accessed 5 Dec 2017).

[3]Similar arrangements exist in Wales and Scotland but personal care in Scotland is not means tested. In Northern Ireland social care is run by health and social care trusts.

[4]Although ELSA covers some people in care homes, the information collected for them is insufficient to include them in our analysis.

people to meet the costs of their care up to the point where disposable income would fall below 125% of the guaranteed minimum income level, known as the 'Guarantee Credit' (tC), which is embodied in the means-tested benefit system; there will be no entitlement to publicly funded social care if income is above this level plus the cost of care that the LA assesses as required.

The reach of the social care system is much less than that of the disability benefit system. In March 2017, the number of older people in England receiving long-term LA social care in their own homes or in a care home was 400,300—around 4% of the total population in England aged 65+ (Health and Social Care Information Centre, 2017). There are no administrative figures on the overlap between the two forms of support.

III. A coherent approach to measuring disability and targeting of public support

Disability is a difficult concept. There are many different aspects of disability —its physiological/psychological sources, its severity, its intermittent or persistent nature, its incidence in relation to certain activities rather than others. Policy analysts have struggled with this complexity (Altman, 2001; Haveman and Wolfe, 2000), but policy must necessarily impose simplicity by making a distinction between people judged eligible for public support and others who are not.

Given the practical requirements of policy design, there are obvious advantages in using an approach to policy analysis that works with a simple 1-dimensional measure of disability at the individual level. Such a measure cannot be observed directly in household surveys, but must be constructed or inferred from information that surveys are able to provide. General self-reported measures of health status, such as presence of diagnosed medical conditions, are limited indicators of an individual's functional dependence on basic tasks of everyday life (Wiener et al., 1990) that is often the basis for determining eligibility for disability programmes. Disability indices based on difficulties with ADLs (Katz et al., 1963) and IADLs (Lawton and Brody, 1969) are perhaps the most widely used examples.

There is a long history of attempts to evaluate disability benefit targeting in the research literature. One simple approach uses a single-equation framework in which

receipt of disability benefits is regressed on an assortment of disability/health indicators (or a summary scale of them) and other characteristics found to be relevant in influencing benefit receipt. See Banks et al. (2015) and Zantomio (2013) as empirical examples applied to the UK context. An alternative approach uses a two-stage method: principal component analysis (PCA) is first used to construct a disability index as a weighted average of the set of available indicators, with weights chosen so that the index captures as much of the covariation in the indicators as possible. At the second stage, the constructed measure is used for analysis of the policy response to disability and treated as if it were a directly measured variable. The PCA approach has been used in many contexts, for instance by Poterba et al. (2013) to measure general health in relation to wealth after retirement and by Croda et al. (2013) to assess target efficiency of disability programs for working-age people in Europe. It has three main drawbacks: first, the PCA approach does not take into account the different amounts of measurement noise in each self-reported health indicator (Bound et al., 2001). Second, using the derived PCA disability score in a classical econometric (regression) procedure generally leads to biased coefficient estimators (Liu, 1988). Third, the approach does not account for unobserved variability in *true* health (Deaton and Paxson, 2001; Graham, 2009) as well as in individuals' survey reporting (Bago d'Uva et al., 2011).

In our view, a better approach is to work with an explicit statistical model that allows for the coarse and error-prone nature of the survey indicators of disability and also integrates, within a comprehensive statistical framework, the two aspects of disability measurement and outcomes at the individual level of policy on public support for people with disabilities. The main advantage of this unified treatment over simpler two-stage methods is that both the survey indicators of disability and the measures of policy outcome contain information about the underlying disability state, so that it makes fuller use of the available information relating to disability.

Our econometric approach is closely related to that proposed by e.g. Lee (1982) and recently used by Hancock et al. (2015)and Morciano et al. (2015), in considering health status/disability as a latent concept. Suppose we have a representative sample of individuals and let d_i be the unobserved degree of disability for the ith sampled individual. We observe in the survey a set of J binary indicators of the difficulties caused by the individual's health condition(s): $D_{i1}, \ldots D_{iJ}$.

The following *measurement equations* embody the assumption that the observed indicators relate to the underlying disability via a linear function involving statistical "noise" represented by a set of mutually independent random errors $e_{i1}, \ldots e_{iJ}$:

$$D_{ij} = \begin{cases} 1 & if \quad \lambda_{0j} + \lambda_{1j} d_i \quad + e_{ij} > 0 \\ 0 & otherwise \end{cases} \tag{1}$$

and we allow the data to determine the degree of noise, $\sigma_j^2 = var(\varepsilon_{ij})$, in each of the survey indicators, by treating $\sigma^2_1 \ldots \sigma^2_J$ as parameters to be estimated. The coefficients $\lambda_{11}, \ldots \lambda_{1J}$ are the *factor loadings*, which reflect the sensitivity of each indicator as a measure of underlying disability. Although we assume that D_{ij} contains binary self-reported indicators, our framework can be extended easily to continuous and Likert-scale response indicators as well as objective measures of health.

We specify a regression model (the *disability model*) of the relationship between underlying (latent) disability d_i and its socio-economic determinants summarised by a set of covariates $\boldsymbol{W}_i$:

$$d_i = \boldsymbol{W}_i\alpha + u_i \tag{2}$$

where u_i is a $N(0, \sigma^2_d)$ random residual. Subject to arbitrary normalisation conditions (such as $\lambda_{01} = 0; \lambda_{11} = 1$) required to fix the location and scale of latent disability, a disability model comprising only (1) and (2) could be estimated by maximum likelihood. Instead, we estimate them jointly with two further statistical relationships linking receipt of social care and receipt of disability benefit to latent disability, d_i.

We distinguish three care states: $C_i = 0$ indicates no receipt of social care services; $C_i = 1$ indicates receipt of only private care services; and $C_i = 2$ indicates receipt of public care services (with or without additional privately-purchased top-up). Conditional on the disability state d_i and a set of covariates $\boldsymbol{X}_i$, the probabilities of the two types of care receipt are given by a multinomial logit structure:

$$Pr(C_i = k|d_i, \boldsymbol{X}_i) = \frac{e^{\boldsymbol{X}_i\beta_k + \gamma_k d_i + \rho_k V_i}}{1 + e^{\boldsymbol{X}_i\beta_1 + \gamma_1 d_i + \rho_1 V_i} + e^{\boldsymbol{X}_i\beta_2 + \gamma_2 d_i + \rho_2 V_i}}, \quad k = 1, 2. \tag{3}$$

The other form of public support is disability benefit, receipt of which is indicated by the binary variable B_i. Conditional on disability d_i and a further set of covariates $\boldsymbol{Z}_i$, the probability of benefit receipt is specified as a logistic regression:

$$Pr(B_i = 1|d_i, \boldsymbol{Z}_i) = \frac{e^{\boldsymbol{Z}_i\delta + \theta d_i + V_i}}{1 + e^{\boldsymbol{Z}_i\delta + \theta d_i + V_i}}. \tag{4}$$

We allow for residual correlation between equations (3) and (4) by including the latent $N(0, 1)$ variable V_i to represent unobserved factors (such as access to informal support, attitudes to dependency, ability to negotiate the claims process) linking receipt of formal care and disability benefits. Without loss of generality, the coefficient of V_i in (4) is set to unity as an arbitrary normalization to identify the structure. Equations (1- 4) have been estimated simultaneously. Our approach therefore differs from the approach used by Poterba et al. (2010a,b, 2013)and Croda et al. (2013), where a PCA is used to derive a latent index which a) accounts

neither for measurement errors nor for the socio-economic -health gradient; and b) is used as exogenous covariate in a subsequent model of the outcome of interest. From a strict statistical viewpoint, if the model is correctly specified, it is preferable to estimate the measurement equation jointly with the outcome regression, and there is no need to estimate the latent variable separately.

IV. Data and implementation of the statistical model

We use data from wave 6 (May 2012-June 2013) of ELSA. ELSA is a nationally representative survey collecting data on health, disability, financial circumstances and well-being of people aged 50 and over ('core members') and their partners living in private households in England.[5] Fieldwork began in 2002 and sample members have been re-interviewed at two-yearly intervals since then. The original ELSA cohort, interviewed in 2002/3, was drawn from households who responded to the 1998, 1999 and 2001 cross-sectional Health Survey for England (HSE). Refreshment cohorts drawn from later HSEs were added to the original ELSA sample to ensure the study continued to cover the youngest age group and to address attrition at older ages.

Wave 6 of ELSA included new questions on receipt of, and payment for, social care, which were originally developed for use in the HSE (Balarajan et al., 2009; Blake et al., 2010; Curtis and Burns, 2015). They improve on questions in previous ELSA waves, distinguishing more clearly between respondents who receive social care with financial support from a Local Authority and those who rely on care purchased privately. The new questions follow modules on health and disability; questions on receipt of disability benefits appear later still in the questionnaire. The social care and disability benefit questions are thus not vulnerable to the "justification bias" that can arise if questions on receipt of public support for disability precede those on disability (Crossley and Kennedy, 2002). The new data allow us to estimate the gross cost of social care received, which is important in calculating an individuals liability (and ability) to pay for their care.

Like the earlier versions, the new social care questions are asked only of people who report difficulties with ADLs or IADLs. In contrast, receipt of disability

[5]ELSA is the result of collaboration between the University College London, the Institute of Fiscal Studies (IFS), and the National Centre for Social Research (NatCen). The universities of Cambridge, Exeter and East Anglia provided expert advice on specific modules. Many of the health measures adopted in ELSA are comparable with those in the Health and Retirement Survey conducted in the US (Banks and Smith, 2012) and the Survey of Health and Retirement in Europe (Börsch-Supan et al., 2005). See documentation at http://www.elsa-project.ac.uk/ for a fuller description.

benefits is asked of all respondents even if they report no ADL/IADL difficulties. An assumption that people who report no ADL/IADL difficulties do not receive social care might bias our results towards a conclusion that publicly funded social care is better targeted than disability benefits: there would apparently be no 'leakage' of social care spending to those who report no disabilities. However, we analysed the 2011 and 2012 HSEs which included the same social care questions but asked of all sample members aged 65 and over and found that less than 2% of the sample receiving LA-supported care reported no ADL/IADLs difficulties.[6] Moreover, the reach of LA-funded social care observed in ELSA is comparable with administrative figures: of the over-65 non care-home population, about 3.2% received LA-supported care in 2012.

1. Sample selection

Our analysis focus on the 65+ population as programmes for this age group which have been at the centre of policy debate. This age restriction also has the advantage of reducing the potential for endogeneity whereby for working-age adults the availability of disability benefits and publicly-subsidised social care could reduce labour supply and earnings, and hence pre-benefit income. Respondents with missing values for variables included in the analysis were excluded resulting in a total sample size of 5,125 (corresponding to about 97% of the total sample of core members aged 65+ interviewed in wave 6). The ELSA sample is affected by non-response in the HSE, initial refusal to take part in ELSA and cumulative attrition after initial participation in ELSA (Bridges et al., 2015). We therefore apply the ELSA sample weights to mitigate the bias that could result from such non response.

2. Disability measurement equations

The binary disability indicators D_j are derived from questions on mobility, strength and dexterity; and on difficulties with ADLs/IADLs. These questions have been used in previous ELSA-based studies (Banks et al., 2015; Ermisch, 2014; Vlachantoni et al., 2015; Hancock et al., 2015). We also include indicators of the presence of housing adaptations to help meet disability needs and of whether respondents had poor eyesight, hearing problems or any visible physical or mental impairment as assessed by the survey interviewer. Although ELSA includes objective physical and cognitive functioning tests, and a range of biomarkers, we do

[6] In this paper we use ELSA rather than HSE because ELSA offers a larger sample size and collects fuller income information.

not exploit them here to limit potential bias associated with non-random consent to these tests[7]. Table A.1 in the Appendix A provides the full list of 30 indicators used in the measurement equations, together with their means and standard errors.

3. Latent disability equation

In the latent disability equation, the covariates $\boldsymbol{W}_i$ represent all the major influences on later-life disability. As far as possible they should capture circumstances and resources over the life-course that may affect current health including diagnosed health conditions and socio-economic and demographic factors. We include in $\boldsymbol{W}_i$ indicators of diagnosed physical conditions (such as stroke, cancer, lung disease, asthma, arthritis and osteoporosis), chronic cognitive conditions (such as Parkinson, Alzheimer, dementia and other cognitive degenerative disorders) and cardio-vascular diseases (such as heart problems, diabetes, cholesterol, angina and high blood pressure). Diagnosed conditions are included in $\boldsymbol{W}_i$ rather than in D_j as it is generally accepted that chronic conditions are potential causes of functional disability rather than measures of functional disability (Johnson and Wolinsky, 1993; Verbrugge and Jette, 1994).

Early-life living standards and parental socio-economic status are known to influence individuals accumulation of advantage or disadvantage in socio-economic status and health (Currie, 2009). We therefore include in $\boldsymbol{W}_i$ indicators of the respondent's father's economic status when the respondent was 14 years old: whether he worked in casual jobs; was economically inactive, unemployed or prevented from working by disability; and if economically active whether or not he was in a managerial, professional or technical job or running his own business. $\boldsymbol{W}_i$ also includes the respondent's age on leaving education and a dummy variable indicating whether receiving or expecting to receive either an employer pension or a personal/private pension.

The income and wealth variables included in $\boldsymbol{W}_i$ are specified to capture lifetime economic resources. Wealth includes financial, net primary housing and

[7]Physical examination and performance data (e.g. walking speed and tests on cognitive function) are affected by relevant and non-ignorable item non-response. About 15% of our sample did not complete the first and the second walking tests. The reach of disability benefits (B) and LA-supported care (C_2) was higher among those who did not undertake the test (B = 32.4%; C_2 = 12.5%) than among performers (B = 9.2%; C_2 = 0.1%). Cognitive tests were impaired/not performed for about 15.6% of our sample, with the receipt of B and C_2 higher among those who did not perform the tests. Similar patters occurred in the comparison of those who did and did not participate in the nurse visit.

physical (other properties, businesses and other physical assets) wealth. Income comprises income from pensions and investments (interests, rent, dividends, private pensions, annuities) and earnings, net of income taxes and housing costs. Disability-related benefits (whose receipt is clearly determined by disability rather than being an influence on disability) and means-tested benefits (where entitlement depends on other current income and wealth) are excluded. Income and wealth variables totalled for the household and then ascribed to each household member, are expressed per capitain constant 2015 prices. Additional personal characte- ristics included in $\boldsymbol{W}_i$ are age, gender and current partnership status (married or cohabiting versus single).

4. Receipt of care and disability benefit equations

We identify disability benefit recipients as respondents who reported receiving either AA or DLA. Recipients of LA-funded care are defined as those who reported that a LA contributed towards the cost of their social care and the estimated gross cost of their social care was greater than the contribution that was made by the individual or family towards the cost. Appendix B details how we estimate the gross cost of social care received by respondents and the contribution to its cost made by a LA.

Receipt of public social care and disability benefits is determined partly by claim behaviour and partly by eligibility rules and their administration. Eligible individuals may fail to claim because, for example, they think a claim would be unsuccessful, there are costs associated with claiming, they lack the skills to navigate the claim system or they fear stigmatization. Although these factors are not observable directly, there are variables known to be associated with claim behaviour which can be included in $\boldsymbol{X}_i$ and $\boldsymbol{Z}_i$ in the semi-reduced form equations (3) and (4). Following previous relevant work (Zantomio, 2013; Hernandez and Pudney, 2007; Pudney et al., 2006) we include, as likely influences on claim behaviour, age, gender, current partnership status (married or cohabiting versus single), age left education and whether the respondent is a social renter. The last of these is intended in part to capture contact with the welfare system which may increase propensity to claim entitlements to social care or disability benefits.

In addition to the means test, income also influences individual decisions to apply to Local Authorities for social care, since the ability to self-finance is strongly related to current income. We construct the vector $\boldsymbol{X}$ in a way that approximates the effect of the means test super-imposed on claim behaviour. Therefore, in addition to socio-demographic variables listed above, the vector $\boldsymbol{X}$ contains indicators of whether the respondent meets each of the income and assets components of the means test and if not, how far their income or assets are above the

corresponding threshold. An individual is calculated to meet the income test if $Y - c \leq 1.25ttC$, with Y representing assessable income and c an estimate of the gross cost of care received. Assessable income differs from the measure of income included in $\boldsymbol{W}$ because it includes disability-related and means-tested benefits. The test on financial assets (F) is based on whether the net per-capita amount of financial assets reported by the respondent and any partner falls below £23,250.[8]

Where respondents had income or assets above the relevant thresholds, we computed measures of the distances from these thresholds as follows:

$$\begin{array}{lll} \textit{Income:} & (Y - c - 1.25ttC)/(c + 1.25ttC) & \text{if } Y - c > 1.25ttC \text{ ; 0 otherwise} \\ \textit{Assets:} & (F - 23{,}250)/23{,}250 & \text{if } F > 23{,}250\text{ ; 0 otherwise.} \end{array} \quad (5)$$

Further details of the construction of these measures and the gross cost of care, c, are included in Appendix B. Locally weighted regressions of the probability of receiving LA-subsidised care by the degree to which respondent appears to be beyond the means test thresholds are given in Appendix Figures B.1 and B.2. They suggest that we are able to simulate the income test quite well (the empirical rate of LA-funded care receipt is virtually zero above the threshold), but the asset test is harder to simulate accurately. This could be due to measurement problems with self-reported measures of wealth. But LAs have some discretion in implementing national guidance on the means test, and it is possible that they make more use of that discretion in the assets test than in the income test.

The absence of a means test for disability benefits implies that in equation (4) income influences benefit receipt primarily through the incentive to claim, and the income effect therefore operates in a smoother way than for receipt of LA-funded social care. Construction of the covariate vector $\boldsymbol{Z}_i$ reflects this, with pre-disability benefit income (net of income taxes and housing costs) and financial wealth entered as continuous variables.

Rates of receipt of public support and mean values for elements of $\boldsymbol{W}_i$, $\boldsymbol{X}_i$ and $\boldsymbol{Z}_i$ are given in Appendix Table A.2.-

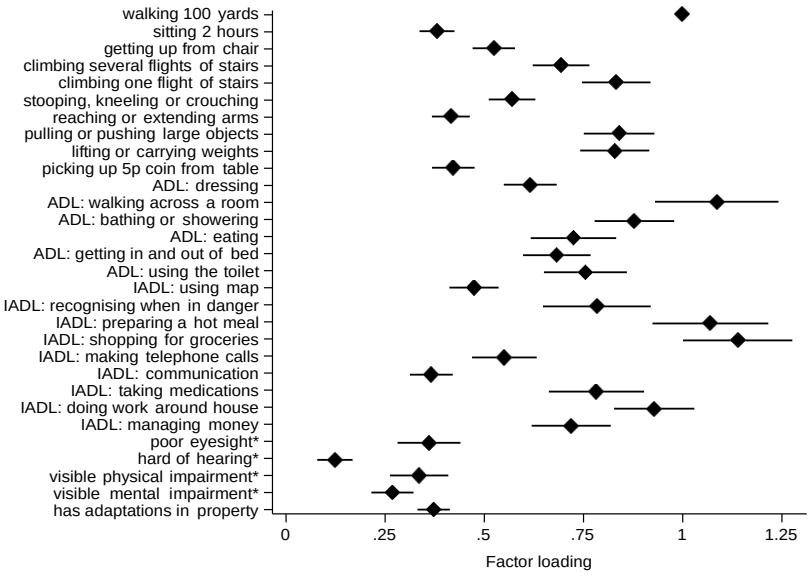
[8]In practice the income test can be more complicated in the case of couples with LAs having some discretion over how couples are assessed. Appendix B presents some sensitivity analysis of the form of assessment for couples but the effects on the main econometric results presented in Section V were found to be negligible.

V. Estimation results

Factor loading estimates for equations (1) are plotted in Figure 1 with their 95% confidence intervals. They represent the effect of latent disability on each disability indicator. All factor loadings have the expected positive sign, meaning that higher underlying disability generates more reported difficulties with mobility, strength and dexterity, limitations in (I)ADLs and so on. They are also all statistically significant at the 1% level, most of them very strongly. The factor loading for the self-reported disability indicators are generally larger than those for the interviewer reported measures. The largest factor loadings are for activities requiring mobility/strength, bathing, preparing hot meals and shopping.

FIGURE 1

Factor loadings and 95% CIs of the measurement model for latent disability



Notes: the factor loading associated with "*walking 100 yards*" is constrained to be one to normalise the scale of the continuous latent variable. Constraining alternative factor loadings yielded virtually identical results. (*) indicator constructed using the interviewer's report (see text for details).

Structural parameters for the latent disability equation (equation 2) are reported in the first column of Table 1. The presence of a degenerative cognitive condition such as Parkinson, Alzheimer and dementia increases the latent disability index (d) by 3.01 standard deviation units whereas the presence of physical conditions such as stroke, cancer, lung disease, asthma, arthritis/osteoporosis produces an estimated increase of the latent index of about 1.04. Suffering from cardiovascular diseases produces an increase of 0.61 standard deviation units in d.

Latent disability increases significantly with age and it is higher for single people than for those who are married or cohabiting. It is also higher for women than men. The estimated effects on disability of early-life living standards as measured by father's socio-economic status, own education, home-ownership, membership of private pension plans, income and financial wealth all contribute to a consistent picture of a socio-economic gradient in disability.

The second and third columns of Table 1 show estimates of the effects of covariates on the log odds of receipt of privately funded care (column 2) and LA-funded care (column 3) as opposed to non-receipt of care. Disability level, age, education and satisfying the income component of the means test all exert positive influences on being a care recipient. The effects of disability and satisfying the income test are both larger for receipt of LA-funded care than for receipt of only privately-funded care whereas the effects of age and education are smaller for LA-funded care. Living with a partner reduces the odds of receiving care rather than no care but more so for LA-funded care than for privately-funded care. Having assets above the means test threshold reduces the odds of being in receipt of either form of care but the coefficient estimate is statistically significant for only privately-funded care. The extent to which assets exceed the means test threshold does not have a statistically significant effect on receipt of privately paid-for or LA-funded care. We found no significant gender or housing tenure effects at conventional levels of statistical significance.

Estimates of the parameters of equation (4) for receipt of disability benefits, are reported in the final column of Table 1. Latent disability has a dominant positive effect on receipt of disability benefits, as we would expect. But other coefficients suggest the existence of further important determinants. Income and wealth both have significant negative effects on benefit receipt despite the absence of means-testing and we interpret this as evidence of strong economic incentive effects on the propensity to claim benefit. The strong positive coefficient for being a social renter is a common finding in studies of take-up behaviour and we have previously argued that this is likely to be related to access to advisory and support services that many social landlords offer. The negative impact of education and female gender are also typical findings, although the explanation for them is less

clear. In contrast to receipt of care, neither age nor cohabitation is significantly associated with receipt of disability benefits.

We find evidence of positive correlation between receipt of care services and disability benefits. The estimated cross-equation coefficients ρ_1 and ρ_2 are highly significant for both categories of care, suggesting there are indeed unobservable factors influencing receipt of both types of support. The correlation between disability benefit receipt and privately purchased care is slightly higher than the correlation between disability benefits and LA-funded care.

TABLE 1

Structural parameters of the latent disability equation and for receipt of social care and disability benefits (AA/DLA)

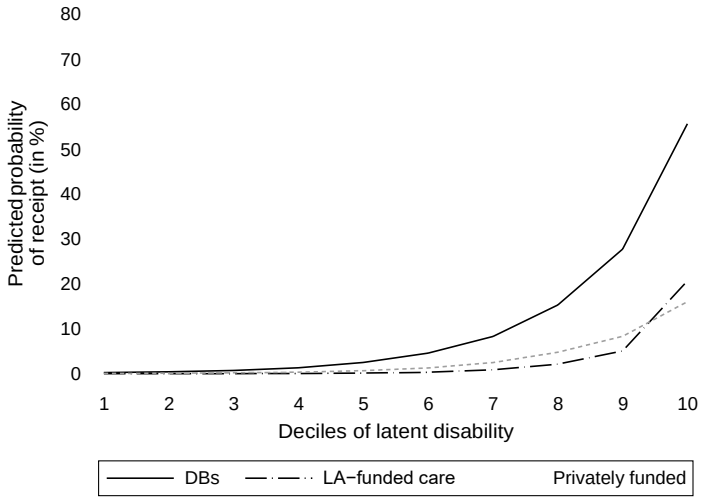
	Latent disability	Receipt of care		Receipt of disability benefits
		private payers	LA supported	
Latent disability index		0.494***	0.726***	0.543***
Diagnosed cognitive conditions (1=yes,0=no)	3.007***			
Diagnosed physical conditions (1=yes,0=no)	1.039***			
Diagnosed cardio-vascular diseases (1=yes,0=no)	0.613***			
Age in years	0.143***	0.114***	0.076***	-0.012
Married or cohabiting	-0.456***	-1.297***	-1.530***	-0.081
Female	0.858***	0.304	0.011	-0.378***
Age left education (in years)	-0.194***	0.266***	0.234***	-0.090**
Main father's job when respondent aged 14 (1=yes,0=no):				
casual jobs, retired, unemployed, sick/disabled	0.483**			
manager or senior official, self-employer	-0.053			
Rights in private/employer pension scheme(s)	-0.481***			
Home owner (1=yes,0=no)	-1.257***			
Social renter (1=yes,0=no)		-0.152	0.168	0.672***
Per capita net wealth (£'00,000)	-0.094***			
Per capita original income (£'000)	-0.114**			
Income test met (1=yes,0=no)		0.528**	1.294***	
Proportional distance above income test threshold		-0.285	-1.042**	
Assets above the means test threshold (1=yes,0=no)		-0.412*	-0.299	
Proportional distance above asset means test threshold		0.022	-0.141	
Per-capita net pre-disability income (£'000)				-0.263**
Per-capita net financial wealth (£'00,000)				-0.429***
Constant		-18.158***	-18.643***	-6.449***
Variance σ_d^2	10.358***			
Covariance parameter ρ_j		0.969***	0.882***	1

Notes: Observations: 5,125. *Significance level:* *** = 1%, ** = 5%, * = 10%.
Goodness of fit statistics: Log-likelihood: -37495.99; Degree of freedom: 106; AIC: 75203.99; BIC: 75897.43.

To aid interpretation of the estimated equations for receipt of care and benefits, Figures 2 and 3 plot how the average predicted probabilities of receipt of disability benefits and care vary according to predicted disability ($\grave{d}$) and original income (measured before disability and means-tested benefits) respectively. For this purpose, we group sample members into deciles of predicted latent disability[9] and of income. Figure 2 illustrates three main points. Firstly, predicted receipt of all forms of support is negligible in the lowest 30-40% of the distribution of estimated disability but rises thereafter. Secondly, from the 30th to 40th percentiles of disability, predicted receipt of disability benefits starts to rise and increasingly exceeds predicted receipt of either publicly funded or privately purchased care. Thirdly, predicted receipt of privately purchased care is higher than receipt of LA-funded care until somewhere between the 9th and 10th decile so that it is only at the very highest disability levels that more people receive LA-funded care than purchase care exclusively privately. There is thus a very strong concentration of publicly funded care on those with the highest levels of disability.

FIGURE 2

Average predicted probabilities of care and disability benefit receipt by decile of latent disability



[9]For comparison, the median number of mobility difficulties and ADL limitations reported in the lowest 30% of $\grave{d}$ is 0. In the 4th and 5th deciles of $\hat{d}$, the median number of mobility difficulties reported rise to one; to 2 (5) in the 6th (8th) decile. In the 10th decile of $\grave{d}$, the median number of mobility difficulties reported is 8 (over 10) whereas the median number of ADL limitation reported is 3 (over 6).

As we would expect given the means test, predicted receipt of LA-funded care falls with income (Figure 3). A very striking feature of Figure 3 is the sharp fall in the average predicted probability of receiving disability benefits as income rises, despite the fact that disability benefits are not means-tested. Also of note is the fall in predicted probability of purchasing care privately as income rises. Underlying both of these observations is the (negative) socio-economic gradient of disability which is captured in the structural equations approach. In the case of privately purchased care, the restriction of LA-funded care to those who not only have low means but also have high disability is likely to result in people with lower but still substantial levels of disability having to purchase care themselves. Given the socio-economic gradient of disability, they will typically have lower incomes and assets than those with no or low levels of disability.

In summary, we found evidence of considerable targeting, by disability and income, of each of the two systems of public support for older people with disabilities. Our estimates predict that at all levels of disability and income, the probability of receipt of disability benefits is higher than that for LA-funded care. However, the rate at which that probability falls as income rises appears to be higher for disability benefits than for LA-funded care, despite the stringent means test for the latter and no means test for the former.

FIGURE 3

Average predicted probabilities of care and disability benefit receipt by decile of income

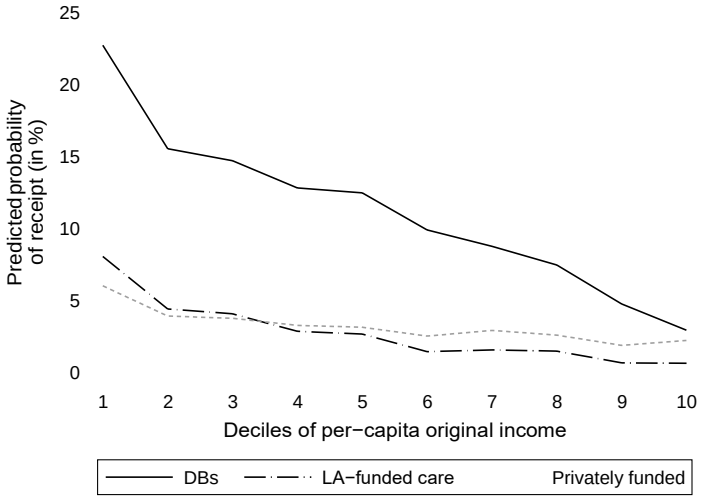
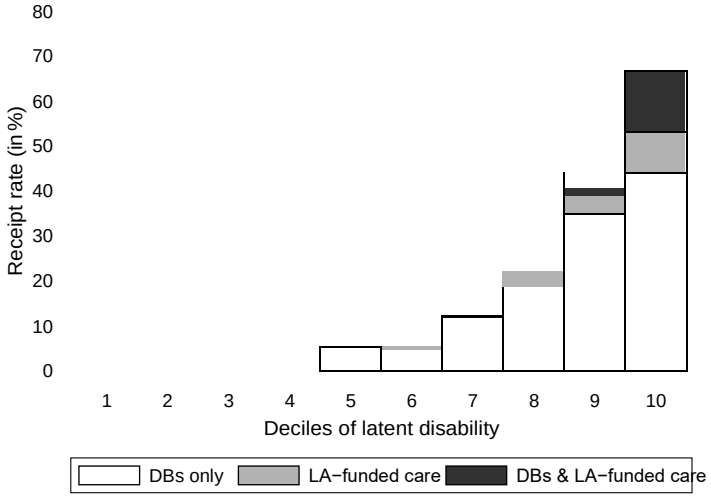


FIGURE 4
Observed rates of receipt of cash-disability benefits, LA-funded care and both by decile of latent disability



VI. Interpretation of results

In this section we extend our use of the predicted disability levels and receipt of support to shed more light on the workings of the dual system of support for older people with disabilities.

Using the predicted disability level, *d*, we can see that the observed rates of both care and disability benefits are zero below the 4^{th} decile of disability (Figure 4). Sample members start to receive disability benefits at the 4^{th} decile of disability where receipt is about 3.5%. No sample members report receipt of LA-funded care below the median level of disability and at the median level just 0.4% are recipients. Receipt of LA-funded care rises to about 3.2% at the 8^{th} decile of predicted disability. At that point the observed rate of disability benefits is much higher at about 19%.

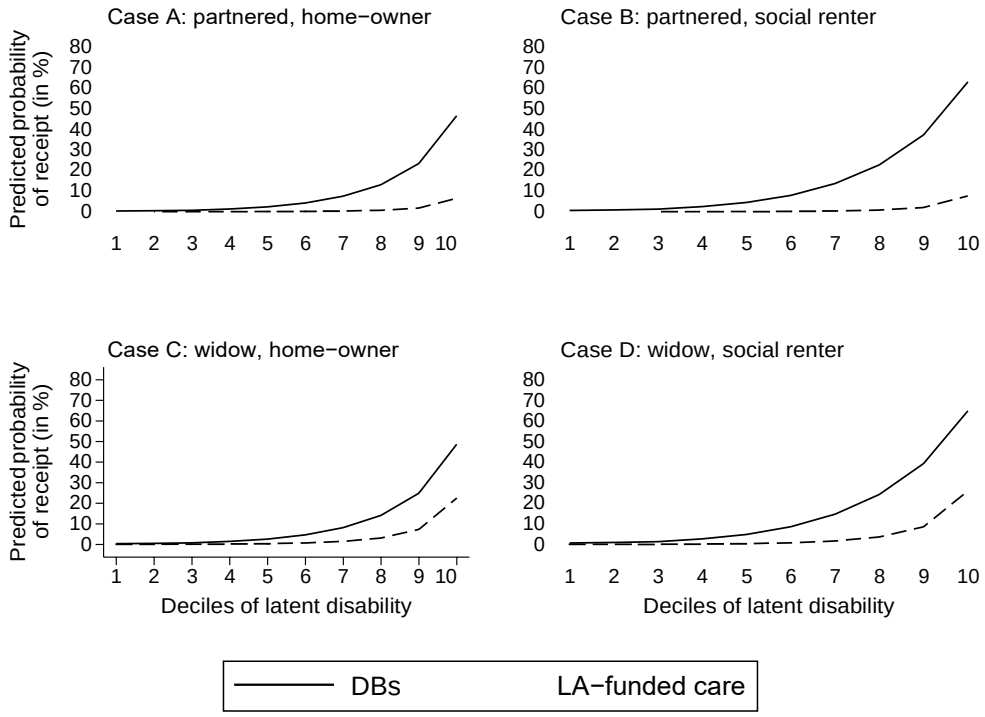
Each programme seems well targeted towards more disabled older people. Rates of receipt of each rise significantly in the top 20% of disability. Within the 10% of the most disabled individuals, the rate of receipt of disability benefits is 53% and 23% receive LA-funded care.

Given the stringent disability and means tests that apply to publicly funded social care, and the much higher overall rate of receipt of disability benefits, it is

not surprising that relatively few recipients of disability benefits (around 11%) also receive publicly funded care. A more surprising finding is that the proportion of recipients of publicly funded care who also receive disability benefits is under one half (49%). Even among the 10% of most disabled people, only 60% of the 23% who receive publicly funded social care also receive disability benefits. Moreover some 33% of older people in the top 10% of disability receive neither form of support.

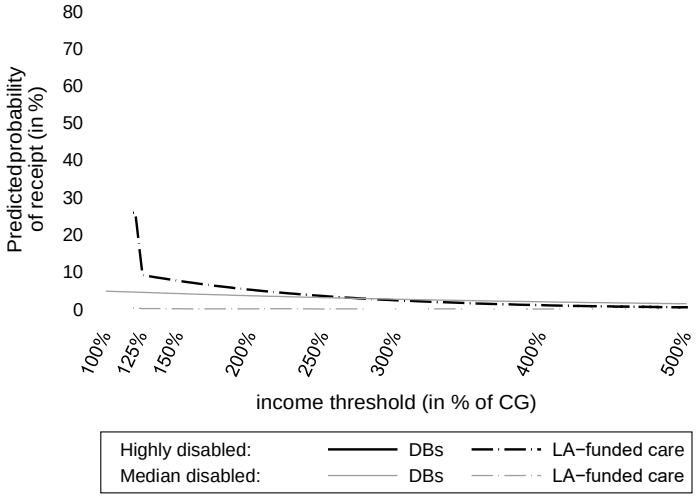
In Figure 5, we compare the implications of the estimated models, for four illustrative individuals aged 73 (the median age observed in the sample), for a spectrum of disability levels that correspond to the median values of $\grave{d}$ observed in each decile. Each of the individuals has left school at 14 which was the minimum school leaving age allowed at the time, with income and financial asset set at 125% of the GC level and at the upper capital threshold respectively. Two of the cases are women living with their partners. One is a homeowner (*case A*) and one is a social renter (*case B*). The two other cases are widows living alone: a homeowner (*case C*) and a social renter (*case D*). A number of points emerge from these comparisons. First, other things equal, being a social renter increases the predicted probability of receiving disability benefits but has little effect on the probability of receiving LA-funded care. On the other hand, living alone has virtually no effect on the predicted probability of receiving disability benefits but does increase the probability of receiving LA-funded support.

FIGURE 5
Predicted probabilities of cash-disability benefits and LA-funded care by level of disability for two benchmark cases



In Figure 6, we examine how the estimated probability of receiving support varies by income level for a widow who is a social renter (*case D* above), with either a high or a median level of disability, corresponding to the median values of $\grave{d}$ observed in the 10^{th} and 5^{th} deciles of its distribution. Below 125% of GC, the predicted rates of receipt when disability is high is about 26% for LA-funded care and approximately two-thirds for disability benefits. Because of the means-test, the predicted probability of receiving LA-funded care drops sharply after the 125% of GC threshold to close to zero. Despite the absence of a means test for disability benefits, their predicted rate of receipt also declines as income rises. The strict disability test for publicly funded care means that predicted receipt is virtually zero at all levels of income when disability at the median level. Predicted rates of disability benefit receipt are much lower than for the high disability case but still fall slightly as income rises.

FIGURE 6
Predicted probabilities of cash-disability benefits and LA-funded care by income for a 73-year old social renter widow



VII. Conclusions

Much of the previous literature on the design of disability programmes considers working-age adults, where labour market attachment is a primary concern (Burkhauser et al., 2014; Bound and Burkhauser, 1999, see e.g.) and is the focus of policy reforms. Instead, our interest here is in older people, typically well beyond retirement age, and in programmes that address care needs and the personal costs of disability, rather than act as earnings replacement.

This paper is motivated by the considerable policy debate on the respective roles of the English cash disability benefit and social care systems in providing help for older people with care needs, with various suggestions for integrating the two systems. In November 2017, the UK Government announced that it plans to consult on proposals to reform care and support for older people via a Green paper to be published in Summer 2018[10].This is the most recent in a long line of attempts to identify reform options for the English system of sup- port for older people with care needs (Joseph Rowntree Foundation, 1996; Royal Commission on Long Term Care of the Elderly, 1999; Wanless, 2006; Department

[10]https://www.gov.uk/government/news/government-to-set-out-proposals-to-reform-care-and-support

of Health, 2009; Commission on Funding Care and Support, 2011; Commission on the Future of Health and Social Care in England, 2014). Any proposals for reform of the systems need to draw on good evidence on how well the current systems, taken together, are targeted on those in most need. In this paper, we have therefore investigated the targeting properties of the English two-part system of support for older people with disabilities. We have extended pre- vious research in four ways. First, we consider both parts of the system in contrast to previous research looking only at disability benefits (Hancock et al., 2015; Zan- tomio, 2013) or only social care receipt (Vlachantoni et al., 2015). Secondly, our statistical approach integrates the measurement of disability and its influence on receipt of each type of state support in a single framework, allowing for the socio-economic gradient in disability, whereas previous literature has used simple discrete indicators of di- sability and single equation frameworks. Thirdly, we have adopted definitions of income and wealth appropriate to each part of the statistical model. This may explain why we find significant income and wealth influences on receipt of publicly subsidised social care where Vlachantoni et al. (2015) found none. Finally, we have also been able to exploit newly available data on social care collected in wave 6 (2012) of ELSA which enables us to distinguish better between those who receive publicly subsidised care and those who pay the full cost of care.

We find that receipt of each of disability benefits and LA-funded care rises as disability increases (a finding consistent with previous research), with a strong concentration on those with the highest levels of disability, more so for LA-funded care than for disability benefits. The overlap between the two programmes occurs entirely among the most disabled population. It is striking that less than half of recipients of local authority-funded care also receive a disability benefit, while amongst those in the top 10% of the disability distribution, a third receive neither form of support. As we would expect given the means test, receipt of LA-funded care falls as income rises. As we have found in previous research using different data (Hancock et al., 2015), there is also considerable income and wealth targeting of disability benefits, even though they are not means tested. This is explained partly by the socio-economic gradient in disability but is also likely to reflect claim behaviour. The scope for improving income/wealth targeting of disability benefits by means testing them, as some have suggested, is thus less than might be expected.

Under a two part system, the chance of a disabled person being awarded at least some support is likely to be greater than under a single system given the need to make a claim and the inevitable judgements involved by system administrators in

disability assessment. The limited overlap in receipt of the two forms of support suggests that combining them into a single system risks increasing the already substantial proportion of the most disabled older people who receive neither form of support.

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Appendix A. Descriptive Statistics

TABLE A.1
Means and standard errors (s.e.) for the binary indicators of disability (1=has difficulty, 0=does not have difficulty)

	mean	s.e.
Mobility: difficulty walking 100 yards	20.31%	0.402
Mobility: difficulty sitting 2 hours	14.48%	0.352
Mobility: difficulty getting up from chair after sitting long periods	30.32%	0.460
Mobility: difficulty climbing several flights stairs without resting	43.56%	0.496
Mobility: difficulty climbing one flight stairs without resting	22.39%	0.417
Mobility: difficulty stooping, kneeling or crouching	46.50%	0.499
Mobility: difficulty reaching or extending arms above shoulder level	14.42%	0.351
Mobility: difficulty pulling or pushing large objects	24.12%	0.428
Mobility: difficulty lifting or carrying weights over 10 pounds	30.97%	0.462
Mobility: difficulty picking up 5p coin from table	8.07%	0.272
ADL: difficulty dressing, including putting on shoes and socks	16.42%	0.370
ADL: difficulty walking across a room	5.19%	0.222
ADL: difficulty bathing or showering	13.24%	0.339
ADL: difficulty eating, such as cutting up food	3.29%	0.178
ADL: difficulty getting in and out of bed	6.99%	0.255
ADL: difficulty using the toilet, including getting up or down	4.28%	0.202
IADL: difficulty using map to figure out how to get around strange place	6.73%	0.251
IADL: recognising when in physical danger (wave 4 onwards)	2.04%	0.141
IADL: difficulty preparing a hot meal	6.94%	0.254
IADL: difficulty shopping for groceries	13.86%	0.346
IADL: difficulty making telephone calls	3.55%	0.185
IADL: difficulty with communication (wave 4 onwards)	5.42%	0.226
IADL: difficulty taking medications	3.19%	0.176
IADL: difficulty doing work around house and garden	20.64%	0.405
IADL: difficulty managing money, e.g. paying bills, keeping track expenses	5.00%	0.218
Blind or poor eyesight*	1.67%	0.128
Deaf or hard of hearing*	3.82%	0.192
Has physical impairment/illness*	1.64%	0.127
Has mental impairment, lost concentration, very nervous or anxious*	3.36%	0.180
Has adaptations in property	23.28%	0.423
Observations	5,125	

*Notes:** indicator constructed using the interviewer's report.

TABLE A.2

Means and standard errors (s.e.) for covariates used in the equations for latent disability, receipt of care and receipt of disability benefits.

	mean	s.e.
Diagnosed cardio-vascular diseases	17.17%	0.377
Diagnosed physical conditions	12.05%	0.326
Diagnosed cognitive conditions	3.17%	0.175
Age	74.5	7.284
Cohabitation	61.66%	0.486
Women	54.58%	0.498
Age left education:		
14 or under/never	19.73%	0.398
15 years old	37.38%	0.484
16 years old	18.21%	0.386
17 years old	7.33%	0.261
18 years old	5.40%	0.226
19 years old or over	11.95%	0.324
Whether home owner	80.85%	0.393
Whether is a social renter (LA or H. Ass)	14.55%	0.353
Main father's job[a]: casual jobs, retired, unemployed, sick/disabled	5.11%	0.220
Main father's job[a]: manager or senior official, self-employer	23.32%	0.423
Receiving/contributing/retained rights in a private/occupational pension(s)	67.96%	0.467
Per capita net wealth (£'00,000)	2.039	3.419
Per capita net financial wealth (£'00,000)	0.371	0.520
Per capita original (pre-disability and means-test benefits) income (£'000 pm)	1.059	1.589
Per capita (pre-disability benefits) income (£'000 pm)	1.024	0.623
Income test met	37.48%	0.484
Income ability to self-finance[b][c]	0.850	2.463
Assets above the means test met threshold 59.39% 0.491		
Wealth ability to self-finance[b][c]	4.029	11.071
Social Care received:		
Do not receive care	92.75%	0.259
Private-funded	4.02%	0.196
LA-supported	3.23%	0.177
In receipt of cash disability benefits (AA/DLA)	13.92%	0.346
Observations	5,125	

Notes: [a]: when respondent aged 14.
[b]: Measured as proportionate distance above the means test.
[c]: Sample mean and s.e. has been computed here only among members that do not meet the eligibility criteria.
the eligibility criteria.

Appendix B. Simulating the means test for publicly funded social care

In the main text we describe the construction of covariates used in the receipt of care equations designed to capture the effects of the income and asset tests which determine whether someone is eligible for publicly funded social care. This requires us to estimate the gross cost of the care received by individuals in the sample. In this appendix we describe how this cost is estimated and also present some sensitivity analysis for the case of couples where Local Authorities have some discretion over how they treat joint/shared income.

1. Estimating the gross cost of care and any Local Authority contribution to it

Each of five possible sources of social care were assigned an hourly cost in 2012 prices, based on data from Curtis (2013). The five sources were home care, reablement, warden, cleaner, handyman. These were sources mentioned by respondents as providing help with ADL/IADL tasks. For each type of care, respondents were asked how many hours of care they received each week. If they were not able to give an exact number of hours they were asked first to say in which of nine bands of hours, the hours of care they received fell. If they could not select from these nine bands they were then offered three bands to select from. Where respondents could not give an exact number of hours of care, they were assigned the mid-point of the band they selected. This number was then multiplied by the appropriate hourly rate and aggregated across types of care to provide an estimate of the gross cost of care received by each respondent.

Respondents were asked a series of questions which enabled us to *(i)* identify whether a Local Authority contributed to the cost of any care they received and *(ii)* to estimate the total payment that respondents or their families made towards the cost of their care.

Where the Local Authority was identified as contributing to the cost, its contribution was taken as the excess, if any, of the gross cost of care over what the recipient (or family) paid towards their care. Recipients of LA-funded care were then deemed to be those for whom the LA contribution to the gross cost of care was strictly positive.

2. Sensitivity analysis for the treatment of couples in the means tests for social care

National guidance encourages LAs to take into account only the disabled persons income and not those of any partner. However, they must adjust the assessment where a partner is financially dependent on the person who is being assessed (Department of Health, 2013).

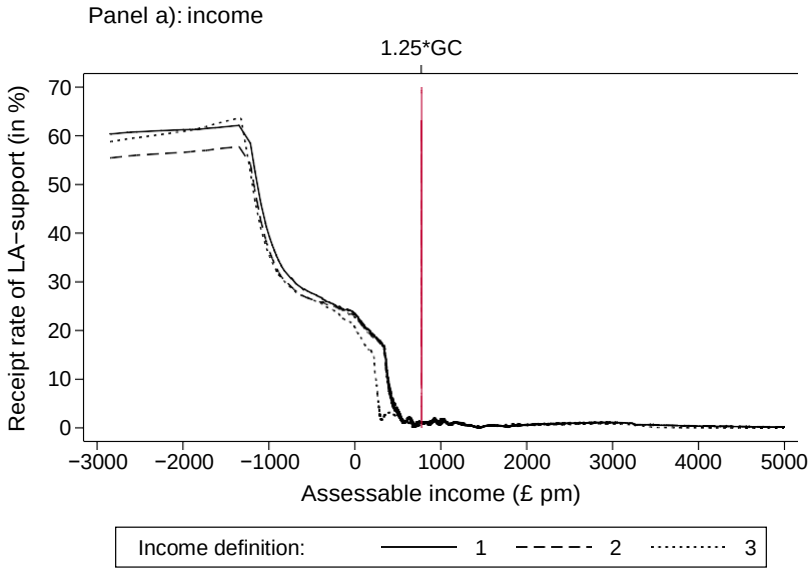
Let c be the gross value of care received and Y_{LA} be the income the LA compares with the means test threshold of 125% of the Guarantee Credit level. In the case of a single person $Y_{LA} = (Y - c)$ where Y is the individual's disposable (after tax and housing costs). For a partnered person the question is whether and how the income of the partner (Y^p) and the cost of any care s(he) receives (c^p) is taken into account. We allow for three possibilities:

1. LAs assess on the basis of half the total disposable income of the individual and partner less the individuals care costs: $Y_{LA} = \frac{Y + Y^p}{2} - c$.
2. LAs compute the total income less the total care costs and assess on the basis of half the result: $Y_{LA} = \frac{(Y + Y^p) - (c + c^p)}{2}$.
3. LAs assess eligibility by using the lesser of individual disposable income less care costs and the result at 2) above: $Y_{LA} = min(Y - c, \frac{(Y + Y^p) - (c + c^p)}{2})$. In other words the income assessment is the most favourable from the point of view of the individual. This is the income definition used in equation 5 of the paper.

Figure B.1 graphs the locally weighted regressions of the probability of receiving LA-subsidised care on the three definitions of income as observed in the ELSA sample. The vertical line in the graph indicates the value of the single person's GC level plus 25%. Receipt of LA-funded care is virtually zero above this threshold on any of the definitions of assessable income. Below the threshold, receipt varies only a little according to the definition used. This suggests that we are able to capture the income component of the means test quite well and that varying the income definition used in constructing the corresponding covariates as defined in equation (5) in the receipt of care model would be unlikely to have much effect on the estimated coefficients.

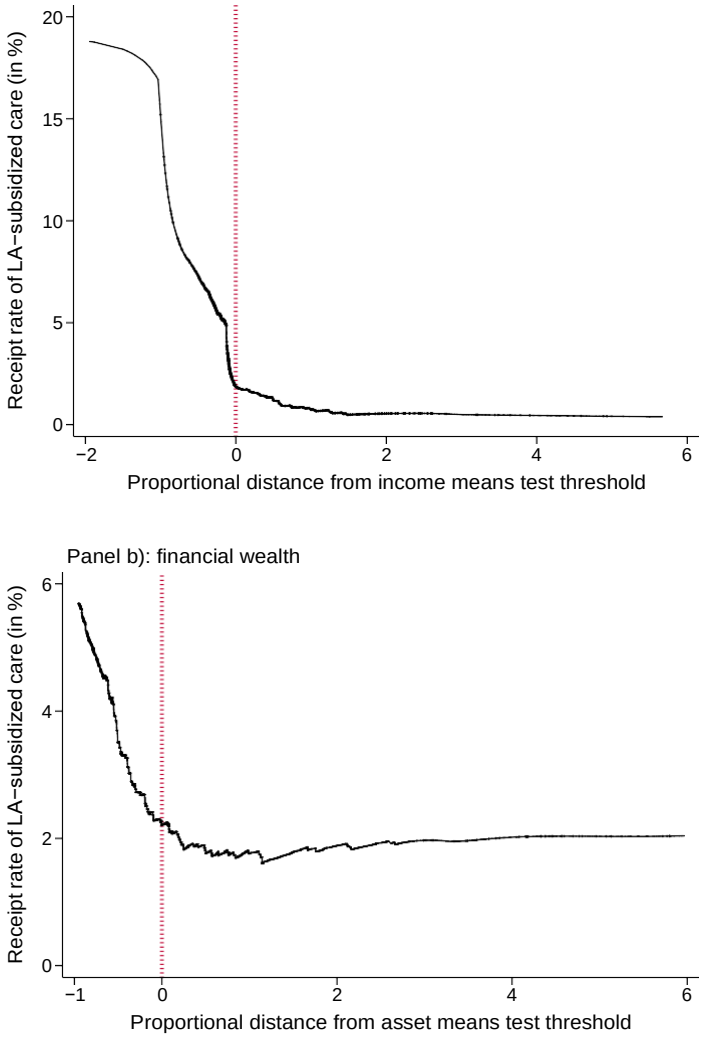
Figure B.2 graphs the locally weighted regressions of the probability of receiving LA-subsidised care on the individuals' ability to self-finance in terms of distance from the income threshold (Y_{LA} determined using option 3 above) and asset threshold. As one would expect, the dispersion on the financial dimension is far higher that the dispersion in income.

FIGURE B.1
Simulating means-test of LA-funded care



Notes: bandwidth=0.1. Sample size: 5,125.

FIGURE B.2
Receipt of publicly funded care by distance from the means test thresholds



Notes: bandwidth=0.1. Sample size: 5,125.