Does job insecurity affect household consumption?

Andrew Benito[*]

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[*] Structural Economic Analysis Division, Bank of England, Threadneedle Street, London EC2R 8AH. E-mail: andrew.benito@bankofengland.co.uk.

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Abstract

This paper confronts implications of precautionary saving models with microdata on British households. The results provide support for the central proposition that job insecurity depresses household consumption levels. A one standard deviation increase in unemployment risk for the head of household is estimated to reduce household consumption by 2.7%. Interpreting the spread of the distribution across workers in job insecurity levels as consisting of four standard deviations, this implies that moving from the bottom to the top of the distribution gives rise to a reduction in consumption of 11%, *ceteris paribus*. This effect is estimated to be greater for the young, those without non-labour income and manual workers, a pattern also consistent with the predictions of precautionary saving models. The paper then studies the propensity for households to purchase durable goods and finds durables purchases to be delayed significantly by higher unemployment risk. The paper therefore demonstrates that job insecurity affects aggregate demand through both non-durable and durable expenditure, controlling for other influences including estimated permanent income.

Key words: Consumption, precautionary saving, job security.

JEL classification: D12, E21.

Summary

The hypothesis that household consumption is in part shaped by how much uncertainty households face regarding their future incomes has potentially important implications for our understanding of consumer expenditure, the single largest component of aggregate demand. This hypothesis is also associated with precautionary saving models of consumption. This paper considers this by taking job insecurity to be an observable and quantitatively important indicator of income uncertainty for most households and examines its role in influencing the non-durable and durable expenditure decisions of households in the United Kingdom.

In addition to shedding light on how households form their expenditure decisions, the paper is also motivated by a desire to examine the effects of job insecurity on household decision-making in the United Kingdom. Although the issue of job insecurity has attracted considerable attention, relatively little is known about the effects of a perceived or actual increase in job insecurity. To this end, the paper estimates to what extent non-durable consumption by households is depressed when they experience a high level of insecurity about their job prospects. In addition, the paper considers whether households delay the purchase of durable goods when they are subject to greater risk of becoming unemployed. The paper employs data at the level at which such household consumption decisions are actually made–that is at the level of individual households in the United Kingdom–from around 10,000 households covered by the British Household Panel Survey (BHPS).

The first contribution of the paper is to provide evidence of significant precautionary saving effects associated with unemployment risk. More specifically, the estimates imply that a one standard deviation increase in unemployment risk lowers consumption by 2.7%. This is an appreciable impact. Interpreting the spread of the distribution of levels of job security across workers as consisting of four standard deviations, this implies that moving from the top to the bottom of the distribution gives rise to a reduction in consumption of 11%, *ceteris paribus*.

Variation across households in this estimated effect is considered. This is of interest for two reasons. First, this increases the richness of the results. Second, economic theory itself makes specific predictions about which types of households should respond relatively more strongly in terms of their spending decisions to higher levels of job insecurity. For instance, according to the

theory of precautionary saving, this effect should be stronger among younger households. Such households are in the process of building a buffer stock of saving in order to weather the effects of income uncertainty. Older households that have already accumulated such assets need not depress consumption to the same extent in response to income uncertainty. Furthermore, households that have financial assets that they draw upon during any period of low income should be less sensitive to uncertainty concerning their labour income. These two predictions are borne out strongly in the analysis. At age 25, a one standard deviation increase in unemployment risk is estimated to reduce consumption by 5.2%, whereas by age 60 the effect is zero. The consumption of those that are more reliant on labour income–those that do not have liquid assets to draw upon–is also found to be more sensitive to unemployment risk. For those without investment income, the one standard deviation increase in unemployment risk lowers household consumption by 4.2%. Moreover, variation by occupational group is considered. The consumption of manual workers, for whom the persistence of a shock to income induced by unemployment is likely to be greater given typically longer unemployment durations, is found to be more sensitive to job insecurity than that of non-manual workers.

Finally, the paper explores the relationship between consumer durables purchases and job insecurity. Evidence is found supporting the notion that increases in unemployment risk cause households to delay their purchases of durable goods. Economic theory suggests that an increase in labour income uncertainty, such as that originating from greater job insecurity, leads households to delay the purchase of consumer durables as they instead opt to add to their precautionary assets, which are used as a buffer against the higher level of uncertainty. In the estimates presented here, use of a subjective measure of job insecurity shows that households that express some degree of job insecurity have a significantly lower probability of having recently purchased durable goods.

Income uncertainty probably increased through much of the 1980s and early 1990s in the United Kingdom. Unemployment risk, at least since the early 1990s, has been falling. This suggests other sources of income risk have increased in importance. Future research might therefore consider these forms of income uncertainty, such as wage flexibility, and whether they give rise to a precautionary saving motive.

1 Introduction

The risk of job loss is among the most important sources of income uncertainty facing most households. The hypothesis that such uncertainty gives rise to a precautionary motive for saving has been put forward as a significant development of the standard life-cycle model of consumption (eg Carroll (2001a), Caballero (1990)). Such models of precautionary saving have many attractive features. In principle, they appear able to account for a number of stylised facts associated with consumption patterns and the life cycle, such as the apparent excess sensitivity of consumption to anticipated income, that the canonical permanent income model cannot explain.[(1)] However, the attempts that have been made to identify evidence of a precautionary motive have produced mixed results. Although Carroll *et al* (2003) and Lusardi (1998) find evidence supporting the basic proposition, other studies find little or no such evidence (eg Dynan (1993), Starr-McCluer (1996)).

The issue of job insecurity has also attracted increasing attention, particularly in Britain, with such interest partly motivated by the apparently large increases in perceived job insecurity (eg Nickell *et al* (2002)).[(2)] But what are the *effects* of job insecurity? Might job insecurity affect consumption behaviour as implied by the precautionary motive for saving? The issue also has important implications for the aggregate behaviour of consumption and conditions in the labour market. Carroll and Dunn (1997) examine the time-series behaviour of US consumption and unemployment expectations and argue that the latter have played a key role in the cyclical behaviour of consumers' expenditure and the US economy.

This paper confronts a key empirical implication of the precautionary model of consumption with microdata for British households. Specifically, the hypothesis considered is whether consumption levels are related to job insecurity.[(3)] As noted above, there have been relatively few previous attempts to consider this question, none of which use data for Britain. Closest in spirit to the present paper are the studies by Carroll *et al* (2003) and Lusardi (1998). Carroll *et al* (2003) construct individual-level predicted probabilities of job loss and include this variable in models for savings finding significant evidence of additional saving by those households whose head of

(1) Pemberton (1997) for instance, calibrates the standard life-cycle model under perfect capital markets and argues that the results are inconsistent with the basic stylised facts of consumption. Clarida (1991), however, shows that small modifications to the permanent income model can give rise to excess sensitivity.
(2) Job insecurity also appears strongly related to individual well-being (Blanchflower and Oswald (1999)).
(3) The use of the term 'job insecurity' here refers specifically to the likelihood of job loss. Nickell *et al* (2002) discuss other interpretations including wage flexibility.

household faces greater job insecurity. Lusardi (1998) instead employs a self-reported likelihood of job loss for a sample of men close to retirement in the United States with results indicating that saving is positively related to the indicator of job insecurity. The present paper borrows from both approaches, employing a model-based predicted likelihood of job loss and subjective job insecurity measure for households in Britain from the British Household Panel Survey and considers a role for these variables in influencing household-level consumption. The first contribution of the paper is to provide evidence of significant precautionary saving effects associated with unemployment risk in shaping non-durable consumption for households in Britain. More specifically, the estimates imply that a one standard deviation increase in unemployment risk lowers consumption by 2.7%. Second, variation across households in this estimated effect is found to be consistent with the intuition of precautionary saving. In particular, the effect of job insecurity is estimated to be significantly stronger for heads of household that are young, that do not have non-labour sources of income and that are manual workers, as we might be led to expect *a priori* under a buffer stock model of saving. Third, evidence that consumer durables purchases are delayed by heightened unemployment risk is also presented suggesting that job insecurity affects both durable and non-durable expenditures.

The remainder of the paper is organised as follows. Section 2 provides some further economic and theoretical background to the paper. Section 3 sets up the econometric model and presents the hypotheses of interest. Section 4 discusses the data and estimation results derived from the British Household Panel Survey. Section 5 concludes.

2 Economic background

Precautionary saving models extend the standard life-cycle approach to allow for undesirable (and uninsurable) income uncertainty.(4) A result of Caballero (1990) illustrates the role of uncertainty and precautionary saving most clearly, by assuming the within-period utility function is exponential. With (constant) coefficient of absolute risk aversion κ, this is $U(c_t) = -\frac{1}{\kappa}\exp(-\kappa c_t)$, where c is consumption. It is further assumed that income, y, takes the form $y_t = \lambda y_{t-1} + (1-\lambda)\widehat{y} + \varepsilon_t$, where $\varepsilon_t \sim iid(0, \sigma^2)$, $\widehat{y}$ is the deterministic component of income and λ measures the degree of persistence in income shocks, ε_t. The consumer chooses a

(4) More specifically, the precautionary motive arises from a positive third derivative of the utility function. This precludes the case of a quadratic utility function combined with labour income uncertainty, which gives rise to the standard certainty equivalence result.

path for consumption maximising expected intertemporal utility from consumption subject to the income process and the budget constraint, $w_t = R_t w_{t-1} + y_t - c_t.$, where w_t is end-of-period t wealth and R is the interest factor $(1 + r)$.

Caballero (1990) shows that the solution to this problem is the sum of two components. The first component is the certainty equivalence level of consumption, while the second is that associated with the precautionary motive for saving. In the case where the rate of interest equals the rate of time preference and when the income shock is normally distributed, this latter term simplifies to $\kappa\sigma^2/(R - \lambda)$ such that precautionary saving is increasing in the variance of shocks to income, σ^2, the degree of persistence of income shocks, λ, and the degree of risk aversion, κ.[5] The level of consumption is decreasing in each of these terms. The assumption of exponential utility is of course, restrictive, but under more general conditions it can be shown that greater income uncertainty lowers the optimal level of consumption. Skinner (1988) assumes the one-period utility function takes the constant relative risk aversion (CRRA) form in place of the constant absolute risk aversion (CARA) form used by Caballero (1990). Again the result obtained from his approximation is that optimal consumption is a negative function of income uncertainty. This result is also found using numerical methods by Zeldes (1989) for the CRRA case. It is the key message from the literature on precautionary savings and consumption that we wish to confront with data.[6]

A number of empirical attempts exist at confronting this message from the literature on the precautionary motive for saving. Carroll *et al* (2003) estimate models for the individual probability of unemployment for a sample of US households, relating saving behaviour to this variable and find evidence of a significant precautionary effect at modest and higher levels of income. Guiso *et al* (1992) employ Italian household-level survey data including self-reported earnings uncertainty and also find evidence consistent with the basic hypothesis.

For the United Kingdom, Miles (1997) and Guariglia and Rossi (2002) find evidence of precautionary motives at work based on constructing estimates of the income risk facing

(5) Under exponential utility, the coefficient of absolute risk aversion, κ, coincides with the degree of prudence, defined as the ratio of the third to the second derivative of the within-period utility function (Kimball (1990)). One unattractive feature of this function is that it does not rule out negative consumption.

(6) In models of precautionary saving such as Carroll (1992), it is the probability of a near-zero income that is the key determinant of the precautionary saving motive. Carroll (1992) suggests that unemployment comes closest to such an event. This provides a further link between these models and the use of the probability of job loss as the relevant measure of labour income uncertainty below. Earlier models include Leland (1968).

households and including these in a household consumption function or Euler equation in the case of Guariglia and Rossi (2002). For the measure of income risk, Miles (1997) uses the squared residual from an income equation while Guariglia and Rossi (2002) employ the variance of each household's residual over the three years (or more, depending upon the number of observations per household and year in question) up to year t. The squared residual employed by Miles (1997) could pick up any non-linearity while basing a variance measure on as few as three observations, as in Guariglia and Rossi (2002), (and with the number of observations varying across households and time) is also problematic. Merrigan and Normandin (1996) also estimate Euler equations for the growth rate in consumption using annual cross-sections of data. They find evidence interpreted as consistent with precautionary saving behaviour.(7) Carroll (2001b), however, recommends that IV estimation of structural Euler equations be abandoned, arguing that their interpretation is severely flawed.

Banks *et al* (2001), adopt an approach based on the construction of a cohort-based quasi-panel, which distinguishes between cohort-specific and common income risks. Their results find strong evidence of precautionary saving, in particular associated with the cohort-specific income risk component. This paper instead focuses exclusively on unemployment risk of the household head as the source of risk facing the household, in part in order to understand the effects of job insecurity. Note that none of these studies using evidence for the United Kingdom look specifically at the question of whether job insecurity affects household consumption.

The relation between consumer durables purchases and unemployment expectations is considered by Carroll and Dunn (1997) using aggregate US data. They develop an (*S*,*s*) model of consumer durables purchasing with a role for income uncertainty. In this framework an increase in unemployment risk leads to the postponement of the purchase of consumer durables as households instead opt to add to their precautionary assets which are used as a buffer stock. That is, the lower trigger of the (*S*,*s*) rule for the ratio of the value of durable goods to permanent labour income falls. Households instead wish to accumulate more savings which they use as a buffer against the

(7) Merrigan and Normandin (1996) employ data from the Family Expenditure Survey. Although the FES contains superior data on consumption compared to the BHPS, it would not be possible to construct estimates of the probability of entering unemployment from the FES as the data are annual cross-sections with no panel component.

higher level of uncertainty resulting from job insecurity.[8] In this way, those facing greater job insecurity should be less likely to have recently purchased household consumer durables, controlling for other demographic characteristics of the household. This is an additional hypothesis confronted with data below. Carroll and Dunn (1997) highlight the absence of evidence employing microdata that addresses this hypothesis.

3 Estimation strategy

In order to address the basic hypothesis–that household consumption levels are a function of job insecurity–there are a number of econometric issues to be confronted. The estimation strategy is largely geared towards addressing these issues which relate to the construction of permanent income from cross-sectional data, the grouped nature of the data on consumption and identification.

The basic model for consumption involves estimating a consumption function of the following form:

$$c_{it} = \alpha + \theta_1 y_{it}^P + \theta_2 y_{it}^T + \theta_3 y_{it}^W + \delta \widehat{u}_{it} + X_{it}\beta + \gamma_t + \varepsilon_{it} \qquad \textbf{(1)}$$

where i indexes households, i=1,2..N and t indexes waves of the survey, t=1992...1998. c is log household consumption, y^P is permanent labour income, y^T is transitory labour income and y^W is investment income.[9] This estimation approach essentially follows Miles (1997) and divides permanent income into its human capital and non-human capital components, with the human capital component consisting of a forward-looking projection of labour income derived from a standard semi-log earnings equation (see below). The estimating equation therefore allows for different marginal propensities to consume from different sources of income. $\widehat{u}$ is the measure of job insecurity. This consists of either the subjectively perceived degree of job insecurity or a

(8) The value of consumer durables depreciates over time, while permanent income grows over time, such that the ratio of the value of durables to permanent labour income drifts downwards. When the ratio has fallen sufficiently, it is optimal to make a purchase. An increase in labour income uncertainty raises the marginal utility of precautionary assets held as a buffer against uncertainty, such that the durables purchase decision is delayed. This model is related to the notion that uncertainty increases the 'option value' of waiting.

(9) The income terms are considered in levels rather than logs since transitory income takes on negative values. Consumption is considered in logs since in levels its distribution is skewed. The definition of the transitory income term may pick up idiosyncratic human capital as well as the purely temporal dimension intended. It is nevertheless the established approach in the literature.

predicted risk of job loss. X_{it} represents a vector of regressors with associated parameter vector, β. The regressor set X includes controls for household and head of household demographics (family size, composition, educational attainment etc; see Table 3 for more details).[10] γ_t denotes a set of common year effects with error term, ε_{it}.

3.1 Permanent income

The standard definition of permanent income is the annuity value of the sum of the present discounted value of expected future labour income (ie human wealth) and non-human wealth. Following King and Dicks-Mireaux (1982) and Guiso *et al* (1992) permanent labour income y^P, is defined as normal (weekly) labour income adjusted for age and cohort effects. Transitory income y_{it}^T, is defined as the difference between current and permanent labour incomes. Non-human wealth is not measured explicitly here and its role is captured through the investment income term, y^W, as in Miles (1997).[11] Note that this excludes housing wealth.

Permanent income differs from current household income for various reasons and in particular through life-cycle effects and transitory income differentials. The calculation of permanent income involves taking the predicted values from a random effects equation for log household labour income as a function of a range of household demographic variables and then obtaining a 'permanent' value from a projection of this value forwards until retirement (assumed 65 for men, 60 for women) for each household also using estimates of how household incomes vary with age. Estimates of this differential obtained from cross-sectional data conflate the age effect with a cohort effect (Shorrocks (1975)) since in any cross-section older household heads also belong to earlier cohorts, who have lower lifetime income owing to productivity growth. In order to separate out the cohort from the age effect, separate evidence from Benito (2001) on the magnitude of the age effects is used. The estimation of the age effects did not restrict the form of the effects, instead using separate age dummies in a cohort/age quasi-panel constructed from Family Expenditure Survey data for the years 1972 to 1998.[12] This is clearly much less restrictive than the approach of Guiso *et al* (1992) and Miles (1997) both of which imposed a quadratic relation in age. Mean

(10) The head of household is defined as the principal owner or renter of the property and (where there is more than one) the eldest takes precedence.
(11) Non-human wealth would equal y^W/r where r is the instantaneous interest rate.
(12) For a description of pseudo-panel methods, see Attanasio (1999). The identifying restriction imposed consisted of assuming that the year effects for the period 1972 to 1998, intended to reflect cyclical factors, averaged zero. The age and cohort effects on income were unrestricted.

(median) weekly permanent income (1995 prices) is calculated as £438.74 (£401.61), transitory income, £62.15 (£50.97) and investment income £12.26 (£2.20).[13]

The form of estimating equation is similar to that of Carroll (1994) and Guiso *et al* (1992) who use Italian household data focusing on the impact of a self-reported measure of earnings uncertainty on consumption. The use of consumption data for the dependent variable avoids specification issues arising in studies that have employed net worth data as the dependent variable, in particular where this possesses negative values but a log specification seems justified.[14] Data for specifically food and groceries expenditures would not be the preferred measure of consumption. However, as in studies such as Guariglia and Rossi (2002), Kuehlwein (1991) and Hall and Mishkin (1982), its use can be justified as an empirically important component of non-durable expenditure and by an assumption of separability of utility from food and other forms of consumption. Nevertheless, to the extent that uncertainty leads households to cut back on expenditures and in particular on those items that are not essentials, the use of food and grocery expenditure as the dependent variable will bias the results *against* finding evidence of precautionary saving. Further analysis below will also consider the relation between consumer durables purchases and unemployment risk.[15]

The main previous attempt to estimate a consumption function of this form on British or UK data is that by Miles (1997) who employed separate waves of the Family Expenditure Survey (FES). Miles (1997) estimated an elasticity of consumption with respect to household permanent income of 0.82 and with respect to transitory income of 0.61. Note that in the present case the dependent variable consists of consumption on food and groceries for which the elasticity with respect to permanent income should be expected to be well below unity. The discussion of precautionary saving motivates the consideration of the further hypothesis, H_o: $\delta = 0$ versus H_A: $\delta < 0$, under precautionary saving, which will be the focus of attention here.

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(13) The definition of transitory income does not require that it is mean zero.

(14) King and Dicks-Mireaux (1982) for instance, dropped observations where annual earnings were less than $2,500. This is likely to introduce a substantial sample selection effect although they do attempt to correct for it; Carroll *et al* (2003) adopt an inverse hyperbolic sine functional form for this reason.

(15) Carroll (1992, page 107) reports results suggesting that aggregate food consumption in the United States is as sensitive to unemployment expectations as total non-durable expenditures. Browning and Crossley (1999) find that households cut back on 'small' durables (eg clothing) to a greater extent than food during an actual unemployment spell.

3.2 Grouped consumption data

The data on consumption are grouped, specifying a particular interval or range for the level of weekly expenditure on food and groceries.[16] To explicitly allow for this grouped nature, a maximum likelihood method is employed that allows for the fact that the actual level within each band (with one open-ended category) is unobserved. The estimator is essentially an Ordered Probit model with known thresholds between the different bands. A common alternative, that of using the mid-points to the bands, and then treating the variable as if it were continuous, will not in general provide consistent parameter estimates (see Stewart (1983)). This latter approach is adopted by Guariglia and Rossi (2002) in estimating Euler equations by GMM using BHPS data. The grouped dependent variable (GDV) estimator has been used most extensively in studies of earnings determination where, in British survey data, this has often been grouped into intervals (eg Stewart (1990)).[17]

This paper employs two approaches to consider the hypothesis $\delta = 0$. These approaches differ in their construction of the unemployment expectations or job insecurity term, $\widehat{u}$. The first approach takes head of household responses to a question in the BHPS of all employed individuals concerning the likelihood that they will become unemployed in the next twelve months (see below for further details). This is straightforward to implement. The second approach estimates the individual probability of *becoming* unemployed in twelve months for the sample of employed heads of households. This is derived as the predicted probability from a probit model:

$$u_{it} = 1\{Z_{it}\varpi + \upsilon_{it} > 0\} \qquad \textbf{(2)}$$

where $1\{A\}$ is an indicator function of the event A such that $u_{it} = 1$ if the individual becomes unemployed at the time of the subsequent BHPS interview and zero otherwise. The set of regressors, Z_{it} includes a set of regional and year dummies to control for regional and aggregate effects as well as the other individual and household characteristics contained in X_{it} in **(1)**. Under

(16) The bands are the following: below £10; £10 to £19; £20 to £29; £30 to £39; £40 to £49; £50 to £59; £60 to £79; £80 to £99; £100 to £119; £120 to £139; £140 to £159; above £160.

(17) Note that the grouping of data in bands is not necessarily a weakness of the data. For example, in the 1991 wave of the BHPS, the food consumption data were not grouped but show clear evidence of rounding (at £5 and £10 intervals). Rather than taking such data at face value, in the presence of such rounding it is preferable to treat the data *as if* it were grouped and to employ the GDV estimator.

the probit assumption, $v_{it} \sim N(0, \sigma_u^2)$, the predicted probabilities are then calculated as $\Phi(Z_{it}\widehat{\varpi})$ where $\Phi(\cdot)$ is the standard normal distribution function and $\widehat{\varpi}$ are the maximum likelihood probit estimates of **(2)**. The potential advantage of this approach compared to the self-reported response to the job insecurity question is that in being based on a continuous variable, the predicted probabilities provide more variation in job insecurity levels which can be exploited to identify the relationship between consumption and job insecurity. The complication it introduces is that associated with identification.

3.3 Identification

For the model to be identified, exclusion restrictions on the consumption equation are required. This requires the isolation of at least one variable that influences income and job loss risk directly but does not affect consumption independent of the effects through income and/or risk of job loss. These exclusion restrictions are then the instruments for the respective income and job insecurity terms. This paper claims to pay special attention to this identification problem. By comparison, this issue is not discussed by Guiso *et al* (1992). Moreover, inspecting their income and consumption equations indicates that no exclusion restrictions are imposed on the latter. This makes interpretation of their results difficult.[(18)]

A number of alternative instrument sets will be considered below. The choice of exclusion restrictions needs to be justified on *a priori* grounds. On such grounds, the favoured instrument set for both income and job loss risk consists of the experience of unemployment in the previous year, the size of the household head's employer and his/her union status, although alternatives and sensitivities will be considered. The rationale for these is as follows. There is a significant body of evidence suggesting that unemployment experience has 'scarring' effects on subsequent employment and re-employment earnings (eg Arulampalam *et al* (2000, 2001)). This leads us to expect significant effects from experience of unemployment in the previous year on the probability of job loss and household income. These hypotheses are confirmed in the analysis below. Since the favoured interpretation of this result is that unemployment adversely affects human capital, then there seems no reason *a priori* why this should be correlated with consumption behaviour independent of its effect on human capital and thereby on job insecurity and income.

(18) Instrumenting the permanent income and job insecurity terms will also help address issues of measurement error.

A second favoured candidate for a valid instrument is that of employer (workplace) size. The earnings differential by workplace size is a key wage differential in the labour market and is quantitatively large (eg Green *et al* (1997)). A favoured interpretation of this differential is one of reflecting (dynamic) monopsony associated with labour turnover costs such that larger employers bid up wage rates. There seems no reason why the resulting differential should be related to consumption behaviour. In terms of the risk of job loss equation, it may also be the case that jobs at larger establishments are more secure, due to larger employers possessing greater market power or that for a given employer the closure of smaller establishments incurs lower re-organisation costs. Again, it seems unlikely that this characteristic should be related to consumption independent of any effect via income or job insecurity.

Union status is also considered as a zero restriction in the consumption equations. Unions raise earnings, with this differential being associated with coverage and individual membership. Owing to the emphasis unions impose on due process they are also likely to improve job security. This leads us to expect a role for union status in both the income and job security equations. Again it seems highly unlikely that these characteristics should be related to consumption independent of the effects through household income and/or risk of job loss. A number of other candidates for valid instruments are also available and several of these are considered below. These include region, which was employed by Carroll *et al* (2003) as the instrument for job loss and income in their analysis. Another possibility is being on a temporary contract which is significantly related with the probability of job loss. Nevertheless, willingness to accept a job with a temporary contract may be related to attitudes to risk which could thereby imply a relationship with consumption. Miles (1997) uses gender of the household head, education, region and occupation; their *a priori* justification is slightly more questionable with the strongest case for exclusion from consumption being with region of residence. In the light of this discussion, the preferred instrument set consists of past unemployment experience, employer size and union presence.[(19)] As well as these terms, job loss risk from the probit model is also identified through the non-linear functional form of the probit model.

(19) Occupation is another possible proxy or instrument for job loss risk that has been used in the literature (eg Skinner (1988), Dardanoni (1991)). The difficulty here is that occupational choice may be a function of attitudes to risk, rendering the resulting estimates based on excluding the occupation terms from the consumption function, inconsistent. In a similar vein, education is likely to be correlated with individuals' rates of time preference. Industry affiliation was also considered in the instrument set and provided similar results (see Benito (2000) for evidence on inter-industry wage differentials).

4 Data and estimation results

4.1 Data description

This paper employs a British data source, the British Household Panel Survey (BHPS). The BHPS consists of an annual panel-based survey of approximately 5,500 households in Britain beginning in 1991. The data set provides detailed information on employment, education, income and demographic characteristics of households but also contains some information on consumption. The paper employs data from the BHPS for the years 1992 to 1998.[(20)] Since the key variable of interest concerning self-reported job insecurity was only asked of respondents in waves 6 and 7 of the survey, the data employed for the specifications using self-reported job insecurity are restricted to those two cross-sections of data. The specifications that employ the estimated probability of job loss do not require this restriction.

In the BHPS, each household is asked how much (approximately) the household spends each week on food and groceries. Responses to the consumption question were banded into 12 intervals (at source), giving rise to the use of the grouped dependent variable estimator referred to in Section 3.

For self-reported unemployment expectations, in waves 6 and 7 of the survey each employed individual is asked:

> 'In the next twelve months, how likely do you think it is that you will become unemployed?'

Responses fall into one of four categories, 'very likely' (3.0%), 'likely' (6.9%), 'unlikely' (50.7%) and 'very unlikely' (39.4%). In view of the small proportion that respond in the 'very likely' group, for subsequent analysis this is merged with the 'likely' response thereby forming a 'likely or very likely' group.

The sample of households is selected on the basis of being employed, heads of household aged between 21 and 65 and providing the necessary information for each of the variables used in the

(20) The survey question concerning consumption was slightly different in 1991 so this year is omitted from the analysis.

analysis. This produces a sample of 10,557 heads of household available for the main analysis of household consumption functions.

4.2 Estimation results

Before examining the consumption functions, the models for unemployment risk are first considered. The specifications reported differ in their definition of the job insecurity term–whether this is the self-reported measure or the estimated risk of job loss.

4.2.1 Job insecurity

What factors are correlated with job insecurity or the perceived probability of job loss? Table 1 presents probit estimates for the propensity for individuals' self-reported job insecurity based on likely or very likely versus unlikely or very unlikely unemployment responses for twelve months hence.

The results accord with standard economic priors. Individuals on temporary or seasonal contracts, those with experience of unemployment in the previous year, those with poor health, all have a higher propensity for job insecurity, controlling for the other characteristics, while the degree-educated have a significantly lower probability of job insecurity. By tenure, those with one-two years have higher levels of job insecurity than those with longer tenure. The marginal effects reported for the probit model indicate that the variables with the strongest relationship to job insecurity are being on a temporary contract, being in poor health and having experienced unemployment over the previous year. Being on a temporary contract increases the probability of feeling insecure about one's job over the subsequent year by 0.24; poor health increases this probability of job insecurity by 0.12 and a recent spell of unemployment by 0.10. By comparison, having a degree qualification (relative to having no formal qualifications) is associated with a reduction in the probability of experiencing job insecurity by 0.04.

The results for the unemployment risk models–that is of the probability of becoming unemployed in one year, from our sample of employed heads of household–are reported in Table 2. Unemployment risk is considerably higher among those who have previous experience of unemployment, controlling for other characteristics and those on temporary contracts. The

marginal effect of a spell of unemployment in the previous year is an increase in the probability of becoming unemployed of 0.02 ('t-ratio' = 3.98), while being on a temporary contract has a marginal effect of 0.033 ('t-ratio' = 5.23). Given that the raw probability of entering unemployment is 0.023, these are large effects. Larger employers tend to be associated with greater job security, although the marginal effects are non-linear. The employer size variables are jointly significant ($\chi^2(7) = 25.47$, p-value = 0.00). Unemployment risk is significantly lower among the degree-educated, with a degree being associated with a decline in the probability of entering unemployment of 0.01 ('t-ratio' = -2.42) relative to the case of no qualifications. Union presence in the form of union recognition but not individual union membership is also significantly and inversely related to the propensity to entering unemployment, and also has a marginal effect close to -0.01. Higher levels of tenure are also associated with lower unemployment risk. The pattern of results is highly plausible. Note also that the predicted probability of becoming unemployed is increasing in the self-reported job insecurity measure. The mean predicted probabilities by subjective chance of becoming unemployed are 0.0137 ('very unlikely'), 0.0153 ('unlikely') and 0.0285 ('likely or very likely').

4.2.2 Consumption

The main estimation results for the consumption functions are presented in Table 3. Following equation **(1)**, household consumption is considered as a function of permanent, transitory and investment incomes, job insecurity and a set of controls.

Column 1 presents results for the specification which considers the job insecurity variable as the self-reported measure. A standard set of controls is employed, in particular through the inclusion of terms for educational attainment, number of household members in employment, family size and composition. These terms attract plausible coefficients. Household consumption is increasing in the number of children in the household and the number of employed adults.

The results in column 1 do not reject the null hypothesis $\delta = 0$, that job insecurity has no influence on household consumption, contrary to the precautionary saving model. The coefficient (standard error) on the job insecurity term is -0.012 (0.024). Employing a slightly modified definition of self-reported job insecurity that distinguishes between three different responses in terms of the level of job insecurity does not alter this result. Although negatively signed, the results fail to

indicate that job insecurity depresses consumption significantly.

As emphasised above, the limited degree of variation in the categorical variable for self-reported job insecurity may mitigate against finding a significant relation between this variable and consumption. Recall that less than 10% of the sample reports that becoming unemployed is either likely or very likely. Since there will be degrees of job insecurity a case can be made for attempting to exploit such variation as a basis to the estimation. This motivates the use of the probit model for the predicted risk of becoming unemployed for our sample of employed heads of household. That there is significant variation across the sample in the predicted risk of becoming unemployment is therefore important. The coefficient of variation for this variable exceeds one (standard deviation, 0.028; mean, 0.025). The latter approach also means that the analysis is no longer restricted to the 1996 and 1997 waves of the survey that contained the self-reported job insecurity question.

Column 2 reports results for the benchmark case where zero restrictions are imposed on the unemployment experience in the previous year, employer size and union status terms. Note that these instruments are jointly significant in the income equation (reported in the appendix) and in the unemployment risk equation (Table 2). The coefficient (standard error), multiplied by 1,000, on permanent income is 0.418 (0.027) and compares to 0.112 (0.017) on transitory income and 0.391 (0.100) on investment income. A test of the equality of the permanent and transitory labour income coefficients easily rejects the null, $\chi^2(1) = 85.63$ (p-value = 0.00). The estimate of θ_1 corresponds to an elasticity of food consumption with respect to permanent income of 0.18, evaluated at mean permanent income. Recall that these estimates compare to permanent and transitory income elasticities of total consumption estimated by Miles (1997) of 0.82 and 0.61, respectively. The lower elasticities here likely reflect the fact that the measure of consumption, of necessity, is restricted to food and grocery expenditures which are likely to be less income elastic than other categories of consumption. The results generally do not suggest a different responsiveness of consumption to permanent and investment incomes.

Crucially, the unemployment risk term is now significantly negative, attracting a ‘t-ratio’ of -4.41, supporting the key hypothesis associated with the precautionary saving approach.[21] This is the first finding of its kind for British data. For a one standard deviation increase in unemployment

(21) The standard errors are not adjusted for the presence of a generated regressor (Pagan (1984)). As in Miles (1997), it is unlikely that this would render the key terms insignificant.

risk, this estimate implies that consumption declines by 2.7%. This compares to an estimate obtained by Carroll (1994) that a one standard deviation increase in predicted future income uncertainty reduces consumption by around 3%, although in several of Carroll's (1994) specifications this was not statistically significant. Columns 3 to 5 consider various alternative specifications of the instrument set in order to consider the robustness of the results. These results are also favourable to the precautionary saving hypothesis that unemployment risk depresses consumption at the micro-level as well as further supporting the hypothesis that consumption responds more strongly to permanent income than to transitory income. The results also indicate a role for demographic factors associated with the size and composition of the household, consistent with results obtained by Miles (1997).

A further hypothesis considered is that theory might suggest that the effect of unemployment uncertainty should be non-linear. Thus income uncertainty, that is the variance of income associated with unemployment risk, would in principle be given by $p(1-p)(1-RR)^2Y^2$, where p is the predicted probability of job loss, RR is the replacement ratio in the event of unemployment and Y is current earnings of the household head. In effect, income uncertainty should be at its peak when the probability of job loss is 0.5 since as the likelihood of job loss approaches 1 it becomes more certain that future income will be $RRxY$.[22] Since RR is not known, the income risk term considered in column 6 assumes it is zero, defining income risk as $\widehat{\sigma}^2 = p(1-p)Y^2$ thereby attempting to pick up the notion that income at risk is greater for those with higher current earnings, *ceteris paribus*. This term is far from significant, however, so that the attempt at isolating a role for job insecurity is more successful than the attempt at constructing a proxy for income risk. The remainder of the paper focuses on the specific question of the role of job insecurity.

One possible alternative interpretation of the estimated unemployment risk effect merits discussion. The estimate of permanent income does not allow for the fact that an unemployment spell will have an effect on permanent income. This point, which applies equally to previous studies, implies that the estimated unemployment risk effect could be picking up a permanent income effect. The response to this however is that the estimated job insecurity effect appears much too large to be accounted for by an implied reduction in permanent income. Taking an estimated food elasticity with respect to permanent income of 0.18, moving from someone with

(22) In practice, none of the sample have a predicted probability at this level, with the maximum predicted probability of job loss over the next year in the sample being 0.371.

zero unemployment spells to someone who spent only 2.8% of their time unemployed would need to imply a reduction in permanent income of 15% (ie 0.027/0.18) to account for the estimated reduction in consumption. More plausible estimates of the likely effect on permanent income suggest that this could account for around one fifth of the estimated effect associated with unemployment risk.

Three further experiments are now considered. The first examines whether there is any variation in the precautionary motive by age. In a precautionary saving model, unemployment risk should have a greater effect for the young than the old. As individuals age they accumulate liquid assets which in part act as a buffer to unemployment and their consumption should therefore be less sensitive to unemployment risk. The framework of Carroll (1994, page 140) maintains that 'young and middle-aged households are trying to build up a buffer stock, but by the time they have reached their peak earning years, 45-54, they have achieved a large enough buffer and so do not need to continue depressing consumption to continue building up the stock further.' This point also emerges in the analysis of Gourinchas and Parker (2002). The hypothesis is considered here by interacting the unemployment risk term with the age of the household head. The results, also presented in Table 4, provide strong evidence in support of such an effect. The interaction term attracts a significantly positive coefficient, (with a 't-ratio' of around 4.2) indicating that the negative effect of unemployment risk upon consumption weakens with age. The estimates imply that at age 25 a one standard deviation increase in unemployment risk reduces consumption by 5.2% while at age 60, the effect is zero.

A second hypothesis is that individuals may respond to unemployment risk differently according to how dependent they are on earnings as a source of income. In particular, household consumption could be less sensitive to unemployment risk where households have other sources of income in addition to labour income. This possibility was noted by Zeldes (1989) and Miles (1997) and is considered in Table 4, through the addition of an interaction between the unemployment risk term and a dummy for whether the household reports having positive investment income–72.7% of households indicate that this is the case. The results provide support for this hypothesis as the interaction term is positively signed and statistically significant. The negative impact of unemployment risk on households' consumption is muted where households possess other sources of income. For those without investment income, the one standard deviation increase in unemployment risk lowers household consumption by 4.2%. Note also that the point

estimate on the interaction term, at 0.969, is less in absolute terms than the coefficient on the unemployment risk term, -1.514, suggesting that a consumption effect from unemployment risk is not removed entirely by the possession of some investment income. Given the scale of most households' investment incomes this is not surprising. In a similar vein, the possibility that multiple earner households' consumption might be less sensitive to the unemployment risk of the household head was considered. This was examined by interacting the job insecurity measure with indicators for whether another household member was in employment. No evidence for such variation in the job insecurity effect was found, however.

A final possibility is to consider whether the scale of the estimated effect from unemployment risk is greater for households for whom the impact on household finances of an unemployment spell may be greater. The expected duration of any unemployment spell and the wage at which re-employment occurs will be key factors in determining this expected cost of job loss. These factors can be thought of as increasing the value of λ, that is the persistence of an income shock (such as unemployment), in Section 2. As an, albeit somewhat crude, attempt to pick up any tendency for such effects, the impact of job insecurity is estimated separately for manual and non-manual employees. The economic intuition here leads us to expect that the precautionary motive should be stronger for manual workers, partly since unemployment durations are typically longer for manual workers. The coefficient (standard error) on the unemployment risk term for manual workers is -1.154 (0.301), while for non-manual workers it is at the margin of significance with a coefficient (standard error) of -0.670 (0.342). The point estimate for the unemployment risk term for manual workers implies that a one standard deviation increase in unemployment risk, reduces consumption by 3.2%, while that for non-manual workers implies a 1.9% fall in consumption. Job insecurity has a stronger effect on the consumption behaviour of certain workers for whom the costs of job loss might be expected to be greater.

4.2.3 Durables purchases

The relation between durables expenditures and job insecurity is now considered. Indeed, it may be the case that unemployment risk is more likely to cause households to cut back or delay durables purchases than non-durables consumption, particularly food consumption, the case considered above. As noted above, the model of Carroll and Dunn (1997) of consumer durables purchases has this key implication, that greater labour income uncertainty delays the purchase of

durables, as it is optimal for households to add further to their precautionary assets. Carroll and Dunn (1997) examine aggregate data on durables purchases and unemployment expectations in the United States and their results lend support to this implication. They recommend however, that a household-level probit model be run regressing durables purchases on job insecurity data.

Data on durables expenditures at the micro-level are limited but available data from the BHPS justify such an exercise. The BHPS includes information on whether the household has purchased nine listed consumer durables in the past year.(23) The procedure employed here is to consider the propensity for a household to have purchased any of these consumer durables in the previous year as a function of the job insecurity of the household head, according to both the self-reported and estimated unemployment risk, and the full set of household and individual-level controls. This is estimated as a probit model with the results presented in Table 4.

The probability of having recently purchased consumer durables for the household varies inversely with job insecurity. This provides empirical support for the notion that unemployment risk delays consumer durables purchases. Employing the model-based predicted risk of unemployment, the term is on the margin of significance. For the durables purchase probits, the results using the self-reported measure of job insecurity indicate a stronger role for unemployment expectations, as the term attracts a coefficient (standard error) of -0.182 (0.081). The marginal effect implies that reporting some level of job insecurity is associated with a 0.07 lower probability of having recently purchased a consumer durable. Relative to an overall proportion of households that report any consumer durable purchase in the past year of 0.465, this is by no means a small effect.

5 Conclusions

This paper has confronted several implications of the precautionary model of consumption/saving with microdata on British households for the first time. By relating consumption to job insecurity, controlling for other characteristics including estimated permanent income, evidence in favour of a precautionary motive for saving associated with unemployment risk has been found. The analysis can also be considered an attempt to examine some of the *effects* of job insecurity, a phenomenon that has attracted significant interest in Britain (eg Nickell *et al* (2002)). Despite the

(23) The consumer durables are the following: colour TV, VCR, freezer, washing machine, tumble dryer, dish washer, microwave, home computer and CD player. The proportion of households that undertake any such purchase in the previous year is 0.465.

large literature that has developed assessing job insecurity in the British labour market, there has been little if any attempt to consider how job insecurity might affect household decision-making. This paper has considered household consumption as a potential such case, at the same time assessing the empirical merit of a central implication of the precautionary model of saving.

As a test of the precautionary model of saving the approach adopted here, through the use of estimated and self-reported unemployment risk, is preferable to other attempts that define income uncertainty on the basis of the variability in income over a (very) limited number of years, or through an additional non-linearity in the relationship between consumption and income. Unemployment risk is likely to represent the dominant form of income uncertainty to households of working age, is less likely to be due to voluntary (and anticipated) changes in behaviour and can arguably be more reliably measured than previous measures of income risk.

The results have been broadly favourable to the key implication of precautionary saving, namely that greater unemployment risk should depress levels of household consumption. This result was found in the models that constructed a predicted probability of becoming unemployed for a sample of employed heads of household. Across the sample as a whole, the estimates implied that a one standard deviation increase in unemployment risk lowers household (food) consumption by 2.7%. This represents an appreciable impact. It was also found that the unemployment risk effect is stronger for the young as implied by a buffer stock model of saving such as Carroll (1994) (see also Gourinchas and Parker (2002)) where individuals accumulate assets earlier in their working life as a precautionary buffer to income shocks. At age 25, a one standard deviation increase in unemployment risk is estimated to reduce consumption by 5.2%, whereas by age 60 the effect is zero. Those that are more reliant on labour income and do not have investment income are also found to be more sensitive in terms of their consumption to unemployment risk, as we would expect. For those without investment income, the one standard deviation increase in unemployment risk lowers household consumption by 4.2%. Further, variation by occupational group was also considered. The consumption of manual workers, for whom the persistence of a shock to income induced by unemployment is likely to be greater given typically longer unemployment durations, was found to be more sensitive to job insecurity.

The paper has also explored the relationship between consumer durables purchases and job insecurity. In so doing the analysis has responded to Carroll and Dunn's (1997) concluding

recommendation for future research, reflecting the prior absence of testing with microdata the hypothesis that income uncertainty might cause households to defer purchases of durables, thereby offering an additional channel for job insecurity to influence aggregate demand. The probability of the household having recently purchased durable goods was found to vary inversely with job insecurity of the head of the household. This provides empirical support for the notion that unemployment risk causes households to delay consumer durables purchases, as in the model of Carroll and Dunn (1997). In this model, an increase in labour income uncertainty, such as that originating from greater job insecurity, leads households to delay purchases of durable goods as households instead opt to add to their precautionary assets, which are used as a buffer against the higher level of uncertainty. In the estimates presented here, use of the self-reported measure of job insecurity implied that some degree of job insecurity was associated with a reduction in the probability of having recently purchased durable goods of 0.07–by no means a small effect.

For the United Kingdom, the most persuasive prior evidence of precautionary saving is that of Banks *et al* (2001), who adopt an approach based on the construction of a cohort-defined quasi-panel, which distinguishes between cohort-specific and common income risks. Their results find strong evidence of precautionary saving, in particular associated with the cohort-specific income risk component. This paper has instead focused specifically on unemployment risk as a potentially major source of disruption to income and in order to consider the possible effects of job insecurity. Banks *et al* (2001) suggest that income uncertainty was increasing through much of the 1980s and early 1990s in the United Kingdom. Unemployment risk, at least since the early 1990s, is likely to have fallen. This may point to other sources of income risk having increased. Future research might therefore consider these other forms of income uncertainty, such as wage flexibility, which may have increased in importance in the British labour market in giving rise to a precautionary motive for saving.

Table 1: Self-reported job insecurity

	Coefficient (standard error)	Marginal effect
Education (highest qualification)		
Degree	-0.292 (0.132)	-0.038
Other Higher QF	-0.170 (0.102)	-0.024
A-levels	-0.087 (0.119)	-0.012
O-levels or equivalent	-0.176 (0.105)	-0.024
CSEs, commercial QF or other	0.008 (0.121)	0.001
Unemployed in previous year	0.467 (0.123)	0.099
Temporary contract	0.977 (0.108)	0.244
Aged 30 to 39	0.181 (0.104)	0.028
Aged 40 to 49	0.410 (0.102)	0.070
Aged 50 or more	0.449 (0.107)	0.080
Poor health	0.581 (0.115)	0.122
Covered union member	0.065 (0.073)	0.010
Covered non-union member	0.054 (0.084)	0.008
Married	-0.027 (0.092)	-0.004
White	-0.279 (0.156)	-0.050
Male	-0.008 (0.091)	-0.001
Tenure: 7-12 months	0.062 (0.117)	0.010
Tenure: 1-2 years	0.217 (0.105)	0.036
Tenure: 2-4 years	0.206 (0.103)	0.033
Tenure: 4 years or more	0.046 (0.096)	0.007
Workplace size:		
10 to 24 employees	-0.118 (0.108)	-0.016
25 to 49 employees	0.007 (0.107)	0.001
50 to 99 employees	-0.146 (0.115)	-0.020
100 to 199 employees	-0.033 (0.113)	-0.005
200 to 499 employees	0.043 (0.102)	0.007
500 to 999 employees	-0.167 (0.132)	-0.023
1000 or more employees	-0.125 (0.114)	-0.017
Occupation dummies	yes (8)	
Region dummies	yes (18)	
Wave dummy	yes	
Log-likelihood	-1,211.229	
Pseudo R-squared	0.098	
Observations	4,211	

Note: Maximum likelihood probit estimates for self-reported job insecurity. Standard errors corrected for multiple observations in parentheses.

Table 2: Unemployment risk

	Coefficient (standard error)	Marginal effect
Highest qualification: Degree	-0.292 (0.121)	-0.009
Other Higher QF	-0.129 (0.086)	-0.005
A-levels	0.096 (0.095)	0.004
O-levels or equivalent	-0.043 (0.086)	-0.002
CSEs, commercial QF or other	0.015 (0.097)	0.001
Unemployed in previous year	0.380 (0.095)	0.022
Temporary contract	0.503 (0.096)	0.033
Covered union member	-0.198 (0.062)	-0.007
Covered non-union member	-0.288 (0.082)	-0.009
Aged 30 to 39	-0.022 (0.076)	-0.001
Aged 40 to 49	0.076 (0.080)	0.003
Aged 50 or more	0.224 (0.086)	0.010
Poor health	0.218 (0.115)	0.011
Married	-0.194 (0.080)	-0.009
White	-0.170 (0.132)	-0.008
Male	0.092 (0.079)	0.003
Tenure: 7-12 months	0.001 (0.091)	0.000
Tenure: 1-2 years	-0.081 (0.092)	-0.003
Tenure: 2-4 years	-0.103 (0.088)	-0.004
Tenure: 4 years or more	-0.277 (0.082)	-0.011
Workplace size:		
10 to 24 employees	-0.258 (0.086)	-0.008
25 to 49 employees	-0.178 (0.090)	-0.006
50 to 99 employees	-0.239 (0.099)	-0.008
100 to 199 employees	-0.034 (0.088)	-0.001
200 to 499 employees	-0.377 (0.092)	-0.012
500 to 999 employees	-0.284 (0.115)	-0.009
1,000 or more employees	-0.250 (0.110)	-0.008
Log-likelihood	-1,320.979	
Pseudo R-squared	0.098	
Observations	13,288	

Notes: Maximum likelihood probit estimates for risk of job loss. Standard errors in parentheses. Regression also includes occupation dummies (8), region dummies (17) and year dummies (6).

Table 3: Consumption

	Self-reported job insecurity	Estimated unemployment risk				
	[1]	[2]	[3]	[4]	[5]	[6]
Permanent income, y^P	0.410 (0.049)	0.418 (0.027)	0.413 (0.027)	0.448 (0.026)	0.418 (0.027)	0.434 (0.027)
Transitory income, y^T	0.120 (0.033)	0.112 (0.017)	0.113 (0.017)	0.114 (0.017)	0.112 (0.017)	0.113 (0.018)
Investment income, y^W	0.443 (0.158)	0.391 (0.100)	0.404 (0.101)	0.390 (0.101)	0.392 (0.100)	0.406 (0.099)
Job insecurity, $\widehat{u}$	-0.012 (0.024)	-0.982 (0.223)	-0.723 (0.246)	-0.641 (0.228)	-0.901 (0.194)	
Income risk, $\widehat{\sigma}^2$						0.313 (0.955)
Household						
Married	0.305 (0.022)	0.306 (0.012)	0.309 (0.012)	0.297 (0.012)	0.307 (0.012)	0.311 (0.012)
Number of children	0.197 (0.008)	0.202 (0.005)	0.201 (0.005)	0.200 (0.005)	0.201 (0.005)	0.198 (0.004)
Number of employed adults	0.118 (0.013)	0.114 (0.007)	0.115 (0.007)	0.113 (0.007)	0.115 (0.007)	0.116 (0.007)
Test: $\theta_1 = \theta_2$; $\chi^2(1)$	21.75 (p=0.000)	85.63 (p=0.000)	82.21 (p=0.000)	104.85 (p=0.000)	85.52 (p=0.000)	96.35 (p=0.000)
Test: $\theta_1 = \theta_3$; $\chi^2(1)$	0.04 (p=0.848)	0.07 (p=0.799)	0.01 (p=0.928)	0.29 (p=0.592)	0.06 (p=0.811)	0.07 (p=0.786)
Log-likelihood	-6,041.816	-19,583.972	-19,580.175	-19,628.476	-19,584.253	-20,638.352
$s.e.$	0.373 (0.005)	0.370 (0.003)	0.369 (0.003)	0.371 (0.003)	0.370 (0.003)	0.372 (0.003)
Observations	3,204	10,557	10,557	10,557	10,557	10,557

Notes: Table reports maximum likelihood estimates for grouped dependent variable model (Stewart (1983)).

Dependent variable is log household consumption on food and groceries (weekly). Standard errors in parentheses.

Coefficients and standard errors on y^P, y^T and y^W multiplied by 1,000, and that for $\widehat{\sigma}^2$ multiplied by $1X10^6$. s.e. is the standard error of the regression.

$\theta_1 = \theta_2$ (θ_3) is a $\chi^2(1)$ test of the hypothesis that the permanent and transitory (investment) income coefficients are equal.

Other controls included are age dummies (3), education (5), male, poor health, white, tenure (4), occupation (8) and year (6).

Instrument sets (by column number):

[1] unemployed previous year, employer size, union status. [2] unemployed previous year, employer size, union status.

[3] unemployed previous year, employer size. [4] unemployed previous year, employer size, and region.

[5] unemployed previous year, employer size, union and temporary contract. [6] unemployed previous year, employer size, union status.

Table 4: Further experiments

	Consumption				Pr(any durables purchase in previous year)	
	Age interaction	y^W interaction	Manual	Non-manual	Self-reported $\widehat{u}$	Model-based $\widehat{u}$
Permanent income, y^P	0.420 (0.026)	0.413 (0.027)	0.479 (0.051)	0.410 (0.030)	0.226 (0.164)	0.289 (0.085)
Transitory income, y^T	0.112 (0.017)	0.112 (0.017)	0.390 (0.050)	0.083 (0.019)	0.292 (0.124)	0.110 (0.054)
Investment income, y^W	0.385 (0.100)	0.355 (0.101)	0.038 (0.278)	0.442 (0.110)	-0.406 (0.546)	-0.000 (0.321)
Job insecurity, $\widehat{u}$	-3.243 (0.586)	-1.514 (0.257)	-1.154 (0.301)	-0.670 (0.342)	-0.182 (0.081)	-1.333 (0.687)
Job insecurity X age	0.055 (0.013)					
Job insecurity X ($y^W > 0$)		0.969 (0.234)				
Test: $\theta_1 = \theta_2$; $\chi^2(1)$	87.35 (p=0.000)	83.20 (p=0.000)	1.56 (p=0.212)	69.97 (p=0.00)	0.09 (p=0.762)	2.89 (p=0.090)
Test: $\theta_1 = \theta_3$; $\chi^2(1)$	0.11 (p=0.744)	0.30 (p=0.586)	2.34 (p=0.126)	0.07 (p=0.788)	1.15 (p=0.283)	0.76 (p=0.384)
Log-likelihood	-19575.271	-19575.43	-7772.664	-11725.44	-2116.443	-7939.840
$s.e.$	0.369 (0.003)	0.369 (0.003)	0.347 (0.004)	0.381 (0.004)	-	-
Observations	10,557	10,557	4,297	6,260	3,203	11,775

Notes: See notes to Table 3. All consumption equations use predicted unemployment risk as the measure of job insecurity.

Instruments are unemployed previous year, employer size dummies and union status.

Any durables purchase refers to the purchase of consumer durables in the previous year, estimated as a probit model.

Data appendix

The data are derived from the British Household Panel Survey, obtained through the Data Archive at the University of Essex. Full details of the survey design are available from Taylor *et al* (1999). This data appendix describes the construction of the some of the key variables and provides summary statistics. Labels referred to in square parentheses [.] below are the original BHPS variable names (where 'W' varies according to the wave of the survey).

Variable construction

Consumption

The twelve-way categorical response is derived from household-level responses to the following question, 'Tell me approximately how much your household spends each week on food and groceries?' [Wxpfood]

Current income

Household income in month prior to survey [Wfihhmn]. Imputed values [Wfihhmni=1] on this variable are omitted from the analysis. Converted to weekly equivalent values and deflated using the GDP deflator.

Permanent income

The construction of the measure of permanent income takes as its starting point a regression for current household labour income on observable characteristics, Z_{it}. Defining the age and cohort effects as $\pi(\alpha)_i$ and $\phi(c)_i$, respectively gives the following cross-sectional equation for log current household income, y_{it}:

$$y_{it} = Z_{it}\varphi + \pi(\alpha)_i + \phi(c)_i + \upsilon_{it} \qquad \textbf{(3)}$$

The cohort effects $\phi(c)_i$ cannot be separately identified from the age effects $\pi(\alpha)_i$ in cross-sectional data. External estimates of the age effects from Benito (2001) are therefore employed to produce cohort-adjusted estimates of the age effects on current household income, $\widehat{\pi}(\alpha)_i$.The error term, υ_{it} in **(3)** consists of an unobserved (permanent) heterogeneity component, υ_i and transitory income component, ϵ_{it}

$$v_{it} = v_i + \epsilon_{it}.$$

The income equation **(3)** is therefore estimated as a random effects model allowing for the unobserved heterogeneity through the random effects error component, v_i. As in Guiso *et al* (1992), under the assumption that the interest rate equals the rate of productivity growth, permanent labour income is then calculated as

$$y_{it}^P = \left(T^R - \alpha_i\right)^{-1} \sum_{\alpha=\alpha_i}^{T^R} \left(Z_{it}\widehat{\varphi} + \widehat{\pi}(\alpha)_i + v_i\right)$$

where T^R is retirement age (assumed 65 for men and 60 for women) and α is current age.

Transitory income

Transitory income is defined as the difference between current and permanent income.

Investment income

Amount received in the form of dividends or interest from any savings and investments.

Job insecurity

Two approaches to job insecurity are employed. The first considers a self-reported measure derived from head of household responses to the question, 'In the next twelve months, how likely do you think it is that you will become unemployed?' [Weprosc]

The second approach estimates probit models for the probability of becoming unemployed, as described in the text.

Income risk

Calculated as $\widehat{\sigma}^2 = p(1-p)Y^2$ where p is the predicted probability of job loss and Y is current (weekly) earnings of the household head.

Demographics

The additional variables included in the analysis are indicators for a range of demographic characteristics. Summary statistics for these and the variables described above are reported in Table A.1.

Table A.1: Summary statistics

Variable	
Current income	499.77 (319.66)
Permanent income	438.74 (209.59)
Transitory income	62.15 (217.73)
Investment income	12.26 (38.13)
Estimated unemployment risk	0.025 (0.028)
Self-reported job insecurity (binary coding)	0.095
Highest qualification: Degree	0.164
Other Higher QF	0.267
A-levels	0.129
O-levels or equivalent	0.197
CSEs, commercial QF or other	0.085
Unemployed in previous year	0.045
Temporary contract	0.040
Covered union member	0.395
Covered non-union member	0.153
Aged 30 to 39	0.335
Aged 40 to 49	0.287
Aged 50 or more	0.195
Poor health	0.037
Married	0.744
White	0.966
Male	0.807
Number of children	0.706 (0.986)
Number of employed adults in household	1.788 (0.733)
Tenure: 1-6 months	0.148
Tenure: 7-12 months	0.091
Tenure: 1-2 years	0.134
Tenure: 2-4 years	0.191
Tenure: 4 years or more	0.436
Workplace size: 10 to 24 employees	0.133
25 to 49 employees	0.124
50 to 99 employees	0.129
100 to 199 employees	0.118
200 to 499 employees	0.166
500 to 999 employees	0.084
1,000 or more employees	0.115

Note: Sample means (st. dev. in parentheses) for sample in the unemployment risk regressions (n=13,288).

Table A.2: Household labour income

	Log current household income
Highest qualification: Degree	0.443 (0.021)
Other Higher QF	0.216 (0.017)
A-levels	0.191 (0.020)
O-levels or equivalent	0.146 (0.018)
CSEs, commercial QF or other	0.066 (0.023)
Unemployed in previous year	-0.087 (0.014)
Temporary contract	-0.065 (0.015)
Covered union member	0.088 (0.009)
Covered non-union member	0.016 (0.010)
Poor health	-0.018 (0.014)
Married	0.272 (0.011)
White	0.101 (0.033)
Male	0.192 (0.016)
Number of children	-0.031 (0.004)
Number of employed adults	0.281 (0.005)
Tenure: 7-12 months	0.006 (0.009)
1-2 years	-0.001 (0.008)
2-4 years	0.011 (0.008)
4 years or more	0.016(0.008)
Workplace size: 10 to 24 employees	0.030 (0.011)
25 to 49 employees	0.049 (0.012)
50 to 99 employees	0.076 (0.012)
100 to 199 employees	0.081 (0.012)
200 to 499 employees	0.080 (0.011)
500 to 999 employees	0.107 (0.013)
1,000 or more employees	0.103 (0.013)
Occupation dummies	yes (8)
Region dummies	yes (18)
Wave dummies	yes (7)
R-squared	0.542
ρ	0.713
Observations	12,192

Note: Table reports maximum likelihood estimates of a random effects model. ρ represents the proportion of the total variance accounted for by the panel individual-specific component. Standard errors in parentheses.

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