Do Self-Insurance and Disability Insurance Prevent Consumption Loss on Disability?

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June 2009

Abstract

In this paper we show the extent to which public insurance and self-insurance mitigate the cost of health shocks that limit the ability to work. We use consumption data from the UK to estimate the insurance provided by the government disability programme and account for the effectiveness of alternative self-insurance mechanisms. Individuals with a work-limiting health condition, but in receipt of disability insurance, have 7% lower consumption than those without such a condition. Self-insurance through savings and a working partner each provide some insurance benefit, improving outcomes from 2% to 4%. Reductions in the generosity of incapacity benefit after 1995 are associated with increases in the consumption loss associated with disability.

Keywords: disability insurance, living standards, consumption, liquidity constraints

JEL Classification: D91, J14, H53

1 Introduction

There is now significant evidence of the growth in claimants of disability benefits since the mid-1980s in the UK, and convincing evidence that, although these benefits have become less generous over time, they have nonetheless become increasingly generous relative to other public insurance programmes. The financial cost of incapacity benefit is now almost three times the cost of providing government unemployment insurance, and for the last decade the number of registered disabled has far exceeded the unemployed (DWP, 2007b). Despite this, there has been little attempt to measure the welfare benefit of the insurance provided by state disability support. The aim of this paper is to fill this gap. We use consumption data to estimate the costs of disability and the insurance benefit provided by the government disability programme, and to account for the effectiveness of alternative self-insurance mechanisms.

Much of the analysis of disability insurance has focused on the incentive effects of disability insurance on labour supply (Parsons, 1980a, b; Bound, 1989), and on false applications by those who are not truly disabled (Benitez-Silva, Buchinsky, and Rust, 2004). Similarly, the literature exploring the growth in claimants points to a combination of changes to disability benefit generosity (Disney and Webb, 1991; Huddleston, 2000; Beatty *et al*, 2000; Bell and Smith, 2004) and screening intensities (Berthound, 1998), in addition to falling demand for low skilled workers (Huddleston, 2000; Bell and Smith, 2004; McVicar, 2008). These explanations focus on the incentive effects and the costs of providing disability insurance. Our focus instead is on the value of disability benefit to those who receive it. The value of this insurance will depend on the seriousness of the disability and the availability of alternative mechanisms for self-insurance.

Using data on consumption expenditures from the British Household Panel Survey (BHPS) we show the extent to which disability leads to lower consumption and the

degree to which consumption losses are insured by positive asset holdings, having a spouse who is working, own labour force participation, and disability insurance. None of these insurance mechanisms provide full insurance, and they are imperfect substitutes.

We find that individuals experiencing a work-limiting health condition, whose only support is the state social security programme, experience a 7% drop in food expenditures. Given that food is a necessary and nondurable good, this represents a substantial fall in total consumption. Each self-insurance mechanism offers some mitigation for this fall in food expenditures, ranging from 2% to 4% improvement; holding positive assets is the most effective of these mechanisms. Among the disabled, individuals not receiving disability insurance, as a group, are observed to have higher food expenditure than those in receipt of insurance payments. This arises because the consumption level of insurance recipients is determined by two offsetting mechanisms: firstly, food expenditure will be higher from the direct effect of individuals receiving benefits; and secondly, the group's average food expenditure will be lower from the selection effect of benefits being targeted at the most severely disabled. Our results indicate that the selection effect dominates, providing some support for the effectiveness of the screening mechanism onto state disability support. Further, we use a fully insured group to establish that issues of non-separability are not important in our sample—that is, disability affects food consumption primarily through the channel of income,not by affecting the marginal utility of consumption. Our average food expenditure drop of 7% is in line with similar econometric studies carried out on US data: Stephens (2001) and Meyer and Mok (2006) find 5% and 8.6% lower food expenditures for the disabled, respectively. However, these studies do not analyse the effect of different self-insurance mechanisms on expenditure, nor do they investigate the selection effect that we find significant in the UK data.

These consumption losses mask heterogeneity over time. We present evidence that

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the consumption loss associated with disability is greater after 1995, when the generosity of government insurance in the UK was reduced. This reduction in generosity was part of an attempt to reduce the incentive costs of the disability programme, but our results show the implications of this in terms of the reduction in insurance benefits provided.

The next section describes the disability benefit programme in the UK and how it has changed in the recent past. Section 3 describes our data source and sample selection, and provides information on the characteristics of the disabled. Section 4 details the estimation strategy. Section 5 shows our results, estimating the effect of health shocks on food expenditure in three stages: first, for a broad measure of disability; second, allowing for different types of disability; and finally, looking at the dynamics of consumption loss after the onset of disability. Section 6 provides evidence on the implications of the 1995 reforms for consumption insurance, and section 7 concludes.

2   The Disability Insurance Programme in the UK

The Current Benefit Programme   There are three main types of public insurance provided to support individuals suffering from a work-limiting health condition. Firstly, there exist four different benefits that are targeted at replacing lost earnings: incapacity benefit, statutory sick pay, carer's allowance and severe disablement allowance. Incapacity benefit (previously called invalidity benefit) is designed to insure individuals against long-term sickness or disability. It is a contributionary, earnings replacement benefit and accounts for the vast majority of disability benefit claimants. Incapacity benefit requires a work history, in the form of sufficient accumulated credits, in order to be eligible and usually constrains claimants not to work.[1] Individuals

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[1]Though some work may be permitted if earnings remain low.

must also pass a "personal capability assessment," testing the degree to which they are unable to undertake certain mental and physical tasks. The level of payment individuals receive while claiming incapacity benefit is not earnings related or means tested; benefits are paid at three different flat rates, depending on the claimant's length of inactivity.

Statutory sick pay is paid by employers and only covers the first six months of illness. Carer's allowance (previously called invalid care allowance) provides financial support to spouses for loss of income resulting from leaving employment in order to care for a disabled partner. Carer's allowance has been plagued by eligibility problems (for example, married women were only deemed eligible in 1987) and low take-up. Severe disablement allowance is aimed at those with insufficient credit for invalidity benefits; there have been no new claimants allowed since 2001.

Secondly, in addition to these earning replacement benefits there are a number of means tested benefits. These include income support (which may come with a disability premium if the claimant passes the "personal capability assessment"), working tax credit for the disabled in low paid work, housing benefit, and council tax benefit. Finally, there are additional cost benefits intended to compensate for the extra costs associated with disability: for example, transportation expenses, sensory aids, special clothing, or modifications to household appliances. These include attendance allowances and disability living allowance.

Changes in Benefits over Time   Since 1980, increases in disability benefits have been linked to prices rather than average earnings. Given that wage growth has outstripped inflation over the last three decades, even for the lowest decile of the income distribution (Machin, 2003), average replacement ratios have been falling. Sweeping reforms in 1995 reduced the generosity of disability benefits further still. However, since incapacity benefit is a very progressive programme, average replacement rates

hide significant heterogeneity in the generosity of benefits. The age-related generosity of the programme adds further heterogeneity.

While absolute disability benefit replacement ratios have fallen over the last 25 to 30 years, there is evidence that generosity has declined less than for other public insurance payments. In particular, many researchers have drawn comparisons to unemployment benefit, arguing that disability insurance has become relatively more liberal over the years (Disney and Webb, 1991; Bell and Smith, 2004). Bell and Smith (2004) document how the this increased relative generosity is concentrated on older claimants. They show that the ratio of disability benefit to unemployment benefit has remained roughly constant for those under 40 from 1984 onwards, whereas among the older age groups (ages 45-49 and 55-59) the relative replacement ratio has risen from around 150% in 1984 to 200% in 1995. This striking growth came to an end in 1995 when the previous programme of invalidity benefit was renamed incapacity benefit and, crucially, the additional pension benefit was removed. At this time the relative generosity for older claimants fell back to levels similar to those of the early 1980s and has remained at these low levels since then.

Coinciding with this growth in relative generosity, there has been significant increases in the number of disability benefit claimants during the last few decades. This enrolment growth was particularly pronounced between the mid-1980s and mid-1990s, with incapacity (invalidity) benefit claimants doubling from around one million in the mid-1980s to two million in the mid-1990s (McVicar, 2008). During the last ten years this growth has continued, although at a slower rate, and there are currently almost 2.5 million claimants (DWP, 2007b). The co-movement of claimant numbers and relative generosity has spurred discussion on possible causation (Disney and Webb, 1991; Beatty *et al*, 2000; Bell and Smith, 2004). These authors argue that the increased generosity of incapacity benefit relative to unemployment insurance has directly caused the increases in disability benefit rolls. See McVicar (2008) for a re-

view of the literature attempting to explain the reasons behind the observed growth in disability benefit rolls.

In addition to the reduction in absolute generosity in 1995, the government has tried to reduce the incentive costs of providing disability insurance through the "pathways to work" programme, which tries to remove barriers to working for those claiming disability benefit. Prior to this initiative, which began in 1997, very little had been done to promote disability claimants moving back into the workforce. In addition to advice on obtaining work and job focussed interviews, tax credits are now available to encourage claimants to return to the labour force, and payments can differ depending on the severity and permanence of the health condition.

3   Data

We use data from the British Household Panel Survey (BHPS) between 1991 and 2004. This is a longitudinal data set starting in 1991 with a sample of approximately 10,000 individuals each year. The survey is designed to be representative of the UK population and has information on a wide number of variables such as spending, health, and demographics. In this section we detail our choice over variables of interest and our sample selection criteria.

Disability Status   We categorise the disabled using responses to the following question:

> "*Does your health limit the type of work or amount of work that you do?*"
> Answers: {yes, no}

Those who answer positively to this "work limitation" question are asked (up to) two further questions from the survey to identify the severity of the disability:

"Does your health keep you from doing some types of work?"

Answers: {can do nothing, yes, no}

"For work you can do, how much does your health limit the amount of work you can do?"

Answers: {a lot, somewhat, a bit, not at all}

We categorise the severely disabled as those who answer "can do nothing" to the first additional question, or answer "a lot" or "somewhat" to the second additional question. All others are categorised as mildly disabled.

In addition to the severity of disability, we also differentiate according to the duration of the work-limiting condition. We define a short-term disabled spell to be one that lasts up to three periods in total, with long-term disability representing a work-limiting condition for four or more periods. Using these two dimensions we can disaggregate down to four different categories of disability: short-term mildly disabled, long-term mildly disabled, short-term severely disabled and long-term severely disabled.

There is some debate as to the reliability of self-reported responses to questions about health (see Banks *et al*, 2005), with some authors preferring to use disability benefit receipt to define work limitation (see, Bound *et al*, 2006). However, the use of disability benefit rolls is also subject to significant biases. Many of those truly disabled may not apply for disability benefit, for reasons ranging from stigma to ignorance to ineligibility. Also, many applicants are denied, and such rejection does not necessarily mean that these individuals are not suffering work limitations. Further, the use of self-reports is now becoming commonplace in the literature (see, Meyer and Mok, 2006; Stephens, 2001; Burchardt, 2000) and a study by Benitez-Silva *et al* (2004) has shown that these responses provide unbiased estimates of disability benefit eligibility decisions. Given this paper's focus on analysing both self-insurance and

public insurance, we are interested in capturing all types of work-limiting conditions, not just those covered by the disability benefit programme. Therefore, even though these self-reports are not without their limitation, we believe such responses are the best available criteria for assigning disability onset and duration.

Insurance Mechanisms We analyse both public and self-insurance mechanisms. Respondents are classified as receiving disability insurance if they ever received the main class of government provided insurance, namely incapacity (invalidity) benefit. We consider three distinct self-insurance mechanisms: firstly, individuals can use personal saving to buffer work limitations. The BHPS contains limited information on household asset allocations, and we take households who report positive investment earnings[2] in the month prior to the interview as those able to use savings to self-insure. Secondly, we look at individuals with a working partner.[3] Finally, we consider individuals who remain in the labour force while experiencing a work limitation. We include both self-employed and the employed in this definition.

Consumption The BHPS contains data on food expenditure. In each wave, respondents have been asked the following question:

> *Please [...] tell me approximately how much your household spends each week on food and groceries? Include all food, bread, milk, soft drinks etc., exclude pet food, alcohol, cigarettes and meals out.*

For all but the first wave the interviewer asks the respondent to assign their expenditure into one of twelve bands, rather than giving a precise figure.[4] However, in the first wave a precise amount was reported. We assign this value into the same bands used for all subsequent years, and treat all the data as though they were banded.

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[2] This includes earnings from rents, savings and investments.

[3] The classification "married" includes those who report that they are "living as a couple".

[4] Answers (waves 2-13): {Under £19, £10-£19, £20-£29, £30-£39, £40-£49, £50-£59, £60-£79, £80-£99, £100-£119, £120-£139, £140-£159, £160 and over}

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These expenditure data are far from ideal. It would be better to have detailed expenditure data on goods other than food, as total expenditure may not respond in the same way as food expenditure to changes in health status. However, we cannot use the Family Expenditure Survey, for example, primarily because that source does not have a disability question and is not a panel. Food has the advantage of being a nondurable, necessary good with a small income elasticity. Recent work by Browning and Crossley (2008) has shown that many households smooth consumption by cutting back on the purchase of durables, leaving nondurable expenditure almost unchanged. This implies that any test based solely on nondurable expenditures (such as food) is not very sensitive. The restrictions imposed on us from the BHPS data mean that we are putting into force a weak test of the extent of consumption loss, and any effect we find of disability on food expenditures can be interpreted as a lower bound to the effect on total expenditures.

Despite their drawbacks, food expenditure data are the basis of much empirical work, and related studies have used very similar measures for consumption (Stephens, 2001; Meyer and Mok, 2006). A potentially larger problem originates from the banded nature of our food data. This means that in our food expenditure regressions we do not have a continuous variable as our dependent variable, so we cannot use standard OLS estimators (see section 5).

Other Individual Characteristics We construct dummy variables for gender, marital status, educational achievement, home ownership, and ethnicity. We also use variables on respondents' age and the number of persons in the household.

Sample Selection We use the entire BHPS unbalanced panel from 1991 through to the 2004 wave in this study. We drop the oversampling of low income individuals, and keep the original sample that was designed to be representative. This gives us 16,082

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respondents before our sample selection. We select male and female respondents of working age, restricted to be between 25 and 60 years old. We use individual responses and input food expenditure and household characteristics from the data on household responses.

No health question was asked in 1999, compelling us to drop this wave entirely. We only consider individuals for whom we have at least four years of data, with a minimum of three of these running consecutively. In order to control on past observables, we require that individuals have at least one data point prior to their first reporting of disability. Following Burkhauser (1999), we re-classify those respondents who only report one period of disability as not disabled.[5] Finally we drop observations where key variables (demographics, health status, disability benefit receipt, region) are missing. This leaves us with a sample of 5,985 individuals over twelve waves (1991-2004), with an average of just over nine responses per individual.

3.1   Characteristics of the Disabled

This section provides information on the characteristics of individuals with health-related work limitations. We focus on three aspects: first, we provide information on the prevalence of disability in the sample, and the prevalence of disabilities of differing severity and duration. Second, we analyse the individual characteristics of the disabled. Finally, we provide information on the characteristics of those receiving disability insurance.

Prevalence of Disability   The first striking point about disability is the sheer number of individuals who suffer at least some work limitation. In our sample, over a quarter of respondents report a health-related work limitation at least once. Of

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[5] We later test this assumption and find no significant consumption loss for individuals experiencing a single period work limitation, suggesting these shocks are not serious or are contaminated by measurement error.

those who become disabled within our sample period (and have a spell of more than one year), just over 50% suffer from long-term poor health, almost 22% experience a severe disablement, and 12% are subject to a health shock that is both severe and long-term. Thus, these work limitations affect significant proportions of the population, often with acute and long-term consequences.

Individual Characteristics   Given the evidence on the prevalence of work limitations it is important to determine the characteristics of individuals affected by these conditions. To gain insights into the attributes of the disabled, we run a series of probit regressions. We use a pooled probit estimation, and correct the standard errors for dependence across the panel structure. Table 1 shows the marginal effects from estimating disability status as a function of age, income, time trend and a number of individual characteristics.

The first column of Table 1 shows the results from a probit on the probability of being disabled for our whole sample. We find that the disabled are more likely to be old, female, married without a working spouse, non-white and less educated. This details the well-documented relative depravation of those suffering from work limitations. In the second column of table 1 we show a probit regression on the probability of being long-term disabled, conditional on being disabled, using the same explanatory variables as before. We find that out of those suffering from a work limitation, individuals experiencing longer duration tend to be significantly older, non-white, and less likely to own their own home. The third column documents the probability of severe disability conditional on being disabled. Again we see increased likelihood of older individuals but many of the other variables are not significant.

Recipients of Disability Insurance   A first step to understanding how well these negative health shocks are insured by public insurance is to identify who actually

Table 1: Probit estimation for disability status

	Pr[Disabled]	Conditional on being disabled	
		Pr[long-term dis]	Pr[Sev dis]
Age	0.008	0.077	0.031
	(0.002)***	(0.014)***	(0.016)**
Age squared/1000	-0.063	-0.841	-0.322
	(0.020)***	(0.157)***	(0.179)*
Male	-0.014	0.006	0.033
	(0.004)***	(0.029)	(0.036)
Married, working spouse	-0.032	-0.049	-0.09
	(0.005)***	(0.031)	(0.037)**
Single	-0.014	-0.052	-0.059
	(0.005)***	(0.044)	(0.047)
College	-0.022	-0.087	-0.083
	(0.005)***	(0.050)*	(0.048)
High school	-0.008	-0.006	-0.062
	(0.005)*	(0.035)	(0.04)
Home owner	-0.046	-0.079	0.009
	(0.006)***	(0.030)***	(0.039)
Household size	0.002	-0.001	-0.006
	(0.002)	(0.011)	(0.013)
White	-0.016	-0.069	-0.052
	(0.006)***	(0.032)**	(0.045)
Year dummies	Yes	Yes	Yes
Mean Value	0.143	0.503	0.218
N	5985	859	859
Pseudo R-squared	0.07	0.05	0.02

Coefficients show marginal effects. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

receives disability benefit. In this section, we first report the raw correlations of disability insurance receipt by self-reported disability status. We then present the results of probit regressions of disability receipt on observable characteristics.

Table 2: Disability insurance receipt by health status

	Work limitation	No work limitation	Total
Disability benefit	**0.60**	**0.40**	
	0.36	*0.04*	*0.09*
	(311)	(211)	(522)
No disability benefit	**0.10**	**0.90**	
	0.64	*0.96*	*0.91*
	(548)	(4,915)	(5,463)
Total	**0.14**	**0.86**	
	(859)	(5,126)	

Row percentages in bold, column percentages in italics, cell sizes in parentheses.

Table 2 shows the relationship of disability insurance receipt to disability status. An individual is classified as being work limited if they have ever reported suffering from a work-limiting condition, and similarly classified as being on disability benefit if they have ever received disability payments.[6] The first issue is the fraction of false positives: 40% of the sample have received disability benefits despite never suffering a work limitation in our sample period. The second issue is the fraction of those with a work limitation who never receive disability insurance. 64% of those reporting a work limitation never benefit from any state disability insurance, although this falls to 35% if we condition on those reporting a severe disability. We cannot infer from this fraction that the disability application process is rejecting legitimate claimants because we do not observe who has applied for benefits. Indeed, given the requirement

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[6]Very similar correlations are obtained if contemporaneous measures of disability and benefits are used.

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that recipients are allowed to work only a very limited amount, this high percentage of unhealthy individuals not receiving benefits may simply reflect a large number not applying for disability insurance. Without data on the disability application decision, we will not be able to disentangle this effect. On the other hand, the fraction does tell us that disability benefit is not providing insurance to a large fraction of those who have suffered a shock to their health.

To determine the characteristics of the recipients of disability benefits we run a probit regression of the contemporaneous receipt of state insurance on observable characteristics. The results are shown in the first column of table 3 using the broad measure of work limitation. This table shows, reassuringly, that the main economically significant variable is disability status. Further, benefits are more likely among the relatively less well-off members of society, with successful claimants coming from low educated, non-home-owning households, where the claimant is more likely to be married without a working spouse. Age, gender and ethnicity have no significant effect on the likelihood of receiving benefits. In the second column of table 3 we repeat this same probit estimation splitting disability status by duration and severity. We see significant differences between the coefficients, with the marginal effect on the probability of receiving benefits increasing from 10% for short-term mild disabilities to almost 60% for long-term severe conditions. The more serious work limitations, both in terms of severity and duration, are much more likely to be covered by disability insurance.

The results in this section inform the debate about who actually benefits from disability insurance. The next sections address the question of how much these individuals benefit.

Table 3: Probit estimation for disability benefit receipt.

	Pr[Disability benefit]	Pr[Disability benefit]
Disabled	0.267 (0.015)***	
Short-term mildly disabled		0.107 (0.015)***
Long-term mildly disabled		0.250 (0.022)***
Short-term severely disabled		0.415 (0.049)***
Long-term severely disabled		0.584 (0.037)***
Married, working spouse	-0.025 (0.004)***	-0.024 (0.004)***
Single	-0.005 (0.004)	-0.004 (0.004)
College	-0.023 (0.003)***	-0.022 (0.003)***
High school	-0.011 (0.003)***	-0.011 (0.003)***
Home owner	-0.026 (0.004)***	-0.026 (0.004)***
Mean Value	0.087	0.087
N	5,985	5,985
Pseudo R-squared	0.23	0.25

Coefficients show marginal effects. Both specifications include year dummies. Other controls which are insignificant: age, age^2, gender, household size, race. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

4 Estimation Strategy

Underlying our estimation of the benefits of disability insurance is a theoretical framework where individuals choose consumption to smooth marginal utility over their life-cycle. When a shock to disability occurs, an individual's income falls, with the extent of the impact on permanent income depending on the persistence of the shock as well as its severity. This fall in income leads to lower consumption. Consumption may also fall simply because the marginal utility of consumption is lower when disabled, and this induces an intertemporal reallocation. A fall in consumption due to such non-separabilities between consumption and disability does not, in itself, constitute a welfare loss because it reflects smoothing of marginal utility. A fall in consumption is costly if the change in consumption reflects an inability to smooth marginal utility, and it is only in this case that insurance is valuable.

These considerations give rise to the following reduced form equation for consumption:

$$\ln C_{it} = \beta' X_{it} + \gamma' Z_{it} + \omega_i + \varepsilon_{it} \tag{1}$$

where Z includes indicators of disability status and interactions involving disability status; X includes a set of controls for permanent income and observable characteristics; ω represents individual heterogeneity and is interpreted as the marginal utility of wealth.[7] The controls for heterogeneity in permanent income are necessary so that

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[7]It is well known that optimal intertemporal allocation implies that the marginal utility of wealth, λ_t, should follow a unit root:

$$\lambda_t = \lambda_{t-1} - u_t$$

where u_t is a random error term. Extrapolating this through time allows us to write this stochastic process as:

$$\lambda_t = \lambda_0 - \sum_{j=1}^{t} u_j$$

Hence, the marginal utility of wealth can be captured by a fixed effect, λ_0, and a composite error

the coefficients on disability capture the effects of differences in disability on consumption rather than permanent differences across individuals. Our estimates of the effect of disability will still be a combination of the effect due to lost income and the effect due to any non-separabilities. We identify the extent of the non-separability by looking at the consumption loss for groups who we would expect to be fully insured.

Due to the categorical structure of our consumption data we cannot difference out the marginal utility of wealth, and coefficients can only be estimated consistently if we make a distributional assumption. To overcome this difficulty we implement the technique of interval regression. In effect, this is an ordered probit with the cut points fixed. By assuming that the conditional distribution of the dependent variable is normally distributed, we can estimate our coefficients using maximum likelihood. The integral in the maximum likelihood is approximated by Gaussian-quadrature. Simulation studies have shown that this is a reasonable approximation for small time dimension panels like ours, though we also perform a post estimation check on the applicability of the numerical technique used.

This procedure has a number of drawbacks: first, estimation is somewhat slow as quadrature methods are used to approximate the integral in the likelihood; and more importantly, with this procedure fixed effects cannot be conditioned out of the likelihood necessitating that individual heterogeneity be assumed i.i.d.. Thus, our data restrictions force us to use random effects and a rich set of controls to condition out differences in the marginal utility of wealth across individuals. As a simple robustness test, we have run fixed effect regressions using the mid-points of consumption bands as the dependent variable. The results are qualitatively consistent with our interval regressions.[8]

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term (see Browning and Crossley, 2001).

[8]Regressions not shown, results available upon request.

5 Results

The effect of disability on consumption is highly heterogeneous because individuals experience different health shocks and have access to a range of insurance possibilities. Health status varies widely across individuals, with some being subject to more minor grievances that do not persist for many periods, and others experiencing long-term severe disablement.

We analyse the effect of both state insurance and self-insurance mechanisms on mitigating food expenditure loss for those experiencing disability. We consider three distinct forms of self-insurance: savings, spousal income and own labour force participation. Individuals holding a precautionary buffer of assets can run down these funds during periods of poor health in order to smooth consumption; within a couple, partner income can be used to mitigate adversity in response to a work limitation; and, for some individuals a work limitation does not necessitate complete inactivity, enabling own labour income to help alleviate hardship. The effectiveness of each of these mechanisms will depend on individual circumstance, and on the severity and duration of the health shock.

We analyse the value of these different mechanisms in three stages. We begin with a broad definition of disability, covering individuals who have suffered both mild and severe shocks, ignoring differences in duration. Given this definition, we investigate the effect of the various public and self-insurance mechanisms on consumption. For this baseline specification, we provide evidence that we have adequately controlled for heterogeneity in the marginal utility of wealth by testing that future disability status does not predict current consumption. We also provide evidence that non-separabilities between consumption and disability are insignificant. In the second stage, we disaggregate by the severity and duration of the disability shock and analyse the differing insurance mechanisms. Finally, we look at the dynamics of declines in

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food expenditure post onset of the work-limiting condition.

In all our analysis, we investigate the average effect of disability on consumption over the whole sample period. It is important to note that over the period in question there have been a number of changes in the state disability programme, hence our estimates average over multiple policy regimes. In section 6 we look at the effect of these policy changes.

5.1 Consumption Losses of the Disabled

Table 4 shows the results of our interval regressions on the reduced form equation (1) for the broad measure of disability. This definition includes all types of work limitation, incorporating mild, severe, long term and short-term disablements. In all regressions we include a rich set of controls to condition out differences in marginal utility of wealth (or permanent income) across individuals. The two columns differ by whether or not we control for self-insurance mechanisms.

In the first column, we report the effect of a work limitation on food expenditures without controlling for any insurance mechanism. In this case, food expenditure is 2.7% lower when disabled once we have conditioned on observable characteristics. However, this number conflates a number of issues: first, even with full insurance, the marginal utility of consumption at a given level of consumption may be different across disabled and non-disabled individuals if there are non-separabilities between consumption and health; we return to this issue below. Second, each individual has access to vastly different insurance mechanisms, and the figure for the consumption loss is averaging over these differences across individuals.

In the second column, we interact disability status with dummy variables for the presence of a working spouse, positive asset holdings, and labour force participation. We also interact disability status with a dummy variable indicating individuals who

Table 4: The Effect of Disability on Consumption

Dependent variable	Log food spending (1)	Log food spending (2)
Disabled	−0.027 (0.006)***	−0.071 (0.011)***
Interactions:		
disabled + married with working spouse		0.025 (0.014)*
disabled + positive assets		0.040 (0.014)***
disabled + labour force participation		0.021 (0.015)
disabled + no disability benefit		0.032 (0.013)**
Controls:		
Age	0.032 (0.002)***	0.032 (0.002)***
Age squared/1000	−0.282 (0.020)***	−0.282 (0.020)***
Male	−0.005 (0.007)	−0.005 (0.007)
Married, non-working spouse	−0.054 (0.005)***	−0.053 (0.005)***
Single	−0.151 (0.005)***	−0.150 (0.005)***
College	0.072 (0.009)***	0.071 (0.008)***
High school	−0.006 (0.006)	−0.007 (0.006)
Home owner	0.105 (0.005)***	0.104 (0.005)***
Household size	0.186 (0.002)***	0.186 (0.002)***
Year and regional dummies	Yes	Yes
N	5985	

Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

do not receive disability insurance. The coefficient on disability now reflects the food expenditure falls of an individual without any self-insurance, but who receives disability insurance. The loss for such individuals is estimated at 7.1%. For those that do not have self-insurance, and do not receive disability insurance, the food expenditure fall is actually less at 3.9%. This apparent improvement in mitigating consumption loss likely reflects a selection issue: disability insurance is intended to be paid to individuals who have suffered the worst shocks to their health. This suggests that the screening process for disability benefit is partially effective. Such a selection issue creates a difficulty in interpreting the significantly larger fall in consumption for those on benefits as evidence of insufficient insurance cover. It is likely that these individuals would have fared far worse in the absence of state assistance, especially given the deficiency of self-insurance mechanisms. However, given that we do not observe the counterfactual of these individuals' food expenditure levels in the absence of incapacity benefit, we cannot quantify the true welfare benefit of disability insurance.

The results in the second column of table 4 highlight the benefits of self-insurance. We find that the presence of a working spouse and positive asset holdings mitigate the food expenditure fall by 2.5% and 4.0%, respectively. In addition, we find a positive (but statistically insignificant) effect from own labour force participation. We do not look at the effects on consumption of those who receive disability insurance but who are not disabled. This is partly because our focus is on the benefit of disability insurance to those who suffer from poor health conditions, and partly because of small sample size.

Non-Separabilities The first potential problem with interpreting these results is due to the possibility of non-separabilities. As discussed above, in addition to the effect through the budget constraint, health status can influence the marginal utility of consumption directly: the marginal utility at a given level of consumption may be

different for an individual when they are disabled, compared to when they are fully healthy. Even with full insurance, consumption may vary over different work-limiting conditions, and this would imply that a drop in consumption across disability status may not be evidence of imperfect insurance. To try to tackle the extent of these non-separabilities, we analyse two sub-samples of households: first, we look only at households with positive assets and a working spouse, where we would expect self-insurance to be most effective; and second, we select only those households who are in the bottom ten percent of the income distribution, where we would expect state insurance to be close to complete.[9] These results are shown in table 5.

Table 5: Testing for Non-separabilities

Dependent variable	Log food spending (1) $A_t > 0$	Log food spending (2) Low income group
Disabled	-0.002 (0.016)	-0.020 (0.015)
N	1,006	630

Column (1) shows regression for subsample with positive assets and working spouse. Column (2) shows regression for the bottom decile of the income distribution. Other controls: age, age squared, household size, education, sex, marital status, home ownership, time and regional dummies. Standard errors in parentheses. Neither of the coefficients reported is significant.

From the first column of table 5 we see that there is no significant fall in food expenditures during disability for those individuals who have positive assets holdings and a working spouse. Similarly, the insignificant coefficient in the second column of table 5 demonstrates that there is no clear drop in food expenditure for households in the bottom decile of the income distribution. We expect these two sets of individuals to be close to fully insured, and so this evidence is highly suggestive of non-separability issues being unimportant. This finding is consistent with other work demonstrating that the presence of non-separabilities in the utility function is weak (De Nardi *et al*,

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[9] This is only strictly valid if disability insurance is not subject to type I and type II errors.

2006).

Unobserved Heterogeneity The second check on our results is over whether we have adequately controlled for individual heterogeneity. In particular, we need to ensure that our indicator of disability status is not picking up omitted characteristics of individuals. To show that this is not the case, we construct an indicator of future disability status which equals one for individuals who become disabled at some point in the future but who are currently not disabled.

Table 6: Insignificance of Future Disability

Dependent variable	Log food spending
Disabled	-0.030 $(0.007)^{***}$
Future disability	-0.007 (0.008)
N	5,985

Future disability equals 1 for individuals who are currenlty not disabled, but who become disabled later in the sample. Other controls: age, age squared, household size, education, sex, marital status, home ownership, time and regional dummies. Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

The results in table 6 show that becoming disabled at some point in the future does not have an impact on consumption in the current period, while consumption is depressed in the periods when individuals are actually disabled. As the future disability variable is not significant, this suggests that our specification adequately controls for individual heterogeneity.

5.2 The Effect of Disability Severity and Duration

The effect of disability on consumption and the effectiveness of different insurance mechanisms depend on the type of health shock an individual receives and its ex-

pected duration. We classify health shocks in two dimensions: severity and realised duration.[10] This gives four types of disability: short-term severe, long-term severe, short-term mild and long-term mild. As with table 4, we first present regressions of food expenditure on observable characteristics, now including dummies for each of the possible disability shocks. We then present regressions where we interact disability status with the various insurance mechanisms.

In table 4 we saw that food expenditure was 2.7% lower for those with any type of disability. The first column of Table 7 shows the extent to which this number is averaging over individuals with quite different experiences. Those with short-term and mild disabilities see no significant change in food expenditure, whereas those with a mild disability of a longer duration see a significant fall of 3.3%. For the severely disabled we see even greater falls of 4.0% for short-term and 4.3% for long-term. While these numbers are significantly different from zero, they are not significantly different from each other, except for the loss of those with a short-term mild disability.

These different types of disability have different insurance possibilities. The second column of table 7 introduces interactions for individuals with self-insurance and those who never receive disability benefits. The key point is that food expenditure is about 6-8% lower for individuals with all forms of disability who receive disability insurance and have no self-insurance. This represents the consumption level supported by state insurance. The flatness of the benefit schedule leads to no significant difference in food expenditures across the different classifications of disability. As before, the different self-insurance mechanisms mitigate the food expenditure fall by between 2% and 4%, and we see evidence of the selection effect whereby the worst-off individuals are those

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[10]Realised duration may be a problematic characteristic to be conditioning on. It is valid only if individuals know at onset of the disability whether they have received a shock that will be of short duration or a shock of long duration. To the extent that disability is due to particular health problems, the durations of health conditions are largely predictable. An alternative would be to assume that disability shocks follow a three state first-order Markov process, where the states are defined by the severity of the work limitation. Individual behaviour conditioning on the realised duration and severity of the work limitation would then be identical.

Table 7: Consumption loss for disability disaggregated by severity and duration

Dependent variable	Log food spending (1)	Log food spending (2)
Short-term mildly disabled	−0.009 (0.011)	−0.065 (0.016)***
Long-term mildly disabled	−0.033 (0.009)***	−0.078 (0.013)***
Short-term severely disabled	−0.040 (0.023)*	−0.080 (0.025)***
Long-term severely disabled	−0.043 (0.016)***	−0.061 (0.017)***
Interactions:		
disability + married with working spouse		0.025 (0.014)*
disability + positive assets		0.040 (0.014)***
disability + labour force participation		0.021 (0.015)
disability + no disability benefit		0.033 (0.014)**
N	5,985	

Controls: age, age squared, household size, education, sex, marital status, home ownership, time and regional dummies. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

in receipt of incapacity benefit.

As discussed in section 2, incapacity benefit becomes more generous as duration increases, and it is targeted at more severe conditions. This is evident in our regressions, as we find that the long term severely disabled have higher food expenditure than the short term severely disabled, once we condition on receiving disability insurance. This may reflect the more generous benefits being paid out to longer duration claimants. In addition, these long-term severely disabled have higher food expenditure than the long-term mildly disabled, possibly reflecting the targeting of benefits towards more acute health shocks. However, the differences between coefficients are only marginally significant.

5.3   Dynamics of Consumption Loss after Disability Onset

Up to this point, our regressions have shown estimates for responses averaged over time for each individual in our sample. We now disaggregate the responses into three time categories to capture the dynamics of consumption changes associated with disability. The time categories we use are: the period of disability onset; three years after onset; and more than three years after onset. This approach is similar in nature to that followed by Meyer and Mok (2006) and Stephens (2001).[11]

We show the dynamics of declines in food expenditure for individuals with different severities of disability shock. In table 8, we report the regression without controlling for self-insurance in column (1), and with controls for self-insurance in column (2). As before, in both regressions we include a number of variables on observable characteristics.

Those with a mild disability experience no fall in food expenditure at onset, with food expenditure 2-3% lower for subsequent periods. The severely disabled do see a

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[11]Better panel data sources in the US allow these authors to analyse years by year dynamics, we do not have sufficient data to do this.

Table 8: The dynamics of consumption loss

Dependent variable	Log food spending (1)	Log food spending (2)
Mild disability:		
-onset	−0.018 (0.011)	−0.070 (0.015)***
-3 years after onset	−0.021 (0.009)**	−0.070 (0.014)***
-more than 3 years after onset	−0.032 (0.011)***	−0.081 (0.015)***
Severely disabled:		
-onset	−0.041 (0.021)*	−0.071 (0.022)***
-3 years after onset	−0.053 (0.017)***	−0.079 (0.018)***
-more than 3 years after onset	−0.025 (0.019)	−0.048 (0.020)**
Interactions:		
-married with working spouse		0.025 (0.014)*
-positive assets		0.040 (0.014)***
-labour force participation		0.021 (0.015)
-no disability benefit		0.034 (0.014)**
N	5,985	5,985

Column (1) shows baseline results; column (2) includes controls for self-insurance. Other controls: age, age squared, household size, education, sex, marital status, home ownership, time and regional dummies. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

fall in food expenditure at onset, this persists for three years after onset and then recovers. Meyer and Mok (2006) find similar results for the US.[12] They find that individuals suffering severe work-limiting conditions suffer a 6% food expenditure fall at onset. This worsens to a 15% fall and then to an 18% fall in years two and three respectively, with later years seeing a slight improvement in consumption. For those experiencing a mild condition these authors also find no significant fall at onset. However, in contrast to our results, they find little evidence of consumption falls post onset, possibly reflecting their choice not to exclude one-off disablements as we do.

As with the previous regressions, these effects do not take account of the availability of different insurance mechanisms, and in the second column we report the results once we have controlled self-insurance. We find that food expenditure is now 5-8% lower for both disability types over all periods. Those individuals who only have the state insurance for support have a large and persistent fall in food expenditure, highlighting the imperfect insurance offered by disability benefit.

6 The Reform of 1995

In 1995, the UK government reformed incapacity benefit to reduce the generosity of benefits. For example, Bell and Smith (2004) document how the generosity of incapacity benefit compared to unemployment benefit increased for all age groups in the 1980s and especially in the early 1990s, but that the generosity of incapacity benefit was scaled back substantially in 1995. This occurred primarily through reducing the pension entitlement of those on incapacity benefit. This scaling back of generosity, and the increased work-related requirements introduced by the Labour government in the "Pathways to work" programme, reduced the insurance provided by incapacity (invalidity) benefit. In this section, we test the extent to which this reduction in

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[12]See results on food consumption in Table 12 (p.84).

insurance has led to greater consumption losses among the disabled. To do this, we split the sample by the date of onset of disability into those where onset occurred in 1995 or earlier and those where it occurred after 1995. We then reproduce in table 9 the consumption regressions reported in table 4 above. After 1995, disability was associated with consumption being 7% lower, whereas in the earlier period the decline was smaller and not statistically significant.

Table 9: Consumption Loss before and after 1995

Dependent variable	Log food spending (pre-1995)	Log food spending (post-1995)
Disabled	-0.039 (0.029)	-0.069 (0.019)***
Interactions:		
disabled + married with working spouse	-0.024 (0.026)	0.042 (0.021)**
disabled + positive assets	0.081 (0.027)***	0.031 (0.022)
disabled + labour force participation	0.003 (0.028)	0.017 (0.022)
disabled + no disability benefit	0.005 (0.030)	0.033 (0.023)
N	5,059	5,384

Controls: age, age squared, household size, education, sex, marital status, home ownership, time and regional dummies. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

7 Conclusions

The aim of this paper was to analyse consumption losses due to disability, and to explore how effectively alternative insurance mechanisms mitigate such adversity. Our main conclusion is that individuals receiving disability insurance, without any form of self-insurance, have food consumption which is 7% lower than those without a work limitation. Since we are analysing food expenditures, which we would a priori expect

to respond less than other expenditure to income shocks, this suggests that insurance against a work-limiting health shock is fairly incomplete.

We consider various forms of self-insurance, including savings, a working partner and own work. Each of these mitigates the food expenditure loss by between 2% and 4%. When we compare the group receiving disability benefit to those not receiving it, we find that those receiving disability insurance have lower food expenditure. This suggests that individuals receiving disability insurance experience more severe work-limiting conditions than those not receiving benefits, providing some support for the effectiveness of the screening mechanism onto state disability support. This is further supported by our finding that the receipt of disability insurance is correlated the severity of the condition. This result also implies a selection issue in interpreting our results as providing evidence of the benefit of disability insurance and, in particular, we do not know how far consumption would have fallen for those in receipt of incapacity benefit had they not been receiving the benefit.

In our regressions, we have concentrated on the average effect of a health-limiting condition on food expenditures over time. However, during the period we analyse there have been a number of sizeable shifts in policy, particularly in 1995 and after Labour came to power. We present evidence that the reductions in generosity associated with these policy changes led to less insurance against consumption losses.

References

Anyadike-Danes M, and McVicar D, 2008, "Has the boom in Incapacity Benefit claimant numbers passed its peak?" *Fiscal Studies,* 29(4), 415-434

Banks J, Blundell R, Oldfield Z, and Smith J, 2007. "Housing Price Volatility and Downsizing in Later Life," *NBER Working Papers 13496*

Banks J, Kapteyn A, Smith J, and van Soest A, 2005. "Work disability is a pain in the *****, especially in England, the Netherlands, and the United States," *NBER Working Papers 11558*

Beatty C, Fothergill S, and Macmillan R, 2000, "A theory of employment, unemployment and sickness," *Regional Studies,* 34, 617-30

Bell B and Smith J, 2004, "Health, disability insurance and labour force participation," *Bank of England Working Paper*, 218

Benitez-Silva H, Buchinsky M, and Rust J, 2004, "How Large are the Classification Errors in the Social Security Disability Award Process?," *NBER Working Paper 10219*

Benitez-Silva H, Buchinsky M, Chan H M, Rust J, and Cheidvasser S, 1999, "An empirical analysis of the social security Application, Appeal and Award Process," *Labor Economics,* 6, 147-78

Berthoud R, 1998, *Disability Benefits: A Review of the Issues and Options for Reform,* York: York Publishing Services

Bound J, 1989, "The Health and Earnings of Rejected Disability Insurance Applicants," *American Economic Review*, 79, 482-503

Bound J, and Burkhauser R V, 1999, "Economic analysis of transfer programs targeted on people with disabilities," in Ashenfelter O, and Card D, *Handbook of Labor Economics*, Volume 3 (eds.), Elsevier

Bound J, Stinebrickner T R, and Waidmann T, 2006 "Health, economic resources and the work decisions of older men," *Working Paper*, University of Michigan and NBER

Browning M, and Crossley T F, 2008, "Shocks, stocks and socks: smoothing consumption over a temporary income loss," *Journal of the European Economic Association* (forthcoming)

Browning M, and Crossley T F, 2001, "Unemployment benefit levels and consumption changes," *Journal of Public Economics*, 80(1), 1-23

Burchardt T, 2000, "The dynamics of being disabled," *CASE paper 36*

De Nardi M, French E, Bailey Jones J, 2006, "Differential mortality, uncertain medical expenses, and the saving of elderly singles," *Working Paper Series WP-05-13, NBER Working Papers 12554*

Disney R, and Webb S, 1991, "Why are there so many long term sick in Britain?," *Economic Journal,* 101, 252-62

DWP, 2007a, "Benefit expenditure tables," available at http://www.dwp.gov.uk

DWP, 2007b, "Benefit claimants tables," available at http://www.dwp.gov.uk

Hall G, and Rust J, 1999, "Econometric methods for endogenously sampled time series: the case of commodity price speculation in the steel market," Unpublished Manuscript

Huddleston T, 2000, "Explaining the growth in the number of people claiming Incapacity Benefits," *mimeo*, Department for Work and Pensions, London

Machin S, 2003, "Wage inequality since 1975," in Dickens R, Gregg P, and Wadsworth J, (eds.) *The Labour Market under New Labour*, Basingstoke: Palgrave Macmillan

McVicar D, 2008, "Why have UK disability benefit rolls grown so much?," *Journal of Economic Surveys*, 22(1), 114-139

Meyer B D, and Mok W, 2006, "Disability, earnings, income and consumption," *Harris school working paper 06.10*

Parsons D O, 1980a, "The Decline of Male Labor Force Participation," *Journal of Political Economy*, 88, 117-34

Parsons D O, 1980b, "Racial Trends in Male Labor Force Participation," *American Eccnomic Review*, 70, 911-20

Stephens M, 2001, "The long-run consumption effects of earnings shocks," *Review and Economics and Statistics*, 83(1), 28-36